Framework Adjustment 56
To the Northeast Multispecies FMP

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

Initial Framework Meeting: June 22, 2016
Final Framework Meeting: November 16, 2016 and January 25, 2017
Date Submitted: April 13, 2017

April 13, 2017

Intentionally Blank

1.0 EXECUTIVE SUMMARY

In New England, the New England Fishery Management Council (NEFMC) is charged with developing management plans that meet the requirements of the Magnuson-Stevens Act (M-S Act). The Northeast Multispecies Fishery Management Plan (FMP) specifies the management measures for thirteen groundfish species (cod, haddock, yellowtail flounder, pollock, plaice, witch flounder, white hake, windowpane flounder, Atlantic halibut, winter flounder, redfish, Atlantic wolffish, and ocean pout) off the New England and Mid-Atlantic coasts. The FMPs have been updated through a series of amendments and framework adjustments. Amendment 16, which became effective on May 1, 2010, adopted a broad suite of management measures in order to achieve the fishing mortality targets necessary to rebuild overfished stocks and meet other requirements of the M-S Act. Amendment 18 which would address fleet diversity and accumulation limits, was approved by NMFS on March 6, 2017 in a letter indicating that the final rule would publish in spring 2017. Since 2010, eleven framework adjustments have updated the measures in the groundfish plan.

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

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

Framework 56 (FW56) is intended to incorporate stock status changes for witch flounder, set specifications for several groundfish stocks, and adjust management measures for commercial fisheries that catch groundfish stocks. This framework incorporates the results of new stock assessments.

The *need* for this action is to meet regulatory requirements and adjust management measures that are necessary to prevent overfishing, ensure rebuilding, and help achieve optimum yield in the fishery consistent with the status of stocks and the requirements of MSA of 2006, and to provide additional flexibility within the sector system in the face of changing regulations. There are several *purposes* of FW56: to update changes to the witch flounder status determination criteria, to adopt specifications for FY 2017- FY 2019 for witch flounder and FY 2017 for Georges Bank (GB) yellowtail flounder, to adopt U.S./ Canada Total Allowable Catches (TACs) for Eastern GB cod, Eastern GB haddock, and GB yellowtail flounder, to allocate northern windowpane flounder to the scallop fishery, to increase the sub-ACL for Georges Bank haddock for the Atlantic herring mid-water trawl fishery, and to temporarily change the trigger for the GB yellowtail flounder and Northern windowpane flounder accountability measures for the Atlantic sea scallop fishery.

Proposed Action

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

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

The Preferred Alternatives Include:

- Stock status changes and Annual Catch Limits
    - *Revised Status Determination Criteria for witch flounder.* The preferred alternative would revise status determination criteria for witch flounder consistent with the results of the 2016 peer reviewed benchmark assessment.
    - *Revised Annual Catch Limit Specifications.* The preferred alternative would adopt new Overfishing limits (OFLs), Acceptable Biological Catches (ABCs), and Annual Catch Limits for FY 2017 – FY 2019 for witch flounder and FY2017 – FY2018 for GB yellowtail flounder would be as specified. Additionally, U.S./Canada TACs- would be specified for GB yellowtail flounder, Eastern GB cod and Eastern GB haddock. This alternative would also distribute the ABCs to the various components of the fishery. State waters and other sub-components would be modified to reflect recent catches for northern windowpane flounder, a sub-ACL for northern windowpane flounder would be allocated to the Atlantic sea scallop fishery based on 90% of the scallop fishery's recent estimated catch (21% of the ABC), and the midwater trawl Atlantic herring sub-ACL for GB haddock would increase (1.5% of the U.S. ABC) with a review process would be established (to potentially modify the sub-ACL to a value of 1% to up to 2% following the completion of the assessment of the total GB haddock).
- Commercial Fishery Measures
    - *Atlantic Sea Scallop fishery AM implementation policy.* The preferred alternatives temporarily change the AM implementation policy for GB yellowtail flounder and northern windowpane flounder for catches occurring in fishing years 2017 and 2018. The temporary change would mean that the scallop fishery AMs for GB yellowtail flounder and northern windowpane flounder would only be implemented if the scallop fishery exceeds its sub-ACL for the stock and the overall ACL for the stock is also exceeded.

Summary of Environmental Consequences

The environmental impacts of all of the alternatives under consideration are described in Section 7.0. Biological impacts are described in Section 7.1; impacts on essential fish habitat are described in Section 7.2; impacts on endangered and other protected species are described in Section 7.3; the economic impacts are described in Section 7.4; and the social impacts are described in Section 7.5. Cumulative effects are described in Section 7.6. Summaries of the most significant impacts are provided in the following paragraphs. As required by the National Environmental Policy Act (NEPA), the Preferred Alternatives are compared to the No Action alternative and other alternatives. In some instances and as

appropriate, comparisons are also made between the Preferred Alternatives and status quo to enable a more realistic analysis of potential impacts.

Biological Impacts

The Preferred Alternatives are expected to result in mixed (positive, neutral, and negative) biological impacts on regulated groundfish species and other species when compared to the No Action alternative and FY 2016. The preferred alternative of revised status determination criteria for witch flounder is primarily administrative and the likely impacts on regulated groundfish species and other species are neutral. The preferred alternative would increase FY 2017 ACLs for witch flounder and GB haddock. There would be decreases in FY 2017 ACLs for GB cod and GB yellowtail flounder. Relative No Action, the preferred alternative would increase FY 2017 ACLs for witch flounder from those established in FW 55 and EGB cod quota would be specified and replace default specifications. For these reasons under the preferred alternative a slight increase in overall fishing mortality is expected, therefore, low negative impacts on regulated groundfish species are likely when compared with No Action and relative to FY 2016. Mixed (positive, neutral, and negative) impacts on other species are expected. The preferred alternative would establish a scallop fishery sub-ACL for northern windowpane flounder. Since overfishing is less likely to occur under the preferred alternative, impacts on regulated groundfish species are positive and impacts on other species are also positive if fishing mortality is reduced as a consequence. The preferred alternative would increase the midwater trawl Atlantic herring fishery sub-ACL for GB haddock and establish a review process. Biological impacts on regulated groundfish species are likely to be similar under No Action and the preferred alternative and thus continue to provide low positive benefits for the GB haddock stock. Impacts on other species are likely expected to be similar and low positive when comparing the No Action alternative and the preferred alternative. The preferred alternative would allow for a temporary change to the Atlantic sea scallop fishery AM implementation policy for GB yellowtail flounder and northern windowpane flounder. Biological impacts on regulated groundfish species are expected to be low negative to neutral impacts depending on the magnitude of all fisheries catches and the fact that the preferred alternative would be put in place as a temporary measure for two years (for catches occurring in FY 2017 and FY 2018).

Essential Fish Habitat (EFH) Impacts

The Preferred Alternatives are expected to result in mixed (positive, neutral, and negative) habitat impacts when compared to the No Action alternative and FY 2016. The preferred alternative of revised status determination criteria for witch flounder is primarily administrative and the likely impacts on EFH is neutral. For the same reasons identified in the Biological Impacts summary of the preferred alternative for revised ACLs, a slight increase in overall fishing mortality is expected. Therefore, negative impacts on EFH are likely when compared with No Action and relative to FY 2016. The preferred alternative would establish a scallop fishery sub-ACL for northern windowpane flounder. Since overfishing is less likely to occur under the preferred alternative and there could be changes in effort in both the groundfish and scallop fisheries, negative impacts to EFH are expected to be reduced relative to the impacts of No Action. The preferred alternative would increase the midwater trawl Atlantic herring fishery sub-ACL for GB haddock and establish a review process. The effects of midwater trawl gear on the seafloor are minimal and temporary; therefore neutral impacts on EFH are expected. The preferred alternative would allow for a temporary change to the Atlantic sea scallop fishery AM implementation policy for GB yellowtail flounder and northern windowpane flounder. This flexibility is more likely to influence patterns effort in the Atlantic sea scallop fishery, and specifically is likely to increase effort in the fishery relative to No Action, which would increase negative impacts to EFH. However since this is a temporary measure (for catches in FY 2017 and FY 2018), long-term increased negative impacts to EFH are not expected.

Impacts on Endangered and Other Protected Species
The Preferred Alternatives would likely result in neutral to low negative impacts on protected species. The preferred alternative of revised status determination criteria for witch flounder is primarily administrative and the likely impacts on protected species is neutral. When compared to recent fishing activity, the preferred alternatives would likely lead to negligible to low negative impacts on protected species. The remaining preferred alternatives (i.e., establish a northern windowpane flounder sub-ACL for the Atlantic sea scallop fishery, increase the GB haddock sub-ACL for the midwater trawl Atlantic herring fishery, and make a temporary change to the AM implementation policy for the Atlantic sea scallop fishery for GB yellowtail flounder and northern windowpane flounder) would result in neutral impacts to protected species when compared to the respective No Action alternative.

Economic Impacts
The Preferred Alternatives would likely result in mostly positive impacts for the groundfish fishery and other fisheries, with some mixed (positive, neutral, and negative) economic impacts. The preferred alternative of revised status determination criteria for witch flounder is primarily administrative and the likely impacts on the groundfish fishery is neutral. The preferred alternative would likely result in an increase in groundfish fishing vessel revenues when compared to No Action for ACLs. This is not informative, however, since No Action would adopt default specifications for the first three months of the fishing year for EGB cod. The preferred alternatives would be expected to result in $76 million in gross groundfish revenues for FY 2017. This represents approximately a $5 million dollar increase in predicted revenue from FY 2016 ($71 million), but a $4 million dollar reduction in groundfish revenue for FY 2015 ($79 million). The economic impacts of the preferred alternatives are not expected to be uniformly distributed across vessel size class and port. The increase in the midwater trawl Atlantic herring fishery sub-ACL for GB haddock would likely result in positive impacts for the Atlantic herring fishery and negligible or neutral economic impacts on the groundfish fishery. The temporary change in the scallop fishery AM implementation policy for GB yellowtail flounder and northern windowpane flounder would likely result in positive economic impacts for the scallop fishery, while negative economic impacts to the groundfish fishery could occur depending on if overages occur. These negative impacts are only expected for the short-term due to the nature of the measures being temporary for Atlantic sea scallop catches of GB yellowtail flounder and northern windowpane flounder occurring in FY 2017 and FY 2018 only.

Social Impacts
The Preferred Alternatives would likely result in mostly positive impacts for the groundfish fishery and other fisheries, with some mixed (positive, neutral, and negative) economic impacts. The preferred alternative of revised status determination criteria for witch flounder is primarily administrative and the likely social impacts on the Attitudes*, Beliefs, and Values* of the groundfish fishery are neutral to low positive. If fishermen perceive that management decisions are being made based on information from the most recent benchmark assessment, their attitudes towards fishery management may become more favorable. However, these positive impacts would likely be tempered by the fact that many groundfish fishermen remain doubtful of the methods and data used to make management decisions. The preferred alternative to revise ACLs would increase groundfish fishermen's earning potential, which would have positive social impacts on the *Size and Demographic Characteristics* of the groundfish fishery and would likely have a positive impact on groundfish fishermen's *Attitudes, Beliefs, and Values* towards management. This may be particularly true for day-boat fishermen, who traditionally target witch flounder. These positive impacts may be partially countered by the fact that QCM results predict that WGB cod and GOM cod would be constraining stocks. If avoiding these stocks inhibits fishermen's ability to harvest other target stocks, this could have negative social impacts on the *Size and Demographic Characteristics* and the *Attitudes, Beliefs, and Values* of the commercial groundfish fishery. The remaining preferred alternatives (i.e., establish a northern windowpane flounder sub-ACL for the Atlantic sea scallop fishery, increase the GB haddock sub-ACL for the midwater trawl Atlantic herring fishery, and make a temporary change to the AM implementation policy for the Atlantic sea scallop fishery for

GB yellowtail flounder and northern windowpane flounder) would result in mixed (positive, neutral, and negative) impacts for the groundfish fishery and other fisheries when compared to the respective No Action alternative.

Alternatives to the Proposed Action

There are a number of alternatives analyzed in the document that are not identified as preferred alternatives. These include some of the No Action alternatives in sections 4.1(Updates to Status Determination Criteria and Annual Catch Limits) and 4.2 (Commercial Fishery Measures), which were not identified as preferred alternatives. These alternatives are briefly described below.

- *Stock Status Changes and Annual Catch Limits*
    - *Revised status determination criteria for witch flounder.* The No Action would not update the status determination criteria (SDC) or the numerical estimates for the SDC for witch flounder. Using the old criteria would not be consistent with recently completed 2016 benchmark assessment and would not comply with M-S Act requirements to use best available science.
    - *Revised Annual Catch Limit Specifications.* The No Action would not adopt new specifications witch flounder, GB cod, GB haddock and GB yellowtail flounder. Default specifications for EGB cod, set at 35% of the prior year's ACL, would remain in place through July 31st, 2017. A northern windowpane flounder sub-ACL would not be allocated to the scallop fishery. The GB haddock sub-ACL for the midwater trawl Atlantic herring fishery would remain at 1% of the U.S. ABC.
- Commercial Fishery Measures
    - *Atlantic Sea Scallop fishery AM implementation policy.* The No Action would maintain the scallop fishery AM implementation policy such that AMs would be implemented if either the scallop fishery exceeds its sub-ACL for a stock and the overall ACL is also exceeded or the scallop fishery exceeds its sub-ACL for a stock by 50% or more.

Impacts of Alternatives to the Proposed Action

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

Biological Impacts
Because the No Action alternatives would not adopt revised specifications for several stocks, and would not modify the SDC based on best available science, it would lead to a reduction in groundfish fishing activity. Because of the slight reduction in groundfish fishing activity, the alternatives would be expected to result in reduced fishing mortality rates and faster stock rebuilding than the Preferred Alternatives.

Essential Fish Habitat
Because the No Action alternatives would not adopt revised specifications for several stocks, and would not modify the status determination criteria based on best available science, it would lead to a slight reduction in groundfish fishing activity over the course of the fishing year. The alternatives to the proposed

action would be expected to result in reduced habitat impacts because they could result in lower fishing effort than the Preferred Alternatives.

Impacts on Endangered and Other Protected Species
Because the No Action alternatives would not adopt specifications for several stocks, and would not modify the status determination criteria based on best available science, it would lead to a reduction in groundfish fishing activity over the course of the fishing year. The alternatives to the proposed action, in general, would be expected to result in reduced fishing effort and thus reduced fishing impacts on endangered and other protected species.

Economic Impacts
Because the No Action alternatives would not adopt specifications for several stocks, and would not modify the status determination criteria based on best available science, it would lead to a reduction in groundfish fishing activity. As a result, predicted fishing vessel gross revenues on groundfish fishing trips would be $65 million compared to $76 million under the preferred alternative for ACLs

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

Intentionally Blank

2.0 CONTENTS

2.1 Table of Contents

1.0 Executive Summary 3
2.0 Contents 10
2.1 Table of Contents 10
2.2 List of Tables 15
2.3 List of Figures 19
2.4 List of Appendices 20
2.5 List of Acronyms 21
3.0 Introduction and Background 25
3.1 Background 25
3.2 Purpose and Need for the Action 26
3.3 Brief History of the Northeast Multispecies Management Plan 27
3.4 National Environmental Policy Act (NEPA) 28
3.5 Fishery Data Sources 28
4.0 Alternatives Under Consideration 29
4.1 Updates to Status Determination Criteria and Annual Catch Limits 29
4.1.1 Revised Status Determination Criteria for Witch Flounder 29
4.1.1.1 Option 1: No Action 29
4.1.1.2 Option 2: Revised Status Determination Criteria for Witch Flounder (*Preferred Alternative*) 29
4.1.2 Annual Catch Limits 31
4.1.2.1 Option 1: No Action 31
4.1.2.2 Option 2: Revised Annual Catch Limit Specifications (*Preferred Alternative*) 35
4.2 Commercial Fishery Measures 49
4.2.1 Atlantic Scallop Fishery Measures 49
5.0 Alternatives Considered and Rejected 51
5.1 Updates to Status Determination Criteria, and Annual Catch Limits 51
5.1.1 Annual Catch Limits 51
5.1.1.1 Sub-Option 1C– Use a Dual Fixed Percentage Baseline 51
5.1.1.2 Sub-Option 2C – Increase the Midwater Trawl Atlantic Herring Fishery Sub-ACL for Georges Bank Haddock with a transfer provision 52
5.2 Recreational Fishery Measures 53
5.2.1 Recreational Fishery Measures 53
5.2.1.1 Option 1: No Action 53
5.2.1.2 Option 2: Revised Recreational Fishery Measures 53
6.0 Affected Environment 55
6.1 Physical Environment/Habitat/EFH 55
6.1.1 Gulf of Maine 56
6.1.2 Georges Bank 58

6.1.3 Southern New England/Mid-Atlantic Bight 60
6.1.4 Habitat Requirements for Groundfish 61
6.1.5 Essential Fish Habitat Designations 61
6.1.6 Gear Types and Interaction with Habitat 64
6.1.6.1 Trawl Gear 65
6.1.6.2 Gillnet Gear 66
6.1.6.3 Fish Traps and Pots 67
6.1.6.4 Hook and Line Gear 67
6.1.6.5 Gear Interaction with Habitat 68
6.2 Regulated Groundfish Species 70
6.2.1 Gulf of Maine Cod 71
6.2.2 Georges Bank Cod 72
6.2.3 Gulf of Maine Haddock 72
6.2.4 Georges Bank Haddock 73
6.2.5 American Plaice 73
6.2.6 Witch Flounder 73
6.2.7 Gulf of Maine Winter Flounder 74
6.2.8 Georges Bank Winter Flounder 75
6.2.9 Southern New England/Mid-Atlantic Winter Flounder 75
6.2.10 Cape Cod/Gulf of Maine Yellowtail Flounder 75
6.2.11 Georges Bank Yellowtail Flounder 75
6.2.12 Southern New England/Mid-Atlantic Yellowtail Flounder 76
6.2.13 Acadian Redfish 76
6.2.14 Pollock 77
6.2.15 White Hake 77
6.2.16 Gulf of Maine/Georges Bank Windownpane Flounder 77
6.2.17 Southern New England/Mid-Atlantic Windownpane Flounder 78
6.2.18 Ocean Pout 78
6.2.19 Atlantic Halibut 79
6.2.20 Atlantic Wolffish 79
6.3 Non-Groundfish Species 81
6.3.1 Spiny Dogfish 81
6.3.2 Skates 81
6.3.3 Monkfish 82
6.3.4 Summer Flounder 82
6.3.5 American Lobster 83
6.3.6 Whiting (Silver Hake) 84
6.3.7 Loligo Squid 84
6.3.8 Atlantic Sea Scallops 85
6.3.9 Scup 85
6.3.10 Atlantic Herring 86
6.3.11 Bycatch 86
6.4 Assemblages of Fish Species 88
6.5 Protected Species 90
6.5.1 Species Present in the Area 90
6.5.2 Species and Critical Habitat Not Likely Affected by the Proposed Action 92
6.5.3 Species Potentially Affected by the Proposed Action 92
6.5.3.1 Sea Turtles 92

6.5.3.2 Marine Mammals 93
6.5.3.3 Atlantic Sturgeon 100
6.5.3.4 Atlantic Salmon (Gulf of Maine DPS) 100
6.5.4 Interactions Between Gear and Protected Species 101
6.5.4.1 Marine Mammals 101
6.5.4.2 Sea Turtles 110
6.5.4.3 Atlantic Sturgeon 112
6.5.4.4 Atlantic Salmon 113
6.6 Human Communities 114
6.6.1 Groundfish Fishery Overview 118
6.6.2 Fleet Characteristics 119
6.6.3 Effort 121
6.6.4 Landings and Revenue 122
6.6.5 ACE Leasing 123
6.6.6 Fishing Communities 124
6.6.6.1 Primary and Secondary Fishing Ports 124
6.6.6.2 Primary Port Communities 126
6.6.6.3 Employment 134
6.6.7 Consolidation and Redirection 135
6.6.8 Regulated Groundfish Stock Catch 136
6.6.9 Fishery Sub-Components 141
6.6.9.1 Sector Harvesting Component 141
6.6.9.2 Common Pool Harvesting Component 144
6.6.9.3 Recreational Harvesting Component 148
7.0 Environmental Consequences – Analysis of Impacts 150
7.1 Biological Impacts 151
7.1.1 Updates to Status Determination Criteria and Annual Catch Limits 151
7.1.1.1 Revised Status Determination Criteria 151
7.1.1.2 Annual Catch Limits 153
7.1.2 Commercial Fishery Measures 171
7.1.2.1 Atlantic Sea Scallop Fishery Measures 171
7.2 Essential Fish Habitat Impacts 183
7.2.1 Updates to Status Determination Criteria and Annual Catch Limits 183
7.2.1.1 Revised Status Determination Criteria 183
7.2.1.2 Annual Catch Limits 184
7.2.2 Commercial Fishery Measures 186
7.2.2.1 Atlantic Sea Scallop Fishery Measures 186
7.3 Impacts on Endangered and Other Protected Species 188
7.3.1 Updates to Status Determination Criteria and Annual Catch Limits 188
7.3.1.1 Revised Status Determination Criteria 188
7.3.1.2 Annual Catch Limits 188
7.3.2 Commercial Fishery Measures 193
7.3.2.1 Atlantic Sea Scallop Fishery Measures 193
7.4 Economic Impacts 195
7.4.1 Updates to Status Determination Criteria and Annual Catch Limits 195

7.4.1.1 Revised Status Determination Criteria 195
7.4.1.2 Annual Catch Limits 196
7.4.2 Commercial Fishery Measures 214
7.4.2.1 Atlantic Sea Scallop Fishery Measures 214
7.5 Social Impacts 218
7.5.1 Updates to Status Determination Criteria and Annual Catch Limits 219
7.5.1.1 Revised Status Determination Criteria 219
7.5.1.2 Annual Catch Limits 220
7.5.2 Commercial Fishery Measures 228
7.5.2.1 Atlantic Sea Scallop Fishery Measures 228
7.6 Cumulative Effects Analysis 230
7.6.1 Introduction 230
7.6.2 Past, Present, and Reasonably Foreseeable Future Actions 231
7.6.3 Baseline Conditions for Resources and Human Communities 242
7.6.4 Summary Effects of Framework 56 Actions 246
7.6.5 Cumulative Effects Summary 248
8.0 Applicable Laws 251
8.1 Magnuson-Stevens Fishery Conservation and Management Act 251
8.1.1 Consistency with National Standards 251
8.1.2 Other M-S FCMA requirements 253
8.1.3 EFH Assessment 257
8.1.3.1 Description of Action 257
8.1.3.2 Assessing the Potential Adverse Impacts 257
8.1.3.3 Minimizing or Mitigating Adverse Impacts 258
8.1.3.4 Conclusions 258
8.2 National Environmental Policy Act 258
8.2.1 Environmental Assessment 258
8.2.2 Finding of No Significant Impact (FONSI) 259
8.2.3 List of Preparers; Point of Contact 263
8.2.4 Agencies Consulted 264
8.2.5 Opportunity for Public Comment 264
8.3 Endangered Species Act 265
8.4 Marine Mammal Protection Act 265
8.5 Coastal Zone Management Act 265
8.6 Administrative Procedure Act 266
8.7 Data Quality Act 266
8.7.1 Utility of Information Product 266
8.7.2 Integrity of Information Product 266
8.7.3 Objectivity of Information Product 267
8.8 Executive Order 13132 (Federalism) 268
8.9 Executive Order 13158 (Marine Protected Areas) 268
8.10 Paperwork Reduction Act 268
8.11 Regulatory Impact Review and Initial Regulatory Flexibility Analysis (E.O. 12866 and IRFA) 269
8.11.1 Determination of significance under E.O. 12866 269

8.11.1.1 Objectives 269
8.11.1.2 Description 270
8.11.1.3 Problem Statement 271
8.11.1.4 Analysis of Alternatives 271
8.11.1.5 Summary of Expected Economic Impacts from Implementation of FW56 Proposed Action 277
8.11.1.6 Determination of Significance 279
8.11.2 Initial Regulatory Flexibility Act 279
9.0 References 281
9.1 Glossary 281
9.2 Literature Cited 295
9.3 Index 308

2.2 List of Tables

Table 1 - Purpose and Need for Framework 56 27
Table 2 - No Action status determination criteria. 29
Table 3 - No Action numerical estimates of SDCs. 29
Table 4 - Option 2 status determination criteria 30
Table 5 - Option 2 current numerical estimates of SDCs (provided for informational purposes only). 30
Table 6 - No Action/Option 1 Northeast Multispecies OFLs, ABCs, ACLs, and other ACL sub-components for FY 2017-FY 2018 (metric tons, live weight), based on final sector rosters for 2016 and a corrected mistake to the other sub-component for ocean pout. Values are rounded to the nearest metric ton. Default specifications for FY 2018 and FY 2019 are shown in gray and italics, and remain in place through July 31st, 2018 or 2019, as published in the final rule to FW 55, May 2, 2016 with the exception of GB haddock which was recalculated here due to an error in the FW 55 final rule. FY 2018 and FY 2019 default specs have not been adjusted for final sector rosters in 2016. 32
Table 7 - Proposed FY2017 U.S./Canada TACs (mt). 35
Table 8 - Comparison of the Proposed FY 2017 U.S. TACs and the FY 2016 U.S. TACs (mt). 35
Table 9 - Option 2 Revised Northeast Multispecies OFLs, ABC, ACLs, and other ACL sub-components for FY 2017-FY 2018 (metric tons, live weight), based on final sector rosters for 2016 and a corrected mistake to the other sub-component for ocean pout. Values are rounded to the nearest metric ton. Values in gray are unchanged from No Action and not proposed to be adjusted under Option 2. Default specifications for FY 2019 are shown in italics and gray, and remain in place through July 31st, 2019, as published in the final rule to FW 55, May 2, 2016 with the exception of GB haddock which was recalculated here due to an error in the FW 55 final rule. FY 2019 default specs have not been adjusted for final sector rosters in 2016. Stocks which are underlined would be subject to adjustments in 2018 based on US/CA quotas. PDT's recommendations included for adjustments to state waters and other sub-components for witch flounder and northern windowpane flounder and Canadian catches of GB winter flounder and white hake. 37
Table 10- CAI Hook Gear Haddock SAP TACs (FY2017 - FY2018). 41
Table 11- Approaches to allocating northern windowpane flounder to the scallop fishery under Sub-Option 1A and Sub-Option 1B, using the most recent ten years (2005-2014) or five years (2010-2014) of catch estimates (mt). 43
Table 12- Approaches to allocating northern windowpane flounder to the scallop fishery under Sub-Option 1A and Sub-Option 1B, using the most recent ten years (2003-2013) or five years (2009-2013) of catch estimates (mt), after dropping 2014. 44
Table 13- Approach to allocating northern windowpane flounder to the scallop fishery (mt) under Sub-Option 1C. 51
Table 14 – Availability of Data from MRIP 'Waves' 54
Table 15 - 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. Based on updated OHA2 EFH designations. See OHA2 Vol. 2 and Appendix B for details 62
Table 16 - Description of the gear types used by the multispecies fishery 65
Table 17 - Status of Northeast Groundfish stocks for FY2016 71
Table 18 - Comparison of Demersal Fish Assemblages of Georges Bank and the Gulf of Maine 89
Table 19 - Species protected under the ESA and/or MMPA that may occur in the affected environment of the Northeast multispecies fishery. Marine mammal species (cetaceans and pinnipeds) italicized and in bold are considered MMPA strategic stocks.[1] 90
Table 20 - Large whale occurrence in the area of operation for the multispecies fishery. 94
Table 21 - Small cetacean occurrence in the area of operation of the multispecies fishery. 96
Table 22 - Pinniped occurrence in the area of operation of the multispecies fishery. 99
Table 23 - Summary of confirmed human-caused injury or mortality to fin, minke, humpback, sei, and North Atlantic right whales from 2010-2014 due to entanglement in fishing gear.[1] 103

Table 24 - Small cetacean and pinniped species observed seriously injured and/or killed by Category I and II gillnet or trawl fisheries in the affected environment of GAR fisheries. 105
Table 25 - Summary of major trends in the Northeast multispecies fishery. 115
Table 26 - Number of vessels by fishing year. 120
Table 27 - Vessel activity by size class. 121
Table 28 - Effort by active vessels. 122
Table 29 - Total landing and revenue from all trips by fishing year. 123
Table 30 - Total landings and nominal revenue from groundfish trips by fishing year. 123
Table 31 - Primary and secondary multispecies port communities 126
Table 32 - Groundfish fishery in Portland, ME 130
Table 33 - Groundfish fishery in Portsmouth, NH. 130
Table 34 - Groundfish Fishery in Seabrook, NH 131
Table 35 - Groundfish fishery in Rye, NH. 131
Table 36 - Groundfish fishery in Gloucester, MA 131
Table 37 - Groundfish fishery in Boston, MA 132
Table 38 - Groundfish fishery in Chatham, MA 132
Table 39 - Groundfish fishery in New Bedford, MA 133
Table 40 - Groundfish fishery in Scituate, MA. 133
Table 41 - Groundfish fishery in Point Judith, RI. 134
Table 42 - Number of crew positions and crew days on active vessels by homeport and state. 135
Table 43 - FY2015 Northeast Multispecies Percent of Annual Catch Limit Caught (%). 137
Table 44 - FY 2015 Northeast Multispecies Total Catch (mt). 138
Table 45 - FY2015 Northeast Multispecies Other Sub-Component Catch Detail (mt) 139
Table 46 – Annual catch entitlement (ACE) and catch (live pounds) 142
Table 47 - Common Pool Revenue and Landings FY2010 - FY2014 144
Table 48 - Common pool permits landing allocated groundfish. 145
Table 49 - Common pool groundfish landings by state of trip (landed lb) 145
Table 50 - Common pool groundfish landings by port (landed lb). 145
Table 51 - Common pool landings (landed lbs) by permit category and stock 146
Table 52 - Gulf of Maine Cod and Haddock Recreational Effort and Catch estimates by Fishing Year[1] 148
Table 53 - All GOM Angler Trips by Fishing Year and Mode 149
Table 54 - For-hire recreational vessels catching cod or haddock from the Gulf of Maine 149
Table 55 - Impact designations in this document are defined generally as positive, negligible/neutral, and negative. 150
Table 56 – Scallop PDT yellowtail flounder and windowpane flounder bycatch estimates for the scallop fishery for FY 2017. 158
Table 57 - Final year-end catch data (mt) for northern windowpane flounder. 160
Table 58- Recent northern windowpane flounder catch estimates by fishery (mt). 160
Table 59 – Northern windowpane flounder estimated catches by fishery as a percentage of the total ACL (not sub-ACL). 160
Table 60 – Number of observed scallop hauls reporting catch of windowpane flounder by statistical reporting area, SRA. Presence/absence of windowpane flounder in observed scallop hauls by statistical reporting area from Scallop FY2011 – preliminary Scallop FY2016 (as of September 2, 2016). Note that SRA 515 was excluded due to a low number of observed hauls. 163
Table 61 - Presence/Absence of windowpane flounder in observed scallop hauls in Closed Area I and Closed Area II from Scallop FY2007 – preliminary Scallop FY2016 (as of September 2, 2016), by month. There were no observed hauls in Closed Area I or II in February, or Closed Area I in March and April.163
Table 62- Limited Access scallop fishery allocations by Scallop FY and recent schedule of CA I and CAII access, including estimated scallop fishery catch of northern windowpane flounder. 164
Table 63 - Number of unique scallop permits with VTR landings by statistical reporting area from FY 2010 - FY 2015. 165

Table 64 - Summary of recent catches (mt) of Georges Bank haddock by the midwater trawl Atlantic herring fishery, groundfish FY 2010- FY 2016. Sources: Groundfish FY2010 – FY2015 final year-end catch reports, FY2016 preliminary in-season report through 3/8/2017, GARFO, and CV and observer coverages rates for FY 2011- FY 2015 from GARFO personal communication May 23, 2016. 168
Table 65 - GB haddock catch cap summary, FY 2011-FY2015. Years highlighted indicate when the catch cap was exceeded. 168
Table 66 - Summary of recent catches (mt) of Georges Bank haddock by the US commercial groundfish fishery, groundfish FY 2010- FY 2016. Sources: Groundfish FY2010 – FY2015 final year-end catch reports. 169
Table 67 – Recent Georges Bank yellowtail flounder TACs and scallop fishery sub-ACLs and catches. Values shown in metric tons (mt). 175
Table 68 - Limited Access scallop fishery allocations by fishing year and recent schedule of CAII access 176
Table 69 - SMAST Bycatch Avoidance Program areas 2010-2016. Numbers in parentheses represent the number of participating vessels in each year. Closed Area II row is shown in gray. 177
Table 70 - QCM predictions, FY2011-2015, 2016 dollars (millions). 199
Table 71 - Summary of realized 2015 and predicted 2016 and 2017 revenues and costs for the commercial sector groundfish fishery, nominal dollars (millions). 201
Table 72- No Action option stock-level groundfish species catch and revenue predictions with 5% and 95% confidence intervals, nominal dollars (millions). 202
Table 73 - No Action option groundfish species revenue predictions by port, with 5% and 95% confidence intervals and average fish prices on groundfish trips, nominal dollars (millions). 202
Table 74 - No Action option groundfish species revenue predictions by size class, with 5% and 95% confidence intervals, nominal dollars (millions). 203
Table 75 - Common Pool catch, gross revenues and average fish prices, 2016 dollars (millions). 203
Table 76 - Option 2 groundfish stock-level groundfish species catch and revenue predictions with 5% and 95% confidence intervals, nominal dollars (millions). 206
Table 77 - Option 2 groundfish species revenue predictions by port, with 5% and 95% confidence intervals and average fish prices on groundfish trips, nominal dollars (millions). 206
Table 78 - Option 2 groundfish species revenue predictions by size class, with 5% and 95% confidence intervals, nominal dollars (millions). 207
Table 79 - Commercial groundfish sub-ACLs for FY 2016 and FY 2017 under Option 2. 207
Table 80 - Catch of GB haddock by the herring fishery relative to the sub-ACL, FYs 2011-2015. 212
Table 81 - Average herring landings (landed lbs.) from limited access and open access herring-permitted vessels inside GB haddock AM area, groundfish fishing years 2011-2014. 212
Table 82 - Average herring price per pound (Nominal $) received by limited access and open access herring-permitted vessels, groundfish fishing years 2011-2014. 213
Table 83 - Average mackerel landings (landed lbs.) from limited access and open access herring-trips* inside GB haddock AM area, groundfish fishing years 2011-2014. 213
Table 84 - Catch of GB yellowtail by the scallop fishery relative to the sub-ACL, FYs 2011-2015. 215
Table 85 - Average scallop landings (meat lbs.) from limited access scallop vessels fishing in statistical area 562, CYs 2010-2015. 216
Table 86 - Average scallop revenue (nominal $) from limited access scallop vessels fishing in statistical area 562, CYs 2010-2015. 216
Table 87 - Summary of Effects on VECs from Past, Present, and Reasonably Foreseeable Future FMP and Other Fishery Related Actions. 232
Table 88 - Summary effects of past, present, and reasonably foreseeable future actions on the VECs identified for Framework 56. 241
Table 89 - Cumulative effects assessment baseline conditions of regulated groundfish stocks. 243
Table 90 – Cumulative effects assessment baseline conditions of non-groundfish species, habitat, protected resources, and human communities. 244

Table 91 – Summary of impacts of measures relating to SDCs and specifications. 247
Table 92 – Summary of impacts of measures relating to commercial fishery management measures..... 248
Table 93 - Summary of possible effects to EFH as a result of Preferred Alternative 258
Table 94- Summary of realized 2015 and predicted 2016 and 2017 revenues and costs for the commercial sector groundfish fishery, nominal dollars (millions). 273
Table 95- Common Pool catch, gross revenues and average fish prices, 2016 dollars (millions)..... 274
Table 96- Summary of expected economic impacts for the FW56 proposed action for the commercial sector component of the groundfish fishery, 2016 dollars (millions). 278

2.3 List of Figures

Figure 1 - Northeast U.S. Shelf Ecosystem 56
Figure 2 - Gulf of Maine 57
Figure 3 - Northeast Multispecies Broad Stock Areas 70
Figure 4 - Estimated total mean annual mortality of small cetaceans and pinnipeds by GAR fisheries from 2009-2013 (*source* Waring *et al*. 2014a,b; Waring *et al*. 2015; Waring *et al*. 2016). 107
Figure 5 - Map of marine mammal bycatch in gillnet gear in the New England region (excluding large whales) observed by Northeast Fisheries Observer Program (NEFOP) and At Sea Monitoring (ASM) program between 2007 and 2012. 108
Figure 6 - Map of marine mammal bycatch in trawl gear in the New England region (excluding large whales) observed by the Northeast Fisheries Observer Program (NEFOP) and At Sea Monitoring (ASM) program between 2007 and 2011. 108
Figure 7 - Observed locations of turtle interactions in bottom tending gears in the GAR from 1989-2014. 111
Figure 8- Northern windowpane flounder accountability measure areas (large and small). 161
Figure 9 – Presence (I) and absence (O) of northern windowpane flounder in observed scallop fishery. 162
Figure 10 - Limited access Atlantic sea scallop landings (lbs) from northern windowpane stock area by reporting area and fishing year. 165
Figure 11 – Ratio of US discards to US landings of Georges Bank yellowtail flounder, 1979-2015. Source: 2016 stock assessment of Georges Bank yellowtail flounder, TRAC, Table 1, pp. 9. 171
Figure 12- Average proportion of yellowtail flounder kept to total groundfish kept. Source: 2010 – 2016 to date observed US large-mesh trawl fishing on Georges Bank. 172
Figure 13- Proportion of sector groundfish trips into offshore Georges Bank by trawl gear type (Rhule trawl, Haddock Separator, and Bottom-Otter Trawl) with trip counts, FY2011-May FY2016. Source: GARFO/DMIS. 173
Figure 14- Proportion of vessels taking sector groundfish trips into offshore Georges Bank by trawl gear type (Rhule trawl, Haddock Separator, and Bottom-Otter Trawl) with vessel counts, FY2011-May FY2016. Source: GARFO/DMIS. 173
Figure 15- Proportion of sector Georges Bank yellowtail flounder landing by trawl gear type (Rhule trawl, Haddock Separator, and Bottom-Otter Trawl) with landings totals, FY2011-May FY2016. Source: GARFO/DMIS. 174
Figure 16 - Map of all reporting grids used for the SMAST Bycatch Avoidance Program. 177
Figure 17 - Number of LA scallop VTR trips over five year period from 2010 – 2014 by ten minute squares. 179
Figure 18 - Annual spatial distribution of scallop VTR trips by ten-minute squares (FY 2011 – FY2014). Access areas green when open and red when closed. 180
Figure 19- Distribution of predictions relative to FY15 realized values, gross revenues (left) and operating profits (right). 201
Figure 20- Distribution of predictions relative to FY15 realized values, gross revenues (left) and operating profits (right). 273

2.4 List of Appendices

Appendix I: SSC Recommendation for Northeast Multispecies ABCs, FY 2017 – FY 2019
Appendix II: Calculation of Northeast Multispecies Annual Catch Limits, FY 2017 – FY 2019

2.5 List of Acronyms

ABC	Acceptable Biological Catch
ACE	Annual Catch Entitlement
ACL	Annual Catch Limit
ALWTRP	Atlantic Large Whale Take Reduction Plan
AM	Accountability Measure
APA	Administrative Procedures Act
ASAP	Age-structured assessment program; assessment model
ASM	At-sea monitoring
ASMFC	Atlantic States Marine Fisheries Commission
B	Biomass
CAA	Catch at Age
CATT	Closed Area Technical Team- a team established by the Council to look at spatial based management on spawning fish
CAI	Closed Area I
CAII	Closed Area II
CC	Cape Cod
CEQ	Council on Environmental Quality
CPUE	Catch per unit of effort
CV	Coefficient of Variation
CZMA	Coastal Zone Management Act
DAH	Domestic Annual Harvest
DAM	Dynamic Area Management
DAP	Domestic Annual Processing
DAS	Days-at-sea
DEA	Data Envelopment Analysis
DFO	Department of Fisheries and Oceans (Canada)
DMF	Division of Marine Fisheries (Massachusetts)
DMR	Department of Marine Resources (Maine)
DSEIS	Draft Supplemental Environmental Impact Statement
DSM	Dockside monitoring
DWF	Distant-Water Fleets
E.O.	Executive Order
EA	Environmental Assessment
ECPA	East Coast Pelagic Association
ECTA	East Coast Tuna Association
EEZ	Exclusive economic zone
EFH	Essential fish habitat
EIS	Environmental Impact Statement
ELM	Extra-large mesh
EM	Electronic monitoring
ESA	Endangered Species Act
ETA	Elephant Trunk Area
F	Fishing mortality rate
FAAS	Flexible Area Action System
FEIS	Final Environmental Impact Statement
FMP	Fishery Management Plan
FSCS	Fisheries Scientific Computer System

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

NAPA	National Academy of Public Administration
NAS	National Academy of Sciences
NEFMC	New England Fishery Management Council
NEFOP	Northeast Fishery Observer Program
NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act
NLCA	Nantucket Lightship closed area
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NS	National Standard
NSGs	National Standard Guidelines
NSTC	Northern Shrimp Technical Committee
NT	Net tonnage
NWA	Northwest Atlantic
OBDBS	Observer database system
OA2	Omnibus Essential Fish Habitat Amendment 2
OCS	Outer Continental Shelf
OFL	Overfishing Limit
OLE	Office for Law Enforcement (NMFS)
OY	Optimum yield
PBR	Potential Biological Removal
PDT	Plan Development Team
PRA	Paperwork Reduction Act
PREE	Preliminary Regulatory Economic Evaluation
PS/FG	Purse Seine/Fixed Gear
PSC	Potential Sector Contribution
QCM	Quota change model
RFA	Regulatory Flexibility Act
RFFA	Reasonably Foreseeable Future Action
RIR	Regulatory Impact Review
RMA	Regulated Mesh Area
RPA	Reasonable and Prudent Alternatives
SA	Statistical Area
SAFE	Stock Assessment and Fishery Evaluation
SAP	Special Access Program
SARC	Stock Assessment Review Committee
SASI	Swept Area Seabed Impact
SAV	Submerged Aquatic Vegetation
SAW	Stock Assessment Workshop
SBNMS	Stellwagen Bank National Marine Sanctuary
SCAA	Statistical catch-at-age assessment model
SEIS	Supplemental Environmental Impact Statement
SFA	Sustainable Fisheries Act
SFMA	Southern Fishery Management Area (monkfish)
SIA	Social Impact Assessment
SNE	Southern New England
SNE/MA	Southern New England-Mid-Atlantic
SSB	Spawning stock biomass
SSC	Scientific and Statistical Committee

TAC	Total allowable catch
TALFF	Total Allowable Level of Foreign Fishing
TC	Technical Committee
TED	Turtle excluder device
TEWG	Turtle Expert Working Group
TMGC	Trans-boundary Management Guidance Committee
TMS	Ten minute square
TRAC	Trans-boundary Resources Assessment Committee
TRT	Take Reduction Team
TSB	Total stock biomass
USAP	U.S. At-Sea Processing
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
VEC	Valued Ecosystem Component
VMS	Vessel monitoring system
VPA	Virtual population analysis
VTR	Vessel trip report
WGOM	Western Gulf of Maine
WO	Weigh-out
YPR	Yield per recruit

3.0 INTRODUCTION AND BACKGROUND

3.1 Background

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

(1) To take immediate action to conserve and manage the fishery resources found off the coasts of the United States;

(2) To support and encourage the implementation and enforcement of international fishery agreements for the conservation and management of highly migratory species;

(3) To promote domestic and recreational fishing under sound conservation and management principles;
(4) To provide for the preparation and implementation, in accordance with national standards, of fishery management plans which will achieve and maintain, on a continuing basis, the optimum yield from each fishery;

(5) To establish Regional Fishery Management Councils to exercise sound judgment in the stewardship of fishery resources through the preparation, monitoring, and revisions of such plans under circumstances which enable public participation and which take into account the social and economic needs of the States.

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

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

Amendment 16, which became effective on May 1, 2010, was the most recent amendment to adopt a broad suite of management measures in order to achieve the fishing mortality targets necessary to rebuild overfished stocks and meet other requirements of the M-S Act. In 2011, the NEFMC also approved Amendment 17, which allowed for NOAA-sponsored state-operated permit banks to function within the structure of Amendment 16. Amendment 16 greatly expanded the sector management program and adopted a process for setting Annual Catch Limits that requires catch levels to be set in biennial specifications packages. Amendment 18, which is approved by not yet effective would address fleet diversity and accumulation limits. Eleven framework adjustments have updated the measures in Amendment 16.

Amendment 16 made major changes to the FMP. The Amendment adopted a system of Annual Catch Limits (ACLs) and Accountability Measure (AMs) that are designed to ensure catches remain below desired targets for each stock in the management complex. The National Standard Guidelines provide advisory guidance (that does not have the effect or force of law) for the implementation of these requirements (50CFR 600.310(g)). AMs are management controls to prevent ACLs from being exceeded

and to correct or mitigate overages of the ACL if they occur. AMs should address and minimize both the frequency and magnitude of overages and correct the problems that caused the overages in as short a time as possible. AMs can be either in season AMs or AMs for when the ACL is exceeded.

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

This framework (Framework Adjustment 56, FW56) is intended to incorporate stock status changes for witch flounder, set specifications for several groundfish stocks, and adjust management measures for commercial fisheries that catch groundfish stocks.

3.2 Purpose and Need for the Action

Periodic frameworks are used to adjust strategies in response to the evaluations that adjust rebuilding plans and overfishing. This framework (FW 56) is intended to incorporate stock status changes for witch flounder, set specifications for several groundfish stocks, and adjust management measures for commercial fisheries that catch groundfish stocks. The *need* for this action is to meet regulatory requirements and adjust management measures that are necessary to prevent overfishing, ensure rebuilding, and help achieve optimum yield in the fishery consistent with the status of stocks and the requirements of MSA of 2006, and to provide additional flexibility within the sector system in the face of changing regulations.

There are several *purposes* of FW56: to update changes to the witch flounder status determination criteria, to adopt specifications for FY 2017- FY 2019 for witch flounder and FY 2017 for Georges Bank (GB) yellowtail flounder, to adopt U.S./ Canada Total Allowable Catches (TACs) for Eastern GB cod, Eastern GB haddock, and GB yellowtail flounder, to allocate northern windowpane flounder to the scallop fishery, to increase the sub-ACL for Georges Bank haddock for the Atlantic herring mid-water trawl fishery, and to temporarily change the trigger for the GB yellowtail flounder and Northern windowpane flounder accountability measures for the Atlantic sea scallop fishery.
.

The measures analyzed in this EA are intended to meet the goals and many of the objectives of the Northeast Multispecies FMP, as modified in Amendment 16.

To better demonstrate the link between the purpose and need for this action, Table 1 summarizes the need for the action and corresponding purposes.

Table 1 - Purpose and Need for Framework 56

Need for Framework 56	*Corresponding Purpose for Framework 56*
Ensure that stock are managed consistent with the status of stocks, the National Standard guidelines, and the requirements of the MSA	Measure to update status determination criteria
Ensure that levels of catch for Fishing Years 2017-2019 are consistent with best available science, the ABC control rules adopted in Amendment 16 to the Northeast Multispecies FMP, the International Fisheries Agreement Clarification Act, and the most recent relevant law	Measures to adopt ACLs, including relevant sub-ACLs and incidental catch TACs Measure to adopt TACs for U.S./Canada area
Ensure that overfishing does not occur consistent with the status of stocks, and the requirements of MSA of 2006	Measures to temporarily change the trigger for the Georges Bank yellowtail flounder and Northern windowpane flounder accountability measures for the Atlantic sea scallop fishery

3.3 Brief History of the Northeast Multispecies Management Plan

Groundfish stocks were managed under the M-S Act beginning with the adoption of a groundfish plan for cod, haddock, and yellowtail flounder in 1977. This plan relied on hard quotas (total allowable catches, or TACs), and proved unworkable. The quota system was terminated in 1982 with the adoption of the Interim Groundfish Plan, which used minimum fish sizes and codend mesh regulations for the Gulf of Maine and Georges Bank to control fishing mortality. The interim plan was replaced by the Northeast Multispecies FMP in 1986, which established biological targets in terms of maximum spawning potential and continued to rely on gear restrictions and minimum mesh size to control fishing mortality. A detailed discussion of the history of the FMP up to 2009 can be found in Amendment 16 (NEFMC 2009b).

Amendment 16 was adopted in 2009 and had major changes to the FMP. It greatly expanded the sector program and implemented Annual Catch Limits in compliance with 2006 revisions to the M-S Act. There were a host of mortality reduction measures for "common pool" (i.e. non-sector) vessels and the recreational component of the fishery. An appeal of the lawsuit filed by the Cities of Gloucester and New Bedford and several East Coast fishing industry members against Amendment 16 was heard by the U.S. Court of Appeals for the First Circuit in Boston in September, 2012. The court ruled against the plaintiffs and the provisions of Amendment 16 were upheld. Framework 44 was also adopted in 2009, and it set specifications for FY 2010 – 2012 and incorporated the best available information in adjusting effort control measures adopted in Amendment 16.

There have been several approved Council actions since the adoption of Amendment 16. Framework 45 was approved by the Council in 2010 and adopts further modifications to the sector program and fishery specifications; it was implemented May 1, 2011. Framework 46 revised the allocation of haddock to be caught by the herring fishery and was implemented in August 2011. Amendment 17 authorizes NOAA-sponsored state-operated permit banks and was implemented on April 23, 2012. Framework 47, implemented on May 1, 2012, set specifications for some groundfish stocks for FY 2012 – 2014, modified AMs for the groundfish fishery and the administration of the scallop fishery AMs, and revised common pool management measures; modification of the Ruhle trawl definition and clarification of regulations for charter/party and recreational groundfish vessels fishing in groundfish closed areas were proposed under the RA authority. Framework 48 was partially approved for May 1, 2013 some measures are still in review. That action proposes revised status determination criteria for several stocks, modifies the sub-ACL system, adjusts monitoring measures for the groundfish fishery, and changes several

accountability measures (AMs). Framework 50 was also implemented on May 1, 2013, and set specifications for many groundfish stocks and modified the rebuilding program for SNE/MA winter flounder. Framework 49 is a joint Northeast Multispecies/Atlantic Sea Scallop action that modified the dates for scallop vessel access to the year-round groundfish closed areas; this action was implemented on May 20, 2013. Framework 51 modified rebuilding programs for GOM cod and American plaice, set specifications for FY2014-2016 and modified management measures in order to ensure that overfishing does not occur including, additional management measures related to U.S./Canada shared stocks and yellowtail flounder in the groundfish and scallop fisheries. Framework Adjustment 52 was approved on January 15, 2015. This action made two revisions to the accountability measures (AMs) for the groundfish fishery for the northern (GOM/GB) and southern (SNE/MA) windowpane flounder stocks. Framework 53 was implemented on May 1, 2015. This action updated changes to the status determination criteria, set specifications for FY2015-2017, adopted U.S./ Canada Total Allowable Catches (TACs), established management measures for GOM cod that revise rolling closures and possession limits to enable GOM cod protection while providing opportunity for the groundfish fishery to prosecute healthy stocks in other times and areas, implemented default specifications, and to revised regulations governing Sector Annual Catch Entitlement (ACE) carryover. Monkfish FW 9 was a joint action with the groundfish plan (FW 54), and modified regulations for vessels in the DAS program. FW 55 incorporated stock status changes for groundfish stocks, set specifications for all groundfish stocks for FY 2017- FY 2019, adopted an additional sector and modified the sector approval process, modified the definition of a haddock separator trawl so that the separator panel is easily identifiable, made changes to the groundfish monitoring program, made changes to the management measures for U.S./Canada TACs in order to move GB cod quota from the eastern management area to the western management area and modified the Gulf of Maine Cod Protection Measures so that the recreational possession limit for GOM cod can once again be modified by the Regional Administrator. Amendment 18 which would address fleet diversity and accumulation limits, was approved by NMFS on March 6, 2017 in a letter indicating that the final rule would publish in spring 2017.

The final documents for all prior actions can be found on the internet at http://www.nefmc.org.

3.4 National Environmental Policy Act (NEPA)

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

3.5 Fishery Data Sources

This document includes fishery data from FY2009 to FY2015 and in some instances partial FY 2016 data. This approach informs the analysis and provides a baseline for the public to better understand the operation of the fishery. Some differences in totals between this analysis and prior analyses exist.

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

4.0 ALTERNATIVES UNDER CONSIDERATION

4.1 Updates to Status Determination Criteria and Annual Catch Limits

4.1.1 Revised Status Determination Criteria for Witch Flounder

4.1.1.1 Option 1: No Action

No Action. There would be no revisions to the status determination criteria (SDC) of witch flounder, and numerical estimates would not change from those determined in the 2015 Groundfish Operational Assessments (Table 2 and Table 3).

Table 2 - No Action status determination criteria.

Stock	Biomass Target (SSB_{MSY} or proxy)	Minimum Biomass Threshold	Maximum Fishing Mortality Threshold (F_{MSY} or proxy)
Witch Flounder	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40% MSP

Table 3 - No Action numerical estimates of SDCs.

Stock	Model/ Approach	B_{MSY} or Proxy (mt)	F_{MSY} or Proxy	MSY (mt)
Witch Flounder	VPA	9,473	0.279	1,957

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

This option updates the status determination criteria and the numerical estimates of the SDC for witch flounder (Table 4 and Table 5).

A benchmark assessment for witch flounder was completed by the Stock Assessment Workshop (SAW)/Stock Assessment Review Committee (SARC) 62 (November 29-December 2, 2016) and determined that both the overfishing and overfished status for this stock in 2015 was unknown (Table 4 and Table 5). The SARC noted that the witch flounder age-structured assessment model, while scientifically well thought-out, had major retrospective patterns in the estimates. Those model results were not recommended for management purposes, and the status of the witch flounder stock is currently considered unknown relative to biological reference points. Further, the review committee determined that the previously accepted virtual population assessment (VPA) model is not an acceptable alternative to the rejected age-structured assessment program (ASAP) application because it exhibits a similar retrospective pattern. Because of major retrospective patterns, the SARC rejected the analytical assessment conducted for the SARC review as well as the previous VPA model, so there is no basis for calculating model-based reference points. The biological reference points estimated in the 2015 assessment were based on results of a VPA model that was rejected during the SARC 62 peer review.

The SARC supported the SAW's proposed alternative to use an F_{MSY} proxy of a relative exploitation rate derived from the average exploitation (recent catch divided by recent swept area exploitable biomass estimates) in the near term, where other alternatives are unavailable. The SARC noted that the basis of this value is ad hoc, calculated as the average exploitation over the most recent years based on the empirical approach. Stock abundance in recent years is relatively stable. The empirical approach, based

on the NEFSC's spring and autumn surveys, calculates swept-area abundance that incorporate the results of the swept-area experiment. While absolute biomass estimates from this method will be highly uncertain (because of assumptions required in the conversion of survey catch rate to absolute estimates), the estimates of relative exploitation rates will be more robust to those uncertainties. The SARC explained that it did not have time to fully review this approach in comparison to other data poor procedures or to the Terms of Reference provided for the meeting. The SARC did not recommend using the F40% approach for catch advice because the assessment basis for that value has been rejected.

The SARC panel noted that the spring and autumn Northeast Fisheries Science Center (NEFSC) surveys are regarded as providing the best available fishery independent indices for witch flounder and they show broadly similar patterns of a decline from the early 1960s to record low levels in the late 1980s and early 1990s, an increase to early 2000s followed by a declining trend. The empirical area swept method does not provide a biomass threshold, but does indicate that the stock is at low historical levels.

While examining the spreadsheet for calculating the exploitation rate within the empirical approach, the Groundfish Plan Development Team (PDT) noticed that the method in which the proposed F_{MSY} proxy was determined was inconsistent with the way it was applied for catch advice. In the draft assessment report and associated spreadsheet, the proposed F_{MSY} proxy was determined by taking the mean exploitation rate (total catch divided by average survey biomass) for the 9 most recent years, resulting in a value of 0.05. The proposed F_{MSY} proxy (0.05) was then applied to the most recent exploitable biomass (90% of the average survey biomass). The PDT suggested that this is an incorrect approach since different "biomass" is used when applying the rate than when determining the proposed F_{MSY} proxy. All the catch advice options developed by the PDT incorporate the correction. The corrected average exploitation rate from 2007 to 2015 is 0.060 which was used in the PDT calculations forwarded to the Scientific and Statistical Committee (SSC) for consideration in catch advice options.

Rationale: This option would update the SDC to unknown and the numerical estimates of the status determination criteria for witch flounder to unknown. This option reflects recent 2016 benchmark assessment results for witch flounder.

Table 4 - Option 2 status determination criteria

Stock	Biomass Target (SSB_{MSY} or proxy)	Minimum Biomass Threshold	Maximum Fishing Mortality Threshold (F_{MSY} or proxy)
Witch Flounder	unknown	unknown	unknown

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

Stock	**Model/ Approach**	**B_{MSY} or Proxy (mt)**	**F_{MSY} or Proxy**	**MSY (mt)**
Witch Flounder	Empirical Area Swept	NA	NA	NA

4.1.2 Annual Catch Limits

4.1.2.1 Option 1: No Action

No Action. There would be no changes to the specifications for FY 2017 – FY 2018 and default specifications that were adopted with the Framework Adjustment (FW) 55 final rule (Table 6) and default specifications that would be set for Eastern Georges Bank (EGB) cod for FY 2017. The default specifications would be in effect from May 1, 2017, to July 31, 2017, and would equal 35% of the FY 2016 catch limit for EGB cod.

Rationale: The No Action alternative uses overfishing limits (OFLs)/acceptable biological catches (ABCs)/annual catch limits (ACLs) adopted in FW55. These values are based on assessments completed in 2015.

Table 6 - No Action/Option 1 Northeast Multispecies OFLs, ABCs, ACLs, and other ACL sub-components for FY 2017-FY 2018 (metric tons, live weight), based on final sector rosters for 2016 and a corrected mistake to the other sub-component for ocean pout. Values are rounded to the nearest metric ton. Default specifications for FY 2018 and FY 2019 are shown in gray and italics, and remain in place through July 31st, 2018 or 2019, as published in the final rule to FW 55, May 2, 2016 with the exception of GB haddock which was recalculated here due to an error in the FW 55 final rule. FY 2018 and FY 2019 default specs have not been adjusted for final sector rosters in 2016.

Stock	Year	OFL	US ABC	State Waters Sub-Component	Other sub-components	Scallops	Groundfish Sub-ACL	Comm. Ground-fish Sub-ACL	Rec Ground-fish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non-sector Ground-fish	MWT or Small mesh Sub-ACL	Total ACL
GB Cod	2017	1,665	1,249	37	162		997	997		978	19		1,197
	2018	1,665	1,249	37	162		997	997		978	19		1,197
	2019		*583*				*465*			*455*	*10*		*437*
GOM Cod	2017	667	500	27	10		437	280	157	271	9		473
	2018	667	500	27	10		437	280	157	271	9		473
	2019		*233*				*204*			*127*	*4*		*175*
GB Haddock	2017	258,691	48,398	484	484		44,599	44,599		44,306	293	450	46,017
	2018	358,077	77,898	779	779		71,783	44,599		71,312	471	724	74,065
	2019		*27,264*				*25,124*			*24,959*	*165*	*253*	*25,923*
GOM Haddock	2017	5,873	4,534	33	33		4,177	3,017	1,160	2,985	32	42	4,285
	2018	6,218	4,815	35	35		4,436	3,204	1,231	3,170	34	45	4,550
	2019		*2,176*				*1,552*			*1,107*	*14*	*16*	*1,685*
GB Yellowtail Flounder	2017		354		4	55	278	278		274	4	7	343
	2018		*39*				*32*			*31*	*1*		*39*
SNE/MA Yellowtail Flounder	2017		267	5	29	34	187	187		155	32		256
	2018		267	5	29	37	185	185		153	32		256
	2019						*66*			*52*	*14*		*93*
C/GOM Yellowtail Flounder	2017	707	427	43	26		341	341		326	14		409
	2018	900	427	43	26		341	341		326	14		409
	2019		*315*				*119*			*113*	*5*		*149*

Stock	Year	OFL	US ABC	State Waters Sub-Component	Other sub-components	Scallops	Groundfish Sub-ACL	Comm. Ground-fish Sub-ACL	Rec Ground-fish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non-sector Ground-fish	MWT or Small mesh Sub-ACL	Total ACL
American Plaice	2017	1,748	1,336	27	27		1,218	1,218		1,198	21		1,272
	2018	1,840	1,404	28	28		1,280	1,280		1,259	22		1,337
	2019		*644*				*448*			*439*	*9*		*491*
Witch Flounder	2017	732	460	12	59		370	370		362	8		441
	2018	954	460	12	59		370	370		362	8		441
	2019		*334*				*129*			*126*	*3*		*161*
GB Winter Flounder	2017	1,056	668		60		590	590		585	5		650
	2018	1,459	668		60		590	590		585	5		650
	2019		*511*				*233*			*231*	*2*		*264*
GOM Winter Flounder	2017	1,080	810	122	16		639	639		607	32		776
	2018	1,080	810	122	16		639	639		607	32		776
	2019		*378*				*224*			*212*	*12*		*284*
SNE/MA Winter Flounder	2017	1,021	780	70	94		585	585		523	62		749
	2018	1,587	780	70	94		585	585		523	62		749
	2019		*555*				*205*			*180*	*25*		*273*
Redfish	2017	14,665	11,050	111	221		10,183	10,183		10,127	56		10,514
	2018	15,260	11,501	115	230		10,598	10,598		10,540	58		10,943
	2019		*5,341*				*3,709*			*3,688*	*21*		*4,025*
White Hake	2017	4,816	3,624	36	72		3,340	3,340		3,314	25		3,448
	2018	4,733	3,560	36	71		3,281	3,281		3,256	25		3,387
	2019		*1,657*				*1,168*			*1,160*	*8*		*1,268*
Pollock	2017	32,004	21,312	1,279	1,279		17,817	17,817		17,704	113		20,374
	2018	34,745	21,312	1,279	1,279		17,817	17,817		17,704	113		20,374
	2019		*12,161*				*6,236*			*6,196*	*39*		*7,459*

Stock	Year	OFL	US ABC	State Waters Sub-Component	Other sub-components	Scallops	Groundfish Sub-ACL	Comm. Ground-fish Sub-ACL	Rec Ground-fish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non-sector Ground-fish	MWT or Small mesh Sub-ACL	Total ACL
GOM/GB Windowpane Flounder	2017	243	182	2	109		66	66			66		177
	2018	243	182	2	109		66	66			66		177
	2019		*85*				*64*				*64*		*64*
SNE/MA Windowpane Flounder	2017	833	623	37	249	209	104	104			104		599
	2018	833	623	37	249	209	104	104			104		599
	2019		*292*				*218*				*218*		*218*
Ocean Pout	2017	220	165	2	23		130	130			130		155
	2018	220	165	2	23		130	130			130		155
	2019		*77*				*58*				*58*		*58*
Atlantic Halibut	2017	210	124	25	4		91	91			91		119
	2018	210	124	25	4		91	91			91		119
	2019		*74*				*55*				*55*		*55*
Atlantic Wolffish	2017	110	82	1	3		72	72			72		77
	2018	110	82	1	3		72	72			72		77
	2019		*39*				*29*				*29*		*29*

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

Under Option 2, the annual specification for FY 2017 – FY 2018 for George Bank (GB) yellowtail flounder, FY 2017 GB cod and GB haddock, and FY 2017- FY 2019 for witch flounder would be specified as in Table 9. Option 2 includes no changes to the state waters and other sub-component values from those specified in FW 55 under the No Action with the exception of witch flounder and northern windowpane flounder and adjustments for updated expected Canadian catches of GB winter flounder and white hake, and a correction to the value of the other sub-component for ocean pout (see Appendix II for additional information). Table 10 provides the Closed Area I (CAI) Hook Gear Haddock Special Access Program (SAP) total allowable catches (TACs).

U.S./Canada TACs

This alternative would specify TACs for the U.S./Canada Management Area for FY 2017 as indicated in Table 7. If NMFS determines that FY 2016 catch of GB cod, haddock, or yellowtail flounder from the U.S./Canada Management Area exceeded the respective 2016 TAC, the U.S./Canada Resource Sharing Understanding and the regulations require that the 2017 TAC be reduced by the amount of the overage. Any overage reduction would be applied to the components of the fishery that caused the overage of the U.S. TAC in 2017. In order to minimize any disruption to the fishing industry, NMFS would attempt to make any necessary TAC adjustment in the first quarter of the fishing year.

A comparison of the proposed FY 2017 U.S. TACs and the FY 2016 U.S. TACs is shown in Table 8 Changes to the U.S. TACs reflect changes to the percentage shares, stock status, and the Transboundary Management Guidance Committee's (TMGC) recommendations.

Table 7 - Proposed FY2017 U.S./Canada TACs (mt).

	Eastern GB Cod	Eastern GB Haddock	GB Yellowtail Flounder
Total Shared TAC	730	50,000	300
U.S. TAC	146	29,500	207
Canada TAC	584	20,500	93

Table 8 - Comparison of the Proposed FY 2017 U.S. TACs and the FY 2016 U.S. TACs (mt).

Stock	U.S. TAC		Percent Change
	FY 2017	FY 2016	
Eastern GB cod	146	138	*+5.8%*
Eastern GB haddock	29,500	15,170	*+94.5%*
GB yellowtail flounder	207	269	*-23%*

Witch Flounder

This alternative would set witch flounder specifications for FY 2017- FY 2019 as indicated in Table 9. At its meeting on January 17, 2016, the SSC determined that OFL is unknown for the witch flounder stock and recommended an ABC for FY 2017- FY 2019 of 878 mt. The ABC is based on applying the empirical approach and using a three year moving average of exploitable biomass estimates from the NEFSC trawl surveys and a mean exploitation rate of 0.060 from the rates observed over the last nine years (2007-2015). The SSC also offered a number of research recommendations with the hope that the witch flounder assessment would return to using an analytical framework in the future. See Section 4.1.1.2 for an overview of the 2016 Benchmark Assessment results. At its January 2017 meeting, the Council clarified that the 2018 and 2019 witch flounder ABCs will be determined following the 2017 operational assessments.

Rationale: This measure would adopt new specifications for GB yellowtail flounder, GB haddock, GB cod, and witch flounder consistent with the most recent stock assessment information.

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

Rationale for ABCs set for GB yellowtail flounder and witch flounder can be found in the SSC's reports to the Council in Appendix I.

With the exception of northern windowpane flounder and GB haddock only one alternative to No Action is shown (see Section 4.1.2.2.1 and Section 4.1.2.2.2). This is because the values in Option 2 represent the best scientific information, as determined by the Council's SSC, and the M-S Act requires that catches not be set higher than these levels. Any catches below these levels would not mitigate economic impacts on fishing communities. This measure would also adjust state waters and other sub-components to reflect recent sub-component performance for witch flounder and northern windowpane flounder and adjustments for updated expected Canadian catches of GB winter flounder and white hake, and a correction to the value of the other sub-component for ocean pout (see Appendix II).

Table 9 - Option 2 Revised Northeast Multispecies OFLs, ABC, ACLs, and other ACL sub-components for FY 2017-FY 2018 (metric tons, live weight), based on final sector rosters for 2016 and a corrected mistake to the other sub-component for ocean pout. Values are rounded to the nearest metric ton. Values in gray are unchanged from No Action and not proposed to be adjusted under Option 2. Default specifications for FY 2019 are shown in italics and gray, and remain in place through July 31st, 2019, as published in the final rule to FW 55, May 2, 2016 with the exception of GB haddock which was recalculated here due to an error in the FW 55 final rule. FY 2019 default specs have not been adjusted for final sector rosters in 2016. Stocks which are underlined would be subject to adjustments in 2018 based on US/CA quotas. PDT's recommendations included for adjustments to state waters and other sub-components for witch flounder and northern windowpane flounder and Canadian catches of GB winter flounder and white hake.

Stock	Year	OFL	US ABC	State Waters Sub-Component	Other sub-components	Scallop	Groundfish Sub-ACL	Comm. Ground-fish Sub-ACL	Rec Ground-fish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non-sector Ground-fish Sub-ACL	MWT or Small mesh Sub-ACL	Total ACL
GB Cod	2017	1,665	665	20	86		531	531		521	10		637
	2018	1,665	1,249	37	162		997	997		978	19		1,197
	2019		*583*				*465*			*455*	*10*		*437*
GOM Cod	2017	667	500	27	10		437	280	157	271	9		473
	2018	667	500	27	10		437	280	157	271	9		473
	2019		*233*				*204*			*127*	*4*		*175*
GB Haddock	2017	258,691	57,398	574	574		52,892	52,892		52,545	347	534	54,574
(*MWT- 1%)*	2018	358,077	77,898	779	779		71,783	71,783		71,312	471	724	74,065
	2019		*27,264*				*25,124*			*24,959*	*165*	*253*	*25,923*
GB Haddock	2017	258,691	57,398	574	574		52,620	52,620		52,274	346	801	54,574
(*MWT –1.5%* ***Council Preferred****)*	2018	358,077	77,898	779	779		71,413	71,413		70,944	469	1,087	74,065
	2019		*27,264*				*25,124*			*24,959*	*165*	*253*	*25,923*
GB Haddock	2017	258,691	57,398	574	574		52,347	52,347		52,003	344	1,068	54,563
(*MWT – 2%)*	2018	358,077	77,898	779	779		71,043	71,043		70,576	467	1,449	74,050
	2019		*27,264*				*25,124*			*24,959*	*165*	*253*	*25,923*
GOM	2017	5,873	4,534	33	33		4,177	3,017	1,160	2,985	32	42	4,285
Haddock	2018	6,218	4,815	35	35		4,436	3,204	1,231	3,170	34	45	4,550
	2019		*2,176*				*1,552*			*1,107*	*14*	*16*	*1,685*

Stock	Year	OFL	US ABC	State Waters Sub-Component	Other sub-components	Scallop	Groundfish Sub-ACL	Comm. Ground-fish Sub-ACL	Rec Ground-fish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non-sector Ground-fish Sub-ACL	MWT or Small mesh Sub-ACL	Total ACL
GB Yellowtail Flounder	2017		207		2	32	163	163		160	2	4	201
	2018		354		4	55	278	278		274	4	7	343
SNE/MA Yellowtail Flounder	2017		267	5	29	34	187	187		155	32		256
	2018		267	5	29	37	185	185		153	32		256
	2019						*66*			*52*	*14*		*93*
CC/GOM Yellowtail Flounder	2017	707	427	43	26		341	341		326	14		409
	2018	900	427	43	26		341	341		326	14		409
	2019		*315*				*119*			*113*	*5*		*149*
American Plaice	2017	1,748	1,336	27	27		1,218	1,218		1,198	21		1,272
	2018	1,840	1,404	28	28		1,280	1,280		1,259	22		1,337
	2019		*644*				*448*			*439*	*9*		*491*
Witch Flounder	2017		878	35	70		734	734		718	16		839
	2018		878	35	70		734	734		718	16		839
	2019		878	35	70		734	734		718	16		839
GB Winter Flounder	2017	1,056	702		63		620	620		615	5		683
	2018	1,459	702		63		620	620		615	5		683
	2019		*511*				*233*			*231*	*2*		*264*
GOM Winter Flounder	2017	1,080	810	122	16		639	639		607	32		776
	2018	1,080	810	122	16		639	639		607	32		776
	2019		*378*				*224*			*212*	*12*		*284*

Stock	Year	OFL	US ABC	State Waters Sub-Component	Other sub-components	Scallop	Groundfish Sub-ACL	Comm. Ground-fish Sub-ACL	Rec Ground-fish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non-sector Ground-fish Sub-ACL	MWT or Small mesh Sub-ACL	Total ACL
SNE/MA Winter Flounder	2017	1,021	780	70	94		585	585		523	62		749
	2018	1,587	780	70	94		585	585		523	62		749
	2019		*555*				*205*			*180*	*25*		*273*
Redfish	2017	14,665	11,050	111	221		10,183	10,183		10,127	56		10,514
	2018	15,260	11,501	115	230		10,598	10,598		10,540	58		10,943
	2019		*5,341*				*3,709*			*3,688*	*21*		*4,025*
White Hake	2017	4,816	3,644	36	73		3,358	3,358		3,333	25		3,467
	2018	4,733	3,580	36	72		3,299	3,299		3,274	25		3,406
	2019		*1,657*				*1,168*			*1,160*	*8*		*1,268*
Pollock	2017	32,004	21,312	1,279	1,279		17,817	17,817		17,704	113		20,374
	2018	34,745	21,312	1,279	1,279		17,817	17,817		17,704	113		20,374
	2019		*12,161*				*6,236*			*6,196*	*39*		*7,459*
GOM/GB Windowpane Flounder (*no Scallop sub-ACL, adjust sub-components – other at 65%)*	2017	243	182	2	118		58	58			58		178
	2018	243	182	2	118		58	58			58		178
	2019		*85*				*64*				*64*		*64*

Stock	Year	OFL	US ABC	State Waters Sub-Component	Other sub-components	Scallop	Groundfish Sub-ACL	Comm. Ground-fish Sub-ACL	Rec Ground-fish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non-sector Ground-fish Sub-ACL	MWT or Small mesh Sub-ACL	Total ACL
GOM/GB Windowpane Flounder (*Scallop – highest- 46%)*	2017	243	182	2	4	78	86	86			86		170
	2018	243	182	2	4	78	86	86			86		170
	2019		*85*				*64*				*64*		*64*
GOM/GB Windowpane Flounder (***Council Preferred-** 21%)*	2017	243	182	2	4	36	129	129			129		170
	2018	243	182	2	4	36	129	129			129		170
	2019		*85*				*64*				*64*		*64*
GOM/GB Windowpane Flounder (*Scallop-lowest- 2%)*	2017	243	182	2	4	3	161	161			161		170
	2018	243	182	2	4	3	161	161			161		170
	2019		*85*				*64*				*64*		*64*
SNE/MA Windowpane Flounder	2017	833	623	37	249	209	104	104			104		599
	2018	833	623	37	249	209	104	104			104		599
	2019		*292*				*218*				*218*		*218*
Ocean Pout	2017	220	165	2	23		130	130			130		155
	2018	220	165	2	23		130	130			130		155
	2019		*77*				*58*				*58*		*58*
Atlantic Halibut	2017	210	124	25	4		91	91			91		119
	2018	210	124	25	4		91	91			91		119
	2019		*74*				*55*				*55*		*55*

Stock	Year	OFL	US ABC	State Waters Sub-Component	Other sub-components	Scallop	Groundfish Sub-ACL	Comm. Ground-fish Sub-ACL	Rec Ground-fish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non-sector Ground-fish Sub-ACL	MWT or Small mesh Sub-ACL	Total ACL
Atlantic	2017	110	82	1	3		72	72			72		77
Wolffish	2018	110	82	1	3		72	72			72		77
	2019		*39*				*29*				*29*		*29*

Table 10- CAI Hook Gear Haddock SAP TACs (FY2017 - FY2018).

Year	Exploitable Biomass (thousand mt)	Western Georges Bank Exploitable Biomass	B(year)/B(2004)	TAC (mt, live weight)
2017	739,567	258,848	9.477	10,709
2018	1,145,309	400,858	14.677	16,584

4.1.2.2.1 Sub-Option 1: Develop an Atlantic Sea Scallop Fishery Allocation for GOM/GB (Northern) Windowpane Flounder

4.1.2.2.1.1 No action.

A scallop fishery sub-ACL for northern windowpane flounder would not be developed or specified.

Rationale: This option would not distribute the ACL for northern windowpane flounder to the scallop fishery. This would simplify accounting, but would mean that the groundfish fishery would be responsible for any overages of the ACL.

4.1.2.2.1.2 Sub-Option 1: Develop an Atlantic Sea Scallop Fishery Allocation for GOM/GB (Northern) Windowpane Flounder (*Preferred Alternative*)

As part of the specification setting process, the Council developed a northern windowpane flounder sub-ACL for the scallop fishery. Besides the groundfish fishery, the scallop fishery is the major contributor to northern windowpane flounder catches. The scallop fishery catches of northern windowpane flounder are not subject to limits, and the groundfish fishery is therefore accountable for any overages. When triggered, accountability measures (AMs) restrict the ability of the groundfish fishery to target and catch marketable species, mainly other flatfish such as winter flounder, and result in adverse economic impacts to the groundfish fleet fishing on Georges Bank when the gear-restricted areas are in place.

The last three assessments for northern windowpane flounder have only included catches from limited access scallop dredges and trawls. Prior to 2004, there was limited observer coverage of General Category scallop dredge and trawl trips. The Groundfish PDT calculated General Category catch of this stock using data from 2004-2014 (Table 11 and Table 12).

Specific scallop fishery AMs for this sub-ACL would be adopted in a future scallop management action during 2017. The AMs will be implemented in time to be effective in 2018. If there is an overage in the scallop fishery sub-ACL that is allocated in 2017, any overage of the 2017 sub-ACL will be subject to the AMs that are adopted. Consistent with a policy adopted in FW 47 for the scallop fishery, any scallop fishery AMs for this sub-ACL will only be triggered if the overall ACL is exceeded and the scallop fishery sub-ACL is exceeded, or the scallop fishery catch is 150 percent or more of the sub-ACL. The Scallop FMP will develop AMs for this sub-ACL.

Table 11- Approaches to allocating northern windowpane flounder to the scallop fishery under Sub-Option 1A and Sub-Option 1B, using the most recent ten years (2005-2014) or five years (2010-2014) of catch estimates (mt).

	Catch Data			Calculation for Fixed percentages	
Calendar Year	**Scallop Limited Access Catch Estimate**	**Total catches for all fisheries**	**Scallop Gen. Cat. IFQ Catch estimate**	**2005-2014 (Ten years)**	**2010-2014 (Five years)**
	X	**Y**	**Z**	**(X+Z)/(Y+Z)**	**(X+Z)/(Y+Z)**
2005	16.59	967.52	5	2.22%	
2006	73.07	682.92	5	11.35%	
2007	97.77	1091.46	3	9.21%	
2008	43.33	375.67	2	12.00%	
2009	15.45	439.56	5	4.60%	
2010	8.59	235.90	5	5.64%	5.64%
2011	32.72	179.84	1	18.65%	18.65%
2012	34.85	199.22	2	18.31%	18.31%
2013	63.37	354.81	3	18.55%	18.55%
2014	95.37	214.67	6	45.94%	45.94%
			Number of years	10	5
			Mean (Average)	14.65%	21.42%
			Median	11.68%	18.55%
	Sub-Option 1A		**90th percentile**	**21.38%**	**35.02%**
	Sub-Option 1B		**Range**	**2-46%**	**6-46%**

Table 12- Approaches to allocating northern windowpane flounder to the scallop fishery under Sub-Option 1A and Sub-Option 1B, using the most recent ten years (2003-2013) or five years (2009-2013) of catch estimates (mt), after dropping 2014.

	Catch Data			Calculation for Fixed percentages	
Calendar Year	**Scallop Limited Access Catch Estimate**	**Total catches for all fisheries**	**Scallop Gen. Cat. IFQ Catch estimate**	**2004-2013 (Ten years)**	**2009-2013 (Five years)**
	X	**Y**	**Z**	**(X+Z)/(Y+Z)**	**(X+Z)/(Y+Z)**
2004	6.94	327.52	9	4.74%	
2005	16.59	967.52	5	2.22%	
2006	73.07	682.92	5	11.35%	
2007	97.77	1091.46	3	9.21%	
2008	43.33	375.67	2	12.00%	
2009	15.45	439.56	5	4.60%	4.60%
2010	8.59	235.90	5	5.64%	5.64%
2011	32.72	179.84	1	18.65%	18.65%
2012	34.85	199.22	2	18.31%	18.31%
2013	63.37	354.81	3	18.55%	18.55%
			Number of years	10	5
			Mean (Average)	10.53%	13.15%
			Median	10.28%	18.31%
	Sub-Option 1A add 2004, drop 2014		**90th percentile**	**18.56%**	**18.61%**
	Sub-Option 1B add 2004, drop 2014		**Range**	**2-19%**	**6-19%**

The Council chose from two sub-options (Sub-Option 1A or Sub-Option 1B) and one calculation approach to address the development of a scallop fishery allocation for northern windowpane flounder.

4.1.2.2.1.2.1 Sub-Option 1A – Fixed percentage based on the 90th percentile of scallop catch rates for northern windowpane flounder (*Preferred Alternative*)

Sub-Option 1A would set the scallop sub-ACL for northern windowpane flounder based the 90th percentile of the scallop fishery catches of northern windowpane flounder (as a percent of the total catch of northern windowpane flounder) for the period calendar year 2005 through 2014, 2010 through 2014, 2004 through 2013, or 2009 through 2013 using information in the 2015 stock assessment of northern windowpane flounder and the PDT's estimate of General Category catches (Table 11 and Table 12). A similar approach was used in FW 48 to set a scallop fishery allocation for SNE/MA (southern) windowpane flounder.

The fixed percentage would be applied to the northern windowpane flounder ABC to determine the sub-ABC for the scallop fishery and then reduced for management uncertainty to determine the sub-ACL with the current management uncertainty buffer for non-allocated stocks of 7%.

Under Sub-Option 1A (using a fixed percentage based on the 90th percentile of northern windowpane flounder catches in the scallop fishery relative to total northern windowpane flounder catches), there were four calculation approaches to consider:

1. Allocation based on catch rates from a range of the most recent 10 years (i.e., 2005-2014) resulting in a percentage of **21%** (*Preferred Alternative*);
2. Allocation based on catch rates from a shorter and more recent range of the most recent 5 years (i.e., 2010-2014), resulting in a percentage of **35%**.
3. Allocation based on catch rates from a range of the most recent 10 years dropping 2014 (i.e., 2004-2013) resulting in a percentage of **19%**; or
4. Allocation based on catch rates from a shorter and more recent range of the most recent 5 years dropping 2014 (i.e., 2009-2013), resulting in a percentage of **19%**.

The longer time period would incorporate higher catches by the groundfish fishery, when the fishery was more active. Approaches using catch rates for the most recent 5 or 10 years that do not include 2014 (i.e., 2009-2013 and 2004-2013) would refrain from using data when an area-based AM for northern windowpane flounder was in place for the groundfish fishery for FY 2014.

Rationale: This option would establish a scallop sub-ACL for northern windowpane flounder using a method similar to that for the scallop sub-ACL for southern windowpane flounder in FW 48. Under this option, the sub-ACL is based on a fixed percentage approach based on catch history. Projected catch should not be used because it can fluctuate. The scallop fishery catches of this stock are large enough that the effectiveness of the AM system could be undermined if those catches are not constrained and subject to an AM. This measure would create a sub-ACL, based on recent scallop fishery catches. AMs for the scallop fishery will be adopted in a future action and will apply to any overages that occur in FY 2017 and subsequent years.

4.1.2.2.1.2.2 Sub-Option 1B – Select a percentage from a range of recent scallop catches

Sub-Option 1B would set the scallop sub-ACL for northern windowpane flounder using a fixed percentage chosen from a range of northern windowpane flounder discards by the scallop fishery as percentages of total northern windowpane flounder catches. The range of percentages is based on bycatch estimates from the 2015 operational assessment, and used to calculate scallop catch as a percentage of total catch between calendar years 2004 through 2014 and the PDT's estimate of General Category catches (Table 11 and Table 12).

The fixed percentage would be applied to the northern windowpane flounder ABC to determine the sub-ABC for the scallop fishery and then reduced for management uncertainty to determine the sub-ACL with the current management uncertainty buffer for non-allocated stocks of 7%.

Under Sub-Option 1B (selecting a percentage from a range of recent northern windowpane flounder catches in the scallop fishery relative to total northern windowpane flounder catches), there were four calculation approaches to consider:

1. Allocation based on catch rates from a range of the most recent 10 years (i.e., 2005-2014), resulting in a range of **2%-46%**;
2. Allocation based on catch rates from a shorter and more recent range of the most recent 5 years (i.e., 2010-2014), resulting in a range of **6%-46%** or
3. Allocation based on catch rates from a range of the most recent 10 years dropping 2014 (i.e., 2004-2009) resulting in a range of **2%-19%**;
4. Allocation based on catch rates from a shorter and more recent range of the most recent 5 years dropping 2014 (i.e., 2009-2013), resulting in a range of **6%-19%**.

The longer time period would incorporate higher catches by the groundfish fishery, when the fishery was more active. Approaches using catch rates for the most recent 5 or 10 years that do not include 2014 (i.e., 2009-2013 and 2004-2013) would refrain from using data when an area-based AM for northern windowpane flounder was in place for the groundfish fishery for FY 2014.

Rationale: The approach is similar to how scallop sub-ACLs were developed for GB yellowtail and could be used to allocate a scallop sub-ACL for northern windowpane flounder. Under this option, allocating a sub-ACL is based on a fixed percentage approach based on catch history. Projected catch should not be used because it can fluctuate. The scallop fishery catches of this stock are large enough that the effectiveness of the AM system could be undermined if those catches are not constrained and subject to an AM. This measure would create a sub-ACL based on recent scallop fishery catches. AMs for the scallop fishery will be adopted in a future action and will apply to any overages that occurs in FY 2017 and subsequent years.

4.1.2.2.2 Sub-Option 2: Increase the Midwater Trawl Atlantic Herring Fishery Sub-ACL for Georges Bank Haddock

4.1.2.2.2.1 No action.

The midwater trawl Atlantic herring fishery sub-ACL for GB haddock would remain at 1% of the U.S. ABC.

Rationale: This option would not increase the sub-ACL for GB haddock in the midwater trawl Atlantic herring fishery, but would continue to allow for long-term sustainable management the GB haddock stock and groundfish fishery while providing incentives for the midwater Atlantic herring fishery to minimize bycatch for this stock to the extent practicable.

4.1.2.2.2.2 Sub-Option 2: Increase the Midwater Trawl Atlantic Herring Fishery Sub-ACL for Georges Bank Haddock (*Preferred Option*)

This option would consider measures to incentivize the midwater trawl fleet to minimize the incidental catch of GB haddock to the extent practicable in the midwater trawl Atlantic herring fishery while providing the opportunity for the fleet to fully harvest its herring sub-ACL for Herring Management Areas 1B and 3. Sub-Option 2A and Sub-Option 2B would reduce the potential for negative impacts on the herring and Atlantic mackerel fisheries caused by reductions in fishing opportunities in Areas 1B and 3, and avoid potential market interruptions for the supply of herring as bait for the lobster fishery. The GB haddock AMs for the midwater trawl Atlantic herring fishery (i.e., pound for pound payback provision and in-season closure) remain unchanged in this action.

The Council chose from two sub-options (Sub-Option 2A or Sub-Option 2B) to address the sub-ACL for GB haddock in the midwater trawl Atlantic herring fishery.

4.1.2.2.2.2.1 Sub-Option 2A – Increase the Midwater Trawl Atlantic Herring Fishery Sub-ACL for Georges Bank Haddock and Establish a Review Process (*Preferred Alternative*)

Sub-Option 2A would increase the current sub-ACL for GB haddock in the midwater trawl Atlantic herring from 1% of the US ABC to 1.5% or 2% of the U.S. ABC, reduced by the management uncertainty

buffer to determine the sub-ACL. The Council's preferred alternative is 1.5% of the US ABC. The uncertainty buffer is currently 7%.

This option would also establish a review process. Such that following an assessment of the entire GB haddock stock, the Groundfish PDT would conduct a review of the sub-ACL to recommend to the Council a sub-ACL for the midwater trawl Atlantic herring fishery of up to 2% of the U.S. ABC. The review of the sub-ACL would include a range of 1% (i.e., status quo/No Action) up to 2% of the U.S. ABC. The review for GB haddock would consider but not be limited to: fishery catch performance, utilization, status of the resource, recruitment, incoming year-class strength, and evaluation of the coefficient of variation (CV) of the GB haddock incidental catch estimates for the Atlantic herring midwater trawl fishery. The Council would review the work of the PDT and determine if a change in the sub-ACL (up or down) would be considered in the action in which specifications for GB haddock would be adopted following an assessment of the entire GB haddock stock. The review process would not take place following the assessment of only the EGB haddock stock.

Rationale: Sub-Option 2A would continue to ensure the long-term sustainability of the GB haddock stock and groundfish fishery. It also would provide incentives for the midwater Atlantic herring fishery to minimize, to the extent practicable, the bycatch of this stock. Further, this option better meets the goals and objectives of the Atlantic herring management program, particularly the goal to achieve, on a continuing basis, optimum yield, and the objectives to achieve full utilization of the allowable the catch of herring, and to use the resource in a manner which maximizes social and economic benefits to the nation, while taking into account the protection of marine ecosystems. The review process would allow for consideration of the most recent stock assessment and fishery information to allow for an adjustment of the sub-ACL.

4.1.2.2.2.2.2 Sub-Option 2B – Maintain the Midwater Trawl Atlantic Herring Fishery Sub-ACL for Georges Bank Haddock and Establish a Review Process

Sub-Option 2B would maintain the current sub-ACL for GB haddock in the midwater trawl Atlantic herring at 1% of the US ABC, reduced by the management uncertainty buffer to determine the sub-ACL. The uncertainty buffer is currently 7%.

This option would also establish a review process. Such that following an assessment of the entire GB haddock stock, the Groundfish PDT would conduct a review of the sub-ACL to recommend to the Council a sub-ACL for the mid-water trawl Atlantic herring fishery of up to 2% of the US ABC. The review of the sub-ACL would include a range of 1% (i.e., status quo/No Action) up to 2% of the U.S. ABC. The review for GB haddock would consider but not be limited to: fishery catch performance, utilization, status of the resource, recruitment, incoming year-class strength, and evaluation of the CV of the GB haddock incidental catch estimates for the Atlantic herring midwater trawl fishery. The Council would review the work of the PDT and determine if a change in the sub-ACL (up or down) would be considered in the action in which specifications for GB haddock would be adopted following an assessment of the entire GB haddock stock. The review process would not take place following the assessment of only the EGB haddock stock.

Rationale: Sub-Option 2B would continue to ensure the long-term sustainability of the GB haddock stock and groundfish fishery. It would also provide incentives for the midwater Atlantic herring fishery to minimize bycatch for this stock to the extent practicable. Further, this option better meets the goals and objectives of the Atlantic herring management program, particularly the goal to achieve, on a continuing basis, optimum yield, and the objectives to achieve full utilization of the allowable catch of herring, and use the resource in a manner which maximizes social and economic benefits to the nation, while taking

into account the protection of marine ecosystems. The review process would allow for consideration of the most recent stock assessment and fishery information to allow for an adjustment of the sub-ACL.

4.2 Commercial Fishery Measures

4.2.1 Atlantic Scallop Fishery Measures

4.2.1.1.1 Scallop fishery AM implementation policy

4.2.1.1.1.1 Option 1: No Action

The AM policy established in FW 47 for the scallop fishery would remain unchanged. FW 47 established a policy that scallop fishery sub-ACLs would be administered and evaluated in the context of total catches in the fishery. The general principle is that if a scallop fishery sub-ACL (for any stock) would be exceeded, but the overall ACL was not exceeded, then the scallop fishery would not be subject to AMs unless the scallop fishery sub-ACL was exceeded by 50 or more percent. There would be two criteria that would result in implementing the AMs if either was met:

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

Rationale: The AM policy established in FW 47 for the scallop fishery would remain unchanged. The purpose of the ACL and AM system is to prevent overfishing. Overfishing is likely to occur only if the total ACL is exceeded. If the sub-ACL is exceeded by 50 or more percent and the AM is implemented, scallop profits would be sacrificed even if the overall ACL is not exceeded. At the same time, there is a need to hold the scallop fishery accountable for its catch.

4.2.1.1.1.2 Option 2: Temporary change to the scallop fishery AM implementation policy (*Preferred Alternative*)

These options would allow for a temporary change to the AM implementation policy so that the only criteria to determine if an AM would be implemented would be if the scallop fishery exceeds its sub-ACL for a stock and the overall ACL is also exceeded.

The Council selected more than one sub-option (Sub-Option A and Sub-Option B) in this section to add an exception to the scallop fishery AM implementation policy.

4.2.1.1.1.2.1 Sub-Option A – Temporary change to the scallop fishery AM implementation policy for the GB yellowtail flounder stock (*Preferred Alternative*)

Sub-Option A would allow for a temporary change to the AM implementation policy for the GB yellowtail flounder stock so that the only criteria to determine if an AM would be implemented would be if the scallop fishery exceeds its sub-ACL for a stock and the overall ACL is also exceeded. This measure include a 2-year "sunset" provision. Therefore if the measure was implemented in FY 2017, the temporary change to AM policy would only apply for FY 2017 and FY 2018 catches and in FY 2019 and beyond the underlying policy would apply (i.e., as described under No Action).

Rationale: The purpose of the ACL and AM system is to prevent overfishing. Overfishing is likely to occur only if the total ACL is exceeded. The recommended total ACL for GB yellowtail has been very low in recent years (>500 mt), which has prevented the groundfish fishery from targeting this species. The low total ACL, combined with low groundfish effort for GB yellowtail, and high repercussions associated with the scallop fishery AM (i.e., pound for pound payback and a time/area

closure that can extend for the full fishing year depending on the severity of the overage), should prevent ACL overages under this exemption. No other provisions of the AMs would change (e.g., the AMs and pound-for-pound payback provisions). The "sunset" provision would limit the time the exception to the AM implementation policy was available to the scallop fishery. Such an approach would reduce the potential for risk to the groundfish fishery, the small-mesh fisheries, and the GB yellowtail flounder stock in the event the scallop fishery catch of GB yellowtail flounder caused an overage of the total ACL.

4.2.1.1.1.2.2 Sub-Option B– Temporary change to the scallop fishery AM implementation policy for the northern windowpane flounder stock (*Preferred Alternative*)

Sub-Option B would allow for a temporary change to the AM implementation policy for the northern windowpane flounder stock so that the only criteria to determine if an AM would be implemented would be if the scallop fishery exceeds its sub-ACL for a stock and the overall ACL is also exceeded. This measure include a 2-year "sunset" provision. Therefore if the measure was implemented in FY 2017, the temporary change to AM policy would only apply for FY 2017 and FY 2018 catches and in FY 2019 and beyond the underlying policy would apply (i.e., as described under No Action and Section 4.1.2.2.1.2).

Rationale: The purpose of the ACL and AM system is to prevent overfishing. Overfishing is likely to occur only if the total ACL is exceeded. Northern windowpane flounder AMs for the scallop fishery would be developed in 2017 in a Scallop FMP action and would be implemented should an overage occur in FY 2017 and beyond. The "sunset" provision would limit the time the temporary change to the AM implementation policy was available to the scallop fishery. Such an approach would reduce the potential for risk to the groundfish fishery and the northern windowpane flounder stock in the event the scallop fishery catch of northern windowpane flounder stock caused an overage of the total ACL.

5.0 ALTERNATIVES CONSIDERED AND REJECTED

5.1 Updates to Status Determination Criteria, and Annual Catch Limits

5.1.1 Annual Catch Limits

5.1.1.1 Sub-Option 1C– Use a Dual Fixed Percentage Baseline

Sub-Option C would set a lower sub-ACL based on a fixed percentage in years when the fishing patterns of the limited access scallop fleet more closely reflects a year the current rotational access and open area management program is expected to have a relatively low interaction with northern windowpane flounder compared to historic levels. Sub-Option 1C would set a higher sub-ACL in years when the fishing patterns of the limited access scallop fleet more closely reflects a year the rotational access and open area management program is expected to have a relatively high interaction with northern windowpane flounder compared to historic levels.

Table 13- Approach to allocating northern windowpane flounder to the scallop fishery (mt) under Sub-Option 1C.

	Catch Data			Calculation for Dual Fixed Percentages		
Calendar Year	**Scallop Limited Access Catch Estimate**	**Total catches for all fisheries**	**Scallop Gen. Cat. IFQ Catch estimate**	**Scallop LA and Gen. Cat. IFQ Catch Estimates**	**Low Fixed Percentage**	**High Fixed Percentage**
	X	**Y**	**Z**	**(X+Z)**	**Mean (3 lowest values)/ 2017 ABC**	**Mean (3 highest values) 2017 ABC**
2005	16.59	967.52	5	21.59	21.59	
2006	73.07	682.92	5	78.07		78.07
2007	97.77	1091.46	3	100.77		100.77
2008	43.33	375.67	2	45.33		
2009	15.45	439.56	5	20.45	20.45	
2010	8.59	235.90	5	13.59	13.59	
2011	32.72	179.84	1	33.72		
2012	34.85	199.22	2	36.85		
2013	63.37	354.81	3	66.37		
2014	95.37	214.67	6	101.37		101.37
				Mean	18.54	93.40
				ABC	182	182
				Percentage	**10.19%**	**51.32%**
					Sub-Option 1C	

The formula used to determine high or low bycatch year would need to be specified upfront and the intent is to set the sub-ACL for the entire scallop fishery, limited access and limited access general category. For each fishing year, a determination regarding high or low catch year would be made, based on projected northern windowpane catch rates for the scallop fishery completed by the Scallop PDT.

The fixed catch rates would be based on a range of fishing years to estimate a low and high catch rate by percentage (i.e., 2005-2014) (Table 13). To select a high fixed catch rate, consider the average in catch for the top three years from 2005 to 2014 with high catch rates for windowpane flounder. A low fixed percentage would be calculated based on comparing the average high catch rate to the FY 2017 ABC for northern windowpane flounder, which is 182 mt. To select a low average catch, consider the average catch rate by percentage for the three years in which catch rates were at its lowest for the time series, 2005 to 2014. A low fixed percentage would be calculated based on a comparison of the average low catch to the FY2017 ABC for northern windowpane flounder, which is 182 mt. Based on this approach, the low fixed percentage would be **10%** and the high fixed percentage would be **51%** of the ABC. In the future, the Council may want to consider updating these fixed percentages to reflect recent catch rates.

The low and high percentages would be applied to the northern windowpane flounder ABC to determine the sub-ABC options for the scallop fishery and then reduced for management uncertainty to determine the sub-ACL. The current management uncertainty buffer for non-allocated stocks in 7%.

Rationale for not including 5.1.1.1: Although initially promising, the Council discontinued work on this approach and in light of concerns raised from the Groundfish PDT and Scallop PDT about accurately identifying future "low" and "high" northern windowpane flounder years.

5.1.1.2 Sub-Option 2C – Increase the Midwater Trawl Atlantic Herring Fishery Sub-ACL for Georges Bank Haddock with a transfer provision

Sub-Option 2C would increase the current sub-ACL for GB haddock in the midwater trawl Atlantic herring from 1% of the US ABC to 1.5% or 2% of the US ABC reduced by the management uncertainty buffer to determine the sub-ACL. The uncertainty buffer is currently 7%. This allocation would be available at the start of the groundfish fishing year. The addition of the transfer provision would accommodate an in-season transfer of GB haddock allocation from the mid-water trawl Atlantic herring fleet to the groundfish fleet, similar to the existing regulations regarding an in-season transfer of GB and SNE/MA yellowtail flounder from the scallop fishery to the groundfish fishery (Refer to 50 CFR 648.90(a)(4)(iii)(C)).

By December of that year, about mid-way through the fishing year, if the mid-water trawl Atlantic herring fishery is not projected to harvest its full sub-ACL of GB haddock, NMFS would provide catch projections for GB haddock that is expected to be caught by the mid-water trawl Atlantic herring fishery through the remainder of the fishing year. If NMFS makes the determination that the mid-water trawl Atlantic herring fishery catch is projected to be less than 90 percent of the mid-water trawl Atlantic herring fishery's allocation for that year, the Regional Administrator may reduce the appropriate allocation to match the herring fishery's projected catch quantity, and increase the allocation to the groundfish fishery up to the reduced mid-water trawl Atlantic herring fishery quantity. Any additional GB haddock to the groundfish fishery would be allocated proportionally among the groundfish sectors and common pool vessels.

Rationale for not including 5.1.1.2: The Council discontinued work on this approach for two primary reasons: 1) the transfer provision lacks the right incentives to be beneficial to the groundfish fishery due to the abundant GB haddock resource and 2) concerns raised about the ability to accurately project mid-water trawl Atlantic herring fishery catch of GB haddock to determine if a transfer would be available.

5.2 Recreational Fishery Measures

5.2.1 Recreational Fishery Measures

5.2.1.1 Option 1: No Action

Framework Adjustment 48 revised the recreational AMs so that the Regional Administrator may proactively adjust recreational management measures to ensure the recreational fishery will achieve, but not exceed, its sub-ACL. To the extent possible, any changes to the recreational management measures would be made prior to the start of the fishing year. The Regional Administrator would consult with the Council, or the Council's designee, and would tell the Council, or its designee, what recreational measures are under consideration for the upcoming fishing year. If time allows, the NEFMC would also provide the RAP an opportunity to meet and discuss the proposed management measures. These AMs require development in consultation with the Council, because the appropriate suite of measures (e.g., bag limit, minimum fish size, and season) depends on the ACL specified.

The Council provided guidance in FW48 on its preference of measures that NMFS should consider if additional recreational effort controls are necessary to reduce GOM cod or GOM haddock catches, though this guidance does not restrict NMFS in selecting management measures that would best achieve, but not exceed, the recreational sub-ACL.

- Cod: If additional effort controls are necessary to reduce cod catches, the Council's non-binding preference is that NMFS first consider increases to minimum fish sizes, then adjustments to seasons, followed by changes to bag limits.
- Haddock: If additional effort controls are necessary to reduce haddock catches, the Council's non-binding preference is that NMFS first consider increases to minimum size limits, then changes to bag limits, followed by adjustments to seasons.

5.2.1.2 Option 2: Revised Recreational Fishery Measures

Under Option 2, the process would be revised such that regulations for the recreational fishery be made available sooner with the goal for knowing the upcoming regulations by the end of February each year.

Data from the Marine Recreational Information Program (MRIP) is released in two-month 'waves' with preliminary data provided approximately six weeks following the end of each wave (Table 14). Wave 6 catch could be projected since the preliminary estimate for wave 6 catch would not be available in time. However, assumptions about Wave 6 data would need to be made for projections including using information from previous years.

Table 14 – Availability of Data from MRIP 'Waves'

Wave	Period Covered	Data Availability
Wave 1	January - February	April
Wave 2	March - April	June
Wave 3	May – June	August
Wave 4	July – August	October
Wave 5	September - October	December
Wave 6	November - December	February

Rationale for not including 5.2: After reviewing the work to date, the Council concluded this concept is not adequately developed for inclusion in Framework 56. Therefore, the Council recommended continuing development of the concept in 2017 and in conjunction with the 2018-2020 specifications-setting process.

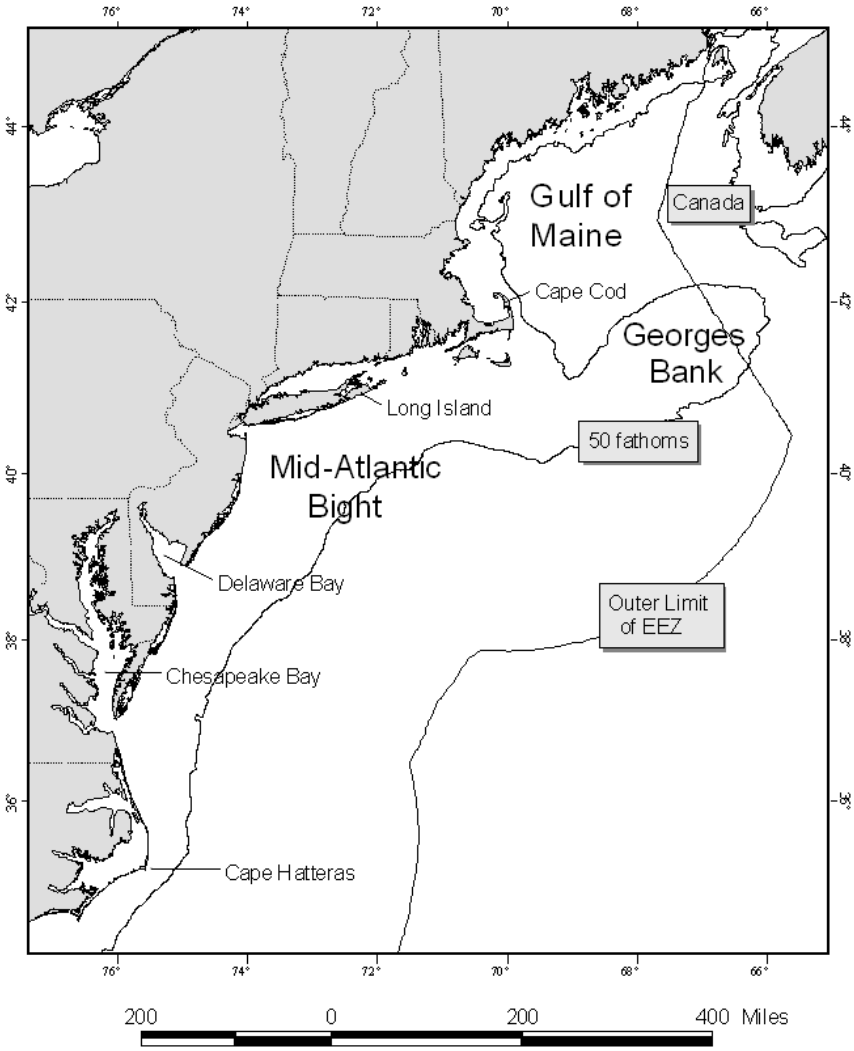
6.0 AFFECTED ENVIRONMENT

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

6.1 Physical Environment/Habitat/EFH

The Northeast U.S. Shelf Ecosystem (Figure 1) includes area from the Gulf of Maine south to Cape Hatteras, extending from the coast seaward to the edge of the continental shelf, including the slope sea offshore to the Gulf Stream (Sherman et al. 1996). The continental slope includes the area east of the shelf, out to a depth of 6,562 ft (2,000 m). Four distinct sub-regions are identified: the Gulf of Maine, Georges Bank, the Mid-Atlantic Bight, and the continental slope. The groundfish fishery primarily occurs in the inshore and offshore waters of the Gulf of Maine, Georges Bank, and the southern New England/Mid-Atlantic areas. Therefore, the description of the physical environment focuses on these sub-regions. The distinctive features of Southern New England are included in the sections describing Georges Bank and the Mid-Atlantic Bight.

Figure 1 - Northeast U.S. Shelf Ecosystem

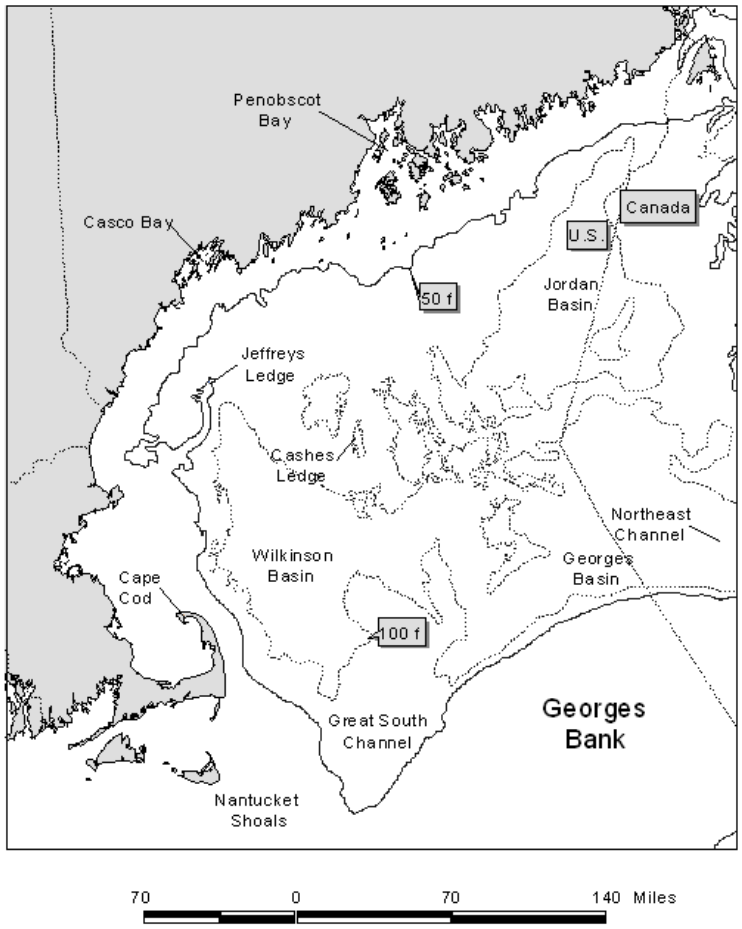


Source: Stevenson et al. (2004).

6.1.1 Gulf of Maine

The Gulf of Maine is bounded on the east by Browns Bank, on the north by the Nova Scotia (Scotian) Shelf, on the west by the New England states, and on the south by Cape Cod and Georges Bank (Figure 2). The Gulf of Maine is a boreal environment characterized by relatively cold waters and deep basins, with a patchwork of various sediment types. There are 21 distinct basins separated by ridges, banks, and swells. Depths in the basins exceed 820 ft. (250 m), with a maximum depth of 1,148 ft (350 m) in Georges Basin, just north of Georges Bank. High points within the Gulf of Maine include irregular ridges, such as Cashes Ledge, which peaks at 30 ft (9 m) below the surface.

Figure 2 - Gulf of Maine



Source: Stevenson et al. (2004).

The Gulf of Maine is an enclosed coastal sea that was glacially derived and contains a system of deep basins, moraines, and rocky protrusions. The Gulf of Maine is topographically diverse from the rest of the continental border of the U.S. Atlantic coast. Very fine sediment particles created and eroded by the glaciers have collected in thick deposits over much of the seafloor of the Gulf of Maine, particularly in its deep basins. These mud deposits blanket and obscure the irregularities of the underlying bedrock, forming topographically smooth terrains. In the rises between the basins, other materials are usually at the surface. Unsorted glacial till covers some morainal areas, sand predominates on some high areas, and gravel,[1] sometimes with boulders, predominates others. Bedrock is the predominant substrate along the western edge of the Gulf of Maine, north of Cape Cod in a narrow band out to a water depth of about 197 ft. (60 m). Mud predominates in coastal valleys and basins that often abruptly border rocky substrates. Gravel, often mixed with shell, is common adjacent to bedrock outcrops and in fractures in the rock. Gravel is most abundant at depths of 66 - 131 ft. (20 - 40 m), except off eastern Maine where a gravel-covered plain exists to depths of at least 328 ft. (100 m). Sandy areas are relatively rare along the inner shelf of the western Gulf of Maine, but are more common south of Casco Bay, especially offshore of sandy beaches (Stevenson, et al. 2004).

[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.

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

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

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

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

- Deepwater/Slope and Canyon: offshore hake, blackbelly rosefish, Gulf stream flounder;
- Intermediate/Combination of Deepwater Gulf of Maine-Georges Bank and Gulf of Maine-Georges Bank Transition: silver hake, red hake, goosefish (monkfish);
- Shallow/Gulf of Maine-Georges Bank Transition Zone: Atlantic cod, haddock, pollock;
- Shallow water Georges Bank-southern New England: yellowtail flounder, windowpane flounder, winter flounder, winter skate, little skate, longhorn sculpin;
- Deepwater Gulf of Maine-Georges Bank: white hake, American plaice, witch flounder, thorny skate; and
- Northeast Peak/Gulf of Maine-Georges Bank Transition: Atlantic cod, haddock, pollock.

6.1.2 Georges Bank

Georges Bank is a shallow (10 - 492 ft. [3 - 150 m depth]), elongated (100 mi.(161 km) wide by 20 mi (322 km) long) extension of the continental shelf that was formed during the Wisconsinian glacial episode

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

(Figure 1). It has a steep slope on its northern edge, a broad, flat, gently sloping southern flank, and steep submarine canyons on its eastern and southeastern edges. It has highly productive, well-mixed waters and strong currents. The Great South Channel lies to the west. Natural processes continue to erode and rework the sediments on Georges Bank. Erosion and reworking of sediments by the action of rising sea level as well as tidal and storm currents may reduce the amount of sand and cause an overall coarsening of the bottom sediments (Valentine & Lough 1991).

Bottom topography on eastern Georges Bank consists of linear ridges in the western shoal areas; a relatively smooth, gently dipping seafloor on the deeper, easternmost part; a highly energetic peak in the north with sand ridges up to 30 m high and extensive gravel pavement; and steeper and smoother topography incised by submarine canyons on the southeastern margin. The central region of Georges Bank is shallow, and the bottom has shoals and troughs, with sand dunes superimposed within. The area west of the Great South Channel, known as Nantucket Shoals, is similar in nature to the central region of Georges Bank. Currents in these areas are strongest where water depth is shallower than 164 ft. (50 m). Sediments in this region include gravel pavement and mounds, some scattered boulders, sand with storm-generated ripples, and scattered shell and mussel beds. Tidal and storm currents range from moderate to strong, depending upon location and storm activity.

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

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

1. The Western Basin assemblage is found in comparatively deep water (492 - 656 ft. [150 - 200 m]) with relatively slow currents and fine bottom sediments of silt, clay, and muddy sand. Fauna are comprised mainly of small burrowing detritivores and deposit feeders, and carnivorous scavengers.
2. The Northeast Peak assemblage is found in variable depths and current strength and includes coarse sediments, consisting mainly of gravel and coarse sand with interspersed boulders, cobbles, and pebbles. Fauna tend to be sessile (coelenterates, brachiopods, barnacles, and tubiferous annelids) or free-living (brittle stars, crustaceans, and polychaetes), with a characteristic absence of burrowing forms.
3. The Central Georges Bank assemblage occupies the greatest area, including the central and northern portions of Georges Bank in depths <328 ft. (100 m). Medium-grained shifting sands predominate this dynamic area of strong currents. Organisms tend to be small to moderately large with burrowing or motile habits. Sand dollars are most characteristic of this assemblage.
4. The Southern Georges Bank assemblage is found on the southern and southwestern flanks at depths from 262 - 656 ft. (80 - 200 m), where fine-grained sands and moderate currents predominate. Many southern species exist here at the northern limits of their range. Dominant fauna include amphipods, copepods, euphausiids, and starfish.

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

6.1.3 Southern New England/Mid-Atlantic Bight

The Mid-Atlantic Bight includes the shelf and slope waters from Georges Bank south to Cape Hatteras, and east to the Gulf Stream (Figure 1). The northern portion of the Mid-Atlantic Bight is sometimes referred to as southern New England. It generally includes the area of the continental shelf south of Cape Cod from the Great South Channel to Hudson Canyon. The Mid-Atlantic Bight consists of the sandy, relatively flat, gently sloping continental shelf from southern New England to Cape Hatteras, North Carolina. The shelf slopes gently from shore out to 62 - 124 ft (100 - 200 km) offshore, where it transforms to the slope (328 - 656 ft. [100 - 200 m water depth]) at the shelf break. In both the Mid-Atlantic Bight and on Georges Bank, numerous canyons incise the slope, and some cut up onto the shelf itself (Stevenson, et al. 2004). Like the rest of the continental shelf, sea level fluctuations during past ice ages largely shaped the topography of the Mid-Atlantic Bight. Since that time, currents and waves have modified this basic structure.

The sediment type covering most of the shelf in the Mid-Atlantic Bight is sand, with some relatively small, localized areas of sand-shell and sand-gravel. Silty sand, silt, and clay predominate on the slope. Permanent sand ridges occur in groups with heights of about 33 ft. (10 m), lengths of 6 - 31 mi (10 - 50 km), and spacing of 1 mi (2 km). The sand ridges are usually oriented at a slight angle towards shore, running in length from northeast to southwest. Sand ridges are often covered with smaller similar forms such as sand waves, megaripples, and ripples. Sand waves are usually found in patches of 5 - 10 with heights of about 7 ft. (2 m), lengths of 164 - 328 ft. (50 - 100 m), and 0.6 - 1 mi (1 - 2 km) between patches. Sand waves are temporary features that form and re-form in different locations. They usually occur on the inner shelf, especially in areas like Nantucket Shoals where there are strong bottom currents. Because tidal currents southwest of Nantucket Shoals and southeast of Long Island and Rhode Island slow significantly, there is a large mud patch on the seafloor where silts and clays settle out.

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

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

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

2. The "silty sand fauna" zone is dominated by amphipods and polychaetes and occurs immediately offshore from the sand fauna zone, in stable sands containing a small amount of silt and organic material.
3. Silts and clays become predominant at the shelf break and line the Hudson Shelf Valley supporting the "silt-clay fauna."

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

Colvocoresses and Musick (1984) identified the following assemblages in the Mid-Atlantic sub region during spring and fall.[4]

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

6.1.4 Habitat Requirements for Groundfish

Habitats provide living things with the basic life requirements of nourishment and shelter. This ultimately provides for both individual and population growth. The quantity and quality of available habitat influences the fishery resources of a region. Depth, temperature, substrate, circulation, salinity, light, dissolved oxygen, and nutrient supply are important parameters of a given habitat. These parameters determine the type and level of resource population that the habitat supports. Table 15 briefly summarizes the habitat requirements for each of the large-mesh groundfish species/stocks managed by the Northeast Multispecies FMP. Information for this table was extracted from the original Northeast Multispecies FMP and profiles available from NMFS. EFH information for egg, juvenile, and adult life stages for these species was compiled from Stevenson et al. 2004 (Table 15). Note that EFH for the egg stage was included for species that have a demersal egg stage (winter flounder and ocean pout); eggs of all other species are found either in the surface waters, throughout the water column, or are retained inside the parent until larvae hatch. The egg habitats of these species are therefore not generally subject to interaction with gear and are not listed in Table 15.

6.1.5 Essential Fish Habitat Designations

The Sustainable Fisheries Act defines EFH as "[t]hose waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The proposed action could potentially affect EFH for benthic life stages of species that are managed under the Northeast Multispecies FMP; as well as EFH for species managed under the Atlantic Sea Scallop; Monkfish; Northeast Skate Complex; Atlantic Herring; Summer Flounder, Scup, and Black Sea Bass; Golden Tilefish; Atlantic Mackerel, Squid, and Butterfish; and Atlantic Surfclam and Ocean Quahog FMPs. EFH for deep-sea red crab is designated beyond the operating depths of the multispecies fishery. EFH for the species managed under these FMPs

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

includes a wide variety of benthic habitats in state and federal waters throughout the Northeast U.S. shelf ecosystem. Table 15 summarizes the EFH text descriptions for all the benthic life stages of the species managed under the Northeast Multispecies FMP. Full text descriptions and maps are available in Volume 2 of Omnibus Habitat Amendment 2 (OHA2) (http://www.nefmc.org/library/omnibus-habitat-amendment-2). Interactive maps of EFH for each species and life stage are available on NOAA EFH Mapper http://www.habitat.noaa.gov/protection/efh/efhmapper/index.html. The mapper will be updated to reflect changes proposed in OHA2 once the amendment is published.

Table 15 - 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. Based on updated OHA2 EFH designations. See OHA2 Vol. 2 and Appendix B for details.

Species	Geographic Region	Food Source	Essential Fish Habitat		Commercial Fishing Gear Used
			Water Depth	**Substrate**	
Atlantic Cod	Gulf of Maine, Georges Bank and southward, including bays and estuaries	Crustaceans, fish, squid (adults)	(J): Intertidal to 120 m (A): 30-160 m	(J): Structurally-complex habitats, including eelgrass, mixed sand and gravel, and rocky habitats (gravel pavements, cobble, and boulder) with and without attached macroalgae and emergent epifauna, are essential habitats for juvenile cod. In inshore waters, young-of-the-year juveniles prefer gravel and cobble habitats and eelgrass beds after settlement, but in the absence of predators also utilize adjacent un-vegetated sandy habitats for feeding (A): Structurally complex hard bottom habitats composed of gravel, cobble, and boulder substrates with and without emergent epifauna and macroalgae are essential habitats for adult cod. Adult cod are also found on sandy substrates and frequent deeper slopes of ledges along shore	Otter trawl, bottom longlines, gillnets
Haddock	Gulf of Maine, Georges Bank, and Southern New England	Amphipods, polychaetes, echinoderms, bivalves, cnidarians (adults), and fish	(J): 40-140 m (A): 50-160 m	(J/A): Hard sand (particularly smooth patches between rocks), mixed sand and shell, gravelly sand, and gravel	Otter trawl, bottom longlines, gillnets
Acadian redfish	Gulf of Maine, continental slope south of Georges Bank	Crustaceans, larvaceans, fish (adults)	(J): 50-200 m GOM, to 600 m on slope (A): 140-300 m GOM, to 600 m on slope	(J): Bottom habitats of complex rocky reef substrates with associated structure-forming epifauna (e.g., sponges, corals), and soft sediments with cerianthid anemones (A): Finer grained bottom sediments and variable deposits of clays, silts, gravel, and boulders with associated structure-forming	Otter trawl

				epifauna (e.g. corals, sponges, cerianthid anemones, sea pens)	
Pollock	Gulf of Maine, Georges Bank, and Southern New England, including bays and estuaries	Juveniles: chaetognaths, amphipods, euphausiids, squid. Adults: nematodes, amphipods, euphausiids, decapods, squids, fish	(J): Intertidal to 180 m (A): 80-300 m (shallower in south)	(J): Rocky bottom habitats with attached macroalgae (rockweed and kelp) that provide refuge from predators. Shallow water eelgrass beds for young-of-the-year pollock in the Gulf of Maine (A): Tops and edges of offshore banks and shoals (e.g., Cashes Ledge) with mixed rocky substrates, often with attached macro algae	Otter trawl, gillnets
Atlantic Halibut	Gulf of Maine, Georges Bank	Crustaceans, fish, squid	(J/A): 60-140 m (to 700 m on slope); nursery grounds 20-60 m	(J/A): Sand, gravel, or clay substrates; nursery grounds in sandy, coastal areas	Otter trawl bottom longlines
Ocean Pout	Gulf of Maine, Georges Bank, Southern New England, Middle Atlantic north of Cape May, NJ, including bays and estuaries	Juveniles feed on amphipods, polychaetes, scallops, brittle stars. Adults feed on decapods, amphipods, mollusks, brittle stars, sea urchins	(E): < 100 m (L): intertidal to 120 m (A) 20-140 m	(E): Generally hard bottom sheltered nests, holes or crevices where juveniles are guarded (J): Variety of substrates, including shells, rocks, algae, soft sediments, sand, and gravel (A): Mud and sand, particularly in association with structure forming habitat types; i.e. shells, gravel, or boulders. Burrow in soft sediments.	Otter trawl
White hake	Gulf of Maine, Georges Bank, Southern New England, including bays and estuaries	Juveniles feed mostly on polychaetes and crustaceans; adults feed mostly on crustaceans, squids and fish	(J): intertidal to 300 m (A): 100-400 m, shallower in certain bays/estuaries; to 900 m on slope	(J): Fine-grained sand, vegetated or un-vegetated; older juveniles in deeper water (A): Fine-grained, muddy substrates and in mixed soft and rocky habitats	Otter trawl, gillnets
Yellowtail flounder	Gulf of Maine, Southern New England, Georges Bank	Amphipods, decapods, cnidarians, and polychaetes	(J): 20-80 m (40-70 mid-Atlantic) (A): 25-90 m	(J): Sand and muddy sand (A): Sand and sand with mud, shell hash, gravel, and rocks	Otter trawl
American plaice	Gulf of Maine, Georges Bank, including coastal bays and estuaries	Polychaetes, crustaceans, mollusks, echinoderms, nematodes (juveniles), Atlantic herring (adults)	(J): 40-180 m (A): 40-300 m	(J/A): Soft bottom substrates (mud and sand), also found on gravel and sandy substrates bordering bedrock	Otter trawl

Witch flounder	Gulf of Maine, Georges Bank, Mid-Atlantic Bight/Southern New England	Mostly polychaetes, juveniles feed on amphipods	(J): 50-400 m GOM; to 1500 m on slope (A): 35-400 m GOM; to 1500 m on slope	(J/A): Mud and muddy sand	Otter trawl
Winter flounder	Gulf of Maine, Georges Bank, Southern New England, Mid-Atlantic Bight, including estuaries and bays	Polychaetes, crustaceans, cnidarians, mollusks	(J): Intertidal to 60 m (A): Intertidal to 70 m	(J) Mud, sand, rocky substrates with macroalgae, tidal wetlands, eelgrass. YOY inshore on mud/sand, adjacent to vegetated areas. Older juveniles in coarser grained substrates. (A): Mud, sand, and hard bottom on offshore banks; inshore spawning grounds	Otter trawl, gillnets
Atlantic wolffish	Gulf of Maine & Georges Bank	Mollusks, brittle stars, crabs, and sea urchins	(J): 70-184 m (A): Sub-tidal to 173 m	(J): No strong substrate preference (A): Variety of sand/gravel substrates, spawning in rocky habitats	Otter trawl, bottom longlines, and gillnets
Window pane flounder	Gulf of Maine to Cape Hatteras	Juveniles mostly crustaceans; adults feed on crustaceans and fish	(J): Intertidal to 60 m (A): Intertidal to 70 m	(J/A): Mud and sand substrates (sand preferred by YOY juveniles)	Otter trawl

6.1.6 Gear Types and Interaction with Habitat

A variety of gears are used to prosecute the multispecies fishery (Table 16). Groundfish vessels fish for target species with a number of gear types: trawl, gillnet, and hook and line gear (including jigs, handline, and non-automated demersal longlines). This section discusses the characteristics of each of the gear types, as well as the typical impacts to the physical habitat associated with each of these gear types. 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. The Council's recently published Omnibus Habitat Amendment 2 includes an assessment of relative habitat vulnerability to the gear types used in the northeast region.

Table 16 - Description of the gear types used by the multispecies fishery

	Trawl	Sink/Anchor Gillnets	Bottom Longlines	Hook and Line
Total Length	Varies	295 ft. (90 m) long per net	~1,476 ft. (451 m)	Varies by target species
Lines	N/A	Leadline and floatline with webbing (mesh) connecting	Mainline is parachute cord. Gangions (lines from mainline to hooks) are 15 in (38 cm) long, 3 - 6 in (8 to 15 cm) apart, and made of shrimp twine	One to several with mechanical line fishing
Nets	Rope or large-mesh size, depends upon target species	Monofilament, mesh size depends on the target species (groundfish nets minimum mesh size of 6.5 in [16.5 cm])	No nets, but 12/0 circle hooks are required	No nets, but single to multiple hooks, "umbrella rigs"
Anchoring	N/A	22 lbs (10 kg) Danforth-style anchors are required at each end of the net string	20-24 lbs (9-11 kg) anchors, anchored at each end, using pieces of railroad track, sash weights, or Danforth anchors, depending on currents	No anchoring, but sinkers used (stones, lead)
Frequency/ Use Duration	Tows last for several hours	Frequency of trending changes from daily (when targeting groundfish) to semi-weekly (when targeting monkfish and skate)	Usually set for a few hours at a time	Depends upon cast/target species

6.1.6.1 Trawl Gear

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

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

A flatfish trawl is a type of bottom otter trawl designed with a low net opening between the headrope and the footrope and more ground rigging on the sweep. This type of trawl is designed so that the sweep follows the contours of the bottom. As flounders lie in contact with the seafloor, these animals respond to the bottom-tending sweep by swimming up off the bottom where they can be entrained into net. Flatfish trawls are used on smooth mud and sand bottoms. A high-rise or fly net with larger mesh has a wide net opening and is used to catch demersal fish that tend to rise higher off the bottom than flatfish (NEFSC 2002).

Bottom otter trawls are rigged with rockhopper gear for use on "hard" bottom (i.e., gravel or rocky bottom), mud or sand bottom with occasional boulders. This type of gear seeks to sweep over irregularities in the bottom without damaging the net. The sweep in trawls rigged for fishing on smooth bottoms looks to herd fish into the path of the net (Mirarchi 1998).

The raised-footrope trawl was designed to provide vessels with a means of continuing to fish for small-mesh species without catching groundfish. Raised-footrope trawls fish about 1.6 - 2.0 ft. (0.5 - 0.6 m) above the bottom. Although the doors of the trawl still ride on the bottom, underwater video and observations in flume tanks have confirmed that the sweep in the raised-footrope trawl has much less contact with the seafloor than the traditional cookie sweep (Carr & Milliken 1998).

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

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

6.1.6.2 Gillnet Gear

In addition to trawl gear, the fishery is also prosecuted using gillnets. A bottom gillnet is a large wall of netting equipped with floats at the top and lead weights along the bottom. Bottom gillnets are anchored or staked in position. Fish are caught while trying to pass through the net mesh. Gillnets are highly selective because the species and sizes of fish caught are dependent on the mesh size of the net. The meshes of individual gillnets are uniform in size and shape, hence highly selective for a particular size of fish (Jennings et al. 2001). Bottom gillnets are fished in two different ways, as "standup" and "tiedown" nets (Williamson 1998). Standup nets typically catch Atlantic cod, haddock, pollock, and hake and are soaked (duration of time the gear is set) for 12 - 24 hours. Tiedown nets are set with the floatline tied to the leadline at 6-ft (1.8 m) intervals, so that the floatline is close to the bottom and the net forms a limp bag between each tie. They are left in the water for 3-4 days, and are used to catch flounders and monkfish.

Individual sink/anchor gillnets which are about 295 ft. (90 m) long. They are usually fished as a series of 5 - 15 nets attached end-to-end. A vast majority of “strings” consist of 10 gillnets. Gillnets typically have

three components: the leadline, webbing, and floatline. In New England, leadlines are approximately 66 lbs/net (30 kg/net). Webs are monofilament, with the mesh size depending on the species of interest. Nets are anchored at each end using materials such as pieces of railroad track, sash weights, or Danforth anchors, depending on currents. Anchors and leadlines have the most contact with the bottom. For Northeast groundfish, gillnets are tended daily to semiweekly (NEFSC 2002c).

6.1.6.3 Fish Traps and Pots

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

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

6.1.6.4 Hook and Line Gear

6.1.6.4.1 Hand Lines/Rod and Reel

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

6.1.6.4.2 Mechanized Line Fishing

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

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

6.1.6.4.3 Bottom Long Lines

Sectors would also use bottom longlines. This gear consists of a long length of line to which short lengths of line ("gangions") carrying baited hooks are attached. Longlining is undertaken for a wide range of bottom species. Bottom longlines typically have up to six individual longlines strung together for a total length of more than 1,476 ft. (450 m) and are deployed with 20 - 24 lbs (9 - 11 kg) anchors. The mainline is a parachute cord. Gangions are typically 16 in (40 cm) long and 3 - 6 in (1 - 1.8 m) apart and are made of shrimp twine. These bottom longlines are usually set for a few hours at a time (NEFSC 2002c).

All hooks must be 12/0 circle hooks. A “circle hook is a hook with the point turned back towards the shank. The barbed end of the hook is displaced (offset) relative to the parallel plane of the eyed-end or shank of the hook when laid on its side. Habitat impacts from bottom long lines are negligible.

6.1.6.5 Gear Interaction with Habitat

The Council has included habitat impacts assessments in its fishery management plans since the early 2000s. Amendment 13 (NEFMC 2003) included a comprehensive evaluation of gear effects on habitat . The amendment described the general effects of bottom trawls on benthic marine habitats. This analysis primarily used an advisory report prepared for the International Council for the Exploration of the Seas (ICES 2000). The report generally concluded that: (1) low-energy environments are more affected by bottom trawling; and (2) bottom trawling affects the potential for habitat recovery (i.e., after trawling ceases, benthic communities and habitats may not always return to their original pre- impacted state).

The Committee on Ecosystem Effects of Fishing for the National Research Council’s Ocean Studies Board (NRC 2002) prepared an evaluation of the habitat effects of trawling and dredging that was also evaluated during Amendment 13. This report identified four general conclusions regarding the types of habitat modifications caused by bottom trawls:

- Trawling reduces habitat complexity;
- Repeated trawling results in discernible changes in benthic communities;
- Bottom trawling reduces the productivity of benthic habitats; and
- Fauna that live in low natural disturbance regimes are generally more vulnerable to fishing gear disturbance.

In 2002, NEFMC and MAMFC convened a regional workshop to evaluate the existing scientific research on the effects of fishing gear on benthic habitats; determine the degree of impact from various gear types on benthic habitats in the Northeast; specify the type of evidence that is available to support the conclusions made about the degree of impact; rank the relative importance of gear impacts to various habitat types; and provide recommendations on measures to minimize those adverse impacts. The panel was provided with a summary of available research studies that summarized information relating to the effects of bottom otter trawls, bottom gillnets, and bottom longlines. Relying on this information plus professional judgment, the panel identified the effects and the degree of impact of these gears on mud, sand, and gravel/rock habitats.

In general, the panel determined that impacts from trawling are greater in gravel/rock habitats with attached epifauna. The panel ranked impacts to biological structure higher than impacts to physical structure. Effects of trawls on major physical features in mud (deep water clay-bottom habitats) and gravel bottom were described as permanent. Impacts to biological and physical structure were given recovery times of months to years in mud and gravel. Impacts of trawling on physical structure in sand were estimated to be of shorter duration (days to months) given the exposure of most continental shelf

sand habitats to strong bottom currents and/or frequent storms. Impacts of sink gillnets and bottom longlines on sand and gravel habitats were estimated to be less than bottom trawl impacts. The duration of impacts to physical structures from these gear types would be expected to last days to months on soft mud, but could be permanent on hard bottom clay structures along the continental slope. Impacts to mud would be caused by gillnet lead lines and anchors. Physical habitat impacts from sink gillnets and bottom longlines on sand would not be expected. The workshop report (NEFSC 2002c) noted that factors such as frequency of disturbance from fishing and from natural events are important when evaluating impacts.

The Council's Omnibus Essential Fish Habitat Amendment 2 (OHA2) evaluated existing habitat management areas and developed new habitat management areas. To assist with this effort, the Habitat PDT developed an analytical approach to characterize and map habitats and to assess the extent to which different habitat types are vulnerable to different types of fishing activities. This body of work, termed the Swept Area Seabed Impact approach, includes a quantitative, spatially-referenced model that overlays fishing activities on habitat through time to estimate both potential and realized adverse effects to EFH. The approach is summarized in Volume 1 of the FEIS and detailed in Appendix D. Both documents are available at http://www.nefmc.org/library/omnibus-habitat-amendment-2. The SASI approach builds on previous fishing impacts assessments including the 2002 workshop, and reached similar conclusions, but made the assessment more explicitly spatial. This spatial approach facilitated the use of the assessment when developing management areas.

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

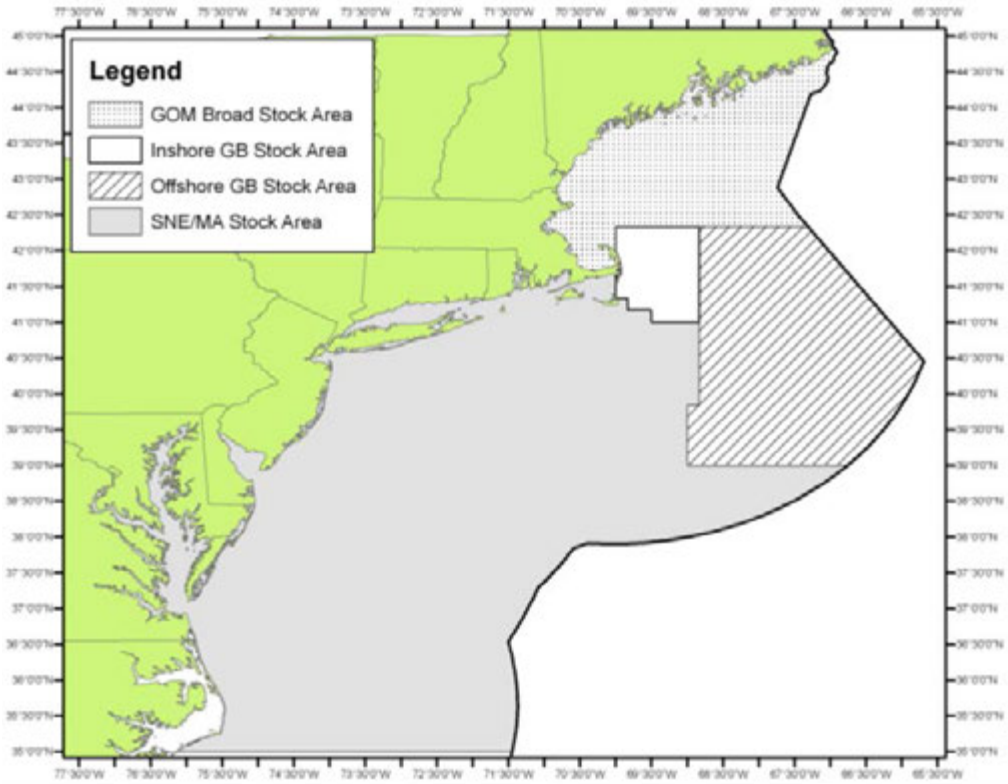
One of the outputs of the model is habitat vulnerability, which is related in part to the characteristics of the habitat itself, and part to the quality of the impact. Because of a general need for attachment sites, epifauna that provided a sheltering function for managed species tend to be more diverse and abundant in habitats containing larger grain sized substrates. Consistent with previous findings, the literature review completed to support the SASI model found that structurally complex and/or long-lived epifaunal species are more susceptible to gear damage and slower to recover to impacts from mobile gears, including trawls and dredges. Recovery rates were assumed to be slower in low energy areas, such that overall vulnerability (susceptibility + recovery) of low energy areas is greater than high energy areas, other factors being equal. Of the mobile gears, hydraulic dredges were estimated to have the greatest per unit area impact, with lower and similar per unit area impacts associated with bottom otter trawls and scallop dredges. Although the literature on fixed gear impacts is relatively sparse, it was estimated that mobile gears have a greater per-unit area swept impact than fixed gears. Again, this was consistent with previous findings. Combining the SASI vulnerability assessment and spatial model, gravel habitats on Georges Bank and in the Gulf of Maine were identified as vulnerability hotspots for all gear types, with moderate vulnerability in deeper, low energy habitats in the Gulf of Maine and along the continental margin, and lower vulnerability in sand habitats on Georges Bank, in Southern New England, and in the Mid-Atlantic Bight.

6.2 Regulated Groundfish Species

This section describes the life history and stock population status for each allocated fish stock harvested under the Northeast Multispecies FMP. Figure 3 identifies the four broad stock areas used in the fishery. Further information on life history and habitat characteristics of the stocks managed in this FMP can be found in the Essential Fish Habitat Source Documents at http://www.nefsc.noaa.gov/nefsc/habitat/efh/.

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

Figure 3 - Northeast Multispecies Broad Stock Areas



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

The following discussions have been adapted from the most recent stock assessment reports (NEFSC 2015 and NEFSC 2016). Table 17 summarizes the status of the northeast groundfish stocks as of the most recent operational assessments, noting which groundfish stocks are overfished or are experiencing overfishing.

Table 17 - Status of Northeast Groundfish stocks for FY2016

Stock	2015 Assessment		**2016 Assessments**	
	Overfishing?	Overfished?	Overfishing?	Overfished?
Georges Bank Cod	Unknown	Yes		
Gulf of Maine Cod	Yes	Yes		
Georges Bank Haddock	No	No		
Gulf of Maine Haddock	No	No		
Georges Bank Yellowtail Flounder	Unknown	Unknown	Unknown	Unknown
Southern New England/Mid-Atlantic Yellowtail Flounder	Yes	Yes		
Cape Cod/Gulf of Maine Yellowtail Flounder	Yes	Yes		
American Plaice	No	No		
Witch Flounder	Yes	Yes	Unknown	Unknown
Georges Bank Winter Flounder	Yes	Yes		
Gulf of Maine Winter Flounder	No	Unknown		
Southern New England/Mid-Atlantic Winter Flounder	No	Yes		
Acadian Redfish	No	No		
White Hake	No	No		
Pollock	No	No		
Northern Windowpane Flounder	No	Yes		
Southern Windowpane Flounder	No	No		
Ocean Pout	No	Yes		
Atlantic Halibut	Unknown	Yes		
Atlantic Wolffish	No	Yes		

6.2.1 Gulf of Maine Cod

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

Population Status. The inshore GOM stock appears to be relatively distinct from the offshore cod stocks on the banks of the Scotian Shelf and Georges Bank based on tagging studies. GOM cod spawning stock biomass is estimated to have been just over 22,000 mt in 1982. After a period of decline in the 1980's, SSB returned to roughly 20,000 mt in 1990 before decreasing again in the 1990's. The use of separate assessment models (M=0.2 and M-ramp) in the last three assessments yield two estimates for SSB in recent years, though both indicate a sharp decline in SSB since 2010, when SSB was estimated at 8,638 mt and 10,645 mt (respectively). The stock remains low relative to historic levels and is subject to a formal stock rebuilding plan. The 2014 SSB estimates (M=0.2 and M-ramp models) are 2,225 mt and

2,536 mt (respectively), which are 6% and 4% (respectively) of the biomass target. The 2014 fully selected fishing mortality was estimated to be 0.956 and 0.932, which is 517% and 498% of the F_{MSY} proxy (respectively) (NEFSC 2015). Currently, the GOM cod stock is overfished and overfishing is occurring (NEFSC 2015).

6.2.2 Georges Bank Cod

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

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

6.2.3 Gulf of Maine Haddock

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

Population Status. The GOM haddock underwent a benchmark assessment in 2014 at SAW 59, which indicated that the stock was not overfished, and overfishing was not occurring. The 2013 SSB was estimated at 4,153 mt, above the <2,452 mt overfishing threshold, a change from the 2012 assessment

update when the stock was experiencing overfishing (NEFSC 2014). As of the 2015 groundfish operational assessments, the stock is not overfished and overfishing is not occurring, with 2014 SSB estimated to be at 10,325 mt, which is 223% of the biomass target (NEFSC 2015).

6.2.4 Georges Bank Haddock

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

Population Status. The GB haddock stock is a transboundary stock co-managed by the U.S. and Canada. The stock is not overfished and overfishing is not occurring (NEFSC 2015). There has been a steady increase in SSB from ~15,000 mt in the early 1990s, to about 252,000 mt in 2007. The dramatic increase 2005 - 2007 is due to the exceptionally large 2003 year class reaching maturity. From 2007 - 2010, SSB decreased 35% as that 2003 year class decreased due to natural and fishing mortality. The fishing mortality rate for this stock has been low in recent years. Substantial declines have recently occurred in the weights at age due to slower than average growth. This was particularly true of the 2003 year-class. This decline is affecting productivity in the short-term. The growth of subsequent year-classes is returning to the earlier rates (NEFSC 2012b). The retrospective adjusted 2014 SSB was estimated to be at 150,053 mt, which is 139% of the biomass target (NEFSC 2015).

6.2.5 American Plaice

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

Population Status. In the Gulf of Maine and Georges Bank, the American plaice is not overfished and overfishing is not occurring (NEFSC 2015). The NEFMC adopted a revised rebuilding strategy through FW 51, which would rebuild the stock in 10 years with a 50 percent (median) probability of success by 2024 (NEFMC 2014). The retrospective adjusted spawning stock biomass in 2014 was estimated to be at 10,977 mt, which is 84% of the biomass target (NEFSC 2015).

6.2.6 Witch Flounder

Life History. Witch flounder, *Glyptocephalus cynoglossus*, is a demersal flatfish distributed on both sides of the North Atlantic. In the western North Atlantic, the species ranges from Labrador southward, and closely associates with mud or sand-mud bottom. In U.S. waters, witch flounder are common throughout the Gulf of Maine, in deeper areas on and adjacent to Georges Bank, and along the shelf edge as far south

as Cape Hatteras, North Carolina. Witch flounder is managed as a unit stock. Spawning occurs at or near the bottom; however, the buoyant eggs rise into the water column where subsequent egg and larval development occurs. The pelagic stage of witch flounder is the longest among the species of the family *Pleuronectidae*. Descent to the bottom occurs when metamorphosis is complete, at 4 - 12 months of age. There has been a decrease in both the age and size of sexual maturity in recent years. Witch flounder spawn from March to November, with peak spawning occurring in summer. The general trend is for spawning to occur progressively later from south to north. In the Gulf of Maine-Georges Bank region, spawning occurs from April to November, and peaks from May to August. Spawning occurs in dense aggregations that are associated with areas of cold water. Witch flounder spawn at 32 - 50 °F (0 – 10 °C) (NEFSC 2011c).

Population Status. The witch flounder stock status is unknown due to a lack of biological reference points. The 2016 benchmark assessment (SARC 62) peer review panel did not accept the analytical assessment models for witch flounder (NEFSC 2017). The 2015 operational assessment update concluded that the stock was overfished and that was overfishing was occurring (NEFSC 2015), but this was based on results of a VPA model that the panel also rejected during the SARC 62 peer review process. The 2016 peer review concluded that the age-structured assessment models (VPA, ASAP, and SCAA) had major retrospective patterns in the estimates that prevent their use for status evaluation and determination of catch advice. Because a stock assessment model framework is lacking, no historical estimates of biomass, fishing mortality rate, or recruitment can be calculated. Status determination relative to reference points is not possible because reference points cannot be defined. In the absence of an assessment model, an area-swept empirical approach indicates the stock is at low historical levels and stock biomass has declined since 2002. The fishery landings and survey catch by age indicate a truncation of age structure and a reduction in the number of old fish in the population (NEFSC 2017).

6.2.7 Gulf of Maine Winter Flounder

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

Population Status. Gulf of Maine winter flounder overfished status is unknown, and overfishing is not occurring. The overfished status remains unknown because a biomass reference point or proxy cannot be determined without an assessment model, and an analytical assessment model has not been accepted since the last benchmark (NEFSC 2015). In the absence of an assessment model, an area-swept empirical approach is used to estimate the abundance of 30+ cm biomass based on state and federal surveys, which was estimated at 4,655 mt for 2014 biomass (NEFSC 2015).

6.2.8 Georges Bank Winter Flounder

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

Population Status: Based on the 2015 operational assessment, the Georges Bank winter flounder stock is overfished and overfishing is occurring (NEFSC 2015). This was a change from the 2014 assessment in which the stock was not overfished and overfishing was not occurring, due to a worsening of the retrospective error associated with fishing mortality and SSB (NEFSC 2014). The retrospective adjusted spawning stock biomass in 2014 was estimated to be 2,883 mt, which is 43% of SSB_{MSY}. The 2014 fully selected fishing mortality was estimated to be 0.778, which is 145% of the F_{MSY} proxy (NEFSC 2015).

6.2.9 Southern New England/Mid-Atlantic Winter Flounder

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

Population Status: Based on the 2015 operational assessment, the SNE/MA winter flounder stock is overfished but overfishing is not occurring. The 2014 spawning stock biomass was estimated to be 6,151 mt, which is 23% of SSB_{MSY} (NEFSC 2015).

6.2.10 Cape Cod/Gulf of Maine Yellowtail Flounder

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

Population Status: Based on the 2015 operational assessment, the CC/GOM yellowtail flounder stock is overfished and overfishing is occurring. The retrospective adjusted 2014 spawning stock biomass was estimated to be 857 mt, which is 16% of the biomass target. The 2014 fully selected fishing mortality was estimated to be 0.64, which is 229% of the F_{MSY} proxy (NEFSC 2015).

6.2.11 Georges Bank Yellowtail Flounder

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

Population Status: The Georges Bank yellowtail flounder stock is a transboundary stock co-managed by the U.S. and Canada. The GB yellowtail flounder stock status is unknown due to a lack of biological reference points. Because a stock assessment model framework is lacking, no historical estimates of biomass, fishing mortality rate, or recruitment can be calculated. Status determination relative to reference

points is not possible because reference points cannot be defined. In the absence of an assessment mode, an empirical approach based on survey catches indicates stock condition is poor, given a declining trend in survey biomass despite reductions in catch to historical low levels. Total catch has declined in recent years and is at the lowest value in the time series. The stock has been experiencing below average recruitment and a truncation of age structure. Stock biomass is low and productivity is poor (TRAC 2016).

6.2.12 Southern New England/Mid-Atlantic Yellowtail Flounder

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

Population: Based on the 2015 operational assessment, the SNE/MA yellowtail flounder stock is overfished and overfishing is occurring (NEFSC 2015). This is a change from the 2012 assessment update when the stock was not overfished and overfishing was not occurring (NEFSC 2014). The 2014 spawning stock biomass was estimated to be 502 mt, which is 26% of the biomass target. The 2014 fully selected fishing mortality was estimated to be 1.64, which is 469% of the F_{MSY} proxy (NEFSC 2015). The stock is experiencing increased catches relative to the stock biomass and very low recruitment of young fish, resulting in low adult biomass. Should this pattern of poor recruitment continue into the future, the ability of the stock to recover will be impeded (NEFSC 2015).

6.2.13 Acadian Redfish

Life History: The Acadian redfish, *Sebastes fasciatus Storer*, and the deepwater redfish, *S. mentella Travin*, are virtually indistinguishable from each other based on external characteristics. Deepwater redfish are less prominent in the more southerly regions of the Scotian Shelf and appear to be virtually absent from the Gulf of Maine. Conversely, Acadian redfish appear to be the sole representative of the genus Sebastes. NMFS manages Acadian redfish inhabiting the U.S. waters of the Gulf of Maine and deeper portions of Georges Bank and the Great South Channel as a unit stock. The redfish are a slow growing, long-lived, ovoviviparous species with an extremely low natural mortality rate. Redfish fertilize their eggs internally. The eggs develop into larvae within the oviduct, and are released near the end of the yolk sac phase. The release of larvae lasts for 3 to 4 months with a peak in late May to early June. Newly spawned larvae occur in the upper 10 m of the water column; at 0.4 to 1.0 in (10 to 25 mm). The post-larvae descend below the thermocline when about 1 in (25 mm) in length. Young-of-the-year are pelagic until reaching 1.6 to 2.0 in (40 to 50 mm) at 4 to 5 months old. Therefore, young-of-the-year typically move to the bottom by early fall of their first year. Redfish of 9 in (22 cm) or greater are considered adults. In general, the size of landed redfish positively correlates with depth. This may be due to a combination of differential growth rates of stocks, confused species identification (deepwater redfish are a larger species), size-specific migration, or gender-specific migration (females are larger). Redfish make diurnal vertical migrations linked to their primary euphausiid prey.

Population Status: Based on the 2015 operational assessment, the redfish stock is not overfished and overfishing is not occurring. The retrospective adjusted spawning stock biomass in 2014 was estimated to be 330,004 mt, which is 117% of the biomass target (NEFSC 2015).

6.2.14 Pollock

Life History: Pollock, *Pollachius virens*, occur on both sides of the North Atlantic. In the western North Atlantic, the species is most abundant on the western Scotian Shelf and in the Gulf of Maine. There is considerable movement of pollock between the Scotian Shelf, Georges Bank, and the Gulf of Maine. Although some differences in meristic and morphometric characters exist, there are no significant genetic differences among areas. As a result, pollock are assessed as a single unit. The principal pollock spawning sites in the western North Atlantic are in the western Gulf of Maine, Great South Channel, Georges Bank, and on the Scotian Shelf. Spawning takes place from September to April. Spawning time is more variable in northern sites than in southern sites. Spawning occurs over hard, stony, or rocky bottom. Spawning activity begins when the water column cools to near 46 °F (8°C) and peaks when temperatures are approximately 40 to 43 °F (4.5 to 6°C). Thus, most spawning occurs within a comparatively narrow range of temperatures. Pollock eggs are buoyant and rise into the water column after fertilization. The pelagic larval stage lasts for 3 to 4 months. At this time the small juveniles or "harbor pollock" migrate inshore to inhabit rocky subtidal and intertidal zones. Pollock then undergo a series of inshore-offshore movements linked to temperature until near the end of their second year. At this point, the juveniles move offshore where the pollock remain throughout the adult stage. Pollock are a schooling species and occur throughout the water column. With the exception of short migrations due to temperature changes and north-south movements for spawning, adult pollock are fairly stationary in the Gulf of Maine and along the Nova Scotian coast. Male pollock reach sexual maturity at a larger size and older age than females.

Population Status: Based on the 2015 operational assessment, the pollock stock is not overfished and overfishing is not occurring. The retrospective adjusted spawning stock biomass in 2014 was estimated to be 154,919 mt, which is 147% of the biomass target (NEFSC 2015).

6.2.15 White Hake

Life History: The white hake, *Urophycis tenuis*, occurs from Newfoundland to southern New England and is common on muddy bottom throughout the Gulf of Maine. The depth distribution of white hake varies by age and season. Juvenile white hake typically occupy shallower areas than adults, but individuals of all ages tend to move inshore or shoalward in summer and disperse to deeper areas in winter. The northern spawning group of white hake spawns in late summer (August-September) in the southern Gulf of St. Lawrence and on the Scotian Shelf. The timing and extent of spawning in the Georges Bank - Middle Atlantic spawning group has not been clearly determined. The eggs, larvae, and early juveniles are pelagic. Older juvenile and adult white hake are demersal. The eggs are buoyant. Pelagic juveniles become demersal at 2.0 to 2.4 in (50 - 60 mm) total length. The pelagic juvenile stage lasts about two months. White hake attain a maximum length of 53 in (135 cm) and weigh up to 49 lbs (22 kg). Female white hake are larger than males (NEFSC 2013b).

Population Status: Based on the 2015 operational assessment, the white hake stock is not overfished and overfishing is not occurring. The 2014 spawning stock biomass is estimated to be 28,553 mt, which is 88% of the biomass target (NEFSC 2015). The stock has not rebuilt as the projections from the last assessment indicated, due to the retrospective pattern in recruitment. Spawning stock biomass has shown a general increasing trend since 2005 (NEFSC 2015).

6.2.16 Gulf of Maine/Georges Bank Windownpane Flounder

Life History: Windowpane flounder or sand flounder, *Scophthalmus aquosus*, is a left-eyed, flatfish species that occurs in the northwest Atlantic from the Gulf of St. Lawrence to Florida (Collette & Klein-

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

Population Status: Based on the 2015 operational assessment, the northern windowpane flounder stock is overfished but overfishing is not occurring (NEFSC 2015). This is a change from the 2012 assessment update when the stock was overfished and overfishing was occurring (NEFSC 2012). The stock has been experiencing stable-to-decreasing catch since 2008, and an increasing trend in the survey index since 2010 (NEFSC 2015).

6.2.17 Southern New England/Mid-Atlantic Windownpane Flounder

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

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

6.2.18 Ocean Pout

Life History: Ocean pout, *Zoarces americanus*, is a demersal eel-like species found in the northwest Atlantic from Labrador to Delaware. Ocean pout are most common on sand and gravel bottom (Orach-Meza 1975) at depths of 49-262 ft (15-80 m) and temperatures of 43º-48º F (6º-9º C) (Scott 1982). In US waters, ocean pout are assessed and managed as a unit stock from the Gulf of Maine to Delaware. In the Gulf of Maine, median length at maturity for males and females is 11.9 in (30.3 cm) and 10.3in (26.2 cm), respectively. Median length at maturity for males and females from Southern New England is 12.6 in (31.9 cm) and 12.3in (31.3 cm), respectively (O'Brien, et al. 1993). According to tagging studies conducted in Southern New England, ocean pout appear not to migrate, but do move between different substrates seasonally. In Southern New England-Georges Bank they occupy cooler rocky areas in summer, returning in late fall (Orach-Meza 1975). In the Gulf of Maine, they move out of inshore areas in

the late summer and then return in the spring. Spawning occurs between September and October in Southern New England (Olsen & Merriman 1946) and in August and September in Newfoundland (Keats et al. 1985). Adults aggregate in rocky areas prior to spawning. Eggs are internally fertilized (Mercer et al. 1993; Yao & Crim 1995) and females lay egg masses encased in a gelatinous matrix that they then guard during the incubation period of 2.5-3 months (Keats, et al. 1985). Ocean pout hatch as juveniles on the bottom and are believed to remain there throughout their lives (Methven & Brown 1991; Yao & Crim 1995).

Population Status: Based on the 2015 operational assessment, ocean pout is overfished but overfishing is not occurring. The stock is not rebuilding as expected, despite low catch (NEFSC 2015).

6.2.19 Atlantic Halibut

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

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

6.2.20 Atlantic Wolffish

Life History: Atlantic wolffish, *Anarhichas lupus*, is a benthic fish distributed on both sides of the North Atlantic Ocean. In the northwest Atlantic, the species occurs from Davis Straits off of Greenland to Cape Cod and sometimes in southern New England and New Jersey waters (Collette & Klein-MacPhee 2002). In the Georges Bank-Gulf of Maine region, abundance is highest in the southwestern portion at depths of 263 - 394 ft (80 - 120 m), but wolffish are also found in waters from 131 - 787 ft (40 - 240 m) (Nelson & Ross 1992) and at temperatures of 29.7º - 50.4º F (-1.3º - 10.2º C) (Collette & Klein-MacPhee 2002). They prefer complex benthic habitats with large stones and rocks (Pavlov & Novikov 1993). Atlantic

wolffish are mostly sedentary and solitary, except during mating season. There is some evidence of a weak seasonal shift in depth between shallow water in spring and deeper water in fall (Nelson & Ross 1992). Most individuals mature by age 5-6 when they reach ~18.5 in (47 cm) total length (Nelson & Ross 1992; Templeman 1986). Northern wolffish mature at smaller sizes than faster growing southern fish. Peak spawning is believed to occur from September to October for Gulf of Maine-Georges Bank wolffish (Collette & Klein-MacPhee 2002), though laboratory studies have shown that wolffish can spawn most of the year (Pavlov & Moksness 1994). Eggs are laid in masses, and males are thought to brood for several months. Incubation time is dependent on water temperature and may be 3 - 9 months. Larvae and early juveniles are pelagic between 20 - 40 mm TL, with settlement beginning by 50 mm TL (Falk-Petersen & Hansen 1991).

Population Status: Based on the 2015 operational assessment, Atlantic wolfish is overfished but overfishing is not occurring. The 2014 spawning stock biomass is estimated to be 638 mt, which is 38% of the biomass target (NEFSC 2015).

6.3 Non-Groundfish Species

6.3.1 Spiny Dogfish

Life History. Spiny dogfish, *Squalus acanthias*, occurs in the western North Atlantic from Labrador to Florida. Spiny dogfish is considered to be a unit stock off the coast of New England. In summer, dogfish migrate northward to the Gulf of Maine-Georges Bank region and into Canadian waters. They return southward in autumn and winter. Spiny dogfish tend to school by size and, when mature, by sex. The species bears live young, with a gestation period of 18 – 22 months, and produce 2 - 15 pups (average of 6). Size at maturity for females is ~31 in (80 cm), but can vary from 31 - 33 in (78 - 85 cm) depending on the abundance of females (NEFSC 2013h).

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

6.3.2 Skates

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

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

population dynamics of skates, there remains considerable uncertainty about the status of skate stocks. Based on NEFSC bottom trawl survey data through autumn 2015/spring 2016, one skate species remains overfished (thorny) and overfishing is not occurring in any of the seven skate species. Barndoor skate is considered to be rebuilt for the purposes of federal management as of August 2016. Recent skate landings have fluctuated between approximately 30 and 40 million pounds. The landings and catch limits proposed by Amendment 3 have an acceptable probability of promoting biomass growth and achieving the rebuilding (biomass) targets for thorny skates. Modest reductions in landings and a stabilization of total catch below the median relative exploitation ratio should cause skate biomass and future yield to increase.

6.3.3 Monkfish

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

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

- Limiting the number of vessels with access to the fishery and allocating DAS to those vessels;
- Setting trip limits for vessels fishing for monkfish; minimum fish size limits;
- Gear restrictions;
- Mandatory time out of the fishery during the spawning season; and
- A framework adjustment process.

The Monkfish FMP defines two management areas for monkfish (northern and southern), divided roughly by an east-west line bisecting Georges Bank. As of 2013 data, monkfish in both management areas are not overfished and overfishing is not occurring (NEFSC 2013c). An operational assessment for monkfish was conducted in 2016, but it was recommended that stock status not be updated during this data update due to a lack of biological reference points (Richards 2016).

6.3.4 Summer Flounder

Life History. Summer flounder, *Paralichthys dentatus*, occur in the western North Atlantic from the southern Gulf of Maine to South Carolina. Summer flounder are concentrated in bays and estuaries from late spring though early autumn, when an offshore migration to the outer continental shelf is undertaken. Spawning occurs during autumn and early winter, and the larvae are transported toward coastal areas by prevailing water currents. Development of post larvae and juveniles occurs primarily within bays and estuarine areas. Most fish are sexually mature by age 2. The largest fish are females, which can attain lengths over 90 cm (36 in) and weights up to 11.8 kg (26 lbs.; NEFSC 2011c). Recent NEFSC trawl

survey data indicate that while female summer flounder grow faster (reaching a larger size at the same age), the sexes attain about the same maximum age (currently age 15 at 56 cm for males, and age 14 at 65 cm for females). Unsexed commercial fishery samples currently indicate a maximum age of 17 for an 85 cm fish (Terceiro personal communication).

Population and Management Status. The FMP was developed by the MAFMC in 1988, and scup and black sea bass were later incorporated into the FMP. Amendment 2, implemented in 1993, established a commercial quota allocated to the states, a recreational harvest limit, minimum size limits, gear restrictions, permit and reporting requirements, and an annual review process to establish specifications for the coming fishing year. In 1999, Amendment 12 revised the overfishing definitions for all three species, established rebuilding programs, addressed bycatch and habitat issues and established a framework adjustment procedure for the FMP to allow for a streamlined process for relatively minor changes to management measures. Results from the 2016 assessment update indicate that the summer flounder stock was not overfished, but overfishing was occurring in 2015 relative to the biological reference points from the SAW 57 benchmark assessment (Terceiro 2016). The estimated SSB in 2015 was 36,240 mt, which is 58% of the target biomass (Terceiro 2016). Fully selected fishing mortality was estimated to be 0.390 in 2015, which is 126% of the F_{MSY} proxy (Terceiro 2016).

6.3.5 American Lobster

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

Population and Management Status. The states and NMFS cooperatively manage the American lobster resource through the ASMFC under the provisions of the Atlantic Coastal Fisheries Cooperative Management Act (ACFCMA). Inshore landings have increased steadily since the early 1970s. States have jurisdiction for implementing measures in state waters, while NMFS implements complementary regulations in federal waters. Fishing effort is intense and increasing throughout much of the range of the species. The majority of the landings are reportedly harvested from state waters. While each stock area has an inshore and offshore component, Gulf of Maine and Southern New England areas support predominantly inshore fisheries and the Georges Bank supports a predominantly offshore fishery. The most recent 2009 Stock Assessment Report concluded that "(t)he American lobster fishery resource presents a mixed picture, with stable abundance for much of the Gulf of Maine stock, increasing abundance for the Georges Bank stock, and decreased abundance and recruitment yet continued high fishing mortality for the Southern New England stock" (ASMFC 2009). An updated benchmark formulation was used in 2015. This assessment combined the GOM and GB stocks into a single biological unit. The GOM/GB unit is not overfished and overfishing is not occurring, while the SNE stock is considered depleted but overfishing is not occurring (ASMFC 2015).

6.3.6 Whiting (Silver Hake)

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

Population and Management Status. Due to their abundance and availability, silver hake have supported important U.S. and Canadian fisheries as well as distant-water fleets. Landings increased to 137,000 mt in 1973 and then declined sharply with increased restrictions on distant-water fleet effort and implementation of the Magnuson Fishery Conservation and Management Act (MFCMA) in 1977. U.S. landings during 1987-1996 were relatively stable, averaging 16,000 mt per year, but have gradually declined to a historic low of 6,800 mt in 2005. The otter trawl remains the principal gear used in the U.S. fishery, and recreational catches have been low since 1985. Silver hake are managed under the NEFMC's Northeast Multispecies FMP ("non-regulated multispecies" category). In 2000, the NEFMC implemented Amendment 12 to this FMP, and placed silver hake into the “small mesh multispecies” management unit, along with red hake and offshore hake. This amendment established retention limits based on net mesh size, adopted overfishing definitions for northern and southern stocks, identified essential fish habitat for all life stages, and set requirements for fishing gear (NEFMC 2000). As of the last assessment in 2010, silver hake is not overfished and overfishing is not occurring in the northern or southern management area (NEFSC 2011a).

6.3.7 Loligo Squid

Life History. Longfin inshore squid (*Doryteuthis (Amerigo) pealeii*) are distributed primarily in continental shelf waters located between Newfoundland and the Gulf of Venezuela (Cohen 1976; Roper et al. 1984). In the northwest Atlantic Ocean, longfin squid are most abundant in the waters between Georges Bank and Cape Hatteras where the species is commercially exploited. The management unit is all longfin squid under U.S. jurisdiction (i.e. U.S. east coast). Distribution varies seasonally. North of Cape Hatteras, squid migrate offshore during late autumn to overwinter in warmer waters along the shelf edge and slope, and then return inshore during the spring where they remain until late autumn (Jacobson 2005). The species lives for 6-8 months, grows rapidly, and spawns year-round with peaks during late spring and autumn. Individuals hatched in summer grow more rapidly than those hatched in winter and males grow faster and attain larger sizes than females (Brodziak & Macy III 1996).

Population and Management Status. Based on a new biomass reference point from a 2010 SAW-SARC assessment, the longfin squid stock was not overfished in 2009, but overfishing status was not determined because no overfishing threshold was recommended (though the assessment did describe the stock as

"lightly exploited"). The domestic fishery occurs primarily in Southern New England and Mid-Atlantic waters, but some fishing also occurs along the edge of Georges Bank. Fishing patterns reflect seasonal distribution patterns and effort is generally directed offshore during October through April and inshore during May through September. The fishery is dominated by small-mesh otter trawlers, but near-shore pound net and fish trap fisheries occur during spring and summer. Summer or winter landings may dominate in any given year, but summer landings have been high in the most recent years. The stock is managed by the MAFMC under the Atlantic Mackerel, Squid, and Butterfish FMP. Management measures include annual TACs, which have been partitioned into 3 four-month seasonal trimesters since 2007. There is a moratorium on new fishery permits, and an ongoing action may reduce latent permits and modify the trimester allocation and closure provisions. A minimum codend mesh size of 2 1/8 inches applies from Sept-April and 1 7/8 inches from May-August. The fishery can also be closed if butterfish discards are excessive.

6.3.8 Atlantic Sea Scallops

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

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

6.3.9 Scup

Life History. Scup are found in a variety of habitats in the Mid-Atlantic. Essential fish habitat (EFH) for scup includes demersal waters, areas with sandy or muddy bottoms, mussel beds, and sea grass beds from the Gulf of Maine through Cape Hatteras, North Carolina. Scup undertake extensive seasonal migrations between coastal and offshore waters. They are mostly found in estuaries and coastal waters during the spring and summer. In the fall and winter, they move offshore and to the south, to outer continental shelf waters south of New Jersey. Scup spawn once annually over weedy or sandy areas, mostly off of southern New England. Spawning takes place from May through August and usually peaks in June and July

(Steimle et al. 1999). About 50% of scup are sexually mature at two years of age and about 17 cm (about 7 inches) total length. Nearly all scup older than three years of age are sexually mature. Scup reach a maximum age of at least 14 years. They may live as long as 20 years; however few scup older than age 7 are caught in the Mid-Atlantic (DPSWG 2009, NEFSC 2015).

Population and Management Status. The scup fishery is cooperatively managed by the MAFMC and the ASMFC under the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan (FMP). The primary commercial fishery management measure is a quota that is distributed to three trimester periods and to individual states. Other federal regulations include minimum mesh size, gear restricted areas, and a minimum fish size. States typically restrict harvest to their quota using seasons and trip limits. Scup were under a formal rebuilding plan from 2005 through 2009. NMFS declared the scup stock rebuilt in 2009 based on the findings of the Data Poor Stocks Working Group (DPSWG 2009). As of SAW 60, the scup stock was not overfished and overfishing was not occurring (NEFSC 2015b). SSB was estimated to be 403 million pounds in 2014, about 210% of the SSB_{MSY} proxy. Scup biomass continues to be high, relative exploitation ratios remain low, and the 2015 year class appears to be large (NEFSC 2016).

6.3.10 Atlantic Herring

Life History. The Atlantic herring is widely distributed in continental shelf waters of the Northeast Atlantic, from Labrador to Cape Hatteras. Herring is in every major estuary from the northern Gulf of Maine to the Chesapeake Bay. They are most abundant north of Cape Cod and become increasingly scarce south of New Jersey (Kelly & Moring 1986). Spawning occurs in the summer and fall, starting earlier along the eastern Maine coast and southwest Nova Scotia (August – September) than in the southwestern GOM (early to mid-October in the Jeffreys Ledge area) and GB (as late as November - December; Reid et al. 1999). In general, GOM herring migrate from summer feeding grounds along the Maine coast and on GB to SNE/MA areas during winter, with larger individuals tending to migrate farther distances. Atlantic herring play an important role as forage in the Northeast U.S. shelf ecosystem. They are eaten by a wide variety of fish, marine mammals, birds, and (historically) by humans in the region.

Population and Management Status. The Atlantic herring fishery is managed by the NEFMC. Presently, herring from the GOM (inshore) and GB (offshore) stock components are combined for assessment purposes into a single coastal stock complex. The fishery uses quotas by area and season. Prosecuted primarily by mid water trawls (single and paired) and purse seines, management measures include restrictions on the incidental catch of haddock and other regulated groundfish. Mid-water trawls are allowed access to the groundfish closed areas as an exempted fishery but their use of the areas is subject to numerous regulatory restrictions. As of the 2015 operational assessment report, Atlantic herring was not overfished and overfishing was not occurring (Deroba 2015). The retrospective adjusted spawning stock biomass in 2014 is estimated to be 622,991 mt, which is 150% of the biomass target (Deroba 2015).

6.3.11 Bycatch

The MSA defines bycatch as fish which are harvested in a fishery, but which are not sold or kept for personal use, including economic discards and regulatory discards. Fish released alive under a recreational catch and release fishery management program are not included. The MSA requires that, to the extent practicable, bycatch and the mortality of bycatch that cannot be avoided should both be minimized. To consider whether these objectives are being met, bycatch must be reported and assessed. To this end, the MSA requires that a standardized reporting methodology assess the amount and type of bycatch occurring in a fishery. The primary tools used to report bycatch in the multispecies fishery are the Vessel Trip Report system (VTR) and the NEFSC Observer Program (NEFOP). Each federally permitted

groundfish vessel is required to report discards and landings on every trip from each statistical area they fish in. The sea sampling/observer program places personnel on boats to observe and estimate the amount of discards on a haul-by-haul basis. More information on bycatch may be found at: http://www.greateratlantic.fisheries.noaa.gov/

6.4 Assemblages of Fish Species

Georges Bank and the Gulf of Maine have historically had high levels of fish production. Several studies have identified demersal fish assemblages over large spatial scales. Overholtz and Tyler (1985) found five depth-related groundfish assemblages for Georges Bank and the Gulf of Maine that were persistent temporally and spatially. The study identified depth and salinity as major physical influences explaining assemblage structure. Table 18 compares the six assemblages identified in Gabriel (1992) with the five assemblages from Overholtz and Tyler (1985). This EA considers these assemblages and relationships to be relatively consistent. Therefore, these descriptions generally describe the affected area. The assemblages include allocated target species, as well as non-allocated target species and bycatch. The terminology and definitions of habitat types in Table 18 vary slightly between the two studies. For further information on fish habitat relationships, see Table 15.

Table 18 - Comparison of Demersal Fish Assemblages of Georges Bank and the Gulf of Maine

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

6.5 Protected Species

6.5.1 Species Present in the Area

Numerous protected species inhabit the environment within the Northeast Multispecies FMP management unit (Table 19). These species are under NMFS jurisdiction and are afforded protection under the Endangered Species Act (ESA) of 1973 and/or the Marine Mammal Protection Act (MMPA) of 1972.

Table 19 - Species protected under the ESA and/or MMPA that may occur in the affected environment of the Northeast multispecies fishery. Marine mammal species (cetaceans and pinnipeds) italicized and in bold are considered MMPA strategic stocks.[1]

Species	Status[2]	Potentially affected by this action?
Cetaceans		
North Atlantic right whale (Eubalaena glacialis)	***Endangered***	***Yes***
Humpback whale, West Indies DPS (Megaptera novaeangliae)[3]	***Protected (MMPA)***	***Yes***
Fin whale (Balaenoptera physalus)	***Endangered***	***Yes***
Sei whale (Balaenoptera borealis)	***Endangered***	***Yes***
Blue whale (Balaenoptera musculus)	***Endangered***	***No***
Sperm whale (Physeter microcephalus	***Endangered***	***No***
Minke whale (*Balaenoptera acutorostrata*)	Protected (MMPA)	Yes
Pilot whale (*Globicephala spp.*)[4]	Protected (MMPA)	Yes
Risso's dolphin (*Grampus griseus*)	Protected (MMPA)	Yes
Atlantic white-sided dolphin (*Lagenorhynchus acutus*)	Protected (MMPA)	Yes
Short Beaked Common dolphin (*Delphinus delphis*)[5]	Protected (MMPA)	Yes
Spotted dolphin (*Stenella frontalis*)	Protected (MMPA)	No
Bottlenose dolphin (Tursiops truncatus[6]	***Protected (MMPA)***	***Yes***
Harbor porpoise (Phocoena phocoena)	***Protected (MMPA)***	***Yes***
Sea Turtles		
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered	Yes
Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered	Yes
Green sea turtle, North Atlantic DPS (*Chelonia mydas*)[7]	Threatened	Yes
Loggerhead sea turtle (*Caretta caretta*), Northwest Atlantic DPS	Threatened	Yes
Hawksbill sea turtle (*Eretmochelys imbricate*)	Endangered	No
Fish		
Shortnose sturgeon (*Acipenser brevirostrum*)	Endangered	No

Atlantic salmon (*Salmo salar*)	Endangered	Yes
Atlantic sturgeon *(Acipenser oxyrinchus)*		
Gulf of Maine DPS	Threatened	Yes
New York Bight DPS, Chesapeake Bay DPS, Carolina DPS & South Atlantic DPS	Endangered	Yes
Cusk (*Brosme brosme)*	Candidate	Yes
Pinnipeds		
Harbor seal (*Phoca vitulina*)	Protected (MMPA)	Yes
Gray seal (*Halichoerus grypus*)	Protected (MMPA)	Yes
Harp seal (*Phoca groenlandicus*)	Protected (MMPA)	Yes
Hooded seal (*Cystophora cristata*)	Protected (MMPA)	Yes
Critical Habitat		
North Atlantic Right Whale[8]	ESA (Protected)	No
Northwest Atlantic DPS of Loggerhead Sea Turtle	ESA (Protected)	No

Notes:
[1] A strategic stock is defined under the MMPA as a marine mammal stock for which: (1) the level of direct human-caused mortality exceeds the potential biological removal level; (2) based on the best available scientific information, is declining and is likely to be listed as a threatened species under the ESA within the foreseeable future; and/or (3) is listed as a threatened or endangered species under the ESA, or is designated as depleted under the MMPA (Section 3 of the MMPA of 1972).
[2] The status of the species is defined by whether the species is listed under the ESA as endangered (species are at risk of extinction) or threatened (species at risk of endangerment), or protected under the MMPA. Note, marine mammals listed under the ESA are also protected under the MMPA. Candidate species are those species in which ESA listing may be warranted.
[3] On September 8, 2016, a final rule was issued revising the ESA listing status of humpback whales (81 FR 62259). Fourteen DPSs were designated: one as threatened, four as endangered, and nine as not warranting listing. The DPS found in U.S. Atlantic waters, the West Indies DPS, is delisted under the ESA; however, this DPS is still protected under the MMPA.

[4] There are two species of pilot whales: short finned (*G. melas melas*) and long finned (*G. macrorhynchus*). Due to the difficulties in identifying the species at sea, they are often just referred to as *Globicephala spp*.

[5] Prior to 2008, this species was called "common dolphin."
[6] This includes the following Stocks of Bottlenose Dolphins: Western North Atlantic Offshore, Northern Migratory Coastal (strategic stock), and Southern Migratory Coastal (strategic stock).
[7] On April 6, 2016, a final rule was issued removing the current range-wide listing of green sea turtles and, in its place, listing eight green sea turtle DPSs as threatened and three DPSs as endangered (81 FR 20057). The green sea turtle DPS located in the Northwest Atlantic is the North Atlantic DPS of green sea turtles; this DPS is considered threatened under the ESA.
[8] Originally designated June 3, 1994 (59 FR 28805); Expanded on January 27, 2016 (81 FR 4837).

Cusk is a NMFS "candidate species" under the ESA. Candidate species are those petitioned species for which NMFS has determined that listing may be warranted under the ESA and those species for which NMFS has initiated an ESA status review through an announcement in the Federal Register. If a species is proposed for listing the conference provisions under Section 7 of the ESA apply (see 50 CFR 402.10); however, candidate species receive no substantive or procedural protection under the ESA. As a result these species will not be discussed further in this and the following sections; however, NMFS

recommends that project proponents consider implementing conservation actions to limit the potential for adverse effects on candidate species from any proposed action. Additional information on cusk can be found at http://www.nmfs.noaa.gov/pr/species/esa/candidate.htm

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

Based on available information, it has been determined that this action is not likely to affect multiple ESA listed and/or marine mammal protected species or any designated critical habitat (see Table 19). This determination has been made because either the occurrence of the species is not known to overlap with the area primarily affected by the action and/or there have never been documented interactions between the species and the primary gear type (i.e., gillnet and bottom trawl) used to prosecute the multispecies fishery (see Waring *et al*. 2014a, 2015, 2016; NMFS NEFSC FSB 2015; http://www.nefsc.noaa.gov/fsb/take_reports/nefop.html; NMFS 2013). In the case of critical habitat, this determination has been made because the action will not affect the essential physical and biological features of North Atlantic right whale or loggerhead (NWA DPS) critical habitat and therefore, will not result in the destruction or adverse modification of any species critical habitat (NMFS 2013; NMFS 2014a; NMFS 2015a,b).

6.5.3 Species Potentially Affected by the Proposed Action

Table 19 provides a list of sea turtle, marine mammal, and fish species present in the affected environment of the multispecies fishery, and that may also be affected by the operation of this fishery. Of primary concern is the potential for the fishery to interact (e.g., bycatch, entanglement) with these species. To understand the potential risk of an interaction, it is necessary to consider (1) species occurrence in the affected environment of the fishery and how the fishery will overlap in time and space with this occurrence; and (2) data and observed records of protected species interaction with particular fishing gear types. Information on species occurrence in the affected environment of the multispecies fishery is provided in this section, while information on protected species interactions with specific fishery gear is provided in Section 6.5.4.

6.5.3.1 Sea Turtles

Green (North Atlantic DPS), Kemp's ridley, leatherback, and loggerhead (Northwest Atlantic Ocean DPS) sea turtle are the four ESA listed species of sea turtles that occur in the area of operation for the 13 GAR fisheries (see Table 19). Three of the four species are considered hard-shelled turtles (i.e., green, loggerhead, and Kemp's ridley). Additional background information on the range-wide status of the other four species, as well as a description and life history of the species, can be found in a number of published documents, including sea turtle status reviews and biological reports (NMFS and USFWS 1995;; Turtle Expert Working Group [TEWG] 1998, 2000, 2007, 2009; Conant *et al*. 2009; NMFS and USFWS 2013; NMFS and USFWS 2015; Seminoff *et al*. 2015), and recovery plans for the loggerhead sea turtle (Northwest Atlantic DPS; NMFS and USFWS 2008), leatherback sea turtle (NMFS and USFWS 1992), Kemp's ridley sea turtle (NMFS *et al.* 2011), and green sea turtle (NMFS and USFWS 1991).

Hard-shelled sea turtles

Distribution

In U.S. Northwest Atlantic waters, hard-shelled turtles commonly occur throughout the continental shelf from Florida (FL) to Cape Cod, Massachusetts (MA), although their presence varies with the seasons due to changes in water temperature (Shoop and Kenney 1992; Epperly *et al.* 1995a, 1995b; Braun and Epperly 1996; Mitchell *et al.* 2003; Braun-McNeill *et al.* 2008; TEWG 2009). While hard-shelled turtles are most common south of Cape Cod, MA, they are known to occur in the Gulf of Maine (GOM). Loggerheads, the most common hard-shelled sea turtle in the GAR, feed as far north as southern Canada. Loggerheads have been observed in waters with surface temperatures of 7 °C to 30 °C, but water temperatures ≥11 °C are most favorable (Shoop and Kenney 1992; Epperly *et al.* 1995b). Sea turtle presence in U.S. Atlantic waters is also influenced by water depth. While hard-shelled turtles occur in waters from the beach to beyond the continental shelf, they are most commonly found in neritic waters of the inner continental shelf (Mitchell *et al.* 2003; Braun-McNeill and Epperly 2002; Morreale and Standora 2005; Blumenthal *et al.* 2006; Hawkes *et al.* 2006; McClellan and Read 2007; Mansfield *et al.* 2009; Hawkes *et al.* 2011; Griffin *et al.* 2013).

Seasonality

Hard-shelled sea turtles occur year-round in waters off Cape Hatteras, North Carolina (NC) and south. As coastal water temperatures warm in the spring, loggerheads begin to migrate to inshore waters of the southeast United States and also move up the Atlantic Coast (Epperly *et al.* 1995a, 1995b, 1995c; Braun-McNeill and Epperly 2002; Morreale and Standora 2005; Griffin *et al.* 2013), occurring in Virginia (VA) foraging areas as early as late April and on the most northern foraging grounds in the GOM in June (Shoop and Kenney 1992). The trend is reversed in the fall as water temperatures cool. The large majority leave the GOM by September, but some remain in Mid-Atlantic and Northeast areas until late fall. By December, sea turtles have migrated south to waters offshore of NC, particularly south of Cape Hatteras, and further south (Shoop and Kenney 1992; Epperly *et al.* 1995b; Hawkes *et al.* 2011; Griffin *et al.* 2013).

Leatherback sea turtles

Leatherback sea turtles also engage in routine migrations between northern temperate and tropical waters (NMFS and USFWS 1992; James et al. 2005; James et al. 2006; Dodge et al. 2014). Leatherbacks, a pelagic species, are known to use coastal waters of the U.S. continental shelf (James et al. 2005; Eckert et al. 2006; Murphy et al. 2006; Dodge et al. 2014). They have a greater tolerance for colder water than hard-shelled sea turtles (NMFS and USFWS 2013). They are also found in more northern waters later in the year, with most leaving the Northwest Atlantic shelves by mid-November (James et al. 2005; James et al. 2006; Dodge et al. 2014).

6.5.3.2 Marine Mammals

6.5.3.2.1 Large Cetaceans

As provided in Table 19, as North Atlantic right, humpback, fin, sei, and minke whales are found throughout the waters of the Northwest Atlantic Ocean, these species will occur in the affected environment of the multispecies fishery. In general, these species follow an annual pattern of migration between low latitude (south of 35ºN) wintering/calving grounds and high latitude spring/summer foraging grounds (primarily north of 41ºN; Waring *et al*. 2014a; Waring *et al*. 2015; Waring *et al*. 2016; NMFS 1991, 2005, 2010, 2011, 2012). This, however, is a simplification of whale movements, particularly as it relates to winter movements. It remains unknown if all individuals of a population migrate to low latitudes in the winter, although, increasing evidence suggests that for some species (e.g., right and

humpback whales), some portion of the population remains in higher latitudes throughout the winter (Waring *et al*. 2014a; Waring *et al*. 2015; Waring *et al*. 2016; Khan *et al*. 2009, 2010, 2011, 2012; Brown *et al*. 2002; NOAA 2008; Cole *et al*. 2013; Clapham *et al*. 1993; Swingle *et al*. 1993; Vu *et al*. 2012). Although further research is needed to provide a clearer understanding of large whale movements and distribution in the winter, the distribution and movements of large whales to foraging grounds in the spring/summer is well understood. Movements of whales into higher latitudes coincide with peak productivity in these waters. As a result, the distribution of large whales in higher latitudes is strongly governed by prey availability and distribution, with large numbers of whales coinciding with dense patches of preferred forage (Mayo and Marx 1990; Kenney *et al*. 1986, 1995; Baumgartner *et al*. 2003; Baumgartner and Mate 2003; Payne *et al*.1986, 1990; Brown *et al.* 2002; Kenney and Hartley 2001; Schilling *et al.* 1992). For additional information on the biology, status, and range wide distribution of each whale species please refer to: Waring *et al*. 2014a; Waring *et al*. 2015; Waring *et al*. 2016; NMFS 1991, 2005, 2010, 2011, 2012.

To further assist in understanding how the multispecies fishery may overlaps in time and space with the occurrence of large whales, a general overview on species occurrence and distribution in the area of operation for the multispecies fishery is provided in the following table (Table 20).

Table 20 - Large whale occurrence in the area of operation for the multispecies fishery.

Species	Prevalence and Approximate Months of Occurrence
North Atlantic Right Whale	• Distributed throughout all continental shelf waters from the GOM to the South Atlantic Bight (SAB) throughout the year. • New England waters (GOM and GB regions) = **Foraging Grounds**. Important foraging grounds include (Late winter (January) through summer (July)): › Massachusetts and Cape Cod Bays; › Great South Channel; › GOM (e.g., Jordan Basin; Wilkinson Basin; Cashes Ledge, Platts Bank, Georges Basin); and › northern edge of GB; • Mid-Atlantic waters: Migratory pathway to/from northern (high latitude) foraging and southern calving grounds. • SAB (Coastal waters from Cape Fear, North Carolina (NC), to 28ºN (northeastern Florida (FL)) = **Calving and Nursing Grounds** (mid- November-early April). • Increasing evidence of wintering areas (approximately November – January) in: › Cape Cod Bay; › Jeffreys and Cashes Ledges; › Jordan Basin; and › Massachusetts Bay (e.g., Stellwagen Bank).
Humpback	• Distributed throughout all continental shelf waters of the Mid-Atlantic (SNE included), GOM, and GB throughout the year.

Species	Prevalence and Approximate Months of Occurrence
	• New England waters (GOM and GB regions) = **Foraging Grounds** (March-November). • Mid-Atlantic waters: Migratory pathway to/from northern (high latitude) foraging and southern (West Indies) calving grounds. • Increasing evidence of wintering areas (for juveniles) in Mid-Atlantic (e.g., waters in the vicinity of Chesapeake and Delaware Bays; peak presence approximately January through March) and Southeastern coastal waters.
Fin	• Distributed throughout all continental shelf waters of the Mid-Atlantic (SNE included), GOM, and GB throughout the year. • Mid-Atlantic waters: › Migratory pathway to/from northern (high latitude) foraging and southern (low latitude) calving grounds; and › Possible offshore calving area (October-January). • New England(GOM and GB)/SNE waters = **Foraging Grounds** (greatest densities March-August; lower densities September-November).Important foraging grounds include: > Massachusetts Bay (esp. Stellwagen Bank); > Great South Channel; > Waters off Cape Cod (~40-50 meter contour); > GOM; > Perimeter (primarily eastern) of GB; and > Mid-shelf area off the east end of Long Island. • Evidence of wintering areas in mid-shelf areas east of New Jersey (NJ), Stellwagen Bank; and eastern perimeter of GB.
Sei	• Uncommon in shallow, inshore waters of the Mid-Atlantic (SNE included), GB, and GOM; however, occasional incursions during peak prey availability and abundance. • Primarily found in deep waters along the shelf edge, shelf break, and ocean basins between banks. • Spring through summer, found in greatest densities in offshore waters of the GOM and GB; sightings concentrated along the northern, eastern (into Northeast Channel) and southwestern (in the area of Hydrographer Canyon) edge of GB.
Minke	• Widely distributed throughout continental shelf waters of the Mid-Atlantic (SNE included), GOM, and GB from spring through fall.

Species	Prevalence and Approximate Months of Occurrence
	• Generally occupy continental shelf waters (<100 meters)

***Sources*:** NMFS 1991, 2005, 2010, 2011, 2012; Hain *et al.* 1992; Payne *et al*. 1984; Good 2008; McLellan *et al*. 2004; Hamilton and Mayo 1990; Schevill *et al*. 1986; Watkins and Schevill 1982; Payne *et al*.1990; Winn *et al.* 1986; Kenney et al. 1986, 1995; Khan *et al*. 2009, 2010, 2011, 2012; Brown *et al*. 2002; NOAA 2008; 50 CFR 224.105; CETAP 1982; Clapham *et al*. 1993; Swingle *et al*. 1993; Vu *et al*. 2012; Baumgartner *et al*. 2011; Cole *et al*. 2013; Risch *et al*. 2013; Waring *et al*. 2014a; Waring *et al*. 2015; Waring *et al*. 2016; 81 FR 4837(January 27, 2016); NMFS 2015b.

6.5.3.2.2 Small Cetaceans

As provided in Table 19, as Atlantic white sided dolphins, short and long finned pilot whales, Risso's dolphins, short beaked common dolphins, harbor porpoise, and several stocks of bottlenose dolphins are found throughout the year in the Northwest Atlantic Ocean, these species will occur in the affected environment of the multispecies fishery (Waring et al. 2014a; Waring et al. 2015; Waring et al. 2016). Within this range; however, there are seasonal shifts in species distribution and abundance. To further assist in understanding how fisheries may overlap in time and space with the occurrence of small cetaceans, a general overview of species occurrence and distribution in the area of operation for the multispecies fishery is provided in the following table (Table 21). For additional information on the biology, status, and range wide distribution of each species please refer to Waring et al. (2014a), Waring et al. (2015), and Waring et al. (2016).

Table 21 - Small cetacean occurrence in the area of operation of the multispecies fishery.

Species	Prevalence and Approximate Months of Occurrence
Atlantic White Sided Dolphin	• Distributed throughout the continental shelf waters (primarily to 100 meter isobath) of the Mid-Atlantic (north of 35°N), SNE, GB, and GOM ; however, most common in continental shelf waters from Hudson Canyon (~ 39°N) to GB, and into the GOM. • **January-May**: low densities found from GB to Jeffreys Ledge. • **June-September**: Large densities found from GB, through the GOM. • **October-December**: intermediate densities found from southern GB to southern GOM. • South of GB (SNE and Mid-Atlantic), low densities found year round, with waters off Virginia (VA) and NC representing southern extent of species range during winter months.
Short Beaked Common Dolphin	• Regularly found throughout the continental shelf-edge-slope waters (primarily between the 100-2,000 meter isobaths) of the

Species	Prevalence and Approximate Months of Occurrence
	Mid-Atlantic, SNE, and GB (esp. in Oceanographer, Hydrographer, Block, and Hudson Canyons). • Less common south of Cape Hatteras, NC, although schools have been reported as far south as the Georgia (GA)/South Carolina (SC) border. • **January-May**: occur from waters off Cape Hatteras, NC, to GB (35° to 42°N). • **Mid-summer-autumn**: Occur primarily on GB with small numbers present in the GOM; *Peak abundance* found on GB in the autumn.
Risso's Dolphin	• **Spring through fall**: Distributed along the continental shelf edge from Cape Hatteras, NC, to GB. • **Winter**: distributed in the Mid-Atlantic Bight, extending into oceanic waters. • Rarely seen in the GOM; primarily a Mid-Atlantic continental shelf edge species.
Harbor Porpoise	• Distributed throughout the continental shelf waters of the Mid-Atlantic (north of 35°N), SNE, GB, and GOM. • **July-September**: Concentrated in the northern GOM (waters < 150 meters); low numbers can be found on GB. • **October-December**: widely dispersed in waters from NJ to Maine (ME); seen from the coastline to deep waters (>1,800 meters). • **January-March**: intermediate densities in waters off NJ to NC; low densities found in waters off New York (NY) to GOM. • **April-June**: widely dispersed from NJ to ME; seen from the coastline to deep waters (>1,800 meters).
	Western North Atlantic Offshore Stock • Distributed primarily along the outer continental shelf and continental slope in the Northwest Atlantic from GB to FL. • Depths of occurrence: ≥40 meters **Western North Atlantic Northern Migratory Coastal Stock**

Species	Prevalence and Approximate Months of Occurrence
Bottlenose Dolphin	• Warm water months (e.g., July-August): distributed from the coastal waters from the shoreline to approximately the 25-meter isobaths between the Chesapeake Bay mouth and Long Island, NY. • Cold water months (e.g., January-March): stock occupies coastal waters from Cape Lookout, NC, to the NC/VA border. **Western North Atlantic Southern Migratory Coastal Stock** • **October-December**: stock occupies waters of southern NC (south of Cape Lookout) • **January-March**: stock moves as far south as northern FL. • **April-June**: stock moves north to waters of NC. • **July-August**: stock is presumed to occupy coastal waters north of Cape Lookout, NC, to the eastern shore of VA.
Pilot Whales: *Short- and Long-Finned*	**Short- Finned Pilot Whales** • Except for area of overlap (see below), primarily occur south of 40°N (Mid-Atl and SNE waters); although low numbers have been found along the southern flank of GB, but no further than 41°N. • May through December (approximately): distributed primarily near the continental shelf break of the Mid-Atlantic and SNE; individuals begin shifting to southern waters (i.e., 35°N and south) beginning in the fall. **Long-Finned Pilot Whales** • Except for area of overlap (see below), primarily occur from 42°N to 44°N • Winter to early spring (November through April): primarily distributed along the continental shelf edge-slope of the Mid-Atlantic, SNE, and GB. • Late spring through fall (May through October): movements and distribution shift onto/within GB, the Great South Channel, and the GOM. **Area of Species Overlap:** between approximately 38°N and 41°N.

Species	Prevalence and Approximate Months of Occurrence

Notes : [1]
Information presented in table is representative of small cetacean occurrence in the Northwest Atlantic continental shelf waters out to the 2,000 meter isobath.

***Sources*:** Waring *et al*. 1992, 2007**,** 2014a, 2015, 2016**;** Payne and Heinemann 1993; Payne *et al.* 1984; Jefferson *et al*. 2009.

6.5.3.2.3 Pinnipeds

As provided in Table 19, harbor, gray, harp, and hooded seals will occur in the affected environment of the multispecies fishery. Specifically, pinnipeds are found in the nearshore, coastal waters of the Northwest Atlantic Ocean. They are primarily found throughout the year or seasonally from New Jersey to Maine; however, increasing evidence indicates that some species (e.g., harbor seals) may be extending their range seasonally into waters as far south as Cape Hatteras, North Carolina (35oN) (Waring et al. 2007, 2014a, 2015, 2016). To further assist in understanding how the multispecies fishery may overlap in time and space with the occurrence of pinnipeds, a general overview of species occurrence and distribution in the area of operation of the multispecies fishery is provided in the following table (Table 22). For additional information on the biology, status, and range wide distribution of each species of pinniped please refer to Waring et al. (2007), Waring et al. (2014a), Waring et al. (2015), Waring et al. (2016).

Table 22 - Pinniped occurrence in the area of operation of the multispecies fishery.

Species	Prevalence
Harbor Seal	• Primarily distributed in waters from NJ to ME; however, increasing evidence indicates that their range is extending into waters as far south as Cape Hatteras, NC (35ºN). • **Year Round**: Waters of ME • **September-May**: Waters from New England to NJ.
Gray Seal	• Distributed in waters from NJ to ME. • **Year Round**: Waters from ME to MA. • **September-May**: Waters from Rhode Island to NJ.
Harp Seal	• Winter-Spring (approximately January-May): Waters from ME to NJ.
Hooded Seal	• Winter-Spring (approximately January-May): Waters of New England.

***Sources*:** Waring *et al*. 2007 (for hooded seals); Waring *et al*. 2014a; Waring *et al*. 2015;Waring *et al*. 2016.

6.5.3.3 Atlantic Sturgeon

Table 19 lists the 5 DPSs of Atlantic sturgeon that occur in the affected environment of the multispecies fishery and that may be affected by the operation of this fishery. The marine range of U.S. Atlantic sturgeon extends from Labrador, Canada, to Cape Canaveral, Florida. All five DPSs of Atlantic sturgeon have the potential to be located anywhere in this marine range; in fact, results from genetic studies show that, regardless of location, multiple DPSs can be found at any one location along the Northwest Atlantic coast (ASSRT 2007; Dovel and Berggren 1983; Dadswell *et al*. 1984; Kynard *et al*. 2000; Stein *et al*. 2004a; Dadswell 2006; Laney *et al*. 2007; Dunton *et al*. 2010; Dunton *et al*. 2012; Dunton *et al*. 2015; Erickson *et al*. 2011; Wirgin *et al*. 2012; O'Leary *et al*. 2014; Waldman *et al.* 2013; Wirgin *et al*. 2015).

Based on fishery- independent and dependent data, as well as data collected from tracking and tagging studies, in the marine environment, Atlantic sturgeon appear to primarily occur inshore of the 50 meter depth contour (Stein *et al*. 2004 a,b; Erickson *et al*. 2011; Dunton *et al*. 2010); however, Atlantic sturgeon are not restricted to these depths, as excursions into deeper continental shelf waters have been documented (Timoshkin 1968; Collins and Smith 1997; Stein *et al*. 2004a,b; Dunton *et al*. 2010; Erickson *et al*. 2011). Data from fishery-independent surveys and tagging and tracking studies also indicate that some Atlantic sturgeon may undertake seasonal movements along the coast (Erickson *et al.* 2011; Dunton *et al*. 2010; Wipplehauser 2012). For instance, tagging and tracking studies found that satellite-tagged adult sturgeon from the Hudson River concentrated in the southern part of the Mid-Atlantic Bight, at depths greater than 20 meters, during winter and spring, while in the summer and fall, Atlantic sturgeon concentrations shifted to the northern portion of the Mid-Atlantic Bight at depths less than 20 meters (Erickson *et al.* 2011).

Within the marine range of Atlantic sturgeon, several marine aggregation areas have been identified adjacent to estuaries and/or coastal features formed by bay mouths and inlets along the U.S. eastern seaboard (i.e., waters off North Carolina, Chesapeake Bay, and Delaware Bay; New York Bight; Massachusetts Bay; Long Island Sound; and Connecticut and Kennebec River Estuaries); depths in these areas are generally no greater than 25 meters (Bain *et al.* 2000; Savoy and Pacileo 2003; Stein *et al*. 2004a; Laney *et al*. 2007; Dunton *et al*. 2010; Erickson *et al*. 2011; Oliver *et al*. 2013; Waldman *et al.* 2013; O'Leary *et al*. 2014). Although additional studies are still needed to clarify why these particular sites are chosen by Atlantic sturgeon, there is some indication that they may serve as thermal refuge, wintering sites, or marine foraging areas (Stein *et al*. 2004a; Dunton *et al*. 2010; Erickson *et al*. 2011).

6.5.3.4 Atlantic Salmon (Gulf of Maine DPS)

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

6.5.4 Interactions Between Gear and Protected Species

Protected species described in Section 6.5.3 are all known to be vulnerable to interactions with various types of fishing gear. Available information on gear interactions with a given species (or species group) is provided in the sections below. These sections are not a comprehensive review of all fishing gear types known to interact with a given species; emphasis is only being placed on the primary gear types used to prosecute the northeast multispecies fishery (i.e., sink gillnet and bottom trawl gear).

6.5.4.1 Marine Mammals

Depending on species, marine mammals have been observed seriously injured or killed in bottom trawl and/or sink gillnet gear. Pursuant to the MMPA, NMFS publishes a List of Fisheries (LOF) annually, classifying U.S. commercial fisheries into one of three categories based on the relative frequency of incidental serious injuries and/or mortalities of marine mammals in each fishery (i.e., Category I=frequent; Category II=occasional; Category III=remote likelihood or no known interactions). In the Northwest Atlantic, the 2016 LOF (81 FR 20550 (April 8, 2016)) categorizes commercial gillnet fisheries (Northeast or Mid-Atlantic) as Category I fisheries and commercial bottom trawl fisheries (Northeast or Mid-Atlantic) as Category II fisheries.

6.5.4.1.1 Large Cetaceans

Bottom Trawl Gear

With the exception of minke whales, there have been no observed interactions with large whales and bottom trawl gear. In bottom trawl gear, to date, interactions have only been observed in the northeast bottom trawl fisheries. From the period of 2008-2012, the estimated annual mortality attributed to this fishery was 7.8 minke whales for 2008, and zero minke whales from 2009-2012; no serious injuries were reported during this time (Waring et al. 2015). Based on this information, from 2008-2012, the estimated annual average minke whale mortality and serious injury attributed to the northeast bottom trawl fishery was 1.6 (CV=0.69) whales (Waring et al. 2015). Lyssikatos (2015) estimated that from 2008-2013, mean annual serious injuries and mortalities from the northeast bottom trawl fishery were 1.40 (CV=0.58) minke whales. Based on this information, bottom trawl gear is likely to pose a low interaction risk to any large whale species and therefore, is expected to be a low source of serious injury or mortality to any large whale.

Fixed Fishing Gear (e.g., Sink Gillnet Gear)

The greatest entanglement risk to large whales is posed by fixed fishing gear (e.g., sink gillnet and trap/pot gear) comprised of lines (vertical or ground) that rise into the water column. Any line can become entangled in the mouth (baleen), flippers, and/or tail of the whale when the animal is transiting or foraging through the water column (Johnson et al. 2005; NMFS 2014b; Kenney and Hartley 2001; Hartley et al. 2003; Whittingham et al. 2005a,b). For instance, in a study of right and humpback whale entanglements, Johnson et al. (2005) attributed: (1) 89% of entanglement cases, where gear could be identified, to fixed gear consisting of pot and gillnets and (2) entanglement of one or more body parts of large whales (e.g., mouth and/or tail regions) to four different types of line associated with fixed gear (the buoy line, groundline, floatline, and surface system lines). Although available data, such as Johnson et al. (2005), provides insight into large whale entanglement risks with fixed fishing gear, to date, due to uncertainties surrounding the nature of the entanglement event, as well as unknown biases associated with reporting effort and the lack of information about the types and amounts of gear being used, determining which part of fixed gear creates the most entanglement risk for large whales is difficult (Johnson et al.

2005). As a result, any type or part of fixed gear is considered to create an entanglement risk to large whales and should be considered potentially dangerous to large whale species (Johnson et al. 2005).

The effects of entanglement to large whales range from no injury to death (NMFS 2014b; Johnson et al. 2005; Angliss and Demaster 1998; Moore and Van der Hoop 2012). The risk of injury or death in the event of an entanglement may depend on the characteristics of the whale involved (species, size, age, health, etc.), the nature of the gear (e.g., whether the gear incorporates weak links designed to help a whale free itself), human intervention (e.g., the feasibility or success of disentanglement efforts), or other variables (NMFS 2014b). Although the interrelationships among these factors are not fully understood, and the data needed to provide a more complete characterization of risk are not available, to date, available data indicates that entanglement in fishing gear is a significant source of serious injury or mortality for Atlantic large whales (Table 23; Henry et al. 2016; Waring et al. 2016).

Table 23 summarizes confirmed human-caused injury and mortality to humpback, fin, sei, minke, and North Atlantic right whales along the Gulf of Mexico Coast, U.S. East Coast, and Atlantic Canadian Provinces from 2010 to 2014 (Henry *et al.* 2016); the data provided in Table 23 is specific to confirmed injury or mortality to whales from entanglement in fishing gear. As many entanglement events go unobserved, and because the gear type, fishery, and/or country of origin for reported entanglement events are often not traceable, it is important to recognize that the information presented in Table 23 likely underestimates the rate of large whale serious injury and mortality due to entanglement. Further studies looking at scar rates for right whales and humpbacks suggests that entanglements may be occurring more frequently than the observed incidences indicate (NMFS 2014b; Robbins 2009; Knowlton *et al.* 2012).

Table 23 - Summary of confirmed human-caused injury or mortality to fin, minke, humpback, sei, and North Atlantic right whales from 2010-2014 due to entanglement in fishing gear.[1]

Species	Total Confirmed Entanglement: Serious Injury[2]	Total Confirmed Entanglement: Non-Serious Injury	Total Confirmed Entanglement: Mortality	Entanglement Events: Total Average Annual Injury and Mortality Rate (US waters/Canadian waters/unassigned waters)
North Atlantic Right Whale	16	31	8	4.65 (0.4/0/4.25)
Humpback Whale	30	53	8	6.85 (1.55/0/5.3)
Fin Whale	6	1	4	1.8 (0.2/0.8/0.8)
Sei Whale	0	0	0	0
Minke Whale	20	11	16	6.4 (1.7/2.45/2.25)

Notes:

[1]Information presented in Table Z5 is based on confirmed human-caused injury and mortality events along the Gulf of Mexico Coast, US East Coast, and Atlantic Canadian Provinces; it is not specific to US waters only.

[2] NMFS defines a serious injury as an injury that is more likely than not to result in mortality (for additional details see: http://www.nmfs.noaa.gov/pr/pdfs/serious_injury_procedure.pdf)

***Source*:** Henry *et al.* 2016

As noted in section 6.5.4.1, pursuant to the MMPA, NMFS publishes a LOF annually, classifying U.S. commercial fisheries into one of three categories based on the relative frequency of incidental serious injurious and mortalities of marine mammals in each fishery. Large whales, in particular, humpback, fin, minke, and North Atlantic right whales, are known to interact with Category I and II fisheries in the (Northwest) Atlantic Ocean. As humpback, fin, and North Atlantic right whales are listed as endangered under the ESA, these species are considered strategic stocks under the MMPA (see Table 19). Section 118(f)(1) of the MMPA requires the preparation and implementation of a Take Reduction Plan (TRP) for any strategic marine mammal stock that interacts with Category I or II fisheries. In response to its obligations under the MMPA, in 1996, NMFS established the Atlantic Large Whale Take Reduction Team (ALWTRT) to develop a plan (Atlantic Large Whale Take Reduction Plan (ALWTRP or Plan)) to reduce serious injury to, or mortality of large whales, specifically, humpback, fin, and North Atlantic right whales, due to incidental entanglement in U.S. commercial fishing gear.[5] In 1997, the ALWTRP was

[5] The measures identified in the ALWTRP are also beneficial to the survival of the minke whale, which are also known to be incidentally taken in commercial fishing gear.

implemented; however, since 1997, the Plan has been modified; recent adjustments include the Sinking Groundline Rule and Vertical Line Rules (72 FR 57104, October 5, 2007; 79 FR 36586, June 27, 2014; 79 FR 73848, December 12, 2014; 80 FR 14345, March 19, 2015; 80 FR 30367, May 28, 2015).

The Plan consists of regulatory (e.g., universal gear requirements, modifications, and requirements; area- and season- specific gear modification requirements and restrictions; time/area closures) and non-regulatory measures (e.g., gear research and development, disentanglement, education and outreach) that, in combination, seek to assist in the recovery of North Atlantic right, humpback, and fin whales by addressing and mitigating the risk of entanglement in gear employed by commercial fisheries, specifically trap/pot and gillnet fisheries (http://www.greateratlantic.fisheries.noaa.gov/Protected/whaletrp/; 73 FR 51228; 79 FR 36586; 79 FR 73848; 80 FR 14345; 80 FR 30367). The Plan recognizes trap/pot and gillnet Management Areas in Northeast, Mid-Atlantic, and Southeast regions of the U.S, and identifies gear modification requirements and restrictions for Category I and II gillnet and trap/pot fisheries in these regions; these Category I and II fisheries must comply with all regulations of the Plan.[6] For further details on the ALWTRP please see: http://www.greateratlantic.fisheries.noaa.gov/Protected/whaletrp/

6.5.4.1.2 Small Cetaceans and Pinnipeds

Sink Gillnet and Bottom Trawl Gear

Small cetaceans and pinnipeds are vulnerable to interactions with sink gillnet and bottom trawl gear. Species that have been observed incidentally injured and/or killed by MMPA LOF Category I (frequent interactions) and/or II (occasional interactions) gillnet or trawl fisheries that operate in the affected environment of Greater Atlantic Region (GAR) fisheries are provided in Table 24 (Waring *et al*. 2014a,b; Waring *et al*. 2015; Waring *et al*. 2016; 81 FR 20550 (April 8, 2016)).[7] Of the species provided in Table 24, gray seals, followed by harbor seals, harbor porpoises, short beaked common dolphins, harps seals, and Atlantic white sided dolphins are the most frequently bycaught small cetacean and pinnipeds in sink gillnet gear in the GAR (Hatch and Orphanides 2014, 2015, 2016). In terms of bottom trawl gear, short-beaked common dolphins and Atlantic white-sided dolphins are the most frequently observed bycaught marine mammal species in the GAR, followed by gray seals, long-finned pilot whales, and risso's dolphins (Lyssikatos 2015). Incidental bycatch of these latter species, as well as those provided in Table z6, have been observed in the groundfish fishery (Hatch and Orphanides 2014, 2015, 2016; Lyssikatos 2015; http://www.nefsc.noaa.gov/fsb/take_reports/nefop.html), which is comprised of Category I Northeast sink gillnet and Category II Northeast bottom trawl fisheries (81 FR 20550 (April 8, 2016). Specifically, observed bycatch in sink gillnet hauls targeting groundfish has shown that interactions primarily occur in sink gillnet gear with mesh sizes between 6-7.5 inches, and with soak duration ≤ 72 hours (Hatch and Orphanides 2014, 2015, 2016); in regards to bottom trawl hauls targeting groundfish, general tow time and net mesh size associated with observed bycatch of small cetaceans and pinnipeds are not available (; Lyssikatos 2015).

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

[7] "GAR Fisheries" are in reference to the 13 fisheries in the Greater Atlantic Region (GAR) (i.e., Northeast multispecies (including the whiting/small mesh multispecies complex); monkfish; spiny dogfish; Atlantic bluefish; northeast skate complex; mackerel/squid/butterfish; summer flounder/scup/black sea bass; American lobster; Atlantic herring; Atlantic sea scallop; red crab; surfclam/ocean quahog; and golden tilefish) in which fishery management plans (FMPs) have been developed and authorized; the NMFS-Greater Atlantic Regional Fisheries Office, in association with the New England and Mid-Atlantic Fisheries Management Councils (FMCs), is charged with conserving and managing these FMPs.

Based on the best available information provided in Table 24, Waring *et al*. (2014a,b), Waring *et al*. (2015), Waring *et al*. (2016), and the April 8, 2016, LOF (81 FR 20550), of the gear types primarily used to prosecute fisheries in the GAR (i.e., bottom trawl; mid-water trawl; gillnets (sink); scallop dredge; trap/pot; bottom longline; hydraulic clam dredge; purse seine; and hook and line), Northeast and Mid-Atlantic gillnet fisheries, followed by the Northeast and Mid-Atlantic bottom trawl fisheries (Category I and II fisheries, respectively) pose the greatest risks of serious injury and mortality to small cetaceans and pinnipeds (i.e., approximately 81.0% of the estimated total mean annual mortality to marine mammals (small cetaceans + seals, large whales excluded) is attributed to gillnet fisheries, 18.0% attributed to bottom trawl, 0.23% attributed to mid-water trawl; 0.15% attributed to pot/trap (bottlenose dolphin stocks only); and 0.11% attributed to hook and line (bottlenose dolphin stocks only; Figure 4).[8]

Table 24 - Small cetacean and pinniped species observed seriously injured and/or killed by Category I and II gillnet or trawl fisheries in the affected environment of GAR fisheries.

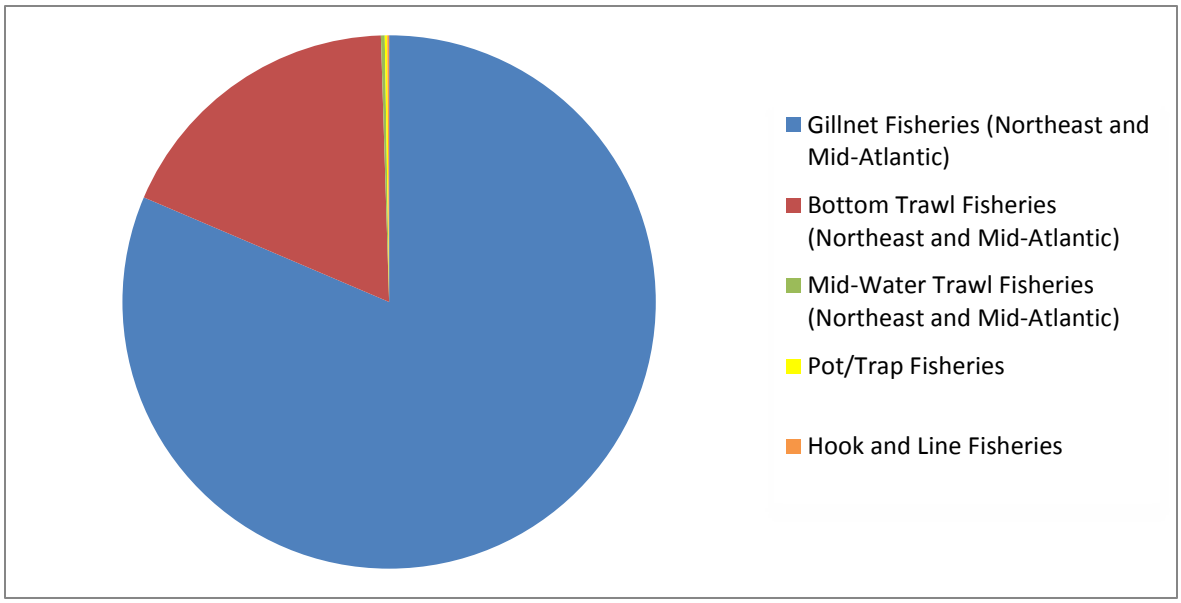
Fishery	Category	Species Observed or reported Injured/Killed
Northeast Sink Gillnet	I	Bottlenose dolphin (offshore)
		Harbor porpoise
		Atlantic white sided dolphin
		Short-beaked common dolphin
		Risso's dolphin
		Pilot whales (spp)
		Harbor seal
		Hooded seal
		Gray seal
		Harp seal
Mid-Atlantic Gillnet		Bottlenose dolphin (Northern Migratory coastal)
		Bottlenose dolphin (Southern Migratory coastal)
		Bottlenose dolphin (offshore)
		White-sided dolphin
		Harbor porpoise
		Short-beaked common dolphin
		Risso's dolphin
		Harbor seal
		Harp seal
		Gray seal
Mid-Atlantic Mid-Water Trawl-Including Pair Trawl		Risso's dolphin
		White-sided dolphin

[8] Northeast anchored float gillnet fisheries were not included in the analysis as mean annual mortality estimates have not been provided for the species affected by these fisheries (Waring *et al*. 2014a; Waring *et al*. 2015; Waring *et al*. 2016). In addition, as there are no known small cetaceans or pinniped interactions with bottom longlines, hydraulic clam dredges, or sea scallop dredges, these fishing gear types were also not included in the assessment.

	II	Harbor seal
		Pilot whales (spp)
		Gray seal
Northeast Mid-Water Trawl-Including Pair Trawl	II	Short-beaked common dolphin
		Pilot whales (spp)
		Gray seal
		Harbor seal
Northeast Bottom Trawl	II	Harp seal
		Harbor seal
		Gray seal
		Pilot whales (spp)
		Short-beaked common dolphin
		White-sided dolphin
		Harbor porpoise
		Bottlenose dolphin (offshore)
		Risso's dolphin
Mid-Atlantic Bottom Trawl	II	White-sided dolphin
		Pilot whales (spp)
		Short-beaked common dolphin
		Risso's dolphin
		Bottlenose dolphin (offshore)
		Gray seal
		Harbor seal
Northeast Anchored Float Gillnet	II	Harbor seal
		White-sided dolphin

Sources: Waring *et al*. 2014a,b; Waring *et al*. 2015; Waring *et al*. 2016; LOF 81 FR 20550 (April 8, 2016).

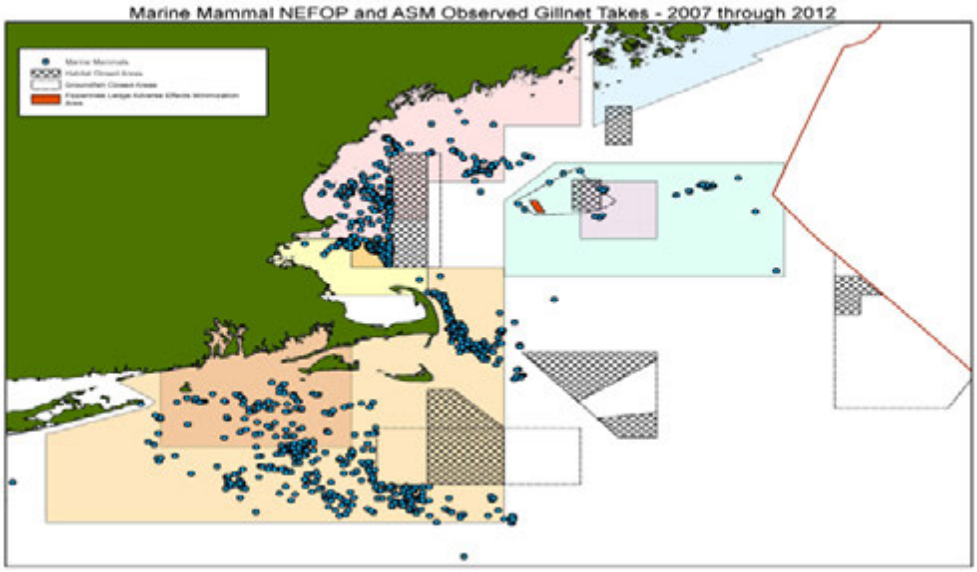
Figure 4 - Estimated total mean annual mortality of small cetaceans and pinnipeds by GAR fisheries from 2009-2013 (*source* Waring *et al*. 2014a,b; Waring *et al*. 2015; Waring *et al*. 2016).



Although there are multiple Category I and II fisheries that have the potential to result in the serious injury and morality of small cetaceans and pinnipeds in the GAR, the risk of an interaction with a specific fishery is affected by multiple factors, including where and when fishing effort is focused, the type of gear being used, and how effort overlaps in time and space with specific species in the affected area. For instance, the following figures (Figure 5 and Figure 6) depict observed marine mammal takes (large whales excluded) in gillnet and trawl gear in waters of the GOM, GB, and SNE from 2007-2012 or 2007-2011, respectively.[9] As depicted in Figure 5 and Figure 6, over the last 5 years, there appears to be particular areas in the GOM, GB, and SNE where fishing effort is overlapping in time and space with small cetacean or pinniped occurrence. Although uncertainties, such as shifting fishing effort patterns and data on true density (or even presence/absence) for some species remain, the available observer data, as depicted in Figure 5 and Figure 6, does provide some insight into areas in the ocean where the likelihood of interacting with a particular species is high and therefore, provides a means to consider potential impacts of future shifts or changes in fishing effort on small cetaceans and pinnipeds. For additional maps depicting observed small cetacean and pinniped interactions with Northeast or Mid-Atlantic bottom trawl or gillnet gear, please see Appendix III in Waring *et al*. (2014a,b), Waring *et al*. (2015), and Waring *et al*. (2016).

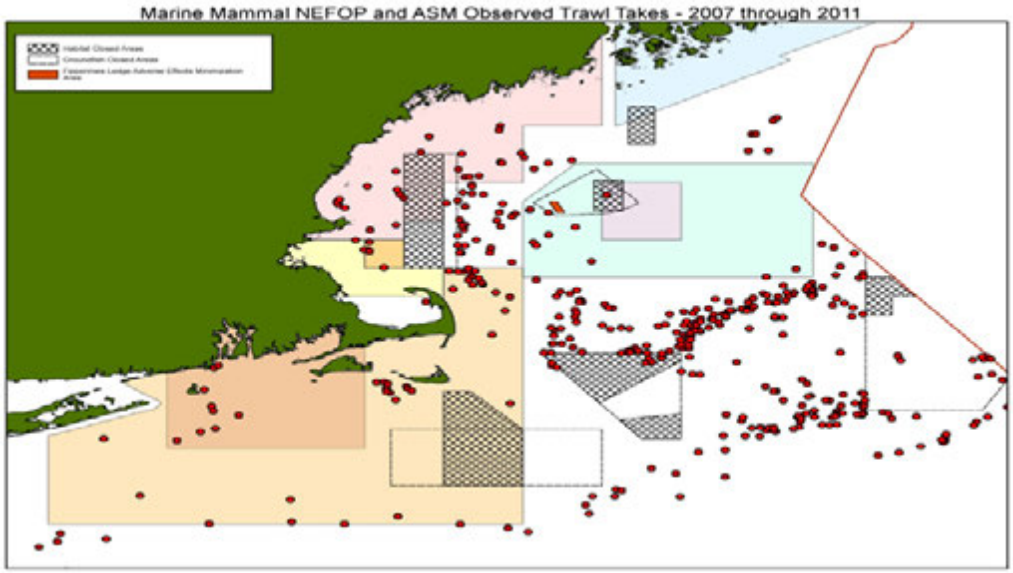
[9] Additional maps of marine mammal takes in various fishing gear can be found in Waring *et al*. 2014a, Waring *et al*. 2015, and Waring *et al*. 2016.

Figure 5 - Map of marine mammal bycatch in gillnet gear in the New England region (excluding large whales) observed by Northeast Fisheries Observer Program (NEFOP) and At Sea Monitoring (ASM) program between 2007 and 2012.



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

Figure 6 - Map of marine mammal bycatch in trawl gear in the New England region (excluding large whales) observed by the Northeast Fisheries Observer Program (NEFOP) and At Sea Monitoring (ASM) program between 2007 and 2011.



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

As noted above, numerous species of small cetaceans and pinnipeds interact with Category I and II fisheries in the GAR; however, several species in Table 23 have experienced such great losses to their populations as a result of interactions with Category I and/or II fisheries that they are now considered strategic stocks under the MMPA (see Table 19). These species include several stocks of bottlenose dolphins, and until recently, the harbor porpoise.[10] Section 118(f)(1) of the MMPA requires the preparation and implementation of a TRP for any strategic marine mammal stock that interacts with Category I or II fisheries. As a result, the Harbor Porpoise TRP (HPTRP) and the Bottlenose Dolphin TRP (BDTRP) were developed and implemented for these species.[11] In addition, due to the incidental mortality and serious injury of small cetaceans incidental to bottom and mid-water trawl fisheries operating in both the Northeast and Mid-Atlantic regions, the Atlantic Trawl Gear Take Reduction Strategy (ATGTRS) was implemented. The following provides a brief overview and summary for each HPTRP, BDTRP, and ATGTRS; however, additional information on each TRP can be found at:
http://www.greateratlantic.fisheries.noaa.gov/protected/porptrp/ or
http://www.nmfs.noaa.gov/pr/interactions/trt/bdtrp.htm
http://www.greateratlantic.fisheries.noaa.gov/Protected/mmp/atgtrp/

Harbor Porpoise Take Reduction Plan (HPTRP)

To address the high levels of incidental take of harbor porpoise in the groundfish sink gillnet fishery, a Take Reduction Team was formed in 1996. A rule (63 FR 66464) to implement the Harbor Porpoise Take Reduction Plan, and therefore, to reduce harbor porpoise bycatch in U.S. Atlantic gillnets was published on December 2, 1998, and became effective on January 1, 1999; the Plan was amended on February 19, 2010 (75 FR 7383), and October 4, 2013 (78 FR 61821). Since gillnet operations differ between the New England and Mid-Atlantic regions, the follow sets of measures were devised for each region:

- **New England Region**: The New England component of the HPTRP pertains to all fishing with sink gillnets and other gillnets capable of catching multispecies in New England waters from Maine through Rhode Island. It includes five management areas and three closure areas. Per specified periods of time, fishing with sink gillnets is restricted in closed areas. In management areas, depending on location, seasonal restrictions include complete closure to sink gillnet fishing to closures to sink gillnet fishing unless pingers are used in the manner prescribed in the TRP regulations.

- **Mid-Atlantic Region:** The Mid-Atlantic portion of the HPTRP pertains to the Mid-Atlantic shoreline from the southern shoreline of Long Island, New York to the North Carolina/South Carolina border. It includes four management areas, each with time and area closures to sink gillnet fishing unless the gear meets certain specifications (e.g., floatline length, twine size, tie downs, net size, net number, nets in a string). Additionally, during regulated periods, sink gillnet fishing in each management area of the Mid-Atlantic is regulated differently for small mesh (> 5 inches to < 7 inches) and large (7-18 inches) mesh gear. The Plan also includes some time and area closures in which sink gillnet fishing is prohibited regardless of the gear specifications.

[10] In the most recent U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessment (Waring *et al*. 2016); harbor porpoise are no longer designated as a strategic stock.
[11] Although the most recent U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessment (Waring *et al.* 2016) no longer designates harbor porpoise as a strategic stock, HPTRP regulations are still in place per the mandates provided in Section 118(f)(1).

Bottlenose Take Reduction Plan (BDTRP)

In April 2006, NMFS published a final rule to implement the BDTRP for the WNA coastal stock of bottlenose dolphin (April 26, 2006, 71 FR 24776) to reduce the incidental mortality and serious injury in the Mid-Atlantic gillnet fishery and eight other coastal fisheries operating within the dolphin's distributional range.[12] The measures contained in the BDTRP include gillnet effort reduction, gear proximity requirements, gear or gear deployment modifications, and outreach and educational measures to reduce dolphin bycatch below the marine mammals stock's PBR. On July 31, 2012 (77 FR 45268), the BDTRP was amended to permanently continue nighttime fishing restrictions of medium mesh gillnets operating in North Carolina coastal state waters. The Bottlenose Dolphin TRP was most recently amended on February 9, 2015 (80 FR 6925) to reduce the incidental serious injury and mortality of strategic stocks of bottlenose dolphins in Virginia pound net fishing gear, and to provide consistent state and federal regulations for Virginia pound net fishing gear.

Atlantic Trawl Gear Take Reduction Strategy (ATGTRS)

In addition to the HPTRP and the BDTRP, in 2006, the Atlantic Trawl Gear Take Reduction Team (ATGTRT) was convened to address the incidental mortality and serious injury of long-finned pilot whales (*Globicephala melas*), short-finned pilot whales (*Globicephala macrorhynchus*), common dolphins (*Delphinus delphis*), and white sided dolphins (*Lagenorhynchus acutus*) incidental to bottom and mid-water trawl fisheries operating in both the Northeast and Mid-Atlantic regions. Because none of the marine mammal stocks of concern to the ATGTRT are classified as a "strategic stock," nor do they currently interact with a Category I fishery, it was determined at the time that development of a take reduction plan was not necessary.[13]

In lieu of a take reduction plan, the ATGTRT agreed to develop an ATGTRS. The ATGTRS identifies informational and research tasks, as well as education and outreach needs the ATGTRT believes are necessary, to provide the basis for decreasing mortalities and serious injuries of marine mammals to insignificant levels approaching zero mortality and serious injury rates. The ATGTRS also identifies several potential voluntary measures that can be adopted by certain trawl fishing sectors to potentially reduce the incidental capture of marine mammals.

6.5.4.2 Sea Turtles

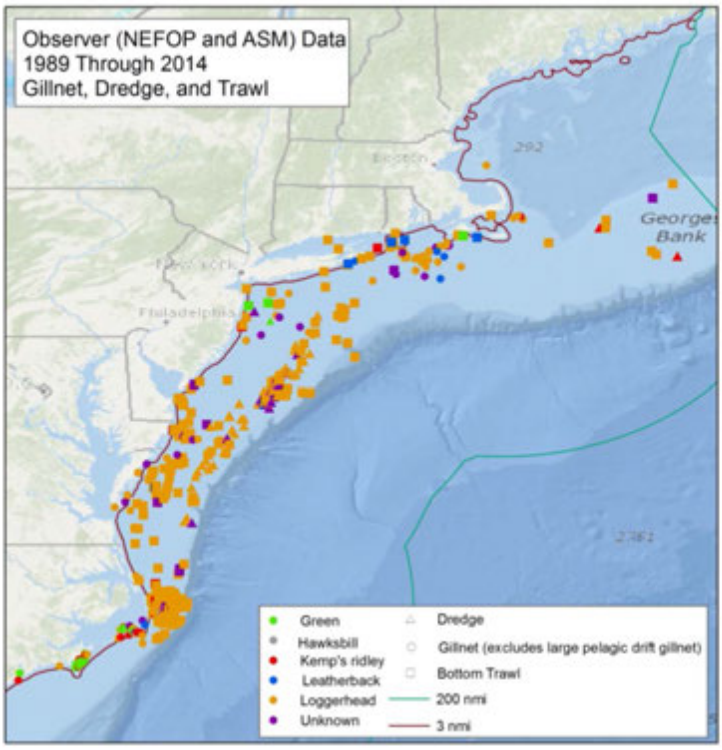
As provided in Figure 7, sea turtle interactions with gillnet, bottom trawl, and other bottom tending gear have been observed in the GOM, GB, and the Mid-Atlantic; however, most of the observed interactions have occurred in the Mid-Atlantic (see Warden 2011a,b; Murray 2013; Murray 2015). As few sea turtle interactions have been observed in the GOM and GB regions of the Northwest Atlantic, there is insufficient data available to conduct a robust model-based analysis on sea turtle interactions with gillnet or bottom trawl gear in these regions and therefore, produce a bycatch estimate for these regions. As a result, the bycatch estimates and the discussion below are based on observed sea turtle interactions in

[12] The final rule issued on April 26, 2006, for the BDTRP also revised the large mesh size restriction under the Mid-Atlantic large mesh gillnet rule for conservation of endangered and threatened sea turtles to provide consistency among Federal and state management measures.

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

gillnet or bottom trawl gear in the Mid-Atlantic.

Figure 7 - Observed locations of turtle interactions in bottom tending gears in the GAR from 1989-2014.



Bottom Trawl Gear

Green, Kemp's ridley, leatherback, loggerhead, and unidentified sea turtles have been documented interacting with bottom trawl gear. However, estimates are available only for loggerhead sea turtles. Warden (2011a,b) estimated that from 2005-2008, the average annual loggerhead interactions in bottom trawl gear in the Mid-Atlantic was 292 (CV=0.13, 95% CI=221-369), with an additional 61 loggerheads (CV=0.17, 95% CI=41-83) interacting with trawls, but released through a Turtle Excluder Device (TED).[14] Of the 292 average annual observable loggerhead interactions, approximately 44 of those were adult equivalents (Warden 2011a,b). Most recently, Murray (2015) estimated that from 2009-2013, the total average annual loggerhead interactions in bottom trawl gear in the Mid-Atlantic was 231 (CV=0.13, 95% CI=182-298). Of the 231 total average annual loggerhead interactions, approximately 33 of those were adult equivalents (Murray 2015). Bycatch estimates provided in Warden (2011a) and Murray (2015b) are a decrease from the average annual loggerhead bycatch in bottom otter trawls during 1996-2004, which Murray (2008) estimated at 616 sea turtles (CV=0.23, 95% CI over the nine-year period: 367-890). This decrease is likely due to decreased fishing effort in high-interaction areas (Warden 2011a,b).

Sink Gillnet Gear

Murray (2013) conducted an assessment of loggerhead and unidentified hard-shell turtle interactions in Mid-Atlantic gillnet gear from 2007-2011. Based on Northeast Fisheries Observer Program data from

[14] TEDs allow sea turtles to escape the trawl net, reducing injury and mortality resulting from capture in the net. Approved TEDs are required in the shrimp and summer trawl fishery. For further information on TEDs see 50 CFR 223.206 and 68 FR 8456 (February 21, 2003).

2007-2011, interactions between loggerhead and hard-shelled sea turtles (loggerheads plus unidentified hard-shelled) and commercial gillnet gear in the Mid-Atlantic averaged 95 hard-shelled turtles and 89 loggerheads (equivalent to 9 adults) annually (Murray 2013).[15] However, average estimated interactions in large mesh gear in warm, southern Mid-Atlantic waters have declined relative to those from 1996-2006 (Murray 2009), as did the total commercial effort (Murray 2013). Murray (2013) also estimated interactions by managed species landed in gillnet gear from 2007-2011. An estimate was not made for the Northeast multispecies fishery; but, takes have been observed in sink gillnet fisheries targeting other species. One of these was documented by an observer north of 42° N. Leatherback, Kemp's ridley, and green sea turtles have also been documented in Mid-Atlantic gillnet gear by observers (NMFS NEFSC FSB 2015), with observed takes of Kemp's ridley and leatherback sea turtles in overlapping areas with the Northeast multispecies fishery.

6.5.4.3 Atlantic Sturgeon

Sink Gillnet and Bottom Trawl Gear

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

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

Although Atlantic sturgeon deaths have rarely been reported in otter trawl gear (ASMFC 2007), it is important to recognize that effects of an interaction may occur long after the interaction. Based on physiological data obtained from Atlantic sturgeon captured in otter trawls, Beardsall *et al*. (2013) suggests that factors such as longer tow times (i.e., >60 min), prolonged handling of sturgeon (>10 min on

[15] At Sea Monitoring (ASM) data was also considered in Murray (2013); however, as the ASM program began 1 May 2010, trips (1,085 hauls), trips observed by at-sea monitors from May 2010 – December 2011 were pooled with the NEFOP data. Further, as most of the ASM trips occur in the Gulf of Maine, only a small portion (9%) of ASM data was used in the Murray (2013) analysis.

deck), and the type of trawl gear/equipment used, may increase the risk of physiological disruption or impairment (e.g., elevated cortisol levels, immune suppression, impaired osmoregulation, exhaustion) to Atlantic sturgeon captured in otter trawls and therefore, may result in an increased risk of post-release mortality. Although additional studies are needed to clearly identify the "after" effects of a trawl interaction, based on the available information, trawls should not be completely discounted as a form of gear that poses a mortality risk to Atlantic sturgeon.

6.5.4.4 Atlantic Salmon

Sink Gillnet and Bottom Trawl Gear

According to the Biological Opinion issued by NMFS Greater Atlantic Regional Fisheries Office on December 16, 2013, NMFS Northeast Fisheries Science Center's (NEFSC) Northeast Fisheries Observer and At-Sea Monitoring Programs documented a total of 15 individual salmon incidentally caught on over 60,000 observed commercial fishing trips from 1989 through August 2013 (NMFS 2013; Kocik *et al*. 2014). Specifically, Atlantic salmon were observed bycaught in gillnet (11/15) and bottom otter trawl gear (4/15), with 10 of the incidentally caught salmon listed as "discarded" and five reported as mortalities (Kocik (NEFSC), pers. comm (February 11, 2013) in NMFS 2013).[16] The very low number of observed Atlantic salmon interactions in gillnet and trawl gear reported in the Northeast Fisheries Observer Program's database suggests that interactions with Atlantic salmon are rare events (NMFS 2013; Kocik *et al*. 2014); however, it is important to recognize that observer program coverage is not 100 percent. As a result, it is likely that some interactions with Atlantic salmon have occurred, but have not been observed or reported.

[16] The genetic identity of the 15 captured salmon is unknown; however, the NMFS 2013 Biological Opinion considers all 15 fish to be part of the GOM Distinct Population Segment, although some may have originated from the Connecticut River restocking program (i.e., those caught south of Cape Cod, Massachusetts).

6.6 Human Communities

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

This section reviews the Northeast multispecies fishery and describes the human communities potentially impacted by the Proposed Action. This includes a description of the sector and common pool participants' groundfish fishing and their homeports. Table 25 contains a summary of major trends in the groundfish fishery. Additional information may be found in the FY2010, FY2011, and FY2012 and FY2013 performance reports for this fishery by the NEFSC (Kitts et al. 2011; Murphy et al. 2012; Murphy et al. 2014; Murphy et al. 2015).

Table 25 - Summary of major trends in the Northeast multispecies fishery.

	2010			2011		
	Total	Sector Vessels	Common Pool	Total	Sector Vessels	Common Pool
Groundfish gross revenue	$83,349,307	$81,286,822	$2,062,485	$88,876,767	$88,036,868	$839,899
Non-groundfish gross revenue	$212,222,869	$116,194,522	$96,028,347	$236,709,451	$142,065,183	$94,644,268
Total gross revenue	$295,572,176	$197,481,344	$98,090,832	$325,586,218	$230,102,050	$95,484,167
Groundfish average price	$1.43/lb	$1.42/lb	$1.58/lb	$1.43/lb	$1.43/lb	$1.57/lb
Non-groundfish average price	$1.19/lb	$1.17/lb	$1.22/lb	$1.12/lb	$1.12/lb	$1.12/lb
Number of active vessels	857	436	421	778	445	336
Number of active vessels that landed GF*	393	293	100	365	290	76
Number of groundfish trips	13,540	11,243	2,297	16,069	13,796	2,273
Number of non-groundfish trips	38,668	16,595	22,073	33,650	16,775	16,875
Number of days absent on groundfish trips	18,521	16,916	1,605	21,825	20,317	1,508
Number of days absent on non-groundfish trips	31,406	16,025	15,382	27,947	15,436	12,511
Total Crew Positions	2,270			2,176		
Total Crew-trips	124,451			122,449		
Total Crew-days	170,519			170,635		

	2012			2013		
	Total	Sector Vessels	Common Pool	Total	Sector Vessels	Common Pool
Groundfish gross revenue	$67,735,338	$67,136,982	$598,356	$55,117,761	$54,144,096	$973,665
Non-groundfish gross revenue	$227,571,729	$135,409,474	$92,162,255	$211,409,693	$128,788,320	$82,621,374
Total gross revenue	$295,307,067	$202,546,456	$92,760,611	$266,527,454	$182,932,415	$83,595,039
Groundfish average price	$1.43/lb	$1.43/lb	$1.69/lb	$1.30/lb	$1.30/lb	$1.53/lb
Non-groundfish average price	$1.07/lb	$1.04/lb	$1.13/lb	$1.05/lb	$0.98/lb	$1.19/lb
Number of active vessels	760	444	318	734	419	315
Number of active vessels that landed GF*	349	285	65	311	231	80
Number of groundfish trips	14,607	12,972	1,635	10,699	9,166	1,533
Number of non-groundfish trips	32,706	17,180	15,526	32,766	17,941	14,825
Number of days absent on groundfish trips	20,062	18,997	1,065	17,431	16,378	1,053
Number of days absent on non-groundfish trips	28,868	16,293	12,575	29,123	16,951	12,172
Total Crew Positions	2,141			2,040		
Total Crew-trips	117,228			106,969		
Total Crew-days	168,930			157,990		

	2014		
	Total	Sector Vessels	Common Pool
Groundfish gross revenue	$55,533,512	$54,702,812	$830,701
Non-groundfish gross revenue	$210,759,922	$126,336,824	$84,423,098
Total gross revenue	$266,293,434	$181,039,636	$85,253,798
Groundfish average price	$1.28/lb	$1.28/lb	$1.67/lb
Non-groundfish average price	$1.04/lb	$0.99/lb	$1.14/lb
Number of active vessels	717	405	313
Number of active vessels that landed GF*	273	217	56
Number of groundfish trips	9,850	8,698	1,152
Number of non-groundfish trips	31,976	16,350	15,626
Number of days absent on groundfish trips	16,784	15,937	848
Number of days absent on non-groundfish trips	27,658	15,636	12,022
Total Crew Positions	2,010		
Total Crew-trips	102,563		
Total Crew-days	150,753		

Notes: Data includes all vessels with a valid limited access multispecies permit. Sector plus common pool vessel counts may exceed the total vessel count because vessels may switch between sector and common pool eligibilities during the fishing year. Revenue and price reported in 2010 dollars. "Trips" refer to commercial trips in the northeast Exclusive Economic Zone (EEZ).
***This refers to vessels that landed allocated groundfish from at least one groundfish trip.**
From NMFS Greater Atlantic Regional Fisheries Office, Summary Tables for FY 2014 Northeast Multispecies Fishery, Accessed February 2017 (Table 1)

6.6.1 Groundfish Fishery Overview

In 1986, the NEFMC implemented the Northeast Multispecies FMP with the goal of rebuilding stocks. Since Amendment 5 in 1994, the multispecies fishery has been administered as a limited access fishery managed through a variety of effort control measures including DAS, area closures, trip limits, minimum size limits, and gear restrictions. Partially in response to those regulations, landings decreased throughout the latter part of the 1980's until reaching a more or less constant level of around 40,000 tons (36,287 mt) annually from the mid 1990's until 2012, when landings decreased to a level around 26,000 tons (23,639 mt) annually from then until the present.

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

Through Amendment 16, the NEFMC sought to rewrite groundfish sector policies with a scheduled implementation date of May 1, 2009. When that implementation date was delayed until FY2010, the NMFS Regional Administrator announced that, in addition to a previously stated 18% reduction in DAS, interim rules would be implemented to reduce fishing mortality during FY2009. These interim measures generally reduced opportunity among groundfish vessels through:

- Differential DAS counting;
- Elimination of the SNE/MA winter flounder SAP;
- Elimination of the state waters winter flounder exemption;
- Revisions to incidental catch allocations; and
- Reduction in some groundfish allocations (NOAA 2009).

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

Amendment 16 to the Northeast Multispecies FMP was implemented for the New England groundfish fishery starting on May 1, 2010, the start of the 2010 fishing year. There were two substantial changes meant to adhere to the catch limit requirements and stock rebuilding deadlines of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (MSA). The first change developed "hard quota" annual catch limits (ACLs) for all 20 stocks in the groundfish complex. The second change expanded the use of Sectors, which are allocated subdivisions of ACLs called Annual Catch Entitlements (ACE) based on each sector's collective catch history.[17] Sectors received ACE for nine of 13 groundfish

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

species (14 stocks + quotas for Eastern US/Canada cod and haddock; 16 ACEs) in the FMP and became exempt from many of the effort controls previously used to manage the fishery.

During the first year of sector management, 17 sectors operated, each establishing its own rules for using its allocations. Vessels with limited access permits that joined sectors were allocated 98% of the total commercial groundfish sub-ACL, based on their collective level of historical activity in the groundfish fishery. Approximately half (46%) of the limited access groundfish permits opted to remain in the common pool. Common pool vessels act independently of one another, with each vessel constrained by the number of DAS it can fish, by trip limits, and by all of the time and area closures. These restrictions help ensure that the groundfish catch of common pool vessels does not exceed the common pool's portion of the commercial groundfish sub- ACL for all stocks (about 2% for 2010) before the end of the fishing year.

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

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

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

In FY2014, the number of groundfish limited access eligibilities for sector members deceased by 6, while the number of eligibilities for the common pool decreased by 3. Sectors accounted for 62% of limited access permits.

6.6.2 Fleet Characteristics

The overall trend since the start of sector management has been a decline in the number of vessels with a limited access groundfish permit, with a low of 1,061 vessels in FY2014 (Table 26). Of those vessels, those with revenue from at least one groundfish trip have also declined, to only 273 in FY2014. The proportion of vessels affiliated with a sector increased each year since FY2010 until FY2013, and decreased slightly in FY2014. A key aspect of Amendment 16 is the ability of a sector to jointly decide how its ACE will be harvested, through redistribution within a sector and/or transferring ACE between sectors. Because inactive sector vessels may benefit if they lease their allocation, changes in the number of inactive vessels may result from a transfer of allocation and not necessarily vessels exiting the fishery. Since FY2010, 32-39% of the vessels were inactive (no landings). Of these inactive vessels, 64-69% were affiliated with sectors.

Table 26 - Number of vessels by fishing year.

	2010	2011	2012	2013	2014
	As of May 1 each Fishing Year:				
Total groundfish limited access eligibilities	**1,441**	**1,422**	**1,408**	**1,380**	**1,371**
Eligibilities held as Confirmation of Permit History	**94**	**168**	**228**	**273**	**303**
	During any part of the fishing year*:				
Total eligible vessels	1,408	1,320	1,222	1,154	1,094
Eligible vessels that did not renew a limited access groundfish permit	26	42	46	36	33
Vessels with a limited access groundfish permit	1,382	1,278	1,176	1,118	1,061
	While under a limited access groundfish permit:				
... those with revenue from any species**	857	778	760	734	717
... those with revenue from at least one groundfish trip	393	365	349	311	273
... those with no landings	525	500	416	384	344
Percent of inactive (no landings) vessels	(38%)	(39%)	(35%)	(34%)	(32%)

*On May 1st of the fishing year the number of vessels will equal to the number of eligibilities not in Confirmation of Permit History (CPH). Over time the number of vessels will differ from the number of eligibilities because these eligibilities can be transferred from vessel to vessel during the fishing year. These numbers exclude groundfish limited access eligibilities held as Confirmation of Permit History (CPH). Starting in 2010, Amendment 16 authorized CPH owners to join Sectors and to lease DAS. For purposes of comparison, CPH vessels are not included in the data for either Sector or Common Pool.
**Active vessels in this report received revenue from any species while fishing under a limited access groundfish permit.
From NMFS Greater Atlantic Regional Fisheries Office, Summary Tables for FY 2014 Northeast Multispecies Fishery, Accessed February 2017 (Table 10).

6.6.3 Effort

The groundfish fishery has traditionally been made up of a diverse fleet, comprised of a range of vessels sizes and gear types. The number of active vessels has declined each year since at least FY2010. This decline has occurred across all vessel size categories (Table 27). Since FY2010, the 30' to < 50' vessel size category, which has the largest number of active groundfish vessels, experienced a 40% decline (242 to 145 active vessels). The <30' vessel size category, containing the least number of active groundfish vessels, experienced a similar reduction (39%) since FY2010 (23 to 14 vessels). The 50' to <75' vessel size category experienced the least reduction (16%) since FY2010.

Table 27 - Vessel activity by size class.

	FY2010	FY2011	FY2012	FY2013	FY2014
Vessels with revenue from any species					
Less than 30	65	51	49	51	47
30 to < 50	462	404	399	383	368
50 to < 75	218	212	207	193	197
75 and above	112	112	111	107	105
Total	857	778	760	734	717
Vessels with revenue from at least one groundfish trip					
Less than 30	23	18	16	17	14
30 to < 50	242	217	207	176	145
50 to < 75	123	120	121	106	103
75 and above	58	61	60	49	45
Total	446	416	401	348	307

Source: NMFS Greater Atlantic Regional Fisheries Office, Summary Tables for FY 2014 Northeast Multispecies Fishery, Accessed February 2017 (Table 13, 14).

Some of the proposed benefits of a catch share system of management are the potential efficiency gains associated with increasing operational flexibility (NOAA 2010). Being released from the former effort controls, but being held to ACLs, sector vessels were expected to increase their catch per unit effort by decreasing effort. During the second year of sector management, 2011, the number of groundfish fishing trips[18] and total days absent on groundfish trips increased by 19% and 18%, respectively (Table 28).[19] Effort on groundfish trips generally decreased in FY2012. Vessels took fewer groundfish trips, with fewer total days absent of groundfish trips, though average trip length increased slightly over FY2011. Effort on groundfish trips further decreased in FY2013 and FY2014.

The groundfish fleet overall took slightly more non-groundfish trips, with a slight increase in total days absent on these trips, in 2013 than it did in 2012. The total number of non-groundfish trips taken by the

[18] Groundfish trip" is defined as a trip where the vessel owner or operator declared, either through the vessel monitoring system or through the interactive voice response system, that the vessel was making a groundfish trip.
[19] The data is taken from different source materials (VMS, etc.) than other data in this document, and thus, may be slightly different than.

fleet in 2014 was 31,976 trips, a 2.4% (-790 trips) decrease from 2013. Overall, the number of non-groundfish trips taken by the fleet has decreased 17.3% over 2010-2014 (Table 28). The total number of days absent on non-groundfish trips taken by the fleet has decreased 11.9% over the 2010-2014 period. Average trip length on non-groundfish trips has increased overall from 2010-2014 by 3.5% (+0.03 days absent), but fell very slightly by 2.2% (-0.02 days absent) in 2013 from 2014 (Table 28).

Table 28 - Effort by active vessels.

	FY2010	FY2011	FY2012	FY2013	FY2014
Number of trips					
groundfish	13,540	16,069	14,607	10,699	9,850
non-groundfish	38,668	33,650	32,706	32,766	
Number of days absent on trips					
groundfish	18,521	21,825	20,062	17,431	
non-groundfish	31,406	27,947	28,868	29,123	
Average trip length*					
Groundfish	1.37	1.36	1.37	1.63	1.70
(std. dev.)	(2.14)	(2.20)	(2.18)	(2.34)	(2.38)
non-groundfish	0.86	0.87	0.91	0.91	0.89
(std. dev.)	(1.56)	(1.52)	(1.61)	(1.57)	(1.52)

*This is the average trip length of all individual trips that have non-missing values for days absent. Since some trip records have missing values for days absent, average trip length reported here may be higher than what is obtained by dividing the overall number of days absent by the overall number of trips.
Source: NMFS Greater Atlantic Regional Fisheries Office, Summary Tables for FY 2014 Northeast Multispecies Fishery, Accessed February 2017 (Table 15).

6.6.4 Landings and Revenue

Total groundfish landings on trips made by vessels possessing a limited access groundfish permit in FY2014 were 43.4M pounds, which is a slight increase in landings from FY2013 (Table 29). Because only 16 groundfish stocks are limited by sector allocations, it is important to consider the landings of non-groundfish species and groundfish species separately as a means of describing any possible shift in effort to other fisheries. Non-groundfish landings made by limited access vessels increased from 177.9M pounds in FY2010 to 211.7M pounds in FY2011, and remained fairly steady at 212.1M pounds in FY2012. Declining groundfish landings were coupled with little growth in non-groundfish landings for the fleet in 2013. Non-groundfish landings remained about the same in FY 2014 at 202.1M pounds. Total landings of all species on all trips were 245.5M pounds in 2014, a 0.7% increase from 2013 (243.7M pounds). This compares to landings ranging from 236.2M – 273.9M pounds in the 2010–2012 fishing years. In 2014, groundfish accounted for only 17.7% of total landings by the groundfish fleet, sectors landed almost 70% of total landings and 98.8% of all groundfish landings.

Table 29 - Total landing and revenue from all trips by fishing year.

	FY2010	FY2011	FY2012	FY2013	FY2014
Landed Pounds					
Groundfish	58,376,025	62,199,462	47,424,184	42,286,097	43,357,534
Non-Groundfish	177,858,315	211,687,965	212,086,306	201,393,759	202,100,345
Total Pounds	236,234,341	273,887,426	259,510,490	243,679,856	245,457,879
Gross Revenue (in 2010 dollars)					
Groundfish	$83,349,307	$88,876,767	$67,735,338	$55,117,761	$55,533,512
Non-Groundfish	$212,222,869	$236,709,451	$227,571,729	$211,409,693	$210,759,922
Total Revenue	$295,572,176	$325,586,218	$295,307,067	$266,527,454	$266,293,434

Source: NMFS Greater Atlantic Regional Fisheries Office, Summary Tables for FY 2014 Northeast Multispecies Fishery, Accessed February 2017 (Table 2).

Table 30 - Total landings and nominal revenue from groundfish trips by fishing year.

	FY2010	FY2011	FY2012	FY2013	FY2014
Landed Pounds					
Groundfish	58,264,898	62,058,041	47,366,270	42,148,212	43,220,719
Non-Groundfish	23,583,639	28,990,164	28,053,234	20,901,441	25,786,666
Total Pounds	81,848,538	91,048,205	75,419,504	63,049,652	69,007,385
Gross Revenue (in 2010 dollars)					
Groundfish	$83,134,475	$88,663,998	$67,624,981	$54,922,673	$55,372,711
Non-Groundfish	$23,428,284	$32,213,528	$26,015,100	$22,352,385	$26,163,996
Total Revenue	$106,562,760	$120,877,526	$93,640,081	$77,275,059	$81,536,707

Source: NMFS Greater Atlantic Regional Fisheries Office, Summary Tables for FY 2014 Northeast Multispecies Fishery, Accessed February 2017 (Table 3).

During the first year of sector management, groundfish revenues from vessels with limited access groundfish permits in FY2010, were $83.3M (Table 30). In FY2011, the groundfish revenues from vessels with limited access groundfish permits were $88.9M. Groundfish revenue in FY2012 decreased to a three-year low of $67.7 million (23.8% lower than in 2011), decreasing even further in FY2013 to $55.1 million. Groundfish revenue in FY2014 was $55.5 million, about the same as in FY2013. Non-groundfish revenue decreased to a five-year low of $210.8 million (11% lower than in FY2011).

6.6.5 ACE Leasing

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

because vessels catching more than their allocation of PSC must have leased additional quota, either as PSC from within the sector or as ACE from another sector.

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

6.6.6 Fishing Communities

There are over 400 communities that have been the homeport or landing port to one or more Northeast groundfish fishing vessels since 2008. These ports occur throughout the New England and Mid-Atlantic. Consideration of the economic and social impacts on these communities from proposed fishery regulations is required by the National Environmental Policy Act (NEPA 1970) and the M-S Act. Before any agency of the federal government may take "actions significantly affecting the quality of the human environment," that agency must prepare an Environmental Assessment (EA) that includes the integrated use of the social sciences (NEPA Section 102(2)(C)). National Standard 8 of the MSA stipulates that "conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities" (16 U.S.C. § 1851(a)(8)).

A "fishing community" is defined in the Magnuson-Stevens Act, as amended in 1996, as "a community which is substantially dependent on or substantially engaged in the harvesting or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew and United States fish processors that are based in such community" (16 U.S.C. § 1802(17)). Determining which fishing communities are "substantially dependent" on and "substantially engaged" in the groundfish fishery can be difficult.

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

6.6.6.1 Primary and Secondary Fishing Ports

Communities dependent on the groundfish resource have been categorized into primary and secondary port groups, so that community data can be cross-referenced with other demographic information (Table 31). Consistent with the approach taken in Amendment 18, both the regional quotient (port groundfish revenue/regional groundfish revenue) and local quotient (port groundfish revenue/port all species revenue) were calculated to provide an objective measure of the level of involvement in groundfishing for

each port. All metrics were calculated using the annual average over the most recent five years for which landings data are available (FY 2009-FY 2013).[20]

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

1. On average over FY 2009-FY 2013, three or more vessels reported groundfish landings in the port, selling to three or more dealers (not necessarily located in the port).
2. At least $100,000 average annual revenue (for all species, not just groundfish).[21]
3. Top 10 ranking in regional quotient or local quotient.

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

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

Using the above method identifies place-based fishing communities based on level of engagement. Because significant geographical shifts in the distribution of groundfish fishing activity have occurred, the characterization of some ports as “primary” or “secondary” may not reflect their historical participation in and dependence on the groundfish fishery. Descriptions of communities involved in the multispecies

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

fishery, and further descriptions of Northeast fishing communities in general, can be found on the Northeast Fisheries Science Center's website (NEFSC 2013d).

Table 31 - Primary and secondary multispecies port communities

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

6.6.6.2 Primary Port Communities

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

Portland, Maine. In 2015, Portland had an estimated population of 66,881, a 1.0% increase from the year 2010 (61,194; Census 2015). In FY 2014, 14 vessels that hailed from Portland landed groundfish (Table 32). The value of groundfish landings from these vessels was $9.3M in FY 2014, whether they landed in Portland or elsewhere. The value of all groundfish revenue in Portland was $6.0M in FY 2013, indicating that several of the vessels based in Portland landed in other ports, likely in Massachusetts. Since FY 2010,

the value of landings in Portland has been less than the value of landings by Portland-based vessels. In FY 2014, 63% of total fisheries revenues of groundfish vessels landing in Portland came from groundfish.

Portland has several dealers, processors, and other shore-side infrastructure that support the groundfish fishery. Opening in 1986, the Portland Fish Exchange is America's first all-display seafood auction. In 2014, the Exchange sold 4.5M pounds of seafood, about 91% of which was groundfish (www.pfex.org). Processors include Bristol Seafood, Channel Fish Processing, Cozy Harbor Seafood, Inc., and North Atlantic, Inc. The Salt and Sea is a community supported fishery based in Portland.

Portsmouth, New Hampshire. In 2015, Portsmouth had an estimated population of 21,530, a 1.4% increase from the year 2010 (21,233; Census 2015). In FY 2013, eight vessels that hailed from Portsmouth landed groundfish, down from 13 in FY 2009 (Table 33). The value of groundfish landings from these vessels was $1.1M in FY 2013, whether they landed in Portsmouth or elsewhere. The value of all groundfish revenue in Portsmouth was $0.9M in FY 2013, indicating that some vessels based in Portsmouth landed in other ports, likely in Massachusetts or Maine. Since at least FY 2009, the value of landings in Portsmouth has been less than the value of landings by Portsmouth-based vessels. In FY 2013, 35% of total fisheries revenues of groundfish vessels landing in Portsmouth came from groundfish.

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

Seabrook, New Hampshire. In 2015, Seabrook had an estimated population of 8,779, a 1.0% increase from the year 2010 (8,693; Census 2015). In FY 2012, four vessels that hailed from Seabrook landed groundfish, down from six in FY 2009 (Table 34). The value of these landings was $0.5M, down from $1.2M in FY 2009. Groundfish landings in Seabrook, regardless of the homeport of the vessel were down from $1.4M in FY 2009 to $1.1M in FY 2012. In FY 2012, 61% of total fisheries revenues of groundfish vessels landing in Seabrook came from groundfish. FY 2013 data is considered confidential.

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

Rye, New Hampshire. In 2015 Rye had an estimated population of 5,379, a 1.5% increase from the year 2010 (5,298; Census 2015). In FY 2012, nine vessels that hailed from Rye landed groundfish, down from 11 vessels in FY 2009 (Table 35). The value of these landings was $1.2M, down from $1.5M in FY 2009. Groundfish landings in Rye, regardless of the homeport of the vessel were down from $1.3M in FY 2009 to $0.8M in FY 2012. In FY 2012, 66% of total fisheries revenues of groundfish vessels landing in Rye came from groundfish. FY 2013 data is considered confidential.

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

Gloucester, Massachusetts. In 2015, Gloucester had an estimated population of 29,781, a 3.4% increase from the year 2010 (28,789; Census 2015). In FY 2014, 50 vessels that hailed from Gloucester landed groundfish, down from 74 in FY 2010 (Table 36). The value of groundfish landings from these vessels

was $9.5M in FY 2014, whether they landed in Gloucester or elsewhere. The value of all groundfish revenue in Gloucester was $14.0M in FY 2014, indicating that vessels based in other ports landed in Gloucester. Since at least FY 2010, the value of landings in Gloucester has been greater than the value of landings by Gloucester-based vessels. In FY 2014, 55% of total fisheries revenues of groundfish vessels landing in Gloucester came from groundfish.

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

Boston, Massachusetts. In 2015, Boston had an estimated population of 667,137, a 8.0% increase from the year 2010 (617,594; Census 2015). In FY 2014, 26 vessels that hailed from Boston landed groundfish, down from 35 in FY 2010 (Table 37). The value of groundfish landings from these vessels was $12.8M in FY 2014, whether they landed in Boston or elsewhere. The value of all groundfish revenue in Boston was $10.5M in FY 2014, indicating that some vessels based in Boston landed in other ports. Since at least FY 2010, the value of landings in Boston has been less than the value of landings by Boston-based vessels. In FY 2014, 80% of total fisheries revenues of groundfish vessels landing in Boston came from groundfish.

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

Chatham, Massachusetts. In 2015, Chatham had an estimated population of 6,143, a 0.3% increase from the year 2010 (6,125; Census 2015). In FY 2014, 16 vessels that hailed from Chatham landed groundfish, down from 26 in FY 2010 (Table 38). The value of groundfish landings from these vessels was $0.5M in FY 2014, whether they landed in Chatham or elsewhere. In FY 2014, the value of landings in Chatham was the same as the value of landings by Chatham-based vessels. In FY 2014, 4% of total fisheries revenues of groundfish vessels landing in Chatham came from groundfish. The Chatham Fish Pier is an active offloading facility in Chatham. The Cape Cod Community Supported Fishery is based in West Chatham. Also on the Cape, the Lobster Trap Co., Inc. purchases groundfish from Chatham-based vessels.

New Bedford, Massachusetts. In 2015, New Bedford had an estimated population of 94,958, remaining fairly steady with a decrease of 0.1% since the year 2010 (95,072; Census 2015). In FY 2014, 35 vessels that hailed from New Bedford landed groundfish, down slightly from 33 in FY 2010 (Table 39). The value of groundfish landings from these vessels was $13.5M in FY 2014, whether they landed in New Bedford or elsewhere. Since at least FY 2010, the value of landings in New Bedford has been greater than

the value of landings by New Bedford-based vessels. In FY 2014, 27% of total fisheries revenues of groundfish vessels landing in New Bedford came from groundfish.

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

Scituate, Massachusetts. In 2015, Scituate had an estimated population of 18,478, a 1.9% increase from the year 2010 (18,133; Census 2015). In FY 2013, eight vessels that hailed from Scituate landed groundfish, down from 14 in FY 2009. The value of groundfish landings from these vessels, whether they landed in Scituate or elsewhere, was $0.3M in FY 2013, down from $1.6M in FY 2009 (Table 40). The value of groundfish landings in Scituate since FY 2011 has been greater than the value of landings from Scituate based vessels. In FY 2013, 57% of total fisheries revenues of groundfish vessels landing in Scituate came from groundfish.

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

Point Judith/Narragansett, Rhode Island. Point Judith is considered a village in the town of Narragansett and does not have Census data as it is not incorporated on its own. It is also not a residential town, and fishermen working out of the port live in surrounding communities and all across Rhode Island. In 2015, Narragansett had an estimated population of 15,650, a 1.6% decrease from the year 2010 (15,868; Census 2015). In FY 2014, 27 vessels that hailed from Point Judith landed groundfish, down from 31 in FY 2010 (Table 41). The value of groundfish landings from these Point Judith-based vessels was $1.5M in FY 2014, similar to the value of groundfish landings in Point Judith at $1.8M. In FY 2014, 6% of total fisheries revenues of groundfish vessels landing in Point Judith came from groundfish.

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

opportunities decrease. Groundfish processors located in Warwick likely serve fishermen offloading in Point Judith, including Gardner's Wharf Seafood and Great Northern Products, Ltd.

Table 32 - Groundfish fishery in Portland, ME

	FY10	FY11	FY12	FY13	FY14
Active groundfish vessels in this homeport(#) [A]	15	15	16	14	14
Value of landings of groundfish by home port ($M)	10.5	10.1	9.3	9.7	9.3
Value of landings of groundfish by port of landing ($M) [B]	3.4	4.8	6.0	5.3	6.0
Value of landings of all species by groundfish vessels by home port ($M)	12.9	12.7	12.2	12.9	12.5
Value of landings of all species by groundfish vessels by port of landing ($M)	6.3	7.4	8.6	8.8	9.5

[A] "Active" defined as revenue from at least one groundfish trip from this homeport.
[B] Revenue includes all vessels landing in Portland.
Source: NMFS Greater Atlantic Regional Fisheries Office, Summary Tables for FY 2014 Northeast Multispecies Fishery, Accessed February 2017 (Table 4,5,6,7,12), all landings are reported in 2010 dollars.

Table 33 - Groundfish fishery in Portsmouth, NH

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

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

Table 34 - Groundfish Fishery in Seabrook, NH

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

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

Table 35 - Groundfish fishery in Rye, NH

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

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

Table 36 - Groundfish fishery in Gloucester, MA

	FY10	FY11	FY12	FY13	FY14
Active groundfish vessels in this homeport(#) [A]	74	69	61	53	50
Value of landings of groundfish by home port ($M)	16.7	16.7	13.6	9.4	9.5
Value of landings of groundfish by port of landing ($M) [B]	27.7	29.3	20.5	14.5	14.0
Value of landings of all species by groundfish vessels by home port ($M)	25.0	25.9	21.6	17.0	18.2
Value of landings of all species by groundfish vessels by port of landing ($M)	39.9	42.1	31.1	24.9	25.6

[A] "Active" defined as revenue from at least one groundfish trip from this homeport.
[B] Revenue includes all vessels landing in Gloucester.
Source: NMFS Greater Atlantic Regional Fisheries Office, Summary Tables for FY 2014 Northeast Multispecies Fishery, Accessed February 2017 (Table 4,5,6,7,12), all landings are reported in 2010 dollars.

Table 37 - Groundfish fishery in Boston, MA

	FY10	FY11	FY12	FY13	FY14
Active groundfish vessels in this homeport(#) [A]	35	34	28	26	26
Value of landings of groundfish by home port ($M)	14.5	17.0	12.6	10.6	12.8
Value of landings of groundfish by port of landing ($M) [B]	11.6	12.1	11.1	9.7	10.5
Value of landings of all species by groundfish vessels by home port ($M)	28.1	30.0	26.4	25.0	27.5
Value of landings of all species by groundfish vessels by port of landing ($M)	14.2	14.8	13.3	12.5	13.2

[A] "Active" defined as revenue from at least one groundfish trip from this homeport.

[B] Revenue includes all vessels landing in Boston.

Source: NMFS Greater Atlantic Regional Fisheries Office, Summary Tables for FY 2014 Northeast Multispecies Fishery, Accessed February 2017 (Table 4,5,6,7,12), all landings are reported in 2010 dollars.

Table 38 - Groundfish fishery in Chatham, MA

	FY10	FY11	FY12	FY13	FY14
Active groundfish vessels in this homeport(#) [A]	26	25	23	20	16
Value of landings of groundfish by home port ($M)	2.3	2.5	0.9	0.8	0.5
Value of landings of groundfish by port of landing ($M) [B]	2.2	2.3	1.0	0.7	0.5
Value of landings of all species by groundfish vessels by home port ($M)	6.5	8.8	8.8	6.6	8.1
Value of landings of all species by groundfish vessels by port of landing ($M)	7.5	9.1	7.2	7.2	11.7

[A] "Active" defined as revenue from at least one groundfish trip from this homeport.

[B] Revenue includes all vessels landing in Chatham.

Source: NMFS Greater Atlantic Regional Fisheries Office, Summary Tables for FY 2014 Northeast Multispecies Fishery, Accessed February 2017 (Table 4,5,6,7,12), all landings are reported in 2010 dollars.

Table 39 - Groundfish fishery in New Bedford, MA

	FY10	FY11	FY12	FY13	FY14
Active groundfish vessels in this homeport(#) [A]	33	37	36	33	35
Value of landings of groundfish by home port ($M)	18.5	20.7	14.5	12.7	13.5
Value of landings of groundfish by port of landing ($M) [B]	29.6	29.9	20.8	18.5	19.8
Value of landings of all species by groundfish vessels by home port ($M)	64.8	76.4	67.8	58.0	49.1
Value of landings of all species by groundfish vessels by port of landing ($M)	95.4	107.1	100.1	87.0	73.9

[A] "Active" defined as revenue from at least one groundfish trip from this homeport.

[B] Revenue includes all vessels landing in New Bedford.

Source: NMFS Greater Atlantic Regional Fisheries Office, Summary Tables for FY 2014 Northeast Multispecies Fishery, Accessed February 2017 (Table 4,5,6,7,12), all landings are reported in 2010 dollars.

Table 40 - Groundfish fishery in Scituate, MA

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

[A] "Active" defined as revenue from at least one groundfish trip from this homeport.

[B] Revenue includes all vessels landing in Scituate.

Source: Murphy, 2015, all landings are reported in 2010 dollars.

Table 41 - Groundfish fishery in Point Judith, RI

	FY10	FY11	FY12	FY13	FY14
Active groundfish vessels in this homeport(#) [A]	31	28	33	30	27
Value of landings of groundfish by home port ($M)	2.4	1.9	1.8	1.9	1.5
Value of landings of groundfish by port of landing ($M) [B]	1.7	1.9	1.7	2.2	1.8
Value of landings of all species by groundfish vessels by home port ($M)	123.0	27.9	24.9	26.0	23.4
Value of landings of all species by groundfish vessels by port of landing ($M)	22.3	27.6	23.7	28.6	27.9

[A] "Active" defined as revenue from at least one groundfish trip from this homeport.
[B] Revenue includes all vessels landing in Point Judith.
Source: NMFS Greater Atlantic Regional Fisheries Office, Summary Tables for FY 2014 Northeast Multispecies Fishery, Accessed February 2017 (Table 4,5,6,7,12), all landings are reported in 2010 dollars.

6.6.6.3 Employment

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

Throughout the Northeast, many communities benefit indirectly from the multispecies fishery, but these benefits are often difficult to attribute. The direct benefit from employment in the fishery can be estimated by the number of crew positions. However, crew positions do not equate to the number of jobs in the fishery and do not make the distinction between full and part-time positions. In FY 2014, vessels with limited access groundfish permits provided 2,010 crew positions, with 48% coming from vessels with homeports in Massachusetts (Table 42). Since at least FY 2010, the total number of crew positions provided by limited access groundfish vessels has declined by 11.5%. Changes in crew positions vary across homeport states. Overall, most states lost crew positions in FY 2014, although Connecticut added a few positions.

A crew day[22] is a measure of employment that incorporates information about the time spent at sea earning a share of the revenue. Conversely, crew days can be viewed as an indicator of time invested in the pursuit of "crew share" (the share of trip revenues received at the end of a trip). The time spent at sea has an opportunity cost. For example, if crew earnings remain constant, a decline in crew days would reveal a benefit to crew in that less time was forgone for the same amount of earnings. In FY 2014, vessels with limited access groundfish permits used 150,753 crew days, with 49% coming from vessels with homeports in Massachusetts (Table 42). Since at least FY 2010, the total number of crew days used by limited access groundfish vessels across the Northeast has declined. The number of crew positions and

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

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

Table 42 - Number of crew positions and crew days on active vessels by homeport and state

Home Port State		FY 2010	FY 2011	FY 2012	FY 2013	FY 2014
CT	Total crew positions	38	40	39	39	46
	Total crew days	4,018	3,009	4,478	3,583	2,938
MA	Total crew positions	1,133	1,065	1,044	984	974
	Total crew days	82,462	85,262	81,588	73,575	73,598
ME	Total crew positions	251	228	243	223	216
	Total crew days	15,566	14,861	16,496	15,286	14,255
NH	Total crew positions	107	106	96	87	77
	Total crew days	3,889	4,914	5,141	4,493	3,985
NJ	Total crew positions	149	145	149	153	149
	Total crew days	10,077	9,890	10,322	9,670	9,268
NY	Total crew positions	209	217	209	194	193
	Total crew days	15,812	16,038	15,011	14,555	14,208
RI	Total crew positions	253	246	232	226	225
	Total crew days	26,806	25,068	24,257	25,637	22,953
Other Northeast	Total crew positions	130	128	128	134	130
	Total crew days	11,888	11,594	11,635	11,191	9,547
Total	**Total crew positions**	**2,270**	**2,176**	**2,141**	**2,040**	**2,010**
	Total crew days	**170,519**	**170,635**	**168,930**	**157,990**	**150,753**

Source: NMFS Greater Atlantic Regional Fisheries Office, Summary Tables for FY 2014 Northeast Multispecies Fishery, Accessed February 2017 (Table 41).

6.6.7 Consolidation and Redirection

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

Both redirection and consolidation have been observed when management regimes for fisheries outside the Northeast US shifted toward a catch share management regime such as sectors. For example, research following the rationalization of the halibut and sablefish fisheries by the North Pacific Fishery Management Council found individuals who received enough quota shares were able to continue fishing with less competition, greater economic certainty, and over a longer fishing season (Matulich & Clark 2001). However, individuals who did not receive enough of a catch share either bought or leased catch shares from other fishermen or sold their quota. Similarly, one year after implementation of the Bering

Sea-Aleutian Island crab fishery Individual Transferable Quota (ITQ), a study found that about half of the vessels that fished the 2004/2005 Bering Sea Snow Crab fishery did not fish the following year. However, research on the ITQ plan for the British Columbia halibut fishery found efficiency gains were greatest during the first round of consolidation, and little incentive to increase efficiency (or continue consolidation) existed afterward (Pinkerton & Edwards 2009). The scope of consolidation and redirection of effort that may be expected to result from sector operations in FY2014 is difficult to predict.

6.6.8 Regulated Groundfish Stock Catch

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

Table 43 - FY2015 Northeast Multispecies Percent of Annual Catch Limit Caught (%)

Stock	Components with ACLs and sub-ACLs: With Accountability Measures (AMs)								Sub-components: No AMs	
	Total	Groundfish Fishery	Sector	Common Pool	Recreational	Midwater Trawl Herring Fishery	Scallop Fishery	Small Mesh Fisheries	State Water	Other
	A to H	A+B+C	A	B	C	D	E	F	G	H
GB Cod	97.3	91.6	91.6	95.8					230.0	193.2
GOM Cod	88.8	82.6	90.2	86.3	69.8				181.2	58.8
GB Haddock	25.9	23.3	23.5	0.1		103.9			10.3	68.6
GOM Haddock	82.9	83.6	76.8	24.8	102.7	-			38.2	116.8
GB Yellowtail Flounder	28.4	18.9	19.3	0.2			98.8	1.0	NA	0.1
SNE Yellowtail Flounder	49.0	48.9	37.9	91.7			79.1		15.4	22.5
CC/GOM Yellowtail Flounder	88.9	84.1	85.0	64.0					137.1	101.9
Plaice	96.9	98.0	98.9	51.5					75.5	70.6
Witch Flounder	85.1	88.0	87.8	98.7					171.2	53.0
GB Winter Flounder	45.4	45.9	46.4	0.0					NA	29.3
GOM Winter Flounder	42.1	30.9	31.7	16.3					92.0	49.1
SNE/MA Winter Flounder	55.2	52.7	50.9	65.6					72.6	61.6
Redfish	46.4	47.9	48.2	0.5					3.6	1.2
White Hake	35.8	36.8	37.1	0.8					1.5	7.2
Pollock	25.2	21.3	21.1	54.4					44.3	54.2
Northern Windowpane	131.8	75.1	NA	NA					84.1	262.3
Southern Windowpane	122.1	134.9	NA	NA			115.1		71.3	137.5
Ocean Pout	34.7	26.8	NA	NA					74.3	94.7
Halibut	105.2	92.2	NA	NA					137.1	63.1
Wolffish	30.4	30.1	NA	NA					99.3	12.6

Source: NMFS Greater Atlantic Regional Fisheries Office, September 30, 2016, run dates June 20, 2016 and August 10, 2016

Table 44 - FY 2015 Northeast Multispecies Total Catch (mt)

Stock	**Total Catch**	Groundfish Fishery	Sector	Common Pool	Recreational	Midwater Trawl Herring Fishery	Scallop Fishery[1]	Small Mesh Fisheries	State Water	Other
	A to H	A+B+C	A	B	C	D	E	F	G	H
GB Cod	1,835.4	1,636.8	1,601.1	35.8					45.5	153.0
GOM Cod	324.8	270.9	181.6	4.8	84.5				46.4	7.5
GB Haddock	6,003.5	5,074.7	5,074.4	0.3		235.5			25.0	668.3
GOM Haddock	1,139.9	1,111.2	726.2	3.1	381.9	-			4.0	24.6
GB Yellowtail Flounder	68.2	38.4	38.4	0.0			29.8	0.1	-	0.0
SNE/MA Yellowtail Flounder	326.6	283.5	174.4	109.2			34.6		2.2	6.3
CC/GOM Yellowtail Flounder	465.6	385.1	371.7	13.4					52.6	27.9
Plaice	1,425.1	1,379.9	1,366.0	13.9					23.3	21.8
Witch Flounder	639.4	536.9	523.2	13.8					40.2	62.3
GB Winter Flounder	886.5	868.8	868.8	0.0					-	17.7
GOM Winter Flounder	205.8	121.0	117.6	3.5					79.8	5.0
SNE/MA Winter Flounder	886.7	688.0	583.4	104.6					85.2	113.5
Redfish	5,291.8	5,284.6	5,284.3	0.3					4.3	2.8
White Hake	1,606.6	1,599.1	1,598.8	0.3					0.7	6.8
Pollock	3,995.1	2,923.9	2,876.9	47.0					441.5	629.7
Northern Windowpane	189.8	73.6	73.6	0.0					1.3	114.9
Southern Windowpane	643.4	137.6	90.4	47.2			210.6		39.1	256.1
Ocean Pout	76.3	52.3	44.1	8.2					1.7	22.3
Halibut	102.0	59.0	58.5	0.4					41.1	1.9
Wolffish	19.7	18.7	18.7	-					0.7	0.4

[1]The GB cod common pool sub-ACL was reduced mid-year to account for an overage of the 2014 Eastern GB cod common pool sub-ACL.
Source: NMFS Greater Atlantic Regional Fisheries Office, September 30, 2016

Table 45 - FY2015 Northeast Multispecies Other Sub-Component Catch Detail (mt)

Stock	Total Catch	SCALLOP[1]	FLUKE	HAGFISH	HERRING	LOBSTER/ CRAB[2]	MENHADEN	MONKFISH	RESEARCH	SCUP	SHRIMP
GB Cod	153.0	8.4	0.2	0.2	0.1	NA	0.0	0.4	0.6	0.1	0.1
GOM Cod	7.5	0.0	-	0.1	0.0	NA	-	0.0	5.5	-	0.0
GB Haddock	668.3	13.5	17.9	-	23.2*	NA	0.3	0.6	1.8	18.5	26.7
GOM Haddock	24.6	0.1	-	1.6	2.0*	NA	-	0.0	0.8	-	0.2
GB Yellowtail Flounder	0.0	-*	-	0.0	-*	NA	-	-	-	-	-
SNE Yellowtail Flounder	6.3	-*	1.4	-	0.1	NA	0.0	0.0	0.2	1.0	0.1
CC/GOM Yellowtail Flounder	27.9	16.2	-	-	0.6	NA	-	0.0	1.6	-	0.1
American Plaice	21.8	15.4	0.1	-	0.2	NA	0.0	0.0	1.1	0.1	0.2
Witch Flounder	62.3	28.0	2.3	-	1.1	NA	0.0	0.1	0.3	2.3	1.1
GB Winter Flounder	17.7	16.9	-	0.0	0.0	NA	-	-	-	-	-
GOM Winter Flounder	5.0	3.5	-	0.0	0.1	NA	-	0.0	0.3	-	0.0
SNE Winter Flounder	113.5	65.9	7.6	-	1.0	NA	0.0	0.2	0.1	6.5	1.1
Redfish	2.8	0.0	0.1	-	0.6	NA	0.0	0.0	0.4	0.1	0.1
White Hake	6.8	0.8	0.4	-	0.2	NA	0.0	0.1	0.9	0.3	0.1
Pollock	629.7	-	-	-	2.6	NA	0.0	0.1	0.1	-	0.1
Northern Windowpane	114.9	114.6	-	-	0.0	NA	-	-	0.0	-	0.0
Southern Windowpane	256.1	-*	60.0	-	1.8	NA	0.0	2.2	-	62.0	1.6
Ocean Pout	22.3	4.1	1.0	-	0.6	NA	0.0	0.0	0.0	0.9	0.7
Halibut	1.9	1.0	-	-	0.0	NA	0.0	0.1	0.0	-	0.0
Wolffish	0.4	0.2	0.0	-	0.0	NA	0.0	-	0.0	-	0.0

Continued.

Stock	Total Catch	SQUID	SQUID/ WHITING	SURFCLAM	WHELK/ CONCH	WHITING	UNKNOWN	RECREATIONAL
GB Cod	153.0	0.4	0.6	0.0	2.9	0.0	7.0	132.1
GOM Cod	7.5	-	0.1	0.0	0.0	0.1	1.5	-*
GB Haddock	668.3	69.8	104.7	1.4	-	0.9	389.0	-
GOM Haddock	24.6	-	6.7	0.4	0.1	6.1	6.7	-*
GB Yellowtail Flounder	0.0	-*	-*	0.0	0.0	-	0.0*	
SNE Yellowtail Flounder	6.3	0.3	0.2	0.0	-	0.0	2.9	
CC/GOM Yellowtail Flounder	27.9	-	5.2	0.1	-	2.0	2.1	
American Plaice	21.8	0.5	0.8	0.0	-	0.0	3.3	
Witch Flounder	62.3	3.0	4.8	0.1	-	0.3	19.0	
GB Winter Flounder	17.7	0.0	0.3	0.0	0.0	0.0	0.5	
GOM Winter Flounder	5.0	-	0.3	0.0	0.0	0.3	0.5	-
SNE Winter Flounder	113.5	3.1	2.2	0.1	-	0.0	25.5	0.1
Redfish	2.8	0.2	0.3	0.0	-	0.0	1.0	
White Hake	6.8	0.4	0.6	0.0	-	0.0	2.9	
Pollock	629.7	0.1	0.2	0.0	-	0.0	1.0	625.5
Northern Windowpane	114.9	0.0	0.1	0.0	-	0.0	0.1	
Southern Windowpane	256.1	6.9	6.8	0.5	0.0	0.0	114.1	
Ocean Pout	22.3	1.7	2.7	0.1	-	0.2	10.4	
Halibut	1.9	0.0	0.0	0.0	-	0.0	0.7	
Wolffish	0.4	0.0	0.0	0.0	-	0.0	0.1	

[1]Based on scallop fishing year March 2015 through February 2016
[2]Estimates not applicable. Lobster/crab bycatch was not attributed to the ACL, consistent with the most recent assessments for these stocks used to set the respective quotas.
Source: NMFS Greater Atlantic Regional Fisheries Office. September 30, 2016, run date of September 7, 2016

6.6.9 Fishery Sub-Components

6.6.9.1 Sector Harvesting Component

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

Combined, 130.2 million (live) pounds of ACE were allotted to the sectors in 2014 but only 49.3 million (live) pounds were landed. Of the 16 ACEs allocated to sectors in 2014, 2 stocks approached the catch limit (>80% conversion) set by the total allocated ACE (Table 46). This is a slight decrease from 2013 when the fleet caught over 80% of the allocation for 3 stocks. Overall, the fleet landed 38% of the total allocated ACE in 2014. As has been the case in previous years, Georges Bank haddock, particularly East GB haddock, accounted for a majority of the unrealized landings. West GB haddock landings, however, increased in 2014 by 63%. East GB haddock comprises almost 16% of total allocated ACE, yet only 7% of total catch. In general, total allocations have decreased since 2010 and total catch has never been above 40% of the allocation.

Table 46 – Annual catch entitlement (ACE) and catch (live pounds)

	2010			2011			2012		
	Allocated ACE	Catch	% Caught	Allocated ACE*	Catch	% Caught	Allocated ACE*	Catch	% Caught
GB Cod East	717,441	568,396	79%	431,357	357,401	83%	350,835	145,248	41%
GB Cod West	6,563,099	5,591,368	85%	9,544,297	6,872,530	72%	10,542,407	3,360,755	32%
GOM Cod	9,540,389	8,074,864	85%	11,357,677	9,667,503	85%	9,008,557	4,798,864	53%
GB Haddock East	26,262,695	4,131,294	16%	21,122,576	2,343,805	11%	15,126,216	813,952	5%
GB Haddock West	62,331,182	14,099,687	23%	54,741,830	6,239,427	11%	51,898,296	1,825,755	4%
GOM Haddock	1,761,206	845,896	48%	1,871,957	1,082,645	58%	1,599,136	539,854	34%
GB Yellowtail Flounder	1,770,451	1,637,338	92%	2,474,662	2,194,073	89%	802,654	472,975	59%
SNE/MA Yellowtail Flounder	517,372	336,127	65%	941,762	895,131	95%	1,422,815	945,488	66%
CC/GOM Yellowtail Flounder	1,608,084	1,268,640	79%	2,169,519	1,784,518	82%	2,448,240	2,101,598	86%
American Plaice	6,058,149	3,354,439	55%	7,302,377	3,641,089	50%	7,771,254	3,528,709	45%
Witch Flounder	1,824,125	1,568,484	86%	2,847,251	2,222,414	78%	3,409,459	2,162,902	63%
GB Winter Flounder	4,018,496	3,081,049	77%	4,796,109	4,261,028	89%	7,752,484	4,255,861	55%
GOM Winter Flounder	293,736	186,173	63%	716,989	351,572	49%	1,590,301	568,983	36%
SNE Winter Flounder	Not allocated			Not allocated			Not allocated		
Redfish	14,894,618	4,714,287	32%	18,034,606	6,051,128	34%	19,933,122	9,749,830	49%
White Hake	5,522,677	4,772,392	86%	7,038,744	6,716,028	95%	7,527,513	5,395,933	72%
Atlantic Pollock	35,666,741	12,191,941	34%	34,096,310	16,780,932	49%	30,670,586	14,076,674	46%
Grand Total	**179,350,461**	**66,422,374**	**37%**	**179,488,022**	**71,461,222**	**40%**	**171,853,874**	**54,743,382**	**32%**

	2013			2014		
	Allocated ACE*	Catch	% Caught	Allocated ACE*	Catch	% Caught
GB Cod East	199,323	73,459	37%	320,123	151,368	47%
GB Cod West	4,701,626	3,323,468	71%	3,711,239	2,856,404	77%
GOM Cod	1,932,992	1,615,568	84%	1,942,256	1,437,777	74%
GB Haddock East	8,249,384	1,276,536	15%	20,842,612	3,386,831	16%
GB Haddock West	55,258,304	5,288,431	10%	18,772,964	8,624,525	46%
GOM Haddock	549,399	373,085	68%	990,991	713,799	72%
GB Yellowtail Flounder	336,532	123,104	37%	552,370	137,592	25%
SNE/MA Yellowtail Flounder	1,203,211	625,893	52%	1,095,796	690,002	63%
CC/GOM Yellowtail Flounder	1,245,861	831,500	67%	1,075,295	549,905	51%
American Plaice	3,770,930	3,068,869	81%	3,150,797	2,850,238	90%
Witch Flounder	1,334,433	1,409,638	106%	1,243,365	1,133,561	91%
GB Winter Flounder	8,457,042	3,796,424	45%	7,630,035	2,533,799	33%
GOM Winter Flounder	1,666,653	371,170	22%	1,589,113	272,701	17%
SNE Winter Flounder	2,367,913	1,478,114	62%	2,483,822	1,080,050	43%
Redfish	24,061,116	8,826,334	37%	24,420,602	10,321,747	42%
White Hake	9,130,471	4,508,966	49%	9,861,419	3,836,345	39%
Atlantic Pollock	30,933,579	10,763,116	35%	30,498,028	8,755,825	29%
Grand Total	**155,398,769**	**47,753,673**	**31%**	**130,180,828**	**49,332,471**	**38%**

Source: NMFS Greater Atlantic Regional Fisheries Office, Summary Tables for FY 2014 Northeast Multispecies Fishery, Accessed February 2017 (Table 31).

6.6.9.2 Common Pool Harvesting Component

With the adoption of Amendment 16, most commercial groundfish fishing activity occurs under sector management regulations. Some vessels have elected to not join sectors, and continue to fish under the effort control system. Collectively, this part of the fishery is referred to as the "common pool." These vessels fish under both limited access and open access groundfish fishing permits. Common pool vessels accounted for only a small amount of groundfish catch in FY2014 (Table 47). The largest common pool catch (SNE/MA winter flounder, 100.4 mt) was 15% of the total groundfish fishery catch of this stock. Common pool vessels caught 2% of the GB cod and 0.0004% of the GB haddock groundfish fishery catch.

Common pool vessels with limited access permits landed 1.3M lbs. (landed lbs.) of regulated groundfish in FY2010, worth over $2M in ex-vessel revenues (Table 47). Landings declined to 535K lbs., worth about $840,000 in FY2011and declined again in FY2012 to 355K lbs., worth $598,000. In FY2013, groundfish landings and revenue from common pool vessels rose to 637Klbs, worth $973,000. In FY2014, groundfish landing and revenue from common pool vessels fell to 496Klbs, worth $830,000. Most common pool vessel groundfish fishing activity takes place in the state of Massachusetts. From FY2011 to FY2013, the activity from Maine, Massachusetts and New Hampshire ports declined dramatically (Table 49). The primary ports for this activity over the last 3 years (FY2011-2013) is Gloucester although the ports of Portland, New Bedford, Point Judith and Montauk have also been involved to varying degrees (Table 50).

Table 47 - Common Pool Revenue and Landings FY2010 - FY2014

ALL TRIPS	**2010**	**2011**	**2012**	**2013**	**2014**
Groundfish Gross Revenue	$2,062,485	$839,899	$598,356	$973,665	$830,701
Non-groundfish Gross Revenue	$96,028,347	$94,644,268	$92,162,255	$82,621,374	$84,423,098
Total Gross Revenue	$98,090,832	$95,484,167	$92,760,611	$83,595,039	$85,253,798
Groundfish Landed	1,303,065	535,769	354,025	637,010	496,583
Non-groundfish landed	78,875,003	84,330,942	81,589,016	69,689,839	74,135,815
Total Pounds Landed	80,178,069	84,866,711	81,943,041	70,326,848	74,632,398
GROUNDFISH TRIPS					
Groundfish Gross Revenue	$2,051,193	$777,949	$565,967	$945,673	$807,029
Non-groundfish Gross Revenue	$4,507,875	$5,688,415	$3,998,734	$3,229,996	$2,564,614
Total Gross Revenue	$6,559,069	$6,466,364	$4,564,701	$4,175,669	$3,371,643
Groundfish Landed	1,295,148	488,516	334,744	590,895	488,078
Non-groundfish landed	4,896,437	5,069,142	3,851,868	3,515,872	2,861,580
Total Pounds Landed	6,191,586	5,557,658	4,186,612	4,106,766	3,349,659

*All revenue listed in 2010 constant dollars. Landings are in landed pounds. Source: NMFS Greater Atlantic Regional Fisheries Office, Summary Tables for FY 2014 Northeast Multispecies Fishery, Accessed Feb. 21, 2017 (Table 2, 3).

Table 48 - Common pool permits landing allocated groundfish

	A	C,D,E,F COMBINED	HA	Total
2011	41	8	26	75
2012	40	5	20	65
2013	45	6	28	79
2014	36	4	15	55

"Permit" here refers to multispecies moratorium right id (MRI)
Allocated groundfish landings from limited-access groundfish trips only

Table 49 - Common pool groundfish landings by state of trip (landed lb)

	FY2011	FY2012	FY2013	FY2014
MA	341,722	158,386	69,187	106,811
ME	48,482	40,716	18,559	48,642
NH	25,850	25,848	4,723	10,341
NJ	17,695	20,107	55,858	7,283
NY	33,418	57,976	64,456	93,248
RI	11,927	31,712	287,350	211,194
CT/Other Northeast	9,422		90,763	10,559
Total	488,516	334,744	590,895	488,078

All groundfish landings from limited-access groundfish trips based on FY 2014 Northeast Multispecies Fishery data

Table 50 - Common pool groundfish landings by port (landed lb)

Port	FY2011	FY2012	FY2013	FY2014
Gloucester, MA	241,561	144,502	50,166	102,486
Point Judith, RI	c	13,380	270,682	207,338
Montauk, NY	19,314	54,367	61,413	82,966
Portland, ME	40,418	34,020	8,661	c
New Bedford, MA	28,513	3,253	1,788	2,636

All groundfish landings from limited-access groundfish trips based on FY 2014 Northeast Multispecies Fishery data

The primary groundfish stocks landed by common pool vessels in 2011 include GOM cod, GB cod, and pollock. In 2014 primary stocks included SNE/MA yellowtail flounder and SNE winter flounder (Table 51). Vessels using HA permits on groundfish trips primarily target GB and GOM cod, GOM haddock, and pollock.

For the common pool permits that landed at least one pound of regulated groundfish in FY2011, FY2012, FY2013, and FY2014, groundfish revenues were a major portion of revenues on groundfish fishing trips. In FY2011 and FY2013 Groundfish revenues were 60% or more of the trip revenues for 55% of these vessels; in FY2012 this was only true for 38% of these vessels.

Table 51 - Common pool landings (landed lbs) by permit category and stock

FY2011 Landings	A	C,D,E,F COMBINED	HA	Total
GB Cod	87,201	3,099	15,304	105,604
GOM Cod	54,062	21,458	54,854	130,374
GB Haddock	22,600			22,600
GOM Haddock	1,841	856		2,697
GB Yellowtail Flounder	3,947	0		3,947
SNE/MA Yellowtail Flounder	26,102	0		26,102
CC/GOM Yellowtail Flounder	18,950		0	18,950
American Plaice	8,042		0	8,042
Witch Flounder	8,569		0	8,569
GB Winter Flounder	2,394	0	0	2,394
GOM Winter Flounder	5,627		0	5,627
Redfish	6,797	186		6,983
White Hake	26,676	3,061		29,737
Atlantic Pollock	90,274	12,160		102,434
Atlantic Halibut	1,131			1,131
Other Groundfish	13,302	22	0	13,324
Total	374,260	34,411	79,845	488,516
FY2012 Landings	**A**	**C,D,E,F COMBINED**	**HA**	**Total**
GB Cod	36,824	9,560		46,384
GOM Cod	13,512	22,409	8,668	44,589
GB Haddock	348			348
GOM Haddock	553		484	1,037
GB Yellowtail Flounder	77,938	0	0	77,938
SNE/MA Yellowtail Flounder		0	0	
CC/GOM Yellowtail Flounder	1,925	800		2,725
American Plaice	4,128	1,446		5,574
Witch Flounder	3,702	797		4,499
GB Winter Flounder	2,412	0	0	4,192
GOM Winter Flounder		1,780	0	
Redfish	10,524	221	26	10,771
White Hake	19,965	10,602	160	30,727
Atlantic Pollock	87,375	14,305	3,117	104,798
Atlantic Halibut	248			248
Other Groundfish	885	30		915
Total	259,862	52,982	21,900	334,744
FY2013 Landings	**A**	**C,D,E,F COMBINED**	**HA**	**Total**
GB Cod	45,497	97	8,922	54,516
GOM Cod	2,643	6,437	4,346	13,426

GB Haddock	517			517
GOM Haddock	91		2,394	2,485
GB Yellowtail Flounder	198,979	0	0	198,979
SNE/MA Yellowtail Flounder		0	0	
CC/GOM Yellowtail Flounder	6,537		0	6,537
American Plaice	2,116	3,973	0	6,089
Witch Flounder	5,025	1,290	0	6,315
GB Winter Flounder	0	0	0	0
GOM Winter Flounder	783	166		949
SNE Winter Flounder	249,941	0	0	249,941
Redfish	6,680	320		7,000
White Hake	7,664	1,459		9,123
Atlantic Pollock	26,894	7,682		34,576
Atlantic Halibut	288			288
Other Groundfish	153			153
Total	553,406	15,683	21,806	590,895

FY2014 Landings	A	C,D,E,F COMBINED	HA	Total
GB Cod	22,340	16,167		38,507
GOM Cod	3,054	15,686		18,740
GB Haddock	1,194			1,194
GOM Haddock	182	842		1,024
GB Yellowtail Flounder	0	0	0	0
SNE/MA Yellowtail Flounder	190,732			190,732
CC/GOM Yellowtail Flounder	1,989		0	1,989
American Plaice	16,973		0	16,973
Witch Flounder	2,440		0	2,440
GB Winter Flounder	0	0	0	0
GOM Winter Flounder	1,256		0	1,256
SNE Winter Flounder	119,994		0	119,994
Redfish	6,094		252	6,346
White Hake	10,195	1,933		12,128
Atlantic Pollock	46,510	29,822		76,332
Atlantic Halibut	423		0	423
Other Groundfish	0	0	0	0
Total	420,177	67,901		488,078

All groundfish landings from limited-access groundfish trips based on FY 2014 Northeast Multispecies Fishery data

6.6.9.3 Recreational Harvesting Component

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

Table 52 summarizes GOM cod and GOM haddock recreational effort and catch estimates for FY 2014, FY 2015 and preliminary FY 2016. Recreational removals of GOM cod declined significantly from FY 2014 to FY 2015, largely due to the year-round prohibition on the possession of GOM cod and the three fish bag limit and reduced minimum size for GOM haddock in FY 2015. GOM cod removals increased in FY 2016 with a 1 cod possession limit and the increase in the GOM haddock bag limit to 15 fish since anglers spent more time pursing haddock and thereby encountering more cod (Table 52). Removals of GOM haddock fell sharply in FY 2015 from FY 2014 and then increased significantly for FY 2016 (Table 52), likely due to changes in bag limits and seasons for GOM haddock during that period. The number of angler trips in the GOM increased by 27% between FY 2015 and FY 2016 (Table 52). Table 53 provides a breakdown of all angler trips in the GOM for FY 2014 – FY 2016. Note that these values are larger than the angler trip numbers presented in Table 52 because not all angler trips in the GOM target cod and/or haddock. Table 54 provides a breakdown of the number of vessels active in the for-hire component of the recreational fishery for FY 1998 to FY 2015.

Table 52 - Gulf of Maine Cod and Haddock Recreational Effort and Catch estimates by Fishing Year[1]

	FY 2014	FY 2015	Preliminary FY 2016		% Change 2015-2016	
Angler Trips[2]	208,737	132,080	167,204		+27%	
Cod Catch (numbers, a+b1+b2)	817,000	502,066	1,018,743		+103%	
Cod Kept (numbers, a+b1)	224,399	5,774	38,503		+567%	
Cod Released (numbers, b2)	592,601	496,292	980,240		+98%	
Cod Removals (numbers, a+b1+(0.15*b2))	313,289	80,218	185,539		+131%	
Cod Removals (weight[4], mt)	619	85	302		+255%	
Cod Avg. Catch Per Trip (numbers)	3.9	3.8	6.1			
Cod Avg. Weight of Caught Fish (lbs)	5.4	2.5	3.3			
Haddock Catch (numbers, a+b1+b2)	1,021,004	727,888	1,745,050		+141%	
Haddock Kept/Released Dead (numbers, a+b1)	173,974	222,149	573,207		+158%	
Haddock Released Alive (numbers, b2)	847,030	505,739	1,171,843		+132%	
Haddock Removals (numbers, a+b1+(0.5*b2))	597,489	475,019	1,159,129		+144%	
Haddock Removals (weight[3], mt)	646	382	1,066		+179%	
Haddock Avg. Catch Per Trip (numbers)	4.9	5.5	10.4			
Haddock Avg. Weight of Caught Fish (lbs)	1.7	1.7	1.7			

[1]Source: Available MRIP data as of Jan. 3, 2017

[2]Wave 6, 2015 and wave 2, 2016 used as proxies for those waves in FY2016.

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

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

Table 53 - All GOM Angler Trips by Fishing Year and Mode

Angler Trips[1]					
Mode	FY2014	FY2015	Preliminary FY2016		% Change 2015 to 2016
Headboat	129,249	88,513	60,397		-32%
Charterboat	107,999	82,376	68,662		-17%
Privateboat	1,323,438	1,075,609	1,309,169		+22%
Shore	761,359	802,133	807,943		+0.7%
	2,322,045	2,048,631	2,246,171		+1%
[1]All angler trips in the Gulf of Maine					

Table 54 - For-hire recreational vessels catching cod or haddock from the Gulf of Maine

Fishing Year	Party	Charter	Total*
1998	52	108	137
1999	53	101	130
2000	49	108	130
2001	63	119	155
2002	43	127	152
2003	58	130	164
2004	63	127	164
2005	57	133	165
2006	65	130	163
2007	51	128	153
2008	55	130	155
2009	53	130	161
2010	54	140	168
2011	46	127	150
2012	43	109	133
2013	40	114	134
2014	39	103	119
2015	34	74	92

Notes: *Total may not sum due to vessels taking both categories of trips during the fishing year.

Based on vessel reporting via vessel log book.

Vessels landing or discarding cod or haddock from Gulf of Maine statistical areas based on vessel log book.

Source: NMFS Greater Atlantic Regional Fisheries Office, February 2017.

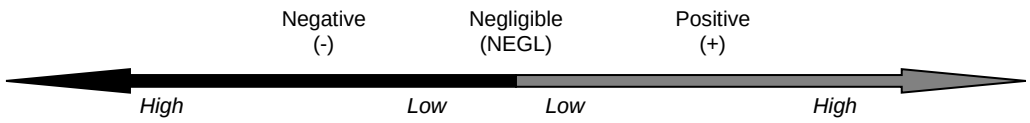
7.0 ENVIRONMENTAL CONSEQUENCES – ANALYSIS OF IMPACTS

Evaluation Criteria

This EA evaluates the potential impacts using the criteria outlined in Table 55. Impacts for all alternatives are judged relative to the baseline conditions, as described in Section 6.0, and compared to each other.

Table 55 - Impact designations in this document are defined generally as positive, negligible/neutral, and negative.

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



7.1 Biological Impacts

Biological impacts discussed below focus on expected changes in fishing mortality for regulated multispecies stocks. Changes in fishing mortality may result in changes in stock size. Impacts on essential fish habitat and endangered or threatened species are discussed in separate sections. Impacts are discussed in relation to impacts on regulated multispecies (groundfish) and other species. The impacts associated with the measures are anticipated to not be significant.

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

7.1.1 Updates to Status Determination Criteria and Annual Catch Limits

7.1.1.1 Revised Status Determination Criteria

A benchmark assessment for witch flounder was completed by the SAW/SARC 62 (November 29-December 2, 2016) and determined that both the overfishing and overfished status for this stock in 2015 was unknown (Table 4 and Table 5). The SARC noted that the witch flounder age-structured assessment model, while scientifically well thought-out, had major retrospective patterns in the estimates. Those model results were not recommended for management purposes, and the status of the witch flounder stock is currently considered unknown relative to biological reference points. Further, the SARC determined that the previously accepted VPA model is not an acceptable alternative to the rejected ASAP application because it exhibits a similar retrospective pattern. Because of major retrospective patterns, the SARC rejected the analytical assessment conducted for the SARC review as well as the previous VPA model, so there is no basis for calculating model-based reference points. The biological reference points estimated in the 2015 assessment were based on results of a VPA model that was rejected during the SARC 62 peer review.

The SARC supported the SAW's proposed alternative to use an F_{MSY} proxy of a relative exploitation rate derived from the average exploitation (recent catch divided by recent swept area exploitable biomass estimates) in the near term, where other alternatives are unavailable. The SARC noted that the basis of this value is ad hoc, calculated as the average exploitation over the most recent years based on the empirical approach because stock abundance in recent years is relatively stable. The empirical approach, based on the NEFSC's spring and autumn surveys, calculates swept-area abundance that incorporates the results of the comparative fishing experiment that was conducted to inform the efficiency of the NEFSC trawl survey net. While absolute biomass estimates from this method will be highly uncertain (because of assumptions required in the conversion of survey catch rate to absolute estimates), the estimates of relative exploitation rates will be more robust to those uncertainties. The SARC explained that it did not have time to fully review this approach in comparison to other data poor procedures or to the Terms of Reference provided for the meeting. Further, the SARC did not specifically define a F_{MSY} proxy, and it did not recommend using the F40% approach for catch advice because the assessment basis for that value has been rejected. Instead, the SARC recommended considering a range of exploitation rates that are

similar to those observed over the last 9 years, when the biomass of witch flounder has been relatively stable.

The SARC panel noted that the spring and autumn NEFSC surveys are regarded as providing the best available fishery independent indices for witch flounder and they show broadly similar patterns of a decline from the early 1960s to record low levels in the late 1980s and early 1990s, an increase to early 2000s followed by a declining trend. A lack of older fish and size truncation was observed in both the surveys and commercial catch in recent years. The empirical area swept method does not provide a biomass threshold, but does indicate that the stock is at historically low levels.

7.1.1.1.1 Option 1: No Action

Impacts on regulated groundfish

Under Option 1/No Action there would be no changes to the SDC for witch flounder, or the resulting numerical estimates derived from these criteria. These values would be based on the previous assessment in 2015. Since a 2016 benchmark assessment was completed for witch flounder, the use of values from the previous assessment would conflict with M-S Act requirements to use the best available science. It is difficult to directly compare the No Action SDCs with Option 2 because of difference between assessments types and results (i.e., using analytical or empirical approaches).

Option 1/No Action would not be expected to have direct or indirect impacts on groundfish species. Based on this findings of SAW/SARC 62, the SDC definitions for witch flounder are unknown under Option 2. Under Option 2, witch flounder status is considered unknown. This measure is primarily administrative in that it establishes the criteria used to determine if overfishing is occurring or the stock is overfished. For these reasons when comparing Option 1/No Action to Option 2, the likely impacts on regulated groundfish species are neutral.

Impacts on other species

Option 1/No Action would not be expected to have direct or indirect impacts on non-groundfish species such as monkfish, dogfish, skates, and Atlantic sea scallops. This measure is primarily administrative in that it establishes the criteria used to determine if overfishing is occurring or the stock is overfished. For these reasons when comparing Option 1/No Action to Option 2, the likely impacts on other species are neutral.

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

Impacts on regulated groundfish

Option 2 would reflect the most recent 2016 benchmark assessment for witch flounder and would be based on the best available science, consistent with the M-S Act. It is difficult to directly compare the No Action SDCs with Option 2 because of differences between assessments types and results (i.e., using analytical or empirical approaches).

Based on this findings of SAW/SARC 62, the SDC definitions for witch flounder are unknown under Option 2. Under Option 2, witch flounder status is considered unknown. Option 2 would not be expected to have direct or indirect impacts on groundfish species. This measure is primarily administrative in that it

establishes the criteria used to determine if overfishing is occurring or the stock is overfished. For these reasons when comparing Option 1/No Action to Option 2, the likely impacts on regulated groundfish species are neutral.

Impacts on other species

Option 2 would not be expected to have direct or indirect impacts on non-groundfish species such as monkfish, dogfish, skates, and Atlantic sea scallops. This measure is primarily administrative in that it establishes the criteria used to determine if overfishing is occurring or the stock is overfished. For these reasons when comparing Option 1/No Action to Option 2, the likely impacts on other species are neutral.

7.1.1.2 Annual Catch Limits

7.1.1.2.1 Option 1: No Action

Impacts on regulated groundfish

Under Option 1/No Action, the ACLs specified for FY 2017 would be unchanged from those adopted through FW 55. There would be no changes to the specifications for FY 2017 – FY 2018 and default specifications that were adopted with the FW55 final rule (Table 6) and default specifications that would be set for EGB cod for FY 2017. The directed groundfish fishery would be expected to operate in all BSAs, with the exception of the EBG management area which would close on August 1, 2017, when the default specifications would expire for EGB cod. Under Option 1/No Action, there would be no FY 2017 quotas specified for the transboundary Georges Bank stock of GB cod and no revised FY 2017 quotas for GB haddock and GB yellowtail flounder, which are managed through the US/CA Resource Sharing Understanding. These quotas are specified annually. There would be no revised specifications for witch flounder for FY 2017- FY 2019.

Under Option 1/No Action, the directed groundfish fishery would be expected to operate in all broad stock areas through July 31. 2017. As of August 1, 2017, EGB cod would not have ACLs specified. In the absence of stock specific specifications, commercial groundfish vessels would not be allowed to fish in the EGB cod management area without an allocation. It is anticipated that Option 1/No Action would result in minimal changes in fishing effort during the first three months of the fishing year. After July 31, 2017, Option 1/No Action would be expected to reduce commercial groundfish fishing effort in the EGB cod management area.

After July 31, 2017, an ACL would not be defined for EGB cod in the multispecies fishery. Without specification of an ACL, a catch would not be allocated to the groundfish fishery (sectors or common pool vessels) and targeted groundfish fishing activity would not occur for this stock. Catches would not be eliminated because there would probably be incidental catches or bycatch from other fisheries. Accountability Measures (AMs) in the multispecies fishery would be maintained but are expected to have a low probability of being triggered without allocations.

In addition to the lack of targeted groundfish fishing activity on EGB cod without an ACL, certain provisions of the sector management system probably would constrain fishing even for stocks with an ACL such as EGB haddock. Current management measures require that a sector stop fishing in a stock area if it does not have ACE for a stock. Fishing can continue on stocks for which the sector continues to have ACE only if the sector can demonstrate it would not catch the ACE-limited stock. What these provisions mean is that in most cases there would be little opportunity for sector vessels to fish on stocks

in EGB that have an ACL under Option 1/No Action, most groundfish fishing activity would not occur on EGB. As a result, in general Option 1/No Action would be expected to have positive impacts compared to the alternative specifications under Option 2. The default specifications for EGB cod would continue to allow fishing for the first three months of the fishing year, but after that, effort and biological impacts on regulated groundfish species would decline for stocks managed or located in that area. In addition, the witch flounder quota would increase under Option 2 and allow for increased fishing opportunity. As a result, in general Option 1/No Action would be expected to result in positive impacts compared to Option 2.

Impacts on other species

Option 1/No Action is not expected to have direct or indirect impacts on non-groundfish species such as monkfish, dogfish, skates, and Atlantic sea scallops. Indirect effects are generally likely to be reduced groundfish fishing activity under No Action/Option 1. Catches of other species that occur on groundfish trips would potentially 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 also have ACLs and AMs so while such effort shifts may have negative economic effects, the biological impacts should not be negative. Considering the differences between the ACLs of Option 1/No Action and Option 2, the lower fishing mortality on other stocks would likely to have low positive impacts under Option 1/No Action.

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

Impacts on regulated groundfish

Option 2 would adopt new specifications for GB yellowtail flounder, GB haddock, GB cod, and witch flounder consistent with the most recent stock assessment information. Option 2 would also adopt new ABCs consistent with the best available science for GB yellowtail flounder and witch flounder.

GB Yellowtail Flounder - The recent assessment for GB yellowtail flounder indicates that the stock status is unknown. The TRAC met July 12-14, 2016 in Woods Hole, MA to conduct assessments for EGB cod, EGB haddock, and GB yellowtail flounder.

Briefly, TRAC results indicate that the GB yellowtail flounder stock biomass is low and productivity is poor (i.e., recent recruitment has been generally below average and age structure includes fewer young fish and fewer old fish). The TAC has been reduced substantially in recent years due to declining stock conditions, and recent catch is low relative to the low quotas. Combined Canada and US catches in 2015 were 118 mt, which is the lowest value in the time series beginning in 1935. The survey biomass from two bottom trawl surveys (NEFSC fall and NEFSC spring) decreased relative to the previous assessment, while the third (Division of Fisheries and Oceans, DFO, winter) increased. Overall, the declining trend in survey biomass to low levels for the past three years remains, despite reductions in catch to historical low amounts. Recent catch is low relative to the quota and biomass estimated by the surveys, while catch curve analyses indicated high total mortality rates ($Z>1$).

To generate catch advice, the 2016 TRAC applied the empirical approach based on survey catches developed during the 2014 Georges Bank Yellowtail Flounder Diagnostic and Empirical Approach Benchmark. A range of exploitation rates of 2% to 16% was recommended by the 2014 TRAC as an appropriate scientific basis for calculating the catch advice.

At the 2014 and 2015 meetings, the TRAC recommended both the empirical and constant quota approaches for catch advice in 2015 and 2016, respectively. Both approaches resulted in similar catch advice in those years. Further at the 2014 meeting, the TRAC recommended implementing a single approach – constant quota or constant empirical – for 3 years to see if the stock responds.

At the 2016 meeting, the TRAC recommended application of the 2014 Diagnostic and Empirical Benchmark formulation of the empirical approach for catch advice for 2017, rather than an empirical approach and constant quota approach as in 2014 and 2015. Assuming whole-net survey catchability for all three surveys is 0.37 and applying an exploitation rate of 2% to 16%, the TRAC recommended a range for the catch advice of 31 mt to 245 mt. The TRAC based its recommendation on further declines in the survey biomass since last year.

The TRAC noted that a constant quota approach would result in quota of 354 mt and an exploitation rate of 23% which is above the 16% upper bound using the empirical/exploitation rate approach to determining catch advice.

The PDT recognized that the stock condition of GB yellowtail flounder is poor. The average trend in the surveys biomass indices continued to decline and recruitment (age 1 and age 2) is at new record lows. The PDT noted several sources of uncertainty in the TRAC assessment:

- Timing of the 2016 spring survey was 4 weeks later than usual and the potential for that delay to bias the results high or low is unknown at present.
- The TRAC working paper on GB yellowtail flounder notes that "uncertainty in the US catch of Georges Bank Yellowtail Flounder has increased this year due to allegations of catch misreporting currently under litigation."
- An experimental estimate of the catchability of the Bigelow survey trawl was not available for the 2014 benchmark assessment. In lieu of this information, a literature review was conducted to develop a value for survey catchability. Trawl door spread catchability estimates from two other studies (Harden Jones, 1977; Somerton et al, 2007) were averaged to generate a catchability value of 0.37. These door spread efficiency estimates were based on field research done in different regions (Gulf of Alaska and North Sea), for different survey trawls, and for species other than yellowtail flounder. Catchability studies in this region could provide a better understanding on q (catchability coefficient). The 2016 TRAC was presented with information to suggest a q of less than 0.37, but the TRAC indicated that more thorough analyses would still be needed to determine a new value for q.
- The exploitation rate approach provides a technical basis for catch setting, because it is tied directly to the NEFSC and DFO surveys. However, this approach means that the quota could vary annually based on survey biomass estimates, which could result in wide swings in catch advice from year to year.
- The GB yellowtail flounder stock does not appear to have responded to low catches. Further, it is unclear if or what environmental driver(s) may be negatively impacting stock productivity.

The PDT recognized that catches might not be indicative of biomass, and changes in catch may not accurately track changes in biomass well for this stock. The PDT discussed that low catches may be due to a combination of factors including, but not limited to, the loss of market for GB yellowtail flounder due to low quotas, poor stock condition, spatial shifts in stock distribution, avoidance of the stock through use of separator gear, and difficulty finding GB yellowtail flounder. The PDT also discussed that recent low catches of GB yellowtail flounder by the U.S. groundfish fishery may be influenced by other management. For example, the large Northern windowpane flounder AM has been in place in FY 2014 and FY 2015 due to overages of Northern windowpane flounder catch limits. The AM requires the use of

approved gear (i.e., haddock separator trawl, rope separator trawl or Rhule trawl) while fishing in the gear restricted area to reduce impact on flatfish. The area is located west and southwest of Closed Area II, which has historically been an important fishing ground for yellowtail flounder. In addition, the Canadian fleet does not direct fishing on GB yellowtail flounder and vessels may only use haddock separator gear in the US/CA management area.

Further, recent low quotas for GB yellowtail flounder have not appeared to constrain the U.S. groundfish fishery in its access to other abundant stocks like GB haddock. Otherwise, GB yellowtail flounder would be expected to be caught at a higher rate. Total fishery catches were 218 mt in 2013, 159 mt in 2014, and 118 mt in 2015. Quotas lower than recent catches may constrain access to other species (i.e., haddock, scallops).

Option 2 would set GB yellowtail flounder specifications FY 2017- FY 2018 as indicated in Table 9. At its meeting on August 10, 2016, the SSC determined the ABC for the GB yellowtail flounder stock should not exceed 354 mt for FY2017 and FY2018, with the expectation that the FY 2018 catch specifications will be revisited and possibly adjusted following the 2017 TRAC assessment. OFL for the stock remains unknown. The SSC further recommended that an SSC sub-group should be formed to develop alternatives for quantitative metrics that would trigger an upward or downward adjustment of the ABC.

Witch Flounder- The recent benchmark assessment for witch flounder indicates that stock status is unknown. While examining the exploitation rate within the empirical approach, the PDT noticed that the method for determining the exploitation rate was inconsistent with the way it was applied for catch advice. In the draft assessment report and associated spreadsheet, the exploitation rate was determined by taking the mean exploitation rate (total catch divided by average survey biomass) for the 9 most recent years, resulting in a value of 0.05. The exploitation rate (0.05) was then applied erroneously to the most recent exploitable biomass (90% of the average survey biomass). The PDT suggested that this is an incorrect approach since different "biomass" is used when applying the rate than when determining the exploitation rate. All the catch advice options developed by the PDT incorporate the correction. The corrected average exploitation rate from 2007 to 2015 is 0.060 which was used in the PDT calculations forwarded to the SSC for consideration in catch advice options.

Option 2 would set witch flounder specifications FY 2017- FY 2019 as indicated in Table 9. At its meeting on January 17, 2016, the SSC determined that OFL is unknown for the witch flounder stock and recommended an ABC for FY 2017- FY 2019 at 878 MT. The ABC is based on applying the empirical approach and using a three year average of exploitable biomass estimates from the NEFSC spring and fall trawl surveys and a mean exploitation rate of 0.060 from the rates observed over the last nine years (2007-2015). The SSC also offered a number of research recommendations with the hope that the witch flounder assessment would return to using an analytical framework in the future. At its January 2017 meeting, the Council clarified that the 2018 and 2019 witch flounder ABCs will be determined following the 2017 operational assessments.

Relative to FY 2016, Option 2 would increase FY 2017 ACLs for witch flounder and GB haddock. There would be decreases in FY 2017 ACLs for GB cod and GB yellowtail flounder. Relative to Option 1/No Action, Option 2 would increase FY 2017 ACLs for witch flounder from those established in FW 55 and EGB cod quota would be specified and replace default specifications. For these reasons under Option 2, low negative impacts are likely when compared with Option 1/No Action and relative to FY 2016.

Overview of Scallop FW 28 and Projected Catches of Groundfish Stock for FY 2017

The final Council preferred alternative for scallop fishery specifications in FY 2017 is anticipated to result in 47.5 million pounds of scallop landings. The Council's preferred alternative would allocate full-time Limited Access (LA) vessels four access area trips with an 18,000 lb. trip limit, or a total of 72,000 lb. per vessel. The preferred alternative would allocate one trip the Nantucket Lightship Access Area, one to the Closed Area II South Access Area, and two to the Mid-Atlantic Access Area. In the Mid-Atlantic Access Area, one trip would be allocated a newly created Elephant Trunk "Flex" Access Area, and another to the Mid-Atlantic Access Area. Vessels would be able to harvest up to 36,000 lb from the Mid-Atlantic Access Area, 18,000 of which would be available in Elephant Trunk "Flex" Access Area. For LA DAS, the Council selected Sub-Option 3 as preferred. This option would set DAS at a fishing mortality rate of F=0.44 in open areas, and adjust the configuration of the Nantucket Lightship Access Area so that it includes a rotational closure (Nantucket Lightship extension). The preferred alternative would maintain the existing rotational closure south of Closed Area II in order to protect small scallops that were observed there by 2015 and 2016 surveys.

Scallop Framework Adjustment 28

Framework 28 considered a range of allocations for FY 2017 fishery specifications including eight overall alternatives, which include slightly different DAS allocations and area closures. The Council also changed how specification values are calculated for the IFQ component by allocating 5.5% of the annual projected landings (APL) associated with each specification run. Overall projected landings are expected to be about 47.5 million pounds in FY 2017. This represents an increase from FY2016 harvest levels (~40 million lbs of scallop meats landed). The Scallop PDT produced flatfish bycatch projections for FY 2017, which are summarized in Table 56. The flatfish bycatch projections are forecasts (with error) and should not be interpreted as precise estimates.

The GB yellowtail flounder estimate (63.21 mt) is roughly twice the expected scallop fishery allocation (32 mt ACL) for the coming fishing year. The majority of the GB yellowtail flounder bycatch is anticipated to come from fishing effort in the Closed Area II South Access Area (1 AA trip per FT LA vessel at 18,000 lbs in CA II South this coming year). The discard to kept (D:K) ratio being applied to the CA II S AA is from 2014, the last time the access area was opened. The GB yellowtail flounder stock has been in poor condition, and average survey catches have declined annually since 2014. The TRAC assessment is based on an empirical approach resulting in unknown stock status for GB yellowtail flounder. With this in mind, the 50.1 mt projection of bycatch from CA II S AA in 2017 may be an overestimate.

With respect to Northern windowpane flounder, the FY 2017 estimate for Georges Bank open may be underestimated because the estimate is generated using 2014 data and the status of northern windowpane improved at the last operational assessment in 2015. While the 2017 GB open estimate is smaller than 2015, the CA II South Extension (closed in 2016) was open in 2015. Effort and removals from this area may explain part of the difference in the estimates.

Table 56 – Scallop PDT yellowtail flounder and windowpane flounder bycatch estimates for the scallop fishery for FY 2017.

2017 Projected Landings of 46.5 mil. lbs	
Georges Bank Yellowtail Flounder	
2017 Projections	Bycatch Estimate (mt)
Georges Bank Open	13.14
Closed Area II South	50.07
TOTAL GB YT ESTIMATE	**63.21**
ACL (16% of total)	32 mt
Northern Windowpane Flounder	
2017 Projections	Bycatch Estimate (mt)
Georges Bank Open	23.52
Closed Area II South	79.8
TOTAL NWP ESTIMATE	**103.33**
Council considering sub-ACL	
SNE/MA Yellowtail Flounder	Bycatch Estimate (mt)
TOTAL SNE/MA YT ESTIMATE	**10.66**
Southern Windowpane Flounder	Bycatch Estimate (mt)
TOTAL SWP ESTIMATE	**77.85**

Impacts on other species

In general, the specification of groundfish ABCs and ACLs by this option would not be expected to have direct or indirect impacts on most other species. Other species are caught on groundfish fishing trips and the ABCs/ACLs could indirectly affect species if they result in changes in groundfish fishing activity. When compared to Option 1/No Action, Option 2 would be expected to result in increased groundfish fishing effort and as a result catches of other species would be expected to be greater. This would be expected to result in increased fishing mortality rates for those species when compared to the No Action alternative. Species such as monkfish, skates, and spiny dogfish are among those most likely to be affected. All of these species are subject to management controls, and it is not likely that fishing mortality will exceed targets. Indeed, when compared to recent years, the increases in some groundfish ABCs/ACLs as proposed in this action would be expected to result in increased catches of other species.

The ABCs and ACLs under Option 2 include specification of sub-ACLs for other fisheries with catches of GB yellowtail flounder.

Sub-ACLs are designed to limit the incidental catch of yellowtail flounder and windowpane flounder by the scallop fishery. Exceeding catch limits may trigger accountability measures for the scallop fishery. A comparison of the Option 2 specifications (Table 9) and the Scallop PDT's estimates of projected catch by the scallop fishery (Table 56) indicates that scallop fishery catches of SNE/MA yellowtail flounder and southern (SNE/MAB) windowpane flounder are predicted to be less than the sub-ACL for the fishery in 2017. Scallop catch estimates of GB yellowtail are higher than the sub-ACL. The overall impact of Option 2 ABCs and ACLs are likely to be neutral with respect to the Atlantic sea scallop resource.

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

7.1.1.2.2.1 Sub-Option 1: Develop an Atlantic Sea Scallop Fishery Allocation for GOM/GB (Northern) Windowpane Flounder (*Preferred Alternative*)

Total catches of the northern windowpane flounder stock exceeded the ABC in each of the past five fishing years (FY 2011 to FY 2015) and the OFL in FY 2013 and FY 2014 of 202 mt (Table 57). These overages led to the triggering of AMs for the groundfish fishery in FY 2014 and FY 2015. In addition to the groundfish fishery, the scallop fishery is the other major contributor to northern windowpane flounder catches (Table 58 and Table 59). Scallop fishery catches have increased in recent years of northern windowpane flounder, while groundfish fishery catches decline presumably due to the northern windowpane flounder AMs in place for groundfish fishery in FY 2014 and FY 2015.

AMs for the groundfish fishery are triggered for windowpane flounder when the catches exceed the ACL plus a management uncertainty buffer. The size of the AM is dependent upon the overage. Catches in excess of 20% of the ACL trigger a large AM, while when catches exceed 5% of the ACL but are less than 21% of the ACL, the small AM is implemented. If an AM is triggered, bottom-trawl vessels are required to use selective large-mesh trawl gear designed to reduce the catch of windowpane (and subsequently other flatfish). Approved gears include haddock separator trawls or Rhule trawls.

The large AM area was triggered in FY2014 following catch overages in FY2012 and FY2013. The large AM area remained in place for FY2 015 after it was determined that windowpane catches had exceeded the ACL by over 20% in FY 2014. This gear restricted area overlaps with the U.S./Canada management area, and is located to the west of Closed Area II in statistical reporting areas 561, 562, and 525 (Figure 8).

Table 57 - Final year-end catch data (mt) for northern windowpane flounder.

				Northern Windowpane Flounder Catch (mt)				
				Groundfish Fishery		Sub-Components with No AMs		
FY	**ABC**	**ACL**	**Total Catch**	**Sector**	**Common Pool**	**Scallop Fishery**	**State Waters**	**Other**
2010	169	161	162.6	151.7	1.8	*8.2*	0	9.1
2011	169	161	191.3	156.5	0.3	*33.0*	0	34.8
2012	173	163	208.9	129.5	0.1	*75.7*	2.3	77
2013	151	144	280.1	237.3	0.2	*40.7*	0.9	41.6
2014	151	144	269.3	157.4	0.3	*99.7*	2.7	108.9
2015	151	144	189.8	73.6	0	*114.6*	1.3	114.9

Source: NMFS Greater Atlantic Regional Office, Final Year End Catch Reports for 2010, 2011, 2012, 2013, 2014, 2015
http://www.greateratlantic.fisheries.noaa.gov/aps/monitoring/nemultispecies.html
Note: 'Other' sub-component catch includes scallop catch, in addition to other fisheries. Scallop fishery catches are shown for comparison purposes.

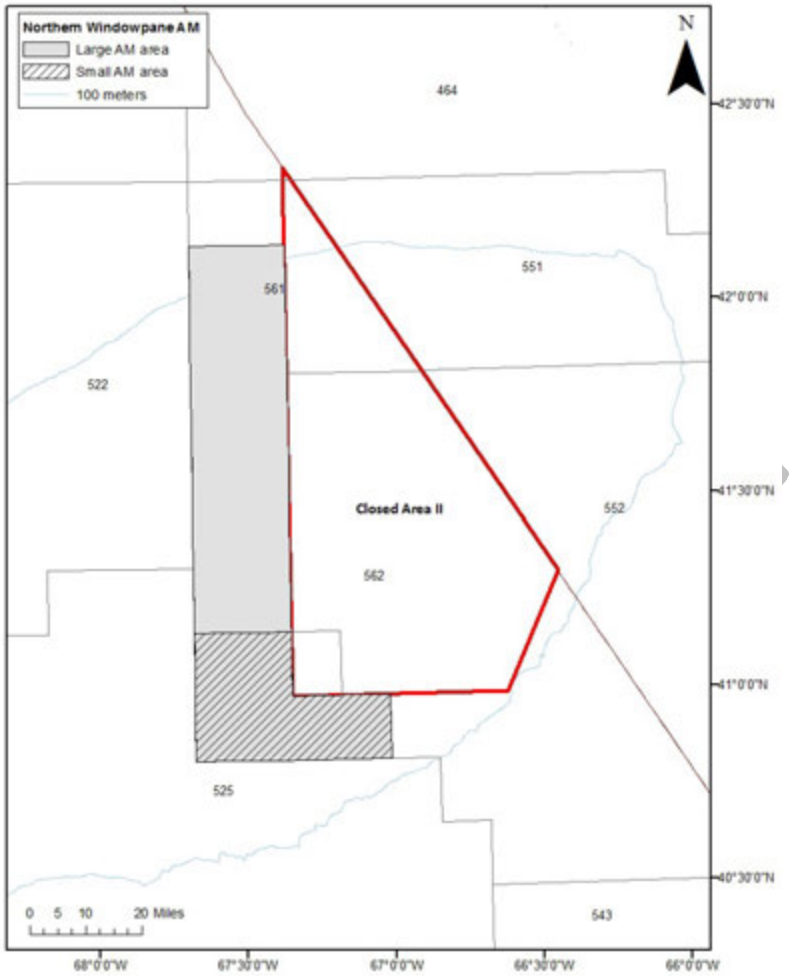
Table 58- Recent northern windowpane flounder catch estimates by fishery (mt).

Fishing Year	***Scallop***	***Squid/Whiting***	***Lobster/Crab***	***Groundfish Sectors***	***Total ACL (mt)***
2012	75.7	0.9	0	129.5	163
2013	40.7	0.6	0	237.3	144
2014	99.7	1.0	7.4	157.4	144
2015	114.6	0.1	N/A	73.6	144

Table 59 – Northern windowpane flounder estimated catches by fishery as a percentage of the total ACL (not sub-ACL).

		Estimated catches as a percentage of the total ACL			
Fishing Year	***Total ACL (mt)***	***Scallop***	***Squid/Whiting***	***Lobster/Crab***	***Groundfish Sectors***
2012	163	46.44%	0.55%	0.00%	79.45%
2013	144	28.26%	0.42%	0.00%	164.79%
2014	144	69.24%	0.69%	5.14%	109.31%
2015	144	79.58%	0.00%	N/A	51.11%

Figure 8- Northern windowpane flounder accountability measure areas (large and small).

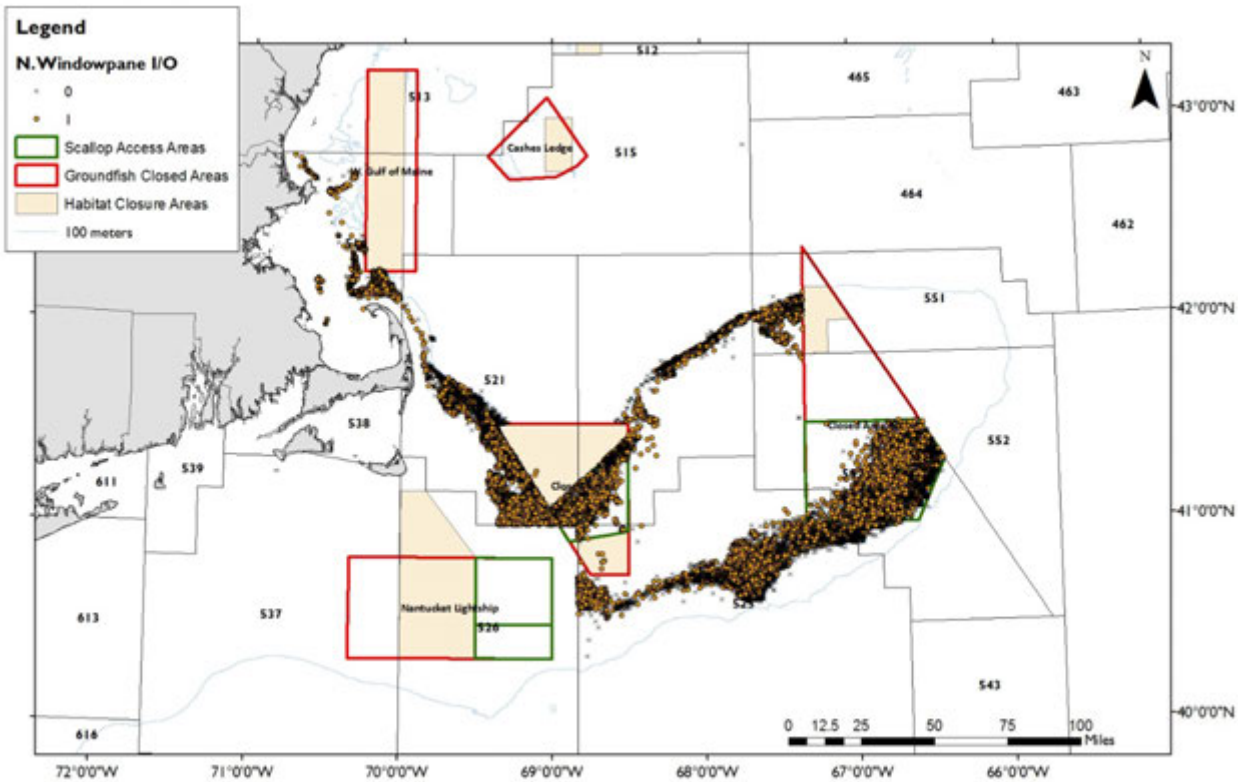


Within the northern windowpane flounder stock boundary, the scallop fishery operates in:

- Access Areas: Closed Area I and Closed Area II South
- Open Areas of significance: Great South Channel (statistical reporting area, SRA, 521), southern flank of Georges Bank, northern flank of Georges Bank, Gulf of Maine.

Figure 9 suggests the scallop fishery catches of northern windowpane flounder are broadly distributed across Georges Bank and the northern portion of the Great South Channel.

Figure 9 – Presence (I) and absence (O) of northern windowpane flounder in observed scallop fishery (LA & LAGC) hauls, Scallop FY2011 – Scallop FY2016 (as of September 2, 2016).



The following summarizes spatial and temporal distribution of northern windowpane catches in the scallop fishery. Within the northern windowpane stock boundary, windowpane flounder were present in 31% of observed scallop hauls (Scallop FY 2011 – preliminary Scallop FY 2016) (Table 60). When examined by SRA, windowpane flounder were present in greater than 24% of observed scallop hauls, with the greatest presence at 41% in SRA 514. Within the boundaries of Closed Area I and II, presence of windowpane flounder in observed scallop haul, varied by month (Table 61). Presence of windowpane flounder in observer scallop hauls was greater than 70% in Closed Area I in January and Closed Area II in December, January, March, and April (no hauls were observed in February in Closed Area I or II and Closed Area I in March and April). This preliminary analysis may indicate that seasonal scallop fishery interactions with northern windowpane flounder are more likely within Closed Area I and Closed Area II in the winter and early spring, although observations are not available for all months. Additional information would be needed such as an examination of scallop fishery access, landings, and effort (e.g., Table 62, Figure 10, and Table 63) and other germane information to develop scallop fishery AMs for northern windowpane flounder in the next Scallop action.

Table 60 – Number of observed scallop hauls reporting catch of windowpane flounder by statistical reporting area, SRA. Presence/absence of windowpane flounder in observed scallop hauls by statistical reporting area from Scallop FY2011 – preliminary Scallop FY2016 (as of September 2, 2016). Note that SRA 515 was excluded due to a low number of observed hauls.

SRA	Absence	Presence	Grand Total	% Absent	% Present
514	1246	851	2097	59.42%	40.58%
521	11483	5918	17401	65.99%	34.01%
522	4167	2375	6542	63.70%	36.30%
525	8480	2834	11314	74.95%	25.05%
561	1963	1202	3165	62.02%	37.98%
562	5874	1886	7760	75.70%	24.30%
Grand Total	*33214*	*15066*	*48280*	*68.79%*	*31.21%*

Table 61 - Presence/Absence of windowpane flounder in observed scallop hauls in Closed Area I and Closed Area II from Scallop FY2007 – preliminary Scallop FY2016 (as of September 2, 2016), by month. There were no observed hauls in Closed Area I or II in February, or Closed Area I in March and April.

	Closed Area I		Closed Area II	
Month	**% Absent**	**% Present**	**% Absent**	**% Present**
January	6%	94%	7%	93%
February	-	-	-	-
March	-	-	0%	100%
April	-	-	0%	100%
May	87%	13%	90%	10%
June	81%	19%	92%	8%
July	88%	12%	81%	19%
August	66%	34%	90%	10%
September	47%	53%	100%	0%
October	43%	57%	92%	8%
November	50%	50%	43%	57%
December	52%	48%	30%	70%
Grand Total	*63%*	*37%*	*75%*	*25%*

Table 62- Limited Access scallop fishery allocations by Scallop FY and recent schedule of CA I and CAII access, including estimated scallop fishery catch of northern windowpane flounder.

FY	Action	LA DAS (FT)	AA trips	CA I AA	CA II AA	Est. Scallop Catch	Notes
2011	FW22	32	4 (2 MA)	1.5 trips (all 313 vessels get 1, 156 get an add.trip)	0.5 trips (157 vessels; 18K lbs/trip)	33 mt	
2012	FW22	34	4	1 trip after EA in May 2012	1 trip (313 vessels; 18K lbs/trip)	75.7 mt	
2013	FW24	33	2	118 Trips (unused trips carryover)	182 trips (13K lbs/trip)	40.7 mt	Seasonal closure of CAII Aug 15 – Nov 15;
2014	FW25	31	2	Closed	197 trips (12K lbs/trip)	99.7 mt	Seasonal closure of CAII Aug 15 – Nov 15;
2015	FW26	30.86	51K lbs to MAAA	Closed	Closed		Windowpane Catch estimate in FW26
2016	FW27	34.55	3 (51K lbs to MAAA)	Closed	Closed		'CAII Extension' closure of open areas to protect small scallops (portion of SRA 525 & 562)

Figure 10 - Limited access Atlantic sea scallop landings (lbs) from northern windowpane stock area by reporting area and fishing year.

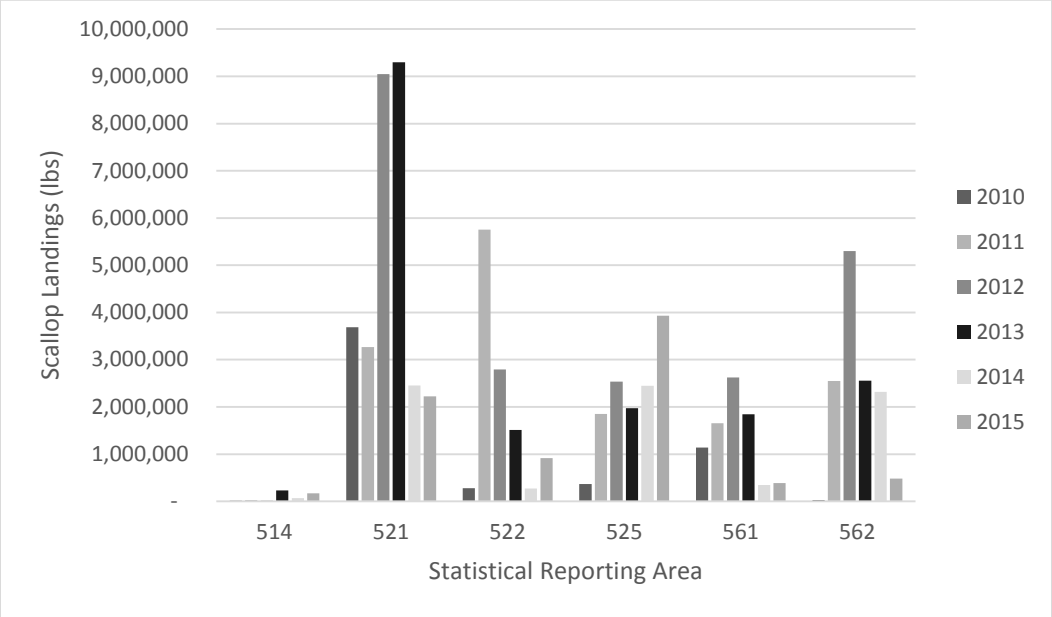


Table 63 - Number of unique scallop permits with VTR landings by statistical reporting area from FY 2010 - FY 2015.

	Fishing Year					
SRA	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
514	68	70	78	86	89	109
521	134	160	266	280	154	172
522	19	220	161	97	34	46
525	26	90	77	64	87	143
561	35	47	66	56	21	25
562	3	129	242	162	171	29

No Action

A scallop fishery sub-ACL for northern windowpane flounder would not be developed or specified.

Impacts on regulated groundfish

No Action would not adopt any additional sub-ACLs for GB/GOM windowpane flounder. As a result, the only sub-ACL for this stock would be for the groundfish fishery, and only the groundfish fishery would have an AM. The ABC for this stock was exceeded in each year since FY 2011, suggesting that controls on other fisheries are needed to effectively constrain catches to the ACL. No Action increases the risk that overfishing will occur for a longer period since the AM is unlikely to modify catches enough to end overfishing. This is because measures taken to control catches by the groundfish fishery can only affect part of the catch. This is true when comparing this option to either Sub-Option 1A or Sub-Option 1B.

Impacts on other species

The projected catch estimates for northern windowpane flounder (Table 56) are above all the options for creating a sub-ACL for the scallop fishery (i.e., highest option at 46% of the ABC or 78 mt in 2017). The overall impact of No Action/Option 1 are likely to be neutral with respect to the Atlantic sea scallop resource.

Sub-Option 1A – Fixed percentage based on the 90th percentile of scallop catch rates for northern windowpane flounder (*Preferred Alternative*- 21%)

Sub-Option 1B – Select a percentage from a range of recent scallop catches
Impacts on regulated groundfish

Under Sub-Option 1A or Sub-Option 1B, a sub-ACL of GB/GOM windowpane flounder would be allocated to the scallop fishery. As a result, the scallop FMP would be modified in a future action to adopt AMs for this stock. The biological effects of this measure are actually due to the adoption of an AM, and not the administrative allocation of a portion of the ACL to the scallop fishery. Once the scallop fishery AM would be adopted, this measure would increase the amount of catch of this stock that is directly subject to an AM. By adopting an ACL for the scallop fishery, nearly all of the catches of this stock will be subject to AMs. Therefore when compared to Option 1/No Action, overfishing is less likely to occur under Sub-Option 1A or Sub-Option 1B.

Impacts on other species

No Action is unlikely to have direct impacts on any other species. When compared to the adoption of Sub-Option 1A or Sub-Option 1B, No Action could result in higher mortality on other stocks because other fisheries would not be subject to AMs if the ACL is exceeded. But all of those fisheries have their own measures in place that are designed to prevent overfishing, so this is unlikely and any differences are not likely to be measureable. Option 2, if adopted, and if the AMs are triggered, may result in reduced fishing mortality for non-groundfish species that are caught on groundfish and scallop fishing trips. This is because the AMs may reduce fishing activity in areas where this stock is caught. Mortality of these stocks under Option 2 would be expected to be lower than No Action. These differences would only occur if the AMs are triggered because an ACL is exceeded. The projected catch estimates for northern windowpane flounder are above all the options for creating a sub-ACL for the scallop fishery (i.e., highest option at 46% of the ABC or 78 mt in 2017). It should be noted that the effects on the scallop and other resource are difficult to predict because they would be influenced by management measures for those fisheries.

7.1.1.2.2.2 Sub-Option 2: Increase the Midwater Trawl Atlantic Herring Fishery ACL for Georges Bank Haddock (*Preferred Alternative*)

Haddock comprises the largest component of groundfish bycatch by midwater trawl vessels, and the catch of haddock by these vessels is managed by the Council through a catch cap (implemented under FW 46 to the Multispecies FMP). Vessels issued a Category A/B Atlantic herring permit and on a declared herring trip, regardless of gear or area fished, and or a vessel issued a Category C permit and/or an Category D permit (open access) that fishes with midwater trawl gear in Areas 1A, 1B, and 3 are prohibited from discarding haddock at-sea (those haddock brought on the deck or pumped into the hold). These vessels are limited to possessing/landing up to 100 lb. of other NE multispecies (e.g., cod, pollock). Atlantic

herring processors and dealers are required to separate out, and retain such haddock for at least 12 hours for inspection by authorized NMFS officers. However, haddock or other NE multispecies separated from the herring catch may not be sold, purchased, received, traded, bartered, or transferred, or attempted to be sold, purchased, received, traded, bartered, or transferred for, or intended for, human consumption.

Table 64 and Table 65 summarize GB haddock catch by the herring midwater trawl fleet in groundfish FY 2010- FY 2015. Starting in 2011, data used to estimate/monitor the cap included observer data, vessel trip reports (VTR), and dealer reports. During the 2012 groundfish fishing year, the haddock catch cap was fully utilized in the GB area. The 2013 GB haddock cap was slightly exceeded. As a result, the 2014 catch cap was adjusted downward from 179 mt to 162 mt to account for the overage. The 2015 cap was exceeded in-season and resulted in a closure of the directed Atlantic herring fishery in the GB haddock catch cap area. The 2016 catch cap was adjusted downward from 521 mt to 512 mt to account for the overage.

For the purpose of comparison, Table 66 summarizes recent catches of Georges Bank haddock by the US commercial groundfish fishery.

Table 64 - Summary of recent catches (mt) of Georges Bank haddock by the midwater trawl Atlantic herring fishery, groundfish FY 2010- FY 2016. Sources: Groundfish FY2010 – FY2015 final year-end catch reports, FY2016 preliminary in-season report through 3/8/2017, GARFO, and CV and observer coverages rates for FY 2011- FY 2015 from GARFO personal communication May 23, 2016.

	Midwater Trawl- Georges Bank Haddock						
Groundfish FY	**Sub-ACL**	**Landings**	**Discards**	**Catch**	**Percentage of sub-ACL**	**CV on Catch**	**Observer Coverage % Trips**
2010	84	69.2	0	69.2	82.3%		
2011	318	101.8	0	101.8	32.0%	17.6%	41.7%
2012	286	271.9	16.7	288.6	100.9%	12.3%	62.9%
2013	273	272.7	17.2	290	106.2%	21.3%	35.6%
2014	162	113.5	0	113.5	70.1%	20.5%	27.2%
2015	227	235.0	0.6	235.5	103.9%	61.4%	4.9%
2016	512			119.3	23.3%		

Table 65 - GB haddock catch cap summary, FY 2011-FY2015. Years highlighted indicate when the catch cap was exceeded.

Fishing Year	Fleet Trips	Observed trips	Obs. Coverage	Haddock Rate	CV (%)	KALL (mt)	Est. Haddock (mt)[1]	Catch Cap (mt)	Pct. Cap
2011	230	96	41.70%	0.002443	17.60%	41,323	101	318	31.70%
2012	237	149	62.90%	0.006675	12.30%	46,555	310.8	286	108.70%
2013	250	89	35.60%	0.00598	21.30%	48,857	292.2	273	107.00%
2014	202	55	27.20%	0.003063	20.50%	36,592	112.1	162	69.20%
2015	164	8	4.90%	0.008489	61.40%	28,018	237.8	227	104.80%

Source: DMIS and OBDBS as of 2016-10-02
[1]Haddock estimate does NOT use replacement methodology and may not match GARFO quota monitoring reports

Table 66 - Summary of recent catches (mt) of Georges Bank haddock by the US commercial groundfish fishery, groundfish FY 2010- FY 2016. Sources: Groundfish FY2010 – FY2015 final year-end catch reports.

	Commercial Fishery- Georges Bank Haddock				
Groundfish FY	**Sub-ACL**	**Landings**	**Discards**	**Catch**	**Percentage of sub-ACL**
2010	40,440	8,299.2	41	8,340.2	20.6%
2011	30,580	3,758.5	82	3,840.5	12.6%
2012	27,438	926.8	270.7	1,197.6	4.4%
2013	26,196	2,696.4	281.1	2,977.5	11.4%
2014	17,171	4,975.3	473.7	5,449.1	31.7%
2015	21,759	4,217.9	856.7	5,074.7	23.3%

No Action

The midwater trawl Atlantic herring fishery sub-ACL for Georges Bank haddock would remain at 1% of the U.S. ABC.

Impacts on regulated groundfish

The sub-ACL is designed to limit the incidental catch of GB haddock by midwater trawl Atlantic herring fisheries, and exceeding the allocations results in triggering AMs in-season. No Action would continue to provide positive benefits for GB haddock.

Impacts on other species

The No Action GB haddock specifications for the midwater trawl Atlantic herring fishery would be lower than when compared to the specifications under Option 2, including Sub-Options 2A and 2B. By reducing the catch limit at which in-season AMs are triggered, No Action may reduce fishing mortality of Atlantic herring which would have positive biological benefits for the Atlantic herring stock. The sub-ACLs may affect fishing mortality and stock size of Atlantic herring and Atlantic mackerel by restricting herring fishing in areas before quotas are reached. Increases to the GB haddock sub-ACL would reduce such an impact.

Sub-Option 2A – Increase the Midwater Trawl Atlantic Herring Fishery Sub-ACL for Georges Bank Haddock and Establish a Review Process **(***Preferred Alternative***)**

Sub-Option 2A would increase the current sub-ACL for GB haddock in the midwater trawl Atlantic herring from 1% of the US ABC to 1.5% or 2% of the US ABC, reduced by the management uncertainty buffer to determine the sub-ACL. The uncertainty buffer is currently 7%. This option would also establish a review process.

Sub-Option 2B – Maintain the Midwater Trawl Atlantic Herring Fishery Sub-ACL for Georges Bank Haddock and Establish a Review Process

Sub-Option 2B would maintain the current sub-ACL for GB haddock in the midwater trawl Atlantic herring at 1% of the US ABC, reduced by the management uncertainty buffer to determine the sub-ACL. The uncertainty buffer is currently 7%. This option would also establish a review process.

Impacts on regulated groundfish species

The GB haddock stock is a transboundary stock co-managed by the U.S. and Canada. The stock is not overfished and overfishing is not occurring (NEFSC 2015). The fishing mortality rate for this stock has been low in recent years. There has been a steady increase in spawning stock biomass (SSB) from ~15,000 mt in the early 1990s, to about 182,000 mt in 2007 to 163,000 mt in 2013. Two exceptionally large year classes (2003 and 2010) contributed to this growth.
Retrospective adjustments were made to the model results from the 2015 operational assessment, due to a major retrospective pattern in SSB and fishing mortality (F). The retrospective adjustment changed the 2014 SSB from 225,080 to 150,053 and the 2014 F_{Full} from 0.159 to 0.241. SSB in 2014 was estimated to be 150,053 (mt) which is 139% of the biomass target (SSB_{MSY} proxy = 108,300). The 2014 fully selected fishing mortality was estimated to be 0.241 which is 62% of the overfishing threshold proxy (F_{MSY} proxy = 0.39).
In the past, extremely large year classes were considered anomalies (e.g., 1963 and 2003). However, since 2003, two additional extremely large (2010 and 2013) and one very large (2012) year classes occurred. Uncertainty remains as to the size of the 2013 year class, which could be even stronger than the 2003 and 2010 year classes. The current model estimate for the 2013 year class is 3.4 billion fish. Experience suggests that estimates of year class strength are usually revised downward with additional years of information. For example, the 2003 year class is now estimated to be only 28% of its initial model estimate, while the 2010 year class is now estimated to be 63% of its initial estimate. Given that only 5 years of data are available to estimate the 2010 year class, it is possible that there may be further revisions to the magnitude of this year class estimate with more years of data (NEFSC 2015).

The groundfish fishery has harvested a low percentage of their allocation in recent years. In addition, some proportion of the fish caught by the midwater trawl Atlantic herring fishery would be immature (i.e., pre-spawners) and not be fully recruited to the groundfish fishery (i.e., smaller fish). However, catches at 1% to 2% of the U.S. ABC would be of low risk to the GB haddock stock given the recent assessment findings. Therefore, biological impacts on regulated groundfish species are likely to be similar under Option 1/No Action to Sub-Option 2A or Sub-Option 2B and continue to provide low positive benefits for the GB haddock stock.

Impacts on other species
Sub-ACLs are designed to limit the incidental catch of GB haddock by midwater trawl Atlantic herring fisheries, and exceeding the allocations results in triggering AMs in-season. The sub-ACLs may affect fishing mortality and stock size of Atlantic herring and Atlantic mackerel by restricting herring fishing in areas before quotas are reached. Increases to the GB haddock sub-ACL would reduce such an impact under Sub-Option 2A when compared to No Action/Option 1 and be neutral when compared to Sub-Option 2B.

7.1.2 Commercial Fishery Measures

7.1.2.1 Atlantic Sea Scallop Fishery Measures

7.1.2.1.1 Scallop fishery AM implementation policy

GB yellowtail flounder catches might not be indicative of biomass, and changes in catch may not accurately track changes in biomass well for this stock. Relative to quotas, recent low catches of GB yellowtail flounder have occurred in the groundfish fishery and scallop fishery. The ratio of GB yellowtail flounder US discards is greater than US landings, with declining proportion of GB yellowtail flounder landed by the groundfish fishing in recent years based on observer data (Figure 11 and Figure 12).

Figure 11 – Ratio of US discards to US landings of Georges Bank yellowtail flounder, 1979-2015. Source: 2016 stock assessment of Georges Bank yellowtail flounder, TRAC, Table 1, pp. 9.

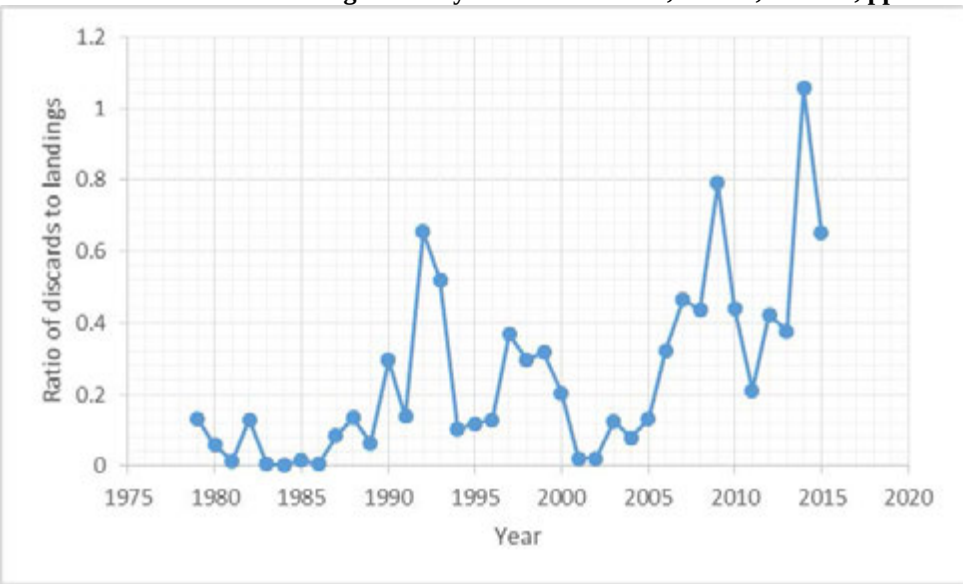
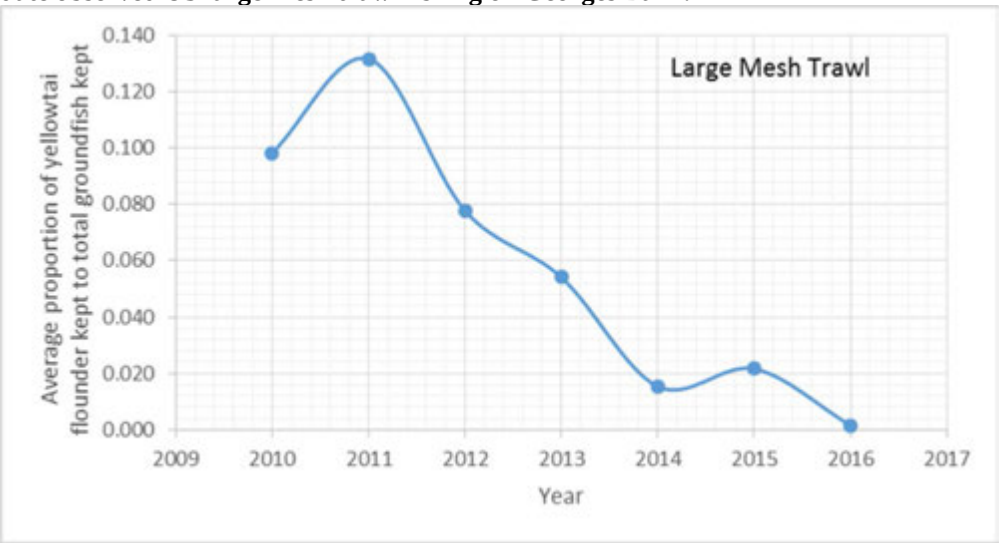


Figure 12- Average proportion of yellowtail flounder kept to total groundfish kept. Source: 2010 – 2016 to date observed US large-mesh trawl fishing on Georges Bank.



Several reasons for low catches are examined in this section. Low catches may be due to a combination of factors including, but not limited to, the loss of market for GB yellowtail flounder due to low quotas, poor stock condition, spatial shifts in stock distribution, avoidance of the stock through use of separator gear, and difficulty finding GB yellowtail flounder. Recent low catches of GB yellowtail flounder by the U.S. groundfish fishery may be influenced by other management. For example, the large Northern Windowpane Flounder AM has been in place in FY 2014 and FY 2015 due to overages of Northern windowpane flounder catch limits (Table 57 and Figure 8). The AM requires the use of approved gear (i.e., haddock separator trawl, rope separator trawl or Rhule trawl) while fishing in the gear restricted area to reduce impact on flatfish. The area is located west and southwest of Closed Area II, which has historically been an important fishing ground for yellowtail flounder. In addition, the Canadian fleet does not direct fishing on GB yellowtail flounder and vessels may only use haddock separator gear in the US/CA management area. Recent increased use of separator gear on Georges Bank by the US groundfish fishery are reflective of the AM (Figure 13 - Figure 15)

Further, recent low quotas for GB yellowtail flounder have not appeared to constrain the U.S. groundfish fishery in its access to other abundant stocks like GB haddock (Table 66). Otherwise, GB yellowtail flounder would be expected to be caught at a higher rate. Total fishery catches were 218 mt in 2013, 159 mt in 2014, and 118 mt in 2015. Quotas lower than recent catches may constrain access to other species (i.e., haddock, scallops). The following includes additional information and analysis.

Usage of separator gear on Georges Bank by the US groundfish fishery

Figure 13- Proportion of sector groundfish trips into offshore Georges Bank by trawl gear type (Rhule trawl, Haddock Separator, and Bottom-Otter Trawl) with trip counts, FY2011-May FY2016. Source: GARFO/DMIS.

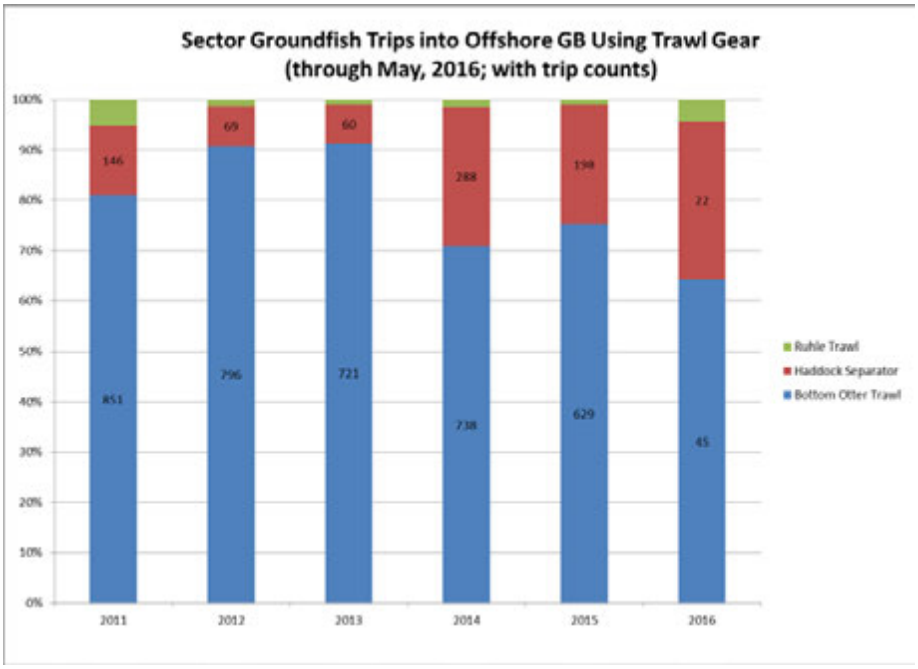


Figure 14- Proportion of vessels taking sector groundfish trips into offshore Georges Bank by trawl gear type (Rhule trawl, Haddock Separator, and Bottom-Otter Trawl) with vessel counts, FY2011-May FY2016. Source: GARFO/DMIS.

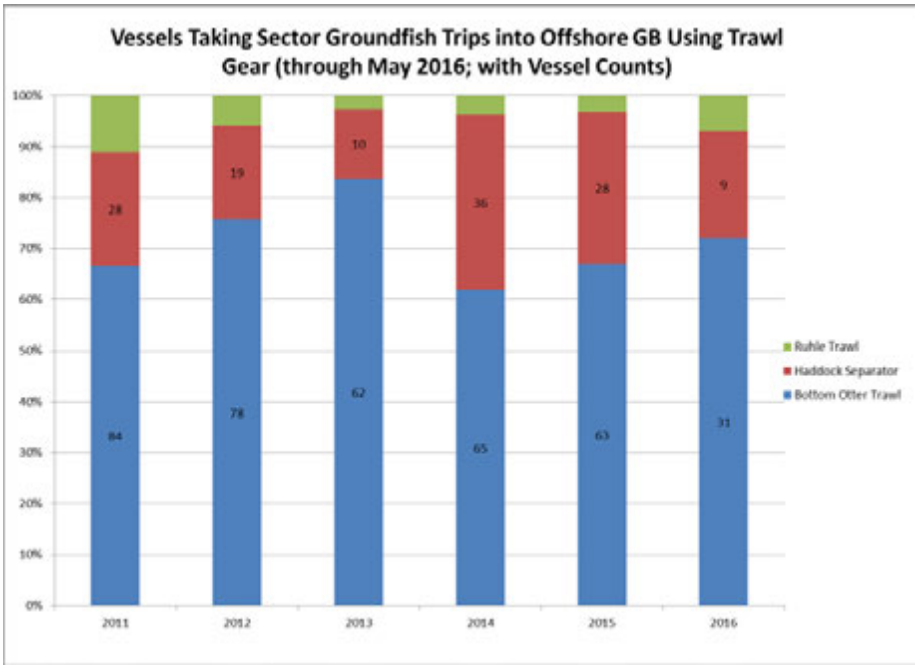
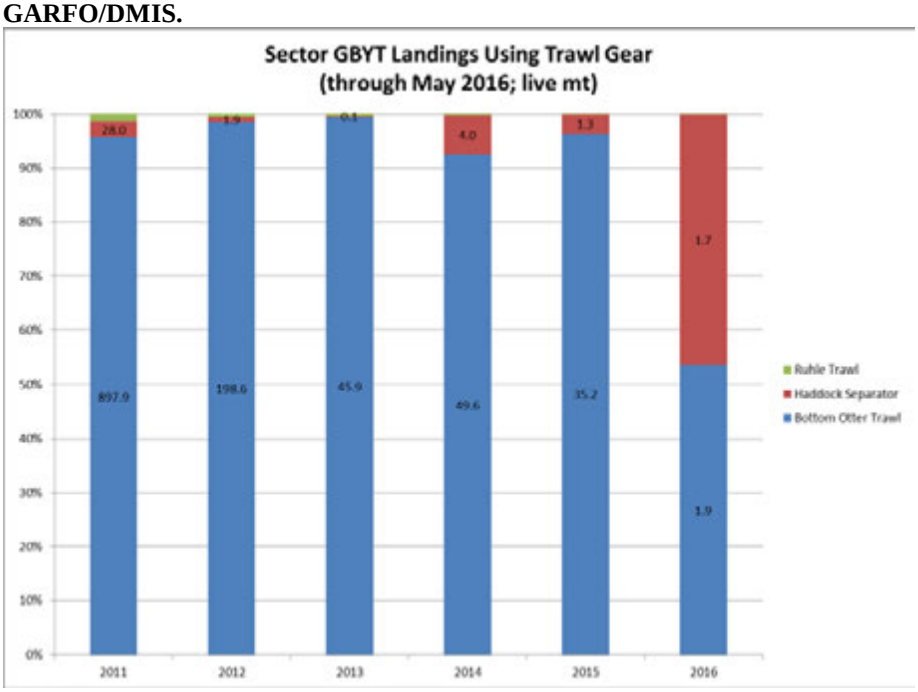


Figure 15- Proportion of sector Georges Bank yellowtail flounder landing by trawl gear type (Rhule trawl, Haddock Separator, and Bottom-Otter Trawl) with landings totals, FY2011-May FY2016. Source: GARFO/DMIS.



The scallop fishery is allocated 16% (based on historic catch) of the GB yellowtail flounder U.S. ABC (FW 48). The scallop fishery's ACL reflects a reduction for management uncertainty. Provisions in both the groundfish and scallop fishery management plans require that NMFS estimate scallop fishery catch of GB yellowtail flounder annually in January to determine if the sub-ACL is likely to be exceeded. In years when NMFS projects that less than 90% of the scallop GB or SNE/MA yellowtail sub-ACL will be caught, the agency may initiate an allocation transfer from the scallop fishery to the groundfish fishery for those stocks. In FY 2015, NMFS transferred 7.9 mt of the GB yellowtail flounder from the scallop fishery to the groundfish fishery (~21% of the FY 2015 scallop GB yellowtail flounder sub-ACL). In FY 2016, NMFS transferred 39.8 mt of GB yellowtail flounder and 15.2 mt of SNE/MA yellowtail flounder from the scallop fishery to the groundfish fishery.

Regulations governing the scallop fishery's retention of GB yellowtail flounder have varied in recent years. Landings of yellowtail flounder became prohibited for the scallop fishery in FY 2014 to remove any incentive to target yellowtail (Table 67). Prior to this, catch estimates were comprised of both landings and discards. In some years, there has been a requirement that vessels land any catch of yellowtail flounder.

Since FY 2011, scallop fishery catch of GB yellowtail flounder has ranged from a high of 164 mt (FY 2012) to a low of 29.7 mt. The limited access component accounts for nearly all GB yellowtail flounder catch (i.e. very little LAGC IFQ catch). The fishery has historically encountered yellowtail within the Closed Area II Access Area (CA II AA) and along the southern flank of Georges Bank in SRA 562 and 525. Lower catches of yellowtail can be expected during closures of these areas (seasonal or year round).

Table 67 – Recent Georges Bank yellowtail flounder TACs and scallop fishery sub-ACLs and catches. Values shown in metric tons (mt).

	Total Shared TAC – US & CA (mt)	US % Share	US TAC (mt)	% US TAC Caught	Scallop sub-ACL (mt)	Scallop catch (mt)	% Scallop ACL Caught
FY2011	2,650	55%	1,458	76%	200.8	83.9	41.8%
FY2012	1,150	49%	564	68%	156.9	164	104.5%
FY2013	500	43%	215	43%	41.5	37.5	90.4%
FY2014*	400	82%	328	37%	50.9	59	115.9%
FY2015*	354	70%	248	28%	38	29.7	78.1%
FY2016*	354	76%	269	***	42	2**	5%

* Indicates that retention of yellowtail flounder was prohibited for scallop fishery
**FY2016 GB yellowtail flounder scallop catch estimate as of Feb. 27, 2017
***Indicates that final catch data is not yet available

Rotational and Seasonal Closures within the GB Yellowtail Flounder Stock Area- Rotational area management is the cornerstone of scallop fisheries management. There are four types of areas in this system: 1) "open areas" where scallop fishing can occur using DAS or IFQ; 2) areas completely closed to scallop fishing year-round to reduce impacts on EFH and/or groundfish mortality; 3) areas temporarily closed to scallop vessels to protect small scallops until a future date; and 4) areas open to very restricted levels of scallop fishing called "access areas." When scallop vessels are fishing in these areas they are limited in terms of total removal and sometimes season. All four types of management areas have been employed within the GB yellowtail flounder stock area. Table 68 describes limited access DAS and access area trip allocations since FY 2011, along with details about the management of the CA II AA and management within the GB yellowtail flounder statistical reporting area (SRA).

The CA II AA is situated within the GB yellowtail flounder SRA. After a series of openings, the CA II AA was closed in FY 2015 and FY 2016. In FY 2016, the area to the south of CA II was designated as a rotational closure. In FY 2013 and FY 2014, seasonal closures from August 15 – November 15 were employed within the CAII AA to help reduce the catch of GB yellowtail flounder by the scallop fishery.

Table 68 - Limited Access scallop fishery allocations by fishing year and recent schedule of CAII access

FY	Action	LA DAS (Full Time)	AA trips	CA II AA	Notes re: CA II AA and other management
2011	FW22	32	4 (2 MA)	0.5 trips (157 vessels; 18K lbs/trip)	10% access area bycatch cap; GB stock-wide monitoring of YT sub-ACL; Bycatch Avoidance Program CAI and CAII
2012	FW22	34	4	1 trip (313 vessels; 18K lbs/trip)	GB stock-wide monitoring of YT sub-ACL; Bycatch Avoidance Program CAI and CAII
2013	FW24	33	2	182 trips (13K lbs/trip)	Seasonal closure of CAII Aug 15 – Nov 15; GB stock-wide monitoring of YT sub-ACL; Bycatch Avoidance Program CAII
2014	FW25	31	2	197 trips (12K lbs/trip)	16% GB YT sub-ACL; YT landings prohibited; Seasonal closure of CAII Aug 15 – Nov 15; GB stock-wide monitoring of YT sub-ACL; Bycatch Avoidance Program CAII
2015	FW26	30.86	51K lbs to MAAA	Closed	In-season transfer to groundfish fishery (7.9 mt).
2016	FW27	34.55	3 (51K lbs to MAAA)	Closed	'CAII Extension' closure of open areas to protect small scallops

Gear Modifications to Reduce Flatfish Catch- Through Scallop FW 26, the Council approved measures that restrict the maximum number of rows in the dredge apron to 7 in all areas as shorter aprons have been shown to reduce flatfish bycatch and improve fish escapement (see Scallop FW 24, Appendix IV). Part of the rationale for this 7 row restriction was to reduce flatfish bycatch and prevent sub-ACLs from being exceeded and triggering reactive accountability measures. The restriction was implemented for in FY

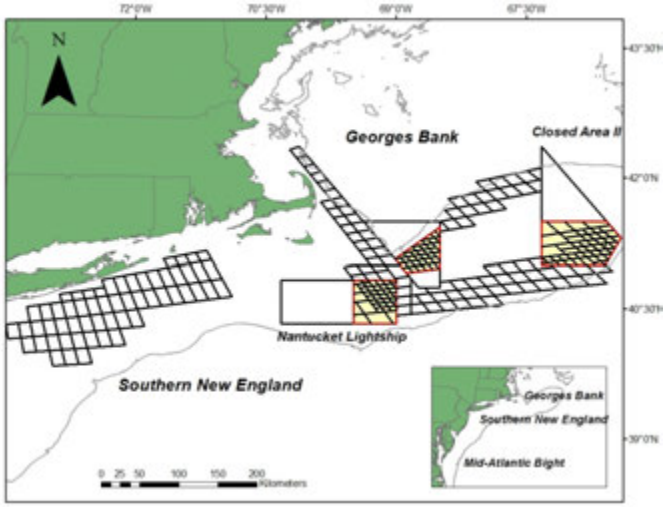
2015. The fishery-wide requirement to use of a 10" twine top (Amendment 10, 2004) improved the escapement of yellowtail flounder.

Bycatch Avoidance Efforts-The SMAST Yellowtail Flounder Bycatch Avoidance System is a voluntary program to exchange real-time, spatially-specific information on yellowtail flounder bycatch in the rotational and open areas of Georges Bank and southern New England. The system uses fishery-dependent data to provide advice on bycatch hotspots. Vessels can use the near real-time advice to change fishing behavior and avoid regions with high bycatch rates. The system was implemented in 2010, and has continued each year with additional participating vessels and areas of bycatch reporting and avoidance (Table 69; Figure 16).

Table 69 - SMAST Bycatch Avoidance Program areas 2010-2016. Numbers in parentheses represent the number of participating vessels in each year. Closed Area II row is shown in gray.

	2010 (122)	2011 (214)	2012 (244)	2013 (252)	2014 (253)	2015 (258)	2016 (258)
NLCA	x		x				
LCA Extended				x	x		
CAI		x	x	x			
CAII		x	x	x	x		
orth GB Open				x	x	x	x
uth GB Open				x	x	x	x
SNE Open					x	x	x
hannel Open						x	x

Figure 16 - Map of all reporting grids used for the SMAST Bycatch Avoidance Program.



Scallop Fishery Effort in GB yellowtail flounder stock area- Fishing effort using limited access vessel trip report data is summarized, focusing on FY 2011 – FY 2014. Fishing effort is shown by 10-minute squares throughout the range of the fishery. Maps were developed using VTR effort data from all trips (open area and access area) of limited access vessels from 2011 – 2014 (Figure 13 and Figure 14). Note that the scales of effort vary by year. The bathymetry lines follow the 60m and 120m contours, which translates to ~30 and ~60 fathoms respectively. In Figure 14, scallop access areas are shown in green when open, and red when they are closed in a particular fishing year. While VTR locations are considered less accurate

than VMS since they generally only have one self-reported location per trip, this approach sufficiently captures annual effort within the GB YT stock area.

The scallop fishery primarily operates between the 30 and 60 fathom curves along the southern flank and northern flanks of Georges Bank, and within the Closed Area II access area. The majority of trips on Georges Bank from 2010 – 2014 (Figure 17) are concentrated within the CA II access area, though effort varies annually (Figure 18). Effort on the northern edge of the bank has been concentrated to the west of the habitat closure area within CA II. The PDT noted that the highest discard to kept ratios (D:K) of yellowtail flounder to scallop meats in the GB yellowtail flounder stock area have been observed in Closed Area II and areas to the south. Less yellowtail catch has been observed along the northern portion of the bank.

Figure 17 - Number of LA scallop VTR trips over five year period from 2010 – 2014 by ten minute squares.

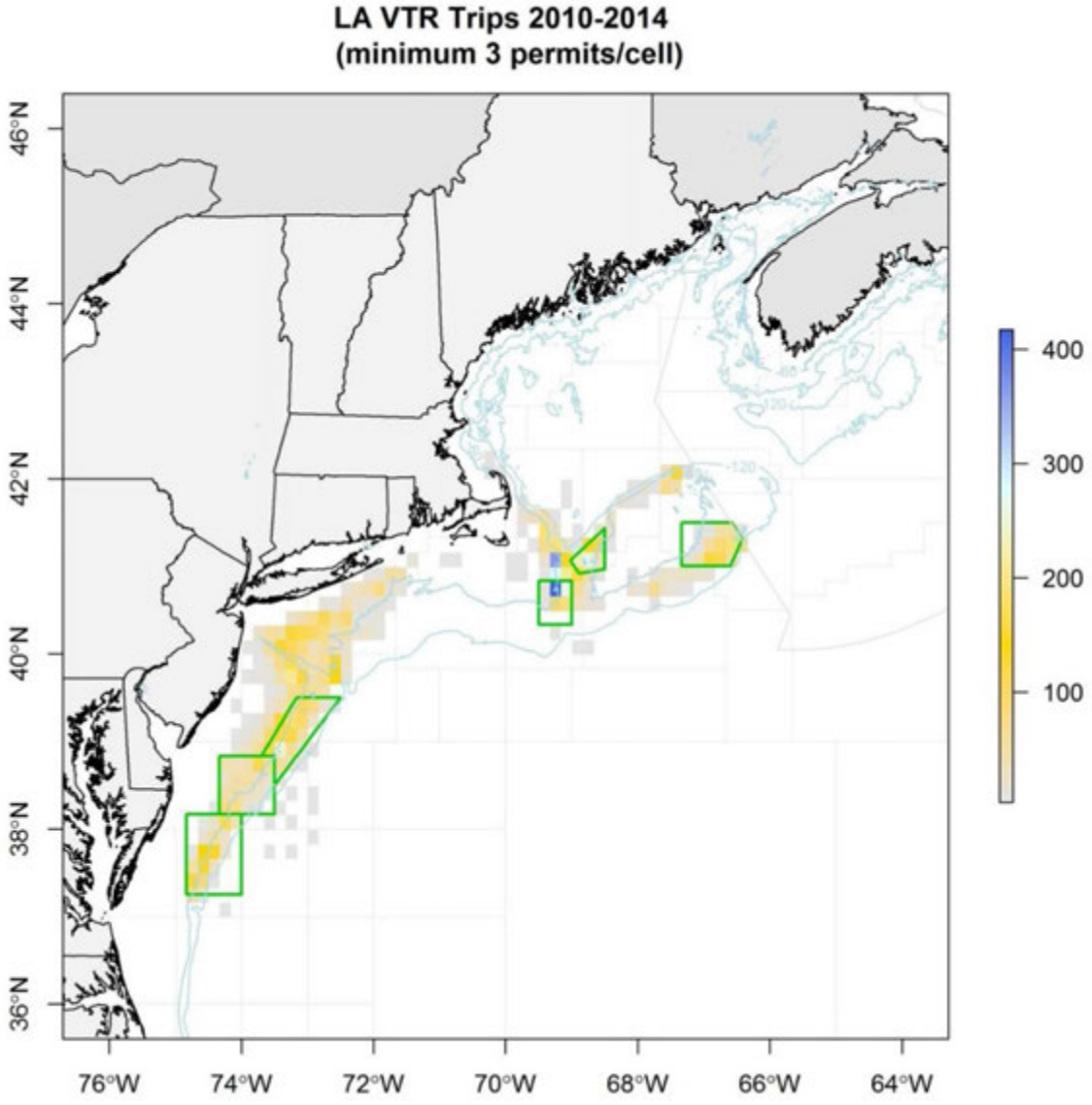
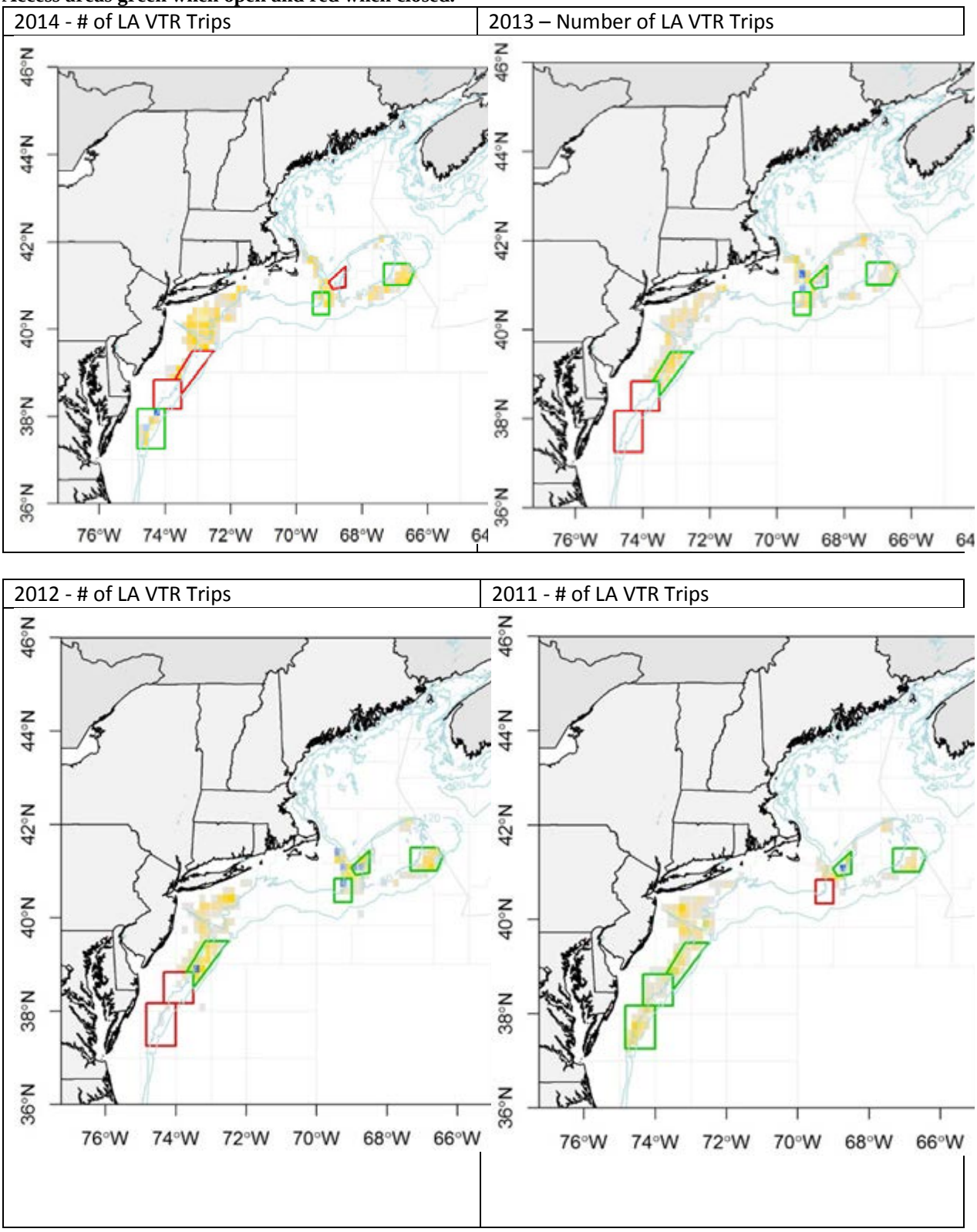


Figure 18 - Annual spatial distribution of scallop VTR trips by ten-minute squares (FY 2011 – FY2014). Access areas green when open and red when closed.



Option 1: No Action

Impacts on regulated groundfish species
The AM policy established in FW 47 for the scallop fishery would remain unchanged. Option 1/No Action would continue to provide positive impacts on all groundfish stocks in which the scallop fishery has a sub-ACL.

Impacts on other species
Option 1/No Action is not expected to have direct or indirect impacts on non-groundfish species such as monkfish, dogfish, and skates. The impacts of Option 1/No Action on Atlantic sea scallops would be negligible if the scallop fishery was able to continue to prosecute their fishery in times/areas outside of the AM areas.

Option 2: Temporary change to the scallop fishery AM implementation policy (*Preferred Alternative*)

Sub-Option A – Temporary change to the scallop fishery AM implementation policy for the GB yellowtail flounder stock (*Preferred Alternative*)

Sub-Option A would allow for a temporary change to the AM implementation policy for the GB yellowtail flounder stock so that the only criteria to determine if an AM would be implemented would be if the scallop fishery exceeds its sub-ACL for a stock and the overall ACL is also exceeded. This measure include a 2-year "sunset" provision. Therefore if the measure was implemented in FY 2017, the temporary change to AM policy would only apply for FY 2017 and FY 2018 catches and in FY 2019 and beyond the underlying policy would apply (i.e., as described under No Action).

Impacts on regulated groundfish species
The information provided on the scallop and groundfish fisheries suggests that the GB yellowtail flounder ACL is unlikely to be exceeded in FY 2017. The Scallop PDT's projected catch estimate for 2017 suggests that the catches would be double the sub-ACL with the AM likely to be triggered under No Action (Table 56). In addition, the groundfish fishery will have the large AM in place for FY 2017 for northern windowpane flounder which may reduce catches of GB yellowtail flounder as a consequence (e.g., Table 57 and Figure 8). Relative to No Action/Option 1, Sub-Option A would be low negative to neutral impacts on regulated groundfish species depending on the magnitude of all fisheries catches and the fact that this option would be put in place as a temporary measure for two years (for catches occurring in FY 2017 and FY 2018).

Impacts on other species
Compared with No Action/Option 1, Sub-Option A is not expected to have direct or indirect impacts on non-groundfish species such as monkfish, dogfish, and skates. The impacts of Option 1/No Action or Sub-Option A on Atlantic sea scallops would be negligible if the scallop fishery was able to continue to prosecute their fishery in times/areas outside of the AM areas.

Sub-Option B – Temporary change to the scallop fishery AM implementation policy for the Northern windowpane flounder stock (*Preferred Alternative*)

Sub-Option B would allow for a temporary change to the AM implementation policy for the northern windowpane flounder stock so that the only criteria to determine if an AM would be implemented would be if the scallop fishery exceeds its sub-ACL for a stock and the overall ACL is also exceeded. This measure includes a 2-year "sunset" provision. Therefore if the measure was implemented in FY 2017, the

temporary change to AM policy would only apply for FY 2017 and FY 2018 catches and in FY 2019 and beyond the underlying policy would apply (i.e., as described under No Action and Section 4.1.2.2.1.2).

Impacts on regulated groundfish species
The information provided on the scallop and groundfish fisheries suggests that the total ACL could be exceeded in FY 2017. The Scallop PDT's projected catch estimate for 2017 suggests that the catches would be greater than all the sub-ACLs being considered in this action (Table 56). In addition, the groundfish fishery will have the large AM in place for FY 2017 for northern windowpane flounder which should reduce catches of Northern windowpane flounder (e.g., Table 57 and Figure 8). Relative to No Action/Option 1, Sub-Option B would be low negative to neutral impacts on regulated groundfish species depending on the magnitude of all fisheries catches and the fact that this option would be put in place as a temporary measure for two years(for catches occurring in FY 2017 and FY 2018).

Impacts on other species
Compared with No Action/Option 1, Sub-Option B is not expected to have direct or indirect impacts on non-groundfish species such as monkfish, dogfish, and skates. The impacts of Option 1/No Action or Sub-Option A on Atlantic sea scallops would be negligible if the scallop fishery was able to continue to prosecute their fishery in times/areas outside of the AM areas.

7.2 Essential Fish Habitat Impacts

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

The area that is potentially affected by the proposed alternatives includes EFH for species managed under the following Fishery Management Plans: NE Multispecies; Atlantic Sea Scallop; Monkfish; Atlantic Herring; Summer Flounder, Scup and Black Sea Bass; Atlantic Mackerel, Squid, and Butterfish; Spiny Dogfish; Tilefish; Deep-Sea Red Crab; Atlantic Surfclam and Ocean Quahog; Atlantic Bluefish; Northeast Skates; and Atlantic Highly Migratory Species.

7.2.1 Updates to Status Determination Criteria and Annual Catch Limits

7.2.1.1 Revised Status Determination Criteria

7.2.1.1.1 Option 1: No Action

This option would retain the existing SDC for witch flounder. From a habitat perspective, the SDC themselves are less important than the catch limits that result from implementing those criteria to generate ACLs. Qualitatively, it is assumed that criteria based on more dated scientific advice may lead to decreases in stock size over the long term. This could lead to reduced CPUE and a resulting increase in seabed area swept, particularly when compared to Option 2. However, many factors interact to produce the amount and location of seabed area swept in a particular fishery, such that the effect of SDC on the amount of habitat impacts is uncertain at best. Stocks with high utilization rates are likely to influence patterns of effort in the fishery if ACLs change. The Quota Change Model (QCM) discussed in the economic impacts section (see Section 7.4) predicts a very high utilization rate of 99.3% for witch flounder during FY 2017.

Per SAW/SARC 62, both the SDC definitions and status of witch flounder are considered unknown. These findings underlie the Option 2 SDC revisions. While in theory SDC based on an earlier assessment should have negative stock and therefore habitat impacts relative to updated SDC based on more recent data and methods, in this case it is difficult to directly compare the Option 1 analytically-based SDC and the Option 2 empirically-based SDC. The impacts to habitat of maintaining the Option 1/No Action SDC vs. adopting the revised Option 2 are uncertain as well. Given that the Council would use recent catch and survey data to inform catch limits, regardless of the SDC in effect, the impacts of the two SDC options on habitat are likely similar.

7.2.1.1.2 Option 2: Revised Status Determination Criteria for Witch Flounder (*Preferred Alternative*)

This option would update the status determination criteria for witch flounder to reflect the results of the December 2016 assessment (SAW/SARC 62). For reasons noted above under Option 1, the impacts of the two SDC options on habitat are likely similar.

7.2.1.2 Annual Catch Limits

7.2.1.2.1 Option 1: No Action

Option 1/No Action retains existing Framework 55 catch limits, and default specifications for EGB cod, which would limit fishing in the eastern Georges Bank stock area beginning August1, 2017. Option 1 also has lower quotas for witch flounder, a stock with high utilization rates. Combining these two factors, fishing effort is expected to be lower under Option 1/No Action than under Option 2, and therefore habitat impacts are expected to be positive for Option1/No Action as compared to Option 2.

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

Option 2 would adopt new specifications for GB yellowtail flounder, GB haddock, GB cod, and witch flounder consistent with the most recent stock assessment information. Option 2 would also adopt new ABCs for GB yellowtail flounder and witch flounder. Considering that EGB cod would be allocated under this option, and witch flounder catch limits will increase, fishing effort and negative habitat impacts are expected to be greater under Option 2 as compared to Option 1.

7.2.1.2.2.1 Sub Option 1: Develop an Atlantic Sea Scallop Fishery Allocation for GOM/GB (Northern) Windowpane Flounder (*Preferred Alternative*)

No Action – No scallop fishery sub-ACL for northern windowpane flounder.

Under No Action, only the groundfish fishery is subject to AMs when the windowpane flounder ACL is exceeded. The AMs for windowpane are implemented in the year following an ACL overage and involve specific areas where modified trawl gear must be used to avoid catch of windowpane and other flatfish. Northern windowpane is considered an incidental stock, but windowpane catch limits do influence patterns of effort in the groundfish fishery because fishermen are seeking to avoid AMs in future years. Without a sub-ACL for the scallop fishery, this incentive to avoid catching northern windowpane is strongest in the fishery that is subject to the AMs. Either Sub-Option 1A or 1B would incentivize the scallop fishery to avoid northern windowpane as the fishery would be held accountable for overage in the form of fishery-specific AMs (to be developed in a Scallop FMP action). Thus, broadly speaking with only one fishery highly incentivized to avoid the stock, fishing effort and therefore negative impacts to EFH may be greater under No Action as compared to the alternative sub-options.

Sub-Option 1A – Fixed percentage based on the 90th percentile of scallop catch rates for northern windowpane flounder (Preferred Alternative- 21%)

The scallop fishery sub-ACL for northern windowpane would vary annually under this sub-option, depending on the percentage selected (19-35%) and the total amount of the ACL in any given year. Shifts

in the amount of sub-ACL allocated to the scallop fishery could influence patterns of fishing effort in both the scallop and groundfish fisheries. Regardless of the specific percentage chosen, the act of adopting a sub-ACL creates an incentive for the scallop fishery to avoid catching northern windowpane, because exceeding the sub-ACL would trigger some sort of in-season or future season restrictions on catch. This specific sub-option sets the sub-ACL at a level equal to 90% of actual scallop fishery catches over a recent time frame. Various options were explored, and the Council adopted sub-ACL of 21%, which is equal to the 90th percentile of scallop fishery catch over the time period 2005-2014. Without knowing how AMs might work in the scallop fishery, it is difficult to estimate how effort might be impacted if the sub-ACL were exceeded. However, broadly speaking, having a sub-ACL for both fleets should reduce fishing effort and therefore habitat impacts as both fleets will be trying to remain within the sub-ACL they are subject to. Because this sub-option is for the 90th percentile of scallop catch, it allocates less windowpane to the scallop fishery as compared to sub-option 1B, which is based on recent total catch percentages. This means that compared to sub-option 1B, if all other conditions in both fisheries are equal, more groundfish fishery effort and less scallop fishery effort would be possible under sub-option 1A. Overall though, negative impacts to habitat are expected to be reduced relative to the impacts of No Action.

Sub-Option 1B – Select a percentage from a range of recent scallop catches

As above, the scallop fishery sub-ACL for northern windowpane would vary annually under this sub-option, depending on the percentage selected (2-46%) and the total amount of the ACL in any given year. As above, there could be changes in effort in both fisheries, with the magnitude and direction of change in each depending on the percentage selected. Again, regardless of the percentage selected, the act of setting a scallop fishery sub-ACL in general could serve to limit effort in both fisheries as they try to remain within the catch limits. Because this sub-option is based on actual scallop fishery catches, not the 90th percentile of catches, this approach could allow more effort in the scallop fishery and less in the groundfish fishery relative to sub-option 1A. Overall though, negative impacts to habitat are expected to be reduced relative to the impacts of No Action.

7.2.1.2.2.2 Sub Option 2: Increase the Midwater Trawl Atlantic Herring Fishery Sub-ACL for Georges Bank Haddock

Herring fishery catch of GB haddock is monitored weekly, and AMs are triggered in season when catch of 100% of the sub-ACL is projected.

No Action - Midwater trawl Atlantic herring fishery sub-ACL for Georges Bank haddock remains at 1% of the U.S. ABC.

Under this sub-option, the sub-ACL for GB haddock would remain at 1%, which is lower than the proposals under Sub-options 2A and 2B. This likely means less midwater trawl effort in the Georges Bank herring fishery under this option relative to the alternatives. However, changes in the amount of midwater trawl effort are not expected to change the impacts of the herring fishery on EFH, because midwater trawl gear has minimal and temporary impacts on seafloor habitats. Thus, maintaining the existing sub-ACL percentage will have neutral impacts on EFH.

Sub-Option 2A – Increase the Midwater Trawl Atlantic Herring Fishery Sub-ACL for Georges Bank Haddock and Establish a Review Process (Preferred Alternative)

This sub-option would increase the GB haddock sub-ACL for the herring fishery from 1% to either 1.5% or 2%. Assuming similar amounts of herring fishing on Georges Bank as in previous years, and similar catch rates of haddock, this increased sub-ACL could prevent the closure of Georges Bank to the herring fishery and thus could lead to increased fishing effort and catch in the herring fishery. Because GB haddock is an under-utilized stock in the directed groundfish fishery, changing the herring fishery sub-ACL is not likely to influence the magnitude of fishing in the directed groundfish fishery.

Midwater trawl gear has minimal and temporary impacts on seafloor habitats. Thus, an increase in midwater trawl fishing activity on Georges Bank is not expected to increase impacts to EFH. Therefore, increasing the sub-ACL under Sub-option 2A will have neutral impacts to EFH. The review process elements of Sub-option 2A will ensure that the sub-ACL does not negatively affect the GB haddock stock, but has no relevance to habitat impacts.

Sub-Option 2B – Maintain the Midwater Trawl Atlantic Herring Fishery Sub-ACL for Georges Bank Haddock and Establish a Review Process

As compared to Sub-option 2A, Sub-option 2B would be more likely to curtail midwater trawling for herring on Georges Bank due to the 1% sub-ACL being exceeded. However, since the effects of midwater trawl gear on the seafloor are minimal and temporary, positive impacts on EFH are not expected to result from any reduced fishing effort under Sub-option 2B. The review elements of this sub-option have no relevance to the magnitude of habitat impacts.

7.2.2 Commercial Fishery Measures

7.2.2.1 Atlantic Sea Scallop Fishery Measures

7.2.2.1.1 Scallop fishery AM implementation policy

No Action

The AM policy established in Framework 47 for the scallop fishery would remain unchanged. FW 47 established a policy that scallop fishery sub-ACLs would be administered and evaluated in the context of total catches in the fishery. The general principle is that if a scallop fishery sub-ACL (for any stock) was exceeded, but the overall ACL was not exceeded, then the scallop fishery would not be subject to AMs unless the scallop fishery sub-ACL was exceeded by 50 or more percent. There would be two criteria that would result in implementing the AMs if either was met:

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

No Action places limits on the scallop fishery regardless of whether catches in the groundfish fishery are very low such that the overall ACL for a stock is not exceeded. Thus, No Action creates stronger incentives for the scallop fishery to avoid windowpane or GB yellowtail, even in cases where groundfish fishery catches remain low. Under No Action, reductions in scallop effort are more likely, because the thresholds for triggering AMs are lower as compared to the alternatives described below. Thus, No

Action could have reduced effort and therefore reduced negative habitat impacts as compared to relaxing the AM policy for one or more stocks.

Sub-Option 3A – Temporary change to the scallop fishery AM implementation policy for the GB yellowtail flounder stock

Currently, GB yellowtail flounder AMs in the scallop fishery are only triggered when both of the following conditions are met: (1) the overall ACL is exceeded, and (2) more than 150% of scallop sub-ACL is caught by the scallop fleet. This alternative would remove the second condition. This could change avoidance behavior in the scallop fishery, but could also increase utilization of the scallop resource. The Closed Area II scallop access area will likely be open to the scallop fishery during 2017, and GB yellowtail flounder occur in and around the access area. Catches of GB yellowtail flounder in the directed groundfish fishery are currently low. This flexibility is more likely to influence patterns effort in the scallop fishery, and specifically is likely to increase effort in the fishery relative to No Action, which would increase negative impacts to habitat. However since this is a temporary measure, long-term increased negative impacts to habitat are not expected.

Sub-Option 3B – Temporary change to the scallop fishery AM implementation policy for the Northern windowpane flounder stock

While northern windowpane AMs remain to be developed, it is likely that they will triggered when both of the following conditions are met, consistent with other AMs: (1) the overall ACL is exceeded, and (2) more than 150% of scallop sub-ACL is caught by the scallop fleet. This alternative would remove the second condition. This flexibility is more likely to influence patterns effort in the scallop fishery, and specifically is likely to increase effort in the fishery relative to No Action, which would increase negative impacts to habitat. However since this is a temporary measure, long-term increased negative impacts to habitat are not expected.

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

7.3 Impacts on Endangered and Other Protected Species

The FW 56 alternatives are evaluated for their impacts on species protected under the Endangered Species Act (ESA) of 1973 and/or the Marine Mammal Protection Act (MMPA) of 1972. Section 6.5 of the Affected Environment Section contains a complete list of protected species (i.e., ESA listed and MMPA protected species) that inhabit the areas of operation for the Northeast multispecies fishery. This impact analysis considers how the fishery may overlap with protected species in time and space, as well as records of protected species interaction with particular gear types (e.g. gillnet, bottom otter trawl).

7.3.1 Updates to Status Determination Criteria and Annual Catch Limits

7.3.1.1 Revised Status Determination Criteria

Updating the SDC is an administrative measure, and will not have a direct impact on protected species because it does not, in and of itself, change fishing effort or fishing behavior. Whatever impact indirectly precipitates from changes to SDC or mortality targets will be discussed in the context of other alternatives – including ACLs – which the Council adopts in order to meet mortality targets derived from the new SDC and control rules.

7.3.1.2 Annual Catch Limits

7.3.1.2.1 Option 1: No Action

Under Option 1, there would be no changes to the specifications for FY2017-2018 and default specifications that were adopted by FW55 final rule (see Table 6). The directed groundfish fishery would also be expected to operate in all BSAs, with the exception of the EBG cod management area, which would close August 1, 2017.

Based on the above information, specifications under Option 1 are not significantly greater than those authorized over the last several years, and therefore, significant changes in effort (e.g., gear quantity, soak/tow time, area fished) are not expected under this Option. As a result, fishing behavior is expected to remain similar to current operating conditions. Understanding expected fishing behavior/effort in a fishery informs potential interaction risks with protected species. Specifically, interaction risks with protected species are strongly associated with amount, time, and location of gear in the water; vulnerability of an interaction increases with increases, relative to respective fisheries current operating conditions, of any or all of these factors. Taking into consideration the latter, as well as fishing behavior/effort under the No Action (Option 1), impacts of the No Action to protected species are provided below.

MMPA Protected Species Impacts

Impacts of Option 1 on marine mammals (i.e., species of cetaceans and pinnipeds) are somewhat uncertain as quantitative analysis has not been performed. However, we have considered, to the best of our ability, available information on marine mammal interactions with commercial fisheries over the last 5 or more years (Waring et al. 2014; Waring et al. 2015; Waring et al. 2016; http://www.nefsc.noaa.gov/fsb/take_reports/nefop.html; www.nefsc.noaa.gov/fsb/take_reports/asm.html). Aside from several large whale species (e.g., North Atlantic right, humpback, and fin), harbor porpoise, and several stocks of bottlenose dolphin, there has been no indication that takes of any other marine mammal species in commercial fisheries has exceeded potential biological removal (PBR) thresholds, and

therefore, gone above and beyond levels which would result in the inability of each species population to sustain itself (Waring et al. 2014, 2015, 2016). Although, as noted above, several species of large whales, harbor porpoise and several stocks of bottlenose dolphin have experienced levels of take that have resulted in the exceedance of each species PBR threshold, take reduction plans have been implemented to reduce bycatch in the fisheries affecting these species (Atlantic Large Whale Take Reduction Plan, Harbor Porpoise Take Reduction Plan, and the Bottlenose Dolphin Take Reduction Plan; see Section 6.5for details); these plans are still in place and are continuing to assist in decreasing bycatch levels for these species. Although the information presented in Waring et al. (2014, 2015, 2016) is a collective representation of commercial fishery interactions with marine mammals, and does not address the effects of any FMP specifically, the information does demonstrate that fishery operations over last 5 or more years have not resulted in a collective level of take that threatens the continued existence of marine mammal populations (aside from those species noted above).

In conjunction with the above, additional analysis on the impacts of the operation of fisheries in the northeast region have also been conducted by NMFS, pursuant to section 7 of the ESA, for ESA-listed species of marine mammals. Specifically, NMFS issued a Biological Opinion in 2013, concluding that the operation of the groundfish FMP, in addition to six other FMPs, may adversely affect, but is not likely to jeopardize the continued existence of any ESA listed species of marine mammals. Since issuance of this Opinion, there has been no indication that these fisheries have changed in any significant manner (e.g., increases in gear quantity and soak/tow time, new areas fished) such that there are new interactions risks to listed marine mammal species that have not already been considered by NMFS to date. As a result, we do not expect interactions with listed marine mammal species to go above and beyond that which has already been considered by NMFS to date (NMFS 2013; Waring et al. 2014; Waring et al. 2015; Waring et al. 2016). Based on this, Option 1, and the resultant fishing behavior under this Alternative, is not, as concluded by NMFS, expected to result in interaction levels that are likely to jeopardize the continued existence of ESA listed species of marine mammals.

Based on the above information, and the fact that the groundfish fishery must comply with specific take reduction plans (i.e., HPTRP, the BDTRP, ALWTRP), Option 1 is expected to have low negative impacts on marine mammal species.

ESA Listed Species

Ascertaining the potential impacts of Option 1 on ESA-listed species (i.e., certain species of whales, sea turtles, and fish) are difficult and somewhat uncertain, as quantitative analysis has not been performed. However, we have considered, to the best of our ability, how the fishery has operated in regards to listed species since 2013, when NMFS issued a Biological Opinion (Opinion) on the operation of seven commercial fisheries, including the groundfish FMP, and its impact on ESA listed species (NMFS 2013). The 2013 Opinion concluded that the seven fisheries may adversely affect, but was not likely to jeopardize the continued existence of any ESA listed species. The Opinion included an incidental take statement authorizing the take of specific numbers of ESA listed species of sea turtles, Atlantic salmon, and Atlantic sturgeon. The groundfish FMP is currently covered by the incidental take statement authorized in NMFS 2013 Opinion.

While specifications have fluctuated since 2013, fishing behavior (gear quantity, soak/tow time, area fished over this time period has not changed significantly and has never resulted in the exceedance of NMFS authorized take of any ESA listed species (NMFS 2013). As specifications under Option 1 are no greater than those authorized since 2013, and the resultant fishing behavior (e.g., gear quantity, soak/tow time, location fished) under these conditions are not expected to change significantly from current operating conditions, Option 1 is not expected to introduce any new risks or additional takes to ESA listed

species that have not already been considered and authorized by NMFS to date. As a result, impacts of the Option 1 on ESA listed species are not expected to be different from those already considered by NMFS (NMFS 2013) and therefore, are not, as concluded by NMFS, expected to result in levels of take that are likely jeopardize the continued existence of ESA listed species. For these reasons, Option 1 would likely have low negative impacts on ESA listed species.

Overall Impacts to Protected Species
As provided above, effort is not expected to increase to levels above and beyond those that have been experienced in the groundfish BSAs to date. As a result, interaction risks to protected species in these BSAs are not expected to change significantly from what has been observed to date in these regions (Waring et al. 2014; Waring et al. 2015; Waring et al. 2016; NMFS 2013; http://www.nefsc.noaa.gov/fsb/take_reports/nefop.html; www.nefsc.noaa.gov/fsb/take_reports/asm.html; NMFS NEFSC FSB 2015, 2016). Specifically, as fishing behavior and effort are not expected to change significantly from status quo conditions, the presence, quantity, or degree of gillnet, bottom trawl or other gear types used in these areas are also not expected to change significantly. As interactions risks with protected species are strongly associated with amount, time, and location of gear in the water, continuation of "status quo" groundfish fishing behavior/effort is not expected to change any of these operating conditions and therefore, is not expected to introduce any new interaction risks to protected species that would result in elevated levels of interactions above and beyond that which has been observed and considered by NMFS to date (Waring *et al*. 2014; Waring *et al*. 2015; Waring et al. 2016; NMFS 2013; NMFS; http://www.nefsc.noaa.gov/fsb/take_reports/nefop.html; www.nefsc.noaa.gov/fsb/take_reports/asm.html).

Relative to Option 1, Option 2 is likely to have neutral impacts on protected species (MMPA and ESA listed species). Although Option 2 includes adjustments the witch flounder stock, as well as new U.S./Canada TACs, the total ACL for the majority of the stocks remains consistent with those provided in Option 1.[23] Annual catch limits can be considered a proxy for relative fishing effort. Information on fishing effort in turn informs potential interaction risks to protected species. Specifically, interaction risks to protected species are associated with the amount, time, and location that gear is set/towed in the water (i.e., components of fishing effort); however, this information is often unavailable. As a result, assessments of protected species interaction with an associated fishery are often dependent on looking at changes (if any) in ACL as a means to identify potential changes in fishing behavior/effort from one year to the next, and therefore, identification of new or additional interaction risks to a protected species. As the total ACLs between Option 1 and 2 are similar, resultant fishing behavior under Option 2 is not expected to change significantly from fishing behavior considered under Option 1. As a result, potential impacts to protected species under Option 2 are expected to be similar to those provided in Option 1.

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

Based on the most recent scientific data, Option 2 would adopt new specifications for witch flounder for FY 2017-FY2019 (see Table 9). This measure includes the identification of ACLs, ABCs, and OFLs as required by the M-S Act and as implemented by Amendment 16. It also specifies TACs for the U.S./Canada Management Area for FY2017.

Similar to Option 1, the proposed specifications under Option 2 are no greater than or are within the range of the specifications that have been authorized by the fishery over the last 5 or more years. As

[23] Based on Table 8, in FY2017, relative to the ACLs provided in FW55, the ACL will be lower for GB Cod; higher for GB Haddock; and lower for GB yellowtail flounder.

previously authorized specifications for the groundfish fishery over this time frame have not resulted in the exceedance of NMFS authorized take of any ESA listed species or resulted in levels of take of MMPA protected species that jeopardize the continued existence of marine mammal populations, we do not expect Option 2 to introduce any new risks or additional takes to protected species that have not already been considered and/or authorized by NMFS to date (NMFS 2013; Waring *et al.* 2014; Waring *et al.* 2015; Waring et al. 2016). For these, and the reasons provided in section 7.3.1.2.1 (Option 1), we expect impacts of Option 2 on protected species (ESA listed and MMPA protected species) to be similar to those described in Section 7.3.1.2.1 (i.e., low negative). Relative to Option 2, Option 1 would have neutral impacts on protected resources for the reasons provided in section 7.3.1.2.1.

7.3.1.2.2.1 Sub Option 1: Develop an Atlantic Sea Scallop Fishery Allocation for GOM/GB (Northern) Windowpane Flounder (*Preferred Alternative*)

Besides the groundfish fishery, the scallop fishery is the major contributor to northern windowpane flounder catches. The scallop fishery catches of northern windowpane flounder are not subject to limits, and the groundfish fishery is therefore accountable for any overages. When triggered, AMs restrict the ability of the groundfish fishery to target and catch marketable species, resulting in adverse economic impacts to the groundfish fleet fishing on Georges Bank when the gear-restricted areas are in place. As a result, the Council considered development of a GOM/GB (northern) windowpane flounder sub-ACL for the scallop fishery. Sub-Option 1A would set the scallop sub-ACL based on a fixed percentage based on the 90th percentile of scallop catch rates for northern windowpane flounder. Sub-Option 1B would set the scallop sub-ACL by selecting a percentage from a range of recent scallop catches. **The Council selected Sub-Option 1A at 21% as its preferred alternative.**

By creating a sub-ACL for the scallop fishery, the scallop fishery can be held accountable for its catch of windowpane flounder, while at the same time, allowing the groundfish fishery to continue to operate without constraints previously imposed on the fishery as a result of another fishery triggering the AM. This Sub-Option, regardless of whether Sub-option 1A or 1B is chosen; however, will not provide any incentive to increase effort or change groundfish fishing behavior in a manner that differs from how the fishery currently operates. Similarly, this sub-option is not expected to provide any incentive to the scallop fishery to target windowpane flounder; its purpose, as noted above, is for accountability. However, although effort in the scallop fishery is unlikely to be affected by this sub-option, depending on the AM triggered, areas fished could be affected, resulting in potential shifts in scallop fishing effort.

Based on the above, impacts to protected species are expected to be low negative. As provided in previous sections, interactions risks with protected species are strongly associated with amount, time, and location of gear in the water. Fishing behavior/effort (e.g., gear quantity, soak/tow time, area fished) in the groundfish fishery is not expected to change from current operating conditions as result of Sub-option 1A or 1B. Similarly, overall effort in the scallop fishery, relative to current operating conditions, is not expected to increase as result of Sub-option 1A or 1B. Further, even if any resultant shift in scallop fishing effort is caused as a result of either sub-option, any shift in effort will be to areas which have been considered by NMFS in its assessment of fishery effects to protected species (NMFS 2012; Waring et al. 2014; Waring et al. 2015; Waring et al. 2016; http://www.nefsc.noaa.gov/fsb/take_reports/nefop.html; NEFMC 2015; NEFMC 2016). With effort in either fishery not expected to increase or change significantly relative to current operating conditions, gear quantity, soak/tow time, and areas fished are also not expected to change. Based on this, new risks or additional takes to protected species that have not already been considered and/or authorized by NMFS to date are not expected (NMFS 2012; NMFS 2013; Waring et al. 2014; Waring et al. 2015; Waring et al. 2016). As a result, we expect impacts to protected species to similar to those provided in Option 1/No Action (i.e., low negative).

As provided above, Sub-option 1 consists of two sub-options. The impact analysis above is an overall impact assessment of Sub-option 1; however, the impact analysis is applicable to both Sub-option 1A or 1B (i.e., if taken separately for each sub-option, the analysis would be the same). As a result, either sub-option is likely to result in low negative impacts to protected species, and relative to one another, are likely to result in neutral impacts to protected species. Also, sub-option 1 (regardless of whether 1A or 1B is chosen) does not introduce any additional positive or negative impacts when considered with Sub-Option 1A or Sub-Option 1B. As a result, relative to No Action, Sub-option 1 would result in neutral impacts to protected species.

7.3.1.2.2.2 Sub Option 2: Increase the Midwater Trawl Atlantic Herring Fishery Sub-ACL for Georges Bank Haddock (*Preferred Alternative*)

Sub-Option 2 would address the current sub-ACL for GB haddock in the mid-water trawl; the GOM haddock sub-ACL in the mid-water trawl Atlantic herring fishery would remain the same at 1% of the ABC. Two sub-options have been proposed; one will increase the sub-ACL from 1% of the US ABC to 1.5%, or 2% of the US ABC (Sub-Option 2A), while the other will maintain the current sub-ACL for GB haddock in the mid-water trawl Atlantic herring at 1% of the US ABC (Sub-Option 2B). The intent of Sub-Option 2 is to incentivize the midwater trawl fleet to minimize the incidental catch of GB haddock while providing the opportunity for the fleet to fully harvest its herring sub-ACL for Herring Management Areas 1B and 3. Specifically, if catch caps for GB haddock are attained in the herring mid-water trawl fishery, resultant AMs are triggered, causing effort in the herring fishery to be constrained. Therefore, Sub-Option 2 aims to reduce the potential for negative impacts on the herring fishery (caused by reductions in fishing opportunities in Areas 1B and 3). **The Council selected Sub-Option 2B as its preferred alternative.**

Sub-Option 2, regardless of whether Sub-Option 2A or 2B is chosen, does not provide any incentive to increase effort or change groundfish fishing behavior in a manner that differs from how the fishery currently operates. With effort in the groundfish fishery not expected to increase or change relative to current operating condition, gear quantity, soak/tow time, and areas fished are also not expected to change to change relative to current operating conditions. As interactions risks with protected species are strongly associated with amount, time, and location of gear in the water, and fishing behavior/effort (e.g., gear quantity, soak/tow time, area fished) in the groundfish fishery is not expected to change from current operating conditions, new risks or additional takes to protected species that have not already been considered and/or authorized by NMFS to date are not expected (NMFS 2013; Waring et al. 2014; Waring et al. 2015; Waring et al. 2016). As a result, changes in impacts (i.e., low negative) to protected species from those provided in Option 1 are not expected (see Section 7.3.1.2.1 for further details to support this rationale).

Sub-Option 2, regardless of whether Sub-Option 2A or 2B is chosen, is also not expected to provide any incentive to increase effort in the herring fishery; however, depending on whether the AM is triggered, shifts in effort are possible. It is difficult to determine how this shift in effort could potentially affect protected species; however, as any shift in effort would be to areas which have been considered by NMFS in its assessment of fishery effects to protected species (NMFS 2012a, b; 2013; 2014a, b; Waring et al. 2014; Waring et al. 2015; Waring et al. 2016), and overall effort in the herring fishery, relative to current operating conditions, is not expected to be affected by this sub-option, new risks or additional interactions with protected species that have not already been considered and/or authorized by NMFS to date are not expected (NMFS 2012a, b; 2013; 2014a, b; Waring et al. 2014; Waring et al. 2015; Waring et al. 2016). In fact, similar to the rationale provided in Option 1/No Action for non-listed marine mammal species,

although the available information on non-ESA listed marine mammal interactions with commercial fishing gear is a collective representation, and does not address the effects of the Atlantic Herring FMP specifically, the information does demonstrate that, to date, operation of the Atlantic Herring FMP, or any other fishery, has not resulted in a collective level of take that threatens the continued existence of non-ESA listed marine mammal populations (Waring et al. 2014; Waring et al. 2015; Waring et al. 2016). Based on this information, and the fact that voluntary measures exist that reduce serious injury and mortality to marine mammal species incidentally caught in trawl fisheries (see the Atlantic Trawl Gear Take Reduction Team), it is expected that under Sub-Option 2, which will not significantly change current operating conditions in the herring fishery, there will be no new risks or additional takes to non-listed marine mammals that have not already been considered and/or authorized by NMFS to date. As a result, Sub-Option 2 is not expected to threaten the continued existence of non- ESA listed species of marine mammals. For these reasons, as well as those provided in previous assessment of the herring fishery's impact on protected species (NEFMC 2016; Waring et al. 2014; Waring et al. 2015; Waring et al. 2016), we expect impacts to non-listed marine mammals to be low negative to negligible; for additional details see (NEFMC 2016; Waring et al. 2014; Waring et al. 2015; Waring et al. 2016).

In regards to ESA listed species, Sub-Option 2, regardless of whether Sub-Option 2A or 2B is chosen, will result in neutral impacts to these species. ESA listed species interactions with the Atlantic herring fishery are rare to non-existent (NMFS 2012a, b; 2013; 2014a, b; Waring et al. 2014; Waring et al. 2015; Waring et al. 2016; NMFS NEFSC FSB 2015, 2016). As Sub-Option 2 will result minimal change to current operating conditions, changes in fishing effort or behavior above and beyond that which has been characteristic of the fishery is not expected. As interactions with ESA listed species have been rare to non-existent in this fishery, Sub-Option 2 is not expected to introduce any new risks (e.g., changes in gear quantity, increases in tow time) to ESA listed species that have not already been considered by NMFS and deemed "not likely to adversely affect" these species (NMFS 2012a, b; 2013; 2014a, b). In fact, NMFS recently concluded that the Atlantic Herring FMP will not adversely affect or jeopardize the continued existence of any ESA listed species (NMFS 2014a,b). Based on this, as well as previous assessments done for the herring fishery and its impacts on ESA listed species (NMFS 2012a, b; 2013; 2014a, b; NEFMC 2016; Waring et al. 2014; Waring et al. 2015; Waring et al. 2016) the effects of sub-option 2 on ESA listed species are expected to be neutral.

As provided above, Sub-Option 2 consists of two sub-options. The impact analysis above is an overall impact assessment of Sub-Option 2; however, the impact analysis is applicable to both Sub-Option 2A or 2B (i.e., if taken separately for each sub-option, the analysis would be the same). As a result, either sub-option is likely to result in low negative to neutral impacts to protected species, and relative to one another, are likely to result in neutral impacts to protected species. Also, Sub-Option 2 (regardless of whether 2A or 2B is chosen) does not introduce any additional positive or negative impacts when considered with Sub-Option 2A or Sub-Option 2B. As a result, relative to No Action, Sub-Option 2 would result in neutral impacts to protected species.

7.3.2 Commercial Fishery Measures

7.3.2.1 Atlantic Sea Scallop Fishery Measures

7.3.2.1.1 Scallop Fishery AM implementation policy

Option 2 would allow for an exception to the AM implementation policy for the GB yellowtail flounder stock (Sub-Option A) and/or the Northern windowpane stock (Sub-Option B) only so that the second criteria (2) the scallop fishery exceeds its sub-ACL for a stock by 50 or more percent would not apply. Therefore for GB yellowtail flounder and/or Northern windowpane flounder, the criteria to determine if

an AM would be implemented would be the first 1) the scallop fishery exceeds its sub-ACL for a stock and the overall ACL is also exceeded. This measure include a 2-year "sunset" provision. Therefore if the measure was implemented in FY 2017, the exception to AM policy would only be available for FY 2017 and FY 2018 and in FY 2019 and beyond the underlying policy would apply (i.e., as described under No Action). **The Council selected Option 2/Sub-Option A and B as preferred alternatives.**

No Action/Option 1 is in reference to existing AMs for the scallop fishery. The exception provided in Option 2/Sub-Option A or B and associated "sunset" provision are established to prevent overfishing. Option 2/Sub-Option A or B does not provide any incentive to increase effort or change groundfish fishing behavior in a manner that differs from how the fishery currently operates. Similarly, Option 2/Sub-Option A or B is not expected to provide any incentive to increase effort in the scallop fishery; however, depending on whether the AM is triggered for GB yellowtail flounder or northern windowpane flounder (with the AM for windowpane to be developed in a future Scallop action) or, shifts in effort are possible.

Based on the above, impacts to protected species are expected to be low negative. As provided in previous sections, interactions risks with protected species are strongly associated with amount, time, and location of gear in the water. Fishing behavior/effort (e.g., gear quantity, soak/tow time, area fished) in the groundfish fishery is not expected to change from current operating conditions as result of Option 2/Sub-Option A and/or B. Similarly, overall effort in the scallop fishery, relative to current operating conditions, is not expected to increase as result of Option 2/Sub-Option A and/or B. Further, even if any resultant shift in scallop fishing effort is caused, any shift in effort will be to areas which have been considered by NMFS in its assessment of fishery effects to protected species (http://www.nefsc.noaa.gov/fsb/take_reports/nefop.html; NMFS 2012; Waring et al. 2014; Waring et al. 2015; Waring et al. 2016; NEFMC 2011; NEFMC 2014; NEFMC 2015; NEFMC 2016;). With effort in either fishery not expected to increase or significantly change relative to current operating condition, gear quantity, soak/tow time, and areas fished are also not expected to change. Based on this, new risks or additional takes to protected species that have not already been considered and/or authorized by NMFS to date are not expected (NMFS 2013; NMFS 2012; Waring *et al.* 2014; Waring *et al*. 2015; Waring et al. 2016). As a result, we expect impacts to protected species to similar to those provided in Option 1/No Action.

As provided above, the impact analysis above is an overall impact assessment of Sub-Option 2; however, the impact analysis is applicable to both Sub-Options A and B (i.e., if taken separately for each sub-option, the analysis would be the same). As a result, either sub-option is likely to result in low negative impacts to protected species, and relative to one another, are likely to result in neutral impacts to protected species. Regardless of whether Sub-Option A or Sub-Option B is chosen, does not introduce any additional positive or negative impacts when considered with Sub-Option A or Sub-Option B. As a result, relative to No Action, Sub-Option 2 would result in neutral impacts to protected species.

7.4 Economic Impacts

Introduction

Consideration of the economic impacts of the changes made in this framework is required pursuant to the National Environmental Policy Act (NEPA) of 1969 and the Magnuson-Stevens Fishery Conservation and Management Act (MSA) of 1976. NEPA requires that before any federal agency may take "actions significantly affecting the quality of the human environment," that agency must prepare an Environmental Assessment (EA) or Environmental Impact Statement (EIS) that includes the integrated use of the social sciences (NEPA Section 102(2) (C)). The MSA stipulates that the social and economic impacts to all fishery stakeholders should be analyzed for each proposed fishery management measure to provide advice to the Council when making regulatory decisions (Magnuson-Stevens Section 1010627, 109-47).

The National Marine Fisheries Service (NMFS) provides guidelines to use when performing economic reviews of regulatory actions. The key dimensions for this analysis are expected changes in net benefits to fishery stakeholders, the distribution of benefits and costs within the industry, and changes in income and employment (NMFS 2007). Where possible, cumulative effects of regulations are identified and discussed. Non-economic social concerns are discussed in Section 7.5. The economic impacts presented here consist of both qualitative and quantitative analyses dependent on available data, resources, and the measurability of predicted outcomes. It is assumed throughout this analysis that changes in revenues would have downstream impacts on income levels and employment; however, these are only mentioned if directly quantifiable.

7.4.1 Updates to Status Determination Criteria and Annual Catch Limits

7.4.1.1 Revised Status Determination Criteria

7.4.1.1.1 Option 1: No Action

Under Option 1, there would be no revision to the Status Determination Criteria (SDC) of witch flounder (Table 2 in Alternatives under Consideration) and the numerical estimates based off the SDC would not change (Table 3 in Alternatives under Consideration).

Under Option 1, there would not be any immediate economic impacts to the groundfish fishery, as the current methodology used for setting ABCs would not be altered. The long term consequences of Option 1 would be that biomass targets would be based on outdated information, and this would not constitute the use of best scientific information as stipulated by the MSA (101-627, 104-297).

7.4.1.1.2 Option 2: Revised Status Determination Criteria for Witch Flounder (*Preferred Alternative*)

No Action would retain the numerical estimates of the existing SDCs. Option 2 would update the SDCs to unknown. The economic impacts of these measures translate directly into commercial sub-ACLs through the annual specifications process, and are analyzed in combination with the Annual Catch Limits measures in the next section. Option 2 would be based on the best available science, consistent with the M-S Act.

7.4.1.2 Annual Catch Limits

Methods

The Quota Change Model (QCM) is used to analyze the impacts of each combination of measures on the sector portion of the groundfish fishery, which comprises over 98% of commercial groundfish landings and revenues. The QCM is a Monte Carlo simulation model that selects from existing records the trips most likely to take place under new regulatory conditions. To do this, a large pool of actual trips is created from a reference data set. The composition of this pool is conditioned on each trip's utilization of allocated ACE, under the assumption that the most likely trips to take place in the FY being analyzed are those fishing efficiently under the new regulatory requirements. The more efficiently a trip uses its ACE, the more likely that trip is to be drawn into the sample pool. ACE efficiency is determined by the ratio of ACE expended to net revenues on a trip, iterated over each of the 17 allocated stocks. Net revenues are calculated as gross revenues minus trip costs minus quota opportunity costs, where trip costs are based on observer data and quota opportunity costs are estimated from an inter-sector lease value model, based here on FY 2014 (details on the methods can be found in Murphy et al. 2015).

After the sample pool has been constructed, trips are pulled from the pool at random, summing the ACE expended for the 17 allocated stocks as each trip is drawn. When one stock's ACE reaches the sector sub-ACL limit, no further trips from that broad stock area are selected. The model continues selecting trips until sector sub-ACLs are achieved in all three broad stock areas or, alternatively, if sub-ACLs are reached for one of the unit stocks, the trip selection process ends for all broad stock areas at once. This selection process forms a "synthetic fishing year" and a number of years are drawn to form a model. Median values and confidence intervals for all draws in a model are reported.

By running simulations based on actual fishing trips, the model implicitly assumes that:

- stock conditions, fishing practices and harvest technologies existing during the data period are representative;
- trips are repeatable;
- demand for groundfish is constant, noting that fish prices do vary between the reference population and the sample population, but this variability is consistent with the underlying price/quantity relationship observed during the reference period;
- quota opportunity costs and operating costs are both constant; and,
- ACE flows seamlessly from lesser to lessee such that fishery-wide caps can be met without leaving ACE for constraining stocks stranded.

Furthermore, because the fishery is modeled as a whole, allocations to individual sectors are not considered.

These assumptions will surely not hold—fishermen will continue to develop their technology and fishing practices to increase their efficiency, market conditions will induce additional behavioral changes, and fishery stock conditions are highly dynamic. Fuel prices and other operating costs may change due to larger economic shifts or shore-side industry consolidation.

The net effect of the constraints placed by these assumptions is unclear. The selection algorithm draws only efficient trips—fishermen making relatively inefficient trips will bias the model results high. Fishermen, however, are generally good at their job, and through a combination of technological improvement (gear rigging, equipment upgrades, etc.) or behavioral modifications, are likely to improve on their ability to avoid constraining stocks. If fishermen are able to make these adjustments, the model results will be biased low. As for FW 55, due to the number of potentially constraining groundfish stocks

in FY 2017, and the geographic range of these stocks, avoidance behavior may be more difficult and/or costly.

Additionally, the model will, in general, under-predict true landings and/or revenues if stock conditions for non-constraining stocks improve, if demand for groundfish rises, or if fishing practices change and fishermen become still more efficient at maximizing the value of their ACE. Conversely, the model will over-predict true landings and/or revenues if stock conditions of non-constraining stocks decline, markets deteriorate or fishing costs increase. Importantly, the model will over-predict landings if stock conditions for constraining stocks improve substantially and/or fishermen are unable to avoid the stock—in this circumstance, better than expected stock conditions will lead to worse than anticipated fishery performance. The opposite is also true—if a stock predicted to be constraining to the fishery becomes easier to avoid due to technological or behavioral improvements in targeting, or due to declining stock conditions, the model will under-predict revenues.

The model is intended to capture fishery wide behavioral changes with respect to groundfish sub-ACL changes, and groundfish catch is maximized by the constrained optimization algorithm. Catch of non-groundfish stocks on groundfish trips are captured in the model, but not explicitly modeled, such that constraints on other fisheries are not incorporated.

Each year the QCM is updated to reflect regulations and on-the-water conditions. In FW's 47, 51 and 53 the QCM drew from the most recent fishing year for which a full year of data was available, which would be FY 15 in this case. To better capture current stock conditions, operating costs and fishing practices, trips from FY16 (through November) are added to supplement the FY15 trip data. This approach was taken in FW 55 as well. Trips taken during FY15 and FY16 to areas that will be closed in FY17 are removed from the selection pool, including removal of eastern US/CA trips from the No Action alternative models. Industry-funded at-sea monitoring (ASM) is explicitly modeled within the QCM at a rate of 10% of trips observed. ASM affects the types of trips likely to be taken by, primarily, negatively impacting trip-level net revenues. A sub-set of trips that are profitable under previous conditions will not be profitable with the addition of ASM costs. This has second-order effects on the distribution of catch across stocks, as well as port and size class level impacts.

Groundfish vessels on groundfish trips form the unit of measurement for this analysis and gross revenues from groundfish trips and from groundfish species alone are reported metrics. Many groundfish fishermen are involved in other fisheries and groundfish trip revenues may represent anywhere from 100% to a small fraction of the total revenues of individual fishing business impacted by these regulations.

The QCM is a prediction model and it is import to understand its ability to predict groundfish fishing in the past. The model was developed during FY 2011 to make predictions for FW47 (FY 2012) and has been used in analyzing the impacts of all subsequent groundfish management actions that included ACL changes for the groundfish fishery. Table 70 summarizes its performance over the past few years.

Predictions for total revenue and groundfish revenue were within +- 7% of realized values for FYs 2012-2015. The most accurate prediction for groundfish revenue came in FY 2013 when revenues were under-predicted by $1.6 million (2.7% of realized value). The most accurate prediction for total revenue came in FY 2012 when revenues were under-predicted by $0.8 million (0.9% of realized value). FY 2011 was predicted retroactively for calibration purposes. The 2011 over-prediction in groundfish revenue by 22% was caused primarily due to GB haddock rates being higher in the reference year (FY 2010) than the prediction year (FY 2011). If GB haddock revenues are backed out then gross revenues for groundfish are over-predicted by about 5%.

Cost predictions have been less accurate in general. For FYs 2011-2013, QCM demonstrated a low bias in predicting operations cost (those costs associated with making a fishing trip) such as fuel, ice, and food. This is a function of optimization. The model predicts total catches and revenues somewhat accurately, but in the past has arrived at these totals from a substantially lower number of trips taken to obtain these catches (Table 70).

Table 70 - QCM predictions, FY2011-2015, 2016 dollars (millions).

	FY2011[1]*		FY2012[2]		FY2013[3]**		FY2014[4]***		FY2015[5]	
	Predicted	Realized	Predicted	Realized	Predicted	Realized	Predicted	Realized	Predicted	Realized
Gross Revenue	140.3	129.8	98.5	99.4	76.9	82.4	71.5	88.6	74.3	79.3
Groundfish Gross Revenue	115.2	94.1	80.8	70.5	57.5	58.9	56.0	59.9	57.0	54.8
Cost of Operations[A]	30.8	34.1	39.2	31.5	15.1	26.3	21.8	22.6	22.9	15.8
Sector Cost	3.3	2.7	2.0	2.1	1.8	1.8	1.6	2.0	1.6	1.9
Quota Cost	29.3	27.7	21.4	17.7	12.5	7.9	12.1	8.3	6.2	7.9
Operating Profit[B]	82.1	65.3	59.3	48.2	47.7	46.5	37.1	55.6	39.7	53.8

[1] Calibration, reference pool=FY10
[2] FW47, reference pool=FY10-11 (last six months FY10, first six months FY11)
[3] FW48, reference pool=FY11
[4] FW51, reference pool=FY12-13 (interim action measures prediction component utilized partial FY13)
[5] FW53, reference pool=FY13

* FY 2011 revenues from GB haddock were predicted at $25.2 million. Realized revenues from GB haddock were $11.7 million.
** FY13 predictions based on white hake ACL mid-season adjustment
*** FY14 predictions based on a combination of FW51 and interim action measures

[A] Cost of Operations includes fuel, food, ice and gear
[B] Operating Profit is Gross Revenue less Cost of Operations, Sector Cost and Quota Cost

7.4.1.2.1 Option 1: No Action

There would be no changes to the specifications for FY 2017 – FY 2018 and default specifications that were adopted with the FW55 final rule and default specifications that would be set for EGB cod for FY 2017. The default specifications would be in effect from May 1, 2017, to July 31, 2017, and are set equal to 35% of the FY 2016 catch limit for EGB cod. The directed groundfish fishery would be expected to operate in all BSAs, with the exception of the EBG management area which would close on August 1, 2017, when the default specifications would expire for EGB cod. There would be no FY 2017 quotas specified for the transboundary Georges Bank stock of GB cod and no revised FY 2017 quotas for GB haddock and GB yellowtail flounder, which are managed through the US/CA Resource Sharing Understanding. These quotas are specified annually.

Economic impacts on the sector component of the commercial groundfish fishery

Option 1 would have negative impacts to the commercial groundfish fishery relative to FY2016 and Option 2. Groundfish vessels would only have three months (May, June, and July) to operate in the eastern US/CA area in FY2017 before the default ACLs expire. Based on the QCM results under No Action ACLs for FY17, predicted revenue from groundfish trips is $65 million. Groundfish revenue from groundfish trips is predicted to be $47 million. The QCM prediction for No Action ACLs assumes industry-funded ASM in FY17. Operating costs would be lower under this option than under the Proposed Action, as well as relative to FY15 realized estimates and FY16 predictions, but this is due to fewer trips being taken and is in proportion with the reduced revenues and profits under this option (Table 71, Figure 19, Table 72 to Table 74).

Table 71 - Summary of realized 2015 and predicted 2016 and 2017 revenues and costs for the commercial sector groundfish fishery, nominal dollars (millions).

Option	Fishing Year	Gross Revenues	Gross Revenues from Groundfish	Cost of Operations	Sector Cost	Quota Cost	ASM Cost	Operating Profit	Crew Days	Days Absent
FY15-Realized	2015	79.3	54.8	15.8	1.9	7.9	0.0	53.8	15,106	54,156
FW55-Prediction	2016	71.1	53.9	17.1	1.9	5.8	0.0	51.3	13,208	48,706
FW56-No Action	2017	64.9	47.0	12.7	1.6	6.1	0.8	46.3	12,668	45,510
FW56-Proposed Action	2017	76.4	53.4	14.1	1.8	8.8	0.8	54.0	14,506	52,065

*Data in millions of dollars, 2016

Figure 19- Distribution of predictions relative to FY15 realized values, gross revenues (left) and operating profits (right).

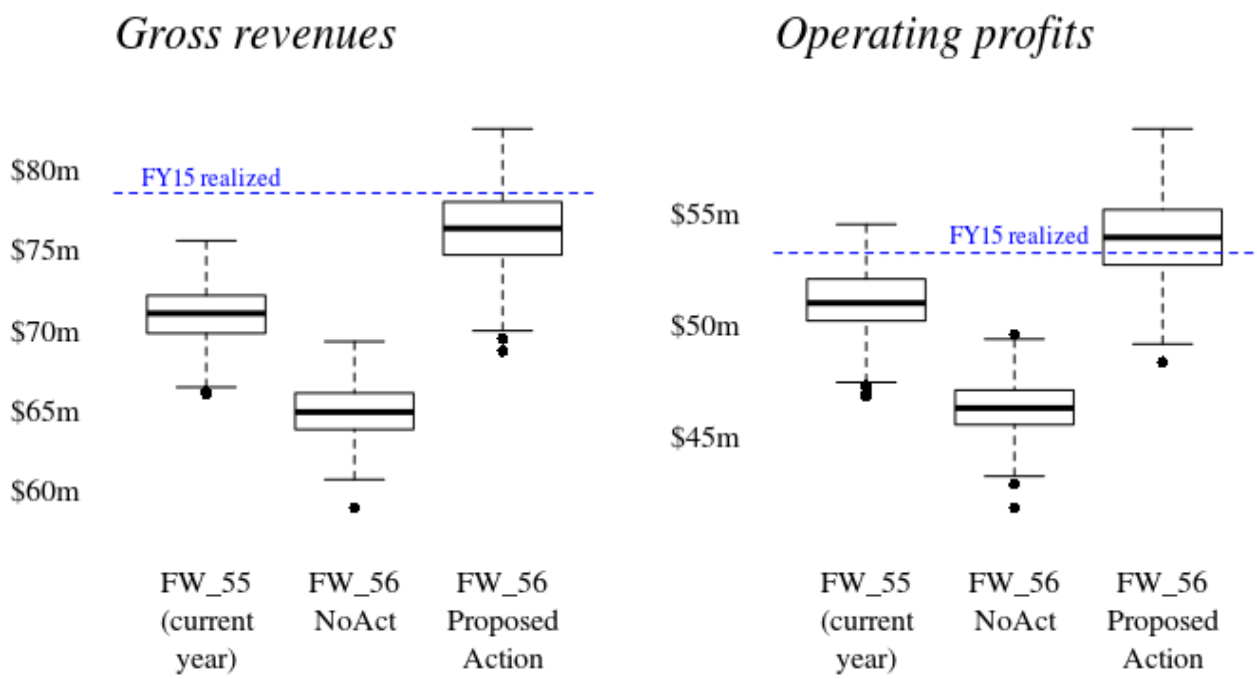


Table 72- No Action option stock-level groundfish species catch and revenue predictions with 5% and 95% confidence intervals, nominal dollars (millions).

Stock	Sub-ACL (mt)	Predicted Catch (mt)	Predicted Utilization	Predicted Revenue	p5(Revenue)	p95(Revenue)
Plaice	1,198	1,116	93%	4.7	4.4	5.0
GB Cod East	47	37	78%	0.1	0.1	0.2
GB Cod West	931	925	99%	3.6	3.5	3.7
GOM Cod	271	197	73%	0.9	0.8	1.0
GB Haddock East	20,365	934	5%	1.8	1.5	2.2
GB Haddock West	23,941	3,593	15%	7.4	6.6	8.2
GOM Haddock	2,985	853	29%	2.3	2.0	2.6
Pollock	17,704	3,000	17%	7.0	6.4	7.6
Redfish	10,127	4,145	41%	5.2	4.5	5.9
White Hake	3,314	1,721	52%	5.3	4.8	5.8
GB Winter Flounder	585	510	87%	2.6	2.1	2.9
GOM Winter Flounder	607	105	17%	0.5	0.4	0.5
SNE Winter Flounder	523	421	81%	1.9	1.6	2.3
Witch Flounder	362	356	98%	1.8	1.7	1.9
CC/GOM Yellowtail Flounder	326	296	91%	1.0	0.8	1.0
GB Yellowtail Flounder	274	30	11%	0.1	0.1	0.2
SNE/MA Yellowtail Flounder	155	146	94%	0.4	0.4	0.5

Table 73 - No Action option groundfish species revenue predictions by port, with 5% and 95% confidence intervals and average fish prices on groundfish trips, nominal dollars (millions).

Port	Gross Revenue	p5(Revenue)	p95(Revenue)	Average Price
CT Ports	0.0	0.0	0.0	0.9
Other MA Ports	2.1	1.6	2.6	1.3
Boston, MA	13.6	12.5	14.7	1.2
Chatham, MA	0.3	0.3	0.4	1.5
Gloucester, MA	9.8	8.8	10.7	1.0
New Bedford, MA	9.4	8.5	10.3	1.2
Other ME Ports	1.2	1.0	1.4	1.5
Portland, ME	7.2	6.1	8.3	1.0
NH Ports	1.8	1.4	2.1	1.4
NJ Ports	0.2	0.2	0.2	1.2
NY Ports	0.4	0.3	0.5	1.3
Other RI Ports	0.1	0.1	0.1	1.0
Point Judith, RI	1.1	0.9	1.3	1.2
Other Northeast Ports	0.0	0.0	0.0	1.2

Table 74 - No Action option groundfish species revenue predictions by size class, with 5% and 95% confidence intervals, nominal dollars (millions).

Size Class	Gross Revenue	p5(Revenue)	p95(Revenue)
<30'	0.0	0.0	0.0
30'to<50'	5.6	5.1	6.2
50'to<75'	16.9	15.6	18.1
75'+	24.4	22.8	26.0

Economic impacts on the common pool component of the commercial groundfish fishery

The QCM incorporates only sector vessels as they make up the vast majority of groundfish landings and revenue. Revenues have been steadily declining, both from groundfish and on groundfish trips, for common pool vessels since the inception of the common pool (Table 75). This trend seems likely to moderate slightly, but continue under the No Action option.

Table 75 - Common Pool catch, gross revenues and average fish prices, 2016 dollars (millions).

FY	Total Catch (mt)	Groundfish Catch (mt)	Total Gross Revenues	Groundfish Gross Revenues	Average Price, All Species	Average Price, Groundfish
2010	3,742	667	7.1	2.2	$0.86	$1.51
2011	3,702	257	7.0	0.9	$0.86	$1.51
2012	2,845	172	5.0	0.6	$0.80	$1.64
2013	2,665	283	4.4	1.0	$0.76	$1.66
2014	2,127	234	3.5	0.9	$0.75	$1.71
2015	2,617	316	2.7	1.3	$0.46	$1.84

Economic impacts on the recreational groundfish fishery

Option 1 would have potentially positive impacts for the recreational fishery relative to FY 2016. The recreational sub-ACL for GOM cod would remain unchanged at 157mt in FY 2017 and the sub-ACL for GOM haddock will increase 25% from 928mt to 1,160mt. The higher sub-ACL however does not necessarily mean that regulations will be less restrictive than in FY 2016. Recreational rules for FY 2017 will be implemented outside of this FW and will be set in a manner to contain catch at the sub-ACLs.

Option 1 would have neutral impacts for the recreational fishery relative to Option 2. Both alternatives would result in a GOM cod recreational sub-ACL of 157mt and a GOM haddock sub-ACL of 1,160mt during FY 2017.

Economic impacts on other fisheries

Sea scallop fishery

Under Option 1, the following sub-ACLs would be allocated to the scallop fishery during the 2017 FY: 55mt of GB yellowtail flounder, 34mt of SNE/MA yellowtail flounder, and 209mt of SNE/MA windowpane flounder. Under Option 1, the FY 2017 sub-ACL adjustment for GB yellowtail would be +13mt (31%) and the adjustment for SNE/MA yellowtail would be +2mt (6%) from FY 2016 levels. Accordingly, Option 1 would have positive impacts to the scallop fishery relative to FY 2016. The sub-ACL for SNE/MA windowpane flounder would be unchanged from FY 2016.

Under Option 1, the sea scallop fishery sub-ACL for SNE/MA yellowtail flounder of 34mt in FY2017 could be limiting if incidental catch rates remain similar to recent fishing years. Actual catches were 49mt in FY 2013, 65mt in FY 2014, and 35mt in FY2015. The sub-ACL for SNE/MA windowpane flounder of 209mt in FY2017 could also be limiting if incidental catch rates remain similar to recent fishing years. Actual catches were 129mt in FY 2013, 140mt in FY 2014, and 211mt in FY2015. The extent of revenue reduction from the presence of AMs is uncertain at this time.

Small mesh fishery

Option 1 would have positive impacts to the small mesh fishery relative to FY 2016. The sub-ACL for GB yellowtail flounder in the small mesh fishery would increase from 5mt to 7mt for FY 2017.

Option 1 would also have positive impacts to the small mesh fishery relative to Option 2. Option 2 would decrease the sub-ACL for GB yellowtail flounder to 4mt in FY 2017. While this sub-ACL is not monitored in-season, AMs can be triggered at the end of the FY from an overage.

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

Under Option 2, the annual specification for FY 2017 – FY 2018 for GB yellowtail flounder, FY 2017 GB cod and GB haddock, and FY 2017- FY 2019 for witch flounder would be specified. Option 2 includes no changes to the state waters and other sub-component values from those specified in FW 55 under the No Action with the exception of witch flounder and northern windowpane flounder and adjustments for updated expected Canadian catches of GB winter flounder and white hake, and a correction to the value of the other sub-component for ocean pout (see Appendix III for additional information).

Impacts on the sector component of the commercial groundfish fishery

Option 2 is predicted to generate $76 million in gross revenues, higher than the No Action option of $65 million and the FW55 prediction for the current FY ($71 million) but modestly lower than the $79 million generated in FY15. Fishery-wide operating profits are predicted to be $54 million, essentially the same as FY15 realized profit estimates and moderately higher than the current year prediction of $51 million. This increase in predicted profits is due almost exclusively to the incorporation of low fuel prices from the FY14 and 15 sample data. If fuel prices remain low for the foreseeable future, the fishery will enjoy slightly higher profits as a percent of revenues than realized from 2010-2014. However, cost of quota is predicted to increase substantially to nearly $9 million, from $6 million predicted for the current FY (and

$8 million estimated to have been realized for FY15). In addition, ASM costs are expected to be borne by the fishery in FY17, adding nearly $1 million to the cost of fishing in the groundfish fishery (Table 71).

GOM and GB cod are predicted to be the most constraining stocks for FY17 at essentially 100%, followed by American plaice and SNE/MA yellowtail flounder, both predicted at over 75%. Model predictions also had CC/GOM yellowtail flounder and SNE winter flounder as constraining in more than 25% of the simulations, though averaged across all runs these two stock are predicted at just over 70% utilization. The fact that six stocks were predicted to be constraining in more than 25% of the model runs indicates that predicting the actual constraining stocks, beyond the two cod stocks, will be very difficult. (Table 76).

Boston, MA is predicted to be the top groundfish port in the fishery with gross revenues in excess of $14 million. New Bedford, MA is predicted to see revenues of $7.6 million, a remarkable decline from groundfish revenues in excess of $18 million in FY 2013 (Murphy et al. 2015). Gloucester, MA is predicted to see gross revenues of almost $13 million, down from $14.5 million in FY 2013. Portland, ME is predicted to see groundfish revenues of over $10 million, one of the few ports expected to see revenue increases from groundfish species. Pt Judith, RI and other southern New England ports are predicted to see continued depressed landings and revenues, driven primarily by low quotas on SNE flatfish stocks. New Hampshire ports are predicted to arrest slightly their substantial declines over the past few years, with predicted groundfish revenues of $2.5 million. (Table 77).

The largest size classes will continue to see the largest share of revenues from groundfish, with $28 million in predicted revenues (over 53% of the $53 million predicted for groundfish revenues overall). The 50-74 ft size class is predicted to generate nearly $17 million in revenues from groundfish species (31% of total). 30-49 foot vessels are predicted to generate $8.6 million, or a bit over 15% of total. (Table 78).

Table 76 - Option 2 groundfish stock-level groundfish species catch and revenue predictions with 5% and 95% confidence intervals, nominal dollars (millions).

Stock	Sub-ACL (mt)	Predicted Catch (mt)	Predicted Utilization	Predicted Revenue	p5(Revenue)	p95(Revenue)
Plaice	1,198	952	79%	4.5	4.2	4.8
GB Cod East	143	52	36%	0.2	0.1	0.3
GB Cod West	378	377	100%	1.5	1.5	1.6
GOM Cod	271	268	99%	1.2	1.2	1.3
GB Haddock East	29,306	1,016	3%	2.0	1.6	2.4
GB Haddock West	22,968	4,787	21%	9.9	8.6	11.2
GOM Haddock	2,985	1,383	46%	3.7	3.4	4.1
Pollock	17,704	3,564	20%	8.9	8.3	9.5
Redfish	10,127	4,199	41%	5.3	4.6	6.0
White Hake	3,333	2,071	62%	6.6	6.1	7.0
GB Winter Flounder	615	409	66%	2.8	2.4	3.3
GOM Winter Flounder	607	148	24%	0.8	0.7	0.9
SNE Winter Flounder	523	386	74%	1.7	1.4	2.1
Witch Flounder	718	449	63%	2.6	2.4	2.7
CC/GOM Yellowtail Flounder	326	237	73%	0.8	0.7	0.9
GB Yellowtail Flounder	160	18	11%	0.1	0.1	0.1
SNE/MA Yellowtail Flounder	155	120	77%	0.3	0.3	0.4

Table 77 - Option 2 groundfish species revenue predictions by port, with 5% and 95% confidence intervals and average fish prices on groundfish trips, nominal dollars (millions).

Port	Gross Revenue	p5(Revenue)	p95(Revenue)	Average Price
CT Ports	0.0	0.0	0.0	1.0
Other MA Ports	2.5	2.1	2.9	1.5
Boston, MA	14.5	13.0	16.1	1.2
Chatham, MA	0.2	0.2	0.3	1.5
Gloucester, MA	12.8	11.6	13.9	1.1
New Bedford, MA	7.6	6.7	8.4	1.3
Other ME Ports	1.4	1.2	1.6	1.5
Portland, ME	10.4	9.1	11.7	1.1
NH Ports	2.5	2.2	2.8	1.5
NJ Ports	0.2	0.2	0.2	1.2
NY Ports	0.4	0.3	0.5	1.1
Other RI Ports	0.1	0.0	0.1	1.0
Point Judith, RI	1.0	0.8	1.2	1.1
Other Northeast Ports	0.0	0.0	0.0	1.2

Table 78 - Option 2 groundfish species revenue predictions by size class, with 5% and 95% confidence intervals, nominal dollars (millions).

Size Class	Gross Revenue	p5(Revenue)	p95(Revenue)
<30'	0.1	0.1	0.2
30'to<50'	8.4	7.8	8.9
50'to<75'	16.6	15.3	18.0
75'+	28.3	26.2	30.7

Impacts on the common pool component of the commercial groundfish fishery

As previously noted, revenues have been steadily declining, both from groundfish and on groundfish trips, for common pool vessels since the inception of the common pool (Table 75). This trend seems likely to moderate slightly, but continue under the Option 2 (Table 79).

Table 79 - Commercial groundfish sub-ACLs for FY 2016 and FY 2017 under Option 2.

Stock	FY 2016 commercial groundfish sub-ACL (mt)	FY 2017 proposed commercial groundfish sub-ACL (mt)	% Change
GB Cod	608	531	-12.7%
GB Haddock (MWT 1.5%)	51,667	52,620	+1.8%
GB Yellowtail Flounder	211	165	-21.8%
Witch Flounder	370	734	+98.4%
GB/GOM Windowpane Flounder	58	129	+122.4%

Economic impacts on the recreational groundfish fishery

Option 2 would have potentially positive impacts to the recreational fishery relative to FY 2016. The recreational sub-ACL for GOM cod would remain unchanged at 157mt in FY 2017 and the sub-ACL for GOM haddock would increase 25% from 928mt to 1,160mt. The higher sub-ACL however does not necessarily mean that regulations will be less restrictive than in FY 2016. Recreational rules for FY 2017 will be implemented outside of this FW and will be set in a manner to contain catch at the sub-ACLs.

Option 2 would have neutral impacts to the recreational fishery relative to Option 1. Both alternatives would result in a GOM cod recreational sub-ACL of 157mt and a GOM haddock sub-ACL of 1,160mt during FY 2017.

Economic impacts on other fisheries

Sea scallop fishery

Under Option 2, the following sub-ACLs would be allocated to the scallop fishery during the 2017 FY: 32mt of GB yellowtail flounder, 34mt of SNE/MA yellowtail flounder, and 209mt of SNE/MA windowpane flounder. Under Option 2, the FY 2017 sub-ACL adjustment for GB yellowtail would be a decrease of 10mt (24%) relative to FY 2016, while the adjustment for SNE/MA yellowtail would be +2mt (6%) from FY 2016 levels. The sub-ACL for SNE/MA windowpane flounder would be unchanged from FY 2016. Option 2 would have uncertain impacts relative to FY 2016 as one of the sub-ACLs would increase (SNE/MA yellowtail) for FY 2017 and one would decrease (GB yellowtail).

Option 2 would also result in negative impacts relative to Option 1. Under Option 1, the FY 2017 sub-ACL for GB yellowtail would be 55mt, a 13mt (31%) increase from FY 2016. Actual catches of GB yellowtail by the scallop fishery were 37mt in FY 2013, 59mt in FY2014, and 30mt in FY 2015. AMs were not triggered in any of these years. Recent utilization rates of GB yellowtail flounder in the groundfish fishery (18.9% in FY 2015, 24.5% in FY 2014, and 36.1% in FY 2013) suggests that the total ACL may not be exceeded in FY 2017, even if the sub-ACL in the scallop fishery is. This would mean that the likely threshold of GB yellowtail catch to trigger scallop fishery AMs would be 48mt (150% of 32mt) under Option 2.

Under Option 2, the sea scallop fishery sub-ACL for SNE/MA yellowtail flounder of 34mt in FY2017 could be limiting if incidental catch rates remain similar to recent fishing years. Actual catches were 49mt in FY 2013, 65mt in FY 2014, and 35mt in FY2015. The sub-ACL for SNE/MA windowpane flounder of 209mt in FY2017 could be limiting if incidental catch rates remain similar to recent fishing years. Actual catches were 129mt in FY 2013, 140mt in FY 2014, and 211mt in FY2015. The extent of revenue reduction from the presence of AMs is uncertain at this time.

Small mesh fishery

Option 2 would have negative impacts on the small mesh fishery relative to Option 1 and FY 2016. The sub-ACL for GB yellowtail flounder in the small mesh fishery would be decreased from 5mt in FY 2016 to 4mt in FY 2017 under Option 2. Option 1 would increase the sub-ACL to 7mt in FY 2017. While this sub-ACL is not monitored in-season, AMs can be triggered at the end of the FY from an overage.

7.4.1.2.2.1 Sub Option 1: Develop an Atlantic Sea Scallop Fishery Allocation for GOM/GB (Northern) Windowpane Flounder (*Preferred Alternative*)

No Action
There would be no allocation of GOM/GB windowpane flounder and no possibility of AMs being placed on the scallop fishery due to catch of GOM/GB windowpane.

Scallop Fishery
No Action would not create any new sub-ACLs for GOM/GB windowpane flounder. Since this option maintains the status quo, it would not have any new economic impact for either the groundfish or scallop fisheries. When compared to Sub-Option 1A or 1B, this option is more likely to result in measures that will have adverse economic effects on the groundfish fishery through the implementation of AMs if the GOM/GB windowpane flounder ACL is exceeded.

Groundfish Fishery
No Action may increase the probability of triggering the AM in the groundfish fishery, incurring the costs discussed in FW52. During FYs 2010-2012, $10.6 million dollars in average annual revenue was estimated from trips to the large AM area for Northern Windowpane. For the small AM area, estimates were $4.3 million dollars annually. The groundfish fishery would continue to be subject to an AM for any overage of the GOM/GB windowpane flounder ACL, regardless of which fishery caused the overage. When compared to Sub-Option 1A or 1B, this option is more likely to result in measures that will have adverse economic effects on the groundfish fishery through the implementation of AMs if the GOM/GB windowpane flounder ACL is exceeded.

Sub-Option 1A – Fixed percentage based on the 90th percentile of scallop catch rates for northern windowpane flounder (*Preferred Alternative – 21%)*

Sub Option 1A would result in positive impacts to the groundfish fishery. The establishment of AMs will incentivize the scallop fishery to reduce incidental catch of GOM/GB windowpane flounder. Such a reduction would leave a greater portion of the total GOM/GB windowpane ACL for the groundfish fishery. While windowpane flounder currently has no retail value to the groundfish fishery, avoiding the triggering of windowpane AMs would increase operational flexibility. Northern Windowpane AMs have been triggered multiple times in the groundfish fishery, as overages occurred in FYs 2011- 2014. The impacts of these AMs on the groundfish fishery were previously analyzed in FW52. During FYs 2010-2012, $10.6 million dollars in average annual revenue was estimated from trips to the large AM area for Northern Windowpane. For the small AM area, estimates were $4.3 million dollars annually.

Sub Option 1A would result in negative impacts to the scallop fishery relative to No Action. The potential impacts of AMs on the scallop fishery cannot be quantified at this time since AM provisions would be developed in a future action. Furthermore, incidental catch of Northern windowpane is highly variable and will be largely driven by what access areas are open in a given fishing year and what open areas are most profitable to fish in. High levels of effort on Georges Bank in one year would increase the likelihood of windowpane AMs being triggered and, depending on the AM provisions, fishing availability on Georges Bank may be impacted for the following year.

Since the details behind potential AMs for the scallop fishery are not available at this time, the economic impacts of Sub-Option 1A across all fisheries is uncertain. From an equity standpoint, Sub-Option 1A would be a positive action as the groundfish fishery would no longer be the sole cost bearer for high catches of windowpane in the scallop fishery.

Sub-Option 1B – Select a percentage from a range of recent scallop catches

Sub Option 1B would result in positive impacts to the groundfish fishery relative to No Action for the reasons listed under Sub Option 1A. Because Sub-Option 1B encompasses such a wide range of options, impacts to the groundfish fishery may be positive or negative relative to Sub-Option 1A. The lower the northern windowpane flounder allocation is for the scallop fishery, the more the groundfish fishery would be expected to benefit.

Sub Option 1B would result in negative impacts to the scallop fishery relative to No Action. As with the groundfish fishery, the impacts of Sub Option 1B to the scallop fishery may be positive or negative relative to Sub-Option 1A depending on the selected allocation. The potential impacts of AMs on the scallop fishery cannot be quantified at this time since the AM provisions would be developed in a future action.

7.4.1.2.2.2 Sub Option 2: Increase the Midwater Trawl Atlantic Herring Fishery Sub-ACL for Georges Bank Haddock (*Preferred Alternative*)

No Action

Atlantic herring fishery
Option 1 would have negative impacts to the Atlantic herring fishery relative to FY 2016. The sub-ACL for GB haddock in the Atlantic herring fishery would be decreased to 450mt, a 14% decline from the FY 2016 sub-ACL of 521mt. Based on current levels of incidental GB haddock catch, AMs are unlikely to be triggered in the herring fishery in FY 2016. During FY 2015, the sub-ACL for GB haddock was reached. The impact of the resulting AMs was previously analyzed in FW55, with an estimated loss in herring revenue of $1.8 million dollars. No Action, AMs could potentially be triggered during FY 2017 if incidental catch rates of GB haddock are similar to those of FY 2015. If catch rates are similar to FY 2016, AMs are unlikely to be triggered. No Action would have negative impacts relative to Option 2. Under Option 2, the GB haddock sub-ACL would be increased to at least 534mt.

Groundfish Fishery
Utilization rates in the groundfish fishery for GB haddock are sufficiently low that an increase in the sub-ACL for the herring fishery would have little to no effect on the groundfish fishery (Table 66).

Sub-Option 2A – Increase the Midwater Trawl Atlantic Herring Fishery Sub-ACL for Georges Bank Haddock and Establish a Review Process

Atlantic herring fishery

Option 2 would have positive impacts on the Atlantic herring fishery relative to Option 1 and FY 2016. The sub-ACL for GB haddock would be increased from FY 2016 under Option 2 from 521mt in FY 2016 to at least 534mt in FY 2017. If Sub-Option 2 is selected, the sub-ACL would be further increased beyond 1% of the U.S. GB haddock ABC up to a 2% maximum. The increased sub-ACL should provide a better opportunity for the Atlantic herring fishery to avoid triggering AMs. During FY 2015, the herring fishery operated under AMs for exceeding the sub-ACL for GB haddock in-season from October 22, 2015 until the end of the 2015 groundfish fishing year. These AMs implemented a 2,000 lb. possession limit for most of the GB stock area, resulting in revenue decreases for the Atlantic herring fishery. The impact of these AMs was previously analyzed in FW55, and the estimated loss in revenue to the herring fishery was $1.8 million dollars. Further discussion on the potential impacts of AMs on the herring fishery is provided under Sub-Option 2.

The AMs, in place to limit incidental catch of GB haddock in FY 2015, likely offer no long term economic benefit to the groundfish fishery at this point. The GB haddock stock is well above B_{MSY} and utilization rates have been low in recent fishing years.

Groundfish Fishery
Sub Option 2 would result in neutral impacts to the groundfish fishery in the short term. Utilization rates of GB haddock in the groundfish fishery have been low in recent years (23.3% in FY 2015, 31.7% in FY 2014, and 11.4% in FY 2013) and it is highly unlikely that an increase in the sub-ACL in the herring fishery will constrain directed haddock fishing. The long term economic impacts of sub Option 2 to the groundfish fishery are also likely neutral considering the robust size of the GB haddock stock.

Sub Option 2 would have positive impacts to the herring fishery. While AMs have only been triggered once for exceeding the GB haddock sub-ACL, the impacts were significant with an estimated $1.8 million in lost herring revenue (FW55). Table 80 shows GB haddock catch by the herring fishery and the % of sub-ACL caught in recent fishing years.

Table 81 shows average herring catch from the GB haddock AM area and throughout all areas by month during groundfish fishing years 2011-2014. At the beginning of the groundfish fishing year, the herring fishery directs a large portion of effort to Georges Bank. During fall there is a major shift to other areas followed by increased landings from Georges Bank during Jan and Feb. During FY 2015 the herring fishery was unable to access Georges Bank during these winter months because of the AMs in place. Table 81 illustrates the fact that if AMs are triggered toward the end of the groundfish fishing year, the herring fishery is likely to be impacted far less so than if AMs are triggered before winter, such as in FY 2015. Herring ex-vessel prices do tend to be lower during the winter than in the spring and summer (Table 82).

Mackerel is one species that is caught with Atlantic herring. Table 83 shows mackerel landings from the same herring trips to Georges Bank in Table 81. Around half of mackerel landings on these trips occur in February. Very small amounts of mackerel are landed from these trips during the summer.

Table 80 - Catch of GB haddock by the herring fishery relative to the sub-ACL, FYs 2011-2015.
***AMs triggered on Oct 22, 2015. No GB haddock catch by the herring fishery after this date during FY 2015**

Groundfish Fishing Year	GB Haddock Sub-ACL (mt) for Herring Fishery	Estimated GB Haddock Catch (mt) by Herring Fishery	% Sub-ACL Caught
2011	318	102	32%
2012	286	289	101%
2013	273	290	106%
2014	162	114	70%
2015*	227	236	104%

Table 81 - Average herring landings (landed lbs.) from limited access and open access herring-permitted vessels inside GB haddock AM area, groundfish fishing years 2011-2014.

Month	Avg. herring landed from inside GB haddock AM area	Avg. herring landed from all areas	% of total herring landed from inside AM area
Jan	9,541,802	26,606,295	35.9%
Feb	4,258,964	12,122,094	35.1%
Mar	1,953,173	8,457,842	23.1%
Apr	450,447	1,768,464	25.5%
May	7,374,205	7,667,105	96.2%
Jun	10,327,451	16,121,146	64.1%
Jul	17,014,052	28,014,395	60.7%
Aug	16,956,725	32,577,772	52.0%
Sep	20,701,053	29,571,467	70.0%
Oct	2,726,784	24,697,282	11.0%
Nov	0	381,259	0.0%
Dec	230,000	9,659,648	2.4%
Total	91,534,656	197,644,767	46.3%

Table 82 - Average herring price per pound (Nominal $) received by limited access and open access herring-permitted vessels, groundfish fishing years 2011-2014.

Month	Avg. herring price
Jan	$0.11
Feb	$0.11
Mar	$0.12
Apr	$0.16
May	$0.16
Jun	$0.15
Jul	$0.15
Aug	$0.14
Sep	$0.14
Oct	$0.14
Nov	$0.14
Dec	$0.13

Table 83 - Average mackerel landings (landed lbs.) from limited access and open access herring-trips* inside GB haddock AM area, groundfish fishing years 2011-2014.
***herring trip defined as any trip with >0lbs. of herring landings**

Month	Avg. mackerel landed by month on herring trips
Jan	685,098
Feb	3,496,983
Mar	1,605,796
Apr	92,475
May	5,500
Jun	0
Jul	3,371
Aug	13,421
Sep	0
Oct	1,250
Nov	837,702
Dec	269,963
Total	7,011,557

Sub-Option 2B – Maintain the Midwater Trawl Atlantic Herring Fishery Sub-ACL for Georges Bank Haddock and Establish a Review Process (*Preferred Alternative*)

Sub-Option 2B would result in neutral impacts to the groundfish and herring fisheries, as no adjustment to the sub-ACL for GB haddock in the herring fishery would be made in this action. If the sub-ACL were to

be raised in the future, the impacts described in Sub-Option 2A (a lower probability of AMs) would apply to the herring fishery. The groundfish fishery would likely be unaffected by a raise of the sub-ACL to 1.5% or 2% given the robust status of the GB haddock stock.

7.4.2 Commercial Fishery Measures

7.4.2.1 Atlantic Sea Scallop Fishery Measures

7.4.2.1.1 Scallop Fishery AM Implementation Policy

7.4.2.1.1.1 Option 1/No Action: Temporary change to the scallop fishery AM implementation policy (*Preferred Alternative*)

No Action
Groundfish fishery
No action would continue to provide positive benefits to the groundfish fishery.

Scallop Fishery
No Action would also result in positive impacts relative to Sub-Option A. Under the Option 2 ACLs, the FY 2017 sub-ACL for GB yellowtail would be 32mt, a 10mt (24%) decline from FY 2016. Actual catches of GB yellowtail by the scallop fishery were 37mt in FY 2013, 59mt in FY2014, and 30mt in FY 2015. AMs were not triggered in any of these years. Recent utilization rates of GB yellowtail flounder in the groundfish fishery (19.3% in FY 2015, 24.5% in FY 2014, and 36.1% in FY 2013) suggests that the total ACL may not be exceeded in FY 2017, even if the sub-ACL in the scallop fishery is. This would mean that the likely threshold of GB yellowtail catch to trigger scallop fishery AMs would be 82.5mt (150% of 55mt) under No Action ACLs. If AMs were triggered, the scallop fishery is subject to area closures in the following fishing years. The length of the AM area closures is determined by the overage percent. If the total ACL is exceeded, the fishery that caused the overage would also be subject to a pound for pound payback under the US/Canada resource sharing agreement.

7.4.2.1.1.2 Sub-Option A: Temporary change to the scallop fishery AM implementation policy for the GB yellowtail flounder stock (*Preferred Alternative*)

Groundfish Fishery
Sub-Option A would result in negative impacts to the groundfish fishery. This alternative could potentially result in increased incidental catch of yellowtail flounder by the scallop fishery relative to No Action. An increase in GB yellowtail flounder by the scallop fishery could have an impact on stock rebuilding efforts and result in low quotas for the groundfish fishery in the future. Though GB yellowtail utilization has been low (18.9% in FY 2015, 24.5% in FY 2014, and 36.1% in FY 2013), the groundfish fishery would be more likely to target yellowtail if quotas were raised and the stock condition improved.

Scallop Fishery
Sub-Option A would result in positive impacts to the scallop fishery. The removal of one of the triggering mechanisms for AMs during FYs 2017 and 2018 could allow for increased fishing effort on Eastern Georges Bank. AMs close area 562 and a small portion of the 525 access area to the limited access scallop fleet. The length of the closure depends on the GB yellowtail overage. For example, an overage of 3% or

less results in a closure for Oct-Nov, while an overage of 56% or greater results in a full scallop fishing year closure (Mar-Feb).

Table 84 shows the catch of GB yellowtail flounder by the scallop fishery relative to the sub-ACL. While the sub-ACL was surpassed on two occasions (2012 and 2014), no AMs were triggered since the scallop fishery has been allowed to catch 150% of its sub-ACL as long as the total ACL is not exceeded. Essentially, Table 84 shows that Sub-Option A would not have impacted the scallop fishery in recent years in terms of avoiding AMs. However, the scallop fishery may have still suffered some costs associated with modifying fishing behavior so as to avoid GB yellowtail flounder.

Table 85 and Table 86 show the reliance of the limited access fleet on statistical area 562 (the full AM area in years where the 525 access area is not open). August is the most important month in terms of absolute landings and revenue, as well as in terms of percentage across all stat areas. February through May have low levels of scallop fishing effort in area 562. In the event of a GB yellowtail overage less than or equal to 3%, the estimated loss in scallop revenue from area 562 would be $3.4 million ($1.7M in Oct and $1.7M in Nov). In the event of a GB yellowtail overage greater than or equal to 56%, the estimated loss in revenue from area 562 would be $23.2 million (total across all months). The actual losses in revenue for the scallop fishery would be less than these figures as effort would shift to other areas in the event of a 562 closure. However, it would be expected that these other areas would not contain the same quality and/or quantity of scallops; otherwise vessels would not be fishing in area 562 in the first place.

Table 84 - Catch of GB yellowtail by the scallop fishery relative to the sub-ACL, FYs 2011-2015. *AMs are triggered if 150% of the sub-ACL is exceeded.

Scallop Fishing Year	GB Yellowtail Flounder Sub-ACL (mt) for Scallop Fishery	Estimated GB Yellowtail Flounder Catch (mt) by Scallop Fishery	% Sub-ACL Caught*
2011	84	201	42%
2012	164	157	105%
2013	37	42	90%
2014	59	51	116%
2015	30	30	99%

Table 85 - Average scallop landings (meat lbs.) from limited access scallop vessels fishing in statistical area 562, CYs 2010-2015.

Month	Avg. scallop landings from stat area 562	Avg. scallop landings from all stat areas	% of total scallop landings from area 562
Jan	45,219	1,033,762	4.4%
Feb	7,652	1,224,649	0.6%
Mar	3,890	2,986,496	0.1%
Apr	11,489	4,794,533	0.2%
May	34,135	6,428,288	0.5%
Jun	331,151	5,505,965	6.0%
Jul	487,766	4,838,121	10.1%
Aug	532,366	4,712,027	11.3%
Sep	238,015	3,283,848	7.2%
Oct	168,313	2,129,381	7.9%
Nov	150,440	1,521,863	9.9%
Dec	119,524	1,197,607	10.0%
Total	2,129,960	39,656,539	5.4%

Table 86 - Average scallop revenue (nominal $) from limited access scallop vessels fishing in statistical area 562, CYs 2010-2015.

Month	Avg. annual scallop revenue from stat area 562	Avg. annual scallop revenue from all stat areas	% of total scallop revenue from area 562
Jan	$511,482	$10,492,831	4.9%
Feb	$92,801	$12,624,655	0.7%
Mar	$46,740	$29,071,682	0.2%
Apr	$139,934	$47,489,471	0.3%
May	$371,742	$63,701,477	0.6%
Jun	$3,514,720	$55,575,410	6.3%
Jul	$5,394,723	$52,868,733	10.2%
Aug	$5,830,205	$50,194,127	11.6%
Sep	$2,491,589	$35,397,972	7.0%
Oct	$1,740,803	$22,768,612	7.6%
Nov	$1,701,166	$16,655,760	10.2%
Dec	$1,345,860	$13,230,450	10.2%
Total	$23,181,764	$410,071,178	5.7%

7.4.2.1.1.3 Sub-Option B: Temporary change to the scallop fishery AM implementation policy for the Northern windowpane flounder stock (*Preferred Alternative*)

Sub-Option B would result in negative impacts to the groundfish fishery. This alternative could potentially result in increased incidental catch of windowpane flounder by the scallop fishery. Northern Windowpane AMs have been triggered multiple times in the groundfish fishery, as overages occurred in FYs 2011- 2014. The impacts of these AMs on the groundfish fishery were previously analyzed in FW52. During FYs 2010-2012, $10.6 million dollars in average annual revenue was estimated from trips to the large AM area for Northern Windowpane. For the small AM area, estimates were $4.3 million dollars annually.

Sub-Option B would result in positive impacts to the scallop fishery. The removal of one of the triggering mechanisms for AMs could allow for increased fishing effort on Georges Bank. The potential impacts of AMs on the scallop fishery cannot be quantified at this time since AM provisions would be developed in a future action. Furthermore, incidental catch of Northern windowpane is highly variable and will be largely driven by what access areas are open in a given fishing year and what open areas are most profitable to fish in. High levels of effort on Georges Bank in one year would increase the likelihood of windowpane AMs being triggered and, depending on the AM provisions, fishing availability on Georges Bank may be impacted for the following year.

7.5 Social Impacts

National Standard 8 (NS8) of the MSA requires the Council to consider the importance of fishery resources to affected communities, to provide those communities with continuing access to fishery resources, and to minimize adverse economic impacts on those communities when designing fishery management plans. However, this must be done without compromising the conservation objectives of management measures. Therefore, while continued access to fishery resources is a consideration, there is no guarantee that fishermen will continue to be able to use certain gear types, fish in particular areas, target specific species, or fish during certain times of year. Fishermen and fishing communities must continually adapt to respond to changes in fishery regulations.

Forecasting social change relative to management actions is fundamentally difficult because communities and other societal groups are constantly evolving in response to external factors (e.g., market conditions, crime rates, and alternate uses of coastal space). Management measures can influence the direction and magnitude of economic and social change, but linking social impacts to specific management actions is challenging with the tools and data available. While the focus of this section is on the social impacts of the proposed fishing regulations contained in FW 56, external factors may also positively or negatively contribute to these impacts. The cumulative impacts resulting from management actions combined with external factors may lead to unanticipated consequences in affected communities.

When examining the social impacts that may result from changes in fishery management, Impacts at a variety of scales are considered, such as: vessel owners and employees (captains and crew); fishing families; the fishing fleet (vessels grouped by fishery, primary gear type, and/or size); shoreside businesses; and wider fishing communities. While certain management measures may have short-term negative impacts on some stakeholders, these negative impacts are weighed against the potential long-term benefits to all communities which could result from a sustainable groundfish fishery.

The social factors in impact assessments are based on NMFS guidance (NMFS 2007) and other texts (e.g., Clay et al. 2010; Clay et al. 2014). Longitudinal data describing these social factors region-wide and in comparable terms is limited. While this analysis does not quantify the impacts of the management alternatives relative to the social impact factors, qualitative discussion of the potential changes to the factors characterizes the likely direction and magnitude of the impacts.

The social impact factors analyzed for this action fit into five categories:

1. *Size and Demographic Characteristics* of the fishery-related workforce residing in the area; these determine demographic, income, and employment effects in relation to the workforce as a whole, by community and region.
2. The *Attitudes, Beliefs, and Values* of fishermen, fishery-related workers, other stakeholders and their communities; these are central to understanding the behavior of fishermen on the fishing grounds and in their communities.
3. The effects of the proposed action on *Social Structure and Organization*; that is, changes in the fishery's ability to provide necessary social support and services to families and communities, as well as effects on the community's social structure, politics, etc.
4. The *Non-Economic Social Aspects* of the proposed action; these include lifestyle, health, and safety issues, and the non-consumptive and recreational uses of living marine resources and their habitats.
5. The *Historical Dependence on and Participation in* the fishery by fishermen and communities, reflected in the structure of fishing practices, income distribution, and rights (NMFS 2007).

Surveys of the Socio-Economic Aspects of Commercial Fishing Vessel Owners and Crew in New England

In addition to insights and information from prior research on groundfish fisheries, the economic impact analysis provided for this framework, and qualitative assessments of public comment sections at Council meetings, this social impact analysis also provide analysis of data from the Surveys on the Socio-Economic Aspects of Commercial Fishing Vessel Owners and Crew in New England and the mid-Atlantic (SEAS) conducted by the Social Science Branch at the Northeast Fisheries Science Center.

The crew survey began in October 2012 and concluded in September 2013. The survey was administered via face-to-face interviews to a randomly selected sample of 1,300 crew members. The interviews were conducted at several selected fishing ports from the region. By the close of the survey, 359 interviews were completed in full, and an additional 42 were partially completed.

The Survey on the Socio-Economic Aspects of Commercial Fishing Vessel Owners in New England and the Mid-Atlantic began in September 2013 and concluded in January 2014. Surveys were mailed to a randomly selected sample of 1,400 vessel owners. By the close of the survey, 160 surveys were completed in full, 10 were partially completed, and 6 were returned as out of scope. More information about the surveys, including survey instruments, can be found at http://www.nefsc.noaa.gov/read/socialsci/.

7.5.1 Updates to Status Determination Criteria and Annual Catch Limits

7.5.1.1 Revised Status Determination Criteria

7.5.1.1.1 Option 1: No Action

Under Option 1, there would be no revisions to the Status Determination Criteria (SDC) for witch flounder, and numerical estimates of the SDC for the witch flounder stock would not change (Table 2 and Table 3).

If Option 1 is selected, the primary result would be to maintain biomass targets based on outdated witch flounder assessments. Selecting Option 1 is unlikely to have immediate substantial social impacts, as it would maintain the current method used to determine the Acceptable Biological Catch (ABC) for this stock. However, if fishermen perceive that fishery managers are not making use of the best available science by incorporating information from a more recent assessment into their decisions, there may be negative social impacts on fishermen's *Attitudes, Beliefs, and Values* concerning fishery management. Historically, groundfish fishermen in the Northeast have expressed doubts about the quality and accuracy of the science used to make management decisions (e.g., Holland et al. 2013; Acheson and Gardner 2014). SEAS survey results reflect a similar trend; the large majority (67%) of groundfish crew members do not believe the information presented by managers when making regulatory decisions (Henry and Olson 2015). The continued use of outdated information to set numerical estimates of SDCs would likely reinforce these perceptions of inadequacy and feelings of mistrust.

Selecting Option 1 could also potentially result in long-term negative social impacts to the *Historical Dependence on and Participation in* the groundfish fishery, particularly regarding the day-boat fishermen that traditionally target witch flounder. If numerical estimates of SDCs for this stock are not revised based on updated assessments, the resulting biomass targets may be inappropriate. If targets are too high, this could contribute to overfishing of that stock, which would threaten continued access to fishery resources and contribute to the perceived inability of regulators to properly manage fishery resources. If targets are

too low, socioeconomic benefits to the groundfish fishing community may be unnecessarily limited (e.g., Hilborn 2002).

7.5.1.1.2 Option 2: Revised Status Determination Criteria for Witch Flounder (*Preferred Alternative*)

Under Option 2, the SDC for witch flounder would be updated to unknown, and the numerical estimates of the SDC for witch flounder would be updated to unknown (Table 4 and Table 5).

Compared to No Action, Option 2 may result in positive social impacts to groundfish to the groundfish fishery and its stakeholders. The use of an empirical area swept approach to estimate biological reference points could have positive impacts on stakeholders' *Attitudes, Beliefs, and Values* towards fishery management. If fishermen perceive that management decisions are being made based on information from the most recent benchmark assessment, their attitudes towards fishery management may become more favorable. However, these positive impacts would likely be tempered by the fact that many groundfish fishermen remain doubtful of the methods and data used to make management decisions. A 2010 survey on social capital amongst groundfish permit holders found that the large majority (90%) of respondents did not feel that the science supporting fisheries management decisions is accurate (Holland et al. 2010). Option 2 may also have long-term positive social impacts regarding the *Historical Dependence on and Participation in* the groundfish fishery if revising the approach used to set biological reference points facilitates the rebuilding of the witch flounder stock, better ensuring continued access to this resource.

Compared to No Action, the overall impacts of Option 2 are neutral to low-positive.

7.5.1.2 Annual Catch Limits

7.5.1.2.1 Option 1: No Action

Under Option 1, there would be no changes to the specifications for FY 2017 – FY 2018 that were adopted through Framework Adjustment 55 (FW55) (Table 6). Default specifications, set at 35% of the FY 2016 OFL/ABC/ACL, would be set for Eastern George's Bank (EGB) cod for FY 2017. There would be no FY 2017 quotas specified for the transboundary GB cod stock, and no revised FY 2017 quotas for GB haddock and GB yellowtail flounder, all of which are managed through the US/Canada Resource Sharing Understanding and specified annually. The directed groundfish fishery would be expected to operate in all BSAs with the exception of the EGB management area, which would close on August 1, 2017 when the default specifications for EGB cod would expire.

Social impacts on the commercial groundfish fishery
Option 1 would likely have negative social impacts on the *Size and Demographic Characteristics* of the fishery-related workforce. Reducing the EGB cod ACL and eventually closing the EGB area to the directed groundfish fishery would disadvantage the individuals, fishing families, and shoreside businesses that traditionally rely on income from harvesting EGB stocks. To adapt to constraints on fishing opportunity, groundfish fishermen traditionally operating in the EGB area may choose to travel farther and longer to fish, employ fewer crew, or they could withdraw from the fishery altogether (Coulthard and Britton 2015). Spatial shifts in fishing effort and changes in competition for resources may negatively impact the fishermen who traditionally operate in the areas where displaced fishermen would gravitate. Additionally, reduced income for fishermen may translate to reduced business opportunities for shoreside service providers, impacting employment in the wider fishing community. If fishermen and shoreside businesses ceased operating due to the constraints on earning potential under Option 1, this would lead to negative impacts on the *Historical Dependence on and Participation in* the fishery. However, long-term

positive social impacts regarding the *Historical Dependence on and Participation in* the groundfish fishery could be achieved if decreasing the EGB cod ACL and closing the EGB area ultimately facilitates the rebuilding of this stock, better ensuring continued access to this resource.

Fishermen could perceive the use of default specifications for EGB cod as a failure by fishery managers to properly regulate groundfish stocks. These negative feelings may be strengthened by the lack of revised ACLs for transboundary GB haddock and GB yellowtail flounder stocks in FY 2017. If fishermen perceive that managers are not making use of the best available science in a timely manner, their *Attitudes, Beliefs, and Values* towards management will be negatively impacted.

Selecting Option 1 may have negative social impacts in terms of the *Non-Economic Social Aspects* of the commercial groundfish community. Several of the strategies that fishermen may employ to cope with changes in regulations (i.e. operating with fewer crew, traveling farther and longer to fish) could compromise safety by increasing the number of hours spent at sea and exacerbating fatigue (e.g., Dyer 2000; Windle et al. 2008). Additionally, constraints on fishing in the EGB area and the resulting declines in fishing earnings may contribute to decreased levels of job satisfaction for groundfish fishermen (e.g., Gatewood and McCay 1988, 1990; Pollnac and Poggie 2006; Pollnac et al. 2008). In turn, decreased job satisfaction may contribute to a decline in the well-being of fishermen, their families, and their communities (e.g., Smith and Clay 2010; Bavinck et al. 2012; Pollnac et al. 2014; Coulthard and Britton 2015). SEAS survey results show that the majority of vessel owners and groundfish crew members feel that they are not able to fish where they want (58% and 83%, respectively) and when they want (59% and 69%, respectively). Additionally, the large majority (70%) of groundfish crew reported being dissatisfied with the predictability of their earnings (Henry and Olson 2015). Option 1 would further constrain fishermen's ability to operate and limit their income potential, which would contribute to these feelings of frustration.

No Action could also have negative social impacts relative to the *Social Structure and Organization* of fishing communities. Non-groundfish vessels (e.g., scallop, herring) would still be allowed to fish in the EGB area even after it had been closed to the directed groundfish fleet. This perceived inequity regarding the distribution of catch responsibility and fishing access may lead to strife and resentment between some groundfish fishermen and members of the wider fishing community. Perceptions of inequity could also further negatively impact groundfish fishermen's *Attitudes, Beliefs, and Values*.

Social impacts on the recreational groundfish fishery

Under Option 1, the recreational groundfish sub-ACL for GOM cod would remain unchanged at 157 mt in FY 2017, and the recreational groundfish sub-ACL for GOM haddock will increase by 25% from FY 2016. This potential increase in fishing opportunity would likely lead to positive social impacts regarding the *Size and Demographic Characteristics* of the recreational groundfish fishery. The higher sub-ACL for FY 2017 would also likely have a positive impact on the *Attitudes, Beliefs, and Values* of recreational groundfish fishermen. However, it is worth noting that although the sub-ACL for GOM haddock would increase for FY 2017, this does not mean that other regulations will not be in place constraining catch of this stock.

Social impacts on other fisheries

Scallop fishery

The scallop sub-ACL is fixed at 16% of the fishery-wide ACL. Under Option 1, the scallop fishery sub-ACL for GB yellowtail flounder would increase from 42 mt to 55 mt for FY 2017. Option 1 would likely have positive social impacts relative to the *Size and Demographic Characteristics* of the scallop fishery. Increasing the sub-ACL for GB yellowtail flounder would reduce the likelihood of the scallop fishery

exceeding its sub-ACL and triggering AMs at the end of FY 2017. This is also likely to have positive impacts on the *Attitudes, Beliefs, and Values* of scallop fishery stakeholders.

Small-mesh fisheries
Under Option 1, the small mesh fishery sub-ACL for GB yellowtail flounder would increase from 5 mt for FY 2016 to 7 mt for FY 2017. Option 1 would likely have positive social impacts relative to the *Size and Demographic Characteristics* of the small mesh fishery. Increasing the sub-ACL for GB yellowtail flounder would reduce the likelihood of the small mesh fishery exceeding its sub-ACL and triggering AMs at the end of FY 2017. This is also likely to have positive impacts on the *Attitudes, Beliefs, and Values* of small mesh fishery stakeholders.

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

Under Option 2, there would be annual specifications set for all stocks for FY 2017, and some stocks would have specifications set for FY 2018 and FY 2019 as well (Table 9). The total ACLs in FY 2017 are the same as or higher than they are under Option 1 for all stocks except GB yellowtail flounder. Option 2 would adopt specifications for the stocks managed under the U.S./Canada Resource Sharing Understanding Table 7 and Table 8) and witch flounder (Table 6).

Social impacts on the commercial groundfish fishery relative to No Action
Option 2 and the associated sub-actions would generally have positive social impacts relative to No Action, as all stocks would have specified catch limits, allowing some amount of fishing to occur uninterrupted in all BSAs in FY 2017. Impacts to the *Attitudes, Beliefs, and Values* of groundfish fishermen would likely be positive relative to No Action. While many fishermen remain skeptical of the science used to make fishery management decisions, neglecting to update catch specifications for GB stocks under No Action could be perceived as a failure by management to make use of the best available science to properly manage groundfish stocks. SEAS survey data indicates that 100% of groundfish crew members surveyed do not trust managing authorities to make the right decisions when it comes to regulating fisheries (Henry and Olson 2015); this lack of faith in management would likely be strengthened if fishermen perceived that managers were basing their decisions on outdated science. Additionally, allowing the directed groundfish fishery to operate in the EGB area all year would have a positive impact on the groundfish fishing community's *Attitudes, Beliefs, and Values*.

Under Option 2, the GB haddock ACL would be about 19% higher than under No Action, and the witch flounder ACL would be about 90% higher than under No Action. These increased ACLs would increase groundfish fishermen's earning potential, which would have positive social impacts on the *Size and Demographic Characteristics* of the groundfish fishery. Additionally, the establishment of a less restrictive witch flounder and GB haddock ACLs would likely have a positive impact on groundfish fishermen's *Attitudes, Beliefs, and Values* towards management. This may be particularly true for day-boat fishermen, who traditionally target witch flounder. These positive impacts may be partially countered by the fact that QCM results predict that under Option 2 specifications, WGB cod and GOM cod would be constraining stocks. If avoiding these stocks inhibits fishermen's ability to harvest other target stocks, this could have negative social impacts on the *Size and Demographic Characteristics* and the *Attitudes, Beliefs, and Values* of the commercial groundfish fishery.

Social impacts relative to FY 2016 commercial sector groundfish specifications
Under Option 2, total groundfish revenues are predicted to increase by roughly 7% in FY 2017, from $71.1 million in FY 2016 to $76.4 million in FY 2017 (Table 71). Specifically regarding groundfish revenue on groundfish trips, revenues are predicted to decrease by 0.9%, from $53.9 million in FY 2016 to $53.4 million in FY 2017 (Table 71). These increases in revenue in FY 2017 will likely yield overall

positive social impacts relative to FY 2016 for the groundfish fishery. However, these impacts will not be distributed evenly across all vessel length classes, fishing ports, or states.

Vessels in the smallest length class (< 30') are predicted to experience the largest percent decrease in fishing revenue, followed by vessels in the 50' to < 75' length class. Vessels in the 30' to <50' are predicted to see the largest percent increase in fishing revenue, followed by vessels in the 75'+ length class. If reduced revenue causes operators in the disadvantaged length classes to cease fishing, to employ fewer crew, or to redirect their efforts into another fishery, this would result in negative social impacts relative to the *Size and Demographic Characteristics* of the fishery. A shift in fishing effort away from groundfish on the part of these operators would also have negative impacts on the *Historical Participation in and Dependence on* the groundfish fishery. Finally, if vessel operators from disadvantaged length classes believe that they are being treated unfairly compared to other operators, this could cause resentment between groups, which would have negative social impacts on the *Social Structure and Organization* of the fishery.

Social impacts at the state-and port-level relative to FY 2016 specifications
The social impacts anticipated under Option 2 will not be distributed evenly across all ports and states. In terms of port-level and state-level changes in fishing revenue, Option 2 is predicted to have largely positive impacts throughout the Northeast. All states except for Massachusetts are predicted to see revenue increases relative to FY 2016. Maine is predicted to see the largest increase in revenues at $0.7 million, followed by New Hampshire and New York at $0.2 million each. Massachusetts is the only state predicted to have an overall decrease in revenues, at $1.1 million relative to FY 2016. Within the state, these impacts are not distributed evenly throughout major ports. Gloucester is predicted to see revenue increases of $2.2 million relative to FY 2016, while Boston and New Bedford are predicted to see decreases of $2.4 million and $1.4 million, respectively.

The negative social impacts resulting from Option 2 are likely to be largely confined to Massachusetts, specifically Boston and New Bedford. Reductions in revenues could limit income and employment opportunities in the groundfish fishery in these two ports, resulting in negative impacts to the *Size and Demographic Characteristics* of the fishery. These reductions in revenues and the associated negative impacts to the groundfish fishery may also have negative impacts on shoreside businesses in Boston and New Bedford. If stakeholders from these ports felt as though they were being unfairly disadvantaged, this could cause negative impacts to their *Attitudes, Beliefs, and Values* toward fishery management.

U.S./Canada TACs
Comparing the proposed FY 2017 U.S. TACs to the FY 2016 U.S. TACs, the EGB cod quota would increase by 5.8% and the EGB haddock quota would increase by 94.5%, but the GB yellowtail flounder quota would decrease by 23% (Table 8). Increased quotas for haddock and cod could have positive impacts relative to the groundfish fishery's *Size and Demographic Characteristics*. Larger groundfish vessels with the ability to fish further offshore for EGB stocks would experience the greatest impact from these regulations, while social impacts to smaller vessels may be negligible. Increased catch limits for EGB haddock and cod could provide increased earning potential and opportunity for employment within the groundfish fishery. Increased ACLs and the associated social benefits would in turn have positive social impacts on fishermen's *Attitudes, Beliefs, and Values*. These positive impacts may be partially offset by negative social impacts if fishermen's ability to harvest the increased haddock and cod quotas was constrained by the decreased yellowtail flounder ACL. However, it is unlikely that this will have a substantial negative impact, due to the fact that annual GB yellowtail flounder landings typically fall well below the catch limit.

Social impacts on the recreational groundfish fishery

Relative to Option 1, the social impacts on the recreational groundfish fishery from Option 2 are neutral. Under Option 2, the recreational groundfish sub-ACL for GOM cod would remain unchanged at 157 mt in FY 2017, and the recreational groundfish sub-ACL for GOM haddock will increase by 25% from FY 2016. Since these are the same specifications that would be implemented under Option 1, the social impacts resulting from selecting Option 2 are likely to be essentially the same.

Social impacts on other fisheries

Sea scallop fishery

The social impacts of Option 2 on the sea scallop fishery are negative relative to Option 1. Under Option 2, the scallop fishery sub-ACL for GB yellowtail flounder would be set at 32 mt, which is 23 mt less than the sub-ACL under Option 1. If the fleet's ability to harvest scallops is constrained by the GB yellowtail sub-ACL, or if the scallop fishery exceeds the sub-ACL by enough to trigger AMs, this could have negative social impacts regarding the *Size and Demographic Characteristics* of the fishery. The more restrictive catch limit would also likely have negative impacts on scallop fishermen's *Attitudes, Beliefs, and Values* towards fishery management.

Small-mesh fishery

Relative to Option 1, the social impacts to the small-mesh fishery under Option 2 would be negative. Under Option 2, the small-mesh fishery sub-ACL for GB yellowtail flounder would decrease from 5 mt in FY 2016 to 4 mt in FY 2017, which is 3 mt less than the sub-ACL specified under Option 1. If the fleet's ability to harvest small-mesh species is constrained by this smaller sub-ACL, or if reducing the sub-ACL makes it more likely that the small-mesh fishery will exceed its sub-ACL and trigger AMs, this could have negative impacts on the *Size and Demographic Characteristics* of the fishery. These impacts would be felt particularly strongly by small-mesh fishermen, fishing families, and communities that rely on the small-mesh resources in the GB yellowtail flounder stock area. These negative impacts to the *Size and Demographic Characteristics* of the fishery would likely be accompanied by negative impacts regarding the *Attitudes, Beliefs, and Values* of small-mesh fishery stakeholders.

7.5.1.2.2.1 Sub Option 1: Develop an Atlantic Sea Scallop Fishery Allocation for GOM/GB (Northern) Windowpane Flounder (*Preferred Alternative*)

No Action

Under No Action, a scallop fishery sub-ACL for northern windowpane flounder would not be developed.

No Action could have negative social impacts relative to the *Social Structure and Organization* of fishing communities. By not specifying a northern windowpane flounder sub-ACL for the scallop fishery, groundfish fishermen alone would be responsible for any overages in the ACL for that stock in FY 2017. If the ACL for northern windowpane flounder is exceeded but the scallop industry is not responsible for any of the overage, this perceived inequity regarding the distribution of catch responsibility and fishing access may lead to resentment between members of the scallop fishing and groundfish fishing communities. Furthermore, there could be negative social impacts regarding groundfish fishermen's *Attitudes, Beliefs, and Values* towards management if they feel that the distribution of catch responsibility is not distributed equitably across the various components of the groundfish fishery.

Sub-Option 1A – Fixed percentage based on the 90th percentile of scallop catch rates for northern windowpane flounder *(Preferred Alternative: 21%)*

Under Sub-Option 1A, a scallop sub-ACL for northern windowpane flounder would be specified based on the 90th percentile of the scallop fishery catches (as a percent of the total) for the period calendar year 2005 through 2014, 2010 through 2014, 2004 through 2013, or 2009 through 2013 using information in the 2015 stock assessment of northern windowpane flounder and the PDT's estimate of General Category

catches. Allocation based on catch rates from a range of the most recent 10 years (i.e., 2005-2014) would result in a percentage of 21%. Allocation based on catch rates from a shorter and more recent range of the most recent 5 years (i.e., 2010-2014) would result in a percentage of 35%. Allocation based on catch rates from a range of the most recent 10 years dropping 2014 (i.e., 2004-2013) would result in a percentage of 19%. Allocation based on catch rates from a shorter and more recent range of the most recent 5 years dropping 2014 (i.e., 2009-2013) would result in a percentage of 19%. AMs would be determined for this sub-ACL by the Scallop FMP, with specifics available for implementation in FY 2018. If the scallop sub-ACL of northern windowpane flounder was exceeded in FY 2017, the fishery would be subject to whatever AMs were implemented in FY 2018.

Sub-Option 1A would likely result in negative social impacts to the scallop fishery; these impacts would be more negative if the sub-ACL was based on a lower percentage (i.e. 19%) as opposed to a higher percentage (i.e. 35%). Designating a scallop fishery sub-ACL for northern windowpane flounder would negatively impact the *Size and Demographic Characteristics* of the fishery, as it would constrain scallop vessels' ability to fish, limiting their earning potential and impacting employment opportunities for crew members within the fleet. These negative impacts would be intensified if **t**his allocation was exceeded and AMs were triggered, further reducing the fleet's ability to harvest scallops. The Scallop PDT projects that in FY 2017, scallop fishery bycatch will amount to approximately 107.4 mt (10/31/2016 Scallop PDT Memo to Groundfish PDT), which exceeds the highest sub-ACL being considered (35%), so the likelihood of triggering AMs may be fairly high.

Reduced opportunity to fish would result in decreased revenue and employment opportunity within the scallop fishery, which would be particularly challenging for individuals and communities that are heavily dependent on scallop fishing. If fishermen began withdrawing from the fishery or employing fewer crew members, this would result in negative social impacts to the *Historical Dependence on and Participation in* the scallop fishery. The scallop fishery may also experience negative impacts in terms of their *Attitudes, Beliefs, and Values* towards management if the new catch limit is perceived to be too restrictive. Additionally, there may be negative impacts to the *Social Structure and Organization* of fishing communities if the designation of the scallop sub-ACL led to increased tension or resentment between groundfish fishery stakeholders and scallop fishery stakeholders.

Sub-Option 1A would help to constrain the scallop fishery's catch of northern windowpane flounder, and it would also hold them jointly responsible for any ACL overage that may occur. This perceived equity in the distribution of catch and responsibility may result in positive social impacts to commercial groundfish fishermen's *Attitudes, Beliefs, and Values*. The specification of a sub-ACL with accompanying AMs could help to incentivize the scallop fishery to avoid catching northern windowpane flounder. Groundfish fishermen may feel that the system is more equitable under this Option because they may not be the only fishery subject to an AM if the northern windowpane flounder ACL is exceeded. This reduced uncertainty that an AM could be triggered for the groundfish fishery even if they reduce their catch of windowpane and do not exceed the ACL could result in positive social impacts relative to the *Non-Economic Social Aspects* of the groundfish fishery.

<u>Sub-Option 1B – Select a percentage from a range of recent scallop catches</u>
Under Sub-Option 1B, a scallop sub-ACL for northern windowpane flounder would be specified based on a fixed percentage chosen from a range of scallop discards as percentages of catch. The range of percentages is based on bycatch estimates from the 2015 operational assessment, and used to calculate scallop catch as a percentage of total catch between calendar years 2004 through 2014 and the PDT's estimate of General Category catches. Allocation based on catch rates from a range of the most recent 10 years (i.e., 2005-2014) would result in a range of 2%-46. Allocation based on catch rates from a shorter and more recent range of the most recent 5 years (i.e., 2010-2014) would result in a range of 6%-46%. Allocation based on catch rates from a range of the most recent 10 years dropping 2014 (i.e., 2004-2009)

would result in a range of 2%-19%. Allocation based on catch rates from a shorter and more recent range of the most recent 5 years dropping 2014 (i.e., 2009-2013) would result in a range of 6%-19%. AMs would be determined for this sub-ACL by the Scallop FMP, with specifics available for implementation in FY 2018. If the scallop sub-ACL of northern windowpane flounder was exceeded in FY 2017, the fishery would be subject to whatever AMs were implemented in FY 2018.

Sub-Option 1B would have similar social impacts to those discussed under Sub-Option 1A; however, if the sub-ACL was based on a fixed percentage near the lower end of the range (2% - 6%) as opposed to the higher end of the range (46%), the resulting social impacts would be substantially more negative to the scallop fishery. The scallop fishery may also experience high negative impacts in terms of their *Attitudes, Beliefs, and Values* if an extremely restrictive catch limit is set using a low fixed percentage.

7.5.1.2.2.2 Sub Option 2: Increase the Midwater Trawl Atlantic Herring Fishery Sub-ACL for Georges Bank Haddock (*Preferred Alternative*)

No Action
Under No Action, the MWT Atlantic herring fishery sub-ACL for GB haddock would be maintained at 1% of the US ABC.

No Action would maintain the herring fishery sub-ACL for GB haddock at 1% of the US ABC. Under No Action, the herring fishery could continue operating without disruption in FY 2017 unless and until it exceeded this sub-ACL for GB haddock. Selecting No Action would likely have neutral to low-negative short-term social impacts to the MWT Atlantic herring fishery. If the herring fishery were to exceed its GB haddock sub-ACL and trigger AMs, the resulting constraints to the fishery would likely result in short-term negative impacts regarding the *Size and Demographic Characteristics* of the fishery. This would likely be accompanied by negative impacts to the *Attitudes, Beliefs, and Values* of herring fishermen. These negative attitudes towards fishery management may be intensified if herring fishermen believe that by choosing not to establish a review process for the MWT Atlantic herring fishery sub-ACL for GB haddock, regulators are failing to take advantage of the best available scientific information to make decisions about the fishery moving forward.

No action would likely have positive social impacts on the commercial groundfish fishery. Maintaining the MWT Atlantic herring fishery sub-ACL at 1% would result in a higher allocation of GB haddock for the commercial groundfish fishery, which would increase fishing opportunities for groundfish fishermen and positively impact the *Size and Demographic Characteristics* of the groundfish fishery. Additionally, groundfish fishermen have previously expressed concern over the fact that increasing the MWT herring sub-ACL for GB haddock would subsequently decrease the commercial groundfish sub-ACL for GB haddock. Commercial groundfish fishermen may perceive the decision to maintain the herring sub-ACL at 1% as management acknowledging their concerns over the allocation of this stock. This would have positive social impacts on groundfish fishermen's *Attitudes, Beliefs, and Values* towards management.

Sub-Option 2A – Increase the Midwater Trawl Atlantic Herring Fishery Sub-ACL for Georges Bank Haddock and Establish a Review Process (*Preferred Alternative – 1.5%)*
Sub-Option 2A would increase the existing MWT Atlantic herring fishery sub-ACL for GB haddock from 1% of the US ABC to 1.5% or 2% of the US ABC. Sub-Option 2A would also establish a review process in which after the entire GB haddock stock had been assessed, the Groundfish PDT team would review the MWT Atlantic herring fishery sub-ACL to determine whether the sub-ACL should be increased (up to 2% US ABC) or whether No Action should be taken.

Sub-Option 2A would have positive social impacts regarding the *Attitudes, Values, and Beliefs* of the MWT Atlantic herring fishing fleet. By periodically reviewing the status of GB haddock and adjusting the sub-ACL accordingly, fishermen may perceive that managers are basing their decisions off the best science available. Increasing the sub-ACL for the MWT Atlantic herring fishery could also have positive impacts on the *Size and Demographic Characteristics* of the MWT Atlantic herring fishery. Increasing the sub-ACL for GB haddock would increase herring fishermen's opportunities to fish, allowing them to better optimize their yield and increase employment and revenue within their fishery. Additionally, a higher sub-ACL would also reduce the likelihood that the herring fishery sub-ACL would be exceeded, therefore reducing the likelihood of triggering costly AMs.

Sub-Option 2A would likely have neutral to low negative social impacts on the commercial groundfish fishery. In terms of the *Size and Demographic Characteristics* of the fishery, increasing the sub-ACL for the MWT herring fishery would result in a corresponding decrease in the groundfish sub-ACL. This decrease would only be along the magnitude of 0.5% – 1%; however, groundfish industry members have indicated that they are concerned about this potential decrease in their sub-ACL for GB haddock. Raising the herring fishery sub-ACL for this stock may be perceived as a failure by management to address the concerns of the groundfish fishery, negatively impacting groundfish fishermen's *Attitudes, Beliefs, and Values.* There could be a small positive impact on the *Attitudes, Beliefs, and Values* of the groundfish community if they perceive that fishery managers are reviewing and revising the sub-ACL policy using the best science available. However, this positive impact would likely be negated by concerns over corresponding adjustments to the groundfish sub-ACL.

<u>Sub-Option 2B – Maintain the Midwater Trawl Atlantic Herring Fishery Sub-ACL for Georges Bank Haddock and Establish a Review Process</u>

Sub-Option 2B would maintain the herring fishery sub-ACL for GB haddock at 1% of the US ABC, and it would establish a review process in which after the entire GB haddock stock had been assessed, the Groundfish PDT team would review the MWT Atlantic herring fishery sub-ACL to determine whether the sub-ACL should be increased (up to 2% US ABC).

The social impacts under Sub-Option 2B are similar to those described for Sub-Option 2A. Under Sub-Option 2B, the herring fishery could continue operating without disruption in FY 2017 unless and until it exceeded its sub-ACL for GB haddock. Selecting Sub-Option 2B would likely have neutral short-term social impacts to the MWT Atlantic herring fishery. If the herring fishery were to exceed its GB haddock sub-ACL and trigger AMs, the resulting constraints to the fishery would likely result in short-term negative impacts regarding the *Size and Demographic Characteristics* of the fishery.

The implementation of a review process to assess the MWT Atlantic herring sub-ACL for GB haddock would likely have a positive social impact on the *Attitudes, Beliefs, and Values* of the herring fleet. If fishermen perceive that managers are periodically updating catch limits according to the best science available, this may improve their attitudes towards managers and fishery management. Furthermore, future increases to the sub-ACL for the MWT Atlantic herring fishery would have positive impacts on the *Size and Demographic Characteristics* of the MWT Atlantic herring fishery.

7.5.2 Commercial Fishery Measures

7.5.2.1 Atlantic Sea Scallop Fishery Measures

7.5.2.1.1 Scallop fishery AM Implementation Policy

No Action

No Action would retain the scallop fishery AM policy which was adopted by FW47. The scallop industry would not be subject to AMs if it exceeded its sub-ACL for any groundfish stock unless: 1) that stock's total ACL was also exceeded; and/or 2) the scallop fishery exceeded its sub-ACL by at least 50%.

No Action would likely have neutral short-term social impacts for the scallop fishery if AM were not triggered. If scallop vessels were to meet the criteria to trigger AMs for any groundfish stocks, the resulting constraints to the fishery would likely result in short-term negative impacts regarding the *Size and Demographic Characteristics* of the fishery. However, part of the purpose of the existing AM policy is to avoid implementing AMs when overfishing is not actually occurring. Continuing this protection from unnecessary costs under No Action could yield positive social impacts relative to the *Attitudes, Beliefs, and Values* of fishermen and the *Size and Demographic Characteristics* of the fleet.

No Action would likely have neutral to low-positive social impacts on the commercial groundfish fishery. In terms of groundfish fishermen's *Attitudes, Beliefs, and Values* towards management, maintaining the scallop fishery AM implementation policy would continue to hold scallop fishermen jointly responsible for overages in the total ACLs of certain groundfish stocks. The scallop fishery would also be held responsible for exceeding its sub-ACL for a stock by at least 50%, even if that stock's total ACL was not exceeded. If groundfish fishermen perceive this distribution of catch responsibility as being equitable, there would likely be positive impacts on their *Attitudes, Beliefs, and Values*.

Option 2/Sub-Option A – Temporary change to the scallop fishery AM implementation policy for the GB yellowtail flounder stock (*Preferred Alternative)*

Sub-Option A would allow for an exemption to the AM implementation policy for GB yellowtail flounder stock so that AMs would not be implemented if only the second criteria, (2) the scallop fishery exceeds its sub-ACL for a stock by 50 or more percent, was met.

Selecting Sub-Option A would likely result in immediate positive social impacts for the scallop fishery. Sub-Option 3A could result in positive social impacts in terms of the *Attitudes, Beliefs, and Values* of the scallop fishing community. By removing the second AM implementation criteria for GB yellowtail flounder, the scallop fishery would not be subject to costly AMs if they exceeded their sub-ACL. This is particularly important due to the fact that the Scallop PDT has projected that scallop fishery bycatch of GB yellowtail flounder in FY 2017 will be approximately 62.8 mt (10/31/2016 Scallop PDT Memo to Groundfish PDT), which is double the sub-ACL of 32 mt under Option 2 Revised ACLs. Stakeholders' attitudes towards fishery management may be improved if they perceive that management measures are being appropriately administered. In addition, if the scallop fishery exceeds its sub-ACL of GB yellowtail flounder but no AMs are implemented, this would have positive social impacts in regard to the *Size and Demographic Characteristics* of the scallop fishery.

Sub-Option A would likely result in neutral to low-negative social impacts on the commercial groundfish fishery. If overfishing of GB yellowtail flounder occurs and the scallop fishery contributes to that overage, the scallop industry will still be subject to the resulting AMs, which would positively impact groundfish fishermen's *Attitudes, Beliefs, and Values* towards management. However, if the scallop

fishery exceeds its sub-ACL by more than 50% and does not trigger any AMs, perceptions of inequity could negatively impact groundfish fishermen's *Attitudes, Beliefs, and Values*. The likelihood of this scenario occurring could be fairly high, based on Scallop PDT's projections of scallop fishery bycatch of GB yellowtail flounder in FY 2017.

Option 2/Sub-Option B – Temporary exception to the scallop fishery AM implementation policy for the northern windowpane flounder stock (*Preferred Alternative*)

Sub-Option B would allow for an exemption to the AM implementation policy for northern windowpane flounder so that AMs would not be implemented if only the second criteria, (2) the scallop fishery exceeds its sub-ACL for a stock by 50 or more percent, was met.

The social impacts of Sub-Option B would be similar to those described for Sub-Option A. Selecting Sub-Option B would likely not result in any immediate social impacts for the scallop fishery. However, Sub-Option B may have long term positive social impacts to the *Size and Demographic Characteristics* of the scallop fishery if the fishery exceeds its sub-ACL of northern windowpane flounder but no AMs are implemented. This is particularly important due to the fact that the Scallop PDT has projected that scallop fishery bycatch of northern windowpane flounder in FY 2017 will be approximately 107.4 mt, which would exceed even the highest sub-ACL considered for that stock (78 mt) under Sub-Option 1. If the scallop fishery was able to avoid costly AMs when overfishing was not actually occurring, this would result in positive social impacts in terms of the *Attitudes, Beliefs, and Values* of the scallop fishing community.

Sub-Option B would likely result in neutral to low-negative social impacts on the commercial groundfish fishery. If overfishing of northern windowpane flounder occurs and the scallop fishery contributes to that overage, the scallop industry will still be subject to the resulting AMs, which would positively impact groundfish fishermen's *Attitudes, Beliefs, and Values* towards management. However, if the scallop fishery exceeds its sub-ACL by more than 50% and does not trigger any AMs, perceptions of inequity could negatively impact groundfish fishermen's *Attitudes, Beliefs, and Values*. The likelihood of this scenario occurring could be fairly high, based on Scallop PDT's projections of scallop fishery bycatch of northern windowpane flounder in FY 2017.

7.6 Cumulative Effects Analysis

7.6.1 Introduction

A cumulative effects assessment (CEA) is a required part of an EIS or EA according to the Council on Environmental Quality (CEQ) (40 CFR part 1508.7) and NOAA's agency policy and procedures for NEPA, found in NOAA Administrative Order 216-6. The purpose of the CEA is to integrate into the impact analyses, the combined effects of many actions over time that would be missed if each action were evaluated separately. CEQ guidelines recognize that it is not practical to analyze the cumulative effects of an action from every conceivable perspective but rather, the intent is to focus on those effects that are truly meaningful. This section serves to examine the potential direct and indirect effects of the alternatives in Framework 56 together with past, present, and reasonably foreseeable future actions that affect the human environment. It should also be noted that the predictions of potential synergistic effects from multiple actions, past, present and/or future will generally be qualitative in nature.

Valued Ecosystem Components (VEC)
As noted in Section 6.0 (Description of the Affected Environment), the VECs that exist within the groundfish fishery are identified and the basis for their selection is established. Those VECs were identified as follows:

1. Regulated groundfish stocks (target and non-target);
2. Non-groundfish species (incidental catch and bycatch);
3. Endangered and other protected species;
4. Habitat, including non-fishing effects; and
5. Human Communities (includes economic and social effects on the fishery and fishing communities).

Temporal Scope of the VECs
While the effects of historical fisheries are considered, the temporal scope of past and present actions for regulated groundfish stocks, non-groundfish species, habitat and the human environment is primarily focused on actions that have taken place since implementation of the initial NE Multispecies FMP in 1977. An assessment using this timeframe demonstrates the changes to resources and the human environment that have resulted through management under the Council process and through U.S. prosecution of the fishery, rather than foreign fleets. For endangered and other protected species, the context is largely focused on the 1980s and 1990s, when NMFS began generating stock assessments for marine mammals and turtles that inhabit waters of the U.S. EEZ. In terms of future actions, this analysis examines the period between the expected implementation of this framework (May, 2017) and 2022.

Geographic Scope of the VECs
The geographic scope of the analysis of impacts to regulated groundfish stocks, non-groundfish species and habitat for this action is the total range of these VECs in the Western Atlantic Ocean, as described in the Affected Environment section of the document (Section 6.0). However, the analyses of impacts presented in this framework focuses primarily on actions related to the harvest of the managed resources. The result is a more limited geographic area used to define the core geographic scope within which the majority of harvest effort for the managed resources occurs. For endangered and protected species, the geographic range is the total range of each species (Section 6.5).

Because the potential exists for far-reaching sociological or economic impacts on U.S. citizens who may not be directly involved in fishing for the managed resources, the overall geographic scope for human communities is defined as all U.S. human communities. Limitations on the availability of information

needed to measure sociological and economic impacts at such a broad level necessitate the delineation of core boundaries for the human communities. Therefore, the geographic range for the human environment is defined as those primary and secondary ports bordering the range of the groundfish fishery (Section 6.6) from the U.S.-Canada border to, and including, North Carolina.

Analysis of Total Cumulative Effects

A cumulative effects assessment ideally makes effect determinations based on the culmination of the following: (1) impacts from past, present and reasonably foreseeable future actions; PLUS (2) the baseline condition for resources and human communities (note – the baseline condition consists of the present condition of the VECs plus the combined effects of past, present and reasonably foreseeable future actions); PLUS (3) impacts from the Preferred Alternative and other alternatives.

A description of past, present and reasonably foreseeable future actions is presented in Table 87. The baseline conditions of the resources and human community are subsequently summarized although it is important to note that beyond the stocks managed under this FMP and protected species, quantitative metrics for the baseline conditions are not available. Finally, a brief summary of the impacts from the alternatives contained in this framework is included. The culmination of all these factors is considered when making the cumulative effects assessment.

Impact definitions for the tables in this section are as summarized in Table 55.

7.6.2 Past, Present, and Reasonably Foreseeable Future Actions

The following is a synopsis of the most applicable past, present, and reasonably foreseeable future actions (PPRFFA) that have the potential to interact with the current action. For a complete historical list of PPRFFAs, please see Amendment 16 and Amendment 18– the last EIS developed for the NE Multispecies FMP.

Table 87 - Summary of Effects on VECs from Past, Present, and Reasonably Foreseeable Future FMP and Other Fishery Related Actions.

Actions	Habitat	Regulated Groundfish Stocks	Non-Groundfish Species	Endangered and other Protected Resources	Human Communities
Past and Present Fishing Actions					
Amendment 13 (2004) – Implemented requirements for stock rebuilding plans and dramatically cut fishing effort on groundfish stocks. Implemented the process for creating sectors and established the GB Cod Hook Gear Sector	L+	H+	+ .	L+ .	Mixed
FW 40A (2004) – allowed additional fishing on GB haddock for sector and non-sector hook gear vessels, created the GB haddock Special Access Pilot Program, and created flexibility by allowing vessels to fish inside and outside the U.S./Canada Area on the same trip	Negl	L-	L-	Negl	+
FW40B (2005) – Allowed Hook Sector members to use GB cod landings caught while using a different gear during the landings history qualification period to count toward the share of GB cod that will be allocated to the sector, revised DAS leasing and transfer programs, modified provisions for the Closed Area II yellowtail flounder SAP, established a DAS credit for vessels standing by an entangled whale, implemented new notification requirements for Category I herring vessels, and removed the net limit for trip gillnet vessels.	Negl to L+	L-	L-	Negl	L+
FW41 (2005) – Allowed for participation in the Hook Gear Haddock SAP by non-sector vessels	Negl	Negl	Negl to L -	Negl	+

Actions	Habitat	Regulated Groundfish Stocks	Non-Groundfish Species	Endangered and other Protected Resources	Human Communities
FW42 (2006) – Implemented further reductions in fishing effort based upon stock assessment data and stock rebuilding needs, implemented GB Cod Fixed Gear Sector	L+	+	+	L+	Mixed
Atlantic Large Whale Take Reduction Plan	Negl to L-	Negl	Negl	+	L-
Monkfish Fishery Management Plan and Amendment 5 (2011) Implemented ACLs and AMs; set the specifications of DAS and trip limits; and make other adjustments to measures in the Monkfish FMP.	L+	+	+	+	Mixed
Spiny Dogfish Fishery Management Plan	Negl	Negl	+	Negl	L+
Amendment 16 to the Northeast Multispecies FMP (2009) Implemented DAS reductions and gear restrictions for the common pool, approved formation of additional 17 sectors	+	+	+	+	Mixed
Skate Fishery Management Plan and Amendment 3 (2010) Amendment 3 implemented final specifications for the 2010 and 2011 FYs, implemented ACLs and AMs, implemented a rebuilding plan for smooth skate and established an ACL and annual catch target for the skate complex, total allowable landings for the skate wing and bait fisheries, seasonal quotas for the bait fishery, new possession limits, in season possession limit triggers.	+	+	+	+	-

Actions	Habitat	Regulated Groundfish Stocks	Non-Groundfish Species	Endangered and other Protected Resources	Human Communities
FW 44 to the Northeast Multispecies FMP (2010) Set ACLs, established TACs for transboundary U.S./CA stocks, and made adjustments to trip limits/DAS measures	+	+	+	+	Mixed
FW 45 to the Northeast Multispecies FMP (2011) Revised the biological reference points and stock status for pollock, updated ACLs for several stocks for FYs 2011–2012, adjusted the rebuilding program for GB yellowtail flounder, increased scallop vessel access to the Great South Channel Exemption Area, modified the existing dockside and at-sea monitoring requirements, established a GOM Cod Spawning Protection Area, authorized new sectors and adjusted TACs for stocks harvested in the US/ CA area for FY 2011.	L+	L+	L+	L+	Mixed
FW 46 to the Northeast Multispecies FMP (2011) Increased the haddock catch cap for the herring fishery to 1% of the haddock ABC for each stock of haddock.	Negl	Negl	Negl	Negl	L-
Harbor Porpoise Take Reduction Plan (2010) Plan was amended to expand seasonal and temporal requirements within the HPTRP management areas; incorporate additional management areas; and create areas that would be closed to gillnet fisheries if certain levels of harbor porpoise bycatch occurs.	Likely +	Likely +	Likely +	Likely +	Likely -

Actions	Habitat	Regulated Groundfish Stocks	Non-Groundfish Species	Endangered and other Protected Resources	Human Communities
Scallop Amendment 15 (2011) Implemented ACLs and AMs to prevent overfishing of scallops and yellowtail flounder; addressed excess capacity in the LA scallop fishery; and adjusted several aspects of the overall program to make the Scallop FMP more effective, including making the EFH closed areas consistent under both the scallop and groundfish FMPs for scallop vessels.	Negl	L+	Negl	Negl	L+
Amendment 17 to the Northeast Multispecies FMP This amendment streamlined the administration process whereby NOAA-sponsored, state-operated permit banks can operate in the sector allocation management program	Negl	Negl	Negl	Negl	Negl
FW 47 to the Northeast Multispecies FMP (2012) FW 47 measures include revisions to the status determination for winter flounder, revising the rebuilding strategy for GB yellowtail flounder, Measures to adopt ACLs, including relevant sub-ACLs and incidental catch TACs; adopting TACs for U.S/Canada area, as well as modifying management measures for SNE/MA winter flounder, restrictions on catch of yellowtail flounder in GB access areas and accountability measures for certain stocks	Negl	+	+	Negl	-

Actions	Habitat	Regulated Groundfish Stocks	Non-Groundfish Species	Endangered and other Protected Resources	Human Communities
Secretarial Amendment to Establish Annual Catch Limits and Accountability Measures for the Small-Mesh Multispecies Fishery This amendment established the mechanism for implementing ACLs and AMs.	Negl to L+	Negl	Negl	Negl	Negl to +
Amendment 3 to the Spiny Dogfish FMP This amendment established a research set aside program, updates to EFH definitions, year-end rollover of management measures and revisions to the quota allocation scheme.	Likely Negl	Likely Negl	Likely L+	Likely Negl	Likely L+
Framework 24 to the Atlantic Sea Scallop FMP (Framework 49 to the Northeast Multispecies FMP) This framework set specifications for scallop FY 2013 and 2014. It is also considered measures to refine the management of yellowtail flounder bycatch in the scallop fishery	Likely Negl	Likely Negl to L+	Likely Negl to L+	Likely Negl	Likely - to +
FW 48 to the Northeast Multispecies FMP This FW modified the ACL components for several stocks, adjust AMs for commercial and recreational vessels, modify catch monitoring provisions, and allow sectors to request access to parts of groundfish closed areas.	Mixed	+	+	+	Mixed
FW50 to the Multispecies FMP This FW adopted FY2013-2015 ACLs and specifications for the U.S./Canada Total Allowable Catches (TACs)	+	+	+	Negl	-

Actions	Habitat	Regulated Groundfish Stocks	Non-Groundfish Species	Endangered and other Protected Resources	Human Communities
FW51 to the Multispecies FMP This FW adopted FY2014-2016 ACLs and specifications for the U.S./Canada Total Allowable Catches (TACs) and included changes to management measures	Mixed	+	+	Negl	Mixed
Framework 25 to the Atlantic Sea Scallop FMP This framework sets specifications for scallop FY 2014 and 2015. It is also considering accountability measures for windowpane flounder stocks.	Likely Negl	Likely Negl to L+	Likely Negl to L+	Likely Negl	Likely - to +
FW52 to the Multispecies FMP This FW would modify existing AMs for northern and southern windowpane flounder	Likely L+	Likely +	Likely +	Negl	Likely +
FW53 to the Multispecies FMP This FW adopted FY2015-2017 ACLs and specifications for the U.S./Canada Total Allowable Catches (TACs) and included changes to management measures including measures to protect GOM cod	Mixed	Mixed	Mixed	Negl to Low -	Mixed
Framework 26 to the Atlantic Sea Scallop FMP This framework sets specifications for scallop FY 2016 and 2017. It is established proactive accountability measures for windowpane flounder.	Likely Negl	Likely Negl to L+	Likely Negl to L+	Likely Negl	Likely - to +
FW 54 to the Multispecies FMP/ Joint Monkfish Framework 9 This framework modified regulations for vessels in the DAS program.	Neg to Low-	Mixed	Mixed	Negl	Neg to L+

Actions	Habitat	Regulated Groundfish Stocks	Non-Groundfish Species	Endangered and other Protected Resources	Human Communities
Amendment 19 to the Atlantic Sea Scallop FMP This amendment changed the start of the Scallop FY to April 1, and developed a specification setting process	Negl	Negl	Negl	Negl	Likely +
Framework 27 to the Atlantic Sea Scallop FMP This framework set specifications for scallop FY 2017 and 2018. It is established access areas.	Likely Negl	Likely Negl	Likely Negl	Likely Negl	Likely +
FW55 to the Multispecies FMP This FW adopted FY2016-2018 ACLs and specifications for the U.S./Canada Total Allowable Catches (TACs) and included changes to commercial and recreational management measures	Mixed	Mixed	Mixed	Negl	Mixed
Framework 28 to the Atlantic Sea Scallop FMP This framework would set specifications for scallop FY 2018 and 2019. It is also established access areas.	Likely Negl	Likely Negl	Likely Negl	Likely Negl	Likely +
Reasonably Foreseeable Future Fishing Actions					
Omnibus Essential Fish Habitat Amendment Phase 2 of the Omnibus EFH Amendment would consider the effects of fishing gear on EFH and move to minimize, mitigate or avoid those impacts that are more than minimal and temporary in nature. Further, Phase 2 would reconsider closures put in place to protect EFH and groundfish mortality in the Northeast Region.	Likely +	Negl to L+	Negl to L+	Negl to Slight -	Mixed

Actions	Habitat	Regulated Groundfish Stocks	Non-Groundfish Species	Endangered and other Protected Resources	Human Communities
Harbor Porpoise Take Reduction Plan (Potential Future Actions) Future changes to the plan in response to additional information and data about abundance and bycatch rates.	Likely L+	Likely +	Likely +	Likely +	Likely -
A18 to the Multispecies FMP This amendment would create accumulation limits, adjustments to management of Handgear A permits, and inshore/offshore measures could be developed through a framework.	Negl	Likely L+	Likely L+	Negl	Mixed

Note: ND = note determined

Table 87 summarizes the combined effects of past, present and reasonably foreseeable future actions that affect the VECs, i.e., actions other than those alternatives under development in this document.

Note that most of the actions affecting this framework and considered in Table 87 come from fishery-related activities (e.g., federal fishery management actions – many of which are identified above in Table 88). As expected, these activities have fairly straightforward effects on environmental conditions, and were, are, or will be taken, in large part, to improve those conditions. The reason for this is the statutory basis for federal fisheries management: the reauthorized Magnuson-Stevens Act. That legislation was enacted to promote long-term positive impacts on the environment in the context of fisheries activities. More specifically, the act stipulates that management comply with a set of National Standards that collectively serve to optimize the conditions of the human environment. Under this regulatory regime, the cumulative impacts of past, present, and future Federal fishery management actions on the VECs should be expected to result in positive long-term outcomes. Nevertheless, these actions are often associated with offsetting impacts. For example, constraining fishing effort frequently results in negative short-term socio-economic impacts for fishery participants. However, these impacts are usually necessary to bring about long-term sustainability of a given resource and as such should, in the long-term, promote positive effects on human communities, especially those that are economically dependent upon the managed resource.

Non-fishing activities were also considered when determining the combined effects from past, present and reasonably foreseeable future actions. Activities that have meaningful effects on the VECs include the introduction of chemical pollutants, sewage, changes in water temperature, salinity, dissolved oxygen, and suspended sediment into the marine environment. These activities pose a risk to the all of the identified VECs in the long term. Human induced non-fishing activities that affect the VECs under consideration in this document are those that tend to be concentrated in near shore areas. Examples of these activities include, but are not limited to agriculture, port maintenance, beach nourishment, coastal development, marine transportation, marine mining, dredging and the disposal of dredged material. Wherever these activities co-occur, they are likely to work additively or synergistically to decrease habitat quality and, as such, may indirectly constrain the sustainability of the managed resources, non-target species, and protected resources. Decreased habitat suitability would tend to reduce the tolerance of these

VECs to the impacts of fishing effort. Mitigation of this outcome through regulations that would reduce fishing effort could then negatively impact human communities.

Omnibus Essential Fish Habitat Amendment 2 is considering six types of management alternatives: (1) EFH designations, (2) HAPC designations, (3) Habitat Management Areas, (4) Spawning Management Areas, (5) Dedicated Habitat Research Areas, and (6) changes to approaches to framework adjustments and monitoring.

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. EFH designations consist of two complementary elements, the text descriptions, and the map representations. The EFH maps are generally based on trawl survey data, with higher relative abundance areas identified as EFH. Most of the maps are refined using depth and temperature data. A major improvement in the new text descriptions is their inclusion of specific depth and temperature ranges that more explicitly connect with the map representations of EFH.

This amendment also includes a number of alternatives to designate habitat areas of particular concern, or HAPCs. Designation of HAPCs is intended to indicate which areas within EFH should receive more of the Council's and NMFS' attention when providing comments on Federal and state actions, and in establishing higher standards to protect and/or restore such habitat.

The habitat management and spawning protection alternatives consist of combinations of current areas, modified versions of current areas, or newly identified areas. The alternatives were developed to address either adverse effects minimization, including more focused objectives related to juvenile groundfish habitat protection, or spawning protection objectives, respectively. Fishing restriction measures vary by area and alternative type. Generally mobile-bottom tending gear restrictions are proposed in habitat management areas and restrictions on gears capable of catching groundfish are proposed in spawning areas.

One approach to address habitat-related information needs is to designate Dedicated Habitat Research Areas (DHRAs) in concert with habitat management areas. These DHRAs would be the focus of research activities to provide information to managers, improve understanding of the ecological effects of fishing across a range of habitats, and ultimately improve model forecasts and inform future habitat management.

Amendment 18 addresses concerns regarding fleet diversity and fishery consolidation within the Northeast Multispecies FMP. A18 would create an accumulation limit on the Potential Sector Contribution that may be held in aggregate across all stocks to an average of no more than 15.5. A Northeast multispecies permit holder could retain one permit with PSC in excess of this limit, and would need to indicate to NMFS annually which permit(s) would be rendered unusable (such that useable holdings are within the limit). No additional permits could be retained. The permits rendered unusable could not be contributed to a sector or to the common pool. Additionally, it would create a limit on the number of permits that may be held to no more than 5%. These accumulation limits would apply to individuals, permit banks and other entities; and could be adjusted through a future framework adjustment due to a permit buyout/buyback program. The PSC cap would be enforced at the beginning of the fishing year following the year in which the limit is reached. For Handgear A (HA) Permits, A18 would remove the March 1-20 closure for common pool HA vessels; remove the standard fish tote requirement for HA vessels; and allow sectors to annually request that HA vessels fishing in the sector be exempt from use of VMS (would use IVR). Additionally, allow a Handgear A permit sub-ACL to be created through a future framework adjustment. For inshore/offshore GOM, the Council was interested in further developing the concepts through a future action. The concepts may include establishing an inshore/offshore boundary within the Gulf of Maine, splitting the GOM cod ACL into and inshore and offshore sub-ACLs, adjusting

gear restriction boundaries, and creating declaration time periods for inshore and offshore areas. Current regulations already allow for each of these concepts to be developed through a framework adjustment.

Table 88 - Summary effects of past, present, and reasonably foreseeable future actions on the VECs identified for Framework 56.

VEC	Past Actions	Present Actions	Reasonably Foreseeable Future Actions	Combined Effects of Past, Present, Future Actions
Regulated Groundfish Stocks	**Mixed** Combined effects of past actions have decreased effort, improved habitat protection, and implemented rebuilding plans when necessary. However, some stocks remain overfished	**Positive** Current regulations continue to manage for sustainable stocks	**Positive** Future actions are anticipated to continue rebuilding and strive to maintain sustainable stocks	**Short-term Negative** Several stocks are currently overfished, have overfishing occurring, or both **Long-Term Positive** Stocks are being managed to attain rebuilt status
Non-Groundfish Species	**Positive** Combined effects of past actions have decreased effort and improved habitat protection	**Positive** Current regulations continue to manage for sustainable stocks, thus controlling effort on direct and discard/bycatch species	**Positive** Future actions are anticipated to continue rebuilding and target healthy stocks, thus limiting the take of discards/bycatch	**Positive** Continued management of directed stocks will also control incidental catch/bycatch
Endangered and Other Protected Species	**Positive** Combined effects of past fishery actions have reduced effort and thus interactions with protected resources	**Positive** Current regulations continue to control effort, thus reducing opportunities for interactions	**Mixed** Future regulations will likely control effort and thus protected species interactions, but as stocks improve, effort will likely increase, possibly increasing interactions	**Positive** Continued effort controls along with past regulations will likely help stabilize protected species interactions
Habitat	**Mixed** Combined effects of effort reductions and better control of non-fishing activities have been positive but fishing activities and non-fishing activities continue to reduce habitat quality	**Mixed** Effort reductions and better control of non-fishing activities have been positive but fishing activities and non-fishing activities continue to reduce habitat quality	**Mixed** Future regulations will likely control effort and thus habitat impacts but as stocks improve, effort will likely increase along with additional non-fishing activities	**Mixed** Continued fisheries management will likely control effort and thus fishery related habitat impacts but fishery and non-fishery related activities will continue to reduce habitat quality
Human Communities	**Mixed** Fishery resources have supported profitable industries and communities but increasing effort and catch limit controls have curtailed fishing opportunities	**Mixed** Fishery resources continue to support communities but increasing effort and catch limit controls combined with non-fishing impacts such as high fuel costs have had a negative economic impact	**Short-term Negative** As effort controls are maintained or strengthened, economic impacts will be negative **Long-term Positive** As stocks improve, effort will likely increase which would have a positive impact	**Short-term Negative** Revenues would likely decline dramatically in the short term and may remain low until stocks are fully rebuilt **Long-term Positive** Sustainable resources should support viable communities and economies

Impact Definitions:
-Regulated Groundfish Stocks, Non-groundfish species, Endangered and Other Protected Species: positive=actions that increase stock size and negative=actions that decrease stock size
-Habitat: positive=actions that improve or reduce disturbance of habitat and negative=actions that degrade or increase disturbance of habitat
-Human Communities: positive=actions that increase revenue and well-being of fishermen and/or associated businesses and negative=actions that decrease revenue and well-being of fishermen and/or associated businesses

7.6.3 Baseline Conditions for Resources and Human Communities

For the purposes of a cumulative effects assessment, the baseline conditions for resources and human communities is considered the present condition of the VECs plus the combined effects of the past, present, and reasonably foreseeable future actions. The following tables (Table 89 and Table 90) summarizes the added effects of the condition of the VECs (i.e., status/trends from Section 6.2) and the sum effect of the past, present and reasonably foreseeable future actions (from Table 88 above). The resulting CEA baseline for each VEC is exhibited in the last column (shaded). In general, straightforward quantitative metrics of the baseline conditions are only available for the managed resources, non-target species, and protected resources. The conditions of the habitat and human communities VECs are complex and varied. As such, the reader should refer to the characterizations given in Sections 6.1 and 6.5, respectively. As mentioned above, this cumulative effects baseline is then used to assess cumulative effects of the proposed management actions in Table 91 and Table 92.

Table 89 - Cumulative effects assessment baseline conditions of regulated groundfish stocks.

VEC		Status/Trends, Overfishing	Status/Trends, Overfished	Combined Effects of Past, Present Reasonably Foreseeable Future Actions	Combined CEA Baseline Conditions
Regulated Groundfish Stocks	GB Cod	Unknown	***Yes***	**Negative** – short term: Several stocks are currently overfished, have overfishing occurring, or both; **Positive** – long term: Stocks are being managed to attain rebuilt status	**Negative** – short term: Overharvesting in the past contributed to several stocks being overfished or where overfishing is occurring; **Positive –** long term: Regulatory actions taken over time have reduced fishing effort and with the addition of Amendment 16, stocks are expected to rebuild in the future
	GOM Cod	***Yes***	***Yes***		
	GB Haddock	No	No		
	GOM Haddock	No	No		
	GB Yellowtail Flounder	Unknown	Unknown		
	SNE/MA Yellowtail Flounder	***Yes***	***Yes***		
	CC/GOM Yellowtail Flounder	***Yes***	***Yes***		
	American Plaice	No	No		
	Witch Flounder	Unknown	Unknown		
	GB Winter Flounder	***Yes***	***Yes***		
	GOM Winter Flounder	No	Unknown		
	SNE/MA Winter Flounder	No	***Yes***		
	Acadian Redfish	No	No		
	White Hake	No	No		
	Pollock	No	No		
	Northern (GOM-GB) Windowpane Flounder	No	***Yes***		
	Southern (SNE-MA) Windowpane Flounder	No	No		
	Ocean Pout	No	***Yes***		
	Atlantic Halibut	Unknown	***Yes***		
	Atlantic Wolffish	No	***Yes***		

Table 90 – Cumulative effects assessment baseline conditions of non-groundfish species, habitat, protected resources, and human communities.

VEC		Status/Trends	Combined Effects of Past, Present Reasonably Foreseeable Future Actions (Table 88)	Combined CEA Baseline Conditions
Non-groundfish Species (principal species listed in section 6.3)	**Monkfish**	Not overfished and overfishing is not occurring.	**Positive** – Continued management of directed stocks will also control incidental catch/bycatch.	**Positive** – Although prior groundfish management measures likely contributed to redirecting effort onto non-groundfish species, as groundfish rebuild this pressure should lessen and all of these species are also managed through their own FMP.
	Dogfish	Not overfished and overfishing is not occurring.		
	Skates	Thorny skate is overfished and overfishing is occurring. Winter skate is not overfished but overfishing is occurring. All other skate species are not overfished and overfishing is not occurring.		
Habitat		Fishing impacts are complex and variable and typically adverse (see section 6.1); Non-fishing activities had historically negative but site-specific effects on habitat quality.	**Mixed** – Future regulations will likely control effort and thus habitat impacts but as stocks improve, effort will likely increase along with additional non-fishing activities. An omnibus amendment to the FMP with mitigating habitat measures is under development.	**Mixed** - reduced habitat disturbance by fishing gear but impacts from non-fishing actions, such as climate change, could increase and have a negative impact.
Protected Resources	**Sea Turtles**	Leatherback, Kemp's ridley and green sea turtles are classified as endangered under the ESA and loggerhead sea turtles are classified as threatened.	**Positive** – reduced gear encounters through effort reductions and management actions taken under the ESA and MMPA have had a positive impact	**Positive** – reduced gear encounters through effort reductions and additional management actions taken under the ESA and MMPA.
	Fish	Atlantic salmon, Shortnose sturgeon, and Atlantic sturgeon are classified as endangered under the ESA; Atlantic sturgeon Gulf of Maine DPS is listed as threatened; cusk and dusky shark are candidate species		
	Large Cetaceans	Of the baleen whales (right, humpback, fin, blue, sei and minke whales) and sperm whales, all are protected under the MSA and with the exception of minke whales, all are listed as endangered under the ESA.		
	Small Cetaceans	Pilot whales, dolphins and harbor porpoise are all protected under the MSA, the HPTRP and the Large Whale Take Reduction Plan Amendment		

Table 90, continued

VEC		Status/Trends	Combined Effects of Past, Present Reasonably Foreseeable Future Actions	Combined CEA Baseline Conditions
Protected Resources	**Pinnipeds**	ESA classification: Endangered, number of nesting females below sustainable level; taken by longfin trawl	**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.
Human Communities		Complex and variable (see Section 6.5). Although there are exceptions, generally groundfish landings have decreased for most New England states since 2001. Declines in groundfish revenues since 2001 have also generally occurred.	**Negative** – Although future sustainable resources should support viable communities and economies, continued effort reductions over the past several years have had negative impacts on communities	**Negative –** short term: lower revenues would continue until stocks are sustainable **Positive** – long term: sustainable resources should support viable communities and economies

7.6.4 Summary Effects of Framework 56 Actions

The alternatives contained in Framework 56 are focused on changes to status determination criteria, specifications, and management measures. The action temporarily modifies the scallop fishery AM policy for GB yellowtail flounder and northern windowpane flounder for FY 2017 and FY 2018.

Amendment 16 defined the fishing mortality targets needed to rebuild groundfish stocks and end overfishing, and adopted a complex suite of measures designed to achieve these mortality objectives. This action further builds upon the specifications adopted in Frameworks 44, 45, 46, 47, 48, 50, 51, 53, and 55 that used the best available science to translate those mortality targets into specific amounts of fish. These quantities must be defined in order to implement the ACLs and AMs called for in the amendment. The management measures in FW 56 are thus consistent with the amendment. These measures affect the prosecution of the commercial fishery. The proposed changes would allow for a temporary change to the scallop fishery AM policy for GB yellowtail flounder and northern windowpane flounder for FY 2017 and FY 2018.

In general, the adoption of these measures will benefit groundfish stocks because it will be more likely that mortality targets will not be exceeded. These measures are not likely to impact non-groundfish stocks, protected species, or habitat to any great extent when compared to the No Action alternatives.

Table 91 – Summary of impacts of measures relating to SDCs and specifications.

Management Measure		VECs				
		Managed Resources	**Non-target Species**	**Protected Resources**	**Habitat Including EFH**	**Human Communities**
UPDATES TO STATUS DETERMINATION CRITERIAAND ANNUAL CATCH LIMITS	**REVISED STATUS DETERMNA-TION CRITERIA FOR WITCH FLOUNDER**	**Positive** – Revised specifications will guide management actions (AMs) and rebuilding using the best available science. This, combined with past management efforts, should contribute to stock rebuilding and provide positive cumulative impacts.	**No Impact/ Neutral** – Provided rebuilding continues, additional impacts to non-target species are not anticipated	**No Impact/ Neutral** – Provided rebuilding continues, additional impacts to protected species are not anticipated	**No Impact/ Neutral** – Provided rebuilding continues, additional impacts to habitat are not anticipated	**Positive** – Overall revenues will increase as stock rebuilds
	REVISED OFL/ABCs/ ACLs	**Positive** – These ABCs, ACLs, and sub-ACLs, and the AMs will impose tighter controls on fishing mortality for these stocks using the best available science. This, combined with past management efforts, should contribute to stock rebuilding and provide positive. cumulative impacts	**No Impact/ Neutral –** Provided rebuilding continues, additional impacts to non-target species are not anticipated	**No Impact/ Neutral –** Provided rebuilding continues, additional impacts to protected species are not anticipated	**No Impact/ Neutral –** Provided rebuilding continues, additional impacts to habitat are not anticipated	**Mixed** – While the Preferred Alternative produces more revenues than No Action, reduced ACLs (as compared to recent years) will result in continued reductions in fishing revenues in the short term. Overall revenues will increase as stocks increase.

Table 92 – Summary of impacts of measures relating to commercial fishery management measures.

Management Measure		VECs				
		Managed Resources	**Non-target Species**	**Protected Resources**	**Habitat Including EFH**	**Human Communities**
COMMERCIAL FISHERY MEASURES	**TEMPORARY CHANGE TO THE SCALLOP FISHERY AM POLICY FOR GB YELLOWTAIL FLOUNDER AND NORTHERN WINDOWPANE FLOUNDER FOR FY 2017 AND FY 2018**	**Low negative/neutral** – When compared to No Action because this would be a temporary measure. AMs for the scallop fishery would still apply if the overall ACL was exceeded.	**Neutral** – When compared to No Action because this would be a temporary measure.	**Neutral** – When compared to No Action because this would be a temporary measure.	**Neutral** – When compared to No Action because this would be a temporary measure and fishing would not be expected to increase.	**Mixed– Neutral** – When compared to No Action because this would be a temporary measure. **Low negative**– groundfish fishery could be more likely to have AMs in the short-term. **Low positive**– scallop fishery could be less likely to have AMs in the short-term.

7.6.5 Cumulative Effects Summary

The regulatory atmosphere within which Federal fishery management operates requires that management actions be taken in a manner that will optimize the conditions of resources, habitat, and human communities. Consistent with NEPA, the M-S Act requires that management actions be taken only after consideration of impacts to the biological, physical, economic, and social dimensions of the human environment. Given this regulatory environment, and because fishery management actions must strive to create and maintain sustainable resources, impacts on all VECs (except short-term impacts to human communities) from past, present and reasonably foreseeable future actions, when combined with baseline conditions, have generally been positive and are expected to continue in that manner for the foreseeable future. This is not to say that some aspects of the various VECs are not experiencing negative impacts, but rather that when taken as a whole and compared to the level of unsustainable effort that existed prior to and just after the fishery came under management control, the overall long-term trend is positive.

Table 91 and Table 92 provide summaries of likely cumulative effects found in the management alternatives contained in FW56. The CEA baseline that, as described above in Table 89 and Table 90, represents the sum of the past, present, and reasonably foreseeable future (identified hereafter as "other") actions and conditions of each VEC. When an alternative has a positive effect on a VEC, for example, reduced fishing mortality on a managed species, it has a positive cumulative effect on the stock size of the species when combined with the "other" actions that were also designed to increase stock size. In contrast, when an alternative has a negative effect on a VEC, such as increased mortality, the cumulative effect on the VEC would be negative and tend to reduce the positive effects of the "other" actions. The resultant positive and negative cumulative effects are described below for each VEC.

<u>Managed Resources</u>

As noted in Table 89 and Table 90, the combined impacts of past federal fishery management actions have led to short-term impacts that result in overfishing and/or overfished status for several stocks. However, management measures, in particular modifications implemented through Amendment 16 to the FMP, are expected to yield rebuilt sustainable groundfish stocks in the future. The action proposed by FW 56 is expected to continue this trend. The adoption of specifications and management measures for the groundfish, small-mesh, herring, and scallop fisheries are designed to meet fishing mortality targets and to promote stock rebuilding. The past and present impacts, combined with the Preferred Alternatives and future actions which are expected to continue rebuilding and strive to maintain sustainable stocks, should yield positive non-significant impacts to managed resources in the long term. In addition, the cumulative impacts of A18 on groundfish species are likely to be negligible and potentially positive for some aspects.

Non-Target Species

As noted in Table 90, the combined impacts of past federal fishery management actions have decreased fishing effort and improved habitat protection for non-target species. Current management measures, including those implemented through Amendment 16 to the FMP, are expected to continue to control effort, and decrease bycatch and discards. The action proposed by FW 56 is expected to continue this trend. The primary mechanism is through the reduced ABCs/ACLs (reduced from recent years). The modifications in management measures are expected to affect non-target species depending on fishing behavior. The past and present impacts, combined with the Preferred Alternative and future actions which are expected to continue rebuilding and strive to maintain sustainable stocks, should yield positive non-significant impacts to non-target species.

Protected Resources

As noted in Table 90, the combined impacts of past federal fishery management actions have reduced fishing effort, and therefore reduced interactions with protected resources. Current management measures, including those implemented through Amendment 16 to the FMP, are expected to continue to control effort and catch, and therefore continue to lessen interactions with protected resources. The action proposed by FW 56 is expected to continue this trend; however, as stocks rebuild to sustainable levels, future actions may lead to increased effort, which may increase potential interactions with protected species. The reductions in ABCs/ACLs may provide short-term benefits to protected resources as groundfish fishing effort will decline, but as stocks rebuild effort may increase. Changes to management measures are not expected to affect protected species. Overall, the combination of past, present, and future actions is expected to stabilize protected species interactions and lead to positive, non-significant cumulative impacts to protected species.

Habitat, Including EFH

As noted in Table 90, the combined impacts of past federal fishery management actions have reduced fishing effort, and therefore have been positive for habitat protection. In addition, better control of non-fishing activities has also been positive for habitat protection. However, both fishing and non-fishing activities continue to decrease habitat quality. The management measures are not expected to have substantial impacts on habitat or EFH. The reduced ABCs/ACLs may result in reduced groundfish fishing activity and provide some minor short-term benefits to habitat. Overall, the combination of past, present, and future actions is expected to reduce fishing effort and hence reduce damage to habitat, resulting in slightly positive, non-significant cumulative impacts. However, it is likely that fishing and non-fishing activities will continue to degrade habitat quality.

Human Communities

As noted in Table 90, the combined impacts of past federal fishery management actions have reduced effort, and therefore have curtailed fishing opportunities. Past and current management measures, including those implemented through Amendment 16 to the FMP and subsequent framework actions, will maintain effort and catch limit controls, which together with non-fishing impacts such as rising fuel costs have had significant negative short term economic impacts on human communities. Allowing for a temporary change in FY 2017 and FY 2018 to the AM implementation policy for GB yellowtail flounder and northern windowpane flounder will provide some benefits to scallop fishing communities in the short-term. However, this action alone is not expected to have significant socioeconomic impacts beyond what was anticipated in Amendment 16. In addition, the cumulative impacts of A18 on the groundfish fishery are likely to be negligible and potentially positive for some aspects. Overall, the combination of past, present, and future actions is expected to enable a long term sustainable harvest of groundfish stocks, which should lead to a long term positive impact on fishing communities and economies.

8.0 APPLICABLE LAWS

8.1 Magnuson-Stevens Fishery Conservation and Management Act

8.1.1 Consistency with National Standards

Section 301 of the Magnuson-Stevens Act requires that regulations implementing any Fishery Management Plan or Amendment be consistent with the ten national standards listed below.

Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.

Amendment 16 to the Northeast Multispecies FMP adopted measures designed to end overfishing on the groundfish stocks that were subject to excessive fishing pressure at the time of its development. This action adjusts those measures in a way that is designed to maximize optimum yield while preventing overfishing and continuing rebuilding plans. For overfished fisheries, the Magnuson-Stevens Act defines optimum yield as the amount of fish which provides for rebuilding to a level consistent with producing the maximum sustainable yield from the fishery. The measures are designed to achieve the fishing mortality rates, and yields, necessary to rebuild the overfished stocks as well as to keep fishing mortality below overfishing levels for stocks that are not in a rebuilding program. The measures in Section 4.1 that adopt status determination criteria and adjust ACLs set controls on catch to ensure that the appropriate fishing mortality rates are implemented. Changes to commercial measures in Section 4.2 implement and adjust programs to achieve the desired mortality levels.

Conservation and management measures shall be based on the best scientific information available.

The Preferred Alternatives are based on the most recent estimates of stock status available for all stocks in the Northeast multispecies complex. These estimates are mostly in the form of information provided by the Northeast Fisheries Science Center in the 2016 TRAC and Integrated Peer Review, and 2016 SAW/SARC 62. Additionally, the mortality limits were determined based on the scientific advice of the SSC, which recommends ABCs to the Council.

With respect to bycatch information, the action uses bycatch information from the most recent assessments. Bycatch data from observer reports, vessel logbooks, or other sources must be rigorously reviewed before conclusions can be drawn on the extent and amount of bycatch. While additional observer data has been collected since the most recent assessments were completed, it has not been analyzed or reviewed through the stock assessment process and thus cannot be used.

The economic analyses in this document are based primarily on landings, revenue, and effort information collected through the NMFS data collection systems used for this fishery.

To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.

The Preferred Alternatives manage each individual groundfish stock as a unit throughout its range. Management measures specifically designed for one stock are applied to the entire range of the stock. In addition, the groundfish complex as a whole is managed in close coordination. Management measures are designed and evaluated for their impact on the fishery as a whole.

Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such a manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.

The Preferred Alternatives do not discriminate between residents of different states. They are applied equally to all permit holders, regardless of homeport or location. While the measures do not discriminate between permit holders, they do have different impacts on different participants. This is because of the differences in the distribution of fish and the varying stock levels in the complex. Some of these impacts may be localized, as often communities near the stock may have developed small boat fisheries that target it. These distributive impacts are difficult to avoid given the requirement to rebuild overfished stocks. These distributive impacts are difficult to avoid given the requirement to rebuild overfished stocks. Even if the measures are designed to treat all permit holders the same, the fact that fish stocks are not distributed evenly, and that individual vessels may target specific stocks, means that distributive impacts cannot be avoided.

Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.

The Preferred Alternatives are not expected to significantly reduce the efficiency of fishing vessels. These measures are considered practicable since they allow rebuilding of depleted groundfish stocks and have considered efficiency to the greatest extent possible. None of the measures in this action have economic allocation as their sole purpose; all are designed to contribute to the control of fishing mortality.

Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

The primary effort controls used in this management plan - effort controls and sectors - allow each vessel operator to fish when and how it best suits his or her business. Vessels can make short or long trips, and can fish in any open area at any time of the year. The measures allow for the use of different gear, vessel size, and fishing practices. The specific measures adopted in this action do not reduce this flexibility.

Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

While some of the measures used in the management plan, and proposed by this action, tend to increase costs, those measures are necessary for achieving the plan's objectives. As an example, measures that reduce the efficiency of fishing vessels, including time area closures, tend to increase the costs of fishing vessels since fishing catches are reduced. These measures accomplish other goals, however, by allowing groundfish stocks to rebuild. The measures do not duplicate other regulatory efforts. Management of multispecies stocks in federal waters is not subject to coordinated regulation by any other management body. Absent Council action, a coordinated rebuilding effort to restore the health of the overfished stocks would not occur.

The Council considered the costs and benefits of a range of alternatives to achieve the goals and objectives of this FMP. It considered the costs to the industry of taking no action relative to adopting the measures herein. The expected benefits are greater in the long-term if stocks are rebuilt, though it is clear there are substantial short-term declines in revenue and possible increases in costs that can be expected.

Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse impacts on such communities.

Consistent with the requirements of the Magnuson-Stevens Act to prevent overfishing and rebuild overfished stocks, the Preferred Alternatives may restrict fishing activity through the implementation of low ACLs for GB cod and GB yellowtail flounder in order to achieve rebuilding targets. Analyses of the impacts of these measures show that landings and revenues are likely to decline for many participants in upcoming years due to the rebuilding programs in place for many stocks. In the short term, these declines will probably have negative impacts on fishing communities throughout the region, but particularly on those ports that rely heavily on groundfish. These declines are unavoidable given the M-S Act requirements to rebuild overfished stocks. The need to control fishing mortality means that catches cannot be as high as they would be with less stringent management measures.

Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.

Many measures adopted in Amendment 16 were designed to limit the discards of both groundfish and some other species, including the sector management program, and this action is expected to continue those benefits with no substantial changes.

Conservation and management measures shall, to the extent practicable, promote safety of human life at sea.

Measures adopted in Amendment 16 were designed to improve safety in spite of low ACLs anticipated by subsequent actions in the near future. The flexibility inherent in sector management and the ability to use common pool DAS at any time are key elements of the measures that promoted safety. The Preferred Alternative, in conjunction with Amendment 16 measures, is the best option for achieving the necessary mortality reductions while having the least impact on vessel safety.

8.1.2 Other M-S FCMA requirements

Section 303 (a) of FCMA contains 14 required provisions for FMPs. These are discussed below. It should be emphasized that the requirement is imposed on the FMP. In some cases noted below, the M-S Act requirements are met by information in the Northeast Multispecies FMP, as amended. Any fishery management plan that is prepared by any Council, or by the Secretary, with respect to any fishery, shall—

contain the conservation and management measures, applicable to foreign fishing and fishing by vessels of the United States, which are-- (A) necessary and appropriate for the conservation and management of the fishery to prevent overfishing and rebuild overfished stocks, and to protect, restore, and promote the long-term health and stability of the fishery; (B) described in this subsection or subsection (b), or both; and (C) consistent with the National Standards, the other provisions of this Act, regulations implementing recommendations by international organizations in which the United States participates (including but not limited to closed areas, quotas, and size limits), and any other applicable law;

Foreign fishing is not allowed under this management plan or this action and so specific measures are not included to specify and control allowable foreign catch. The measures in this management plan are designed to prevent overfishing and rebuild overfished stocks. There is one international agreement that is

germane to multispecies management. On December 20, 2010, the International Fisheries Clarification Act stipulated that the U.S./Canada Resource Sharing Understanding, implemented through Amendment 13, can be considered an international agreement for the purposes of setting ACLs. The proposed measures are consistent with that Understanding.

contain a description of the fishery, including, but not limited to, the number of vessels involved, the type and quantity of fishing gear used, the species of fish involved and their location, the cost likely to be incurred in management, actual and potential revenues from the fishery, any recreational interest in the fishery, and the nature and extent of foreign fishing and Indian treaty fishing rights, if any;

Amendment 16 included a thorough description of the multispecies fishery from 2001 through 2008, including the gears used, number of vessels, landings and revenues, and effort used in the fishery. This information was updated for Amendment 18. This action provides a summary of that information and additional relevant information about the fishery in Section 6.6.

assess and specify the present and probable future condition of, and the maximum sustainable yield and optimum yield from, the fishery, and include a summary of the information utilized in making such specification;

The present biological status of the fishery is described in Section 6.2. Likely future conditions of the resource are described in Section 7.6. Impacts resulting from other measures in the management plan other than the measures included here can be found in Amendment 16. The maximum sustainable yield for each stock in the fishery is defined in Amendment 16 and optimum yield for the fishery is defined in Amendment 9.

assess and specify-- (A) the capacity and the extent to which fishing vessels of the United States, on an annual basis, will harvest the optimum yield specified under paragraph (3); (B) the portion of such optimum yield which, on an annual basis, will not be harvested by fishing vessels of the United States and can be made available for foreign fishing; and (C) the capacity and extent to which United States fish processors, on an annual basis, will process that portion of such optimum yield that will be harvested by fishing vessels of the United States;

U.S. fishing vessels are capable of, and expected to, harvest the optimum yield from this fishery as specified in Amendment 16 and Frameworks 44, 45, 47, 49, 50, 51, 53, 55, and this action FW 56. U.S. processors are also expected to process the harvest of U.S. fishing vessels. None of the optimum yield from this fishery is available to foreign fishing.

specify the pertinent data which shall be submitted to the Secretary with respect to commercial, recreational, and charter fishing in the fishery, including, but not limited to, information regarding the type and quantity of fishing gear used, catch by species in numbers of fish or weight thereof, areas in which fishing was engaged in, time of fishing, number of hauls, and the estimated processing capacity of, and the actual processing capacity utilized by, United States fish processors;

Current reporting requirements for this fishery have been in effect since 1994 and were originally specified in Amendment 5. They were slightly modified in Amendments 13 and 16, and VMS requirements were adopted in FW 42. The requirements include Vessel Trip Reports (VTRs) that are submitted by each fishing vessel. Dealers are also required to submit reports on the purchases of regulated groundfish from permitted vessels. Current reporting requirements are detailed in 50 CFR 648.7.

consider and provide for temporary adjustments, after consultation with the Coast Guard and persons utilizing the fishery, regarding access to the fishery for vessels otherwise prevented from harvesting

because of weather or other ocean conditions affecting the safe conduct of the fishery; except that the adjustment shall not adversely affect conservation efforts in other fisheries or discriminate among participants in the affected fishery;

Provisions in accordance with this requirement were implemented in earlier actions, and continue with this action. For common pool vessels, the carry-over of a small number of DAS is allowed from one fishing year to the next. If a fisherman is unable to use all of his DAS because of weather or other conditions, this measure allows his available fishing time to be used in the subsequent fishing year. Sectors will also be allowed to carry forward a small amount of ACE into the next fishing year. This will help sectors react should adverse weather interfere with harvesting the entire ACE before the end of the year. Neither of these practices requires consultation with the Coast Guard.

describe and identify essential fish habitat for the fishery based on the guidelines established by the Secretary under section 305(b)(1)(A), minimize to the extent practicable adverse effects on such habitat caused by fishing, and identify other actions to encourage the conservation and enhancement of such habitat;

Essential fish habitat was defined for Atlantic wolffish in Amendment 16, and for all stocks in an earlier action. A summary of the EFH can be found in Section 6.1.5.

in the case of a fishery management plan that, after January 1, 1991, is submitted to the Secretary for review under section 304(a) (including any plan for which an amendment is submitted to the Secretary for such review) or is prepared by the Secretary, assess and specify the nature and extent of scientific data which is needed for effective implementation of the plan;

Scientific and research needs are not required for a framework adjustment. Current research needs are identified in Amendment 16.

include a fishery impact statement for the plan or amendment (in the case of a plan or amendment thereto submitted to or prepared by the Secretary after October 1, 1990) which shall assess, specify, and describe the likely effects, if any, of the conservation and management measures on-- (A) participants in the fisheries and fishing communities affected by the plan or amendment; and (B) participants in the fisheries conducted in adjacent areas under the authority of another Council, after consultation with such Council and representatives of those participants;

Impacts of this framework on fishing communities directly affected by this action and adjacent areas can be found in Section 7.5.

specify objective and measurable criteria for identifying when the fishery to which the plan applies is overfished (with an analysis of how the criteria were determined and the relationship of the criteria to the reproductive potential of stocks of fish in that fishery) and, in the case of a fishery which the Council or the Secretary has determined is approaching an overfished condition or is overfished, contain conservation and management measures to prevent overfishing or end overfishing and rebuild the fishery;

Objective and measurable Status Determination Criteria for all species in the management plan are presented in Amendment 16, and have been updated in subsequent frameworks, including FW 48, FW 51, FW 53, FW55, and this action FW 56.

establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery, and include conservation and management measures that, to the extent practicable and in the

following priority-- (A) minimize bycatch; and (B) minimize the mortality of bycatch which cannot be avoided;

None of the measures in this framework are expected to increase bycatch beyond what was considered in Amendment 16.

Since this provision requires the establishment of a Standardized Bycatch Reporting Methodology (SBRM), in January 2006, development began on the Northeast Region Omnibus SBRM Amendment. This amendment covers 13 FMPs, 39 managed species, and 14 types of fishing gear. The SBRM Amendment was approved on October 22, 2007, and a final rule became effective on February 27, 2008, however, this SBRM was dismissed by the U.S. Court of Appeals for the District of Columbia Circuit in 2011 (No. 10-5299 Oceana, Inc. v. Gary F. Locke). That method no longer applies to this framework.

The final rule for the omnibus SBRM amendment, developed by both the New England and Mid-Atlantic Fishery Management Councils, was published on June 30, 2015. It is in place and applies to the groundfish fishery. The intended effect of the amendment was to implement the following: a new prioritization process for all allocation of observers if agency funding is insufficient to achieve target observer coverage levels, bycatch reporting and monitoring mechanisms, analytical techniques and allocation of at-sea fisheries observers, a precision-based performance standard for discard estimates, a review and reporting process, framework adjustment and annual specifications provisions, and provisions for industry-funded observers and observer set-aside programs.

assess the type and amount of fish caught and released alive during recreational fishing under catch and release fishery management programs and the mortality of such fish, and include conservation and management measures that, to the extent practicable, minimize mortality and ensure the extended survival of such fish;

This management plan does not include a catch and release recreational fishery management program and thus does not address this requirement.

include a description of the commercial, recreational, and charter fishing sectors which participate in the fishery and, to the extent practicable, quantify trends in landings of the managed fishery resource by the commercial, recreational, and charter fishing sectors;

As noted above, the description of the commercial, recreational, and charter fishing sectors was fully developed in Amendment 16 and Amendment 18, and the commercial and recreational sector is updated and summarized in this document (Section 6.6).

to the extent that rebuilding plans or other conservation and management measures which reduce the overall harvest in a fishery are necessary, allocate any harvest restrictions or recovery benefits fairly and equitably among the commercial, recreational, and charter fishing sectors in the fishery.

This preferred alternative does not allocate harvest restrictions or stock benefits to the fishery. Such allocations were adopted in Amendment 16, while this action adjusts management measures for some stocks within the existing allocation structure.

establish a mechanism for specifying annual catch limits in the plan (including a multiyear plan), implementing regulations, or annual specifications, at a level such that overfishing does not occur in the fishery, including measures to ensure accountability.

The mechanism for establishing annual catch limits was adopted by Amendment 16. This action uses that mechanism to specify ACLs for future fishing years.

8.1.3 EFH Assessment

This essential fish habitat (EFH) assessment is provided pursuant to 50 CFR 600.920(e) of the EFH Final Rule to initiate EFH consultation with the National Marine Fisheries Service.

8.1.3.1 Description of Action

The purpose of the Framework 56 (Northeast Multispecies FMP) Preferred Alternative is to adopt modifications to management measures that will incorporate new information relative to effective program administration that are necessary to achieve the fishing mortality targets required by Amendment 16.

In general, the activity described by this action, fishing for groundfish species, occurs off the New England and Mid-Atlantic coasts within the U.S. EEZ. Thus, the range of this activity occurs across the designated EFH of all Council-managed species (see Amendment 11 to the Northeast Multispecies FMP for a list of species for which EFH was designated, the maps of the distribution of EFH, and descriptions of the characteristics that comprise the EFH). EFH designated for species managed under the Secretarial Highly Migratory Species FMPs are not affected by this action, nor is any EFH designated for species managed by the South Atlantic Council as all of the relevant species are pelagic and not directly affected by benthic habitat impacts.

The Preferred Alternatives are described in Section 4.0. The alternatives include the following general measures:

- Revised status determination criteria
- Revised groundfish specifications
- Temporary change to sea scallop AM implementation policy

8.1.3.2 Assessing the Potential Adverse Impacts

Refer to the Habitat Impacts of the Alternatives (Section 7.2, summarized in Section 7.2.1) for a tabular look at the summary impacts of the Preferred Alternative. Several measures in this action are administrative with no direct impact to habitat, while some of the measures are expected to have neutral impacts on habitat.

Table 93 - Summary of possible effects to EFH as a result of Preferred Alternative

	Preferred Alternative
Possible negative impacts	Revised groundfish specifications Temporary change to sea scallop AM implementation policy
Neutral Impacts	Revised status determination criteria Revised groundfish specifications Temporary change to sea scallop AM implementation policy
Possible Positive Impacts	Revised groundfish specifications
Uncertain Impacts	N/A

8.1.3.3 Minimizing or Mitigating Adverse Impacts

Section 7.2, (habitat impacts of the alternatives) demonstrates that the overall habitat impacts of all the measures combined in this action have neutral impacts relative to the baseline habitat protections established under Amendment 13 to the Northeast Multispecies FMP. As such, additional measures to mitigate or minimize adverse effects of the multispecies fishery on EFH beyond those established under Amendment 13 are not necessary.

8.1.3.4 Conclusions

The Preferred Alternative is unlikely to have noticeable impacts on EFH when compared with recent fishing activity; there may be low negative impacts when compared to the other alternatives.

8.2 National Environmental Policy Act

NEPA provides a mechanism for identifying and evaluating the full spectrum of environmental issues associated with federal actions, and for considering a reasonable range of alternatives to avoid or minimize adverse environmental impacts. This document is designed to meet the requirements of both the M-S Act and NEPA. The Council on Environmental Quality (CEQ) has issued regulations specifying the requirements for NEPA documents (40 CFR 1500 – 1508), as has NOAA in its agency policy and procedures for NEPA in NAO 216-6 §5.04b.1. All of those requirements are addressed in this document, as referenced below.

8.2.1 Environmental Assessment

The required elements of an Environmental Assessment (EA) are specified in 40 CFR 1508.9(b) and NAO 216-6 §5.04b.1. They are included in this document as follows:

- The need for this action are described in Section 3.2;
- The alternatives that were considered are described in Section 4.0;
- The environmental impacts of alternatives are described in Section 7.0;

- The agencies and persons consulted on this action are listed in Section 8.2.3 and Section 8.2.4.

This document includes the following additional sections that are based on requirements for an Environmental Impact Statement (EIS).

- An Executive Summary can be found in Section 1.0.
- A Table of Contents can be found in Section 2.0.
- Background and purpose are described in Section 3.0.
- A summary of the document can be found in Section 1.0.
- A brief description of the affected environment is in Section 6.0.
- Cumulative impacts of the Preferred Alternatives are described in Section 7.6.
- A determination of significance is in Section 8.2.2.
- A list of preparers is in Section 8.2.3.
- The index is in Section 9.3.

8.2.2 Finding of No Significant Impact (FONSI)

NOAA Order (NAO) 216-6A "Compliance with the National Environmental Policy Act" and its accompanying "Policy and Procedures for Compliance with the National Environmental Policy Act and Related Authorities" (Companion Manual, January 13, 2017) contains criteria for determining the significance of the impacts of a proposed action. The CEQ regulations at 40 C.F.R. §1508.27 also state that the significance of an action should be analyzed both in terms of "context" and "intensity." Each criterion listed below is relevant to making a finding of no significant impact and has been considered individually, as well as in combination with the others. The significance of this action is analyzed based on the NAO 216-6A Companion Manual criteria and CEQ's context and intensity criteria. These include:

(1) *Can the Preferred Alternatives reasonably be expected to jeopardize the sustainability of any target species that may be affected by the action?*

Response: The Preferred Alternatives cannot reasonably be expected to jeopardize the sustainability of any target species that may be affected by the action. With respect to the target species in the Northeast Multispecies fishery, the Preferred Alternatives adopts management measures that are consistent with target fishing mortality rates that promote rebuilding and/or sustaining stock sizes.

(2) *Can the Preferred Alternatives reasonably be expected to jeopardize the sustainability of any non-target species?*

Response: For fishery resources that are caught incidental to groundfish fishing activity, there is no indication in the analyses that the alternatives will threaten sustainability. The fishery does not currently jeopardize non-target species, and it is not likely that these alternatives will change that status.

(3) *Can the Preferred Alternatives reasonably be expected to cause substantial damage to the ocean and coastal habitats and/or essential fish habitat as defined under the Magnuson-Stevens Act and identified in FMPs?*

Response: The Preferred Alternatives cannot reasonably be expected to cause substantial damage to the oceans and coastal habitats and/or essential fish habitat. Analyses described in Section 7.2 indicate that only minor impacts are expected.

(4) *Can the Preferred Alternatives be reasonably expected to have a substantial adverse impact on public health or safety?*

Response: Nothing in the Proposed Action can be reasonably expected to have a substantial adverse impact on public health or safety. Measures adopted in Amendment 16 were designed to improve safety in spite of low ACLs anticipated by subsequent actions in the near term future. The flexibility inherent in sector management and the ability to use common pool DAS at any time are key elements of the measures that promoted safety. The Preferred Alternatives, in conjunction with Amendment 16 measures, are the best options for achieving the necessary mortality reductions while having the least impact on vessel safety.

(5) *Can the Preferred Alternatives reasonably be expected to adversely affect endangered or threatened species, marine mammals, or critical habitat of these species?*

Response: The Preferred Alternatives cannot be reasonably expected to adversely affect endangered or threatened species. As discussed in Section 7.3, these species are expected to experience very minimal impacts from the minor changes in fishing effort that are proposed by this action.

(6) *Can the Preferred Alternatives be expected to have a substantial impact on biodiversity and/or ecosystem function within the affected area (e.g., benthic productivity, predator-prey relationships, etc.)?*

Response: The Preferred Alternatives are not expected to have a substantial impact on biodiversity and/or ecosystem function with the affected area. The use of ACLs and AMs will control catches of target and incidental regulated groundfish stocks. Catches of target and incidental catch species under this program will be consistent with the mortality targets of Amendment 16, and thus will not have a substantial impact on predator-prey relationships or biodiversity. Particular measures within this action will have no more than minimal adverse impacts to EFH. It is therefore reasonable to expect that it will not substantially impact biodiversity or ecosystem function.

(7) *Are significant social or economic impacts interrelated with natural or physical environmental effects*?

Response: The Preferred Alternatives are designed to continue the groundfish rebuilding programs that were first adopted in Amendment 13 to the Northeast Multispecies Fishery Management Plan and modified in subsequent actions, including Amendment 16. The environmental assessment documents that no significant natural or physical effects will result from the implementation of the Preferred Alternative. As described in Section 7.1, the measures in this action are designed to continue rebuilding/ promote target catch levels. The action cannot be reasonably expected to have significant impacts on habitat or protected species, as the impacts are expected to fall within the range of those resulting from Amendments 13 and 16. The action's potential economic and social impacts are also addressed in the environmental assessment (Sections 7.4 and 7.5), as well as in the Executive Order 12866 review (Section 8.11.1) and the Initial Regulatory Flexibility Act review (Section 8.11.2).

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 actions on the human environment, defined as "the natural and physical environment and the relationship of the people with that environment." The EA for

FW 56 describes and analyzes the preferred alternatives and concludes that there will be no significant impacts to the natural and physical environment. While some fishermen, shore-side businesses, and others may experience impacts to their livelihood, these impacts, in and of themselves, do not require the preparation of an EIS, as supported by NEPA's implementing regulations at 40 C.F.R. 1508.14. Consequently, because the EA demonstrates that the action's potential natural and physical impacts are not significant, a FONSI remains appropriate under these criteria.

The Proposed Action is predicted to have some short-term positive impacts on fishing vessels, purchasers of seafood products, ports, recreational anglers, and operators of party/charter businesses. The Preferred Alternatives would likely result in an increase in groundfish fishing vessel revenues when compared to No Action for ACLs. This is not informative, however, since No Action would adopt default specifications for the first three months of the FY for EGB cod. The preferred alternatives would be expected to result in $76 million in gross groundfish revenues for FY 2017. This represents approximately a $5 million dollar increase in predicted revenue from FY 2016 ($71 million), but a $4 million dollar reduction in groundfish revenue for FY 2015 ($79 million). The economic impacts of the preferred alternatives are not expected to be uniformly distributed across vessel size class and port. The increase in the midwater trawl Atlantic herring fishery sub-ACL for GB haddock would likely result in positive impacts for the Atlantic herring fishery. The temporary change in the scallop fishery AM implementation policy for GB yellowtail flounder and northern windowpane flounder would likely result in positive economic impacts for the scallop fishery. Overall, the economic impacts of the proposed action are predicted to be positive.

(8) *Are the effects on the quality of the human environment likely to be highly controversial*?

Response: Some aspects concerning the science used to formulate the preferred alternatives on the quality of human environment are expected to be controversial. There is controversy over the scientific evaluation of current stock status that is used to determine future catches. Some members of the public believe the 2016 assessments do not reflect what they see on the water (i.e., underestimate fish abundance), particularly for GB cod, GB yellowtail flounder, and witch flounder.

(9) *Can the Preferred Alternatives reasonably be expected to result in substantial impacts to unique areas, such as historic or cultural resources, park land, prime farmlands, wetlands, wild and scenic rivers or ecologically critical areas?*

Response: No, the Preferred Alternatives cannot be reasonably expected to result in substantial impacts to unique areas or ecological critical areas. The only designated Habitat Area of Particular Concern (HAPC) in the areas affected by this action is protected by an existing closed area that would not be affected by this action. In addition, vessel operations around the unique historical and cultural resources encompassed by the Stellwagen Bank National Marine Sanctuary would not likely be altered by this action. As a result, no substantial impacts are expected from this action.

(10) *Are the effects on the human environment likely to be highly uncertain or involve unique or unknown risks?*

Response: The Preferred Alternatives are not expected to result in highly uncertain effects on the human environment or involve unique or unknown risks. The measures used in this action are similar to those adopted in past management actions, and these prior actions have reduced fishing mortality on many stocks. While there is a degree of uncertainty over how fishermen will react to the proposed measures, the analytic tools used to evaluate the measures attempt to take that uncertainty into account and reflect the likely results as a range of possible outcomes. For example, the economic analysis in Section 7.4 illustrates the distribution of results that are expected rather than provide only a point estimate. Overall, the impacts of the Preferred Alternatives can be, and are, described with a relative amount of certainty. Overall, the

short-term economic impacts of the proposed action are predicted to be negative and the long-term impacts are uncertain but expected to be positive.

(11) *Is the Preferred Alternative related to other actions with individually insignificant, but cumulatively significant impacts?*

Response: The Proposed Action is not related to other actions with individually insignificant but cumulatively significant impacts. The cumulative effects analysis presented in Section 7.6 of this document considers the impacts of the proposed action in combination with relevant past, present, and reasonably foreseeable future actions and concludes that no additional significant cumulative impacts are expected from the Proposed Action.

(12) *Are the Preferred Alternatives likely to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or cause loss or destruction of significant scientific, cultural or historical resources?*

Response: The Preferred Alternatives are not likely to affect objects listed in the National Register of Historic Places or cause significant impact to scientific, cultural, or historical resources. The only objects in the fishery area that are listed in the National Register of Historic Places are ship wrecks, including several in the Stellwagen Bank National Marine Sanctuary. The current regulations allow fishing within the Stellwagen Bank National Marine Sanctuary. The Preferred Alternative would not regulate current fishing practices within the sanctuary. However, vessels typically avoid fishing near wrecks to avoid tangling gear. Therefore, this action would not result in any adverse effects to wrecks.

(13) *Can the Preferred Alternatives reasonably be expected to result in the introduction or spread of a non-indigenous species?*

Response: This action would not result in the introduction or spread of any non-indigenous species, as it would not result in any vessel activity outside of the Northeast region.

(14) *Are the Preferred Alternatives likely to establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration?*

Response: No, the Preferred Alternatives are not likely to establish precedent for future actions with significant effects. The Preferred Alternatives adopt measures designed to reduce fishing mortality for several groundfish stocks to achieve the fishing mortality targets adopted by Amendment 16 and subsequent framework actions. As such, these measures will address a specific problem and are not intended to represent a decision about future management actions that may adopt different measures.

(15) *Can the Preferred Alternatives reasonably be expected to threaten a violation of Federal, State, or local law or requirements imposed for the protection of the environment?*

Response: The Preferred Alternatives are intended to implement measures that would offer further protection of marine resources and would not threaten a violation of Federal, state, or local law or requirements to protect the environment.

(16) *Can the Preferred Alternatives reasonably be expected to result in cumulative adverse effects that could have a substantial effect on the target species or non-target species?*

Response: As specified in the responses to the first two criteria of this section, the Preferred Alternatives are not expected to result in cumulative adverse effects that would have a substantial effect on target or non-target species. This action would maintain fishing mortality within M-S Act requirements for

several groundfish stocks, with no expected increase in mortality for non-target and non-groundfish stocks.

FONSI STATEMENT:	
In view of the information presented in this document and the analysis contained in the supporting Environmental Assessment prepared for Framework Adjustment 56 to the Northeast Multispecies Fishery Management Plan, it is hereby determined that Framework Adjustment 56 will not significantly impact the quality of the human environment as described above and in the supporting Environmental Assessment. In addition, all beneficial and adverse impacts of the Proposed Action have been addressed to reach the conclusion of no significant impacts. Accordingly, preparation of an EIS for this action is not required.	
Regional Administrator, Greater Atlantic Regional Fisheries Office, NOAA	Date

8.2.3 List of Preparers; Point of Contact

Questions concerning this document may be addressed to:

Mr. Thomas A. Nies, Executive Director
New England Fishery Management Council
50 Water Street, Mill 2
Newburyport, MA 01950 (978) 465-0492

This document was prepared by:

Gregory Ardini (NEFSC)
Michelle Bachman (NEFMC)
Deirdre Boelke (NEFMC)
Daniel Caless, NMFS Greater Atlantic Regional Fisheries Office (GARFO)
Timothy Cardiasmenos (GARFO)
Dr. Jamie Cournane (NEFMC)
Dr. Greg DeCelles (Massachusetts Division of Marine Fisheries)
Chad Demarest (NEFSC)
Robin Frede (NEFMC)
Mark Grant (GARFO)
Paul Nitschke (NEFSC)
Danielle Palmer (GARFO)
Jonathon Peros (NEFMC)
Sally Sherman, Maine Department of Marine Resources
Aja Szumylo (GARFO)
Maria Vasta (NEFSC)

8.2.4 Agencies Consulted

The following agencies were consulted in the preparation of this document:

Mid-Atlantic Fishery Management Council
New England Fishery Management Council, which includes representatives from the following additional organizations:
- Connecticut Department of Environmental Protection
- Rhode Island Department of Environmental Management
- Massachusetts Division of Marine Fisheries
- New Hampshire Fish and Game
- Maine Department of Marine Resources

National Marine Fisheries Service, NOAA, Department of Commerce
United States Coast Guard, Department of Homeland Security

8.2.5 Opportunity for Public Comment

The Preferred Alternatives were developed during the period June 2016 through January 2017 and were discussed at the following meetings. Opportunities for public comment were provided at each of these meetings.

Date	Meeting Type	Location
6/9/16	Groundfish Committee	Hilton Garden Inn Logan, Boston, MA
6/21-23/16	Council	Holiday Inn by the Bay, Portland, ME
8/2/16	Recreational Advisory Panel	DoubleTree by Hilton, Portland, ME
8/3/16	Groundfish Committee	DoubleTree by Hilton, Portland, ME
8/30/16	Groundfish Advisory Panel	DoubleTree by Hilton, Danvers, MA
9/12/16	Groundfish Committee	Fairfield Inn, New Bedford, MA
9/20-22/16	Council	DoubleTree by Hilton, Danvers, MA
10/3/16	Groundfish Committee	Hilton Garden Inn Logan, Boston, MA
10/26/2016	Recreational Advisory Panel	Hilton Garden Inn, Plymouth, MA
11/1/16	Groundfish Advisory Panel	Radisson Airport Hotel, Warwick, RI
11/2/16	Groundfish Committee	Radisson Airport Hotel, Warwick, RI
11/15-17/16	Council	Hotel Viking, Newport, RI
1/18/17	Recreational Advisory Panel	Hilton Garden Inn, Freeport, ME
1/18/17	Groundfish Advisory Panel	Hilton Garden Inn, Freeport, ME
1/19/17	Groundfish Committee	Hilton Garden Inn, Freeport, ME
1/24-26/17	Council	Sheraton Harborside, Portsmouth, NH

8.3 Endangered Species Act

Section 7 of the Endangered Species Act requires federal agencies conducting, authorizing or funding activities that affect threatened or endangered species to ensure that those effects do not jeopardize the continued existence of listed species, or destroy or adversely modify designated critical habitat. The NEFMC has concluded, at this writing, that the proposed framework adjustment and the prosecution of the multispecies fishery is not likely to jeopardize any ESA- listed species, or destroy or adversely modify any designated critical habitat, based on the discussion of impacts in this document and on the assessment of impacts in the Amendment 16 Environmental Impact Statement.

The Council does acknowledge that endangered and threatened species may be affected by the measures proposed, but impacts should be minimal especially when compared to the prosecution of the fishery prior to implementation of Amendment 16. The NEFMC is now seeking the concurrence of the National Marine Fisheries Service with respect to Framework Adjustment 56.

For further information on the potential impacts of the fishery and the proposed management action on listed species, see Section 7.3 of this document.

8.4 Marine Mammal Protection Act

The NEFMC has reviewed the impacts of the Preferred Alternatives on marine mammals and has concluded that the management actions proposed are consistent with the provisions of the MMPA. Although they are likely to affect species inhabiting the multispecies management unit, the measures will not alter the effectiveness of existing MMPA measures, such as take reduction plans, to protect those species based on overall reductions in fishing effort that have been implemented through the FMP.

For further information on the potential impacts of the fishery and the proposed management action on marine mammals, see Section 7.3 of this document.

8.5 Coastal Zone Management Act

Section 307(c)(1) of the Federal CZMA of 1972 requires that all Federal activities that directly affect the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable. Pursuant to Section 930.36(c) of the regulations implementing the Coastal Zone Management Act, NMFS made a general consistency determination that the Northeast Multispecies Fishery Management Plan (FMP), including Amendment 16, and Framework Adjustment 56, is consistent to the maximum extent practicable with the enforceable policies of the approved coastal management program of Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina. This general consistency determination applies to the current NE Multispecies Fishery Management Plan (FMP), and all subsequent routine federal actions carried out in accordance with the FMP such as Framework Adjustments and specifications. A general consistency determination is warranted because Framework Adjustments to the FMP are repeated activities that adjust the use of management tools previously implemented in the FMP. A general consistency determination avoids the necessity of issuing separate consistency determinations for each incremental action. This determination was submitted to the above states on October 21, 2009. To date, the states of North Carolina, Rhode Island, Virginia, Connecticut, New Hampshire, and Pennsylvania have concurred with the General Consistency Determination. Consistency was inferred for those states that did not respond.

8.6 Administrative Procedure Act

This action was developed in compliance with the requirements of the Administrative Procedure Act, and these requirements will continue to be followed when the proposed regulation is published. Section 553 of the Administrative Procedure Act establishes procedural requirements applicable to informal rulemaking by federal agencies. The purpose of these requirements is to ensure public access to the federal rulemaking process, and to give the public adequate notice and opportunity for comment. At this time, the Council is not requesting any abridgement of the rulemaking process for this action.

8.7 Data Quality Act

Pursuant to NOAA guidelines implementing section 515 of Public Law 106-554 (the Data Quality Act), all information products released to the public must first undergo a Pre-Dissemination Review to ensure and maximize the quality, objectivity, utility, and integrity of the information (including statistical information) disseminated by or for Federal agencies. The following section addresses these requirements.

8.7.1 Utility of Information Product

The information presented in this document is helpful to the intended users (the affected public) by presenting a clear description of the purpose and need of the Preferred Alternatives on, the measures proposed, and the impacts of those measures. A discussion of the reasons for selecting the Preferred Alternatives is included so that intended users may have a full understanding of the Preferred Alternatives and its implications.

Until a proposed rule is prepared and published, this document is the principal means by which the information contained herein is available to the public. The information provided in this document is based on the most recent available information from the relevant data sources. The development of this document and the decisions made by the Council to propose this action are the result of a multi-stage public process. Thus, the information pertaining to management measures contained in this document has been improved based on comments from the public, the fishing industry, members of the Council, and NOAA Fisheries Service.

This document is available in several formats, including printed publication, CD-ROM, and online through the Council's web page in PDF format. The Federal Register notice that announces the proposed rule and the final rule and implementing regulations will be made available in printed publication, on the website for the Northeast Regional Office, and through the Regulations.gov website. The Federal Register documents will provide metric conversions for all measurements.

8.7.2 Integrity of Information Product

Prior to dissemination, information associated with this action, independent of the specific intended distribution mechanism, is safeguarded from improper access, modification, or destruction, to a degree commensurate with the risk and magnitude of harm that could result from the loss, misuse, or unauthorized access to or modification of such information. All electronic information disseminated by NOAA Fisheries Service adheres to the standards set out in Appendix III, "Security of Automated Information Resources," of OMB Circular A-130; the Computer Security Act; and the Government Information Security Act. All confidential information (e.g., dealer purchase reports) is safeguarded pursuant to the Privacy Act; Titles 13, 15, and 22 of the U.S. Code (confidentiality of census, business,

and financial information); the Confidentiality of Statistics provisions of the Magnuson-Stevens Act; and NOAA Administrative Order 216-100, Protection of Confidential Fisheries Statistics.

8.7.3 Objectivity of Information Product

For purposes of the Pre-Dissemination Review, this document is considered to be a "Natural Resource Plan." Accordingly, the document adheres to the published standards of the Magnuson-Stevens Act; the Operational Guidelines, Fishery Management Plan Process; the Essential Fish Habitat Guidelines; the National Standard Guidelines; and NOAA Administrative Order 216-6, Environmental Review Procedures for Implementing the National Environmental Policy Act.

This information product uses information of known quality from sources acceptable to the relevant scientific and technical communities. Stock status (including estimates of biomass and fishing mortality) reported in this product are based on either assessments subject to peer-review through the Stock Assessment Review Committee or on updates of those assessments prepared by scientists of the Northeast Fisheries Science Center. These update assessments were reviewed for TRAC by the Integrated Peer Review, and the 2016 SAW/SARC 62 which all included participation by independent stock assessment scientists. Landing and revenue information is based on information collected through the Vessel Trip Report and Commercial Dealer databases. Information on catch composition, by tow, is based on reports collected by the NOAA Fisheries Service observer program and incorporated into the sea sampling or observer database systems. These reports are developed using an approved, scientifically valid sampling process. In addition to these sources, additional information is presented that has been accepted and published in peer-reviewed journals or by scientific organizations. Original analyses in this document were prepared using data from accepted sources, and the analyses have been reviewed by members of the Groundfish Plan Development Team.

Despite current data limitations, the conservation and management measures proposed for this action were selected based upon the best scientific information available. The analyses conducted in support of the Preferred Alternative were conducted using information from the most recent complete calendar years, through 2015, and in some cases includes information that was collected during the first eight months of calendar year 2016. Complete data were not available for calendar year 2016. The data used in the analyses provide the best available information on the number of harvesters in the fishery, the catch (including landings and discards) by those harvesters, the sales and revenue of those landings to dealers, the type of permits held by vessels, the number of DAS used by those vessels, the catch of recreational fishermen and the location of those catches, and the catches and revenues from various special management programs. Specialists (including professional members of plan development teams, technical teams, committees, and Council staff) who worked with these data are familiar with the most current analytical techniques and with the available data and information relevant to the groundfish fishery.

The policy choices are clearly articulated, in Section 4.0 of this document, as the management alternatives considered in this action. The supporting science and analyses, upon which the policy choices are based, are summarized and described in Section 7.0 of this document. All supporting materials, information, data, and analyses within this document have been, to the maximum extent practicable, properly referenced according to commonly accepted standards for scientific literature to ensure transparency.

The review process used in preparation of this document involves the responsible Council, the Northeast Fisheries Science Center, the Greater Atlantic Regional Office, and NOAA Fisheries Service Headquarters. The Center's technical review is conducted by senior level scientists with specialties in population dynamics, stock assessment methods, demersal resources, population biology, and the social sciences. The Council review process involves public meetings at which affected stakeholders have

opportunity to provide comments on the document. Review by staff at the Regional Office is conducted by those with expertise in fisheries management and policy, habitat conservation, protected species, and compliance with the applicable law. Final approval of the action proposed in this document and clearance of any rules prepared to implement resulting regulations is conducted by staff at NOAA Fisheries Service Headquarters, the Department of Commerce, and the U.S. Office of Management and Budget.

8.8 Executive Order 13132 (Federalism)

This E.O. established nine fundamental federalism principles for federal agencies to follow when developing and implementing actions with federalism implications. The E.O. also lists a series of policy making criteria to which Federal agencies must adhere when formulating and implementing policies that have federalism implications. However, no federalism issues or implications have been identified relative to the measures proposed in FW 56. This action does not contain policies with federalism implications sufficient to warrant preparation of an assessment under E.O. 13132. The affected states have been closely involved in the development of the proposed management measures through their representation on the Council (all affected states are represented as voting members of at least one Regional Fishery Management Council). No comments were received from any state officials relative to any federalism implications that may be associated with this action.

8.9 Executive Order 13158 (Marine Protected Areas)

The Executive Order on Marine Protected Areas requires each federal agency whose actions affect the natural or cultural resources that are protected by an MPA to identify such actions, and, to the extent permitted by law and to the maximum extent practicable, in taking such actions, avoid harm to the natural and cultural resources that are protected by an MPA. The E.O. directs federal agencies to refer to the MPAs identified in a list of MPAs that meet the definition of MPA for the purposes of the Order. The E.O. requires that the Departments of Commerce and the Interior jointly publish and maintain such a list of MPAs. A list of MPA sites has been developed and is available at: http://marineprotectedareas.noaa.gov/nationalsystem/nationalsystemlist/ No further guidance related to this Executive Order is available at this time.

8.10 Paperwork Reduction Act

The purpose of the PRA is to control and, to the extent possible, minimize the paperwork burden for individuals, small businesses, nonprofit institutions, and other persons resulting from the collection of information by or for the Federal Government. The authority to manage information and recordkeeping requirements is vested with the Director of the Office of Management and Budget (OMB). This authority encompasses establishment of guidelines and policies, approval of information collection requests, and reduction of paperwork burdens and duplications.

FW 56 does not modify existing collection of information requirements implemented by previous amendments to the FMP that are subject to the PRA, including:

- Reporting requirements for SAPs and the Category B (regular) DAS Program;
- Mandatory use of a Vessel Monitoring System (VMS) by all vessels using a groundfish DAS;
- Changes to possession limits, which will change the requirements to notify NMFS of plans to fish in certain areas; and
- Provisions to allow vessel operators to notify NMFS of plans to fish both inside and outside the Eastern U.S./CA area on the same fishing trip.

8.11 Regulatory Impact Review and Initial Regulatory Flexibility Analysis (E.O. 12866 and IRFA)

This Regulatory Impact Review (RIR) is framed around the preferred alternatives selected by the New England Fishery Management Council (NEFMC) for Framework Adjustment 56 to the NE Multispecies (Groundfish) Fishery Management Plan (FMP). The preferred alternatives were selected at the November 2016 NEFMC meeting in Newport, RI and the January 2017 NEFMC meeting in Portsmouth, NH.

8.11.1 Determination of significance under E.O. 12866

The purpose of E.O. 12866 is to enhance planning and coordination with respect to new and existing regulations. This E.O. requires the Office of Management and Budget (OMB) to review regulatory programs that are considered to be "significant." Section 8.11 of this document represents the RIR, which includes an assessment of the costs and benefits of the Proposed Action in accordance with the guidelines established by E.O. 12866. NMFS guidelines provide criteria to be used to evaluate whether a proposed action is significant.

E.O. 12866 requires a review of proposed regulations to determine whether or not the expected effects would be significant, where a "significant regulatory action" means any regulatory action that is likely to result in a rule that may:

1) *Have an annual effect on the economy of $100 million or more, or adversely affect in a material way the economy, a sector of the economy, productivity, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;*
2) *Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;*
3) *Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or*
4) *Raise novel legal or policy issues arising out of legal mandates, the President's priorities, of the principles set forth in the Executive Order*

Section 7.4 presents a detailed economic analysis for the proposed action. This analysis is also summarized below, with references to the relevant tables in Section 7.4. Together, the economic analysis included in Section 7.4 and this RIR demonstrate that the proposed action is not "significant" because it will not have an annual effect on the economy of $100 million or more, or adversely affect in a material way the economy or a sector of the economy, productivity, jobs, the environment, public health, or safety, or State, local, or tribal governments or communities.

8.11.1.1 Objectives

The goals and objectives of Framework Adjustment 56 derive from those detailed in Amendment 16 to the Northeast Multispecies Fishery FMP and are as follows:

Goal 1: Consistent with the National Standards and other required provisions of the Magnuson-Stevens Fishery Conservation and Management Act and other applicable law, manage the northeast multispecies complex at sustainable levels.

Goal 2: Create a management system so that fleet capacity will be commensurate with resource status so as to achieve goals of economic efficiency and biological conservation and that encourages diversity within the fishery.

Goal 3: Maintain a directed commercial and recreational fishery for northeast multispecies.

Goal 4: Minimize, to the extent practicable, adverse impacts on fishing communities and shoreside infrastructure.

Goal 5: Provide reasonable and regulated access to the groundfish species covered in this plan to all members of the public of the United States for seafood consumption and recreational purposes during the stock rebuilding period without compromising the Amendment 13 objectives or timetable. If necessary, management measures could be modified in the future to insure that the overall plan objectives are met.
Goal 6: To promote stewardship within the fishery.

Objective 1: Achieve, on a continuing basis, optimum yield (OY) for the U.S. fishing industry.

Objective 2: Clarify the status determination criteria (biological reference points and control rules) for groundfish stocks so they are consistent with the National Standard guidelines and applicable law.

Objective 3: Adopt fishery management measures that constrain fishing mortality to levels that are compliant with the Sustainable Fisheries Act.

Objective 4: Implement rebuilding schedules for overfished stocks, and prevent overfishing.

Objective 5: Adopt measures as appropriate to support international trans-boundary management of resources.

Objective 6: Promote research and improve the collection of information to better understand groundfish population dynamics, biology and ecology, and to improve assessment procedures in cooperation with the industry.

Objective 7: To the extent possible, maintain a diverse groundfish fishery, including different gear types, vessel sizes, geographic locations, and levels of participation.

Objective 8: Develop biological, economic and social measures of success for the groundfish fishery and resource that insure accountability in achieving fishery management objectives.

Objective 9: Adopt measures consistent with the habitat provisions of the M-S Act, including identification of EFH and minimizing impacts on habitat to the extent practicable.

Objective 10: Identify and minimize bycatch, which include regulatory discards, to the extent practicable, and to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.

8.11.1.2 Description

This Framework Adjustment will affect entities engaged in fishing within the sector and common pool components of the commercial groundfish fishery, the recreational groundfish fishery, the Atlantic sea scallop fishery, the small mesh multispecies fishery, and the midwater trawl Atlantic herring and Atlantic mackerel fisheries. Entities affected are defined here as individual permits engaged in these fisheries.

Description of the entities affected by this Framework Adjustment, specifically the stakeholders of the New England Groundfish Fishery, is provided in Section 6.6 of this document

8.11.1.3 Problem Statement

The need and purpose of the actions proposed in this Framework Adjustment are set forth in Section 3.2 of this document and are incorporated herein by reference.

8.11.1.4 Analysis of Alternatives

This section provides an analysis of each proposed alternative of FW56 as mandated by E.O. 12866. The focus will be on the expected changes 1) in net benefits and costs to entities engaged in the groundfish fishery, 2) changes to the distribution of benefits and costs within the industry, 3) changes in income and employment, 4) cumulative impacts of the regulation, and 5) changes in other social concerns. Much of this information is captured already in the detailed economic impacts and social impacts analyses of Section 7.4 and Section 7.5 of this document. This RIR will summarize and highlight the major findings of the economic impacts analysis provided in Section 7.4 of this document, as mandated by E.O. 12866.

When assessing net benefits and costs of the proposed FY2017 specifications, it is important to note that the analysis will focus on the changes in producer surplus earned by the impacted fishing businesses. Consumer surplus is not expected to be affected by any of the regulatory changes proposed in FW56, given domestically produced and imported groundfish substitutes.

Impacts on entities engaged in fishing within the sector and common pool components of the commercial groundfish fishery, the recreation groundfish fishery, the Atlantic sea scallop fishery, the small mesh multispecies fishery, and the midwater trawl Atlantic herring and Atlantic mackerel fisheries are analyzed separately where appropriate.

A detailed description of the alternatives under consideration can be found in Section 4.0 of this document.

Revised Status Determination Criteria

Two options exist, No Action and Revised Status Determination Criteria (SDC) for Witch Flounder. No Action would retain the numerical estimates of the existing SDCs. Revised SDC for Witch Flounder would update the SDCs to unknown. The economic impacts of these measures translate directly into Annual Catch Limits through the annual specifications process, and are analyzed in combination with the Annual Catch Limits measures in the next section. On its own, these options have no direct economic impacts.

Annual Catch Limits

The economic impacts of changes in Annual Catch Limits are evaluated using a number of different methods and tools as described in Section 7.4.

Two Options exist, Option 1: No Action, and Option 2: Revised Annual Catch Limit Specifications.

Entities engaged in the sector component of the groundfish fishery

Under Option 1, entities engaged in the sector component of the commercial groundfish fishery would only have three months (May, June and July) to operate in the eastern US/CA area before the default ACLs expire and fishing in this area is closed. Model results predict gross revenues for entities in this segment of the fishery to be $65 million under Option 1, a $14 million loss relative to realized FY15 revenues. Operating profits (gross revenues net of costs) are predicted to be $7 million less than FY15 (Table 94 and Figure 20).

Option 2 is predicted to generate $76 million in gross revenues, higher than the Option 1 ($65 million) but modestly lower than the $79 million generated in FY15. Fishery-wide operating profits are predicted to be $54 million, essentially the same as the FY15 realized profit estimates. Profits in this fishery are driven by fuel prices and, should fuel prices remain low for the foreseeable future, the fishery will enjoy slightly higher profits as a percent of revenues going forward than those realized from 2010-2014. However, cost of quota is predicted to increase substantially to nearly $9 million, from $6 million predicted for the current FY (and $8 million estimated to have been realized for FY15). In addition, ASM costs are expected to be borne by the fishery in FY17, adding nearly $1 million to the cost of fishing in the groundfish fishery.

Development of northern windowpane allocations for the Atlantic sea scallop fishery
Two sub-Options for creating an allocation of Northern Windowpane Flounder for the Atlantic sea scallop fishery are also proposed in this action, along with No Action. No Action may increase the probability of triggering the AM in the groundfish fishery, incurring the costs discussed in FW52. During FYs 2010-2012, $10.6 million dollars in average annual revenue was estimated from trips to the large AM area for Northern Windowpane. For the small AM area, estimates were $4.3 million dollars annually. A portion of these revenues could be displaced to other fishing areas, potentially at higher operational costs and lower operating profits. The groundfish fishery would continue to be subject to an AM for any overage of the GOM/GB windowpane flounder ACL, regardless of which fishery caused the overage. When compared to Sub-Option 1A or 1B, this option is more likely to result in measures that will have adverse economic effects on the groundfish fishery through the implementation of AMs if the GOM/GB windowpane flounder ACL is exceeded.

Sub Option 1A would result in positive impacts to the groundfish fishery. The establishment of AMs will incentivize the scallop fishery to reduce incidental catch of GOM/GB windowpane flounder. Such a reduction would leave a greater portion of the total GOM/GB windowpane ACL for the groundfish fishery. While windowpane flounder currently has no retail value to the groundfish fishery, avoiding the triggering of windowpane AMs would increase operational flexibility and avoid the costs associated with the implementation of AM areas. Northern Windowpane AMs have been triggered multiple times in the groundfish fishery, as overages occurred in FYs 2011- 2014. The actual costs associated with these measures have not been measured, but these AMs may account for some small portion of the increased operating costs observed during these years.

Sub Option 1B would result in positive impacts to the groundfish fishery relative to No Action for the reasons listed under Sub Option 1A. Because Sub-Option 1B encompasses such a wide range of options, impacts to the groundfish fishery may be positive or negative relative to Sub-Option 1A. The lower the northern windowpane flounder allocation is for the scallop fishery, the more the groundfish fishery would be expected to benefit.

Increase the Midwater Trawl Atlantic Herring Fishery Sub-ACL for Georges Bank Haddock
Measures are considered that would increase the allocation of GB haddock to the Atlantic herring fishery. Utilization rates in the groundfish fishery for GB haddock are sufficiently low that an increase in the sub-ACL for the herring fishery would have little to no effect on the sector or common pool or the recreational components of the groundfish fishery.

Changes to the Atlantic sea scallop Accountability Measures implementation policy
Sub-Option A would result in negative impacts to the groundfish fishery. This alternative could potentially result in increased incidental catch of yellowtail flounder by the scallop fishery relative to No Action. An increase in GB yellowtail flounder by the scallop fishery could have an impact on stock rebuilding efforts and result in low quotas for the groundfish fishery in the future. Though GB yellowtail utilization has been low (18.9% in FY 2015, 24.5% in FY 2014, and 36.1% in FY 2013), the groundfish fishery would be more likely to target yellowtail if quotas were raised and the stock condition improved.

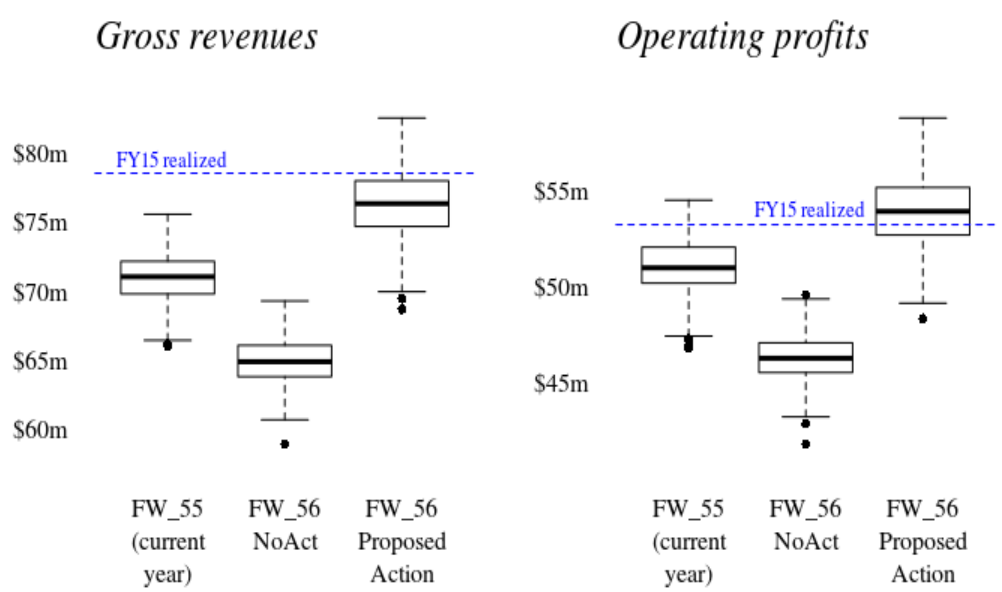
Sub-Option B would result in negative impacts to the groundfish fishery. This alternative could potentially result in increased incidental catch of windowpane flounder by the scallop fishery. Northern Windowpane AMs have been triggered multiple times in the groundfish fishery, as overages occurred in FYs 2011- 2014. The impacts of these AMs on the groundfish fishery were previously analyzed in FW52. During FYs 2010-2012, $10.6 million dollars in average annual revenue was estimated from trips to the large AM area for Northern Windowpane. For the small AM area, estimates were $4.3 million dollars annually.

Table 94- Summary of realized 2015 and predicted 2016 and 2017 revenues and costs for the commercial sector groundfish fishery, nominal dollars (millions).

Option	Fishing Year	Gross Revenues	Gross Revenues from Groundfish	Cost of Operations	Sector Cost	Quota Cost	ASM Cost	Operating Profit	Crew Days	Days Absent
FY15-Realized	2015	79.3	54.8	15.8	1.9	7.9	0.0	53.8	15,106	54,156
FW55-Prediction	2016	71.1	53.9	17.1	1.9	5.8	0.0	51.3	13,208	48,706
FW56-No Action	2017	64.9	47.0	12.7	1.6	6.1	0.8	46.3	12,668	45,510
FW56-Proposed Action	2017	76.4	53.4	14.1	1.8	8.8	0.8	54.0	14,506	52,065

*Data in millions of dollars, 2016

Figure 20- Distribution of predictions relative to FY15 realized values, gross revenues (left) and operating profits (right).



Entities engaged in the common pool component of the groundfish fishery
Entities engaged in the common pool component of the commercial groundfish fishery may be slightly negatively impacted by Option 1, as fishing opportunities in the eastern US/CA area would be diminished in the second and third trimesters of FY17 which may put additional pressures on available TACs for species more abundant in inshore fishing areas during these times. However, relatively few common pool trips occur in this area at all and the additional fishing pressure is anticipated to be minimal. Total revenues for the common pool component of the fishery were $2.7 million in FY15.

Revenues have been steadily declining, both from groundfish and on groundfish trips, for common pool vessels since the inception of the common pool (Table 95). This trend seems likely to moderate slightly, but continue under the Option 2 (Table 94).

Increase the Midwater Trawl Atlantic Herring Fishery Sub-ACL for Georges Bank Haddock
Measures are considered that would increase the allocation of GB haddock to the Atlantic herring fishery. Utilization rates in the groundfish fishery for GB haddock are sufficiently low that an increase in the sub-ACL for the herring fishery would have little to no effect on the sector or common pool or the recreational components of the groundfish fishery.

Table 95- Common Pool catch, gross revenues and average fish prices, 2016 dollars (millions).

FY	Total Catch (mt)	Groundfish Catch (mt)	Total Gross Revenues	Groundfish Gross Revenues	Average Price, All Species	Average Price, Groundfish
2010	3,742	667	7.1	2.2	$0.86	$1.51
2011	3,702	257	7.0	0.9	$0.86	$1.51
2012	2,845	172	5.0	0.6	$0.80	$1.64
2013	2,665	283	4.4	1.0	$0.76	$1.66
2014	2,127	234	3.5	0.9	$0.75	$1.71
2015	2,617	316	2.7	1.3	$0.46	$1.84

Entities engaged in the recreational component of the groundfish fishery
Option 1 will have positive impacts on entities engaged in the recreational component of the fishery relative to FY15 and FY16 due to the unchanged recreational sub-ACL for GOM cod and the 25% increase in the sub-ACL for GOM haddock. Relative to Option 2, the impacts are expected to be neutral.

Option 2 would have potentially positive impacts to the recreational fishery relative to FY 2016. The recreational sub-ACL for GOM cod would remain unchanged at 157mt in FY 2017 and the sub-ACL for GOM haddock would increase 25% from 928mt to 1,160mt. The higher sub-ACL however does not necessarily mean that regulations will be less restrictive than in FY 2016. Recreational rules for FY 2017 will be implemented outside of this FW and will be set in a manner to contain catch at the sub-ACLs.

Option 2 would have neutral impacts to the recreational fishery relative to Option 1. Both alternatives would result in a GOM cod recreational sub-ACL of 157mt and a GOM haddock sub-ACL of 1,160mt during FY 2017.

Increase the Midwater Trawl Atlantic Herring Fishery Sub-ACL for Georges Bank Haddock
Measures are considered that would increase the allocation of GB haddock to the Atlantic herring fishery. Utilization rates in the groundfish fishery for GB haddock are sufficiently low that an increase in the sub-

ACL for the herring fishery would have little to no effect on the sector or common pool or the recreational components of the groundfish fishery.

Entities engaged in the Atlantic sea scallop fishery
Option 1 would have potentially positive impacts to entities engaged in the Atlantic sea scallop fishery relative to FY 2015, depending on realized catch rates for windowpane and yellowtail flounders. The sub-ACL for SNE/MA windowpane flounder would be unchanged from FY 2016. The sea scallop fishery sub-ACL for SNE/MA yellowtail flounder of 34mt in FY2017 could be limiting if incidental catch rates remain similar to recent fishing years. Actual catches were 49mt in FY 2013, 65mt in FY 2014, and 35mt in FY2015. The sub-ACL for SNE/MA windowpane flounder of 209mt in FY2017 could also be limiting if incidental catch rates remain similar to recent fishing years. Actual catches were 129mt in FY 2013, 140mt in FY 2014, and 211mt in FY2015. The extent of revenue reduction from the presence of AMs in the Atlantic sea scallop FMP is uncertain at this time.

Under Option 2, the following sub-ACLs would be allocated to the scallop fishery during the 2017 FY: 32mt of GB yellowtail flounder, 34mt of SNE/MA yellowtail flounder, and 209mt of SNE/MA windowpane flounder. Under Option 2, the FY 2017 sub-ACL adjustment for GB yellowtail would be a decrease of 10mt (24%) relative to FY 2016, while the adjustment for SNE/MA yellowtail would be +2mt (6%) from FY 2016 levels. The sub-ACL for SNE/MA windowpane flounder would be unchanged from FY 2016. Option 2 would have uncertain impacts relative to FY 2016 as one of the sub-ACLs would increase (SNE/MA yellowtail) for FY 2017 and one would decrease (GB yellowtail).

Option 2 would also result in negative impacts relative to Option 1. Under Option 1, the FY 2017 sub-ACL for GB yellowtail would be 55mt, a 13mt (31%) increase from FY 2016. Actual catches of GB yellowtail by the scallop fishery were 37mt in FY 2013, 59mt in FY2014, and 30mt in FY 2015. AMs were not triggered in any of these years. Recent utilization rates of GB yellowtail flounder in the groundfish fishery (18.9% in FY 2015, 24.5% in FY 2014, and 36.1% in FY 2013) suggests that the total ACL may not be exceeded in FY 2017, even if the sub-ACL in the scallop fishery is. This would mean that the likely threshold of GB yellowtail catch to trigger scallop fishery AMs would be 48mt (150% of 32mt) under Option 2.

Under Option 2, the sea scallop fishery sub-ACL for SNE/MA yellowtail flounder of 34mt in FY2017 could be limiting if incidental catch rates remain similar to recent fishing years. Actual catches were 49mt in FY 2013, 65mt in FY 2014, and 35mt in FY2015. The sub-ACL for SNE/MA windowpane flounder of 209mt in FY2017 could be limiting if incidental catch rates remain similar to recent fishing years. Actual catches were 129mt in FY 2013, 140mt in FY 2014, and 211mt in FY2015. The extent of revenue reduction from the presence of AMs is uncertain at this time.

Development of northern windowpane allocations for the Atlantic sea scallop fishery
The action also considers a No Action option and two sub-Options that would develop a specific allocation of Northern Windowpane Flounder. These options would impact entities in this fishery.

Under the No Action option there would be no allocation of GOM/GB windowpane flounder and no possibility of AMs being placed on the scallop fishery due to catch of GOM/GB windowpane. This option would not change gross revenues, profits or costs associated with this fishery.

Sub Option 1A would result in negative impacts to the scallop fishery relative to No Action. The potential impacts of AMs on the scallop fishery cannot be quantified at this time since AM provisions would be developed in a future action. Furthermore, incidental catch of Northern windowpane is highly variable and will be largely driven by what access areas are open in a given fishing year and what open areas are most profitable to fish in. High levels of effort on Georges Bank in one year would increase the likelihood

of windowpane AMs being triggered and, depending on the AM provisions, fishing availability on Georges Bank may be impacted for the following year.

Since the details behind potential AMs for the scallop fishery are not available at this time, the economic impacts of Sub-Option 1A across all fisheries is uncertain. From an equity standpoint, Sub-Option 1A would be a positive action as the groundfish fishery would no longer be the sole cost bearer for high catches of windowpane in the scallop fishery.

Sub Option 1B would result in negative impacts to the scallop fishery relative to No Action. As with the groundfish fishery, the impacts of Sub Option 1B to the scallop fishery may be positive or negative relative to Sub-Option 1A depending on the selected allocation. The potential impacts of AMs on the scallop fishery cannot be quantified at this time since the AM provisions would be developed in a future action.

Changes to the Atlantic sea scallop Accountability Measures implementation policy
No Action would also result in positive impacts relative to Sub-Option A. Under the Option 2 ACLs, the FY 2017 sub-ACL for GB yellowtail would be 32mt, a 10mt (24%) decline from FY 2016. Actual catches of GB yellowtail by the scallop fishery were 37mt in FY 2013, 59mt in FY2014, and 30mt in FY 2015. AMs were not triggered in any of these years. Recent utilization rates of GB yellowtail flounder in the groundfish fishery (19.3% in FY 2015, 24.5% in FY 2014, and 36.1% in FY 2013) suggests that the total ACL may not be exceeded in FY 2017, even if the sub-ACL in the scallop fishery is. This would mean that the likely threshold of GB yellowtail catch to trigger scallop fishery AMs would be 82.5mt (150% of 55mt) under No Action ACLs. If AMs were triggered, the scallop fishery is subject to area closures in the following fishing years. The length of the AM area closures is determined by the overage percent. If the total ACL is exceeded, the fishery that caused the overage would also be subject to a pound for pound payback under the US/Canada resource sharing agreement.

Sub-Option A would result in negative impacts to the groundfish fishery. This alternative could potentially result in increased incidental catch of yellowtail flounder by the scallop fishery relative to No Action. An increase in GB yellowtail flounder by the scallop fishery could have an impact on stock rebuilding efforts and result in low quotas for the groundfish fishery in the future. Though GB yellowtail utilization has been low (18.9% in FY 2015, 24.5% in FY 2014, and 36.1% in FY 2013), the groundfish fishery would be more likely to target yellowtail if quotas were raised and the stock condition improved.

Sub-Option B would result in positive impacts to the scallop fishery. The removal of one of the triggering mechanisms for AMs could allow for increased fishing effort on Georges Bank. The potential impacts of AMs on the scallop fishery cannot be quantified at this time since AM provisions would be developed in a future action. Furthermore, incidental catch of Northern windowpane is highly variable and will be largely driven by what access areas are open in a given fishing year and what open areas are most profitable to fish in. High levels of effort on Georges Bank in one year would increase the likelihood of windowpane AMs being triggered and, depending on the AM provisions, fishing availability on Georges Bank may be impacted for the following year.

Entities engaged in the small mesh multispecies fishery
For entities engaged in the small mesh multispecies fishery, Option 1 would have positive impacts relative to FY 2016 as the sub-ACL for GB yellowtail flounder in this fishery would increase from 5mt to 7mt for FY 2017. Option 1 would also have positive impacts to the small mesh fishery relative to Option 2, which would decrease the sub-ACL for GB yellowtail flounder to 4mt in FY 2017. While this sub-ACL is not monitored in-season, AMs can be triggered at the end of the FY from an overage, implying that any negative fishery impacts are felt in the subsequent fishing year.

Option 2 would have negative impacts on the small mesh fishery relative to Option 1 and FY 2016. The sub-ACL for GB yellowtail flounder in the small mesh fishery would be decreased from 5mt in FY 2016 to 4mt in FY 2017 under Option 2. Option 1 would increase the sub-ACL to 7mt in FY 2017. While this sub-ACL is not monitored in-season, AMs can be triggered at the end of the FY from an overage

Entities engaged in the midwater trawl Atlantic herring and mackerel fisheries
Three options to increase the Atlantic herring fishery's allocation of George's Bank haddock are proposed in this action. The first, No Action, would have negative impacts to the Atlantic herring fishery relative to FY 2016. The sub-ACL for GB haddock in the midwater trawl Atlantic herring fishery would be decreased to 450mt, a 14% decline from the FY 2016 sub-ACL of 521mt. Based on current levels of incidental GB haddock catch, AMs are unlikely to be triggered in the herring fishery in FY 2016. During FY 2015, the sub-ACL for GB haddock was reached. The impact of the resulting AMs was previously analyzed in FW55, with an estimated loss in herring revenue of $1.8 million dollars. No Action, AMs could potentially be triggered during FY 2017 if incidental catch rates of GB haddock are similar to those of FY 2015. If catch rates are similar to FY 2016, AMs are unlikely to be triggered. No Action would have negative impacts relative to Option 2. Under Option 2, the GB haddock sub-ACL would be increased to at least 534mt. The midwater trawl Atlantic mackerel fishery would be impacted similarly to the midwater trawl Atlantic herring fishery, since these species are often caught on the same trips.

The second Option would have positive impacts on the Atlantic herring fishery relative to Option 1 and FY 2016. The sub-ACL for GB haddock would be increased from FY 2016 under Option 2 from 521mt in FY 2016 to at least 534mt in FY 2017. If Sub-Option 2 is selected, the sub-ACL would be further increased beyond 1% of the U.S. GB haddock ABC up to a 2% maximum. The increased sub-ACL should provide a better opportunity for the Atlantic herring fishery to avoid triggering AMs. During FY 2015, the herring fishery operated under AMs for exceeding the sub-ACL for GB haddock in-season from October 22, 2015 until the end of the 2015 groundfish fishing year. These AMs implemented a 2,000 lb. possession limit for most of the GB stock area, resulting in revenue decreases for the Atlantic herring fishery. The impact of these AMs was previously analyzed in FW55, and the estimated loss in revenue to the herring fishery was $1.8 million dollars. The midwater trawl Atlantic mackerel fishery would be impacted similarly to the midwater trawl Atlantic herring fishery, since these species are often caught on the same trips.

The third Option would result in neutral impacts to the herring fishery, as no adjustment to the sub-ACL for GB haddock in the herring fishery would be made in this action. If the sub-ACL were to be raised in the future, the impacts described in Sub-Option 2A (a lower probability of AMs) would apply to the herring fishery. The midwater trawl Atlantic mackerel fishery would be impacted similarly to the midwater trawl Atlantic herring fishery, since these species are often caught on the same trips.

8.11.1.5 Summary of Expected Economic Impacts from Implementation of FW56 Proposed Action

The Proposed Action for Framework 56 includes:

- Revised Status Determination Criteria for witch flounder. The proposed action would revise status determination criteria for witch flounder consistent with the results of the 2016 peer reviewed benchmark assessment.

- Revised Annual Catch Limit Specifications. The proposed action would adopt new Overfishing limits (OFLs), Acceptable Biological Catches (ABCs), and Annual Catch Limits for FY 2017 – FY 2019 for witch flounder and FY2017 – FY2018 for GB yellowtail flounder would be as specified. Additionally, U.S./Canada TACs- would be specified for GB yellowtail flounder, Eastern GB cod and Eastern GB haddock. This alternative would also distribute the ABCs to the various components of the fishery. State waters and other sub-components would be modified to reflect recent catches for northern windowpane flounder, a sub-ACL for northern windowpane flounder would be allocated to the Atlantic sea scallop fishery based on 90% of the scallop fishery's recent estimated catch (21% of the ABC), and the midwater trawl Atlantic herring sub-ACL for GB haddock would increase (1.5% of the U.S. ABC) with a review process would be established (to potentially modify the sub-ACL to a value of 1% to up to 2% following the completion of the assessment of the total GB haddock).
- Atlantic Sea Scallop fishery AM implementation policy. The proposed action temporarily changes the AM implementation policy for GB yellowtail flounder and northern windowpane flounder for catches occurring in fishing years 2017 and 2018. The temporary change would mean that the scallop fishery AMs for GB yellowtail flounder and northern windowpane flounder would only be implemented if the scallop fishery exceeds its sub-ACL for the stock and the overall ACL for the stock is also exceeded.

The regulations proposed in FW56 are expected to have a neutral to slightly negative impact on gross revenues and a neutral to slightly positive impact on operating profits for entities engaged in the commercial sector and common pool groundfish fisheries relative to a FY 2015 baseline. These regulations are expected to have positive net benefits and increased operating profits relative to taking no action. Table 3 provides a summary of expected economic impacts from FW 56 preferred alternatives compared to those under the set of No Action Alternatives, where those impacts are quantifiable

Revenues and profits for entities engaged in the recreational groundfish, Atlantic sea scallop, small mesh multispecies and Atlantic herring fisheries are expected to be either unaffected or, in the case of Atlantic sea scallop, mildly positive in that the scallop fishery's AM for GB yellowtail flounder and northern windowpane flounder is slightly less likely to be triggered relative to taking no action.

Table 96- Summary of expected economic impacts for the FW56 proposed action for the commercial sector component of the groundfish fishery, 2016 dollars (millions).

Option	Fishing Year	Gross Revenues	Gross Revenues from Groundfish	Cost of Operations	Secto r Cost	Quota Cost	ASM Cost	Operating Profit	Crew Days	Days Absent
FY15-Realized	2015	79.3	54.8	15.8	1.9	7.9	0.0	53.8	15,106	54,156
FW56-No Action	2017	64.9	47.0	12.7	1.6	6.1	0.8	46.3	12,668	45,510
FW56-Proposed Action	2017	76.4	53.4	14.1	1.8	8.8	0.8	54.0	14,506	52,065

In total, if implemented, the proposed action is expected to increase gross revenues for the commercial sector component of the groundfish fishery by $11 million relative to taking no action (Table 96). Operating profits are predicted to be over $7 million higher relative to No Action. Entities engaged in the

other fisheries affected by these regulations are not expected to be materially impacted by the proposed action.

8.11.1.6 Determination of Significance

The Proposed Action is not predicted to have an adverse impact on fishing vessels, purchasers of seafood products, recreational anglers, and operators of party/charter businesses in excess of $100 million. Not all alternatives have impacts that could be quantified, but the likely economic impacts of all FW56 measures have been discussed qualitatively, and where possible, quantified.

8.11.2 Initial Regulatory Flexibility Act

The Chief Counsel for Regulation of the Department of Commerce certified to the Chief Counsel for Advocacy of the Small Business Administration (SBA) that this proposed rule, if adopted, would not have a significant economic impact on a substantial number of small entities.

As outlined in section 2.0, the purpose of this action is to implement Framework 56 to the Northeast Multispecies FMP. Framework 56 would revise groundfish fishery specifications for fishing years 2017-2019 (May 1, 2017, through April 30, 2020), amend the Status Determination Criteria for witch flounder, and temporarily change the scallop fishery's AM implementation policy for GB yellowtail flounder and northern windowpane flounder for catches occurring in fishing years 2017 and 2018. Relative to taking no action, the proposed action allows additional fishing opportunities for the commercial components of the groundfish fishery by extending fishing in the eastern Georges Bank area from three months (May, June and July) f no action is taken, to year-round under the proposed action. The recreational groundfish, Atlantic sea scallop, small mesh multispecies and Atlantic herring fisheries are also impacted by the setting of specifications through fishery-dependent sub-allocations of various groundfish species.

As of May 1, 2015 (beginning of fishing year 2015), NMFS had issued 919 limited-access groundfish permits associated with vessels, 268 recreational handgear permits, 726 limited access and general category Atlantic sea scallop permits, 798 small mesh multispecies permits and 368 Atlantic herring permits. Therefore, 3,079 permits are potentially regulated by this action. When accounting for overlaps between fisheries, this number falls to 2,037 permitted vessels. Each vessel may be individually owned or part of a larger corporate ownership structure, and for RFA purposes it is the ownership entity that is ultimately regulated by the proposed action. Ownership entities are identified on June 1st of each year based on the list of all permit numbers, for the most recent complete calendar year, that have applied for any type of Northeast Federal fishing permit. The current ownership data set is based on calendar year 2015 permits and contains gross sales associated with those permits for calendar years 2013 through 2015.

For RFA purposes only, NMFS has established a small business size standard for businesses, including their affiliates, whose primary industry is commercial fishing (see 50 CFR § 200.2). A business primarily engaged in commercial fishing (NAICS code 11411) is classified as a small business if it is independently owned and operated, is not dominant in its field of operation (including its affiliates), and has combined annual receipts not in excess of $11 million for all its affiliated operations worldwide. The determination as to whether the entity is large or small is based on the average annual revenue for the three years from 2013 through 2015.

Ownership data collected from permit holders indicates that there are 1,505 distinct business entities that hold at least one permit regulated by the proposed action. Of these 1,505 entities, 202 do not have

revenues (are inactive). Of the 1,505 entities, 1,495 entities are categorized as small and 10 are categorized as large entities per the NMFS guidelines. All 1,505 entities could be directly regulated by this proposed action. There are 38 entities that are "monkfish dependent" (greater than 50 percent of the entity's gross sales are from the sales of monkfish) and all are considered small entities.

This action, which updates specifications and lowers thresholds for triggering potentially costly fishing area restrictions, would provide groundfish and scallop fishermen with additional fishing opportunities, enhance their operational flexibility, and increase profits.

The measures proposed in Framework 56 are expected to have a positive economic effect on small entities. They allow for nine additional months of fishing in the eastern US/CA fishing area, and generate $11 million in additional gross revenues.

This action is not expected to have a significant or substantial effect on small entities. The effects on the regulated small entities identified in this analysis are expected to be positive relative to the no action alternative, which would result in lower revenues and profits than the proposed action. Under the proposed action, small entities would not be placed at a competitive disadvantage relative to large entities, and the regulations would not reduce the profits for any small entities relative to taking no action. As a result, an initial regulatory flexibility analysis is not required and none has been prepared.

9.0 REFERENCES

9.1 Glossary

Adult stage: One of several marked phases or periods in the development and growth of many animals. In vertebrates, the life history stage where the animal is capable of reproducing, as opposed to the juvenile stage.

Adverse effect: Any impact that reduces quality and/or quantity of EFH. May include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include sites-specific of habitat wide impacts, including individual, cumulative, or synergistic consequences of actions.

Aggregation: A group of animals or plants occurring together in a particular location or region.

Anadromous species: fish that spawn in fresh or estuarine waters and migrate to ocean waters

Amphipods: A small crustacean of the order Amphipoda, such as the beach flea, having a laterally compressed body with no carapace.

Anaerobic sediment: Sediment characterized by the absence of free oxygen.

Anemones: Any of numerous flowerlike marine coelenterates of the class Anthozoa, having a flexible cylindrical body and tentacles surrounding a central mouth.

Annual Catch Entitlement (ACE): Pounds of available catch that can be harvested by a particular sector. Based on the total PSC for the permits that join the sector.

Annual total mortality: Rate of death expressed as the fraction of a cohort dying over a period compared to the number alive at the beginning of the period (# total deaths during year / numbers alive at the beginning of the year). Optimists convert death rates into annual survival rate using the relationship S=1-A.

ASPIC (A Surplus Production Model Incorporating Covariates): A non-equilibrium surplus production model developed by Prager (1995). ASPIC was frequently used by the Overfishing Definition Panel to define BMSY and FMSY reference points. The model output was also used to estimate rebuilding timeframes for the Amendment 9 control rules.

Bay: An inlet of the sea or other body of water usually smaller than a gulf; a small body of water set off from the main body; e.g. Ipswich Bay in the Gulf of Maine.

Benthic community: Benthic means the bottom habitat of the ocean, and can mean anything as shallow as a salt marsh or the intertidal zone, to areas of the bottom that are several miles deep in the ocean. Benthic community refers to those organisms that live in and on the bottom. (In meaning they live within the substrate; e.g., within the sand or mud found on the bottom. See Benthic infauna, below)

Benthic infauna: See Benthic community, above. Those organisms that live in the bottom sediments (sand, mud, gravel, etc.) of the ocean. As opposed to benthic epifauna, that live on the surface of the bottom sediments.

Benthivore: Usually refers to fish that feed on benthic or bottom dwelling organisms.

Berm: A narrow ledge typically at the top or bottom of a slope; e.g. a berm paralleling the shoreline caused by wave action on a sloping beach; also an elongated mound or wall of earth.

Biogenic habitats: Ocean habitats whose physical structure is created or produced by the animals themselves; e.g., coral reefs.

Biomass: The total mass of living matter in a given unit area or the weight of a fish stock or portion thereof. Biomass can be listed for beginning of year (Jan-1), Mid-Year, or mean (average during the entire year). In addition, biomass can be listed by age group (numbers at age * average weight at age) or summarized by groupings (e.g., age 1+, ages 4+ 5, etc.). See also spawning stock biomass, exploitable biomass, and mean biomass.

BMSY: The stock biomass that would produce MSY when fished at a fishing mortality rate equal to FMSY. For most stocks, BMSY is about ½ of the carrying capacity. The proposed overfishing definition control rules call for action when biomass is below ¼ or ½ BMSY, depending on the species.

Bthreshold: 1) A limit reference point for biomass that defines an unacceptably low biomass i.e., puts a stock at high risk (recruitment failure, depensation, collapse, reduced long term yields, etc.).
2) A biomass threshold that the SFA requires for defining when a stock is overfished. A stock is overfished if its biomass is below Bthreshold. A determination of overfished triggers the SFA requirement for a rebuilding plan to achieve Btarget as soon as possible, usually not to exceed 10 years except certain requirements are met. In Amendment 9 control rules, Bthreshold is often defined as either 1/2BMSY or 1/4 BMSY. Bthreshold is also known as Bminimum.

Btarget: A desirable biomass to maintain fishery stocks. This is usually synonymous with BMSY or its proxy.

Biomass weighted F: A measure of fishing mortality that is defined as an average of fishing mortality at age weighted by biomass at age for a ranges of ages within the stock (e.g., ages 1+ biomass weighted F is a weighted average of the mortality for ages 1 and older, age 3+ biomass

weighted is a weighted average for ages 3 and older). Biomass weighted F can also be calculated using catch in weight over mean biomass. See also fully-recruited F.

Biota: All the plant and animal life of a particular region.

Bivalve: A class of mollusks having a soft body with platelike gills enclosed within two shells hinged together; e.g., clams, mussels.

Bottom roughness: The inequalities, ridges, or projections on the surface of the seabed that are caused by the presence of bedforms, sedimentary structures, sedimentary particles, excavations, attached and unattached organisms, or other objects; generally small scale features.

Bottom tending mobile gear: All fishing gear that operates on or near the ocean bottom that is actively worked in order to capture fish or other marine species. Some examples of bottom tending mobile gear are otter trawls and dredges.

Bottom tending static gear: All fishing gear that operates on or near the ocean bottom that I snot actively worked; instead, the effectiveness of this gear depends on species moving to the gear which is set in a particular manner by a vessel, and later retrieved. Some examples of bottom tending static gear are gillnets, traps, and pots.

Boulder reef: An elongated feature (a chain) of rocks (generally piled boulders) on the seabed.

Bryozoans: Phylum aquatic organisms, living for the most part in colonies of interconnected individuals. A few to many millions of these individuals may form one colony. Some bryozoans encrust rocky surfaces, shells, or algae others form lacy or fan-like colonies that in some regions may form an abundant component of limestones. Bryozoan colonies range from millimeters to meters in size, but the individuals that make up the colonies are rarely larger than a millimeter. Colonies may be mistaken for hydroids, corals or seaweed.

Burrow: A hole or excavation in the sea floor made by an animal (as a crab, lobster, fish, burrowing anemone) for shelter and habitation.

Bycatch: (v.) the capture of nontarget species in directed fisheries which occurs because fishing gear and methods are not selective enough to catch only target species; (n.) fish which are harvested in a fishery but are not sold or kept for personal use, including economic discards and regulatory discards but not fish released alive under a recreational catch and release fishery management program.

Capacity: the level of output a fishing fleet is able to produce given specified conditions and constraints. Maximum fishing capacity results when all fishing capital is applied over the maximum amount of available (or permitted) fishing time, assuming that all variable inputs are utilized efficiently.

Catch: The sum total of fish killed in a fishery in a given period. Catch is given in either weight or number of fish and may include landings, unreported landings, discards, and incidental deaths.

Closed Area Model: A General Algebraic Modeling System (GAMS) model used to evaluate the effectiveness of effort controls used in the Northeast Multispecies Fishery. Using catch data from vessels in the fishery, the model estimates changes in exploitation that may result from changes in DAS, closed areas, and possession limits. These changes in exploitation are then converted to changes in fishing mortality to evaluate proposed measures.

Coarse sediment: Sediment generally of the sand and gravel classes; not sediment composed primarily of mud; but the meaning depends on the context, e.g. within the mud class, silt is coarser than clay.

Commensalism: See Mutualism. An interactive association of two species where one benefits in some way, while the other species is in no way affected by the association.

Continental shelf waters: The waters overlying the continental shelf, which extends seaward from the shoreline and deepens gradually to the point where the sea floor begins a slightly steeper descent to the deep ocean floor; the depth of the shelf edge varies, but is approximately 200 meters in many regions.

Control rule: A pre-determined method for determining fishing mortality rates based on the relationship of current stock biomass to a biomass target. Amendment 9 overfishing control rules define a target

biomass (BMSY or proxy) as a management objective. The biomass threshold (Bthreshold or Bmin) defines a minimum biomass below which a stock is considered overfished.

Cohort: see yearclass.

Crustaceans: Invertebrates characterized by a hard outer shell and jointed appendages and bodies. They usually live in water and breathe through gills. Higher forms of this class include lobsters, shrimp and crawfish; lower forms include barnacles.

Days absent: an estimate by port agents of trip length. This data was collected as part of the NMFS weighout system prior to May 1, 1994.

Days-at-sea (DAS): the total days, including steaming time that a boat spends at sea to fish. Amendment 13 categorized DAS for the multispecies fishery into three categories, based on each individual vessel's fishing history during the period fishing year 1996 through 2001. The three categories are: Category A: can be used to target any groundfish stock; Category B: can only be used to target healthy stocks; Category C: cannot be used until some point in the future. Category B DAS are further divided equally into Category B (regular) and Category B (reserve).

DAS "flip": A practice in the Multispecies FMP that occurs when a vessel fishing on a Category B (regular) DAS must change ("flip") its DAS to a Category A DAS because it has exceeded a catch limit for a stock of concern.

Demersal species: Most often refers to fish that live on or near the ocean bottom. They are often called benthic fish, groundfish, or bottom fish.

Diatoms: Small mobile plants (algæ) with silicified (silica, sand, quartz) skeletons. They are among the most abundant phytoplankton in cold waters, and an important part of the food chain.

Discards: animals returned to sea after being caught; see Bycatch (n.)

Dissolved nutrients: Non-solid nutrients found in a liquid.

Echinoderms: A member of the Phylum Echinodermata. Marine animals usually characterized by a five-fold symmetry, and possessing an internal skeleton of calcite plates, and a complex water vascular system. Includes echinoids (sea urchins), crinoids (sea lillies) and asteroids (starfish).

Ecosystem-based management: a management approach that takes major ecosystem components and services—both structural and functional—into account, often with a multispecies or habitat perspective

Egg stage: One of several marked phases or periods in the development and growth of many animals. The life history stage of an animal that occurs after reproduction and refers to the developing embryo, its food store, and sometimes jelly or albumen, all surrounded by an outer shell or membrane. Occurs before the larval or juvenile stage.

Elasmobranch: Any of numerous fishes of the class Chondrichthyes characterized by a cartilaginous skeleton and placoid scales: sharks; rays; skates.

Embayment: A bay or an indentation in a coastline resembling a bay.

Emergent epifauna: See Epifauna. Animals living upon the bottom that extend a certain distance above the surface.

Epifauna: See Benthic infauna. Epifauna are animals that live on the surface of the substrate, and are often associated with surface structures such as rocks, shells, vegetation, or colonies of other animals.

Essential Fish Habitat (EFH): Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. The EFH designation for most managed species in this region is based on a legal text definition and geographical area that are described in the Habitat Omnibus Amendment (1998).

Estuarine area: The area of an estuary and its margins; an area characterized by environments resulting from the mixing of river and sea water.

Estuary: A water passage where the tide meets a river current; especially an arm of the sea at the lower end of a river; characterized by an environment where the mixing of river and seawater causes marked variations in salinity and temperature in a relatively small area.

Eutrophication: A set of physical, chemical, and biological changes brought about when excessive nutrients are released into the water.

Euphotic zone: The zone in the water column where at least 1% of the incident light at the surface penetrates.

Exclusive Economic Zone (EEZ): a zone in which the inner boundary is a line coterminous with the seaward boundary of each of the coastal States and the outer boundary is line 200 miles away and parallel to the inner boundary

Exempt fisheries: Any fishery determined by the Regional Director to have less than 5 percent regulated species as a bycatch (by weight) of total catch according to 50 CFR 648.80(a)(7).

Exploitable biomass: The biomass of fish in the portion of the population that is vulnerable to fishing.

Exploitation pattern: Describes the fishing mortality at age as a proportion of fully recruited F (full vulnerability to the fishery). Ages that are fully vulnerable experience 100% of the fully recruited F and are termed fully recruited. Ages that are only partially vulnerable experience a fraction of the fully recruited F and are termed partially recruited. Ages that are not vulnerable to the fishery (including discards) experience no mortality and are considered pre-recruits. Also known as the partial recruitment pattern, partial recruitment vector or fishery selectivity.

Exploitation rate (u): The fraction of fish in the exploitable population killed during the year by fishing. This is an annual rate compared to F, which is an instantaneous rate. For example, if a population has 1,000,000 fish large enough to be caught and 550,000 are caught (landed and discarded) then the exploitation rate is 55%.

Fathom: A measure of length, containing six feet; the space to which a man can extend his arms; used chiefly in measuring cables, cordage, and the depth of navigable water by soundings.

Fishing mortality (F): A measurement of the rate of removal of fish from a population caused by fishing. This is usually expressed as an instantaneous rate (F) and is the rate at which fish are harvested at any given point in a year. Instantaneous fishing mortality rates can be either fully recruited or biomass

weighted. Fishing mortality can also be expressed as an exploitation rate (see exploitation rate) or less commonly, as a conditional rate of fishing mortality (m, fraction of fish removed during the year if no other competing sources of mortality occurred. Lower case m should not be confused with upper case M, the instantaneous rate of natural mortality).

F0.1: a conservative fishing mortality rate calculated as the F associated with 10 percent of the slope at origin of the yield-per-recruit curve.

FMAX: a fishing mortality rate that maximizes yield per recruit. FMAX is less conservative than F0.1.

FMSY: a fishing mortality rate that would produce MSY when the stock biomass is sufficient for producing MSY on a continuing basis.

Fthreshold: 1) The maximum fishing mortality rate allowed on a stock and used to define overfishing for status determination. Amendment 9 frequently uses FMSY or FMSY proxy for Fthreshold. 2) The maximum fishing mortality rate allowed for a given biomass as defined by a control rule.

Fishing effort: the amount of time and fishing power used to harvest fish. Fishing power is a function of gear size, boat size and horsepower.

Framework adjustments: adjustments within a range of measures previously specified in a fishery management plan (FMP). A change usually can be made more quickly and easily by a framework adjustment than through an amendment. For plans developed by the New England Council, the procedure requires at least two Council meetings including at least one public hearing and an evaluation of environmental impacts not already analyzed as part of the FMP.

Furrow: A trench in the earth made by a plow; something that resembles the track of a plow, as a marked narrow depression; a groove with raised edges.

Glacial moraine: A sedimentary feature deposited from glacial ice; characteristically composed of unsorted clay, sand, and gravel. Moraines typically are hummocky or ridge-shaped and are located along the sides and at the fronts of glaciers.

Glacial till: Unsorted sediment (clay, sand, and gravel mixtures) deposited from glacial ice.

Grain size: the size of individual sediment particles that form a sediment deposit; particles are separated into size classes (e.g. very fine sand, fine sand, medium sand, among others); the classes are combined into broader categories of mud, sand, and gravel; a sediment deposit can be composed of few to many different grain sizes.

Growth overfishing: Fishing at an exploitation rate or at an age at entry that reduces potential yields from a cohort but does not reduce reproductive output (see recruitment overfishing).

Halocline: The zone of the ocean in which salinity increases rapidly with depth.

Habitat complexity: Describes or measures a habitat in terms of the variability of its characteristics and its functions, which can be biological, geological, or physical in nature. Refers to how complex the physical structure of the habitat is. A bottom habitat with structure-forming organisms, along with other three dimensional objects such as boulders, is more complex than a flat, featureless, bottom.

Highly migratory species: tuna species, marlin, oceanic sharks, sailfishes, and swordfish

Hydroids: Generally, animals of the Phylum Cnidaria, Class Hydrozoa; most hydroids are bush- like polyps growing on the bottom and feed on plankton, they reproduce asexually and sexually.

Immobile epifaunal species: See epifauna. Animals living on the surface of the bottom substrate that, for the most part, remain in one place.

Individual Fishing Quota (IFQ): federal permit under a limited access system to harvest a quantity of fish, expressed by a unit or units representing a percentage of the total allowable catch of a fishery that may be received or held for exclusive use by an individual person or entity

Juvenile stage: One of several marked phases or periods in the development and growth of many animals. The life history stage of an animal that comes between the egg or larval stage and the adult stage; juveniles are considered immature in the sense that they are not yet capable of reproducing, yet they differ from the larval stage because they look like smaller versions of the adults.

Landings: The portion of the catch that is harvested for personal use or sold.

Land runoff: The part of precipitation, snowmelt, or irrigation water that reaches streams (and thence the sea) by flowing over the ground, or the portion of rain or snow that does not percolate into the ground and is discharged into streams instead.

Larvae stage: One of several marked phases or periods in the development and growth of many animals. The first stage of development after hatching from the egg for many fish and invertebrates. This life stage looks fundamentally different than the juvenile and adult stages, and is incapable of reproduction; it must undergo metamorphosis into the juvenile or adult shape or form.

Lethrinids: Fish of the genus Lethrinus, commonly called emperors or nor'west snapper, are found mainly in Australia's northern tropical waters. Distinctive features of Lethrinids include thick lips, robust canine teeth at the front of the jaws, molar-like teeth at the side of the jaws and cheeks without scales. Lethrinids are carnivorous bottom-feeding fish with large, strong jaws.

Limited-access permits: permits issued to vessels that met certain qualification criteria by a specified date (the "control date").

Lutjanids: Fish of the genus of the Lutjanidae: snappers. Marine; rarely estuarine. Some species do enter freshwater for feeding. Tropical and subtropical: Atlantic, Indian and Pacific Oceans.

Macrobenthos: See Benthic community and Benthic infauna. Benthic organisms whose shortest dimension is greater than or equal to 0.5 mm.

Maturity ogive: A mathematical model used to describe the proportion mature at age for the entire population. A50 is the age where 50% of the fish are mature.

Mean biomass: The average number of fish within an age group alive during a year multiplied by average weight at age of that age group. The average number of fish during the year is a function of starting stock size and mortality rate occurring during the year. Mean biomass can be aggregated over several ages to describe mean biomass for the stock. For example the mean biomass summed for ages 1 and over is the 1+ mean biomass; mean biomass summed across ages
3 and over is 3+ mean biomass.

Megafaunal species: The component of the fauna of a region that comprises the larger animals, sometimes defined as those weighing more than 100 pounds.

Mesh selectivity ogive: A mathematical model used to describe the selectivity of a mesh size (proportion of fish at a specific length retained by mesh) for the entire population. L25 is the length where 25% of the fish encountered are retained by the mesh. L50 is the length where 50% of the fish encountered are retained by the mesh.

Meter: A measure of length, equal to 39.37 English inches, the standard of linear measure in the metric system of weights and measures. It was intended to be, and is very nearly, the ten millionth part of the distance from the equator to the north pole, as ascertained by actual measurement of an arc of a meridian.

Metric ton: A unit of weight equal to a thousand kilograms (1kgs = 2.2 lbs.). A metric ton is equivalent to 2,205 lbs. A thousand metric tons is equivalent to 2.2 million lbs.

Microalgal: Small microscopic types of algae such as the green algae.

Microbial: Microbial means of or relating to microorganisms.

Minimum spawning stock threshold: the minimum spawning stock size (or biomass) below which there is a significantly lower chance that the stock will produce enough new fish to sustain itself over the long term.

Mobile organisms: organisms that are not confined or attached to one area or place, that can move on their own, are capable of movement, or are moved (often passively) by the action of the physical environment (waves, currents, etc.).

Molluscs: Common term for animals of the phylum Mollusca. Includes groups such as the bivalves (mussels, oysters etc.), cephalopods (squid, octopus etc.) and gastropods (abalone, snails). Over 80,000 species in total with fossils back to the Cambrian period.

Mortality: see Annual total mortality (A), Exploitation rate (u), Fishing mortality (F), Natural mortality (M), and instantaneous total mortality (Z).

Motile: Capable of self-propelled movement. A term that is sometimes used to distinguish between certain types of organisms found in water.

Multispecies: the group of species managed under the Northeast Multispecies Fishery Management Plan. This group includes whiting, red hake and ocean pout plus the regulated species (cod, haddock, pollock, yellowtail flounder, winter flounder, witch flounder, American plaice, windowpane flounder, white hake and redfish).

Mutualism: See Commensalism. A symbiotic interaction between two species in which both derive some benefit.

Natural disturbance: A change caused by natural processes; e.g. in the case of the seabed, changes can be caused by the removal or deposition of sediment by currents; such natural processes can be common or rare at a particular site.

Natural mortality: A measurement of the rate of death from all causes other than fishing such as predation, disease, starvation, and pollution. Commonly expressed as an instantaneous rate (M). The rate of natural mortality varies from species to species, but is assumed to be M=0.2 for the five critical stocks. The natural mortality rate can also be expressed as a conditional rate (termed n and not additive with competing sources of mortality such as fishing) or as annual expectation of natural death (termed v and additive with other annual expectations of death).

Nearshore area: The area extending outward an indefinite but usually short distance from shore; an area commonly affected by tides and tidal and storm currents, and shoreline processes.

Nematodes: a group of elongated, cylindrical worms belonging to the phylum Nematoidea, also called thread-worms or eel-worms. Some non-marine species attack roots or leaves of plants, others are parasites on animals or insects.

Nemerteans: Proboscis worms belonging to the phylum Nemertea, and are soft unsegmented marine worms that have a threadlike proboscis and the ability to stretch and contract.

Nemipterids: Fishes of the Family Nemipteridae, the threadfin breams or whiptail breams. Distribution: Tropical and sub-tropical Indo-West Pacific.

Northeast Shelf Ecosystem: The Northeast U.S. Shelf Ecosystem has been described as including the area from the Gulf of Maine south to Cape Hatteras, extending from the coast seaward to the edge of the continental shelf, including the slope sea offshore to the Gulf Stream.

Northwest Atlantic Analysis Area (NAAA): A spatial area developed for analysis purposes only. The boundaries of this the area are within the 500 fathom line to the east, the coastline to the west, the Hague line to the north, and the North Carolina/ South Carolina border to the south. The area is approximately 83,550 square nautical miles, and is used as the denominator in the EFH analysis to determine the percent of sediment, EFH, and biomass contained in an area, as compared to the total NAAA.

Nutrient budgets: An accounting of nutrient inputs to and production by a defined ecosystem (e.g., salt marsh, estuary) versus utilization within and export from the ecosystem.

Observer: any person required or authorized to be carried on a vessel for conservation and management purposes by regulations or permits under this Act

Oligochaetes: See Polychaetes. Oligochaetes are worms in the phylum Annelida having bristles borne singly along the length of the body.

Open access: describes a fishery or permit for which there is no qualification criteria to participate. Open-access permits may be issued with restrictions on fishing (for example, the type of gear that may be used or the amount of fish that may be caught).

Opportunistic species: Species that colonize disturbed or polluted sediments. These species are often small, grow rapidly, have short life spans, and produce many offspring.

Optimum Yield (OY): the amount of fish which A) will provide the greatest overall benefit to the nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems; B) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and C) in the case of

an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery

Organic matter: Material of, relating to, or derived from living organisms.

Overfished: A conditioned defined when stock biomass is below minimum biomass threshold and the probability of successful spawning production is low.

Overfishing: A level or rate of fishing mortality that jeopardizes the long-term capacity of a stock or stock complex to produce MSY on a continuing basis.

Peat bank: A bank feature composed of partially carbonized, decomposed vegetable tissue formed by partial decomposition of various plants in water; may occur along shorelines.

Pelagic gear: Mobile or static fishing gear that is not fixed, and is used within the water column, not on the ocean bottom. Some examples are mid-water trawls and pelagic longlines.

Phytoplankton: Microscopic marine plants (mostly algae and diatoms) which are responsible for most of the photosynthetic activity in the oceans.

Piscivore: A species feeding preferably on fish.

Planktivore: An animal that feeds on plankton.

Polychaetes: Polychaetes are segmented worms in the phylum Annelida. Polychaetes (poly-chaetae = many-setae) differ from other annelids in having many setae (small bristles held in tight bundles) on each segment.

Porosity: The amount of free space in a volume of a material; e.g. the space that is filled by water between sediment particles in a cubic centimeter of seabed sediment.

Possession-limit-only permit: an open-access permit (see above) that restricts the amount of multispecies a vessel may retain (currently 500 pounds of "regulated species").

Potential Sector Contribution (PSC): The percentage of the available catch a limited access permit is entitled to after joining a sector. Based on landings history as defined in Amendment 16. The sum of the PSC's in a sector is multiplied by the groundfish sub-ACL to get the ACE for the sector.

Pre-recruits: Fish in size or age groups that are not vulnerable to the fishery (including discards).

Prey availability: The availability or accessibility of prey (food) to a predator. Important for growth and survival.

Primary production: The synthesis of organic materials from inorganic substances by photosynthesis.

Recovery time: The period of time required for something (e.g. a habitat) to achieve its former state after being disturbed.

Recruitment: the amount of fish added to the fishery each year due to growth and/or migration into the fishing area. For example, the number of fish that grow to become vulnerable to fishing gear in one year

would be the recruitment to the fishery. “Recruitment” also refers to new year classes entering the population (prior to recruiting to the fishery).

Recruitment overfishing: fishing at an exploitation rate that reduces the population biomass to a point where recruitment is substantially reduced.

Regulated groundfish species: cod, haddock, pollock, yellowtail flounder, winter flounder, witch flounder, American plaice, windowpane flounder, white hake and redfish. These species are usually targeted with large-mesh net gear.

Relative exploitation: an index of exploitation derived by dividing landings by trawl survey biomass. This measure does not provide an absolute magnitude of exploitation but allows for general statements about trends in exploitation.

Retrospective pattern: A pattern of systematic over-estimation or underestimation of terminal year estimates of stock size, biomass or fishing mortality compared to that estimate for that same year when it occurs in pre-terminal years.

Riverine area: The area of a river and its banks.

Saurids: Fish of the family Scomberesocidae, the sauries or needlefishes. Distribution: tropical and temperate waters.

Scavenging species: An animal that consumes dead organic material.

Sea whips: A coral that forms long flexible structures with few or no branches and is common on Atlantic reefs.

Sea pens: An animal related to corals and sea anemones with a featherlike form.

Sediment: Material deposited by water, wind, or glaciers.

Sediment suspension: The process by which sediments are suspended in water as a result of disturbance.

Sedentary: See Motile and Mobile organisms. Not moving. Organisms that spend the majority of their lives in one place.

Sedimentary bedforms: Wave-like structures of sediment characterized by crests and troughs that are formed on the seabed or land surface by the erosion, transport, and deposition of particles by water and wind currents; e.g. ripples, dunes.

Sedimentary structures: Structures of sediment formed on the seabed or land surface by the erosion, transport, and deposition of particles by water and wind currents; e.g. ripples, dunes, buildups around boulders, among others.

Sediment types: Major combinations of sediment grain sizes that form a sediment deposit, e.g. mud, sand, gravel, sandy gravel, muddy sand, among others.

Spawning adult stage: See adult stage. Adults that are currently producing or depositing eggs.

Spawning stock biomass (SSB): the total weight of fish in a stock that sexually mature, i.e., are old enough to reproduce.

Species assemblage: Several species occurring together in a particular location or region

Species composition: A term relating the relative abundance of one species to another using a common measurement; the proportion (percentage) of various species in relation to the total on a given area.

Species diversity: The number of different species in an area and their relative abundance

Species richness: See Species diversity. A measurement or expression of the number of species present in an area; the more species present, the higher the degree of species richness.

Species with vulnerable EFH: If a species was determined to be "highly" or "moderately" vulnerable to bottom tending gears (otter trawls, scallop dredges, or clam dredges) then it was included in the list of species with vulnerable EFH. Currently there are 23 species and life stages that are considered to have vulnerable EFH for this analysis.

Status Determination: A determination of stock status relative to Bthreshold (defines overfished) and Fthreshold (defines overfishing). A determination of either overfished or overfishing triggers a SFA requirement for rebuilding plan (overfished), ending overfishing (overfishing) or both.

Stock: A grouping of fish usually based on genetic relationship, geographic distribution and movement patterns. A region may have more than one stock of a species (for example, Gulf of Maine cod and Georges Bank cod). A species, subspecies, geographical grouping, or other category of fish capable of management as a unit.

Stock assessment: determining the number (abundance/biomass) and status (life-history characteristics, including age distribution, natural mortality rate, age at maturity, fecundity as a function of age) of individuals in a stock

Stock of concern: a regulated groundfish stock that is overfished, or subject to overfishing.

Structure-forming organisms: Organisms, such as corals, colonial bryozoans, hydroids, sponges, mussel beds, oyster beds, and seagrass that by their presence create a three-dimensional physical structure on the bottom. See biogenic habitats.

Submerged aquatic vegetation: Rooted aquatic vegetation, such as seagrasses, that cannot withstand excessive drying and therefore live with their leaves at or below the water surface in shallow areas of estuaries where light can penetrate to the bottom sediments. SAV provides an important habitat for young fish and other aquatic organisms.

Surficial sediment: Sediment forming the sea floor or land surface; thickness of the surficial layer may vary.

Surplus production: Production of new stock biomass defined by recruitment plus somatic growth minus biomass loss due to natural deaths. The rate of surplus production is directly proportional to stock biomass and its relative distance from the maximum stock size at carrying capacity (K). BMSY is often defined as the biomass that maximizes surplus production rate.

Surplus production models: A family of analytical models used to describe stock dynamics based on catch in weight and CPUE time series (fishery dependent or survey) to construct stock biomass history. These models do not require catch at age information. Model outputs may include stock biomass history, biomass weighted fishing mortality rates, MSY, FMSY, BMSY, K, (maximum population biomass where stock growth and natural deaths are balanced) and r (intrinsic rate of increase).

Survival rate (S): Rate of survival expressed as the fraction of a cohort surviving the a period compared to number alive at the beginning of the period (# survivors at the end of the year / numbers alive at the beginning of the year). Pessimists convert survival rates into annual total mortality rate using the relationship A=1-S.

Survival ratio (R/SSB): an index of the survivability from egg to age-of-recruitment. Declining ratios suggest that the survival rate from egg to age-of-recruitment is declining.

TAC: Total allowable catch. This value is calculated by applying a target fishing mortality rate to exploitable biomass.

Taxa: The plural of taxon. Taxon is a named group or organisms of any rank, such as a particular species, family, or class.

Ten-minute- "squares" of latitude and longitude (TMS): Are a measure of geographic space. The actual size of a ten-minute-square varies depending on where it is on the surface of the earth, but in general each square is approximately 70-80 square nautical miles in this region. This is the spatial area that EFH designations, biomass data, and some of the effort data have been binned into for analysis purposes in various sections of this document.

Topography: The depiction of the shape and elevation of land and sea floor surfaces.

Total Allowable Catch (TAC): The amount (in metric tons) of a stock that is permitted to be caught during a fishing year. In the Multispecies FMP, TACs can either be "hard" (fishing ceases when the TAC is caught) or a "target" (the TAC is merely used as an indicator to monitor effectiveness of management measures, but does not trigger a closure of the fishery).

Total mortality: The rate of mortality from all sources (fishing, natural, pollution) Total mortality can be expressed as an instantaneous rate (called Z and equal to F + M) or Annual rate (called A and calculated as the ratio of total deaths in a year divided by number alive at the beginning of the year)

Trophic guild: Trophic is defined as the feeding level within a system that an organism occupies; e.g., predator, herbivore. A guild is defined as a group of species that exploit the same class of environmental resources in a similar way. The trophic guild is a utilitarian concept covering both structure and organization that exists between the structural categories of trophic groups and species.

Turbidity: Relative water clarity; a measurement of the extent to which light passing through water is reduced due to suspended materials.

Two-bin (displacement) model: a model used to estimate the effects of area closures. This model assumes that effort from the closed areas (first bin) is displaced to the open areas (second bin). The total effort in the system is then applied to the landings-per-unit-effort (LPUE) in open areas to obtain a projected catch. The percent reduction in catch is calculated as a net result.

Vulnerability: In order to evaluate the potential adverse effects of fishing on EFH, the vulnerability of each species EFH was determined. This analysis defines vulnerability as the likelihood that the functional value of EFH would be adversely affected as a result of fishing with different gear types. A number of criteria were considered in the evaluation of the vulnerability of EFH for each life stage including factors like the function of habitat for shelter, food and/or reproduction.

Yield-per-recruit (YPR): the expected yield (weight) of individual fish calculated for a given fishing mortality rate and exploitation pattern and incorporating the growth characteristics and natural mortality.

Yearclass: also called cohort. Fish that were spawned in the same year. By convention, the "birth date" is set to January 1st and a fish must experience a summer before turning 1. For example, winter flounder that were spawned in February-April 1997 are all part of the 1997 cohort (or year-class). They would be considered age 0 in 1997, age 1 in 1998, etc. A summer flounder spawned in October 1997 would have its birth date set to the following January 1 and would be considered age 0 in 1998, age 1 in 1999, etc.

Z: instantaneous rate of total mortality. The components of Z are additive (i.e., $Z = F+M$)

Zooplankton: See Phytoplankton. Small, often microscopic animals that drift in currents. They feed on detritus, phytoplankton, and other zooplankton. They are preyed upon by fish, shellfish, whales, and other zooplankton.

9.2 Literature Cited

Atlantic States Marine Fisheries Commission (ASMFC). 2007. Special Report to the Atlantic Sturgeon Management Board: Estimation of Atlantic sturgeon bycatch in coastal Atlantic commercial fisheries of New England and the Mid-Atlantic. August 2007. 95 pp.
Atlantic States Marine Fisheries Commission. 2009. American Lobster Stock Assessment Report for Peer Review. Stock Assessment report No. 09-01 (Supplement). 316 pp. Available at: http://www.asmfc.org/
Atlantic States Marine Fisheries Commission. August 2015. American Lobster Stock Assessment Report for Peer Review. 462 pp. Available at: http://www.asmfc.org/
Atlantic Sturgeon Status Review Team (ASSRT). 2007. Status review of Atlantic sturgeon (Acipenser oxyrinchus oxyrinchus). National Marine Fisheries Service. February 23, 2007. 188 pp.
Baumgartner, M.F., T.V.N. Cole, R.G. Campbell, G.J. Teegarden and E.G. Durbin. 2003. Associations between North Atlantic right whales and their prey, Calanus finmarchicus, over dieand tidal time scales. Mar. Ecol. Prog. Ser. 264: 155–166.
Baumgartner, M.F. and B.R. Mate. 2003. Summertime foraging ecology of North Atlantic right whales. Mar. Ecol. Prog. Ser. 264: 123–135.
Blaxter, J.H.S., D. Danielssen, E. Moksness, and V. Oiestad. 1983. Description of the early development of the halibut, Hippoglossus hippoglossus and attempts to rear the larvae past first feeding. Marine Biology 73: 99 – 107.
Bolles, K.L., and G.A. Begg. 2000. Distinction between silver hake (*Merluccius bilinearis*) stocks in US waters of the northwest Atlantic based on whole otolith morphometrics. Fishery Bulletin 98:3.
Bowen, B.W., A.L. Bass, S.-M. Chow, M. Bostrom, K.A. Bjorndal, A.B. Bolten, T. Okuyama, B.M. Bolker., S. Epperly, E. Lacasella, D. Shaver, M. Dodd, S.R. Hopkins-Murphy, J.A. Musick, M. Swingle, K. Rankin-Baransky, W. Teas, W.N. Witzell, and P.H. Dutton. 2004. Natal homing in juvenile loggerhead turtles (Caretta caretta). Molecular Ecology 13:3797-3808.
Braun J & Epperly SP. (1996). Aerial surveys for sea turtles in southern Georgia waters, June 1991. Gulf of Mexico Science. 1996(1): 39-44.
Braun-McNeill J., Epperly, S.P., Avens, L., Snover, M.L. and Taylor, J.C. 2008. Life stage duration and variation in growth rates of loggerhead (*Caretta caretta*) sea turtles from the western north Atlantic. Herpetological Conservation and Biology 3(2): 273-281.
Brodziak, J.K.T., and W.K. Macy III. 1996. Growth of long-finned squid, *Loligo pealei*, in the northwest Atlantic. Fishery Bulletin 94 (2): 212 – 236.
Brown, M.B., O.C. Nichols, M.K. Marx, and J.N. Ciano. 2002. Surveillance of North Atlantic right whales in Cape Cod Bay and adjacent waters. 2002. Final report to the Division of Marine Fisheries, Commonwealth of Massachusetts. 29 pp., September 2002.
Carr, H.A. and H.O. Milliken. 1998. Conservation engineering: options to minimize fishing's impacts to the sea floor. Pp. 100–103 in E.M. Dorsey and J. Pederson, eds. Effects of Fishing Gear on the Sea Floor of New England. Conservation Law Foundation, Boston, MA. 160 pp.
Census. State and County QuickFacts. U.S. Census Bureau,; Retrieved from: http://quickfacts.census.gov/qfd/index.html.
Chang, S., P. L. Berrien, et al. 1999. Essential Fish Habitat Source Document: Windowpane, Scophthalmus aquosus, Life History and Habitat Characteristics. NOAA Technical Memorandum NMFS-NE-137. 40pp.
Clapham, P.J., S.B. Young, R.L. Brownell, Jr. 1999. Baleen whales: conservation issues and the status of the most endangered populations. Mammal Review 29(1): 35-60.

Clay, P.M., L.L Colburn, J. Olson, P. Pinto da Silva. 2008. Community Profiles for the Northeast US Fisheries. Available at: http://www.nefsc.noaa.gov/read/socialsci/community_profiles/.
Clay PM, Colburn LL, Olson J, Pinto da Silva P, Smith SL, Westwood A, Ekstrom J. Community Profiles for the Northeast US Fisheries. August 22, 2012. Woods Hole (MA): Northeast Fisheries Science Center; Available from: http://www.nefsc.noaa.gov/read/socialsci/communityProfiles.html.
Cohen, A.C. 1976. The systematics and distribution of Loligo (Cephalopoda, Myopsida) in the western North Atlantic, with descriptions of two new species. Institute of Malacology.
Cole, T. V. N., P. Hamilton, A. G. Henry, P. Duley, R. M. Pace III, B. N. White, T. Frasier. 2013. Evidence of a North Atlantic right whale *Eubalaena glacialis* mating ground. Endang Species Res 21: 55–64.
Collette, B.B. and G. Klein-MacPhee. 2002. Bigelow and Schroeder's Fishes of the Gulf of Maine, Smithsonian Books, Washington, D.C.
Colvocoresses, J.A. and J.A. Musik. 1984. Species associations and community composition of middle Atlantic bight continental shelf demersal fishes. U.S. Fisheries Bulletin 82(2):295-313.
Conant, T.A., P.H. Dutton, T. Eguchi, S.P. Epperly, C.C. Fahy, M.H. Godfrey, S.L. MacPherson, E.E. Possardt, B.A. Schroeder, J.A. Seminoff, M.L. Snover, C.M. Upite, and B.E. Witherington. 2009. Loggerhead sea turtle (Caretta caretta) 2009 status review under the U.S. Endangered Species Act. Report of the Loggerhead Biological Review Team to the National Marine Fisheries Service, August 2009. 222 pp.
Dadswell, M. J., B. D. Taubert, T. S. Squiers, D. Marchette, and J. Buckley. 1984. Synopsis of Biological Data on Shortnose Sturgeon, Acipenser brevirostrum, LeSuer 1818.
Dadswell, M. 2006. A review of the status of Atlantic sturgeon in Canada, with comparisons to populations in the United States and Europe. Fisheries 31: 218-229.
Damon-Randall, K., M. Colligan, and J. Crocker. 2013. Composition of Atlantic Sturgeon in Rivers, Estuaries, and Marine Waters. National Marine Fisheries Service, NERO, Unpublished Report. February 2013. 33 pp.
Deroba J. 2015. Atlantic herring operational assessment report 2015. NEFSC Ref Doc 15-16; 30 p. doi: 10.7289/V5CN71WS
Dodge, K.L., B. Galuardi, T. J. Miller, and M. E. Lutcavage. 2014. Leatherback Turtle Movements, Dive Behavior, and Habitat Characteristics in Ecoregions of the Northwest Atlantic Ocean. PLOS ONE 9 (3) e91726: 1-17.
Dovel, W. L. and T. J. Berggren. 1983. Atlantic sturgeon of the Hudson River estuary, New York. New York Fish and Game Journal 30: 140-172.
Dunton, K.J., A. Jordaan, K.A. McKown, D.O. Conover, and M.G. Frisk. 2010. Abundance and distribution of Atlantic sturgeon (Acipenser oxyrinchus) within the Northwest Atlantic Ocean determined from five fishery-independent surveys. Fish. Bull. 108:450-465.
Epperly, S.P., J. Braun, A.J. Chester, F.A. Cross, J.V. Merriner, and P.A. Tester. 1995. Winter distribution of sea turtles in the vicinity of Cape Hatteras and their interactions with the summer flounder trawl fishery. Bulletin of Marine Science 56(2):547-568.
Erickson, D. L., A. Kahnle, M. J. Millard, E. A. Mora, M. Bryja, A. Higgs, J. Mohler, M. DuFour, G. Kenney, J. Sweka, and E. K. Pikitch. 2011. Use of pop-up satellite archival tags to identify oceanic-migratory patterns for adult Atlantic Sturgeon, *Acipenser oxyrinchus oxyrinchus* Mitchell, 1815. J. Appl. Ichthyol. 27: 356–365.
Falk-Petersen, I.R., and T.K. Hasen. 1991. Reproductive biology of wolffish *Anarhichas lupus* from north-Norwegian waters. Int. Coun. Explor. Mer., Demersal Fish. Comm. ICES CM 1991/G:14:17.
Fay, C., M. Bartron, S. Craig, A. Hecht, J. Pruden, R. Saunders, T. Sheehan, and J. Trial. 2006. Status Review for Anadromous Atlantic Salmon (Salmo salar) in the United States. Report to the National Marine Fisheries Service and U.S. Fish and Wildlife Service. 294 pages.

Furevik D, Humborstad O-B, Jorgensen T & Lokkeborg S. (2008). Floated fish pot eliminates bycatch of red king crab and maintains target catch of cod. Fisheries Research. 92: 23-27.
Gabriel W. (1992). Persistence of demersal fish assemblages between Cape Hatteras and Nova Scotia, northwest Atlantic. *Journal of Northwest Atlantic Fisheries. 14*: 29-46.
Graham, N., M. Lyssikatos, C. Orphanides. in review. A comparative analysis of two fishery observer sampling programs and the impact of pooling on bycatch mortality estimation of marine mammals in the Northeast multispecies groundfish fishery.
Griffin, D.B., S. R. Murphy, M. G. Frick, A. C. Broderick, J. W. Coker, M. S. Coyne, M. G. Dodd, M. H. Godfrey, B. J. Godley, L. A. Hawkes, T. M. Murphy, K. L. Williams, and M. J. Witt. 2013. Foraging habitats and migration corridors utilized by a recovering subpopulation of adult female loggerhead sea turtles: implications for conservation. Mar. Biol. 160: 3071–3086.
Grosslein, M.D., and T.R. Azarovitz. 1982. Fish distribution. Monograph 15. MESA New York Bight Atlas. New York Sea Grant Institute, Albany, New York.
Harden Jones, F.R., Margetts, A.R., Greer Walker, M., Arnold, G.P., 1977. The efficiency of the Granton otter trawl determined by sector-scanning sonar and acoustic transponding tags. Rapports et procès verbaux desréunions—Commission internationale pour l'exploration de la mer 170,45–51.
Hartley D, Whittingham A, Kenney JF, Cole TVN & Pomfret E. (2003). Large Whale Entanglement Report. Gloucester, MA: U.S. Department of Commerce. National Marine Fisheries Service Northeast Regional Office.
Hatch, J. and C. Orphanides. 2015. Estimates of cetacean and pinniped bycatch in the 2013 New England sink and Mid-Atlantic gillnet fisheries. US Dept Commer, Northeast Fish. Sci. Cent. Ref. Doc. 15-15; 26p. Available at http://www.nefsc.noaa.gov/publications/
Haug, T., and B. Gulliksen. 1988. Fecundity and oocyte sizes in ovaries of female Atlantic halibut, Hippoglossus hippoglossus (L.). Sarsia 73: 259 – 261.
Hayes, M.L. 1983. Active fish capture methods in Nielson, L.A.; Johnson, D.L., eds. Fisheries techniques. Bethesda, MD: Am. Fish. Soc.; p. 123-145.
Henry AG, Cole TVN, Hall L, Ledwell W, Morin D, Reid A. 2015. Mortality and serious injury determinations for baleen whale stocks along the Gulf of Mexico, United States east coast and Atlantic Canadian provinces, 2009-2013. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 15-10; 45 p. doi: 10.7289/V5C53HTB
Holland, Daniel S., Pinto da Silva, Patricia, and Kitts, Andrew W. 2015. "Evolution of Social Capital and Economic Performance in New England Harvest Cooperatives." *Marine Resource Economics.* 30(4): 371-392.
Hyvarinen, P., P. Suuronen and T. Laaksonen. 2006. Short-term movement of wild and reared Atlantic salmon smolts in brackish water estuary – preliminary study. Fish. Mgmt. Eco. 13(6): 399 -401.
International Council for the Exploration of the Seas (ICES). 2000. Effects of Different Types of Fisheries on North Sea and Irish Sea Benthic Ecosystems. Report of the ICES Advisory Committee on the Marine Environment 2000. ICES Coop. Res. Rep. No. 241, 27 pp.
Jacobson, L. 2005. Essential fish habitat source document: longfin inshore squid, Loligo pealeii, life history and habitat characteristics, Second Edition. NOAA Tech. Memo. NMFS-NE- 193, 42 p. http://www.nefsc.noaa.gov/nefsc/publications/tm/tm193/
James, M.C., R.A. Myers, and C.A. Ottenmeyer. 2005. Behaviour of leatherback sea turtles, Dermochelys coriacea, during the migratory cycle. Proc. R. Soc. B, 272: 1547-1555.
James, M.C., S.A. Sherrill-Mix, K. Martin, and R. A. Myers. 2006. Canadian waters provide critical foraging habitat for leatherback sea turtles. Biological Conservation 133: 347-357.
Jennings, S., M.J. Kaiser, and J.D. Reynolds. 2001. Marine Fisheries Ecology. Blackwell Science, Oxford.

Johnson AJ, Salvador GS, Kenney JF, Robbins J, Krauss SD, Landry SC & Clapham PJ. (2005). Fishing gear involved in entanglements of right and humpback whales. Marine Mammal Science. 21(4): 635-645.
Keats, D.W., G.R. Smith, and D.H. Steele. 1985. Reproduction and egg guarding by Atlantic wolffish (Anarchichas lupus: Anarhichidae) and ocean pout (Macrozoarces americanus: Zoarcidae) in Newfoundland waters. Can. J. Zool. 63: 2565 – 2568.
Kelly, K.H. and J.R. Moring. (1986). *Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates - Atlantic Herring*. U.S. Fish and Wildlife Service. Biological Report 82 (11.38) TR EL-82-4. 22 p.
Kenney, R.D., M.A.M. Hyman, R.E. Owen, G.P. Scott and H.E. Winn. 1986. Estimation of prey densities required by western North Atlantic right whales. Mar. Mamm. Sci. 2: 1–13.
Kenney, R.D., H.E. Winn and M.C. Macaulay 1995. Cetaceans in the Great South Channel, 1979-1989: right whale (*Eubalaena glacialis*). Cont. Shelf Res. 15: 385–414.
Kenney, R.D. 2002. North Atlantic, North Pacific and Southern Right Whales. pp. 806-813, In: W.F. Perrin, B. Würsig, and J.G.M. Thewissen (eds.). Encyclopedia of Marine Mammals. Academic Press, San Diego, CA.
Khan, C., T.V.N. Cole, P. Duley, A. Glass, M. Niemeyer, and C. Christman. 2009. North Atlantic Right Whale Sighting Survey (NARWSS) and Right Whale Sighting Advisory System (RWSAS) 2008 Results Summary. NEFSC Reference Document 09-05. 7 pp.
Khan, C., T. Cole, P. Duley, A. Glass, and J. Gatzke. 2010. North Atlantic Right Whale Sighting Survey (NARWSS) and Right Whale Sighting Advisory System (RWSAS) 2009 Results Summary. NEFSC Reference Document 10-07. 7 pp.
Khan, C., T. Cole, P. Duley, A. Glass, and J. Gatzke. 2011. North Atlantic Right Whale Sighting Survey (NARWSS) and Right Whale Sighting Advisory System (RWSAS) 2010 Results Summary. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 11-05. 6 pp.
Khan C., T. Cole, P. Duley, A. Glass, and J. Gatzke, J. Corkeron. 2012. North Atlantic Right Whale Sighting Survey (NARWSS) and Right Whale Sighting Advisory System (RWSAS) 2011 Results Summary. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 12-09; 6 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://nefsc.noaa.gov/publications/
King, D. and J. G. Sutinen. 2010. Rational Compliance and the liquidation of Northeast groundfish resources. Marine Policy, 34(1), 7-21.
Kitts A, Bing-Sawyer E, McPherson M, Olson J, Walden J. 2011. Report for Fishing Year 2010 on the Performance of the Northeast Multispecies (Groundfish) Fishery (May 2010 - April 2011). December 2011. Woods Hole (MA): NOAA Fisheries Northeast Fisheries Science Center. 11-12. 44 p.
Kocik, J.F, and T.F. Sheehan. 2006. Atlantic Salmon. http://www.nefsc.noaa.gov/sos/spsyn/af/salmon/archives/41_AtlanticSalmon_2006.pdf
Kocik, J., Lipsky, C., Miller, T., Rago, P., & Shepherd, G. 2013. An Atlantic Sturgeon Population Index for ESA Management Analysis. U.S. Dept Commer, Northeast Fish Sci Cent Ref Doc. 13-06; 36 p. Available at: www.nefsc.noaa.gov/nefsc/publications/.
Kynard, B., M. Horgan, M. Kieffer, and D. Seibel. 2000. Habitat used by shortnose sturgeon in two Massachusetts rivers, with notes on estuarine Atlantic sturgeon: A hierarchical approach. Transactions of the American Fisheries Society 129: 487-503.
Kynard, B. and M. Horgan. 2002. Ontogenetic behavior and migration of Atlantic sturgeon, Acipenser oxyrinchus oxyrinchus, and shortnose sturgeon, A. brevirostrum, with notes on social behavior. Environmental Behavior of Fishes 63: 137-150.
Lacroix GL and McCurdy P. 1996. Migratory behavoir of post-smolt Atlantic salmon during initial stages of seaward migration. Journal of Fish Biology. 49: 1086-1101.

Lacroix GL, McCurdy P and Knox D. 2004. Migration of Atlantic salmon post smolts in relation to habitat use in a coastal system. Transactions of the American Fisheries Society. 133(6): 1455-1471.

Lacroix, G.L., D. Knox and M.J.W. Stokesbury. 2005. Survival and behavior of post-smolt Atlantic salmon in coastal habitat with extreme tides. Journal of Fish Biology. 66(2): 485 – 498.

Laney, R.W., J.E. Hightower, B.R. Versak, M.F. Mangold, W.W. Cole Jr., and S.E. Winslow. 2007. Distribution, habitat use, and size of Atlantic sturgeon captured during cooperative winter tagging cruises, 1988-2006. In Anadromous sturgeons: habitats, threats, and management (J. Munro, D. Hatin, J.E. Hightower, K. McKown, K.J. Sulak, A.W. Kahnle, and F. Caron (eds.)), p. 167-182. Am. Fish. Soc. Symp. 56, Bethesda, MD.

Lindeboom HJ & de Groot SJ. (1998). *Impact II - The Effects of Different Types of Fisheries on the North Sea and Irish Sea Benthic Ecosystems*. NIOZ Report. 1998-1. 404 p.

Lock, M.C. and D.B. Packer. 2004. Essential Fish Habitat Source Document: Silver Hake, Merluccius bilinearis, Life History and Habitat Characteristics, Second Edition. NOAA Technical Memorandum NMFS-NE-186. http://www.nefsc.noaa.gov/nefsc/pulications/tm/tm186/tm186.pdf

Mansfield, K.L., V.S. Saba, J. Keinath, and J.A. Musick. 2009. Satellite telemetry reveals a dichotomy in migration strategies among juvenile loggerhead sea turtles in the northwest Atlantic. Marine Biology 156:2555-2570.

Matulich, S., and Clark, M. 2001. Efficiency and Equity Choices in Fishery Rationalization Policy Design: An examination of the North Pacific and Sablefish IFQ policy impacts on processor. State of Alaska, Alaska Department of Fish and Game, Washington State University.

Mayo, C.A. and M.K. Marx. 1990. Surface foraging behaviour of the North Atlantic right whale, Eubalaena glacialis, and associated zooplankton characteristics. Can. J. Zool. 68: 2214–2220.

McClellan CM & Read AJ. (2007). Complexity and variation in loggerhead sea turtle life history. Biology Letters. 3: 592-594.

Mercer, S., G. E. Brown, S. Clearwater and Z. Yao. 1993. Observations of the copulatory behavior of the ocean pout, Macrozoarces americanus. Can. Field Nat. 107:243-244.

Methven, D.A. and J.A. Brown. 1991. Time of hatching affects development, size, yolk volume and mortality of newly hatched Macrozoarces americanus (Pisces: Zoarcidae). Canadian Journal of Zoology 69(8): 2161 – 2167.

Miller, J.M., Burke, J.S., Fitzhugh, G.R., 1991. Early life history patterns of Atlantic North American flatfish: likely (and unlikely) factors controlling recruitment. Neth. J. Sea Res. 27, 261–275.

Miller, T. and G. Shepard. 2011. Summary of Discard Estimates for Atlantic Sturgeon. Northeast Fisheries Science Center, Population Dynamics Branch, August 2011

Mirarchi, F. 1998. Bottom trawling on soft substrates in E.M. Dorsey; J. Pederson, eds. Effects of fishing gear on the sea floor of New England. MIT Sea Grant Pub. 98-4.

Mitchell GH, Kenney RD, Farak AM & Campbell RJ. (2003). Evaluation of Ocurrence of Endangered and Threatened Marine Species in Naval Ship Trial Areas and Transit Lanes in the Gulf of Maine and Offshore of Georges Bank. NUWC-NPT Technical Memo 02-121A. 113 p.

Moore, E. 1947. Studies on the marine resources of southern New England. VI. The sand flounder, Lophopsetta aquosa (Mitchill): a general study of the species with special emphasis on age determination by means of scales and otoliths. Bull. Bingham Oceanogr. Collect. 11(3): 1 – 79.

Moore MJ & van der Hoop JM. 2012. The painful side of trap and fixed net fisheries: Chronic entanglement of large whales. Journal of Marine Biology. 2012(Article ID 230653): 4.

Morgan, L.E. and R. Chuenpagdee. 2003. Shifting Gears: Addressing the collateral impacts of fishing methods in U.S. waters, Pew Science Series on Conservation and the Environment, Washington D.C., Island Press, 41 p.

Morreale, S.J. and E.A. Standora. 2005. Western North Atlantic waters: Crucial developmental habitat for Kemp's ridley and loggerhead sea turtles. Chel. Conserv. Biol. 4(4):872-882.
Morse, W.W., Able, K.W., 1995. Distribution and life history of windowpane, Scophthalmus aquosos, off the Northeastern United States. Fishery Bulletin 93, 674-693.
Murphy, T., Kitts, A., Records, D., Demarest, C., McPherson, M., Walden, J., et al. 2012. 2011 Final Report on the Performance of the Northeast Multispecies (Groundfish) Fishery (May 2011 – April 2012). Woods Hole: NEFSC.
Murphy, T., Kitts, A., Records, D., Demarest, C., Caless, D., Walden, J., and Benjamin, S. 2014. 2012 Final Report on the Performance of the Northeast Multispecies (Groundfish) Fishery (May 2012 – April 2013). Woods Hole: NEFSC. NOAA Fisheries Northeast Fisheries Science Center. 14-01. 121 p.or online at http://www.nefsc.noaa.gov/nefsc/publications/.
Murphy, T., Kitts, A., Demarest, C., and Walden, J. 2015. 2013 Final Report on the Performance of the Northeast Multispecies (Groundfish) Fishery (May 2013 - April 2014). Woods Hole: NEFSC. NOAA Fisheries Northeast Fisheries Science Center. 15-01. 121 pp.
Murray, K.T. 2006. Estimated average annual bycatch of loggerhead sea turtles (Caretta caretta) in U.S. Mid-Atlantic bottom otter trawl gear, 1996-2004. U.S. Dep. Commer., Northeast Fish. Sci. Cent. Ref. Doc. 06-19, 26pp.
Murray, K.T. 2009. Characteristics and magnitude of sea turtle bycatch in U.S. Mid-Atlantic gillnet gear. Endangered Species Research 8:211-224.
Murray, K.T. 2013. Estimated loggerhead and unidentified hard-shelled turtle interactions in Mid-Atlantic sink gillnet gear, 2007-2011. US Dept Commer, Tech. Memorandum NMFS-NE 225; 20p. Available at: http://www.nefsc.noaa.gov/publications/
Murray, K.T. and Orphanides, C.D. 2013. Estimating the risk of loggerhead turtle Caretta caretta bycatch in the US mid-Atlantic using fishery-independent and -dependent data. Mar.Ecol. Prog. Ser. 477:259-270.
New England Fishery Management Council (NEFMC). 1994. Amendment 5 to the Northeast Multispecies Fishery Management Plan.
New England Fishery Management Council (NEFMC). 1996. Amendment 7 to the Northeast Multispecies Fishery Management Plan.
New England Fishery Management Council (NEFMC). 2000. Amendment 12 to the Northeast Multispecies Fishery Management Plan. http://www.nefmc.org/mesh/index.html
New England Fishery Management Council (NEFMC). 2003. Final Amendment 13 to the Northeast Multispecies Fishery Management Plan Including a Final Supplemental Environmental Impact Statement and an Initial Regulatory Flexibility Analysis. Newburyport, MA. Available at: http://www.nefmc.org/nemulti/index.html.
New England Fishery Management Council (NEFMC). 2009a. Final Amendment 3 to the Fishery Management Plan (FMP) for the Northeast Skate Complex and Final Environmental Impact Statement (FEIS). Newburyport, MA. 459 pp. Available at: http://www.nefmc.org/skates/index.html.
New England Fishery Management Council (NEFMC). 2009b. Final Amendment 16 to the Northeast Multispecies Fishery Management Plan Including a Final Supplemental Environmental Impact Statement and an Initial Regulatory Flexibility Analysis. Newburyport, MA. Available at: http://www.nefmc.org/nemulti/index.html.
New England Fishery Management Council. 2011. Final Framework 23 to the Scallop Fishery Management Plan. Final Environmental Assessment, November 30, 2011. http://s3.amazonaws.com/nefmc.org/Final_FW23_submission.nov2011.FINAL.pdf
New England Fishery Management Council.2014. Framework 25 to the Scallop FMP. Final Environmental Assessment, April 17, 2014. http://s3.amazonaws.com/nefmc.org/Final_USE_fw_25_with_correct_maps.pdf

New England Fishery Management Council. 2015. Final Framework 26 to the Scallop FMP. Final Environmental Assessment, February 17, 2015. http://s3.amazonaws.com/nefmc.org/Final-FW26_submission_150217.pdf
New England Fishery Management Council. 2016. Atlantic Herring Fishery Specifications for the 2016-2018 Fishing Years (January 1, 2016 – December 31, 2018). Environmental Assessment. Formal submission: March 1, 2016. http://s3.amazonaws.com/nefmc.org/160301-2016-2018-Herring-Specs-Formal-Submission.pdf
New England Fishery Management Council. 2016. Final Framework 27 to the Scallop FMP. Environmental Assessment, March 14, 2016. http://s3.amazonaws.com/nefmc.org/0.1_USE.Final_submission-of-FW27.March14.pdf
Northeast Data Poor Stocks Working Group (DPSWG). 2009. The northeast data poor stocks working group report, part A: skate species complex, deep sea red crab, Atlantic wolffish, scup, and black sea bass. Northeast Fish Science Center Reference Document 09-02. Available at:http://www.nefsc.noaa.gov/publications/crd/crd0902/.
NEFSC. (2002). *Workshop on the Effects of Fishing Gear on Marine Habitats off the Northeastern United States, October 23-25, 2001, Boston, Massachusetts*. Woods Hole, MA: U.S. Department of Commerce. NEFSC Reference Document 02-01. 86 p.
Northeast Fisheries Science Center (NEFSC). 2002c. Workshop on the Effects of Fishing Gear on Marine Habitats off the Northeastern United States, October 23-25, 2001, Boston, Massachusetts. Woods Hole (MA): US Department of Commerce. Northeast Fisheries Science Center Reference Document 02-01. 86 p.
Northeast Fisheries Science Center (NEFSC). 2010. 50th Northeast Regional Stock Assessment Workshop (50th SAW): Assessment Report. U.S. Dept. Commer., Northeast Fish. Sci. Cent. Ref. Doc. 10-17; 844 pp. Available at: http://www.nefsc.noaa.gov/publications/crd/crd1017/crd1017.pdf.
Northeast Fisheries Science Center (NEFSC). 2011c. EFH Source Documents: Life History and Habitat Characteristics. 2011. Woods Hole, MA: U.S. Department of Commerce; Retrieved from: http://www.nefsc.noaa.gov/nefsc/habitat/efh/.
Northeast Fisheries Science Center (NEFSC). 2011a. 51st Northeast Regional Stock Assessment Workshop (51st SAW) Assessment Report. U.S. Dept. Commer, Northeast Fish. Sci. Cent. Ref. Doc. 11-02; 856 pp. Available at: http://www.nefsc.noaa.gov/publications/crd/crd1102/1102.pdf.
Northeast Fisheries Science Center (NEFSC). 2011b. 52nd Northeast Regional Stock Assessment Workshop (52nd SAW): Assessment Report. U.S. Dept. Commer., Northeast Fish. Sci. Cent. Ref. Doc. 11-17; 968 pp. Available at: http://www.nefsc.noaa.gov/saw/saw52/crd1117.pdf.
Northeast Fisheries Science Center (NEFSC). 2012b. 54th Northeast Regional Stock Assessment Workshop (54th SAW): Assessment Summary Report. U.S. Dept. Commer., Northeast Fish. Sci. Cent. Ref. Doc. 12-14; 45 pp. Available at: http://www.nefsc.noaa.gov/saw/saw52/crd1214.pdf
Northeast Fisheries Science Center (NEFSC). 2013d. Social Sciences Branch. Woods Hole (MA): NMFS Northeast Fisheries Science Center; Available from: http://www.nefsc.noaa.gov/read/socialsci/index.html.
Northeast Fisheries Science Center (NEFSC). 2013a. 55th Northeast Regional Stock Assessment Workshop (55th SAW): Assessment Report. U.S. Dept. Commer., Northeast Fish. Sci. Cent. Ref Doc. Available at: http://www.nefsc.noaa.gov/saw/reports.html.
Northeast Fisheries Science Center (NEFSC). 2013b. 56th Northeast Regional Stock Assessment Workshop (56th SAW) Assessment Summary Report. Woods Hole (MA): U.S. Department of Commerce. Northeast Fisheries Science Center Ref. Doc. 13-04. 42 p.
Northeast Fisheries Science Center (NEFSC). 2013c. 2013 monkfish operational assessment. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 13-23; 116 p. Available from: National Marine Fisheries

Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://nefsc.noaa.gov/publications/
Northeast Fisheries Science Center (NEFSC). 2014. 59th Northeast Regional Stock Assessment Workshop (59th SAW) Assessment Report. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 14-09; 782 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://nefsc.noaa.gov/publications/
Northeast Fisheries Science Center (NEFSC). 2015b. 60th Northeast Regional Stock Assessment Workshop (60th SAW) Assessment Report. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 15-08; 870 p. doi: 10.7289/V5W37T9T
Northeast Fisheries Science Center (NEFSC). 2015. Operational Assessment of 20 Northeast Groundfish Stocks, Updated Through 2014. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 15-24; 251 p.
Northeast Fisheries Science Center (NEFSC). 2016. Scup Data Update for 2016. Available at: http://www.mafmc.org/council-events/2016/ssc-3.
Northeast Fisheries Science Center. (NEFSC). 2017. 62nd Northeast Regional Stock Assessment Workshop (62nd SAW) Assessment Summary Report. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 17-01; 37 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://www.nefsc.noaa.gov/publications/
National Marine Fisheries Service (NMFS) Northeast Fisheries Science Center Fisheries Statistics Branch (NEFSC FSB). 2015. Northeast Fisheries Observer Program: Incidental Take Reports. Omnibus data request + supplemental data for 2014 from: http://www.nefsc.noaa.gov/fsb/take_reports/nefop.html
National Marine Fisheries Service (NMFS) Northeast Fisheries Science Center Fisheries Statistics Branch (NEFSC FSB). 2016. Northeast Fisheries Observer Program: Incidental Take Reports. Omnibus data request + supplemental data for 2014 from: http://www.nefsc.noaa.gov/fsb/take_reports/nefop.html
Neilson,J.D., J.F. Kearney, P.Perley, and H. Sampson. 1993. Reproductive biology of Atlantic halibut (Hippoglossus hippoglossus) in Canadian waters. Canadian Journal of Fisheries and Aquatic Sciences 50: 551 – 563.
Nelson, G.A., and M.R. Ross. 1992. Distribution, growth and food habits of the Atlantic wolfish (Anarhichas lupus) from the Gulf of Maine-Georges Bank region. Journal of Northwest Atlantic Fishery Science 13: 53 – 61.
Neuman, M.J., D.A. Witting, and K.W. Able. 2001. Relationships between otolith microstructure, otolith growth, somatic growth and ontogenetic transitions in two cohorts of windowpane. Journal of fish Biology 58: 967 – 984.
National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS). 1991. Recovery plan for U.S. population of Atlantic green turtle Chelonia mydas. Washington, D.C.: National Marine Fisheries Service. 58 pp.
National Marine Fisheries Service (NMFS). 1991b. Final recovery plan for the humpback whale (Megaptera novaeangliae). Prepared by the Humpback Whale Recovery Team for the national Marine Fisheries Service, Silver Spring, Maryland. 105 pp.
National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS). 1992a. Recovery plan for the Kemp's ridley sea turtle. National Marine Fisheries Service, Washington, D.C. 40 pp.
National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS). 1992b. Recovery plan for leatherback turtles in the U.S. Caribbean, Atlantic, and Gulf of Mexico. National Marine Fisheries Service, Washington, D.C. 65 pp.

National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS). 1993. Recovery plan for the Hawksbill turtle (Eretmochelys imbricate) in the U.S. Caribbean, Atlantic, and Gulf of Mexico. National Marine Fisheries Service, Washington, D.C. 58 pp
National Marine Fisheries Service (NMFS) Southeast Fisheries Science Center (SEFSC). 2001. Stock assessments of loggerhead and leatherback sea turtles and an assessment of the impact of the pelagic longline fishery on the loggerhead and leatherback sea turtles of the Western North Atlantic. NOAA Technical Memorandum NMFS-SEFSC-455. 343 pp.
National Marine Fisheries Service (NMFS). 2002. Biological Opinion. Implementation of the Deep-Sea Red Crab, *Chaceon quinquedens*, Fishery Management Plan. February 6, 2002. Available at: http://www.greateratlantic.fisheries.noaa.gov/prot_res/section7/NMFS-signedBOs/RedCrab2002signedBO.pdf
National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS). 2005. Recovery plan for the Gulf of Maine distinct population segment of the Atlantic salmon (Salmo salar). National Marine Fisheries Service, Silver Spring, MD.
National Marine Fisheries Service (NMFS). 2005b. Revision- recovery plan for the North Atlantic right whale (*Eubalaena glacialis*). Prepared by the Office of Protected Resources National Marine Fisheries Service, Silver Spring, MD. 137 pp.
National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS). 2007a. Loggerhead sea turtle (Caretta caretta) 5 year review: summary and evaluation. National Marine Fisheries Service, Silver Spring, Maryland. 65 pp.
National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS). 2007b. Leatherback sea turtle (Dermochelys coriacea) 5 year review: summary and evaluation. National Marine Fisheries Service, Silver Spring, Maryland. 79 pp.
National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS). 2007c. Kemp's ridley sea turtle (Lepidochelys kempii) 5 year review: summary and evaluation. Silver Spring, Maryland: National Marine Fisheries Service. 50 pp.
National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS). 2007d. Green sea turtle (Chelonia mydas) 5 year review: summary and evaluation. Silver Spring, Maryland: National Marine Fisheries Service. 102 pp.
National Marine Fisheries Service (NMFS). 2007. Guidelines for Assessment of the Social Impact of Fishery Management Actions. In: NMFS Council Operational Guidelines - Fishery Management Process. Silver Spring (MD): National Oceanic and Atmospheric Administration. 39 p.
Orphanides, C.D. 2009. Protected species bycatch estimating approaches: estimating harbor porpoise bycatch in U. S. northwestern Atlantic gillnet fisheries. *J. Northw. Atl. Fish. Sci*., **42**: 55–76. doi: 10.2960/J.v42.m647
National Marine Fisheries Service (NMFS). 2010a. Biological Assessment of Shortnose Sturgeon (*Acipenser brevirostrum*). Prepared by the Shortnose Sturgeon Status Review Team for the National Marine Fisheries Service, Gloucester MA. 417pp.
National Marine Fisheries Service (NMFS). 2010b. Final recovery plan for the fin whale (*Balaenoptera physalus*). Prepared by the Office of Protected Resources National Marine Fisheries Service, Silver Spring, MD. 121 pp.
National Marine Fisheries Service (NMFS). 2010c. Interactive Fisheries Economic Impacts Tool. Available at: https://www.st.nmfs.noaa.gov/pls/apex32/f?p=160:7:3415449084930703.
National Marine Fisheries Service (NMFS). 2012. Endangered Species Act Section 7 Consultation for the Atlantic Sea Scallop Fishery Management Plan. Biological Opinion. July 12, 2012. Available at: http://www.greateratlantic.fisheries.noaa.gov/prot_res/section7/NMFS signedBOs/2012ScallopBiOp071212.pdf

National Marine Fisheries Service (NMFS). 2013. Endangered Species Act Section 7 Consultation on the Continued Implementation of Management Measures for the Northeast Multispecies, Monkfish, Spiny Dogfish, Atlantic Bluefish, Northeast Skate Complex, Mackerel/Squid/Butterfish, and Summer Flounder/Scup/Black Sea Bass Fisheries. Available at: http://www.greateratlantic.fisheries.noaa.gov/protected/section7/bo/actbiops/batchedfisheriesopinionfinal121613.pdf
National Marine Fisheries Service (NMFS). 2014. Endangered Species Act Section 7 Consultation on the Continued Implementation of Management Measures for the American Lobster Fishery. July 31, 2014. Available at:
National Oceanic and Atmospheric Administration (NOAA). 2007a. Status of Fishery Resources off the Northeastern US Aggregate Resource and Landings Trends. Available at: http://www.nefsc.noaa.gov/sos/agtt/.
National Oceanic and Atmospheric Administration (NOAA). 2007b. An Assessment of the Leatherback Turtle Population in the Atlantic Ocean. A Report of the Turtle Expert Working Group. NOAA Tech Memo NMFS-SEFSC- 555, Miami, Fl. 116pp.
National Oceanic and Atmospheric Administration (NOAA). 2009. Small Entity Compliance Guide. June 24, 2009.
National Oceanic and Atmospheric Administration (NOAA). 2010. NOAA Catch Share Policy. Washington, DC: National Oceanic and Atmospheric Administration. 25 p.
National Research Council (NRC). 2002. Effects of Trawling and Dredging on Seafloor Habitat. National Academy Press. 126 p.
O'Brien, L. J. Burnett, and R.K. Mayo. 1993. Maturation of nineteen species of finfish off the northeast coast of the United States, 1985 – 1990. US Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.
O'Leary, S.J., K. J. Dunton, T. L. King, M. G. Frisk, and D.D. Chapman. 2014. Genetic diversity and effective size of Atlantic sturgeon, Acipenser oxyrhinchus oxyrhinchus, river spawning populations estimated from the microsatellite genotypes of marine-captured juveniles. Conserv Genet: DOI 10.1007/s10592-014-0609-9; ISSN 1566-0621.
Olsen, Y.H., and D. Merriman. 1946. Studies on the marine resource of Southern New England. IV. The biology and economic importance of the ocean pout, Macrozoarces americanus (Bloch and Schneider). Bull. Bing. Oceanogr. Collect. 9(4): 1 – 184.
Olson J, Clay PM. 2001. An Overview of the Social and Economic Survey Administered during Round II of the Northeast Multispecies Fishery Disaster Assistance Program." Reference: US Dep. Commer., NOAA Tech. Memo. NMFS NE 164; 69 p.
Olson, Julia and Pinto da Silva, Patricia. 2014. "Changing boundaries and institutions in environmental governance: perspectives on sector management of the Northeast US groundfish fishery." *Maritime Studies.*13(3):1-20.
Orach-Meza, F.L. 1975. Distribution and abundance of Ocean Pout, Macrozoarces americanus (Bloch and Schneider) 1801 in the western North Atlantic Ocean. MS thesis. University of Rhode Island.
Overholtz WJ & Tyler AV. (1985). Long-term responses of the demersal fish assemblages of Georges Bank. *Fisheries Bulletin. 83*: 507-520.
Pavlov, D.A. and G.G. Novikov. 1993. Life history and peculiarities of common wolffish (Anarhichas lupus) in the White Sea. ICES Journal of Marine Science 50(3): 271 – 277.
Pavlov, D.A. and E. Moksness. 1994. Production and quality of eggs obtained from wolffish (Anarhichas lupus) reared in captivity. Aquaculture 122(4): 295 – 312.
Payne, P.M., L. A. Selzer, and A. R. Knowlton. 1984. Distribution and density of cetaceans, marine turtles, and seabirds in the shelf waters of the northeastern United States, June 1980 - December 1983, based on shipboard observations. National Marine Fisheries Service-NEFSC, Woods Hole, MA. 294pp.

Payne, P.M., J.R. Nicholas, L. O'Brien and K.D. Powers 1986. The distribution of the humpback whale, Megaptera novaeangliae, on Georges Bank and in the Gulf of Maine in relation to densities of the sand eel, Ammodytes americanus. Fish. Bull. 84: 271-277.
Payne, P.M., D.N. Wiley, S.B. Young, S. Pittman, P.J. Clapham and J.W. Jossi 1990. Recent fluctuations in the abundance of baleen whales in the southern Gulf of Maine in relation to changes in selected prey. Fish. Bull. 88: 687-696.
Payne, P.M. and D.W. Heinemann. 1993. The distribution of pilot whales (Globicephala sp.) in shelf/shelf edge and slope waters of the northeastern United States, 1978-1988. Rep. Int. Whal. Comm. (Special Issue) 14: 51- 68.
Pinkerton, E., and Edwards, D.N. 2009. The elephant in the room: the hidden costs of leasing individual transferable fishing quotas. Marine Policy, 33, 707-713.
Pratt, S. 1973. Benthic fauna. Pp. 5-1 to 5-70 in: Coastal and offshore environmental inventory, Cape Hatteras to Nantucket Shoals. University of Rhode Island, Marine Publication Series No. 2. Kingston, RI.
Rago PJ and KA Sosebee. 2015. Update on the Status of Spiny Dogfish in 2015 and Projected Harvests at the Fmsy Proxy and Pstar of 40%. Report to MAFMC SSC September 2015. Available at: http://www.mafmc.org/council-events/2015/ssc-meeting-2.
Reddin, D.G. 1985. Atlantic salmon (Salmo salar) on and east of the Grand Bank. J. Northwest Atl. Fish. Soc. 6(2):157-164.
Reddin, D.G and P.B. Short. 1991. Postsmolt Atlantic salmon (Salmo salar) in the Labrador Sea. Can. J. Fish Aquat. Sci. 48:2-6.
Reddin, D.G and K.D. Friedland. 1993. Marine environmental factors influencing the movement and survival of Atlantic salmon. 4th Int. Atlantic Salmon Symposium. St. Andrews, N.B. Canada.
Reid RN, Cargnelli LM, Griesbach SJ, Packer DB, Johnson DL, Zetlin CA, Morse WW & Berrien PL. (1999). *Essential Fish Habitat Source Document: Atlantic Herring, Culpea Harengus L., Life History and Habitat Characteristics*. Highlands, NJ: USDo Commerce.
Richards RA. 2016. 2016 Monkfish Operational Assessment. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 16-09; 109 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://www.nefsc.noaa.gov/publications/.
Roper, C.F.E., M.J. Sweeney, and C.E. Nauen. 1984. Cephalopods of the World. An annotated and illustrated catalogue of species of interest to fisheries. FAO Fisheries Synopsis. 125, 227 pp.
Sainsbury JC. (1996). *Commercial Fishing Methods: An Introduction to Vessels and Gears*. 3rd ed. England: Fishing New Books Ltd. 119 p.
Schilling, M. R., I. Seipt, M. T. Weinrich, S. E. Frohock, A. E. Kuhlberg, and P. J. Clapham. 1992. Behavior of individually-identified sei whales Balaenoptera borealis during an episodic influx into the southern Gulf of Maine in 1986. Fishery Bulletin 90:749–755.
Scott, J.S. 1982. Depth, temperature and salinity preferences of common fishes of the Scotian Shelf. J. Northwest Atl. Fish. Sci. 3: 29-39.
Scott, W.B. and M.G. Scott. 1988. Atlantic Fishes of Canada. Can. Bull. Fish. Aquat. Sci. 219, 731 pp.
Sherman K, Jaworski NA & Smayda TJ eds. (1996). *The Northeastern Shelf Ecosystem - Assessment, Sustainability, and Management*. Cambridge, MA: Blackwell Science. 564 p.
Shoop, C.R., and R.D. Kenney. 1992. Seasonal distributions and abundance of loggerhead and leatherback sea turtles in waters of the northeastern United States. Herpetological Monographs 6:43-67.
Sigourney, D.B., M.R. Ross, J. Brodziak, and J. Burnett. 2006. Length at age, sexual maturity and distribution of Atlantic halibut, Hippoglossus hippoglossus L., off the Northeast USA. NW Atl Fish Sci 36: 81 – 90.

Somerton, D.A., Munro, P.T., Weinberg, K.L., 2007. Whole-gear efficiency of a benthic survey trawl for flatfish. Fish. Bull. 105, 278–291

Steimle, F.W, C. A. Zetlin, P. L. Berrien, D. L. Johnson, and S. Chang. (1999). Essential Fish Habitat source document: Scup, *Stenotomus chrysops*, life history and habitat characteristics. NOAA Technical Memorandum NMFS-NE-149. Available at: http://www.nefsc.noaa.gov/publications/tm/.

Steimle FW & Zetlin C. (2000). Reef habitats in the Middle Atlantic Bight: Abundance, distribution, associated biological communities, and fishery resource use. *Marine Fisheries Review. 62*: 24-42.

Stein, A. B., K. D. Friedland, and M. Sutherland. 2004a. Atlantic sturgeon marine bycatch and mortality on the continental shelf of the Northeast United States. North American Journal of Fisheries Management 24: 171-183.

Stein, A.B., K. D. Friedland, and M. Sutherland. 2004b. Atlantic sturgeon marine distribution and habitat use along the northeastern coast of the United States. Transaction of the American Fisheries Society 133:527-537.

Stevenson D, Chiarella L, Stephan D, Reid R, Wilhelm K, McCarthy J & Pentony M. (2004). Characterization of the Fishing Practices and Marine Benthic Ecosystems of the Northeast U.S. Shelf, and an Evaluation of the Potential Effects of Fishing on Essential Fish Habitat. Woods Hole, MA: U.S. Dept. of Commerce. NEFSC Technical Memo NMFS-NE-181. 179 p.

Swingle, W.M., S.G. Barco, T.D. Pitchford, W.A. McLellan, and D.A. Pabst. 1993. Appearance of juvenile humpback whales feeding in the nearshore waters of Virginia. Mar. Mamm. Sci. 9: 309-315.

Taning, A. V. 1936. On the eggs and young stages of the halibut. Medd. Fra Kom. For Havundersokelser, Serie Fiskeri, Vol IO 4: 1 – 23.

Templeman, W. 1986. Some biological aspects of Atlantic wolffish (Anarhichas lupus) in the Northwest Atlantic. Journal of Northwest Atlantic Fishery Science. 7(7): 57 – 65.

Terceiro M. 2015. Stock assessment update of summer flounder for 2015. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 15-13; 18 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026.

Terceiro M. 2016. Stock Assessment of Summer Flounder for 2016. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 16-15; 117 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://www.nefsc.noaa.gov/publications/.

Transboundary Resources Assessment Committee (TRAC). 2016. Georges Bank Yellowtail Flounder. TRAC Status Report 2016/03.

Turtle Expert Working Group (TEWG). 1998. An assessment of the Kemp's ridley (Lepidochelys kempii) and loggerhead (Caretta caretta) sea turtle populations in the Western North Atlantic. NOAA Technical Memorandum NMFS-SEFSC-409:1-96.

Turtle Expert Working Group (TEWG). 2000. Assessment update for the Kemp's ridley and loggerhead sea turtle populations in the western North Atlantic. NOAA Technical Memorandum NMFS-SEFSC-444:1-115.

Turtle Expert Working Group (TEWG). 2007. An assessment of the leatherback turtle population in the Atlantic Ocean. NOAA Technical Memorandum NMFS-SEFSC-555, 116 pp.

Turtle Expert Working Group (TEWG). 2009. An assessment of the loggerhead turtle population in the Western North Atlantic Ocean. NOAA Technical Memorandum NMFS-SEFSC-575:1-131.

Theroux RB & Grosslein MD. (1987). Benthic fauna. In: *Georges Bank*. Cambridge, MA: MIT Press. p. 283-295.

Theroux RB & Wigley RL. (1998). *Quantitative Composition and Distribution of the Macrobenthic Invertebrate Fauna of the Continental Shelf Ecosystems of the Northeastern United States*. Woods Hole, MA: U.S. Department of Commerce. NOAA Technical Report NMFS 140. 240 p.

Thunberg, E.M. 2007. Demographic and economic trends in the Northeastern United States lobster (Homarus americanus) fishery, 1970–2005. U.S. Dep. Commer., Northeast Fish. Sci. Cent. Ref. Doc. 07-17; 64 p.
Valentine PC & Lough RG. (1991). *The Sea Floor Environment and the Fishery of Eastern Georges Bank*. Woods Hole, MA: U.S. Department of the Interior and U.S. Geological Survey. Open File Report 91-439. 25 p.
Vu, E., D. Risch, C. Clark, S. Gaylord, L. Hatch, M. Thompson, D. Wiley, and S. Van Parijs.2012. Humpback whale song occurs extensively on feeding grounds in the western North Atlantic Ocean. Aq. Biol.14(2):175–183.
Waldman, J. R., J. T. Hart, and I. I. Wirgin. 1996. Stock composition of the New York Bight Atlantic sturgeon fishery based on analysis of mitochondrial DNA. Transactions of the American Fisheries Society 125: 364-371.
Waring, G.T., J. M. Quintal and C. P. Fairfield. 2002. U. S. Atlantic and Gulf of Mexico marine mammal stock assessments - 2002. NOAA Tech. Memo. NMFS-NE-169, 318 pp.
Waring G.T.,E. Josephson, C.P. Fairfield-Walsh , K. Maze-Foley K, editors. 2007. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments -- 2007. NOAA Tech Memo NMFS-NE- 205. 415 pp.
Waring, G.T., E. Josephson, K. Maze-Foley, Rosel, P.E. (eds). 2010. US Atlantic and Gulf of Mexico marine mammal stock assessments -- 2010. NOAA Tech Memo NMFS NE 219; 598 pp.
Waring, G.T., E. Josephson, K. Maze-Foley, and P.E. Rosel, editors. 2014. U.S. Atlantic and Gulf of Mexico marine mammal stock assessments—2013. NOAA Tech Memo NMFS- NE-228. 475 pp.
Waring, G.T., E. Josephson, K. Maze-Foley, P.E. Rosel, editors. 2015. US Atlantic and Gulf of Mexico Marine Mammal Stock Assessments -- 2014. NOAA Tech Memo NMFS NE 231; 361 p. doi: 10.7289/V5TQ5ZH0
Watling, L. 1998. Benthic fauna of soft substrates in the Gulf of Maine. Pp. 20-29 in: Effects of fishing gear on the sea floor of New England, E.M. Dorsey and J. Pederson (eds.). MIT Sea Grant Pub. 98-4.
Whittingham A, Garron M, Kenney JF & Hartley D. (2005). Large Whale Entanglement Report 2003 updated June 2005. Gloucester, MA: U.S. Department of Commerce. National Marine Fisheries Service Northeast Regional Office. 137 p.
Whittingham A, Hartley D, Kenney JF, Cole TVN & Pomfret E. (2005). Large Whale Entanglement Report 2002 updated March 2005. Gloucester, MA: U.S. Department of Commerce. National Marine Fisheries Service Northeast Regional Office. 93 p.
Williamson, J. 1998. Gillnet fishing in E.M. Dorsey, J. Pederson, eds. Effects of fishing gear on the sea floor of New England. MIT Sea Grant Pub. 98-4:87-89.
Wirgin, I., L. Maceda, J.R. Waldman, S. Wehrell, M. Dadswell, and T. King. 2012. Stock origin of migratory Atlantic sturgeon in the Minas Basin, Inner Bay of Fundy, Canada, determined by microsatellite and mitochondrial DNA analyses.
Yao, Z. and L.W. Crim. 1995. Copulation, spawning and parental care in captive ocean pout. Journal of Fish Biology 47: 171 – 173.

9.3 Index

Accountability Measure
AM, 3, 21, 25, 26, 136, 236, 299
Amendment 13, 68
Annual Catch Entitlement (ACE), 21, 28, 118, 119, 123, 124, 141, 255, 281, 290
Annual Catch Limit
ACL, 3, 21, 26, 27, 28, 32, 37, 42, 81, 118, 119, 136, 141, 204, 208, 210, 233, 236, 248, 290
Atlantic halibut, 79
Atlantic wolffish, 79, 80, 243, 302
Biological Impacts, 249
Bycatch, 86, 251, 283, 284
Cod
GB, 35, 71, 72, 118, 145, 148, 232
GOM, 28, 71, 144, 145, 148, 258
Cumulative Effects, 230, 231, 242, 248, 259
Days-at-sea (DAS), 21, 66, 82, 118, 119, 120, 232, 233, 234, 237, 253, 255, 260, 267, 268, 283, 284
Category A, 284
Category B, 268, 284
Category C, 284
Economic impacts, 124, 195, 200, 203, 204, 207, 208, 230, 239, 241, 250, 260, 262
Essential Fish Habitat, 21, 23, 55, 61, 69, 70, 84, 150, 183, 235, 236, 238, 247, 248, 249, 255, 257, 258, 259, 260, 267, 270, 281, 285, 289, 292, 293, 294, 295, 299, 301, 306
Essential Fish Habitat (EFH), 69
Exclusive Economic Zone, 21, 25, 117, 230, 257, 285
Greater Atlantic Regional Fisheries Office, 22, 263
Habitat impacts, 69, 241, 244, 257, 258
Habitat Impacts, 257
Haddock
GB, 35, 72, 73, 75, 141, 210, 232
GOM, 72, 73, 144, 145, 148, 210
Halibut, 34, 40, 79, 243
Incidental Catch TACs, 190, 235
Magnuson-Stevens Fishery Conservation and Management Act, 3, 4, 22, 25, 27, 124, 190, 195, 239, 248, 251, 253, 259, 262, 267, 269, 270
Marine mammals, 188, 189, 230, 260, 297
Ocean pout, 78
Overfishing Level
OFL, 23, 32, 37, 247
Plaice, American, 28, 33, 38, 58, 59, 70, 73, 89, 243, 288, 291
Pollock, 33, 39, 58, 59, 70, 71, 77, 243
Potential Sector Contribution (PSC), 23, 123, 124, 240, 281, 290
Protected species, 303
Redfish, 33, 39, 70, 76, 243
Social Impact Analysis, 23
Social impacts, 218
Special Access Program, 23
Status Determination Criteria, 29, 51, 151, 152, 153, 183, 184, 188, 195, 219, 220, 255
White hake, 58, 59, 61, 77
Windowpane flounder, 3, 25, 28, 58, 59, 61, 70, 77, 78, 204, 208, 237, 238, 249, 250, 288, 291
Northern, 77, 78
Winter flounder, 58, 59, 61
GOM, 74, 148
SNE/MA, 28, 75, 118, 148, 235
Witch flounder, 58, 59, 73
Wolffish, Atlantic, 34, 41, 80, 243
Yellowtail flounder, 59
CC/GOM, 75
GB, 35, 75, 204, 208, 234, 235
SNE/MA, 76