Framework Adjustment 46 to the Northeast Multispecies FMP Working Draft

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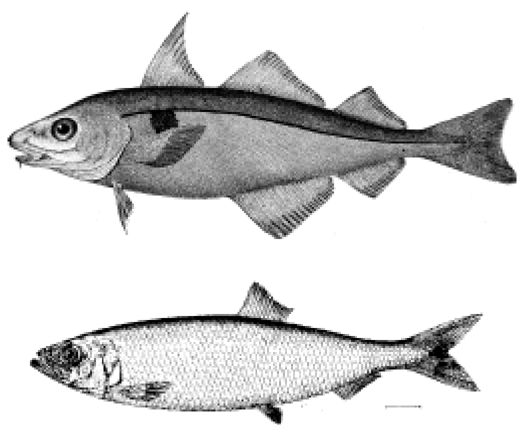


1.0 Table of Contents

1.0 Table of Contents ... 2
1.1 List of Tables ... 5
1.2 List of Figures ... 7
1.3 Acronyms ... 8
2.0 Introduction and Background ... 12
2.1 Background ... 12
2.2 Purpose and Need for the Action ... 13
2.3 Brief History of the Northeast Multispecies Management Plan ... 14
2.4 National Environmental Policy Act (NEPA) ... 15
3.0 Alternatives Under Consideration ... 16
3.1 Option 1: No Action ... 16
3.2 Option 2: Haddock Catch Cap of 1% for the Midwater Trawl Fleet ... 25
3.3 Option 3: Haddock Catch by Herring Fleet Included in "Other Sub-Components" Category for ACL Calculations ... 32
3.3.1.1 Triggered Change to the Catch Cap Provisions ... 37
4.0 Alternatives Considered and Rejected ... 39
4.1 Individual Trip Limits ... 39
4.2 100% Observer Coverage in Area 3 ... 39
4.3 Area Closures ... 39
4.4 Cap Adjusted Based on Observer Coverage ... 40
4.5 Other Alternatives Under Development ... 47
5.0 Affected Environment ... 48
5.1 Physical Environment/Habitat/EFH ... 48
5.1.1 Affected Physical Environment ... 49
5.1.1.1 Gulf of Maine ... 49
5.1.1.2 Georges Bank ... 51
5.1.1.3 Southern New England/Mid-Atlantic Bight ... 52
5.1.2 Essential Fish Habitat (EFH) ... 54
5.1.2.1 Groundfish EFH ... 54
5.1.2.2 Atlantic Herring EFH ... 58
5.1.3 Groundfish Gear Types and Interaction with Habitat ... 63
5.1.3.1 Groundfish Gear Types ... 63
5.1.3.2 Gear Interaction with Habitat ... 67
5.1.4 Herring Gear Types and Interaction with Habitat ... 69
5.1.4.1 Herring Gear Types ... 69
5.1.4.2 Herring Gear Interaction with Habitat ... 71
5.2 Target Species ... 71
5.2.1 Gulf of Maine Haddock ... 71
5.2.2 Georges Bank Haddock ... 74
5.2.3 Atlantic Herring ... 76
5.3 Protected Resources ... 79
5.3.1 Species Present in the Area ... 79
5.3.2 Species Potentially Affected ... 81
5.3.2.1 Sea Turtles ... 81
5.3.2.2 Large Cetaceans ... 82

5.3.2.3 Small Cetaceans ... 84
5.3.2.4 Pinnipeds ... 85
5.3.2.5 Atlantic Sturgeon DPSs ... 85
5.3.2.6 Species Not Likely to be Affected ... 86
5.3.3 Interactions Between Gear and Protected Resources ... 88
5.4 Human Communities and the Fishery ... 93
5.4.1 New England Groundfish Commercial Harvesting Sector ... 93
5.4.1.1 Overview of New England Groundfish Fishery ... 93
5.4.1.2 Landings and Revenues ... 94
5.4.1.2.1 Landings and Revenues by Groundfish Permit Category ... 95
5.4.1.2.2 Landings and Revenues by Vessel Length Group ... 100
5.4.1.2.3 Landings and Revenue by Homeport State ... 102
5.4.1.2.4 Landings and Revenues by Port Group ... 105
5.4.1.3 Groundfish Communities ... 110
5.4.2 Atlantic Herring Fishery ... 112
5.4.2.1 Atlantic Herring Vessels ... 113
5.4.2.2 Landings by Vessels with Herring Permits ... 116
5.4.2.2.1 Atlantic Herring Catch (IVR) ... 116
5.4.2.2.2 Atlantic Herring Landings by Gear (VTR) ... 120
5.4.2.2.3 Landings of Other Species (VTR) ... 122
5.4.2.3 Herring Communities ... 126
5.4.3 Mid-Water Trawl Catches of Haddock ... 127
5.4.3.1 Overview ... 127
5.4.3.2 Herring Fishery Catches of Haddock ... 127
5.4.3.3 Mid-Water Trawl Haddock Catches ... 132
5.4.3.4 Relationship of Herring to Haddock Catches in Mid-water trawls ... 137
5.4.3.5 Length/Frequency of Haddock Catches in Mid-water trawls ... 137
5.4.3.6 Location of Haddock Catches in the Water Column ... 141
5.4.3.7 Catches Not Brought Onboard ... 147
5.4.3.8 MWT Observations on GB in 2010 ... 151
6.0 Environmental Consequences – Analysis of Impacts of the Proposed Action ... 158
6.1 Biological Impacts ... 158
6.1.1 Option 1: No Action ... 158
6.1.2 Option 2: Haddock Catch Cap of 1% for the Midwater Trawl Fleet ... 164
6.1.3 Option 3: Haddock Catch by Herring Fleet Included in “Other Subcomponents” Category for ACL Calculations ... 166
6.1.4 Summary of Biological Impacts ... 169
6.2 Impacts to EFH ... 171
6.2.1 Option 1: No Action ... 172
6.2.2 Option 2: Haddock Catch Cap of 1% for the Midwater Trawl Fleet ... 172
6.2.3 Option 3: Haddock Catch by Herring Fleet Included in “Other Sub-Components” Category for ACL Calculations ... 173
6.2.4 Summary of Impacts to EFH ... 173
6.3 Impacts to Endangered and Other Protected Species ... 175
6.3.1 Option 1: No Action ... 175
6.3.2 Option 2: Haddock Catch Cap of 1% for the Midwater Trawl Fleet ... 176
6.3.3 Option 3: Haddock Catch by Herring Fleet Included in “Other Sub-Components” Category for ACL Calculations ... 177
6.3.3.1 Sub-Option A: Combined MWT and Subcomponent Trigger ... 177
6.3.3.2 Sub-Option B: MWT Trigger ... 178

6.4 Economic Impacts ... 178
6.4.1 Option 1: No Action ... 179
6.4.2 Option 2: Haddock Catch Cap of 1% for the Midwater Trawl Fleet ... 186
6.4.3 Option 3: Haddock Catch by Herring Fleet Included in "Other Sub-components" Category 188
6.4.4 Assessing the Impacts of Changes to the Haddock Catch Cap for the Herring Fishery 189
6.4.4.1 Methods ... 190
6.4.4.2 Results and Discussion ... 191
6.4.4.3 General Conclusions ... 192
6.4.5 Summary of Economic Impacts ... 193
6.5 Social Impacts ... 194
6.5.1 Option 1: No Action ... 194
6.5.2 Option 2: Haddock Catch Cap of 1% for the Midwater Trawl Fleet ... 195
6.5.3 Option 3: Haddock Catch by Herring Fleet Included in "Other Sub-Components" Category for ACL Calculations ... 195
6.5.4 Summary of Social Impacts ... 197
6.6 Cumulative Effects Analysis ... 198
6.6.1 Introduction ... 198
6.6.2 Past, Present and Reasonably Foreseeable Future Actions ... 200
6.6.3 Baseline Conditions for Resources and Human Communities ... 203
6.6.4 Summary Effects of Framework 46 Actions ... 206
6.6.5 Cumulative Effects Summary ... 206
7.0 Applicable Law ... 207
7.1 Magnuson-Stevens Fishery Conservation and Management Act ... 207
7.1.1 Consistency with National Standards ... 207
7.1.2 Other MSFCMA requirements ... 207
7.1.3 EFH Assessment ... 207
7.2 National Environmental Policy Act (NEPA) ... 207
7.2.1 Environmental Assessment ... 207
7.2.2 Finding of No Significant Impact (FONSI) ... 208
7.2.3 List of Preparers; Point of Contact ... 208
7.2.4 Agencies Consulted ... 208
7.2.5 Opportunity for Public Comment ... 208
7.3 Endangered Species Act ... 209
7.4 Marine Mammal Protection Act ... 209
7.5 Coastal Zone Management Act ... 209
7.6 Administrative Procedure Act ... 210
7.7 Data Quality Act ... 210
7.7.1 Utility of Information Product ... 210
7.7.2 Integrity of Information Product ... 211
7.7.3 Objectivity of Information Product ... 211
7.8 Executive Order 13132 (Federalism) ... 212
7.9 Executive Order 13158 (Marine Protected Areas) ... 212
7.10 Paperwork Reduction Act ... 213
7.11 Regulatory Impact Review ... 213
8.0 References ... 214
8.1 Glossary ... 214
8.2 Literature Cited ... 230
8.3 Index ... 237

1.1 List of Tables

Table 1 – Summary of the purpose and need for Framework 46 14
Table 2 – Option 1/No Action OFLs, ABCs, and ACLs for GOM and GB haddock. 23
Table 3 – Option 2 OFLs, ABCs, and ACLs for GOM and GB haddock. 30
Table 4 – Option 4 OFLs, ABCs, and ACLs for GOM and GB haddock. 35
Table 5 – Option 2 OFLs, ABCs, and ACLs for GOM and GB haddock. 45
Table 6 - 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 55
Table 7 – EFH designation of estuaries and embayments for Atlantic herring 59
Table 8 - Descriptions of the fixed gear types used by the multispecies fishery 65
Table 9 – Species protected under the Endangered Species Act and Marine Mammal Protection Act that may occur in the operations area for the groundfish fishery 79
Table 10 – Descriptions of the Tier 2 Fishery Classification Categories 89
Table 11 – Marine Mammals Impacts Based on Groundfishing Gear and Northeast Multispecies Fishing Areas (Based on 2011 List of Fisheries) 90
Table 12 – Observed Atlantic sturgeon on trips targeting groundfish, FY 2007 – 2010 92
Table 13 – Total groundfish landings and revenues, FY 2004 - 2009 95
Table 14 – Total landings by groundfish permit category, FY 2001 - 2009 97
Table 15 – Total revenues (1999 dollars) by groundfish permit category, FY 2001 - 2009 97
Table 16 – Groundfish landings by groundfish permit category, FY 2001 – FY 2009 98
Table 17 – Groundfish revenues (1999 dollars) by groundfish permits category, FY 2001 - 2009 98
Table 18 – Active groundfish permits, FY 2001 - 2009 99
Table 19 – Average groundfish revenues (1999 dollars) per active groundfish permit, FY 2001 - 2009 99
Table 20 – Total landed weight (lbs.) and revenues (1999 dollars) by length group, FY 2001 – 2009 101
Table 21 – Groundfish landed weight (lbs.) and revenues (1999 dollars) by length group, FY 2001 – 2009 101
Table 22 – Total landings by homeport state, FY 2001 – 2009 103
Table 23 – Total revenues (1999 dollars) by homeport state, FY 2001 – 2009 103
Table 24 – Groundfish landings by homeport state, FY 2001 – 2009 104
Table 25 – Groundfish revenues (1999 dollars) by homeport state, FY 2001 – 2009 104
Table 26 – Total landings by port group of landing, FY 2001 – 2009 106
Table 27 – Total revenues (1999 dollars) by port group, FY 2001 – 2009 107
Table 28 – Groundfish landings by port group, FY 2001 – 2009 108
Table 29 – Groundfish revenues (1999 dollars) by port group, FY 2001 - 2009 109
Table 30 – Number of multispecies permit holders landing groundfish, by landing port group (FY 2001 – 2009) for major groundfish states 110
Table 31 – Primary and secondary ports in the New England groundfish fishery 111
Table 32 – Number of vessels by Atlantic herring permit category and length 114
Table 33 – Number of limited access herring vessels by permit category and principal port, 2010 115
Table 34 – 2010 – 2012 Atlantic herring fishery specifications (in metric tons) 117
Table 35 – Total IVR landings of Atlantic herring, 2000 – 2010 118

Table 36 – Herring IVR catch (metric tons) by management area, 2001 – 2010 118
Table 37 – IVR herring catch for FY 2010 119
Table 38 – Weekly IVR catch reports by management area for last 18 weeks of FY 2010........ 120
Table 39 – Atlantic herring landings (000's of lbs.) for herring-permitted vessels by gear type and permit category, 2008 – 2010 121
Table 40 – Atlantic herring landings by gear type and permit category, as a percent of total herring landings, FY 2010 122
Table 41 – Landings of other species (000's of lbs.) by herring permit category, 2009 – 2010 123
Table 42 - Frequency table of haddock bycatch (lbs) in observed hauls and sets for directed herring trips by gear type and bimonthly blocks. Gear categories include bottom otter-trawls (OT), purse seines (PS), and mid-water trawls-single and paired (PR). Directed herring trips are defined as 2,000 lbs of kept Atlantic herring on a trip. Note this table corresponds with the scaled orange circles in Figure 26. Source: NEFOP Database 2005-2009. From Cournane (2011, appendix xx) 131
Table 43 - Estimation of haddock catches in the midwater trawl herring fishery. Midwater trawl trips have been filtered to include only those hauls/subtrips where the catch was composed of ≥ 90% herring 133
Table 44 - Estimation of haddock catches in the midwater trawl herring fishery. Data have not been filtered; all midwater trawl data are included, regardless of catch composition................ 134
Table 45 - Estimation of haddock discards in the midwater trawl herring fishery. Data have not been filtered; all midwater trawl data are included, regardless of catch composition................ 135
Table 46 – Comparison of MWT GB and GOM haddock catch to GB and GOM haddock SSB, landing, catch, bycatch cap. All weights in metric tons 136
Table 47 – Species observed in MWT tows, entire observer database. 1,596 tows total observed. Species in bold italics are usually considered bottom-dwellers. 143
Table 48 – Count of observed MWT tows on GB and instances of haddock and other species catches. See text for details. 2010 data through August 144
Table 49 Frequency of Released Catch Events 2008/2009 148
Table 50 – Summary of catches on observed MTW trips to GB in CY 2010. For this analysis GB defined as SAs 521/522/525/525/561/562 only 152
Table 51 – Summary of CY 2010 MWT observed tows with released catch on GB (through October 2010) 156
Table 52 - Total spiny dogfish discard estimates (mt) by gear type, 1989-2005 using expansion based on discard to kept. Zero values mean that no trips were observed. Table reproduced from SAW 43. 163
Table 53 – Comparison of biological impacts of the options.. 170
Table 54 – Summary of FW 46 EFH Impacts (0 = no impact) 174
Table 55 – Georges Bank haddock ABC, landed pounds from the commercial fishery, and percentage of ABC caught by fishing year (**2010 fishing year landings current through March 1, 2011)* 180
Table 56 – Gulf of Maine haddock ABC, landed pounds from the commercial fishery, and percentage of ABC caught by fishing year (**2010 fishing year landings current through March 1, 2011)* 180
Table 57 Proposed Haddock Sub-ACL Under Option 1 (No Action)....................................... 180
Table 58 2010-2012 Atlantic Herring Fishery Specifications (Metric Tons)............................ 182
Table 59 2010 Weekly IVR Catch Reports (IVR) by Management Area (Metric Tons)........... 183
Table 60 Statistical Areas with at least 1,000 Metric Tons Reported Mackerel Catch, Sorted by Total Catch in the Area From 1997-2009.. 185
Table 3 – Mean number of groundfish sets/tows occurring within 20nm of the daily mean center location of herring tows in the days preceding and following herring fishing. Total number of

herring tows in the study area is 472. Differences between *n* and 472 represent herring tow locations with zero groundfish tows within the 20nm radius. (Data from NEFOP, for statistical areas 521, 522, 561 and 562 from 2008-2010) ... 187
Table 62 Proposed Haddock Sub-ACL Under Option 2 (1% Stock Specific Cap) ... 188
Table 63 Simulation Results for Option 1 (No Action) – Simulated Closures and Foregone Herring ... 191
Table 64 – Summary of FW 46 Social Impacts ... 197
Table 65 – Summary effects of past, present and reasonably foreseeable future actions on the VECs identified for Framework 46 ... 202
Table 66 – Cumulative effects assessment baseline conditions of the VECs ... 204

1.2 List of Figures

Figure 1 – Herring limited access areas ... 17
Figure 2 – Atlantic herring management areas ... 20
Figure 3 – Herring exemption area ... 20
Figure 4 – No Action ACL process for GB haddock ... 24
Figure 5 – No Action ACL process for GOM haddock ... 24
Figure 6 – Proposed stock specific AM areas ... 27
Figure 7 – Option 2 ACL process for GB haddock ... 31
Figure 8 – Option 2 ACL process for GOM haddock ... 31
Figure 9 – Option 4 ACL process for GB haddock ... 36
Figure 10 – Option 4 ACL process for GOM haddock ... 36
Figure 11 – Proposed stock specific AM areas ... 42
Figure 12 – ACL process for GB haddock ... 46
Figure 13 – ACL process for GOM haddock ... 46
Figure 14 – Northeast U.S. Shelf Ecosystem ... 48
Figure 15 – Gulf of Maine ... 49
Figure 16 – EFH designation for Atlantic herring eggs ... 60
Figure 17 – EFH designation for Atlantic herring larvae ... 61
Figure 18 – EFH designation for juvenile Atlantic herring ... 62
Figure 19 – EFH designation for adult Atlantic herring ... 63
Figure 20 – Gulf of Maine haddock spawning stock biomass (SSB) and fishing mortality (F) during 1977-2007 reported in GARM III (blue circles) along with 80% confidence intervals for 2007 estimates. Projected SSB and F with 80% confidence intervals are shown with open squares. ... 73
Figure 21 – Projected GOM haddock stock size ... 74
Figure 22 – Georges Bank haddock spawning stock biomass (SSB) and fishing mortality (F) estimates during 1931-2007 reported in GARM III (blue circles) along with 80% confidence intervals for 2007 estimates. Projected SSB and F with 80% confidence intervals are shown with open squares. ... 75
Figure 23 – Projected GB haddock stock size ... 76
Figure 24 – Atlantic herring spawning stock biomass (SSB) and recruitment estimates, 1966 - 2005 ... 78
Figure 25 – Atlantic herring trends in landings and fishing mortality, 1960-2005 ... 78
Figure 26 – Directed herring fishing activity and observed haddock catches, 2005 – 2009 (from Cournane 2011; see appendix xx) ... 129
Figure 27 – Herring fishery observed catches of haddock in the GOM and GB areas (from Cournane 2011, appendix xx) ... 130

Figure 28 – Plot of herring/haddock on observed MWT tows, 1994 – 2009 138
Figure 29 – Plot of herring/haddock on observed MWT tows. 2006-2009................................ 139
Figure 30 – Length-frequency of haddock on observed MWT tows, 200 - 2009 140
Figure 31 – Relationship between the number of observed MWT tows and the number of observed MWT tows catching haddock, 2004 – August 2010, GB area.................................... 144
Figure 32 – Relationship between number of observed MWT tows and the number of observed MWT toes catching haddock, 2004 – August 2010, GOM and GB areas................................. 145
Figure 33 – Distribution by time of day of GB MWT tows not catching haddock (“NO”) and catching haddock (“YES”); 2004 – August 2010. Time is the hour the tow ended.................. 145
Figure 34 – Distribution by depth of water (fathoms) of GB MWT tows not catching haddock (“NO”) and catching haddock (“YES”); 2004 – August 2010... 146
Figure 35 – Comparison of haddock catch:total catch in and outside of CAI. No tows were observed in CAI during 2007. 147
Figure 36 Analysis of Comments Regarding Released Catch.. 149
Figure 37 Analysis of Comments Regarding Released Catch (continued) 150
Figure 38 Information about Full and Partial Slippage Events 2008/2009 150
Figure 39 – CY 2010 MWT trips in CAI and CAII (Source: NEFOP)...................................... 154
Figure 40 - 2010 MWT trips in CAI and CAII (Source: NEFOP)... 155
Figure 41 – Pounds not brought onboard, FY 2010 MWT tows on GB 156
Figure 42 – Example cumulative ratio haddock catch estimate for CY 2010 157

1.3 Acronyms

ABC	Acceptable Biological Catch
ACE	Annual Catch Entitlement
ACL	Annual Catch Limits
ALWTRP	Atlantic Large Whale Take Reduction Plan
AM	Accountability Measure
APA	Administrative Procedures Act
ASMFC	Atlantic States Marine Fisheries Commission
B	Biomass
CAA	Catch at Age
CAI	Closed Area I
CAII	Closed Area II
CC	Cape Cod
CEQ	Council on Environmental Quality
CHOIR	Coalition for the Atlantic Herring Fishery’s Orderly, Informed, and Responsible Long-Term Development
CPUE	Catch per unit of effort
CZMA	Coastal Zone Management Act
DAH	Domestic Annual Harvest
DAM	Dynamic Area Management
DAP	Domestic Annual Processing
DAS	Days-at-sea
DEA	Data Envelopment Analysis
DFO	Department of Fisheries and Oceans (Canada)
DMF	Division of Marine Fisheries (Massachusetts)

DMR	Department of Marine Resources (Maine)
DSEIS	Draft Supplemental Environmental Impact Statement
DSM	Dockside monitoring
DWF	Distant-Water Fleets
E.O.	Executive Order
EA	Environmental Assessment
ECPA	East Coast Pelagic Association
ECTA	East Coast Tuna Association
EEZ	Exclusive economic zone
EFH	Essential fish habitat
EIS	Environmental Impact Statement
ESA	Endangered Species Act
ETA	Elephant Trunk Area
F	Fishing mortality rate
FAAS	Flexible Area Action System
FEIS	Final Environmental Impact Statement
FMP	Fishery Management Plan
FSCS	Fisheries Scientific Computer System
FSEIS	Final Supplemental Environmental Impact Statement
FW	Framework
FY	Fishing year
GAMS	General Algebraic Modeling System
GB	Georges Bank
GEA	Gear Effects Evaluation
GIFA	Governing International Fisheries Agreement
GIS	Geographic Information System
GMRI	Gulf of Maine Research Institute
GOM	Gulf of Maine
GRT	Gross registered tons/tonnage
HAPC	Habitat area of particular concern
HCA	Habitat Closed Area
HPTRP	Harbor Porpoise Take Reduction Plan
I/O	Input/output
ICNAF	International Commission for the Northwest Atlantic Fisheries
IFQ	Individual fishing quota
IOY	Initial Optimal Yield
IRFA	Initial Regulatory Flexibility Analysis
ITQ	Individual transferable quota
IVR	Interactive voice response reporting system
IWC	International Whaling Commission
IWP	Internal Waters Processing
JVP	Joint Venture Processing
LOA	Letter of authorization
LPUE	Landings per unit of effort
LWTRP	Large Whale Take Reduction Plan
M	Natural Mortality Rate
MA	Mid-Atlantic
MA DMF	Massachusetts Division of Marine Fisheries

MAFAC	Marine Fisheries Advisory Committee
MAFMC	Mid-Atlantic Fishery Management Council
MARFIN	Marine Fisheries Initiative
ME DMR	Maine Department of Marine Resources
MEY	Maximum economic yield
MMC	Multispecies Monitoring Committee
MMPA	Marine Mammal Protection Act
MPA	Marine protected area
MRFSS	Marine Recreational Fishery Statistics Survey
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MSY	Maximum sustainable yield
MWT	Midwater trawl; includes paired mid-water trawl when referring to fishing activity
mt	Metric Tons
NAO	North Atlantic Oscillation
NAPA	National Academy of Public Administration
NAS	National Academy of Sciences
NEFMC	New England Fishery Management Council
NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act
NERO	Northeast Regional Office
NLCA	Nantucket Lightship closed area
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NS	National Standard
NSGs	National Standard Guidelines
NSTC	Northern Shrimp Technical Committee
NT	Net tonnage
NWA	Northwest Atlantic
OBDBS	Observer database system
OCS	Outer Continental Shelf
OFL	Overfishing Limit
OLE	Office for Law Enforcement (NMFS)
OY	Optimum yield
PBR	Potential Biological Removal
PDT	Plan Development Team
PRA	Paperwork Reduction Act
PREE	Preliminary Regulatory Economic Evaluation
PS/FG	Purse Seine/Fixed Gear
PSC	Potential Sector Contribution
RFA	Regulatory Flexibility Act
RFFA	Reasonably Foreseeable Future Action
RIR	Regulatory Impact Review
RMA	Regulated Mesh Area
RPA	Reasonable and Prudent Alternatives
SA	Statistical Area
SAFE	Stock Assessment and Fishery Evaluation

SAP	Special Access Program
SARC	Stock Assessment Review Committee
SAV	Submerged Aquatic Vegetation
SAW	Stock Assessment Workshop
SBNMS	Stellwagen Bank National Marine Sanctuary
SEIS	Supplemental Environmental Impact Statement
SFA	Sustainable Fisheries Act
SFMA	Southern Fishery Management Area (monkfish)
SIA	Social Impact Assessment
SNE	Southern New England
SNE/MA	Southern New England-Mid-Atlantic
SSB	Spawning stock biomass
SSC	Scientific and Statistical Committee
TAC	Total allowable catch
TALFF	Total Allowable Level of Foreign Fishing
TC	Technical Committee
TED	Turtle excluder device
TEWG	Turtle Expert Working Group
TMGC	Trans-boundary Management Guidance Committee
TMS	Ten minute square
TRAC	Trans-boundary Resources Assessment Committee
TRT	Take Reduction Team
TSB	Total stock biomass
USAP	U.S. At-Sea Processing
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
VEC	Valued Ecosystem Component
VMS	Vessel monitoring system
VPA	Virtual population analysis
VTR	Vessel trip report
WGOM	Western Gulf of Maine
WO	Weighout
YPR	Yield per recruit

2.0 Introduction and Background

2.1 Background

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

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

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

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

The most recent amendment, published as Amendment 16, became effective on May 1, 2010. This amendment adopted a broad suite of management measures in order to achieve fishing mortality targets necessary to rebuild overfished stocks and meet other requirements of the M-S Act. Amendment 16 adopted a process for setting Annual Catch Limits that requires catch levels to be set in biennial specifications packages. Several lawsuits are challenging various provisions of Amendment 16, including the amendment’s provisions related to sectors and some of the accountability measures.

Two framework adjustments have updated the measures in Amendment 16. The first, published as Framework 44, became effective on May 1, 2010 concurrently with Amendment 16. It adopted the required specifications for regulated northeast multispecies stocks, as well as stocks managed by the U.S./Canada Resource Sharing Agreement. It was also used to incorporate the best available information in adjusting effort control measures adopted in Amendment 16. Framework 45 became effective on May 1, 2011. It built upon revisions made to the sector program in Amendment 16 and Framework 44, and also to set specifications required under the U.S./Canada Resource Sharing Agreement and incorporating an updated stock assessment for pollock.

Previous amendments to the FMP established processes to evaluate management measures, including fishing mortality and rebuilding progress. If necessary as a result of these evaluations, periodic framework adjustments were planned to facilitate any changes to the management program that may prove necessary in order to improve administration, to comply with the rebuilding programs, and to provide an opportunity to adjust other management measures as necessary. These adjustments to the most recent modifications to the FMP are intended to meet the goals and objectives of the Northeast Multispecies FMP, as modified in Amendment 16.

In 2006, Framework (FW) 43 to the FMP adopted a cap on the amount of haddock that could be caught by the directed herring fishery. That action stated:

> "The primary purpose of this framework adjustment is to modify regulations for the multispecies fishery to address bycatch in the herring fishery by:
> 1) Establishing a haddock catch cap and monitoring program and a multispecies incidental catch allowance for the directed herring fishery; and
> 2) Modifying the current classification of herring fishing gear as *exempted gear* relative to the multispecies fishery."

To meet those objectives, it adopted a cap on bycatch by the herring fleet of 0.2% of the combined TTAC for GOM and GB haddock.

2.2 Purpose and Need for the Action

Since the implementation of FW 43, haddock biomass has grown substantially, especially on Georges Bank (as detailed in Section 5.2.2). In FY 2010, the increased abundance of haddock led the herring fishery to approach the 0.2% cap well before the completion of the fishing year.

<u>*Need:*</u>

Given the current large biomass of haddock on GB, the current fixed 0.2% cap on haddock catch by the herring fleet risks creating a gross constraint on herring catch despite the fact that overall haddock catches are far below the ABC for that stock. The overarching need for this framework is because unless action is taken to modify the provisions adopted in FW 43 to reflect current conditions in the fishery, it appears likely that herring midwater trawl vessels may be prevented from fishing on GB for a large portion of the year after the cap is reached. Furthermore, the cap is monitored based on what occurs on observed trips in the fishery. When observer coverage changes, that leads to midwater trawls leaving the Georges Bank area.

Specifically, this action is needed because such an interruption in the herring fishery would have negative impacts on the fishery participants and is necessary to avoid potential impacts to the supply of herring used as bait for the lobster fishery. It is also needed to avoid reducing opportunities for the herring TAC in Area 3 (and OY) to be fully utilized. Perhaps most importantly, it is needed because reduced fishing effort in the Area 3 herring fishery may result in a shift of effort into Area 1A during the summer and fall, exacerbating concerns about the inshore GOM component of the resource and the impacts of concentrated midwater trawl fishing effort in this area (Table 1).

Purpose:

The Council unanimously adopted the following objectives (purpose) for this action (Table 1) during its January 2011 meeting:

1) To maximize the chance for Georges Bank (Area 3) herring TAC to be caught;
2) To provide incentives to fish offshore;
3) To provide incentives to fish in a manner, at times, and in areas when and where haddock bycatch is none to low; and
4) To reduce the impact of a haddock cap on the entire herring fishery.

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

Table 1 – Summary of the purpose and need for Framework 46

NEED FOR FRAMEWORK 46	CORRESPONDING PURPOSE OF FRAMEWORK 46
Need to avoid potential impacts to the supply of herring used as bait for the lobster fishery and potential impacts to herring fishery participants	To maximize the chance for Georges Bank (Area 3) herring TAC to be caught. To reduce the impact of a haddock cap on the entire herring fishery
Need to avoid reducing opportunities for the herring TAC in Area 3 (and OY) to be fully utilized	To maximize the chance for Georges Bank (Area 3) herring TAC to be caught. To provide incentives to fish in a manner, at times, and in areas when and where haddock bycatch is none to low
Needed because reduced fishing effort in the Area 3 herring fishery may result in a shift of effort into Area 1A during the summer and fall	To provide incentives to fish offshore

2.3 Brief History of the Northeast Multispecies Management Plan

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

2.4 National Environmental Policy Act (NEPA)

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

3.0 Alternatives Under Consideration

This action is proposed based upon existing regulations as of February 2011. It is important to note that changes are under consideration for the herring fishery, including potential modifications to monitoring and reporting regulations.

3.1 Option 1: No Action

If no action is adopted, the herring fishery would be subject to a cap on haddock catch that is equal to 0.2% of the combined GB and GOM haddock ABC. Groundfish ABCs and the cap are calculated based on the calendar year (January-December), but monitored based on the groundfish fishing year (May-April).

These regulations were first adopted in Framework 43 to the Northeast Multispecies FMP (NEFMC 2006). The cap amount was incorporated into the groundfish ACL/AM structure adopted by Amendment 16 (NEFMC 2010), and a corresponding accountability measure had been adopted in Amendment 1 to the Herring FMP. The following information summarizes the existing regulations, but does not address additional requirements when fishing in Closed Area I.

Herring Fishery Status

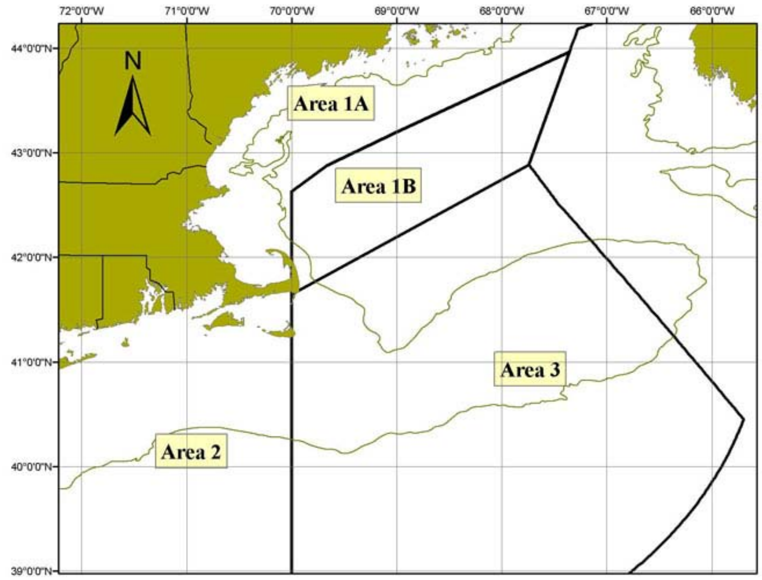
Herring midwater trawls and purse seines are no longer considered exempted gear because they are known to catch groundfish. FW 43 redefined these gears as an exempted, or certified bycatch, fishery but did not change access to closed areas by these gears. Exempted fisheries are regulated by groundfish regulations. Early groundfish amendments only allowed exempted fisheries if their groundfish bycatch was 5 percent or less of the total catch by weight. Amendment 13 acknowledged that exempted fisheries may catch more groundfish as stocks rebuild and left open the possibility they could be allowed even if catching more than 5 percent groundfish. Amendment 13 also says that they can be restricted if groundfish catches are less than 5 percent – for example, if the fishery is determined to catch excessive amounts of juvenile fish.

Herring Permits

There are four herring permit categories affected by the existing cap. These are:

- Category A: Limited access all areas permit, no limit on herring landings
- Category B: Limited access herring area 2 and 3 (Figure 2) permit, no limit on herring landings
- Category C: Limited access incidental catch herring permit; limited to 55,000 pounds of herring per trip with one landing per calendar day; a Category B permit can also hold a Category C permit and use it in Area 1
- Category D: Open access herring permit, limited to 3 mt of herring per trip and one landing per calendar day

Figure 1 – Herring limited access areas



Groundfish Possession Limits

Category A and B herring vessels are required to land all haddock brought on deck or pumped onboard, but it cannot be sold for human consumption. They may land up to 100 pounds of other groundfish.

Monitoring and Reporting Requirements

The haddock catch cap provisions apply to vessels with specific herring permits. All trips by these vessels are considered a herring trip (regardless of species targeted or caught) unless the vessel has declared out of the fishery (DOF) through VMS. When a vessel is declared out of the fishery it is not permitted to fish for, possess, or land herring.

Only haddock catches on category A and B permitted vessels that are documented by the following sources count towards the cap:

(1) Dealers via Dealer Electronic Reporting to either the Standard Atlantic Fisheries Information System (SAFIS) or the Federally Licensed Seafood Dealers Trip Ticket System;

(2) NOAA Fisheries Service Observer Program, through audited observer reports submitted by the Northeast Fisheries Science Center; and

(3) NOAA Fisheries Office of Law Enforcement reports resulting from actual dockside inspections of catch by observers and/or reported by dealers are counted against the cap. Observed catch rates are not expanded to an estimate of total: observer data from the NMFS observer program and dockside monitoring conducted by the states.

The reporting requirements for the herring fishery implemented in the herring FMP would remain unchanged. For full details of the requirements, refer to the FMP for herring. A brief summary of these requirements follows:

- IVR: Limited access vessel operators are required to submit weekly reports, and open access operators must submit reports if their weekly catch exceeds 2000 lbs. Reports must include information such as vessel ID, pounds retained, pounds discarded, management areas fished, and pounds of herring caught in each management area. If vessels engage in pair-trawl or purse seine operations, the vessel that actually lands the catch is responsible for reporting it on IVR. Similarly, if herring is transferred at sea, the catcher vessel, not the carrier, should report the catch. There may be changes to the way these data are submitted in the future.
- VTR: These reports are more thorough than IVR reports and must be submitted monthly to NMFS. These provide information including vessel name, USCG documentation number, permit number, permit number, date/time sailed, date/time landed, trip type, number of crew, number of anglers (if a charter or party boat), gear fished, quantity and size of gear, mesh/ring size, chart area fished, average depth, latitude/longitude (or loran), total hauls per area fished, average tow time duration, hail weight (or fish count if party/charter vessel) by species of all species landed or discarded, dealer name and permit number, date sold, port and state landed, and vessel operator information.
- Dealer Reporting: Reports are submitted weekly. They must include the name, vessel number, and VTR number for any vessel that harvested fish, and the correct weight units for purchased fish. Catch must be attributed to the vessel that harvested the herring, and not a carrier vessel. The following special rules apply to dealer treatment of haddock landed by herring vessels:

  > *"Dealers, including at-sea processors, that cull or separate all other fish from the herring catch must separate and retain all haddock offloaded from vessels that have an All Areas Limited Access Herring permit or an Areas 2 and 3 Limited Access Herring permit. Any haddock may not be sold, purchased, received, traded, bartered, or transferred, and must be retained, after it has been separated from the herring, for at least 12 hours for dealers and processors on land, and for 12 hours after landing on shore by at-sea processors for inspection by law enforcement officials. The dealer or at-sea processor must report all such haddock on the weekly electronic dealer report and must use the appropriate disposition code for the haddock. The weekly dealer report must clearly indicate the vessel name and permit number of the vessels that caught the retained haddock."*
- VMS: A vessel on a herring trip must declare into the fishery prior to leaving port. If a vessel is declared out of the herring fishery prior to leaving port to target a non-VMS required species, that vessel may not harvest, possess, or land herring on that trip. All vessels with an All Areas or Areas 2 and 3 limited access permit using midwater trawl or purse seine gear on a declared herring trip must notify NMFS Office of Law Enforcement through VMS of the time and place of offloading at least 6 hours prior to crossing the VMS demarcation line on their return trip to port, or for vessels that have not fished seaward of the demarcation line, at least 6 hours prior to landing.
- Observer Notification: All vessels with an All Areas or Areas 2 and 3 limited access permit using midwater trawl or purse seine gear on a declared herring trip must provide notice to NMFS at least 72 hours prior to beginning any trip for obtaining an at-sea observer. The notification must include the vessel name, a contact name, telephone number, date, time, and port of departure, and whether the vessel intends to fish in Closed

Area I. Observer coverage is determined by NEFOP in accordance with SBRM requirements, with the exception of Closed Area I, where observer coverage is required on 100 percent of trips.

- Herring Quota Monitoring: The IVR reports are the primary data source used for monitoring the herring ACL and sub-ACLs. IVR reports are supplemented with dealer reports only when the dealer-reported catch is higher. This is the final data stream used for real-time monitoring of the herring ACL and sub-ACLs and implementing trip limit reductions in each herring management area. For open access vessels with catch of under 2000 lbs., monitoring is captured through monthly VTRs. Herring catch data reported by vessels are reconciled with dealer reports and VTRs throughout the fishing season to ensure that the data used to monitor the fishery are as accurate as possible.
- Closed Area I: Since March 2010, any midwater trawl vessel issued a limited access herring Category A or B permit fishing in Northeast (NE) multispecies Closed Area I is prohibited from releasing fish from the codend of the net, except when pumping the catch is not possible due to a concern for vessel safety, or pumping is not possible due to mechanical failure or spiny dogfish clogging the pump intake. If fish are released, the vessel must exit Closed Area I for the remainder of that trip. A vessel operator must also complete, sign, and submit to NMFS a Closed Area I Midwater Trawl Released Codend Affidavit following such a release of fish. These restrictions do not apply to the release of small amounts of fish that cannot be pumped and therefore remain in the net at the end of pumping operations.
- It is possible that herring reporting requirements may be modified via a future herring management action.

Accountability Measure

When the Regional Administrator has determined that the haddock incidental catch cap has been caught, all vessels issued a herring permit are prohibited from fishing for, possessing, or landing herring in excess of 2,000 lb per trip in the Gulf of Maine/Georges Bank Herring Exemption Area. (Figure 3). Additionally, the haddock possession limit for all vessels issued All Areas or Areas 2/3 Limited Access permits is reduced to 0 lb in all of the herring management areas. The 0-lb haddock possession limit does not apply to herring vessels that also possess a Northeast multispecies permit and are operating on a declared groundfish trip.

Rationale:

These measures were adopted by FW 43 to provide a mechanism for the herring fishery to continue fishing on GB (Herring Management Area 3) in spite of low catches of groundfish species. Prior to that action, possession of groundfish species was prohibited.

Figure 2 – Atlantic herring management areas

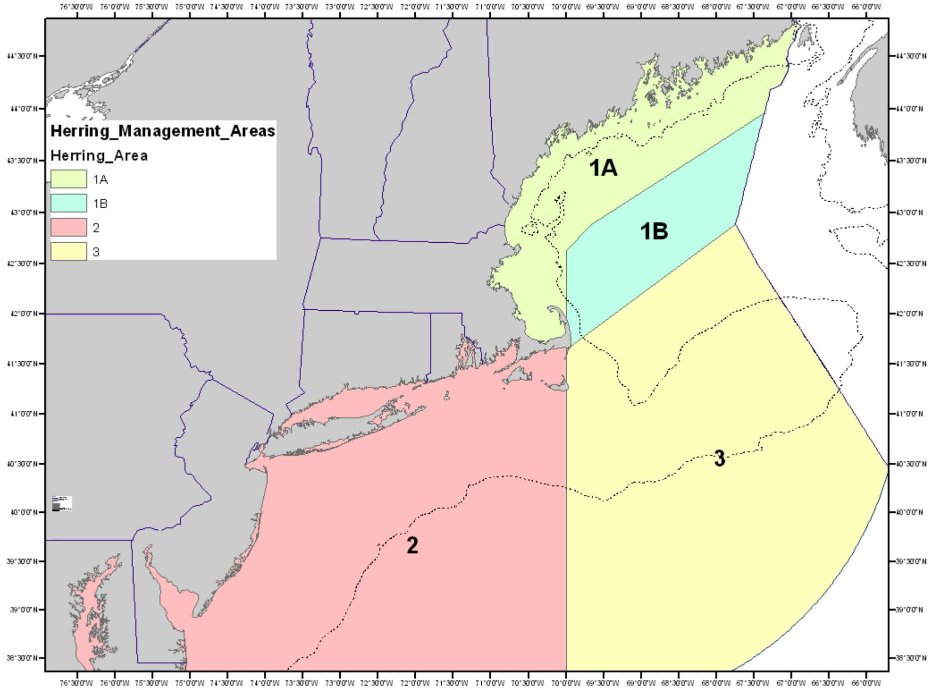
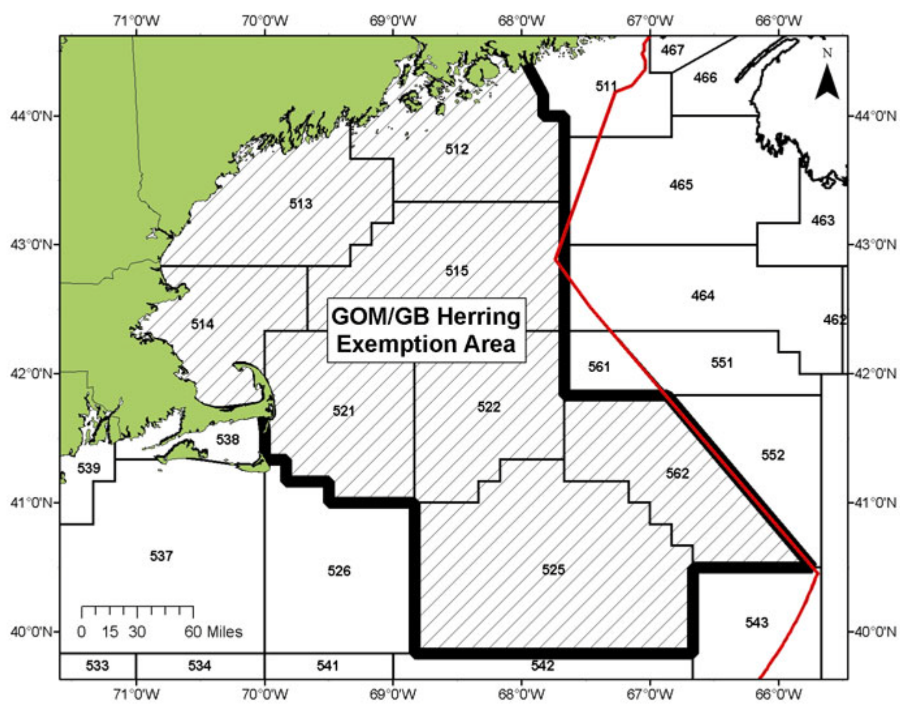


Figure 3 – Herring exemption area



ACLs and Sub-Components

This section describes how the haddock catch cap was calculated in FW 44 and FW 45, and would be calculated under this action. As specified in Amendment 16, the calculation methods can be modified in a framework or specification action. The sub-ACLs that result from this option are shown in Table 2. In this option, the catch cap for the herring fishery combines the value for the two stocks and is monitored as a single cap.

The haddock catch cap was defined in FW 43 as 0.2% of the combined GOM and GB haddock TTACs. With the adoption of the ACL and AM system in Amendment 16 the haddock catch cap was incorporated into this system and was defined as a separate sub-ACL with its own AM. Because the ACL system includes various sub-components that were not in place when FW 43 was adopted, the calculation method for the catch cap had to be refined. This was done in FW 44, and the approach is detailed in Appendix III to that action. There are differences between GOM haddock and GB haddock because the two stocks do not have the same sub-components. The calculations are performed for each stock and then combined. Figure 4 and Figure 5 illustrate the process described below.

GB haddock: The calculation for this stock is relatively straightforward. Once the U.S. ABC is determined, it is divided into four components:

a. The groundfish fishery is allocated 94.8% of the U.S. ABC.
b. Other sub-components are allocated 4% of the U.S. ABC.
c. One percent of the U.S. ABC is assumed taken in state waters.
d. The herring fishery is allocated 0.2% of the ABC for the catch cap.

The sub-components are reduced to account for management uncertainty as appropriate. In the case of the herring fishery, the sub-ACL is 93 percent of the sub-ABC.

GOM haddock: This calculation is more complex because of the different sub-components – primarily because of the way the commercial and recreational allocation were determined for this stock.

a. The recreational fishery is allocated 27.5% of the ABC.
b. The commercial fishery is allocated 72.5% of the ABC.
    (1) Other commercial sub-components are allocated 4% of the commercial sub-ABC.
    (2) State waters commercial catches are assumed to be 1% of the commercial sub-ABC.
    (3) The herring fishery is allocated 0.2% of the ABC. This is deducted from the commercial fishery sub-ABC.
    (4) The commercial groundfish fishery receives the remainder of the commercial fishery sub-ABC after the state waters assumption, herring fishery allocation, and commercial other sub-components allocations are deducted.

The sub-components are reduced to account for management uncertainty as appropriate. In the case of the herring fishery, the sub-ACL is 93 percent of the sub-ABC.

Rationale: Option 1/No Action represents the management measures that were adopted in FW 43 to the Northeast Multispecies FMP. As described in section 2.1, FW 43 modified the regulations pertaining to the herring fishery in order to provide an opportunity for harvesting available herring by allowing catches of multispecies. At the same time it adopted a cap on the amount of haddock that could be caught and imposed measures to stop the catch of haddock if it exceeded the cap. The cap in FW 43 was initially planned to be one percent of the combined GOM and GB haddock TTACs (this framework was adopted prior to ACL requirements). The one percent was reduced to 0.2 percent based on the expectation that observer coverage in the fishery would be 20 percent of trips, only catches documented would apply to the cap, and therefore a more appropriate level for the cap was to reduce it proportional to the expected observer coverage. This option, if adopted, would continue the FW 43 measures.

Table 2 – Option 1/No Action OFLs, ABCs, and ACLs for GOM and GB haddock.
(1) Values for 2012 may be changed during the ABC setting process planned for fall 2011.

Stock	Year	OFL	U.S. ABC	State Waters Sub-component	Other Sub-Components	Scallop Sub-ACL	Ground fish Sub-ACL	Comm Groundfish Sub-ACL	Rec Groundfish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non_Sector Groundfish Sub-ACL	MWT Sub_ ACL	Total ACL
GB Haddock	2011	59,948	34,244	342	1,370	0	30,840		0	30,223	617	64	32,616
	2012	51,150	29,016	290	1,161	0	26,132		0	25,609	523	54	27,637
GOM Haddock	2011	1,536	1,206	9	35	0		787	308	749	37	2	1,141
	2012	1,296	1,013	7	29	0		661	259	630	31	2	959

Figure 4 – No Action ACL process for GB haddock

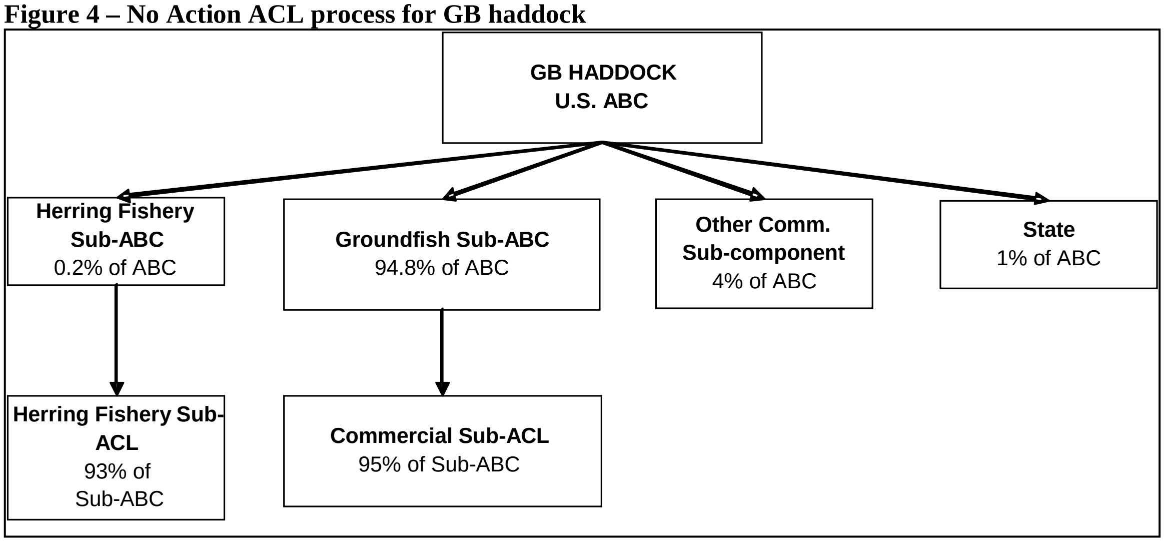
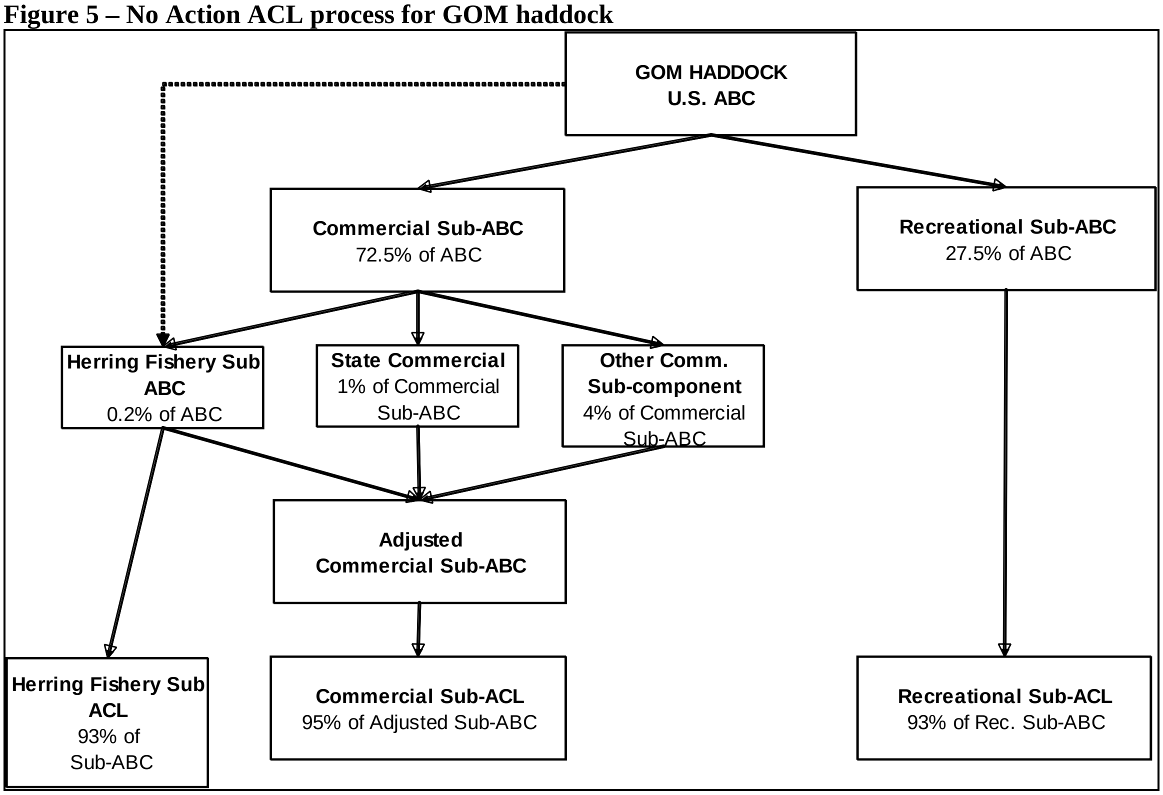


Figure 5 – No Action ACL process for GOM haddock



3.2 Option 2: Haddock Catch Cap of 1% for the Midwater Trawl Fleet

Under this option, the herring fishery's midwater trawl [1]fleet (which includes both single and paired midwater trawl fishing vessels) would be subject to a stock specific cap on haddock catch that is equal to 1% of the Georges Bank haddock ABC and 1% of the Gulf of Maine haddock ABC. Haddock catch estimates would be calculated by extrapolating sea sampling observations to the entire fleet by haddock stock area. The sub-ACLs that result from this option (1% of the stock-specific ABC) are shown in Table 3.

Monitoring and Reporting Requirements

The haddock catch cap provisions would apply to mid-water trawl vessels with a herring permit of any category. All trips by these vessels are considered a herring trip (regardless of species targeted or caught) unless the vessel has declared out of the fishery (DOF) through VMS. When a vessel is declared out of the fishery it is not permitted to fish for, possess, or land herring.

In order to monitor catches against the cap, observed catches of haddock in Herring Management Areas 1A, 1B, and 3 will be expanded to an estimate of total haddock catch. Estimates will be made by haddock stock area – that is, a separate catch estimate will be made for GOM haddock and GB haddock. The estimation procedure will be developed by the NERO in consultation with the NEFSC, and the calculation process will be detailed on the NERO web page. Stock specific haddock catch estimates will be published on the NERO web page at least monthly. Note that under this option, catches from dealer data or enforcement actions are no longer used to monitor the cap.

Other monitoring and reporting requirements are as specified under the No Action alternative. Unlike the No Action alternative, where many of the reporting requirements only apply to vessels with a specific herring permit, under this option the reporting requirements are extended to apply to any mid-water trawl vessel with any category herring permit that fishes in Herring Management Area 1A, 1B, or 3.

The following additional data elements must be reported via IVR or other ACL monitoring system adopted for the herring fishery:

- In addition to reporting herring by herring management area, mid-water trawl herring vessels fishing in herring management areas 1A, 1B, or 3 must report gear and total kept catch by modified haddock stock area. For the purposes of this reporting requirement only, the modified stock areas are defined as the following statistical areas:
    - GOM: SA 464/465/511/512/513/514/515
    - GB: SA 521/522/525/526/561/562

Possession Limits
All MWT herring vessels are required to land all haddock brought on deck or pumped onboard, but it cannot be sold for human consumption. They may land up to 100 pounds of other groundfish.

[1] Throughout this document the term midwater trawl refers to both single and paired midwater trawl vessels or fishing activity.

Category A and B herring vessels will continue to be limited to 100 pounds of other regulated multispecies regardless of gear type used.

Accountability Measure

When the Regional Administrator has determined that the haddock incidental catch cap has been caught, all midwater trawl vessels issued a herring permit are prohibited from fishing for, possessing, or landing herring in excess of 2,000 lb per trip in the appropriate AM area (see below, Figure 6). Additionally, the haddock possession limit for all midwater trawl vessels issued a herring permit is reduced to 0 lbs in the appropriate AM area. The 0-lb haddock possession limit does not apply to herring vessels that also possess a Northeast multispecies permit and are operating on a declared groundfish trip.

Once the total catch of haddock by midwater trawl vessels for a fishing year is determined, using all available information, any haddock sub-ACL overage would result in a reduction of the corresponding ACL/sub-ACL the following year. For example, if final accounting of the 2011 total haddock midwater trawl catch in the GB haddock stock area, which is generally available in the spring of 2012, indicated that the GB haddock MWT sub-ACL was exceeded by 5 mt, then, in 2012, the sub-ACL for GB haddock would be reduced by 5 mt to account for the overage that occurred during 2011. Any overage deductions will be announced by NMFS in the *Federal Register* prior to the start of the groundfish fishing year.

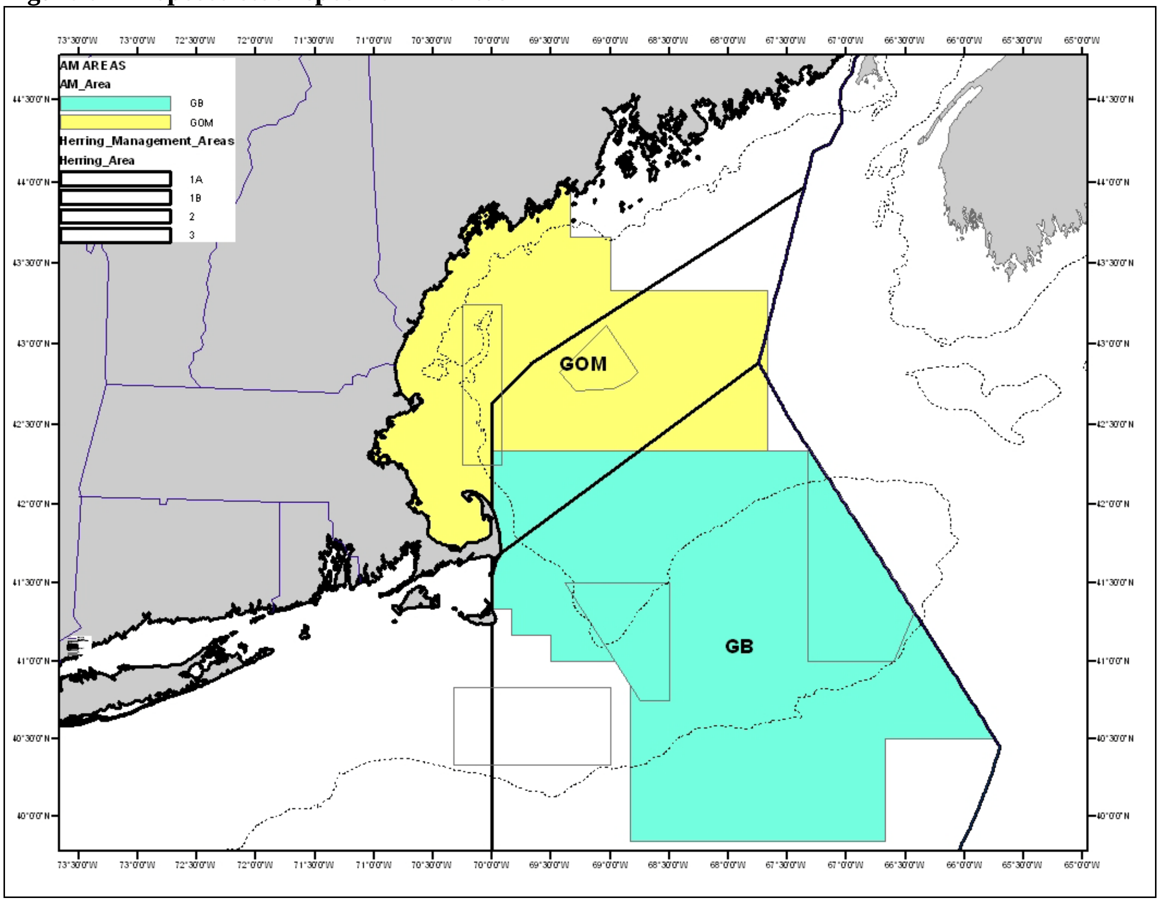
These AM areas are based on the statistical areas where 90 percent of the commercial haddock catch is caught, based on catches for the years 2006 – 2009.

GOM haddock: SA 513/514/515:
- Maine coastline at 69-20 W
- 43-40N 69-20W
- 43-40N 69-00W
- 43-20N 69-00W
- 43-20N 67-40W
- US/CA Boundary at 67-40W
- 42-20N 67-40W
- 42-20N 70-00W
- Massachusetts coastline at 70-00W

GB haddock: 521/522/525/561/562, and that portion of SA 526 that is within CA1:
- Massachusetts coastline at 70-00W
- 42-20N 70-00W
- US/CA Boundary at 42-20N
- US/CA Boundary at 40-30N
- 40-30N 66-40W
- 39-50N 66-40W
- 39-50N 68-50W
- 40-50-59N 68-50W (western side of CAI at 68-50W)
- 41-00N 68-57-33W (western side of CAI at 41N)
- 41-00N 69-30W
- 41-10N 69-30W
- 41-10N 69-50W
- 41-20N 69-50W
- 41-20N 70-00W

Massachusetts shoreline at 70-00W

Figure 6 – Proposed stock specific AM areas



ACLs and Sub-Components

This section describes how the haddock catch cap would be calculated unless changed in a future amendment, framework, or specification action.

The haddock catch cap was defined in FW 43 as 0.2% of the combined GOM and GB haddock TTACs. With the adoption of the ACL and AM system in Amendment 16 the haddock catch cap was incorporated into this system and was defined as a separate sub-ACL with its own AM. Because the ACL system includes various sub-components that were not in place when FW 43 was adopted the calculation method for the catch cap had to be refined. This was done in FW 44, and the approach is detailed in Appendix III to that action. There are differences between GOM haddock and GB haddock because the two stocks do not have the same sub-components. Figure 7 and Figure 8 illustrate the process described below.

GB haddock: The calculation for this stock is relatively straightforward. Once the U.S. ABC is determined, it is divided into four components:

a. The groundfish fishery is allocated 94% of the U.S. ABC.
b. Other sub-components are allocated 4% of the U.S. ABC.
c. One percent of the U.S. ABC is assumed taken in state waters.
d. The MWT herring fishery is allocated 1% of the ABC for the catch cap.

The sub-components are reduced to account for management uncertainty as appropriate. In the case if the herring fishery, the sub-ACL is 93 percent of the sub-ABC.

GOM haddock: This calculation is more complex because of the different sub-components – primarily because of the way the commercial and recreational allocation were determined for this stock.

a. The recreational fishery is allocated 27.5% of the ABC.
b. The commercial fishery is allocated 72.5% of the ABC.
    (1) Other commercial sub-components are allocated 4% of the commercial sub-ABC.
    (2) State waters commercial catches are assumed to be 1% of the commercial sub-ABC.
    (3) The MWT herring fishery is allocated 1% of the ABC. This is deducted from the commercial fishery sub-ABC.
    (4) The commercial groundfish fishery receives the remainder of the commercial fishery sub-ABC after the state waters assumption, herring fishery allocation, and commercial other sub-components allocations are deducted.

The sub-components are reduced to account for management uncertainty as appropriate. In the case if the herring fishery, the sub-ACL is 93 percent of the sub-ABC.

Frameworkable Measures

All provisions of this option can be modified through a framework action. This includes but is not limited to changes in the size of the allocation, reporting and monitoring requirements, and the design of AMs if the cap is reached.

Rationale: Given the current abundance of haddock on GB, the current 0.2% cap on haddock catch by the herring fleet is risking constraining the herring catch despite the fact that overall haddock catches are far below the ABC for that stock. Unless action is taken to modify the existing provisions to reflect current conditions in the fishery, it appears likely that herring midwater trawl vessels may be prevented from fishing on GB for a large portion of the year after the cap is reached.

According to PDT analysis, it does not appear that there is sufficient information to base the cap on actual catches over any recent time period. A further complication is that the reaction of the herring fishery to the cap changes the catches in any given year. There is not yet sufficient information to base the cap on an estimate of future catches, as is done with the scallop fishery and yellowtail flounder, and there does not appear to be a significant relationship between herring catch and haddock catch by herring vessels.

FW 43 (NEFMC 2006) discussed the possibility of setting the cap at one percent of the haddock ACL. This number may be more appropriate than the No Action alternative with regard to the current haddock abundance. In the absence of other information, the one percent is believed to be sufficient to allow the prosecution of the herring fishery without adversely sacrificing groundfish yields over a range of haddock stock sizes.

Section 5.4.3.3 summarizes recent estimates of haddock catches in the MWT fishery on GB and the GOM. In most recent years, the catch estimate on GB is well below 1 percent of the TTAC or ACL; the exception is 2006, when it was 0.79 percent. But these values occurred at unusually high haddock stock sizes due to the exceptional 2003 year class of haddock. Section 5.4.3.8 includes analyses that show that if haddock catches in 2010 were estimated as suggested by this option and the full herring TAC was caught then the haddock catch would have approached 0.65 percent of the likely FY 2012 GB haddock ACL. Analyses in section 6.1.2 shows that the proposed value would be robust to changes in GB haddock stock size, including fluctuations down to ½ B_{MSY}, reducing the need for a future action to adjust the cap if the GB haddock stock declines. Analyses in section 6.4.4suggest the cap proposed in this option will, in the short term, facilitate achieving OY from the herring fishery with herring fishing opportunities with a reduced risk the cap will be exceeded, leading to loss of herring yield.

Furthermore, PDT analysis showed that catches of haddock in the herring fishery are primarily an issue for midwater trawl gear. Making the cap applicable only to the midwater trawl fleet may therefore be appropriate as to avoid unnecessary restrictions on the rest of the fleet.

By monitoring the cap based on an estimate of total catch, the program is less sensitive to changes in observer coverage levels and AMs are based on an estimate of total catch rather than only documented catches. Changes in observer coverage levels will affect the precision of catch estimates. In order to accomplish this monitoring, herring MWT vessels need to report total kept catch by statistical area via electronic reporting, rather than just herring kept catch.

This option also accounts for differences between haddock stocks, making it potentially less constraining to the herring fishery, but creates a possibility of losing area-specific herring yield. It could also complicate monitoring efforts because of the need to track catches in two stock areas.

Table 3 – Option 2 OFLs, ABCs, and ACLs for GOM and GB haddock.
(1)Values for 2012 may be changed during the ABC setting process planned for fall 2011.

Stock	Year	OFL	U.S. ABC	State Waters Sub-component	Other Sub-Components	Scallop Sub-ACL	Ground fish Sub-ACL	Comm Groundfish Sub-ACL	Rec Groundfish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non_Sector Groundfish Sub-ACL	MWT Sub_ ACL	Total ACL
GB Haddock	2011	59,948	34,244	342	1,370	0	30,580		0	29,968	612	318	32,611
	2012	51,150	29,016	290	1,161	0	25,911		0	25,393	518	270	27,632
GOM Haddock	2011	1,536	1,206	9	35	0		778	308	741	37	11	1,141
	2012	1,296	1,013	7	29	0		653	259	622	31	9	958

Figure 7 – Option 2 ACL process for GB haddock

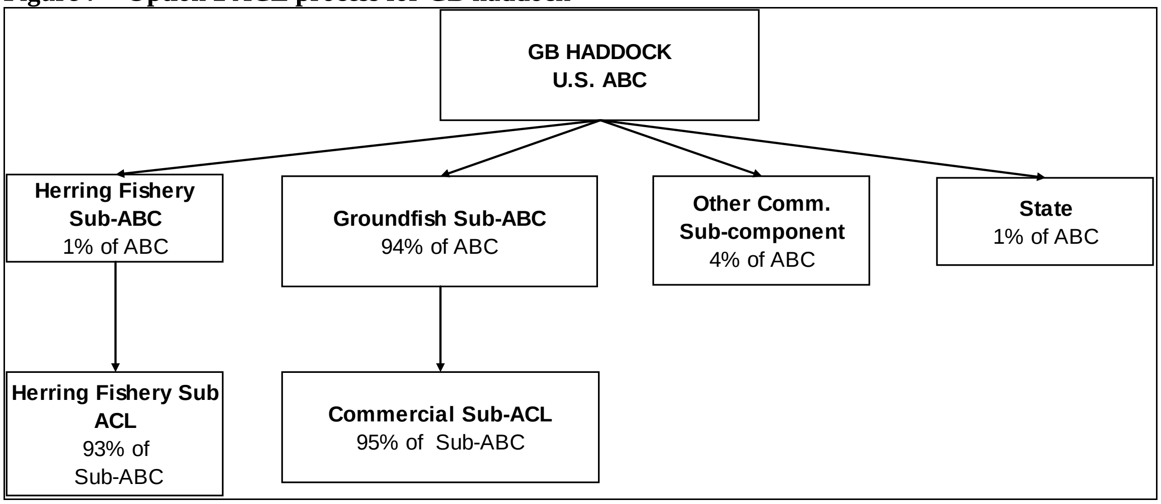
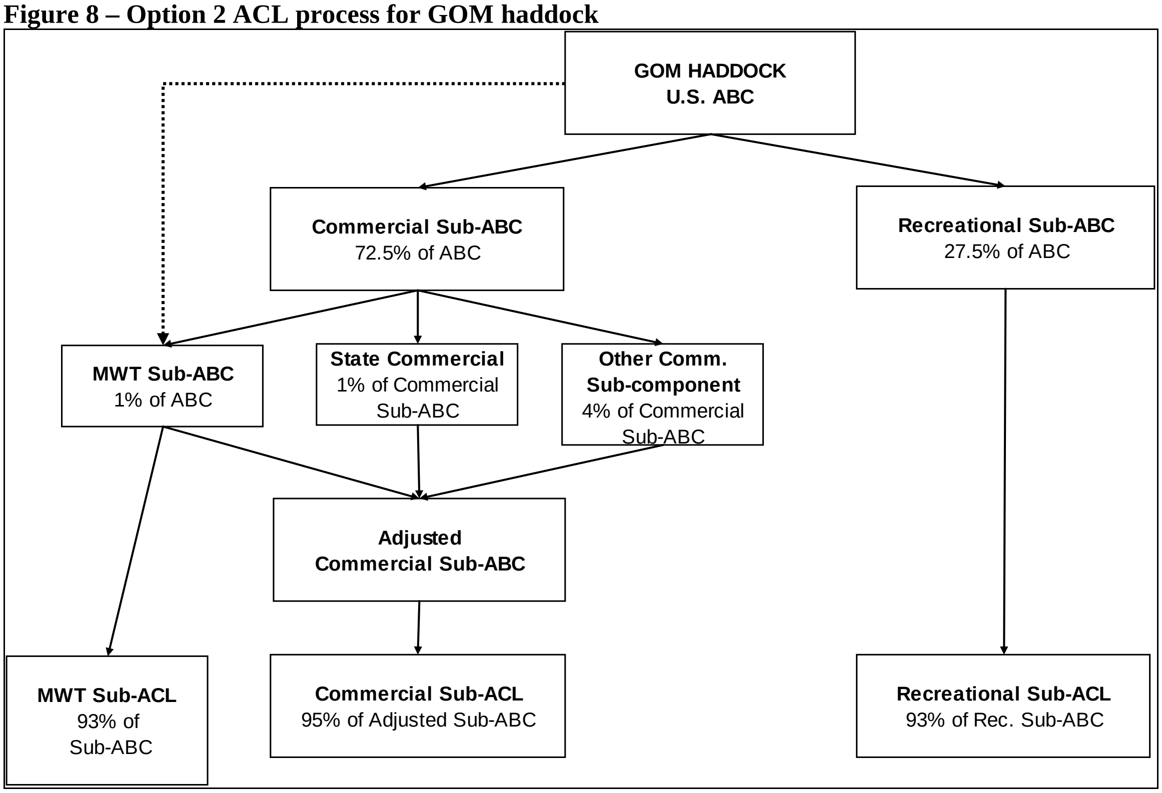


Figure 8 – Option 2 ACL process for GOM haddock



3.3 Option 3: Haddock Catch by Herring Fleet Included in "Other Sub-Components" Category for ACL Calculations

If this option is adopted, catches of haddock by the herring fishery would be incorporated into the "other sub-components" portion of the haddock ACL. Haddock catch in the herring fishery would be monitored for future changes. A sub-option is considered (see section 3.3.1.1) that would automatically modify the treatment of the MWT fishery if the catch of haddock increases beyond a specified level.

This option would update the calculation method for ACLs of each haddock stock that was adopted in Amendment 16. In Amendment 16, any portion of a fishery that caught less than 5% of the overall ACL of a given stock was generally considered to be an "other sub-component". Components grouped in this way are not referred to as sub-ACLs and are not subject to the requirement that AMs be specified. It is important to note that the controls on the portion of the fishery that is subject to AMs must be sufficient to prevent overfishing on the stock as a whole (NEFMC 2010).

Amendment 16 also states, "For the category described as 'other non-specified', catches will be monitored and if the catch rises above five percent accountability measures will be developed to prevent the overall ACL from being exceeded." Observer coverage in the directed herring fishery would be used to monitor bycatch for each haddock stock, if possible, and the Council would re-visit the classification of this component is catch exceeded or was projected to exceed five percent of the ACL for either stock.

Because the haddock bycatch cap for the herring fishery was adopted by Framework 43 (NEFMC 2006), Amendment 16 incorporated the 0.2% cap into the ACL-setting process. This option would remove that practice and include the herring fishery as one of the sub-components subject to the overall ACL cap of five percent. The ACLs that result from this option are shown in Table 4.

Possession Limits
Under this option there are no changes to current possession limits that apply to vessels with a Category A or B herring permit.

Monitoring and Reporting Requirements

All trips by vessels with a limited access herring permit are considered a herring trip (regardless of species targeted or caught) unless the vessel has declared out of the fishery (DOF) through VMS. When a vessel is declared out of the fishery it is not permitted to fish for, possess, or land herring.

In order to monitor herring fishery catches, observed catches of haddock in Herring Management Areas 1A, 1B, and 3 will be expanded to an estimate of total haddock catch. Estimates will be made by haddock stock area – that is, a separate catch estimate will be made for GOM haddock and GB haddock. The estimation procedure will be developed by the NERO in consultation with the NEFSC, and the calculation process will be detailed on the NERO web page. Stock specific haddock catch estimates will be published on the NERO web page at least quarterly. Note that under this option, catches from dealer data or enforcement actions are no longer used to monitor the cap.

Other monitoring and reporting requirements are as specified under the No Action alternative. Unlike the No Action alternative, where many of the reporting requirements only apply to vessels with a specific herring permit, under this option the reporting requirements are extended to apply to any herring fishing vessel with a limited access herring permit that fishes in Herring Management Area 1A, 1B, or 3.

The following additional data elements must be reported via IVR or other ACL monitoring system adopted for the herring fishery:

- In addition to reporting herring by herring management area, all limited access herring vessels fishing in Herring Management Areas 1A, 1B, or 3 must report gear and total kept catch by modified haddock stock area. For the purposes of this reporting requirement only, the modified stock areas are defined as the following statistical areas:
    - GOM: SA 464/465/511/512/513/514/515
    - GB: SA 521/522/525/526/561/562

ACLs and Sub-Components

This section describes how the haddock catch cap would be calculated. The calculation methods can be modified in a framework or specification action.

This option would remove the haddock catch cap as a separate sub-ACL. The haddock catch cap was defined in FW 43 as 0.2% of the combined GOM and GB haddock TTACs. With the adoption of the ACL and AM system in Amendment 16 the haddock catch cap was incorporated into this system and was defined as a separate sub-ACL with its own AM. With the removal of the haddock catch cap, the calculation of ACLs would be as described below. There are differences between GOM haddock and GB haddock because the two stocks do not have the same sub-components. Figure 9 and Figure 10 illustrate the process described below.

GB haddock: The calculation for this stock is relatively straightforward. Once the U.S. ABC is determined, it is divided into four components:

a. The groundfish fishery is allocated 95% of the U.S. ABC.
b. Other sub-components are allocated 4% of the U.S. ABC.
c. One percent of the U.S. ABC is assumed taken in state waters.

The sub-components are reduced to account for management uncertainty as appropriate.

GOM haddock: This calculation is more complex because of the different sub-components – primarily because of the way the commercial and recreational allocation were determined for this stock.

a. The recreational fishery is allocated 27.5% of the ABC.
b. The commercial fishery is allocated 72.5% of the ABC.

(1) Other commercial sub-components are allocated 4% of the commercial sub-ABC.
(2) State waters commercial catches are assumed to be 1% of the commercial sub-ABC.
(3) The commercial groundfish fishery receives the remainder of the commercial fishery sub-ABC after the state waters assumption and commercial other sub-components allocations are deducted.

The sub-components are reduced to account for management uncertainty as appropriate.

Frameworkable Measures

All provisions of this option can be modified through a framework action. This includes but is not limited to changes in the size of the allocation, reporting and monitoring requirements, and the design of AMs if the cap is reached.

Rationale: This option creates the greatest likelihood that there will be no loss of herring yield due to the haddock cap. It is also consistent with the treatment of other fisheries with small groundfish catches. At the same time, it does not allow for unfettered catches of haddock. Under the basic option, if catches of haddock form all other sub-components exceed five percent of the ABC the Council will consider taking actions to control those catches.

Table 4 – Option 4 OFLs, ABCs, and ACLs for GOM and GB haddock.
(1)Values for 2012 may be changed during the ABC setting process planned for fall 2011.

Stock	Year	OFL	U.S. ABC	State Waters Sub-component	Other Sub-Components	Scallop Sub-ACL	Ground fish Sub-ACL	Comm Groundfish Sub-ACL	Rec Groundfish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non_Sector Groundfish Sub-ACL	Total ACL
GB Haddock	2011	59,948	34,244	342	1,370	0	30,905	_	0	30,287	618	32,617
	2012	51,150	29,016	290	1,161	0	26,187	_	0	25,663	524	27,638
GOM Haddock	2011	1,536	1,206	9	35	0	_	789	308	752	37	1,141
	2012	1,296	1,013	7	29	0	_	663	259	631	31	959

Figure 9 – Option 4 ACL process for GB haddock

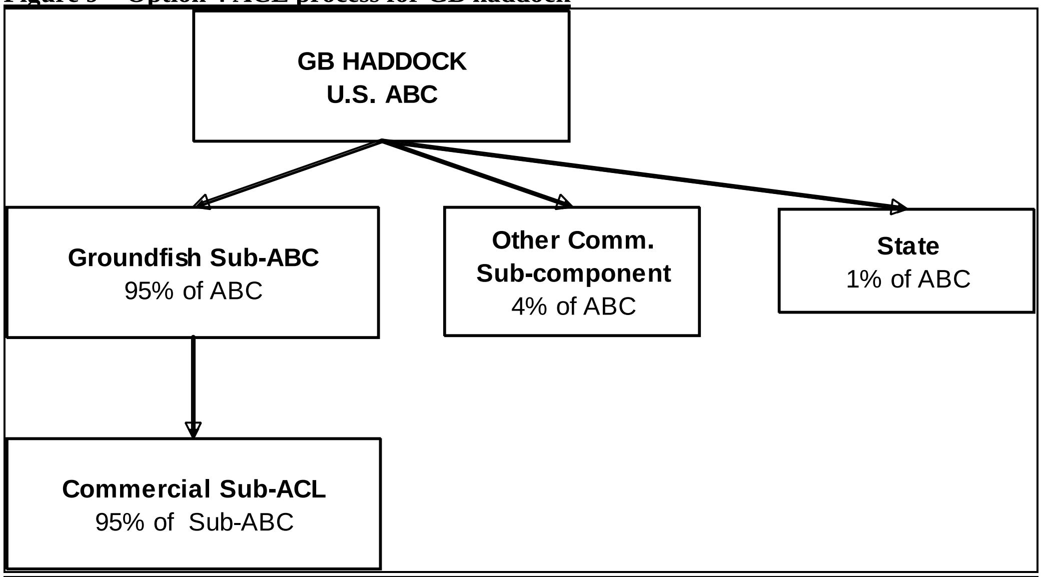
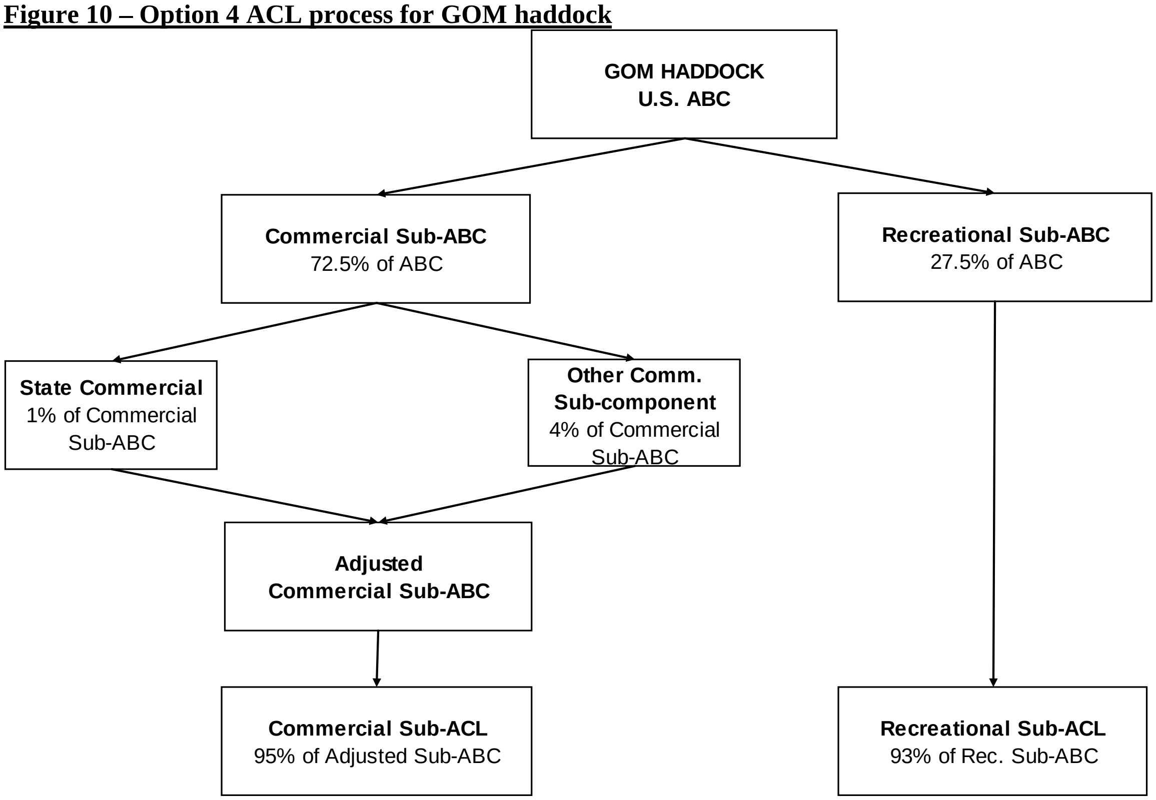


Figure 10 – Option 4 ACL process for GOM haddock



3.3.1.1 Triggered Change to the Catch Cap Provisions

The Council is considering an additional element for Option 3 (section 3.3). One of the Council's concerns with that option is that if the catch of haddock by the herring fishery increases beyond levels that are considered acceptable, such that the other sub-components of the ACLs for haddock may be exceeded, it would be necessary to develop a management action to consider changing the herring fishery haddock catch cap provisions. Because of the time necessary to complete such an action, it may be beneficial to consider adopting a preplanned response for that situation. The planned response is that Option 2 (section 3.2) would be implemented in response to a catch cap trigger. Two options are being considered for the trigger and the response to that trigger.

Sub-Option A – Combined MWT and Subcomponent Trigger
If the stock specific catches of haddock by herring midwater trawl vessels exceeds 1 percent of the GOM haddock ABC or the GB haddock ABC, and the total other sub-components catch (including all herring fishery catches) of GOM haddock or GB haddock from federal waters exceeds four percent of the ABC, the herring midwater trawl fishery would be subject to the measures described in Option 2 for the relevant stock area. Once Option 2 is implemented, it would remain in place unless modified by a future management action.

This option would require an evaluation of the catches of haddock by other fisheries. This information is not likely to be available until after the end of the groundfish fishing year. For this reason, if the requirements of this trigger are met in Year 1, the catches would be determined in Year 2 and Option 2 measures would be implemented in Year 3.

If Option 2 is triggered, limited access mid-water trawl vessels would be subject to cap on the catch of GOM or GB haddock that is limited to one percent of the U.S. ABC. Catches of haddock would be estimated by expanding the observed catch of haddock to an estimate of total catch. If the cap is reached, an area would be closed to fishing for herring using midwater trawls. See section 3.2 for additional details.

Rationale: The federal waters other sub-components portion of the ACL totals four percent of the ABC. As long as catches by all these subcomponents remain below four percent there is little risk of exceeding ACLs. The risk increases if the opposite occurs. This sub option does not trigger additional measures of the midwater trawl fishery unless both criteria are met. This option also provides an incentive for midwater trawl vessels to catch less than one percent of the haddock ABC in order to avoid adopting an ACL/AM system that could result in in-season closures.

Sub-Option B – MWT Trigger
If the stock specific catches of haddock by herring midwater trawl vessels exceeds 1 percent of the GOM haddock ABC or the GB haddock ABC the herring midwater trawl fishery would be subject to the measures described in Option 2. When NMFS projects or determines that the midwater trawl fishery is likely to exceed 1 percent of the GOM or GB haddock ABC, the herring midwater trawl fishery would be subject to the measures described in Option 2 for the relevant stock area in the immediately following fishing year. These measures would be implemented as soon as possible. Once Option 2 is implemented, it would remain in place unless modified by a future management action.

If Option 2 is triggered, limited access mid-water trawl vessels would be subject to cap on the catch of GOM or GB haddock that is limited to one percent of the U.S. ABC. Catches of haddock would be estimated by expanding the observed catch of haddock to an estimate of total catch. If the cap is reached, an area would be closed to fishing for herring using midwater trawls. See section 3.2 for additional details.

Rationale: This option provides an incentive for the midwater trawl fishery to catch less than one percent of the haddock ABC in order to avoid gear-specific AM measures in the following year.

4.0 Alternatives Considered and Rejected

4.1 Individual Trip Limits

Under this option, individual trip limits would have been adopted for midwater trawl vessels fishing in Area 3. Options for the trip limit could include, but not be limited to, bycatch amounts that exceeded the 90th and 99th percentile for this area and gear type using the observer data from 2005-2009.

Rationale:

This alternative would have placed responsibility for avoiding haddock on individual vessels. However, the Council voted in January 2011 not to include it in this action, citing difficulty in monitoring, accountability measures, and the lack of flexibility for unusual events.

4.2 100% Observer Coverage in Area 3

This option would have implemented 100% observer coverage on midwater trawl vessels fishing in Area 3 during September and October, since haddock catch can be high in this area during those months. The coverage would be funded by fishing vessels making trips in Area 3 at that time.

Rationale:

This alternative was proposed during the January 2011 NEFMC meeting. The Council Chair ruled the motion out of order. This framework proposes adjustments to the Northeast Multispecies FMP, and therefore cannot mandate specific levels of observer coverage in the herring fishery. In light of what is permissible in this action, the Council agreed that Option 4 of the Proposed Action was the closest possible approximation to this alternative.

4.3 Area Closures

This option would have led to the identification of months and areas, within herring Area 3, where haddock interactions are likely. The directed herring fishery would then be closed in the specified areas and time periods.

Rationale:

This alternative was considered by the Council in January 2011 but was voted to be rejected from consideration. This was viewed to conflict with the objective stated for this action to maximize the chance for the Georges Bank herring TAC to be caught. Also, PDT analysis failed to show strong relationships between catch of herring and haddock in specific areas.

4.4 Cap Adjusted Based on Observer Coverage

Under this option, the amount of the haddock catch cap would be adjusted based on the expected percentage of observer coverage applied to each haddock stock area. The baseline cap would be equal to 1% of the Georges Bank haddock ABC and 1% of the Gulf of Maine haddock ABC assuming 100% observer coverage of the herring fleet. The percentage of the ABC that constituted the cap amount would be reduced proportionally for observer coverage levels of less than 100%. For example, if observer coverage in the herring fishery was expected to be 50% in a given year, the cap would be equal to 0.5% of the ABC for each haddock stock. The maximum sub-ACLs that result from this option (1% of the stock-specific ABC) are shown in Table 5.

As is the case with the No Action alternative, only observed catches will be applied to count against the bycatch cap. Unlike the No Action alternative, a cap is determined for each haddock stock and each is monitored individually and triggers stock specific AMs.

Each spring, the predicted sea days allocated to the herring fishery would be determined. Annual SBRM reports predict the amount of sea days that will be observed in each fishery in the upcoming fishing year. In addition, other regulatory requirements may influence the number of sea days allocated. To determine the anticipated level of observer coverage that will dictate the cap in a given fishing year, the number of sea days predicted for the herring fishery from all sources will be compared to the number of trip days that were used by the herring fishery in the previous year. The maximum cap of 1% will then be reduced by the amount of this fraction. The formula for the determination is as follows:

$$\text{\% haddock bycatch cap in } FY^{x} = 1\% * \frac{(\text{SBRM predicted observed days in } FY^{x})}{(\text{\# of sea days in herring fishery in } FY^{x-1})}$$

The SBRM reports are generally available on or around April 1st. This should provide ample time for calculating the cap prior to the start of each fishing year on May 1st.

Monitoring and Reporting Requirements

The haddock catch cap provisions apply to vessels with specific herring permits. All trips by these vessels are considered a herring trip (regardless of species targeted or caught) unless the vessel has declared out of the fishery (DOF) through VMS. When a vessel is declared out of the fishery it is not permitted to fish for, possess, or land herring.

Only haddock catches on category A and B permitted vessels that are from the following sources count towards the cap:

(1) Dealers via Dealer Electronic Reporting to either the Standard Atlantic Fisheries Information System (SAFIS) or the Federally Licensed Seafood Dealers Trip Ticket System;

(2) NOAA Fisheries Service Observer Program, through audited observer reports submitted by the Northeast Fisheries Science Center; and

(3) NOAA Fisheries Office of Law Enforcement reports resulting from actual dockside inspections of catch by observers and/or reported by dealers are counted against the cap. Observed catch rates are not expanded to an estimate of total: observer data from the NMFS observer program and dockside monitoring conducted by the states.

Other monitoring and reporting requirements are as specified under the No Action alternative.

Accountability Measure

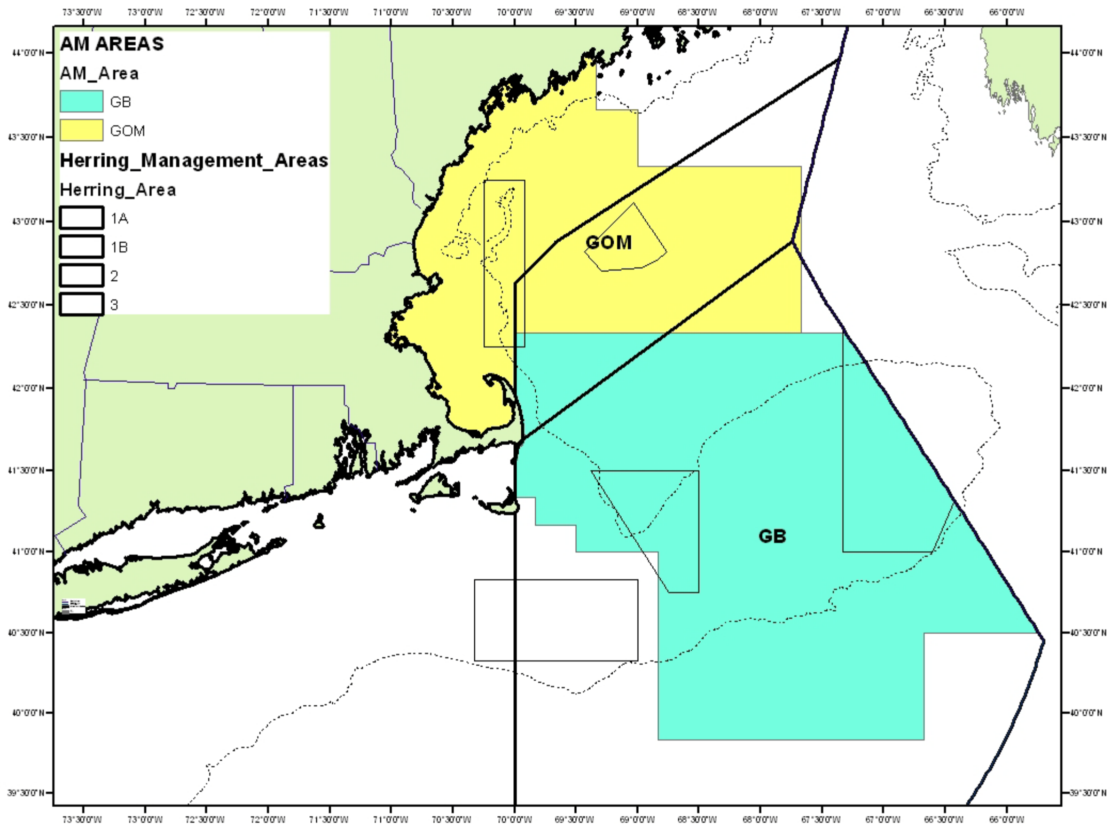
When the Regional Administrator has determined that the haddock incidental catch cap has been caught, all vessels issued a herring permit are prohibited from fishing for, possessing, or landing herring in excess of 2,000 lb per trip in the appropriate AM area (see below, Figure 11). Additionally, the haddock possession limit for all vessels issued All Areas or Areas 2/3 Limited Access permits is reduced to 0 lb in the appropriate AM area. The 0-lb haddock possession limit does not apply to herring vessels that also possess a Northeast multispecies permit and are operating on a declared groundfish trip.

Once the total catch of herring for a fishing year is determined, using all available information, any ACL or sub-ACL overage would result in a reduction of the corresponding ACL/sub-ACL the following year. For example, if final accounting of the 2010 total herring catch in Area 1A, which is generally available in the spring of 2011, indicated that the Area 1A sub-ACL was exceeded by 5 mt, then, in 2012, the sub-ACL for Area 1A would be reduced by 5 mt to account for the overage that occurred during 2010. Any overage deductions will be announced by NMFS in the *Federal Register* prior to the start of the fishing year.

These AM areas are based on the statistical areas where 90 percent of the commercial haddock catch is caught, based on catches for the years 2006 – 2009.

GOM haddock: SA 513/514/515
GB haddock: 521/522/525/561/562

Figure 11 – Proposed stock specific AM areas



ACLs and Sub-Components

This section describes how the haddock catch cap would be calculated unless changed in a future Northeast Multispecies amendment, framework, or specification action.

The haddock catch cap was defined in FW 43 as 0.2% of the combined GOM and GB haddock TTACs. With the adoption of the ACL and AM system in Amendment 16 the haddock catch cap was incorporated into this system and was defined as a separate sub-ACL with its own AM. Because the ACL system includes various sub-components that were not in place when FW 43 was adopted the calculation method for the catch cap had to be refined. This was done in FW 44, and the approach is detailed in Appendix III to that action. There are differences between GOM haddock and GB haddock because the two stocks do not have the same sub-components. Figure 12 and Figure 13 illustrate the process described below.

GB haddock: The calculation for this stock is relatively straightforward. Once the U.S. ABC is determined, it is divided into four components:

a. The groundfish fishery is allocated at least 94% of the U.S. ABC. The exact amount increases if the haddock catch cap is less than 1%.
b. Other sub-components are allocated 4% of the U.S. ABC.
c. One percent of the U.S. ABC is assumed taken in state waters.
d. The herring fishery is allocated up to 1% of the ABC for the catch cap.

The sub-components are reduced to account for management uncertainty as appropriate. In the case if the herring fishery, the sub-ACL is 93 percent of the sub-ABC unless changed in a future action.

GOM haddock: This calculation is more complex because of the different sub-components – primarily because of the way the commercial and recreational allocation were determined for this stock.

a. The recreational fishery is allocated 27.5% of the ABC.
b. The commercial fishery is allocated 72.5% of the ABC.
    (1) Other commercial sub-components are allocated 4% of the commercial sub-ABC.
    (2) State waters commercial catches are assumed to be 1% of the commercial sub-ABC.
    (3) The herring fishery is allocated up to 1% of the U.S. ABC. The exact amount is determined based on the expected level of observer coverage.
    (4) The commercial groundfish fishery receives the remainder of the commercial fishery sub-ABC after the state waters assumption, herring fishery allocation, and commercial other sub-components allocations are deducted.

The sub-components are reduced to account for management uncertainty as appropriate. In the case if the herring fishery, the sub-ACL is 93 percent of the sub-ABC unless changed in a future action.

Frameworkable Measures

All provisions of this option can be modified through a framework action. This includes but is not limited to changes in the size of the allocation, reporting and monitoring requirements, and the design of AMs if the cap is reached.

<u>Rationale</u>:

This option is similar to the approach that was taken to determine the cap adopted by FW 43. In that action, the 0.2% haddock catch cap for the herring fishery was set because a baseline of 1% was established and then reduced to account for a 20% monitoring rate in the fishery. The difference between that calculation and this option is that FW 43 did not allow a mechanism for adjusting the cap if observer coverage levels changed.

This approach would be relatively simple to implement, and could serve as a backstop approach for another option should observer coverage be insufficient to estimate total catch. However, it is sensitive to the level of funding available for observer coverage, and does not make use of available information on catches by fleet. The short time between determination of observer coverage levels and the start of the fishing year could complicate administration. Also, there was little justification for adopting the existing cap levels included in FW 43.

After review of this option the Council recommended it be considered but rejected because of the difficulty in predicting the percentage of trips that would be observed so that the cap could be appropriately set. The Committee believed this option would be complicated and could lead to setting the cap at a level that was not consistent with the realized percentage of trips observed.

Table 5 – Option 2 OFLs, ABCs, and ACLs for GOM and GB haddock.
(1)Values for 2012 may be changed during the ABC setting process planned for fall 2011.
(2) The value shown for the MWT Sub-ACL is the maximum possible under this option (1% of the U.S> ABC). Actual values may be less as it is determined by the level of observer coverage. If MWT sub-ACL declines, the commercial groundfish sub-ACL increases.

Stock	Year	OFL	U.S. ABC	State Waters Sub-component	Other Sub-Components	Scallop Sub-ACL	Ground fish Sub-ACL	Comm Groundfish Sub-ACL	Rec Groundfish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non_Sector Groundfish Sub-ACL	MWT Sub_ ACL	Total ACL
GB Haddock	2011	59,948	34,244	342	1,370	0	30,580		0	29,968	612	318	32,611
	2012	51,150	29,016	290	1,161	0	25,911		0	25,393	518	270	27,632
GOM Haddock	2011	1,536	1,206	9	35	0		778	308	741	37	11	1,141
	2012	1,296	1,013	7	29	0		653	259	622	31	9	958

Figure 12 – ACL process for GB haddock

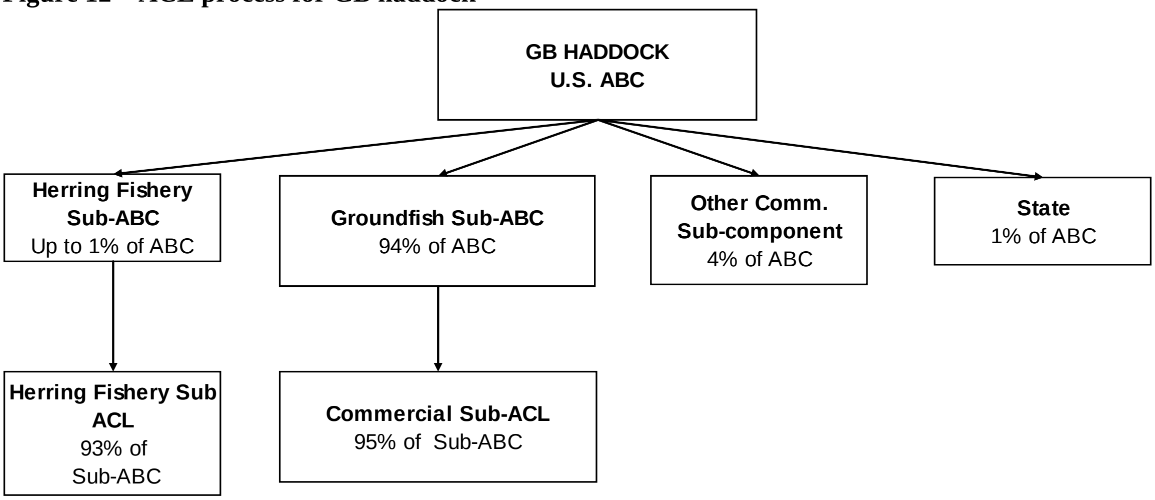
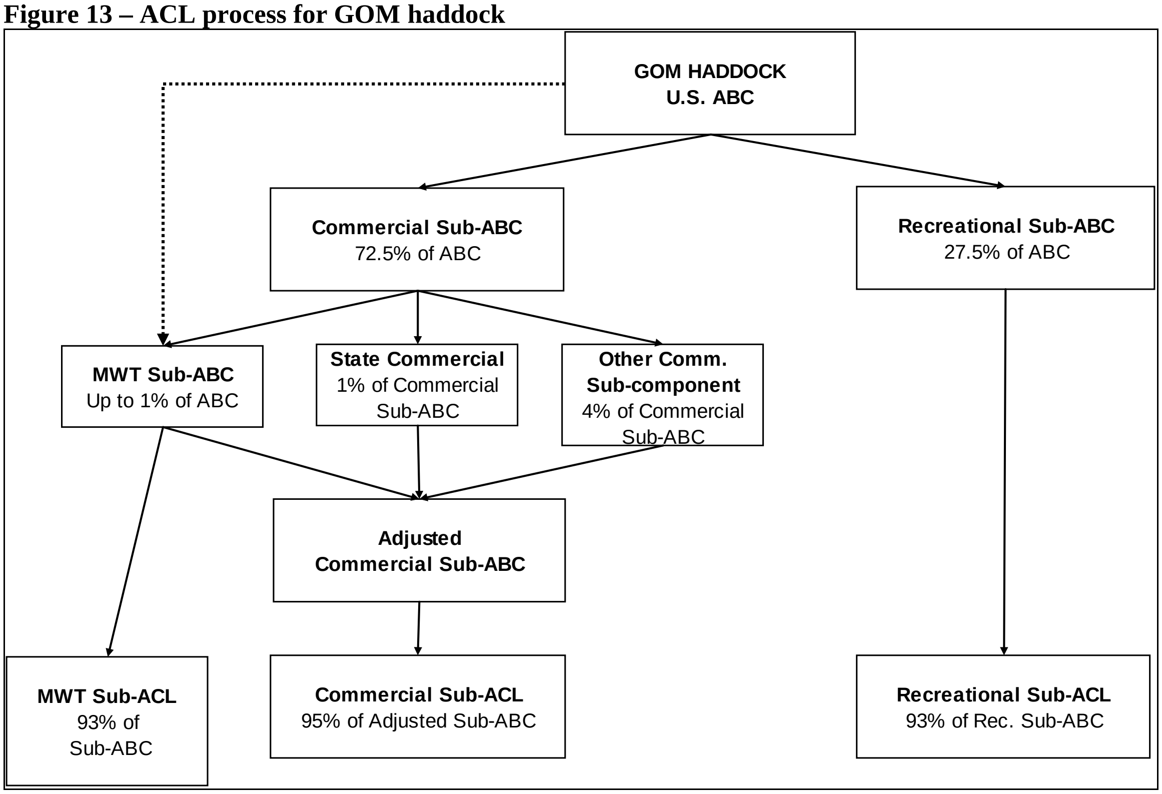


Figure 13 – ACL process for GOM haddock



4.5 Other Alternatives Under Development

Prior to initiating this framework adjustment, the Council initiated Amendment 5 to the Atlantic Herring FMP. Many of the alternatives under consideration in that action are either directly or indirectly related to interactions between the herring fishery and the groundfish fishery, or the monitoring of catches in the herring fishery. Amendment 5 to the Herring FMP is considering management measures for the herring fishery that improve catch monitoring (ACL monitoring, reporting provisions, observer coverage levels, etc.), address river herring bycatch, and establish criteria for midwater trawl access to the year-round groundfish closed areas. Alternatives to address access to the groundfish closed areas range from status quo (no action) to year-round closures for midwater trawl vessels. Other alternatives under consideration could require 100% observer coverage for midwater trawl vessels in the groundfish closed areas and/or sampling provisions similar to those for Closed Area I (all fish must be pumped across the deck). The Council is scheduled to approve the range of alternatives in Amendment 5 at its September 2011 meeting. Public hearings are anticipated in late 2011 so that final measures can be selected by the Council in early 2012.

During the development of this action, public comments have been received that the framework should also consider many of the same measures that are being considered in Amendment 5 to the Atlantic Herring FMP. For example, correspondence has suggested that the framework should consider a prohibition on MWT in the groundfish closed areas, increase observer monitoring levels, and/or expand requirements for fishing in CAI to other closed areas. Because these measures are already being considered in another Council action they are not under discussion for this framework.

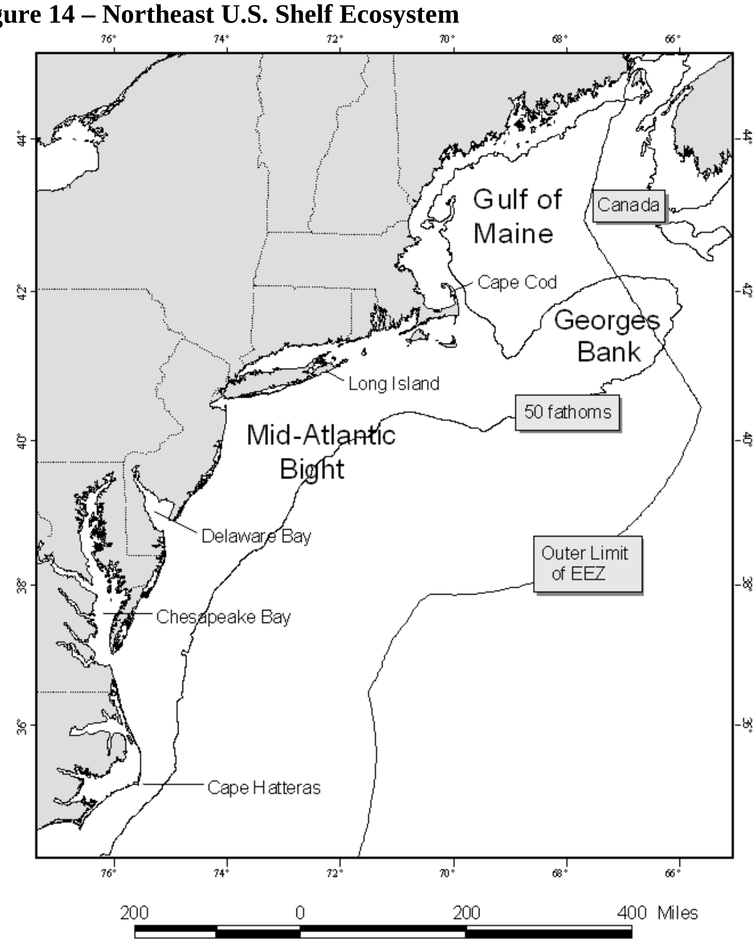
5.0 Affected Environment

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

5.1 Physical Environment/Habitat/EFH

The Northeast U.S. Shelf Ecosystem (Figure 14) has been described as including the area from the Gulf of Maine south to Cape Hatteras, North Carolina, extending from the coast seaward to the edge of the continental shelf, including offshore to the Gulf Stream (Sherman et al. 1996). The continental slope includes the area east of the shelf, out to a depth of 2,000 meters (m). Four distinct sub-regions comprise the NOAA Fisheries Northeast Region: the Gulf of Maine, Georges Bank, the southern New England/Mid-Atlantic region, and the continental slope. Since the groundfish fleet will primarily be fishing in the inshore and offshore waters of the Gulf of Maine, Georges Bank, and the southern New England/Mid-Atlantic areas, the description of the physical and biological environment is focused on these sub-regions. Information on the affected environment was extracted from Stevenson et al. (2004).

Figure 14 – Northeast U.S. Shelf Ecosystem

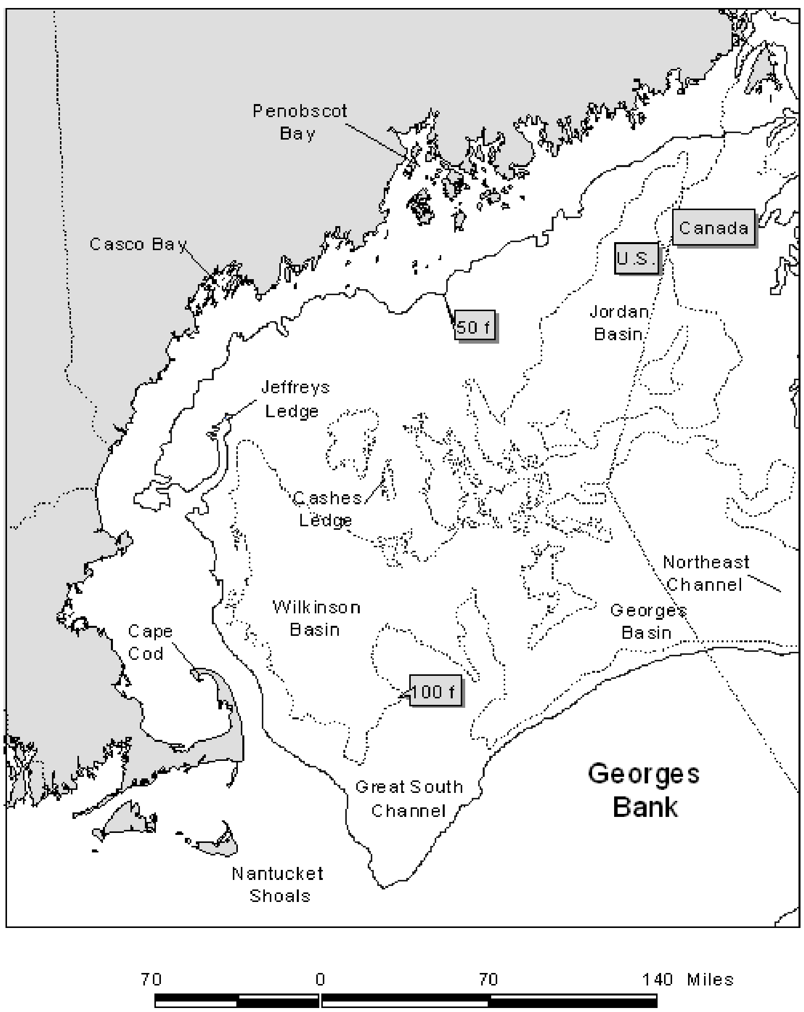


5.1.1 Affected Physical Environment

5.1.1.1 Gulf of Maine

The Gulf of Maine is an enclosed coastal sea, bounded on the east by Browns Bank, on the north by the Nova Scotian (Scotian) Shelf, on the west by the New England states, and on the south by Cape Cod and Georges Bank (Figure 14). The Gulf of Maine is a boreal environment and is characterized by relatively cold waters and deep basins, with a patchwork of various sediment types. There are 21 distinct basins separated by ridges, banks, and swells. Depths in the basins exceed 250 m, with a maximum depth of 350 m in Georges Basin, just north of Georges Bank. High points within the Gulf of Maine include irregular ridges, such as Cashes Ledge, which peaks at 9 m below the surface.

Figure 15 – Gulf of Maine



The Gulf of Maine is an enclosed coastal sea that was glacially derived and is characterized by a system of deep basins, moraines, and rocky protrusions (Stevenson et al. 2004). The Gulf of Maine is topographically diverse from the rest of the continental border of the U.S. Atlantic coast

(Stevenson et al. 2004). Very fine sediment particles created and eroded by the glaciers have collected in thick deposits over much of the seafloor of the Gulf of Maine, particularly in its deep basins. These mud deposits blanket and obscure the irregularities of the underlying bedrock, forming topographically smooth terrains. In the rises between the basins, other materials are usually at the surface. Unsorted glacial till covers some morainal areas, sand predominates on some high areas, and gravel,[2] sometimes with boulders, predominates others. Bedrock is the predominant substrate along the western edge of the Gulf of Maine, north of Cape Cod in a narrow band out to a depth of about 60 m. Mud predominates in coastal valleys and basins that often abruptly border rocky substrates. Gravel, often mixed with shell, is common adjacent to bedrock outcrops and in fractures in the rock. Gravel is most abundant at depths of 20 to 40 m, except off eastern Maine where a gravel-covered plain exists to depths of at least 100 m. Sandy areas are relatively rare along the inner shelf of the western Gulf of Maine, but are more common south of Casco Bay, especially offshore of sandy beaches.

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

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

- Sandy offshore banks: fauna are characteristically sand dwellers with an abundant interstitial component;
- Rocky offshore ledges: fauna are predominantly sponges, tunicates, bryozoans, hydroids, and other hard bottom dwellers;
- Shallow (< 60 m) temperate bottoms with mixed substrate: fauna population is rich and diverse, primarily comprised of polychaetes and crustaceans;
- Primarily fine muds at depths of 60 to 140 m within cold Gulf of Maine Intermediate Water[3]: fauna are dominated by polychaetes, shrimp, and cerianthid anemones;
- Cold deep water, muddy bottom: fauna include species with wide temperature tolerances which are sparsely distributed, diversity low, dominated by a few polychaetes, with brittle stars, sea pens, shrimp, and cerianthids also present;
- Deep basin, muddy bottom, overlaying water usually 7 to 8°C: fauna densities are not high, dominated by brittle stars and sea pens, and sporadically by a tube-making amphipods; and

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

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

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

Two studies (Gabriel 1992, Overholtz and Tyler 1985) reported common[4] demersal fish species by assemblages in the Gulf of Maine and Georges Bank:

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

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

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

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

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

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

5.1.1.2 Georges Bank

Georges Bank is a shallow (3 to 150 m depth), elongate (161 km wide by 322 km long) extension of the continental shelf that was formed during the Wisconsinian glacial episode (Figure 14). It is characterized by a steep slope on its northern edge and a broad, flat, gently sloping southern flank and has steep submarine canyons on its eastern and southeastern edges. It is characterized by highly productive, well-mixed waters and strong currents. The Great South Channel lies to the west. Natural processes continue to erode and rework the sediments on Georges Bank. It is anticipated that erosion and reworking of sediments by the action of rising sea level as well as tidal and storm currents reduces the amount of sand and cause an overall coarsening of the bottom sediments (Valentine and Lough 1991).

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

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

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

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

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

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

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

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

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

5.1.1.3 Southern New England/Mid-Atlantic Bight

The Mid-Atlantic Bight includes the shelf and slope waters from Georges Bank south to Cape Hatteras, and east to the Gulf Stream (Figure 14). The northern portion of the Mid-Atlantic Bight is sometimes referred to as southern New England and generally includes the area of the continental shelf south of Cape Cod from the Great South Channel to Hudson Canyon. The Mid-Atlantic Bight is comprised of the sandy, relatively flat, gently sloping continental shelf from southern New England to Cape Hatteras, North Carolina. The shelf slopes gently from shore out to between 100 and 200 km offshore where it transforms to the slope (100 to 200 m water depth) at the shelf break. In both the Mid-Atlantic Bight and on Georges Bank, numerous canyons incise the slope, and some cut up onto the shelf itself (Stevenson et al. 2004). Like the rest of the continental shelf, the topography of the Mid-Atlantic Bight was shaped largely by sea level fluctuations during past ice ages. Since that time, currents and waves have modified this basic structure.

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

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

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

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

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

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

Rather than substrate as in the Gulf of Maine and Georges Bank, latitude and water depth are considered to be the primary factors influencing demersal fish species distribution in the Mid-Atlantic Bight area. The following assemblages were identified by Colvocoresses and Musick (1984) in the Mid-Atlantic subregion during spring and fall.[5]

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

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

Water of the inner shelf: windowpane flounder;

Water of the outer shelf: fourspot flounder; and

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

5.1.2 Essential Fish Habitat (EFH)

5.1.2.1 Groundfish EFH

EFH is defined by the Sustainable Fisheries Act of 1996 as “[t]hose waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” The environment that could potentially be affected by the Proposed Action has been identified as EFH for benthic life stages of species that are managed under the Northeast Multispecies FMP; Atlantic sea scallop; monkfish; deep-sea red crab; northeast skate complex; Atlantic herring; summer flounder, scup, and black sea bass; tilefish; squid, Atlantic mackerel, and butterfish; Atlantic surfclam and ocean quahog FMPs. EFH for the species managed under these FMPs includes a wide variety of benthic habitats in state and Federal waters throughout the Northeast U.S. Shelf Ecosystem. EFH descriptions of the general substrate or bottom types for all the benthic life stages of the species managed under these FMPs are summarized in Table 6. Full descriptions and maps of EFH for each species and life stage (except Atlantic wolffish) are available on the NMFS Northeast Region website at http://www.nero.noaa.gov/hcd/index2a.htm. In general, EFH for species and life stages that rely on the seafloor for shelter (e.g., from predators), reproduction, or food is vulnerable to disturbance by bottom tending gear. The most vulnerable habitat is more likely to be hard or rough bottom with attached epifauna.

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

Table 6 - Summary of geographic distribution, food sources, essential fish habitat features, and commercial gear used to catch each species in the Northeast Multispecies Fishery Management Unit

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

(Table 6 continued)

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

(Table 6 continued)

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

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

5.1.2.2 Atlantic Herring EFH

Essential Fish Habitat (EFH) for Atlantic herring is described in NEFMC (1998a) as those areas of the coastal and offshore waters (out to the offshore U.S. boundary of the exclusive economic zone) that are designated in Figure 16 through Figure 19 and in Table 7 and meet the following conditions:

Eggs: Bottom habitats with a substrate of gravel, sand, cobble and shell fragments, but also on aquatic macrophytes, in the Gulf of Maine and Georges Bank as depicted in Figure 16. Eggs adhere to the bottom, forming extensive egg beds which may be many layers deep. Generally, the following conditions exist where Atlantic herring eggs are found: water temperatures below 15° C, depths from 20 - 80 meters, and a salinity range from 32 - 33‰. Herring eggs are most often found in areas of well-mixed water, with tidal currents between 1.5 and 3.0 knots. Atlantic herring eggs are most often observed during the months from July through November.

Larvae: Pelagic waters in the Gulf of Maine, Georges Bank, and southern New England that comprise 90% of the observed range of Atlantic herring larvae as depicted in Figure 17. Generally, the following conditions exist where Atlantic herring larvae are found: sea surface temperatures below 16° C, water depths from 50 - 90 meters, and salinities around 32‰. Atlantic herring larvae are observed between August and April, with peaks from September through November.

Juveniles: Pelagic waters and bottom habitats in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Cape Hatteras as depicted in Figure 18. Generally, the following conditions exist where Atlantic herring juveniles are found: water temperatures below 10° C, water depths from 15 - 135 meters, and a salinity range from 26 - 32‰.

Adults: Pelagic waters and bottom habitats in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Cape Hatteras as depicted in Figure 19. Generally, the following conditions exist where Atlantic herring adults are found: water temperatures below 10° C, water depths from 20 - 130 meters, and salinities above 28‰.

Spawning Adults: Bottom habitats with a substrate of gravel, sand, cobble and shell fragments, but also on aquatic macrophytes, in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Delaware Bay as depicted in Figure 19. Generally, the following conditions exist where spawning Atlantic herring adults are found: water temperatures below 15° C, depths from 20 - 80 meters, and a salinity range from 32 - 33‰. Herring eggs are spawned in areas of well-mixed water, with tidal currents between 1.5 and 3.0 knots. Atlantic herring are most often observed spawning during the months from July through November.

All of the above EFH descriptions include those bays and estuaries listed in Table 7, according to life history stage. The Council acknowledges potential seasonal and spatial variability of the conditions generally associated with this species.

Table 7 – EFH designation of estuaries and embayments for Atlantic herring

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults	Spawning Adults
Passamaquoddy Bay		m,s	m,s	m,s	
Englishman/Machias Bay	s	m,s	m,s	m,s	s
Narraguagus Bay		m,s	m,s	m,s	
Blue Hill Bay		m,s	m,s	m,s	
Penobscot Bay		m,s	m,s	m,s	
Muscongus Bay		m,s	m,s	m,s	
Damariscotta River		m,s	m,s	m,s	
Sheepscot River		m,s	m,s	m,s	
Kennebec / Androscoggin Rivers		m,s	m,s	m,s	
Casco Bay	s	m,s	m,s	s	
Saco Bay		m,s	m,s	s	
Wells Harbor		m,s	m,s	s	
Great Bay		m,s	m,s	s	
Merrimack River		M	m		
Massachusetts Bay		s	s	s	
Boston Harbor		s	m,s	m,s	
Cape Cod Bay	s	s	m,s	m,s	
Waquoit Bay					
Buzzards Bay			m,s	m,s	
Narragansett Bay		s	m,s	m,s	
Long Island Sound			m,s	m,s	
Connecticut River					
Gardiners Bay			s	s	
Great South Bay			s	s	
Hudson River / Raritan Bay		m,s	m,s	m,s	
Barnegat Bay			m,s	m,s	
Delaware Bay			m,s	s	
Chincoteague Bay					
Chesapeake Bay				s	

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).
F ≡ The EFH designation for this species includes the tidal freshwater salinity zone of this bay or estuary (0.0 < salinity < 0.5‰).
These EFH designations of estuaries and embayments are based on the NOAA Estuarine Living Marine Resources (ELMR) program (Jury *et al.* 1994; Stone *et al.* 1994).

Figure 16 – EFH designation for Atlantic herring eggs

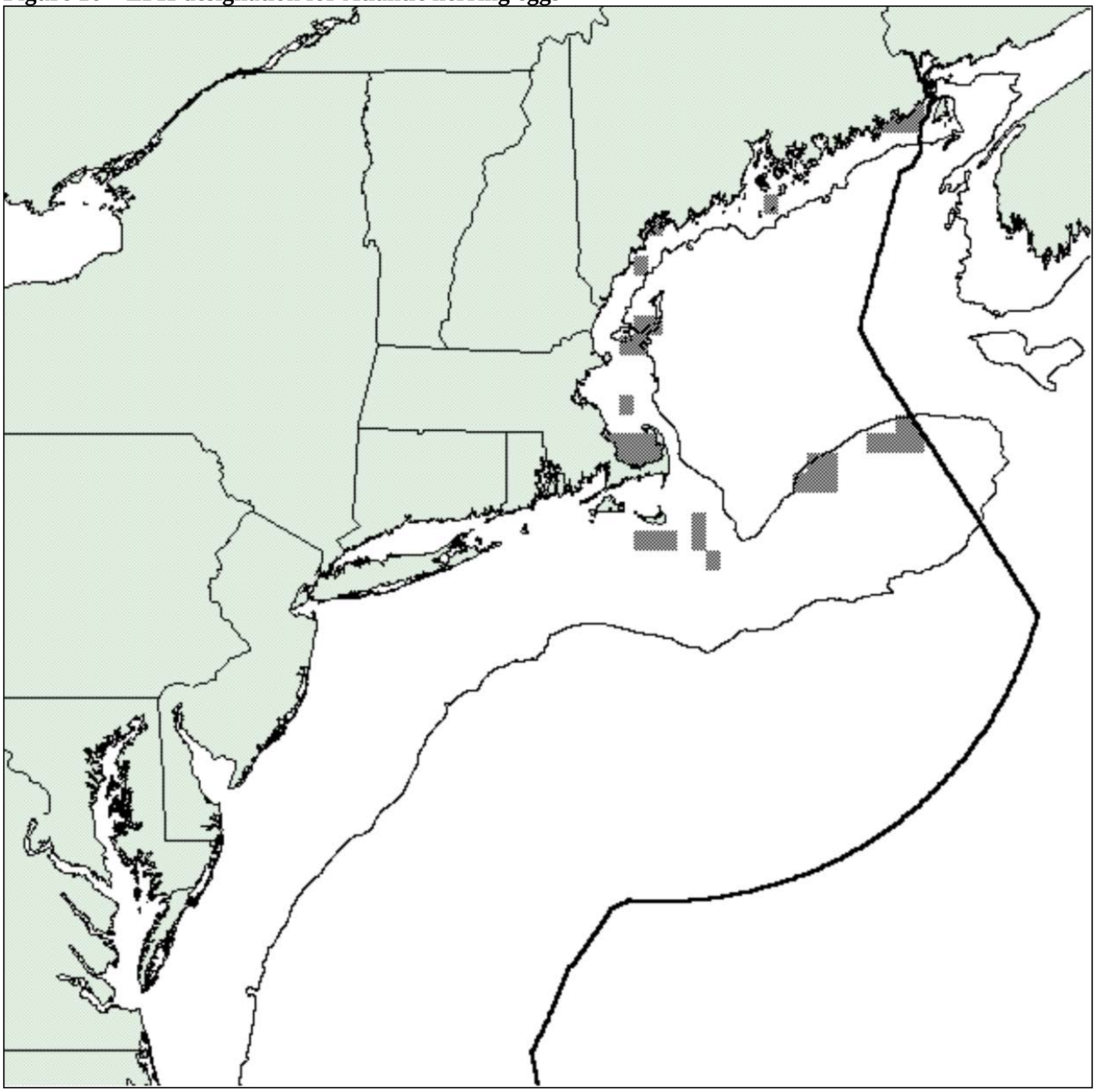


Figure 17 – EFH designation for Atlantic herring larvae

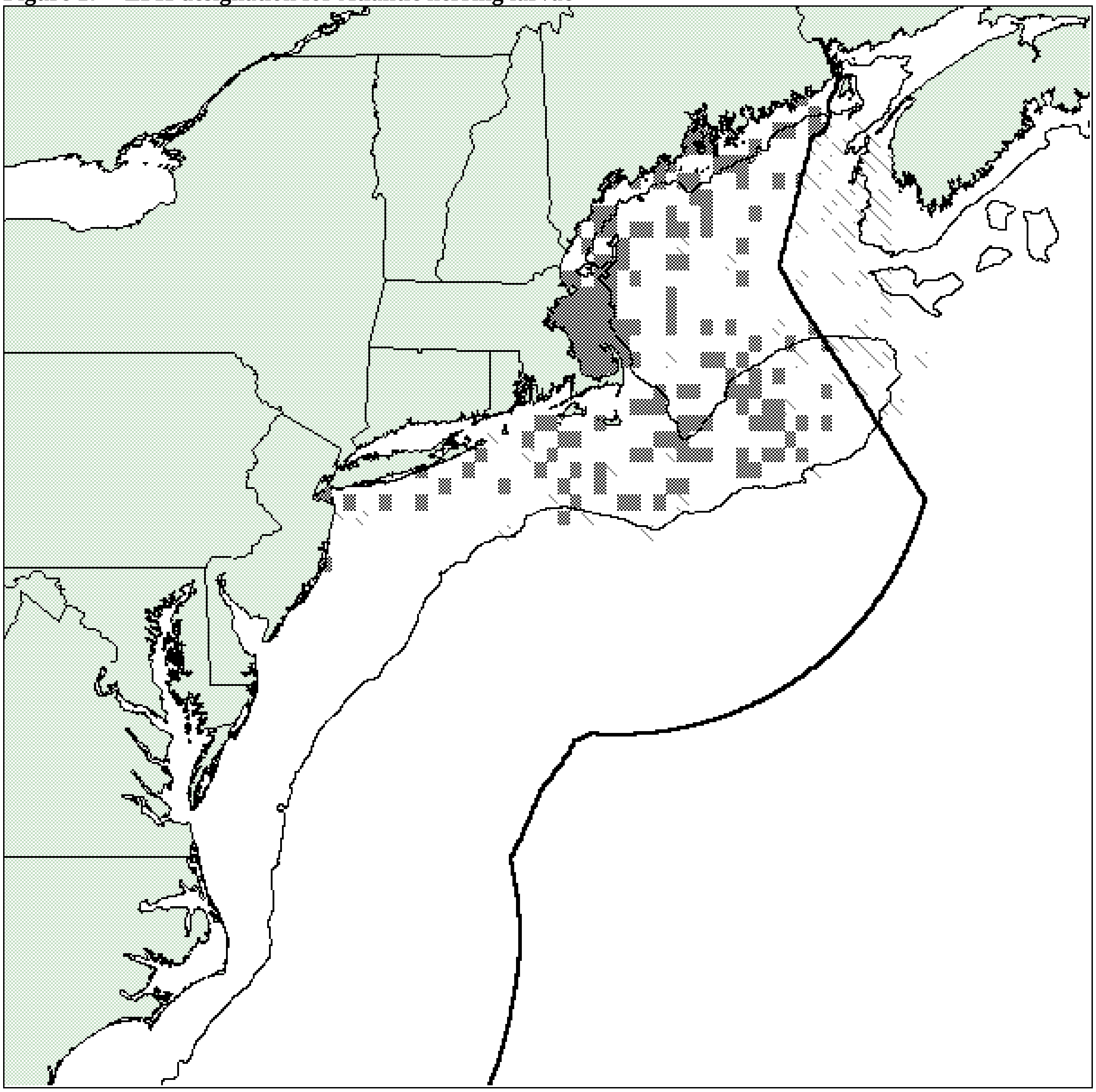


Figure 18 – EFH designation for juvenile Atlantic herring

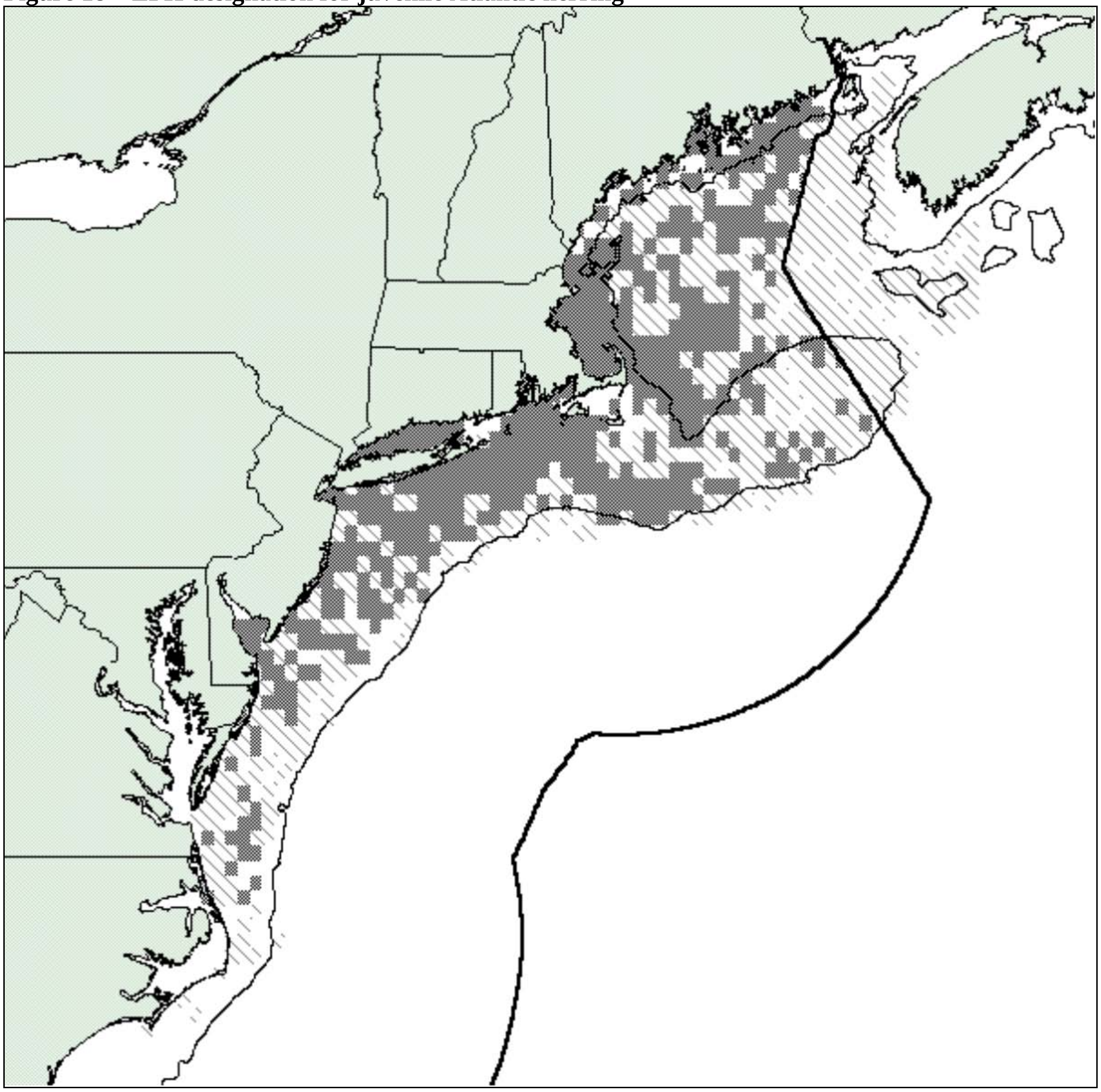
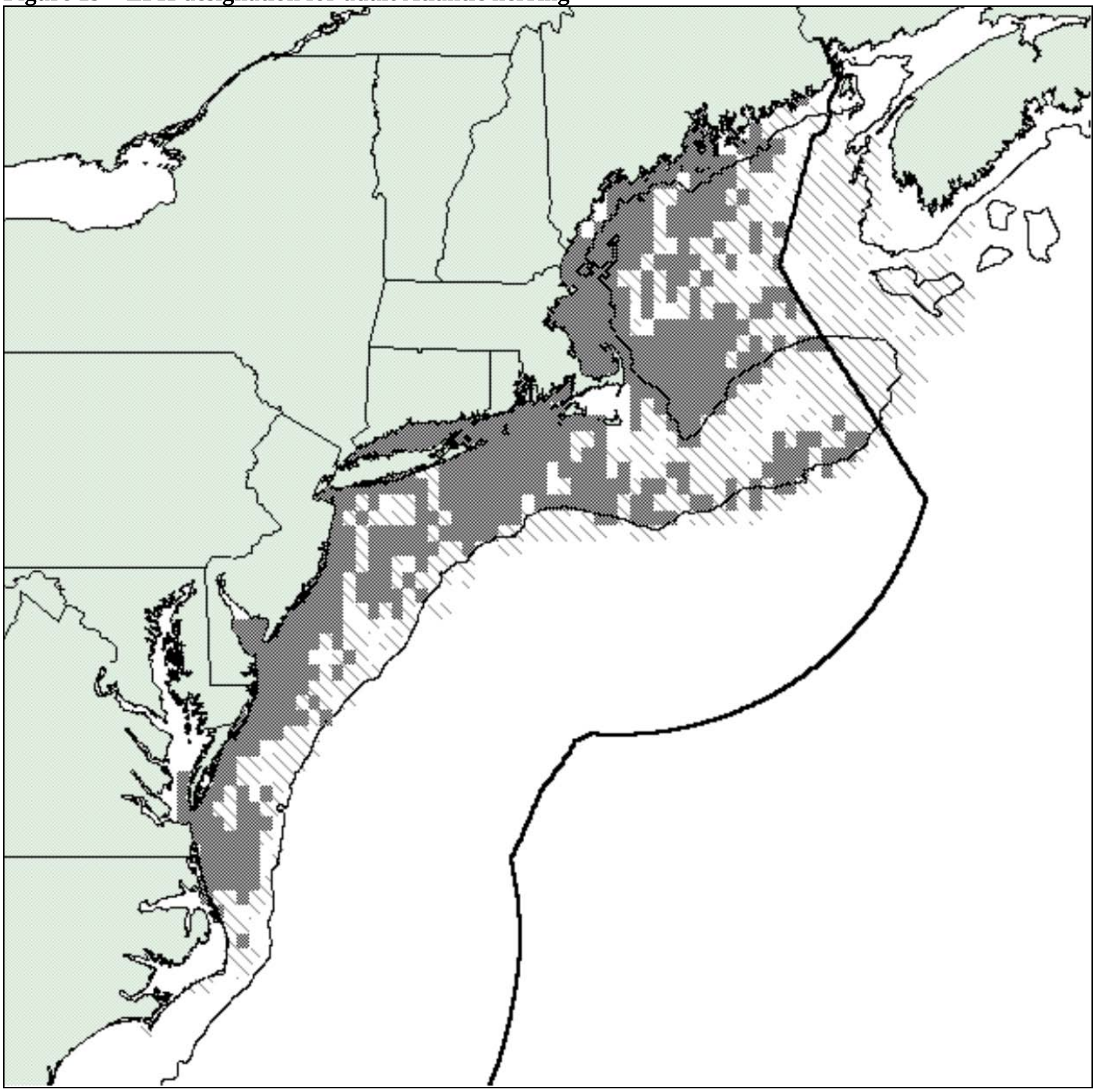


Figure 19 – EFH designation for adult Atlantic herring



5.1.3 Groundfish Gear Types and Interaction with Habitat

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

5.1.3.1 Groundfish Gear Types

The characteristics of typical gear types used by the multispecies fishery are summarized in Table 8.

Table 8 - Descriptions of the fixed gear types used by the multispecies fishery

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

Trawl Gear

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

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

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

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

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

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

Gillnet Gear

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

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

Hook and Line Gear

1. Hand Lines/Rod and Reel

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

2. Mechanized Line Fishing

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

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

Longlines

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

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

5.1.3.2 Gear Interaction with Habitat

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

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

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

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

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

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

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

Trawling reduces habitat complexity;

Repeated trawling results in discernable changes in benthic communities;

Bottom trawling reduces the productivity of benthic habitats; and

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

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

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

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

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

5.1.4 Herring Gear Types and Interaction with Habitat

5.1.4.1 Herring Gear Types

While fixed gear dominated the U.S. Atlantic herring fishery in the 1960s, purse seines became the dominant gear type in the 1980s and early 1990s. Since the mid-1990s, the herring fishery has evolved and is now prosecuted primarily by midwater trawl (single and paired) vessels. All offshore directed fishing for herring (Area 3) occurs through the use of midwater trawls and pair trawls. The use of purse seine gear in the fishery in the inshore Gulf of Maine has recently increased again since the implementation of the Area 1A seasonal purse seine/fixed gear only area in 2007, as a few vessels are converting to purse seine gear to prosecute the summer fishery. The use of small mesh bottom trawl gear in the Atlantic herring fishery has increased in recent years and will be investigated further in the EIS for Amendment 5 to the Atlantic Herring FMP (work in progress).

Midwater Trawl Gear (Single)

Midwater trawls are used to capture pelagic species throughout the water column between the surface and the seabed. Midwater trawls used in the New England Atlantic herring fishery are generally nylon rope trawls with very large meshes in the forward portion of the net that become progressively smaller toward the rear of the net, sometimes called the "brailer." For nets used on single boats, the net is spread horizontally with two large metal doors positioned in front of the net. As the trawler moves forward, the doors, and therefore the net, are forced outward. Once the net is deployed, changes in its position in the water column (height above the bottom) are made by increasing or decreasing the speed of the vessel or by bringing or letting out trawl wire. An electronic sonar system mounted in the mouth of the net allows the fisherman to continually monitor the size of the net opening and the height of the net above the bottom during each tow. The footrope of the net is usually weighted with short lengths of chain in order to keep the mouth of the net open. In most cases, two heavy weights are attached forward of the net to cables that extend from the net opening to the trawl doors, and there is no ground gear (e.g., "cookies") attached to the footrope. Tows typically last for several hours, and catches are large. The fish are usually removed from the net while it remains in the water alongside the vessel by means of a pump. Only larger fish (bycatch or incidental catch) are sorted by the crew as the fish are pumped into the vessel holds.

Paired Midwater Trawls

"Pair trawls" used in the New England Atlantic herring fishery are designed identically as single boat midwater trawls, but do not have doors, since the net is spread by the two vessels. They are often larger than single-boat midwater trawls because the combined towing power of two vessels exceeds that of a single vessel.

Purse Seines

The purse seine is a deep nylon mesh net with floats on the top and lead weights on the bottom. Rings are fastened at intervals to the lead line and a purse line runs completely around the net through the rings (see GMRI web site www.gmri.org). One end of the net remains in the vessel and the other end is attached to a power skiff or "bug boat" that is deployed from the stern of the vessel and remains in place while the vessel encircles a school of fish with the net. Then the net is pursed and brought back aboard the vessel through a hydraulic power block. Purse seines vary in size according to the size of the vessel and the depth to be fished. Most purse seines used in the New England herring fishery range from 30 to 50 meters deep (100-165 ft) (NMFS 2005). Purse seining is a year round pursuit in the Gulf of Maine, but is most active in the summer when herring are more abundant in coastal waters. Purse seines are mostly utilized at night, when herring are feeding near the surface. This fishing technique is less successful when fish remain in deeper water and when they do not form "tight" schools.

Fixed Gear – Stop Seines and Weirs
Weir and stop seining are traditional fishing techniques associated with the tending of inshore coves in Maine (NEFMC 1999). They are the principal gears used in the inshore herring fishery along the Maine coast. These fishing gear types occur entirely within State waters, and therefore are not regulated under a Federal FMP.

5.1.4.2 Herring Gear Interaction with Habitat

The current regulatory definition of midwater trawl gear is:

Midwater trawl gear means trawl gear that is designed to fish for, is capable of fishing for, or is being used to fish for pelagic species, no portion of which is designed to be or is operated in contact with the bottom at any time. The gear may not include discs, bobbins, or rollers on its footrope, or chafing gear as part of the net.

Herring midwater trawls are not designed to fish on the bottom and do not normally contact the bottom, although information provided by herring fishermen indicates that the footrope, the belly of the net, and/or the weights do occasionally contact the bottom. Sometimes, when herring are in deep water near the bottom, midwater trawls are intentionally fished close to or in contact with the bottom. This occurs primarily in southern New England and the Mid-Atlantic during the winter (January-March); it may also occur in certain places on Georges Bank. The use of midwater trawls near or on the bottom generally only occurs on smooth mud and sand substrate, since bottom contact in more complex, rocky habitats (which are more common in the Gulf of Maine) causes the footrope to “hang up” and causes serious damage to the net. Damaged nets require costly repairs, and that provides an incentive to fishermen to avoid bottom contact. The trawl doors do not contact the bottom. Because the herring in the rear of the net remain alive during the tow, even when it is full of herring, the brailer normally floats free of the seafloor when fishing near the bottom.

5.2 Target Species

This section describes the species life history and stock population status for the haddock and herring stocks that would be affected by this action.

5.2.1 Gulf of Maine Haddock

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

Haddock spawn over various substrates including rocks, gravel, smooth sand, and mud. Eggs are broadcast and fertilized near the bottom. Fertilized eggs are buoyant and remain in the water column where subsequent development occurs. Larvae metamorphose into juveniles in roughly 30 to 42 days at lengths of 2 to 3 cm. Small juveniles initially live and feed in the epipelagic zone.

Juveniles remain in the upper part of the water column for 3 to 5 months. Juveniles visit the ocean bottom in search of food. Once suitable bottom habitat is located, juveniles settle into a demersal existence. Haddock do not make extensive seasonal migrations. In winter, haddock prefer deeper waters and tend to move shoreward in summer. Haddock are highly fecund broadcast spawners. Eggs are released near the ocean bottom in batches and fertilized by a courting male. After fertilization, haddock eggs become buoyant and rise to the surface water layer. In the Gulf of Maine, spawning occurs from early February to May, usually peaking in February to April. In the Gulf of Maine, Jeffreys Ledge and Stellwagen Bank are the two primary spawning sites.

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

Spawning biomass increased from 1989 to 2002 and has decreased since then. Fishing mortality has been below F_{msy} since 1992. No retrospective adjustment was made for Gulf of Maine haddock. Stock size is expected to fluctuate around SSB_{MSY} in the near term (Figure 21) if fishing mortality is kept at 75 percent of F_{MSY} .

Figure 20 – Gulf of Maine haddock spawning stock biomass (SSB) and fishing mortality (F) during 1977-2007 reported in GARM III (blue circles) along with 80% confidence intervals for 2007 estimates. Projected SSB and F with 80% confidence intervals are shown with open squares.

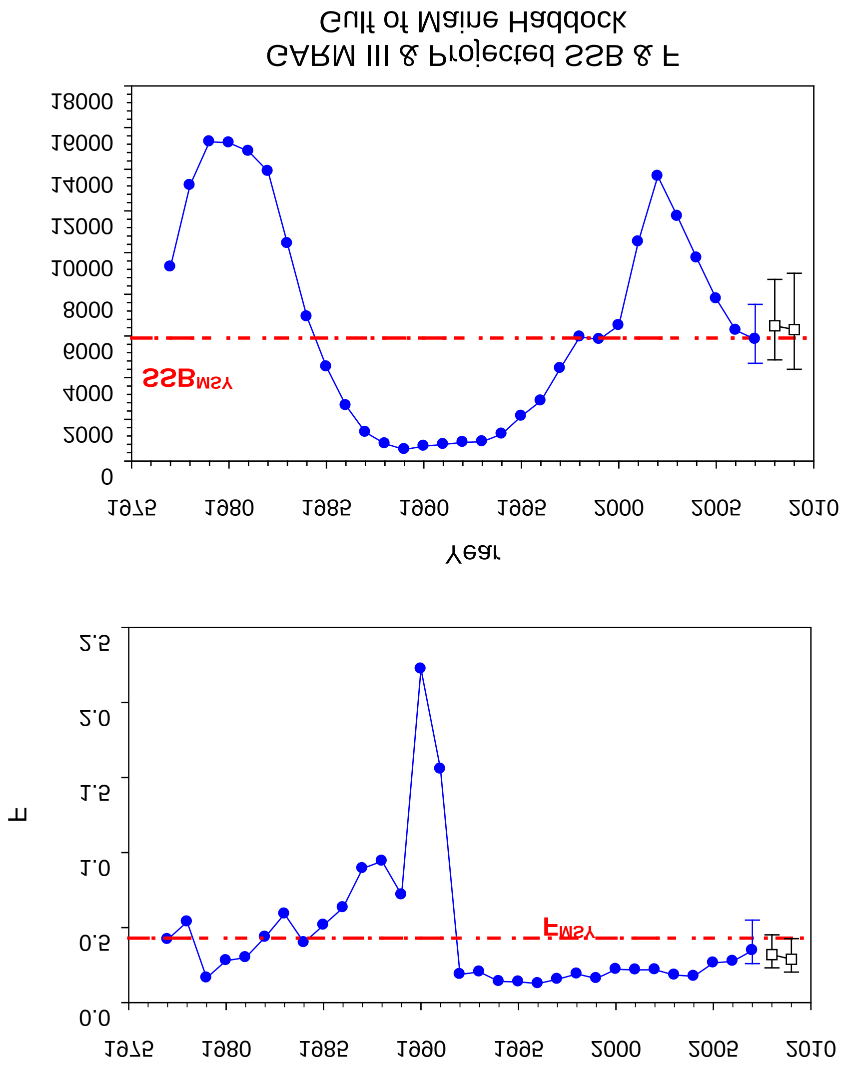
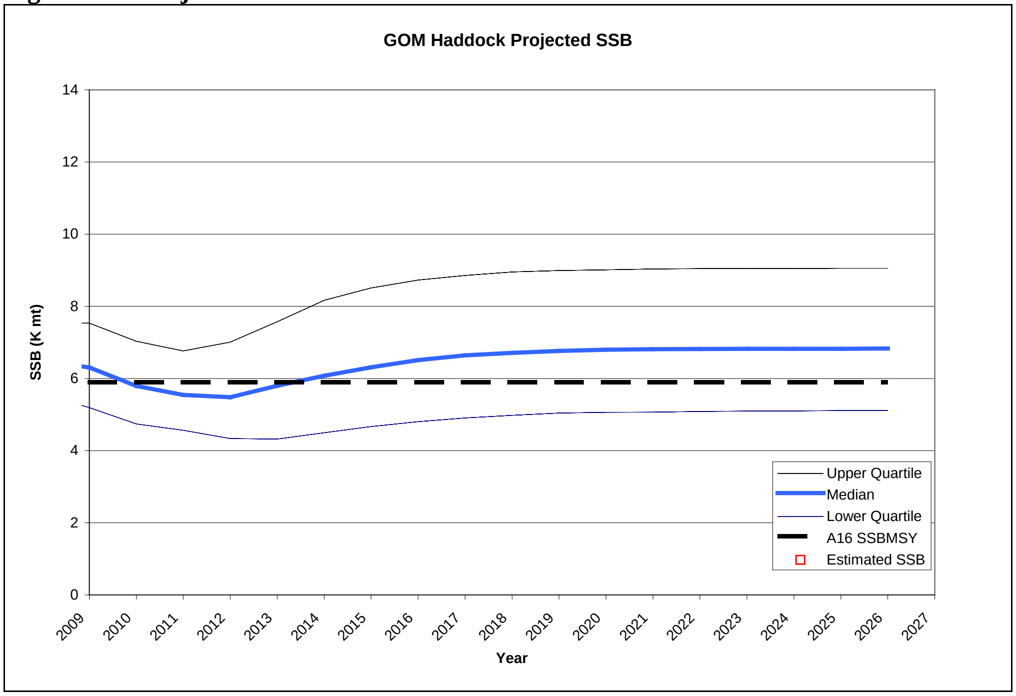


Figure 21 – Projected GOM haddock stock size



5.2.2 Georges Bank Haddock

Life History: The general life history of GB haddock is comparable to the GOM haddock as described above. On Georges Bank, spawning occurs from January to June, usually peaking from February to early-April. Georges Bank is the principal haddock spawning area in the northeast U.S. continental shelf ecosystem. GB haddock spawning is concentrated on the northeast peak of Georges Bank.

Median age and size of maturity differ slightly between the GB and GOM haddock stocks. GARM III found that the Gulf of Maine fishery does not target haddock and is directed mostly at flatfish for which the fleet uses large square (6.5 in) mesh gear, which leads to reduced selectivity on haddock. The Gulf of Maine haddock have lower weights at age than the Georges Bank stock and the age at 50 percent maturity was also lower for Gulf of Maine as compared to Georges Bank haddock.

Population Status: The GB haddock stock is a transboundary resource, which is co-managed with Canada. Substantial declines have recently occurred in the weights at age due to slower than average growth, particularly of the 2003 year-class. This is affecting productivity in the short-term. The growth of subsequent year-classes is returning to the earlier rates. The stock is not overfished and overfishing is not occurring.

Georges Bank haddock has been rebuilt to about twice B_{msy}. Spawning biomass has increased since 1993. Fishing mortality has remained below F_{msy} since 1995. The partial recruited strong 2003 year class made up most of the catch in 2007. No retrospective adjustment was made for Georges Bank haddock.

GB haddock stock size is projected to decline over the next few years if fishing mortality is kept at 75 percent of F_{MSY}. As the 2003-year class ages and the stock returns to more typical stock sizes (Figure 23), near-term ABCs are also projected to decline.

Figure 22 – Georges Bank haddock spawning stock biomass (SSB) and fishing mortality (F) estimates during 1931-2007 reported in GARM III (blue circles) along with 80% confidence intervals for 2007 estimates. Projected SSB and F with 80% confidence intervals are shown with open squares.

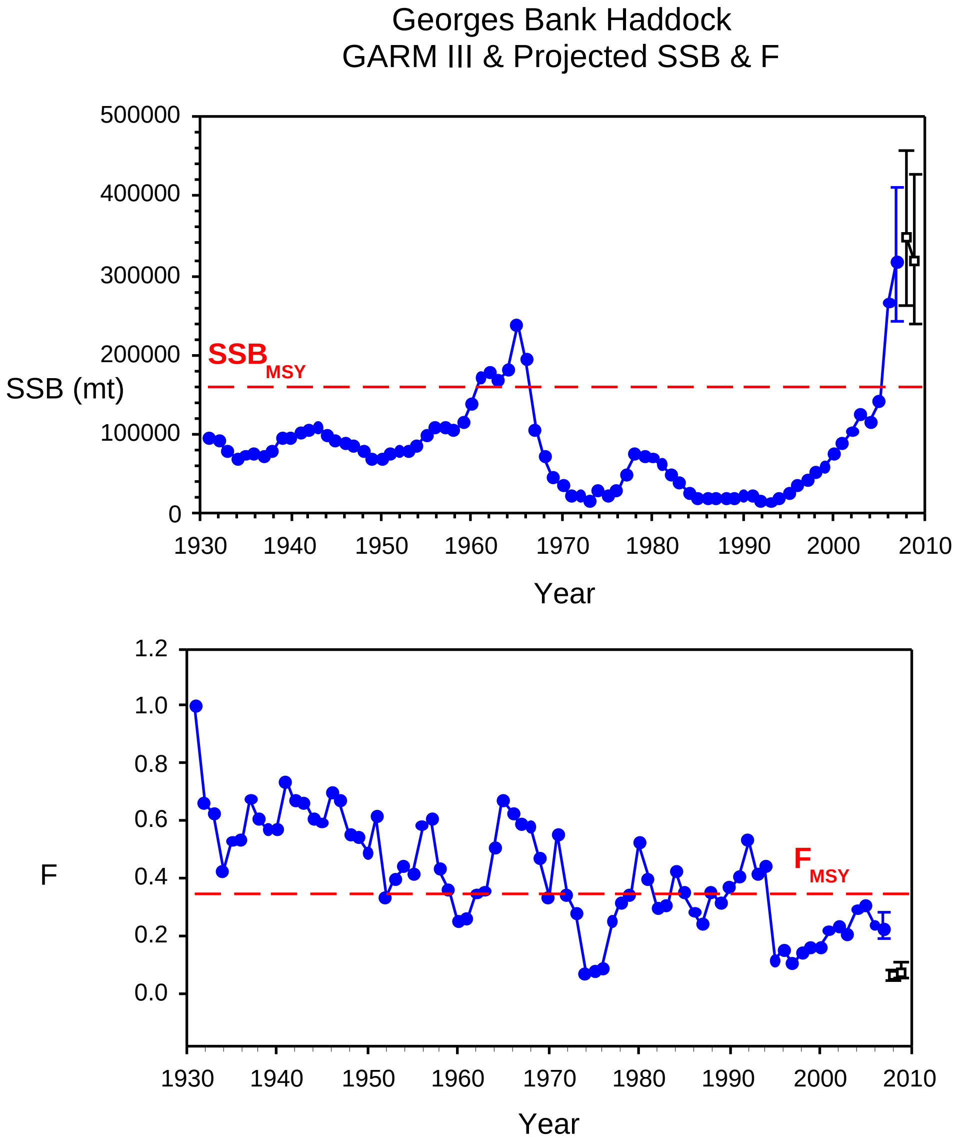
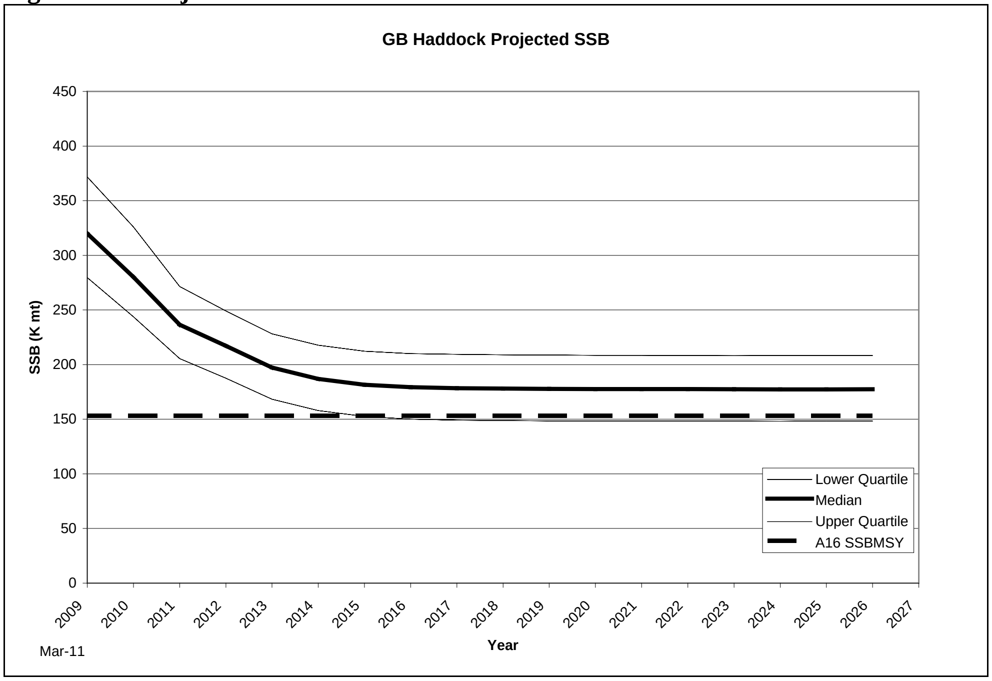


Figure 23 – Projected GB haddock stock size



5.2.3 Atlantic Herring

Life History: Atlantic herring occur from North Carolina to the Canadian Maritime provinces and from inshore to offshore waters to the edge of the continental shelf. They can also be found in every major estuary from the Chesapeake Bay to the Gulf of Maine. They are most abundant north of Cape Cod (Kelly and Moring 1986) with the largest and oldest fish found in the southern most portion of the range (Munroe 2002). Adult herring undertake extensive migrations to areas where they feed, spawn, and overwinter. Spawning occurs in the summer and fall, starting earlier along the eastern Maine coast and southwest Nova Scotia (August – September) than in the southwestern Gulf of Maine (early to mid-October in the Jeffreys Ledge area) and as late as November – December on Georges Bank (Reid et al.1999). In U.S. waters, Atlantic herring reach a maximum length of about 39 cm (15.6 inches) and an age of about 15-18 years (Anthony 1972).

Population Management: The New England Fishery Management Council manages herring under the Atlantic Herring FMP. The stock complex is not overfished at this time, and overfishing is not occurring. A complete description of the Atlantic herring resource can be found in Section 7.1 of the Final EIS for Amendment 1 to the Herring FMP and is being updated as part of Amendment 5 (work in progress). Amendment 5 will include the next comprehensive EIS for the Herring FMP and will update the status of the stock, fishery, and related components through the 2010 fishing year.

Stock Status: A benchmark stock assessment by the Northeast Fisheries Science Center (through the SAW/SARC process) is anticipated for June 2012. The following information summarizes results of the most recent assessment for Atlantic herring, which was used to form the basis of the 2010-2012 fishery specifications.

Since 1998, the Transboundary Resources Assessment Committee (TRAC) has reviewed stock assessments and projections necessary to support management activities for shared resources across the USA Canada boundary in the Gulf of Maine-Georges Bank region. The most recent TRAC benchmark assessment of the Atlantic herring complex occurred in June 2009 in St. Andrew's New Brunswick. This assessment served as an update; Atlantic herring for the Gulf of Maine/Georges Bank area were last assessed in a benchmark assessment in May 2006 (O'Boyle and Overholtz 2006). At the 2006 assessment meeting, it was agreed that the Age Structured Assessment Program (ASAP) Base model showed the least retrospective pattern and was the preferred approach amongst all the model formulations. The purpose of the 2009 update assessment meeting was to update both independent and dependent data, and use it in the established benchmark formulation to determine the current status of the Atlantic herring resource. The updated assessment model also prompted revision of the biological reference points to reflect the new results.

The TRAC update assessment results estimate that Atlantic herring biomass was 651,700 mt at the beginning of 2008, which is slightly below B_{MSY} (670,600 mt). Estimated fishing mortality in 2008 was 0.14, which is below F_{MSY} (0.27). The stock complex is not overfished at this time, and overfishing is not occurring.

The following information summarizes the results of the 2009 TRAC Assessment and the current status of the Atlantic herring complex:

- Stock biomass (2+, January 1) increased steadily from about 111,600 mt in 1982 to almost 830,000 mt in 1997, fluctuated without trend since then, and was estimated to be 652,000 mt at the beginning of 2008. This is below B_{MSY} (670,600 mt).
- Recruitment at Age 2 from the 2004 and 2006 year classes appear weaker than the long-term (1967-2005) average of 2.3 billion fish. The 2005 year class abundance estimate is above average abundance at 3.3 billion fish.
- Fishing mortality (Age 2+) declined to 0.14 in 1993 and has remained stable at about 0.16 from 2002 onwards. Estimated fishing mortality in 2008 was 0.14. This is below F_{MSY} (0.27).
- The Atlantic herring 2006 TRAC recommended that a strategy be adopted to maintain a low to neutral risk of exceeding the fishing mortality limit reference point, and that when stock conditions are poor, fishing mortality rates should be further reduced to promote rebuilding. A Fox surplus production model estimated F_{MSY} = 0.27, MSY = 178,374 mt, and B_{MSY} = 670,600 mt.
- Retrospective analyses were used to detect any patterns to overestimate - or underestimate – fishing mortality, biomass and recruitment relative to the terminal year estimates. A significant retrospective pattern was detected in this assessment in overestimating SSB relative to the current estimate (averaging + 42%/year, and ranging between 14-56%) and this is a concern. The pattern has persisted for several years and is expected to continue in the future.
- An outlook is provided from the 2009 TRAC Assessment in terms of the consequences on SSB and for yield in 2009, 2010, and 2011 of maintaining the 2008 fishing mortality rate (F=0.14). The projections assumed that recruitment of the 2009-2011 year classes was equal to the recent 10-year average (2.0 billion fish at Age 2). A fishing mortality of F=0.14 in 2009 generates a landings of 82,403 mt and an SSB in 2009 of 460,343 mt, a decline of about 11%. Continuing to fish at F=0.14 in both 2010 and 2011 produces annual landings of 81,154 mt and 82,625 mt, respectively, and results in a slight decline in SSB in 2011 to 444,532 mt.

Figure 24 – Atlantic herring spawning stock biomass (SSB) and recruitment estimates, 1966 - 2005

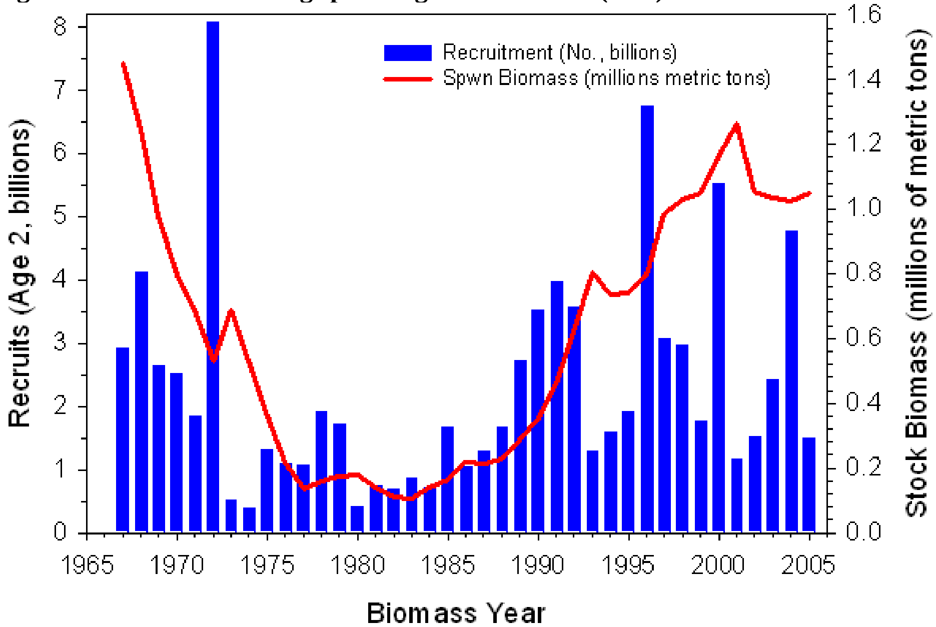
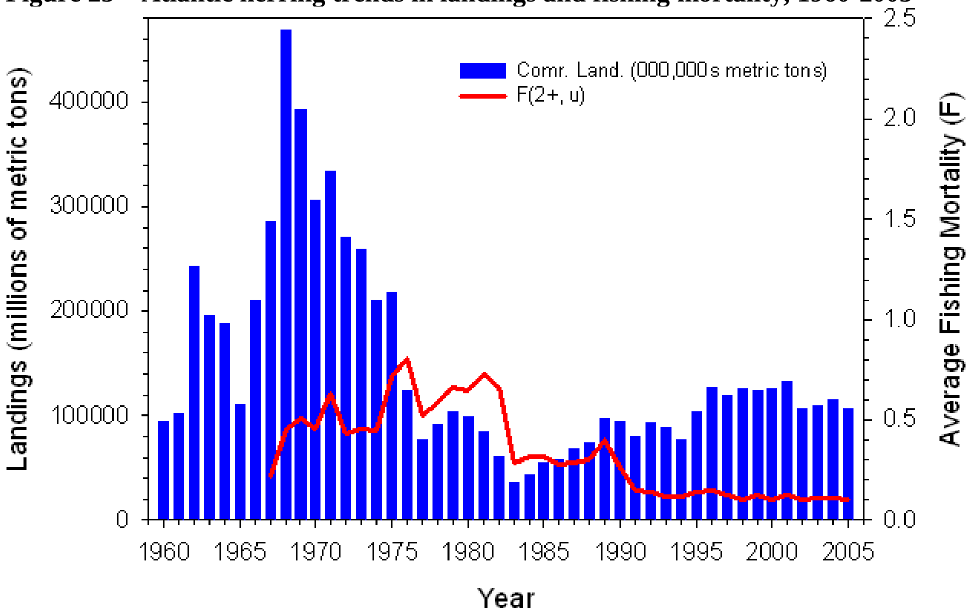


Figure 25 – Atlantic herring trends in landings and fishing mortality, 1960-2005



5.3 Protected Resources

There are numerous protected species that inhabit the environment within the Northeast Multispecies FMP management unit, and that, therefore, potentially occur in the operations area of the fishery. These species are afforded protection under the Endangered Species Act of 1973 (ESA; i.e., for those designated as threatened or endangered) and/or the Marine Mammal Protection Act of 1972 (MMPA), and are under NMFS' jurisdiction. As listed in Table 9, 13 marine mammal, sea turtle, and fish species are classified as endangered or threatened under the ESA; the remaining species in Table 9 are protected by the MMPA and are known to interact with the Northeast multispecies fishery. Non ESA-listed species protected by the MMPA that utilize this environment and have no documented interaction with the Northeast multispecies fishery will not be discussed in this statement.

5.3.1 Species Present in the Area

Table 9 lists the species, protected either by the ESA, the MMPA, or both, that may be found in the environment that would be utilized by the fishery. Table 9 also includes two candidate fish species and one proposed fish species (species being considered for listing as an endangered or threatened species), as identified under the ESA.

Candidate species are those petitioned species that are actively being considered for listing as endangered or threatened under the ESA, as well as those species for which NMFS has initiated an ESA status review that it has announced in the Federal Register. Atlantic sturgeon, Atlantic bluefin tuna, and cusk are known to occur within the action area of the Northeast multispecies fishery and have documented interactions with types of gear used in the Northeast multispecies fishery.

Table 9 – Species protected under the Endangered Species Act and Marine Mammal Protection Act that may occur in the operations area for the groundfish fishery

Species	Status
Cetaceans	
North Atlantic right whale (*Eubalaena glacialis*)	Endangered
Humpback whale (*Megaptera novaeangliae*)	Endangered
Fin whale (*Balaenoptera physalus*)	Endangered
Sei whale (*Balaenoptera borealis*)	Endangered
Blue whale (*Balaenoptera musculus*)	Endangered
Sperm whale (*Physeter macrocephalus*	Endangered
Minke whale (*Balaenoptera acutorostrata*)	Protected
Pilot whale (*Globicephala spp*.)	Protected
Risso's dolphin (*Grampus griseus*)	Protected
Atlantic white-sided dolphin (*Lagenorhynchus acutus*)	Protected
Common dolphin (*Delphinus delphis*)	Protected
Spotted dolphin (*Stenella frontalis*)	Protected

(Table 9 continued)

Species	Status
Bottlenose dolphin (*Tursiops truncatus*)[b]	Protected
Harbor porpoise (*Phocoena phocoena*)	Protected
Sea Turtles	
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered
Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered
Green sea turtle (*Chelonia mydas*)	Endangered[c]
Loggerhead sea turtle (*Caretta caretta*)	Threatened
Hawksbill sea turtle (*Eretmochelys imbricate*)	Endangered
Fish	
Shortnose sturgeon (*Acipenser brevirostrum*)	Endangered
Atlantic salmon (*Salmo salar*)	Endangered
Cusk *(Brosme brosme)*	Candidate
Atlantic sturgeon *(Acipenser oxyrinchus)*	Proposed
Atlantic Bluefin Tuna (*Thunnus thynnus*)	Candidate
Pinnipeds	
Harbor seal (*Phoca vitulina*)	Protected
Gray seal (*Halichoerus grypus*)	Protected
Harp seal (*Phoca groenlandicus*)	Protected
Hooded seal (*Cystophora cristata*)	Protected

Notes:

[a] MMPA-listed species occurring on this list are only those species that have a history of interaction with similar gear types within the action area of the Northeast Multispecies Fishery, as defined in the 2010 List of Fisheries.

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

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

At this time, Atlantic sturgeon has been proposed for listing under the ESA. A status review for Atlantic sturgeon was completed in 2007. NMFS has concluded that the U.S. Atlantic sturgeon spawning populations comprise five Distinct Population Segments (DPSs) (ASSRT, 2007). The Gulf of Maine DPS of Atlantic sturgeon is proposed to be listed as threatened, and the New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs of Atlantic sturgeon are proposed as endangered. On October 6, 2010 (75 FR 61872 and 75 FR 61904), NMFS proposed listing five populations of Atlantic sturgeon along the U.S. East Coast as either threatened or endangered species. A final listing rule is expected by October 6, 2011.

Atlantic sturgeon from any of the five populations could occur in areas where the Northeast multispecies fishery operates, and the species has been captured in gear targeting multispecies (Stein et al. 2004a, ASMFC 2007). The proposed action to modify the Northeast multispecies fishery is expected to be completed before the anticipated date of a final listing determination for Atlantic sturgeon. However, the conference provisions of the ESA apply to actions proposed to be taken by Federal agencies once a species is proposed for listing (50 CFR 402.10). Therefore, this EA includes information on the anticipated effects of the action on Atlantic sturgeon.

Candidate species receive no substantive or procedural protection under the ESA; however, NMFS recommends that project proponents consider implementing conservation actions to limit the potential for adverse effects on candidate species from any proposed project. NMFS has initiated review of recent stock assessments, bycatch information, and other information for these candidate and proposed species. The results of those efforts are needed to accurately characterize recent interactions between fisheries and the candidate/proposed species in the context of stock sizes. Final determinations on the proposed listings are expected by October 6, 2011. Any conservation measures deemed appropriate for these species will follow the information reviews. Please note that once a species is proposed for listing the conference provisions of the ESA apply (see 50 CFR 402.10).

5.3.2 Species Potentially Affected

It is expected that the sea turtle, cetacean, and pinniped species discussed below have the potential to be affected by the operation of the multispecies fishery. Background information on the range-wide status of sea turtle and marine mammal species that occur in the area and are known or suspected of interacting with fishing gear (demersal gear including trawls, gillnets, and longline types) can be found in a number of published documents. These include sea turtle status reviews and biological reports (NMFS and USFWS 1995; Marine Turtle Expert Working Group (TEWG) 1998, 2000; NMFS and USFWS 2007a, 2007b; Leatherback TEWG 2007), recovery plans for ESA-listed cetaceans and sea turtles (NMFS 1991, 2005; NMFS and USFWS 1991a, 1991b; NMFS and USFWS 1992), the marine mammal stock assessment reports (e.g., Waring et al. 2006; 2007; 2009), and other publications (e.g., Clapham et al. 1999, Perry et al. 1999, Best et al. 2001, Perrin et al. 2002).

Additional ESA background information on the range-wide status of these species and a description of critical habitat can be found in a number of published documents including recent sea turtle (NMFS and USFWS 1995, TEWG 2000, NMFS SEFSC 2001, NMFS and USFWS 2007a), loggerhead recovery team report (NMFS and USFWS 2008), status reviews and stock assessments, Recovery Plans for the humpback whale (NMFS 1991), right whale (NMFS 1991a, NMFS 2005), right whale EIS (August 2007), fin and sei whale (NMFS 1998b), and the marine mammal stock assessment report (Waring et al. 2008) and other publications (*e.g.*, Perry *et al.* 1999; Clapham *et al.* 1999; IWC 2001 *a*). A recovery plan for fin and sei whales is also available and may be found at the following web site http://www.NOAAFisheries.noaa.gov/prot_res/PR3/recovery.html (NOAA Fisheries unpublished).

5.3.2.1 Sea Turtles

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

The loggerhead sea turtle is listed as threatened throughout its worldwide range. On July 12, 2007, NMFS and USFWS (Services) received a petition from Center for Biological Diversity and Turtle Island Restoration Network to list the ‘‘North Pacific populations of loggerhead sea turtle’’ as an endangered species under the ESA. In addition, on November 15, 2007, the Services received a petition from Center for Biological Diversity and Oceana to list the ‘‘Western North Atlantic populations of loggerhead sea turtle’’ as an endangered species under the ESA. NMFS published notices in the *Federal Register*, concluding that the petitions presented substantial scientific information indicating that the petitioned actions may be warranted (72 FR 64585, November 16, 2007; 73 FR 11849; March 5, 2008). In 2008, a Biological Review Team (BRT) was established to assess the global population structure to determine whether DPSs exist and, if so, the status of each DPS. The BRT identified nine loggerhead DPSs, distributed globally (Conant et al. 2009). On March 16, 2010, the Services announced 12-month findings on the petitions to list the North Pacific populations and the Northwest Atlantic populations of the loggerhead sea turtle as DPSs with endangered status and published a proposed rule to designate nine loggerhead DPSs worldwide, seven as endangered (North Pacific Ocean DPS, South Pacific Ocean DPS, Northwest Atlantic Ocean DPS, Northeast Atlantic Ocean DPS, Mediterranean Sea DPS, North Indian Ocean DPS, and Southeast Indo-Pacific Ocean DPS) and two as threatened (Southwest Indian Ocean DPS and South Atlantic Ocean DPS). On March 22, 2011, the timeline for the final determination was extended for six months until September 16, 2011 (76 FR 15932).

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

5.3.2.2 Large Cetaceans

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

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

In comparison to the baleen whales, sperm whale distribution occurs more on the continental shelf edge, over the continental slope, and into mid-ocean regions (Waring et al. 2006). However, sperm whales distribution in U.S. EEZ waters also occurs in a distinct seasonal cycle (Waring et al. 2006). Typically, sperm whale distribution is concentrated east-northeast of Cape Hatteras in winter and shifts northward in spring when whales are found throughout the Mid-Atlantic Bight (Waring et al. 2006). Distribution extends further northward to areas north of Georges Bank and the Northeast Channel region in summer and then south of New England in fall, back to the Mid-Atlantic Bight (Waring et al. 1999).

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

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

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

It should also be noted that NMFS expects to propose changes to critical habitat designations of the North Atlantic right whale in 2011. At the time of writing, an announcement by the agency acknowledged that it is proceeding with the petition by working on a rule to propose revisions to the critical habitat designation for this species. "Critical habitat" is an area that contains physical or biological features that may require special management and that are essential to the conservation of the species. Three critical habitat areas currently exist, established in 1994, two of which are within the jurisdiction of the NEFMC; the feeding grounds in Cape Cod Bay and the Great South Channel.

5.3.2.3 Small Cetaceans

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

With respect to harbor porpoise specifically, the most recent Stock Assessment Reports show that the number of harbor porpoise takes is increasing, moving closer to the Potential Biological Removal level calculated for this species (610 animals/year from 2001-2005) rather than declining toward the long-term Zero Mortality Rate Goal (ZMRG), which is 10 percent of PBR (approximately 75 animals). Observer information collected from January 2005 to June 2006 has indicated an increase in porpoise bycatch throughout the geographic area covered by the Harbor Porpoise Take Reduction Plan (HPTRP) in both the Gulf of Maine and Mid-Atlantic regions and in monkfish gear specifically (NMFS, Discussion Paper on Planned Amendments to the Harbor Porpoise TRP 2007). The Harbor Porpoise Take Reduction Team developed options to reduce takes, and NMFS published a proposed rule on July 21, 2009 (74 *Federal Register* 36058) with four alternatives including no action. The comment period on this rule ended on August 20, 2009 and the final rule was published on February 19, 2010 (75 *Federal Register* 7383).

The following changes were implemented in the 2010 amendments to the HPTRP:

New England

- Expand the size of the Massachusetts Bay Management Area, as well as pinger use to include November;
- Establish the Stellwagen Bank Management Area and require pingers from November 1 through May 31;
- Establish the Southern New England Management Area where pingers are required from December 1 through May 31; and
- Establish the Cape Cod South Expansion Consequence Closure Area and Coastal Gulf of Maine Consequence Closure Area. These areas would be closed to gillnetting for two to three months if harbor porpoise bycatch levels are too high.

Mid-Atlantic

- Establish the Mudhole South Management Area, with a seasonal closure and gear modifications for large and small mesh gear;
- Modify the northern boundary of the waters off New Jersey Management Area to intersect with the southern shoreline of Long Island, NY at 72° 30' W longitude; and
- Modify tie-down spacing requirement for large mesh gillnets in all Mid-Atlantic management areas (waters off New Jersey, Mudhole North and South, and Southern Mid-Atlantic Management Areas).

The Atlantic Trawl Gear Take Reduction Team (ATGTRT) was organized in 2006 to implement a plan to address the incidental mortality and serious injury of long-finned pilot whales, short-finned pilot whales, common dolphins, and Atlantic white-sided dolphins in several trawl gear fisheries. In lieu of a TRP, the ATGTRT agreed to develop an Atlantic Trawl Gear Take Reduction Strategy (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 achieving the ultimate MMPA goal of achieving ZMRG. 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. These voluntary measures are as follows:

- Reducing the numbers of turns made by the fishing vessel and tow times while fishing at night; and
- Increasing radio communications between vessels about the presence and/or incidental capture of a marine mammal to alert other fishermen of the potential for additional interactions in the area.

5.3.2.4 Pinnipeds

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

5.3.2.5 Atlantic Sturgeon DPSs

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

5.3.2.6 Species Not Likely to be Affected

The Gulf of Maine (GOM) Distinct Population Segment (DPS) of anadromous Atlantic salmon was initially listed by the USFWS and NMFS (collectively, the Services) as an endangered species on November 17, 2000 (65 FR 69459). A subsequent listing as an endangered species by the Services on June 19, 2009 (74 FR 29344) included an expanded range for the GOM DPS of Atlantic salmon.

Presently, the GOM DPS includes all anadromous Atlantic salmon whose freshwater range occurs in the watersheds from the Androscoggin River northward along the Maine coast to the Dennys River. Included are all associated conservation hatchery populations used to supplement these natural populations; currently, such conservation hatchery populations are maintained at Green Lake National Fish Hatchery (GLNFH) and Craig Brook National Fish Hatchery (CBNFH). Coincident with the June 19, 2009 endangered listing, NMFS designated critical habitat for the GOM DPS of Atlantic salmon (74 FR 29300; June 19, 2009). The critical habitat designation for the GOM DPS includes 45 specific areas occupied by Atlantic salmon at the time of listing that include approximately 19,571 km of perennial river, stream, and estuary habitat and 799 square km of lake habitat within the range of the GOM DPS and in which are found those physical and biological features essential to the conservation of the species. The entire occupied range of the GOM DPS in which critical habitat is designated is within the State of Maine.

The action being considered in the EA is not likely to adversely affect shortnose sturgeon, the Gulf of Maine distinct population segment (DPS) of Atlantic salmon, hawksbill sea turtles, blue whales, or sperm whales, all of which are listed as endangered species under the ESA. Shortnose sturgeon and salmon belonging to the Gulf of Maine DPS of Atlantic salmon occur within the general geographical areas fished by the multispecies fishery, but they are unlikely to occur in the area where the fishery operates given their numbers and distribution. Therefore, none of these species are likely to be affected by the groundfish fishery. The following discussion provides the rationale for these determinations. Although there are additional species that may occur in the operations area that are not known to interact with the specific gear types that would be used by the groundfish fleet, impacts to these species are still considered due to their range and similarity of behaviors to species that have been adversely affected.

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

The wild populations of Atlantic salmon found in rivers and streams from the lower Kennebec River north to the U.S. - Canada border are listed as endangered under the ESA. These populations include those in the Dennys, East Machias, Machias, Pleasant, Narraguagus, Ducktrap, and Sheepscot Rivers and Cove Brook. Juvenile salmon in New England rivers typically migrate to sea in May after a 2- to 3-year period of development in freshwater streams, and remain at sea for two winters before returning to their U.S. natal rivers to spawn. Results from a 2001 post-smolt trawl survey in Penobscot Bay and the nearshore waters of the Gulf of Maine indicate that Atlantic salmon post-smolts are prevalent in the upper water column throughout this area in mid- to late May. Therefore, commercial fisheries deploying small-mesh active gear (pelagic trawls and purse seines within 10 m of the surface) in nearshore waters of the Gulf of Maine may have the potential to incidentally take smolts. However, it is highly unlikely that the approval of this EA would affect the Gulf of Maine DPS of Atlantic salmon given that operation of the groundfish fishery would not occur in or near the rivers where concentrations of Atlantic salmon are likely to be found and groundfishing gear used by the fleet operates in the ocean at or near the bottom rather than near the water surface. Thus, this species is not considered further in this EA.

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

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

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

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

5.3.3 Interactions Between Gear and Protected Resources

Commercial fisheries are categorized by NMFS based on a two-tiered, stock-specific fishery classification system that addresses both the total impact of all fisheries on each marine mammal stock as well as the impact of individual fisheries on each stock. The system is based on the numbers of animals per year that incur incidental mortality or serious injury due to commercial fishing operations relative to a stock's Potential Biological Removal (PBR) level (the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population). Tier 1 takes into account the cumulative mortality and serious injury to marine mammals caused by commercial fisheries while Tier 2 considers marine mammal mortality caused by the individual fisheries; Tier 2 classifications are used in this EA to indicate how each type of gear proposed for use in the Proposed Action may affect marine mammals. Table 10 identifies the classifications used in the List of Fisheries (LOF) for FY 2011 (50 CFR 229), which are broken down into Tier 2 Categories I, II, and III).

Table 10 – Descriptions of the Tier 2 Fishery Classification Categories

Category	Category Description
Tier 2, Category I	A commercial fishery that has frequent incidental mortality and serious injury of marine mammals. This classification indicates that a commercial fishery is, by itself, responsible for the annual removal of 50 percent or more of any stock's potential biological removal (PBR) level.
Tier 2, Category II	A commercial fishery that has occasional incidental mortality and serious injury of marine mammals. This classification indicates that a commercial fishery is one that, collectively with other fisheries, is responsible for the annual removal of more than 10 percent of any marine mammal stock's PBR level and that is by itself responsible for the annual removal of between 1 percent and 50 percent, exclusive of any stock's PBR.
Tier 2, Category III	A commercial fishery that has a remote likelihood of, or no known incidental mortality and serious injury of marine mammals. This classification indicates that a commercial fishery is one that collectively with other fisheries is responsible for the annual removal of: a. Less than 50 percent of any marine mammal stock's PBR level, or b. More than 1 percent of any marine mammal stock's PBR level, yet that fishery by itself is responsible for the annual removal of 1 percent or less of that stock's PBR level. In the absence of reliable information indicating the frequency of incidental mortality and serous injury of marine mammals by a commercial fishery, the Assistant Administrator would determine whether the incidental serious injury or mortality is "remote" by evaluating other factors such as fishing techniques, gear used, methods used to deter marine mammals, target species, seasons and areas fished, qualitative data from logbooks or fisher reports, stranding data, and the species and distribution of marine mammals in the area or at the discretion of the Assistant Administrator.

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

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

Table 11 lists the marine mammals known to have had interactions with sink gillnets, bottom trawls, and bottom longlines within the Gulf of Maine and Georges Bank, as excerpted from the LOF for FY 2011 (also see Waring et al. 2009). Northeast sink gillnets have the greatest potential for interaction with protected resources, followed by bottom trawls. Impacts to protected resources through interaction with bottom longline gear are not known within the operations area; however, interactions between the pelagic longline fishery and both pilot whales and Risso's dolphins led to the development of the Pelagic Longline Take Reduction Plan.

Table 11 – Marine Mammals Impacts Based on Groundfishing Gear and Northeast Multispecies Fishing Areas (Based on 2011 List of Fisheries)

Fishery		Estimated Number of Vessels/Persons	Marine Mammal Species and Stocks Incidentally Killed or Injured
Category	Type		
Tier 2, Category I	Mid-Atlantic gillnet	5,495	Bottlenose dolphin, Northern Migratory costal Bottlenose dolphin, Southern Migratory costal Bottlenose dolphin, Northern NC estuarine system Bottlenose dolphin, Southern NC estuarine system Bottlenose dolphin, WNA, offshore Common dolphin, WNA Gray seal, WNA Harbor porpoise, GME/BF Harbor seal, WNA Harp seal, WNA Humpback whale, Gulf of Maine Long-finned pilot whale, WNA Minke whale, Canadian east coast Short-finned pilot whale, WNA White-sided dolphin, WNA
Tier 2, Category I	Northeast sink gillnet	7,712	Bottlenose dolphin, WNA, offshore Common dolphin, WNA Fin whale, WNA Gray seal, WNA Harbor porpoise, GME/BF Harbor seal, WNA Harp seal, WNA Hooded seal, WNA Humpback whale, Gulf of Maine Minke whale, Canadian east coast North Atlantic right whale, WNA Risso's dolphin, WNA White-sided dolphin, WNA

(Table 11 continued)

Fishery		Estimated Number of Vessels/Persons	Marine Mammal Species and Stocks Incidentally Killed or Injured
Category	Type		
Tier 2, Category II	Mid-Atlantic mid-water trawl (including pair trawl)	546	Bottlenose dolphin, WNA offshore Common dolphin, WNA Long-finned pilot whale, WNA Risso's dolphin, WNA Short-finned pilot whale, WNA White-sided dolphin, WNA!
	Mid-Atlantic bottom trawl	1,182	Bottlenose dolphin, WNA offshore Common dolphin, WNA Long-finned pilot whale, WNA Short-finned pilot whale, WNA White-sided dolphin, WNA
	Northeast bottom trawl	1,635	Common dolphin, WNA Harbor porpoise, GME/BF Harbor seal, WNA Harp seal, WNA Long-finned pilot whale, WNA Short-finned pilot whale, WNA White-sided dolphin, WNA
	Atlantic mixed species trap/pot	1,912	Fin whale, WNA Humpback whale, Gulf of Maine
Tier 2, Category III	Northeast/Mid-Atlantic bottom longline/hook-and-line	1,183	None documented in the most recent 5 years of data

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

Although sea turtles have been caught and injured or killed in multiple types of fishing gear, including gillnets and hook and line fishing, mortalities from these gear types account for only about 50 percent of the mortalities associated with trawling gear (NMFS 2009c). A study conducted in the mid-Atlantic region showed that bottom trawling accounts for an average annual take of 616 loggerhead sea turtles, although Kemp's ridleys and leatherbacks were also caught during the study period (Murray 2006). Sea turtles generally occur in more temperate waters than those in the Northeast multispecies area. Gillnets are considered more detrimental to marine mammals such as pilot whales, dolphins, porpoises, and seals, as well as large marine whales; however, protection for marine mammals would be provided through various Take Reduction Plans outlined above.

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

For the years since 2006, a full bycatch estimate is not yet available. However, observed catch of Atlantic sturgeon is available in the NEFOP database and from the At-Sea-Monitoring Program first implemented in 2010. These databases were examined for the years 2007, 2008, 2009 and 2010. The following is a summary of the numbers of Atlantic sturgeon observed when multispecies were identified as the trip target:

Table 12 – Observed Atlantic sturgeon on trips targeting groundfish, FY 2007 – 2010

Year	Number	Month	Trip Target
2007	2	January	Cod
	1	March	Cod
	1	May	Cod
	1	December	Cod
2008	2	January	Groundfish NK
	1	February	Cod
	1	April	Winter flounder
	1	June	Flounder NK
	1	October	Winter flounder
	2	December	Cod
2009	1	January	Cod
	3	February	Cod
	1	November	Whiting
2010	1	March	Cod

	1	May	Winter flounder
	2	July	Cod
	5	November	Groundfish NK, Cod, Pollock
	2	December	Cod
Total	29		
Annual Average	7		

As illustrated above, for the years 2007 through 2010, approximately an average of 7 Atlantic sturgeon have been observed to be taken by commercial fishing vessels where the trip target declared was one of the species covered in the multispecies FMP (numbers are identical or very similar when haul target or primary species landed data are used). Of the Atlantic sturgeon observed in multispecies fisheries, most were identified as being released alive. However, there were several observed mortalities, some for which their condition was recorded as alive but injured and several for which condition was not known or recorded. The rate of post-release mortality for those released alive is unknown. It is important to note that these numbers represent only the bycatch which occurred and was observed by a NEFOP or At-Sea-Monitoring Program observer and are not being used as an estimate of the bycatch which occurred as a result of the operations of the entire commercial fishing fleet during this time. It should also be noted that some, but not the majority, of these observed catches occurred during the time period of the analysis of potential impacts on the proposed Atlantic sturgeon DPSs – from May to October.

5.4 Human Communities and the Fishery

5.4.1 New England Groundfish Commercial Harvesting Sector

5.4.1.1 Overview of New England Groundfish Fishery

New England's fishery has been identified with groundfish fishing both economically and culturally for over 400 years. Broadly described, the Northeast multispecies fishery includes the landing, processing, and distribution of commercially important fish that live on the sea bottom. In the early years, the Northeast multispecies fishery related primarily to cod and haddock. The Northeast Multispecies FMP (large-mesh and small-mesh) includes a total of 13 large-mesh species of groundfish (Atlantic cod, haddock, pollock, yellowtail flounder, witch flounder, winter flounder, windowpane flounder, American plaice, Atlantic halibut, redfish, ocean pout, white hake, and Atlantic wolffish) harvested from three geographic areas (Gulf of Maine, Georges Bank, and Mid-Atlantic Bight/southern New England) representing twenty distinct stocks. A detailed history of the fishery, along with descriptions of all of the managed stocks, can be found in Framework 45 to the FMP (NEFMC 2010).

There are over 100 communities that are homeport to one or more Northeast groundfishing vessels. These ports are distributed throughout the coastal northeast and in New Jersey. Vessels from these ports pursue stocks in three geographic regions: Gulf of Maine, Georges Bank, and southern New England. In 2009, the estimated dockside value of these groundfish landings was slightly less than $60 million. The communities that rely most heavily on the groundfish industry are described in detail in Framework 45 (NEFMC 2010); no updates to that information are available at this time.

Many groundfish captains and crew are second- or third-generation fishermen who hope to pass the tradition on to their children. This occupational transfer is an important component of community continuity as an important alternative occupation in these port areas, tourism, is largely seasonal. There is little hard socio-economic data upon which to evaluate the regional- or community-specific importance of the multispecies fishery. In addition to the direct employment of captains and crew, the industry is known to support ancillary businesses such as gear, tackle, and bait suppliers; fish processing and transportation; marine construction and repair; and restaurants.

5.4.1.2 Landings and Revenues

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

Landings and revenues by fishing year were summarized in Amendment 13, FW 40A, FW 40B, FW 41, FW 42, Amendment 16, and FW 44. This section updates this information for FY 2004 through 2009. Minor differences exist between the information previously reported and this section due to updates to the databases and revisions to data queries (including the addition of Atlantic wolffish to the management unit). Most notably, nominal and constant groundfish revenues were incorrectly reported in Amendment 16 in Table 57 (NEFMC 2009a) due to a data error; other tables were correct. The data are also reported in different categories than in previous reports in order to capture changes in permit categories and changes in landings and revenues in communities.

Regulated groundfish (cod, haddock, yellowtail flounder, winter flounder, witch flounder, windowpane flounder, plaice (dabs), pollock, redfish, Atlantic halibut, white hake, red/white hake mixed, and Atlantic wolffish) and ocean pout landings and revenues are summarized in Table 13. This table includes all landings reported to the NMFS dealer database system, regardless of whether the landings can be attributed to a multispecies permit. It includes aggregate landings reported by states and landings that cannot be attributed to a permit as well as landings by vessels that did not possess a federal multispecies permit (i.e. landings from state registered vessels fishing in state waters). Regulated groundfish landings declined from 80 million pounds in FY 2004 to 50 million pounds (landed weight) in FY 2006, or 37 percent, before increasing to 68 million pounds in FY 2008 and decreasing again to 66 million pounds in FY 2009. Nominal revenues decreased 9 percent from FY 2004 ($84.6 million) to FY 2006 ($76.9 million) and then rebounded to $85 million in FY 2008 before decreasing again to $79.7 million in FY 2009. Revenues in constant 1999 dollars declined 13 percent, from $74.0 million in FY 2004 to $60.4 million in FY 2009. The average price, in both nominal and constant dollar terms, peaked in FY 2006, the year with the lowest landed weight. By FY 2008, in terms of constant dollars the price declined to less than a dollar per pound. The sections following this table summarize landings and revenues for groundfish permit holders only.

Data Caveats:

Data Sources
NMFS Dealer Database
NMFS Permit Database
NMFS Enforcement Database
NMFS Observer Database

Reported Numbers of Vessels
When evaluating the number of vessels reported in any given table in the following sections it is necessary to understand exactly which vessels those numbers represent. Depending on the way in which the data were queried, a different number of vessels will emerge. In each of the following sections, there are two tables describing the landings and revenues of vessels permitted in the multispecies fishery. The first is associated with total landings by permitted multispecies vessels. In this table, the number given for each fishing year is the quantity of vessels which possess multispecies permits and were active in *any* fishery, which may or may not include the regulated multispecies fishery, in that given fishing year. The second table is associated with groundfish landings only. In this table, the number given for each fishing year is the landings of vessels which possess multispecies permits and were active in the *groundfish* fishery, having landed at least one pound of regulated groundfish, in that given fishing year. In all sections, the fishing activity discussed is associated only with vessels that hold a multispecies permit--one large-mesh limited access multispecies permit *OR* one or more open access multispecies permits.

Table 13 – Total groundfish landings and revenues, FY 2004 - 2009

	FY					
Data	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Groundfish, landed weight	79,833,841	65,707,988	50,095,191	60,781,989	68,161,349	66,159,986
Groundfish, live weight	87,280,257	72,063,086	54,979,680	67,437,099	75,843,340	73,999,137
Nominal Dollars	$84,633,488	$85,210,805	$76,893,026	$84,596,827	$85,061,015	$79,744,807
1999 Dollars	$73,980,543	$74,026,292	$64,951,294	$67,027,790	$64,358,387	$60,423,467
Average Price (nominal)	$1.06	$1.30	$1.53	$1.39	$1.25	$1.21
Average Price (constant)	$0.93	$1.13	$1.30	$1.10	$0.94	$0.91

5.4.1.2.1 Landings and Revenues by Groundfish Permit Category

As mentioned earlier, the information in the following sections is reported for vessels with groundfish permits only. Total landings by groundfish permits declined from 606.3 million pounds in FY 2001 to 436.4 million pounds in FY 2006 before rebounding to 467.9 million pounds in FY 2009, a decline of 22.8 percent from FY 2001. For individual DAS permits, total landings declined from 244.9 million pounds in FY 2004 to 194.6 million pounds in FY 2007 before increasing to 208.9 million pounds in FY 2009, a decline of 14.7 percent from FY 2004. Before FY 2004, total landings from individual DAS permits were significantly lower, due to a large number of vessels fishing under fleet DAS permits. Revenue changes were similar; from FY 2004 to FY 2009 revenues (constant 1999 dollars) declined 7.3 percent for all permits and 18.0 percent for individual DAS permits (Table 14 and Table 15).

Groundfish landings by permitted vessels declined from 103.4 million pounds in FY 2001 to 48.4 million pounds in FY 2006 (-53.2%), then increased to 63.5 million pounds in FY 2009 (-38.6% from FY 2001). Groundfish revenues showed a similarly large initial reduction, declining from $98.6 million in FY 2001 to $62.5 million in FY 2006, a decline of 63.4 percent. In spite of the increase in landed weight from FY 2006 to FY 2009, revenues actually continued to decline slightly to $57.7 million, or 7.7 percent less than FY 2006. Individual DAS permits did slightly better, with FY 2004 revenues of $66.9 million declining 9 percent to $60.5 million in FY 2006, and declining again to $56.1 million in FY 2009, 16.1 percent less than in FY 2004 (Table 16 and Table 17).

The percentage of revenues generated by groundfish permits that came from groundfish tended to decline from FY 2001 to FY 2009, from 75% to just over 12%. These revenues can be earned on groundfish trips or on trips in other fisheries. When comparing total revenues and groundfish revenues for individual DAS permit holders it is clear that groundfish is only a portion of the revenue generated by these fishing businesses. For individual DAS permits, groundfish revenues were 49 percent of total revenues in FY 2001 and declined to 42 percent in FY 2009.

During this period, the number of active groundfish permits with a landings record of any groundfish species in the dealer database also declined, from 1,314 in FY 2001 to 633 in FY 2009 (a change of 52 percent) (Table 18). The number of active Individual DAS permits declined from 691 in 2004 to 450 in 2009. Active Small Vessel Exemption category permits remained fairly constant in numbers, while Combination and Handgear permits declined through about 2004 and remained steady thereafter. Vessels using active Hook Gear permits declined greatly, from 81 in FY 2001 to 9 in FY 2009 (88.9 percent).

Average groundfish revenues for active groundfish permits varied widely across the time series (Table 19). Individual DAS category permits increased from an average of $96,771 in FY 2004 to $124,811 in FY 2009 (22.5 percent). Hook Gear permits fluctuated from a high of $26,535 in FY 2005 to a low of $7,149 in 2009. Handgear A permits had generally increasing average revenues, from a low of $1,392 in FY 2005 to a high of $5,093 in FY 2009. Average revenue from Combination vessel permits declined from FY 2004 until FY 2007, before rebounding in FY 2008 and 2009 (51.3 percent total decline from 2003 to 2009).

Table 14 – Total landings by groundfish permit category, FY 2001 - 2009

Category	2001	2002	2003	2004	2005	2006	2007	2008	2009
Individual DAS	67,082,886	60,555,258	55,545,268	244,869,377	203,659,914	195,144,787	194,633,706	212,790,439	208,885,463
Fleet DAS	231,268,872	188,132,355	186,143,621	605,481					
Small Vessel Exemption	6,588	Conf.	Conf.	10,159	31,635	20,551	119,178	157,423	118,134
Hook Gear	2,770,964	1,675,134	1,818,524	2,134,466	1,694,986	1,218,495	1,009,899	1,108,746	939,276
Combination Vessel	12,926,924	13,218,161	17,743,414	14,452,283	10,888,403	10,970,697	9,360,710	11,375,497	9,578,028
Large Mesh DAS	8,311,976	7,415,139	7,791,124	7,255,971	4,910,866	4,338,460	4,307,712	4,359,829	3,894,537
Handgear	126,761,476	72,361,485	143,865,251						
Handgear A				1,637,728	30,178,130	18,763,373	7,554,424	6,418,633	5,461,766
Handgear B				129,282,110	153,016,712	113,799,842	126,772,588	130,474,054	133,638,177
Other Open Access	157,128,632	96,729,305	100,873,093	109,709,282	98,185,684	92,146,876	97,217,711	104,828,248	105,424,529
Total	606,258,318	440,086,837	513,780,295	509,956,857	502,566,330	436,403,081	440,975,928	471,512,869	467,939,910

Table 15 – Total revenues (1999 dollars) by groundfish permit category, FY 2001 - 2009

Category	2001	2002	2003	2004	2005	2006	2007	2008	2009
Individual DAS	$63,005,926	$61,734,890	$52,738,496	$161,467,018	$180,707,691	$161,258,141	$147,249,497	$142,749,706	$132,375,083
Fleet DAS	$120,721,087	$117,177,937	$112,644,270	$598,602					
Small Vessel Exemption	$7,290	Conf.	Conf.	$11,443	$100,195	$39,263	$146,880	$261,457	$208,113
Hook Gear	$2,854,182	$2,676,627	$2,445,595	$3,335,824	$3,743,698	$3,648,543	$2,835,928	$2,398,836	$2,189,518
Combination Vessel	$27,857,876	$31,513,079	$33,708,899	$40,517,445	$48,260,800	$44,677,387	$38,921,702	$35,848,712	$37,344,169
Large Mesh DAS	$9,352,720	$8,212,359	$6,963,302	$6,567,583	$6,710,455	$4,860,237	$3,789,944	$4,389,421	$2,883,164
Handgear	$28,884,772	$24,452,876	$28,581,585						
Handgear A				$1,401,010	$5,078,144	$4,069,096	$3,008,347	$2,583,039	$2,830,077
Handgear B				$38,259,487	$57,326,175	$55,521,251	$55,642,744	$53,286,823	$49,116,934
Other Open Access	$140,342,092	$158,078,405	$185,176,530	$241,955,823	$281,705,097	$254,821,291	$255,819,899	$221,923,988	$230,847,061
Total	393,025,947	403,846,172	422,258,677	494,114,235	583,632,255	528,895,209	507,414,941	463,441,982	457,794,119

Table 16 – Groundfish landings by groundfish permit category, FY 2001 – FY 2009

Category	2001	2002	2003	2004	2005	2006	2007	2008	2009
Individual DAS	50,301,967	40,864,820	38,216,342	72,715,253	62,067,822	46,802,829	57,662,703	64,671,329	61,835,378
Fleet DAS	45,007,575	38,017,046	37,911,377	95,484					
Small Vessel Exemption	5,496	Conf.	Conf.	Conf.	Conf.	Conf.	1,848	2,592	3,579
Hook Gear	1,098,050	528,342	478,978	631,805	544,607	205,806	192,718	209,022	51,216
Combination Vessel	3,820,879	2,465,981	2,839,056	1,894,704	846,338	397,448	558,376	1,180,765	1,003,665
Large Mesh DAS	2,679,578	1,352,573	1,303,702	1,524,913	671,286	590,093	163,378	317,851	342,503
Handgear	454,907	178,787	136,244						
Handgear A				248,024	30,955	122,378	79,083	100,167	152,261
Handgear B				68,475	47,647	54,995	150,517	84,528	44,852
Other Open Access	49,841	69,615	137,776	101,875	58,480	212,711	115,814	78,370	43,547
Total	103,418,293	83,477,164	81,023,475	77,280,533	64,267,135	48,386,260	58,924,437	66,644,624	63,477,001

Table 17 – Groundfish revenues (1999 dollars) by groundfish permits category, FY 2001 - 2009

Category	2001	2002	2003	2004	2005	2006	2007	2008	2009
Individual DAS	$47,329,837	$45,305,967	$36,299,927	$66,868,777	$69,188,498	$60,526,167	$62,728,288	$59,656,481	$56,164,817
Fleet DAS	$43,106,389	$44,351,025	$39,424,405	$61,184					
Small Vessel Exemption	$5,630	Conf.	Conf.	Conf.	Conf.	Conf.	$2,976	$3,389	$4,059
Hook Gear	$1,258,845	$762,310	$645,903	$828,724	$875,657	$383,944	$336,908	$271,353	$64,345
Combination Vessel	$3,802,377	$2,903,858	$2,958,558	$1,763,554	$1,195,786	$535,598	$727,519	$1,075,572	$880,322
Large Mesh DAS	$2,626,588	$1,612,110	$1,187,912	$1,393,033	$759,700	$554,015	$202,134	$1,145,087	$281,632
Handgear	$463,326	$243,824	$170,583						
Handgear A				$183,214	$47,329	$117,613	$108,815	$124,544	$173,161
Handgear B				$90,048	$75,338	$78,602	$207,849	$124,239	$61,963
Other Open Access	$44,302	$82,275	$127,506	$111,505	$83,056	$321,082	$169,123	$88,292	$45,923
Total	$98,637,293	$95,261,368	$80,814,794	$71,300,039	$72,225,364	$62,517,020	$64,483,613	$62,488,957	$57,676,221

Table 18 – Active groundfish permits, FY 2001 - 2009

Category	2001	2002	2003	2004	2005	2006	2007	2008	2009
Individual DAS	132	131	131	691	634	593	531	507	450
Fleet DAS	734	676	649						
Small Vessel Exemption	4	1	1	2	1	2	4	4	5
Hook Gear	81	53	48	35	33	22	18	15	9
Combination Vessel	32	22	18	16	15	10	16	11	11
Large Mesh DAS	43	28	4	27	22	17	11	7	7
Handgear	226	179	156						
Handgear A				46	34	26	23	32	34
Handgear B				72	58	52	62	61	73
Other Open Access	62	47	63	65	53	63	62	49	44
Total	1,314	1,137	1,070	954	850	785	727	686	633

Table 19 – Average groundfish revenues (1999 dollars) per active groundfish permit, FY 2001 - 2009

Category	2001	2002	2003	2004	2005	2006	2007	2008	2009
Individual DAS	$358,559	$345,847	$277,099	$96,771	$109,130	$102,068	$118,132	$117,666	$124,811
Fleet DAS	$58,728	$65,608	$60,746						
Individual + Fleet Combined	$104,430	$111,099	$97,082						
Small Vessel Exemption	$1,407	Conf.	Conf.	Conf.	Conf.	Conf.	$744	$847	$812
Hook Gear	$15,541	$14,383	$13,456	$23,678	$26,535	$17,452	$18,717	$18,090	$7,149
Combination Vessel	$118,824	$131,994	$164,364	$110,222	$79,719	$53,560	$45,470	$97,779	$80,029
Large Mesh DAS	$61,083	$57,575	$296,978	$51,594	$34,532	$32,589	$18,376	$163,584	$40,233
Handgear	$2,050	$1,362	$1,093						
Handgear A				$3,983	$1,392	$4,524	$4,731	$3,892	$5,093
Handgear B				$1,251	$1,299	$1,512	$3,352	$2,037	$849
Other Open Access	$715	$1,751	$2,024	$1,715	$1,567	$5,097	$2,728	$1,802	$1,044

5.4.1.2.2 Landings and Revenues by Vessel Length Group

When total landings and revenues (constant 1999 dollars) of groundfish permits are examined by vessel length, it is clear that vessels less than 30 feet in length have become an inconsequential component of the fishery since FY 2004, accounting for less than 0.13 percent of landings in FY 2009. The revenues from these few landings decreased by 53.6 percent from FY 2004 through FY 2009. Vessels between 30 and 50 feet in length actually increased groundfish landings (+38 percent) and revenues (+23 percent) from FY 2004 to FY 2009 after a decrease from FY 2001 to FY 2004, the only vessel size class to do so. In FY 2009, Vessels between 50 and 75 feet saw landings decline by 13.7 percent since FY 2004 and by 24.6 percent since FY 2001, and saw revenues decline by 14.5 percent from FY 2004 to FY 2009 after a 10.0% increase from FY 2001 to FY 2004. Vessels 75 feet and over fluctuated in landings but increased in revenue (30.7 percent) from FY 2001 through FY 2004. However, these largest vessels then saw landings decline by 14.2 percent from FY 2004 to FY 2009, and revenues decline by 9.9 percent in the same period (Table 20).

Groundfish landings and revenues (constant 1999 dollars), as examined by vessel length, mirror those of the total landings by vessel length. Vessels less than 30 feet in length accounted for 0.16 percent of landings in FY 2009. The revenues from these few landings decreased by 79.0 percent from FY 2004 through FY 2009. Vessels between 30 and 50 feet in length actually increased groundfish landings (+21 percent) and revenues (+8.9 percent) from FY 2004 to FY 2009 after a decrease from FY 2001 to FY 2004, the only vessel size class to do so. In FY 2009, Vessels between 50 and 75 feet saw landings decline by 38.1 percent since FY 2004 and by 69.4 percent since FY 2001, and saw revenues decline by 31.9 percent from FY 2004 to FY 2009 after a 33.9% decrease from FY 2001 to FY 2004. Vessels 75 feet and over decreased in both groundfish landings (15.7 percent) and revenue (20.9 percent) from FY 2001 through FY 2004. However, these largest vessels then saw landings fluctuate from FY 2004 to FY 2009, ending at 19.3 percent lower than FY 2004, and saw revenues decline by 24.4 percent in the same period. These changes are somewhat surprising, as many believed that the smaller vessels size class (30-50 feet) would suffer the most from the differential DAS counting measures adopted in FW 42 (Table 21).

Table 20 – Total landed weight (lbs.) and revenues (1999 dollars) by length group, FY 2001 – 2009

Length Group	Data	2001	2002	2003	2004	2005	2006	2007	2008	2009
Less than 30	Weight	1,495,389	1,014,569	803,224	1,807,914	1,651,703	1,211,166	818,954	706,801	624,400
	Dollars	$1,426,091	$1,120,241	$1,173,094	$2,047,056	$1,620,449	$1,672,873	$1,546,528	$1,350,337	$949,556
30 to less than 50	Weight	52,543,920	45,049,181	48,202,346	41,176,348	46,103,586	47,588,975	51,369,775	56,808,183	66,066,544
	Dollars	$57,010,963	$52,429,810	$50,153,461	$49,919,445	$76,975,863	$70,891,944	$70,136,102	$69,147,699	$64,560,213
50 to less than 75	Weight	151,531,804	136,713,383	129,204,193	132,542,972	114,714,912	103,909,761	108,288,944	109,601,020	114,317,182
	Dollars	$122,110,693	$126,424,416	$127,033,443	$135,594,052	$156,721,390	$142,378,995	$129,174,633	$120,273,972	$115,940,249
75 and over	Weight	400,687,205	257,309,891	335,571,309	334,429,623	340,096,129	283,693,179	280,498,255	304,396,865	286,931,784
	Dollars	$212,478,201	$223,871,947	$243,899,903	$306,553,683	$348,314,553	$313,951,398	$306,557,678	$272,669,974	$276,344,101
Total Weight		606,258,318	440,087,024	513,781,072	509,956,857	502,566,330	436,403,081	440,975,928	471,512,869	467,939,910
Total Dollars		$393,025,947	$403,846,414	$422,259,902	$494,114,235	$583,632,255	$528,895,209	$507,414,941	$463,441,982	$457,794,119

Table 21 – Groundfish landed weight (lbs.) and revenues (1999 dollars) by length group, FY 2001 – 2009

Length Group	Data	2001	2002	2003	2004	2005	2006	2007	2008	2009
Less than 30	Weight	839,251	396,167	354,991	480,973	146,590	111,993	70,667	57,272	101,519
	Dollars	$942,778	$570,899	$461,981	$518,424	$201,463	$134,229	$105,350	$65,151	$108,764
30 to less than 50	Weight	23,905,156	17,927,058	18,436,523	15,975,112	15,514,340	13,767,506	17,269,922	20,520,014	20,184,371
	Dollars	$23,409,792	$21,922,821	$19,423,441	$17,325,040	$18,620,985	$16,776,424	$18,529,843	$19,800,753	$19,044,650
50 to less than 75	Weight	43,518,214	34,342,719	32,791,598	31,223,980	24,542,026	18,365,249	19,791,111	21,868,584	19,322,235
	Dollars	$40,340,343	$37,897,022	$32,001,358	$26,661,714	$26,827,521	$23,738,294	$22,144,339	$21,040,897	$18,250,097
75 and over	Weight	35,155,672	30,811,275	29,440,367	29,601,487	24,066,362	16,142,254	21,792,737	24,198,754	23,868,876
	Dollars	$33,944,381	$34,870,693	$28,928,019	$26,796,080	$26,577,010	$21,868,655	$23,704,081	$21,582,156	$20,272,711
Total Groundfish Weight		103,418,293	83,477,219	81,023,479	77,281,552	64,269,318	48,387,002	58,924,437	66,644,624	63,477,001
Total Groundfish Dollars		$98,637,293	$95,261,434	$80,814,800	$71,301,257	$72,226,979	$62,517,603	$64,483,613	$62,488,957	$57,676,221

5.4.1.2.3 Landings and Revenue by Homeport State

Each permit holder declares a homeport state on all permit applications. When evaluating impacts of regulations on individual states, summarizing landings and revenues by these homeport states may indicate differential impacts under the assumption that the economic benefits of fishing activity return primarily to these homeport states. Total landings and revenues by homeport state are shown in Table 22 and Table 23. Groundfish landings by homeport state are shown in Table 24 and Table 25.

Vessels claiming Maine, New Hampshire, Massachusetts, or Rhode Island as homeport state landed 97.4 percent of the groundfish in FY 2009, an increase from the 93 percent landed in FY 2004. Of these four states, only New Hampshire vessels increased groundfish landings from FY 2004 to FY 2009 by 1.6 million pounds, or 68 percent. New Hampshire also increased 4 percent from FY 2001 to FY 2009. In FY 2009 Maine vessels landed 94 percent of the groundfish they landed in FY 2004 and 76 of what they landed in FY 2001, while Massachusetts vessels landed 85 percent of what was landed in FY 2004 and 64 percent of what was landed in FY 2001. Groundfish landings by Rhode Island in FY 2009 vessels declined to 34 percent of the FY 2004 value and 28 percent of the FY 2001 value. Again, these changes are somewhat surprising in that the inshore differential DAS area in the GOM was expected to reduce groundfish landings for New Hampshire vessels. Revenue changes differed only slightly from the changes in groundfish landed weight with the exception of Rhode Island, where the 66 percent decline in landings led to only a 42 percent decline in groundfish revenues between FY 2004 and FY 2009.

But as previously noted revenues (constant 1999 dollars) from other fisheries are key components of the income for permit holders. When total revenues by homeport state are examined for the permitted groundfish vessels, a different picture emerges. From FY 2004 to FY 2009, total revenue declines were seen for permits claiming homeport states of Massachusetts (-6 percent), Rhode Island (-13 percent), and New Hampshire (-17 percent). Total revenues for vessels with a Maine homeport increased by 24 percent.

Table 22 – Total landings by homeport state, FY 2001 – 2009

HPST	2001	2002	2003	2004	2005	2006	2007	2008	2009
CT	363,090	439,728	1,436,588	448,781	484,347	676,813	2,492,876	4,499,534	5,057,629
ME	78,724,996	59,323,936	57,293,476	54,890,246	56,618,663	50,232,331	55,559,478	61,229,147	66,214,886
MA	283,227,205	198,514,601	255,231,528	231,381,193	245,837,887	209,348,873	210,919,028	203,706,598	199,354,075
NH	13,367,647	5,642,063	12,581,323	35,369,073	26,996,393	14,342,036	21,918,173	22,039,395	27,138,010
RI	75,348,434	38,070,333	43,504,270	47,543,755	45,940,811	47,476,698	43,997,569	44,954,778	44,130,965
NJ	88,004,781	70,218,101	77,464,613	75,001,365	73,611,052	68,001,667	69,641,289	87,529,876	80,130,006
NY	30,724,670	27,716,785	26,217,127	22,654,206	17,984,632	18,026,110	16,984,292	22,646,698	24,770,025
NC	19,079,500	23,031,633	22,944,851	24,678,303	21,339,788	15,127,768	8,660,404	14,729,383	11,888,749
Other	17,417,995	17,129,844	17,107,296	17,989,935	13,752,757	13,170,785	10,802,819	10,177,460	9,255,565
Total	606,258,318	440,087,024	513,781,072	509,956,857	502,566,330	436,403,081	440,975,928	471,512,869	467,939,910

Table 23 – Total revenues (1999 dollars) by homeport state, FY 2001 – 2009

HPST	2001	2002	2003	2004	2005	2006	2007	2008	2009
CT	$611,048	$730,789	$2,994,566	$1,087,123	$1,840,043	$2,207,758	$5,849,372	$10,526,580	$10,217,904
ME	$26,626,551	$24,710,117	$23,252,319	$23,848,402	$29,474,842	$26,762,024	$29,606,405	$29,528,857	$31,259,947
MA	$195,349,374	$204,157,832	$203,395,819	$230,557,035	$278,960,149	$254,783,145	$242,587,222	$214,714,594	$215,665,776
NH	$8,428,811	$7,087,426	$6,097,642	$16,263,303	$18,411,066	$13,491,492	$14,937,574	$14,461,475	$13,464,488
RI	$30,777,543	$28,525,346	$31,448,563	$30,233,620	$33,951,187	$35,071,866	$29,551,818	$28,163,240	$23,023,845
NJ	$44,292,729	$47,745,282	$57,987,717	$76,836,382	$98,227,659	$93,073,649	$97,696,476	$86,744,930	$83,520,120
NY	$26,398,229	$25,128,722	$23,437,366	$21,108,304	$22,880,870	$21,281,065	$17,807,011	$19,184,325	$20,056,525
NC	$20,069,579	$24,660,941	$28,587,578	$36,166,710	$43,398,662	$33,992,317	$30,152,327	$26,308,882	$26,778,922
Other	$40,472,082	$41,099,959	$45,058,332	$58,013,357	$56,487,775	$48,231,892	$39,226,736	$33,809,098	$33,806,591
Total	$393,025,947	$403,846,414	$422,259,902	$494,114,235	$583,632,255	$528,895,209	$507,414,941	$463,441,982	$457,794,119

Table 24 – Groundfish landings by homeport state, FY 2001 – 2009

HPST	2001	2002	2003	2004	2005	2006	2007	2008	2009
CT	115,152	206,295	205,084	44,916	20,744	91,739	189,999	218,419	101,390
ME	15,319,317	11,649,857	12,854,761	12,348,854	11,565,820	8,611,001	11,240,196	12,075,418	11,641,998
MA	67,392,307	54,942,388	50,527,509	50,702,142	40,489,242	30,784,454	37,684,924	44,257,818	43,238,152
NH	4,712,053	3,313,107	3,445,717	3,346,377	3,170,158	2,795,023	3,944,409	5,245,665	4,899,354
RI	7,239,855	7,225,382	7,596,776	6,114,406	5,319,875	3,661,606	3,611,712	2,616,902	2,048,790
NJ	854,198	502,831	658,452	657,135	599,466	557,385	517,943	386,225	414,864
NY	4,199,723	3,589,125	3,373,185	1,722,950	1,315,094	1,016,606	961,635	854,845	481,209
NC	1,254,276	866,766	1,010,968	1,356,537	1,113,425	410,869	359,894	492,204	621,199
Other	2,331,412	1,181,468	1,351,027	988,235	675,494	458,319	413,725	497,128	30,045
Total	103,418,293	83,477,219	81,023,479	77,281,552	64,269,318	48,387,002	58,924,437	66,644,624	63,477,001

Table 25 – Groundfish revenues (1999 dollars) by homeport state, FY 2001 – 2009

HPST	2001	2002	2003	2004	2005	2006	2007	2008	2009
CT	$99,883	$214,561	$229,002	$54,177	$12,362	$155,887	$280,790	$245,458	$95,732
ME	$14,080,005	$12,309,933	$11,464,247	$10,822,914	$12,050,536	$9,366,964	$10,186,039	$10,395,459	$9,464,422
MA	$65,020,184	$64,152,683	$52,129,610	$48,164,703	$47,268,256	$41,237,285	$42,624,942	$41,421,318	$40,454,349
NH	$4,343,507	$3,715,925	$3,318,173	$3,276,638	$3,184,183	$2,665,476	$3,534,547	$5,205,610	$4,306,638
RI	$6,971,015	$8,150,757	$7,457,243	$4,838,032	$5,613,998	$5,527,044	$4,924,134	$3,018,019	$2,038,594
NJ	$708,091	$511,135	$719,633	$662,121	$636,116	$873,485	$805,938	$474,001	$304,439
NY	$4,066,979	$4,120,634	$3,352,344	$1,605,484	$1,633,937	$1,509,486	$1,282,188	$939,712	$477,467
Other	$2,239,204	$1,234,655	$1,256,223	$962,629	$805,639	$565,236	$378,248	$381,566	$25,876
Total	$98,637,293	$95,261,434	$80,814,800	$71,301,257	$72,226,979	$62,517,603	$64,483,613	$62,488,957	$57,676,221

5.4.1.2.4 Landings and Revenues by Port Group

In this section, landings and revenues are summarized by the place of landing, with individual ports grouped into a series of port groups first used to characterize fishing activity in Amendment 13 (Table 26 through Table 30). This is a different way of looking at the economic activity generated by groundfish fishing activity. Maine ports experienced a large drop in groundfish landings over the period FY 2001 through FY 2009, with the state as a whole seeing groundfish landings decline by 74 percent. In contrast, Coastal New Hampshire experienced only a 16 percent decrease, while Gloucester and the North Shore had a 25 percent increase (almost all since FY 2006), and Boston and the South Shore a 51 percent increase – with the increase occurring since FY 2006. With respect to revenues, only Gloucester/North Shore (+14 percent) and Boston/South Shore (+35 percent) increased groundfish revenues from FY 2001 to FY 2009. In spite of a smaller decrease in landed weight, New Hampshire port groundfish revenues declined by 26 percent from FY 2001 to FY 2009. New Bedford MA was the top groundfish port group through FY 2007, but by FY 2008 ceded the top ranking to Gloucester/North Shore MA.

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

As with revenues by homeport state, the total revenues for individual DAS permits differs from the changes noted for groundfish revenues. Gloucester/North Shore and Boston/South Shore show a 13 percent and 41 percent increase in total revenues for groundfish permits. Coastal NH showed a 40 percent increase (although the high in FY 2005 was 32 percent higher than FY 2009), while Lower Mid-Coast Maine experienced a 60 percent decline in total revenues. New Bedford experienced a 37 percent increase (although there was a 23 percent decline from FY 2005 to FY 2009). Most other port groups experienced declines as well.

The number of multispecies permit holders landing groundfish generally declined in all the larger ports. In coastal New Hampshire, active permits in FY 2009 were only 48 percent of those in FY 2001. In Boston and the South Shore that number was 60 percent, it was also 60 percent in Gloucester and the North Shore, 48 percent in New Bedford, and the Cape and Islands was at only 23 percent of the number of active permits. Coastal Rhode Island had 61 percent as many active permits in FY 2009 as in FY 2001. The only port group that saw an increase in permit holders landing there was Downeast Maine, which had a 350 percent increase throughout the time period (but a small sample size – only 9 permits landed there in FY 2009).

Table 26 – Total landings by port group of landing, FY 2001 – 2009

	Port Group	2001	2002	2003	2004	2005	2006	2007	2008	2009
ME	DOWNEAST ME	607,957	512,139	1,370,037	1,400,914	999,460	974,648	2,340,763	1,332,093	1,868,214
	LOWER MID-COAST ME	86,291,510	48,763,435	57,138,362	47,631,628	42,162,367	39,424,712	29,357,297	28,051,707	40,551,569
	ME					12,000	44,426		48	
	SOUTHERN ME	409,035	424,372	374,822	931,542	696,509	1,231,166	1,239,286	646,877	1,342,709
	UPPER MID-COAST ME	45,475,509	20,846,839	21,739,636	36,316,483	23,392,409	36,338,042	35,659,839	35,714,458	25,656,765
ME Total		132,784,011	70,546,785	80,622,857	86,280,567	67,262,745	78,017,695	70,635,643	65,891,133	70,207,800
MA	BOSTON AND SOUTH SHORE	10,456,302	9,540,137	8,317,949	7,207,106	8,022,364	7,744,359	10,291,142	11,559,444	11,369,324
	CAPE AND ISLANDS	18,744,749	14,965,246	12,666,623	11,254,569	12,763,994	11,140,464	11,445,082	11,686,676	12,224,652
	GLOUCESTER AND NORTH SHORE	114,314,736	55,069,635	98,413,636	75,359,192	118,224,606	91,352,927	84,555,984	95,020,073	98,731,239
	NEW BEDFORD COAST	81,867,937	82,353,878	101,154,939	106,768,138	109,888,378	91,566,346	107,540,003	100,971,529	101,699,852
MA Total		225,495,383	161,946,593	220,635,534	200,590,536	248,899,342	201,812,947	213,832,211	219,237,722	224,076,503
NH	COASTAL NH	13,944,028	18,220,967	23,343,645	21,883,121	18,425,372	9,181,470	7,955,796	7,045,528	11,937,713
NH Total		13,944,028	18,220,967	23,343,645	21,883,121	18,908,003	9,181,470	8,029,992	7,366,561	12,308,506
RI	COASTAL RI	79,009,995	49,433,268	50,983,080	52,019,190	51,340,504	52,198,590	42,822,765	44,613,344	40,390,012
	RI		114,000	650,822	285,212	346,228	51,194	96,093	111,210	2,122,455
RI Total		79,009,995	49,547,268	51,633,902	52,304,402	51,686,732	52,249,784	42,918,858	44,724,554	42,512,467
NY	LONG ISLAND NY	22,558,582	20,447,040	18,375,148	17,311,641	14,000,770	15,201,028	12,610,637	13,164,231	15,127,572
	NY	16,654	4,422	5,647	691,185	232,669	101,936	514,548	96,270	296,012
NY Total		22,575,236	20,451,462	18,380,795	18,002,826	14,233,439	15,302,964	13,125,185	13,266,567	15,443,413
NJ	NJ	1,296,046	226,238	12,589	7,082		2,661	25,195		
	NORTHERN COASTAL NJ	24,017,723	22,609,450	19,766,855	19,126,611	19,264,673	22,759,772	22,789,732	20,955,663	23,619,137
	SOUTHERN COASTAL NJ	49,755,926	55,551,760	61,286,494	76,976,729	56,520,214	37,206,644	53,072,364	75,364,292	58,961,500
NJ Total		75,069,695	78,387,448	81,065,938	96,110,422	75,784,887	59,969,077	75,887,291	96,319,955	82,580,637
CT	COASTAL CT		147,133	1,327,493				1,498,766	3,961,481	4,377,667
CT Total			147,133	1,327,493				1,498,766	4,007,557	4,576,897
Other		57,379,970	40,839,368	36,770,908	34,778,868	25,790,478	19,869,144	15,047,982	20,698,506	16,233,687
Total		606,258,318	440,087,024	513,781,072	509,956,857	502,566,330	436,403,081	440,975,928	471,512,869	467,939,910

* Note state totals include landings that are not attributed to a specific group.

Table 27 – Total revenues (1999 dollars) by port group, FY 2001 – 2009

	Port Group	2001	2002	2003	2004	2005	2006	2007	2008	2009
ME	DOWNEAST ME	$1,841,756	$1,861,686	$1,565,858	$1,493,214	$1,790,079	$2,004,990	$3,160,673	$2,088,450	$2,357,371
	LOWER MID-COAST ME	$26,960,777	$24,214,776	$21,468,003	$20,738,395	$18,849,006	$14,125,504	$11,727,081	$12,052,921	$10,887,865
	ME					$1,033	$283		$323	
	SOUTHERN ME	$363,648	$463,259	$356,085	$883,034	$804,490	$1,514,532	$1,220,372	$880,403	$1,162,712
	UPPER MID-COAST ME	$5,531,333	$3,988,340	$3,648,877	$3,769,537	$4,270,165	$5,143,643	$6,270,437	$8,537,322	$8,790,977
ME Total		$34,697,513	$30,528,060	$27,038,823	$26,884,179	$25,714,772	$22,804,063	$22,870,774	$23,963,277	$23,694,937
MA	BOSTON AND SOUTH SHORE	$8,784,135	$10,806,196	$9,205,128	$8,580,074	$11,752,031	$12,482,215	$13,788,998	$12,743,678	$12,393,509
	CAPE AND ISLANDS	$19,566,974	$16,027,211	$15,035,559	$13,624,301	$22,050,918	$17,568,145	$15,185,292	$13,599,958	$13,110,641
	GLOUCESTER AND NORTH SHORE	$31,318,638	$27,533,121	$30,353,512	$25,991,808	$40,115,317	$35,244,102	$35,098,496	$34,111,982	$35,354,488
	NEW BEDFORD COAST	$137,369,392	$153,726,636	$155,861,625	$188,540,437	$244,956,563	$238,374,839	$220,807,559	$178,138,396	$188,318,753
MA Total		$197,174,488	$208,147,476	$210,513,640	$236,746,245	$318,874,829	$303,706,791	$284,880,345	$238,594,013	$249,200,519
NH	COASTAL NH	$7,947,105	$7,030,472	$5,722,055	$15,833,672	$16,254,167	$12,662,885	$12,108,900	$10,752,686	$11,113,339
NH Total		$7,947,105	$7,030,472	$5,722,055	$15,833,672	$16,316,653	$12,662,885	$12,383,050	$10,856,665	$11,467,798
RI	COASTAL RI	$33,069,263	$29,055,085	$30,485,588	$32,174,669	$44,421,188	$49,126,857	$33,356,541	$27,726,903	$23,018,561
	RI		$10,024	$37,726	$32,021	$45,045	$91,324	$211,795	$137,390	$68,837
RI Total		$33,069,263	$29,065,109	$30,523,314	$32,206,690	$44,466,233	$49,218,182	$33,568,336	$27,864,293	$23,087,398
NY	LONG ISLAND NY	$18,951,602	$17,191,381	$15,872,243	$15,854,244	$17,663,580	$17,878,960	$15,526,791	$14,872,368	$15,005,072
	NY	$11,803	$5,568	$5,139	$438,670	$175,014	$58,702	$339,563	$49,994	$142,216
NY Total		$18,963,405	$17,196,949	$15,877,382	$16,292,914	$17,838,593	$17,937,661	$15,866,354	$14,936,078	$15,168,877
NJ	NJ	$892,437	$216,298	$18,074	$4,644		$14,078	$133,137		
	NORTHERN COASTAL NJ	$23,185,875	$24,435,522	$26,241,720	$29,008,811	$39,462,676	$34,961,114	$35,351,408	$31,143,948	$28,143,708
	SOUTHERN COASTAL NJ	$26,453,501	$28,914,474	$37,040,064	$57,706,780	$52,752,401	$37,382,588	$52,777,491	$59,457,230	$55,169,917
NJ Total		$50,531,813	$53,566,294	$63,299,858	$86,720,235	$92,215,077	$72,357,779	$88,262,036	$90,601,178	$83,313,626
CT	COASTAL CT		$14,839	$1,817,751				$3,380,732	$8,424,792	$8,604,231
CT Total			$14,839	$1,817,751				$3,380,732	$8,468,218	$8,725,525
Other		$50,642,359	$58,297,215	$67,467,079	$79,410,102	$68,202,903	$50,207,848	$46,203,314	$48,158,141	$43,135,438
Total		$393,025,947	$403,846,414	$422,259,902	$494,114,235	$583,632,255	$528,895,209	$507,414,941	$463,441,982	$457,794,119

Table 28 – Groundfish landings by port group, FY 2001 – 2009

	Port Group	2001	2002	2003	2004	2005	2006	2007	2008	2009
ME	DOWNEAST ME	Conf.	Conf.			2,815	1,780	3,191	3,884	6,690
	LOWER MID-COAST ME	18,548,510	14,065,240	13,844,756	13,822,854	11,390,361	6,913,858	7,220,350	6,792,606	4,609,448
	ME								48	
	SOUTHERN ME	360,248	261,089	299,639	559,631	458,892	272,039	228,630	71,651	360,124
	UPPER MID-COAST ME	1,776,235	1,495,340	1,453,711	651,447	581,538	50,783	150,556	162,746	358,630
ME Total		20,684,993	15,821,669	15,598,106	15,033,932	12,433,606	7,240,219	7,602,727	7,031,705	5,336,335
MA	BOSTON AND SOUTH SHORE	5,974,231	5,907,806	5,650,258	5,216,066	5,091,528	4,351,885	7,947,857	9,134,345	9,021,914
	CAPE AND ISLANDS	8,140,487	4,992,069	4,346,465	3,941,488	3,466,607	1,975,394	2,624,889	3,143,801	3,294,815
	GLOUCESTER AND NORTH SHORE	18,390,780	15,808,691	16,777,975	14,708,843	15,429,355	14,235,393	19,044,659	22,750,685	22,975,212
	NEW BEDFORD COAST	40,733,040	34,236,222	31,697,104	31,436,468	22,076,741	13,975,919	15,240,663	18,565,310	17,838,425
MA Total		73,333,041	60,953,767	58,471,802	55,302,865	46,064,231	34,538,591	44,858,068	53,594,141	53,130,366
NH	COASTAL NH	3,881,879	2,625,237	2,926,183	3,520,796	3,270,963	3,248,560	2,915,213	3,648,770	3,265,447
NH Total		3,881,879	2,625,237	2,926,183	3,520,796	3,270,963	3,248,560	2,933,814	3,657,890	3,606,699
RI	COASTAL RI	3,582,482	3,224,566	2,859,158	2,645,309	1,876,245	2,334,131	2,568,854	1,704,956	1,186,785
	RI	3,582,482	3,224,566	2,859,158	2,645,309	1,876,245	2,334,417	2,568,854	1,705,003	1,186,999
RI Total		3,582,482	3,224,566	2,859,158	2,645,309	1,876,245	2,334,417	2,568,854	1,705,003	1,186,999
NY	LONG ISLAND NY	1,319,273	584,058	658,362	357,407	323,905	568,942	498,920	336,225	152,169
	NY	Conf.	1,746		Conf.	Conf.	Conf.			674
NY Total		1,319,373	585,804	658,362	358,877	324,175	569,002	498,920	336,707	153,067
NJ	NJ	Conf.								
	NORTHERN COASTAL NJ	578,599	262,028	498,746	407,040	296,113	450,506	423,277	216,855	10,740
	SOUTHERN COASTAL NJ	5,217	2,238	1,278	2,704	1,437	4,406	3,669	707	24,338
NJ Total		583,816	264,266	500,024	409,744	297,550	454,912	426,946	217,562	35,078
CT	COASTAL CT			6,003				34,238	100,171	27,155
CT Total				6,003				34,238	100,171	27,155
Other		3,601	1,620	3,841	10,029	2,548	1,301	870	1,445	1,302
Total		103,418,293	83,477,219	81,023,479	77,281,552	64,269,318	48,387,002	58,924,437	66,644,624	63,477,001

Table 29 – Groundfish revenues (1999 dollars) by port group, FY 2001 - 2009

	Port Group	2001	2002	2003	2004	2005	2006	2007	2008	2009
ME	DOWNEAST ME	Conf.	Conf.			$11,443	$7,640	$13,113	$15,655	$24,637
	LOWER MID-COAST ME	$17,072,559	$14,930,932	$12,514,645	$12,306,848	$11,752,197	$7,741,772	$6,703,526	$7,182,142	$3,686,562
	ME								$323	
	SOUTHERN ME	$316,120	$291,448	$259,009	$583,903	$455,095	$303,841	$214,573	$59,038	$274,279
	UPPER MID-COAST ME	$1,534,707	$1,544,064	$1,315,051	$547,824	$645,058	$66,849	$182,348	$152,130	$272,346
ME Total		$18,947,094	$16,766,731	$14,088,704	$13,438,575	$12,863,794	$8,123,764	$7,113,559	$7,410,238	$4,260,664
MA	BOSTON AND SOUTH SHORE	$5,892,094	$7,126,012	$6,326,092	$5,455,998	$6,085,710	$5,956,670	$7,946,000	$7,944,989	$7,964,457
	CAPE AND ISLANDS	$8,333,913	$6,434,570	$4,919,719	$4,792,674	$4,748,862	$2,990,911	$3,624,090	$3,239,667	$3,296,215
	GLOUCESTER AND NORTH SHORE	$18,324,684	$18,678,838	$18,002,399	$15,340,838	$18,017,107	$16,837,096	$18,366,900	$19,165,107	$20,979,663
	NEW BEDFORD COAST	$38,358,940	$38,389,226	$30,448,335	$25,796,892	$24,186,247	$20,543,177	$19,899,518	$19,009,186	$16,718,578
MA Total		$71,013,353	$70,644,631	$59,696,545	$51,386,401	$53,037,927	$46,327,853	$49,836,509	$49,358,948	$48,958,913
NH	COASTAL NH	$3,673,222	$3,131,381	$2,826,691	$3,438,552	$3,126,812	$2,730,512	$2,385,931	$2,845,531	$2,730,393
NH Total		$3,673,222	$3,131,381	$2,826,691	$3,438,552	$3,126,812	$2,730,512	$2,397,925	$2,853,063	$3,030,093
RI	COASTAL RI	$3,299,551	$3,703,841	$2,871,007	$2,152,964	$2,340,605	$3,770,813	$3,654,369	$2,026,543	$1,189,509
	RI	$3,299,551	$3,703,841	$2,871,007	$2,152,964	$2,340,605	$3,771,153	$3,654,369	$2,026,625	$1,189,774
NY	LONG ISLAND	$1,214,417	$696,270	$739,255	$389,164	$441,206	$831,152	$729,412	$404,081	$171,157
	NY	Conf.	$1,609		Conf.	Conf.	Conf.			$449
NY Total		$1,214,417	$697,880	$739,255	$389,164	$441,206	$831,152	$729,412	$404,711	$171,880
NJ	NJ	Conf.								
	NORTHERN COASTAL NJ	$485,725	$313,869	$584,559	$481,599	$413,679	$725,030	$690,092	$308,693	$7,974
	SOUTHERN COASTAL NJ	$2,172	$1,971	$1,270	$3,261	$1,314	$6,804	$3,215	$703	$23,554
NJ Total		$487,896	$315,840	$585,828	$484,859	$414,993	$731,834	$693,307	$309,395	$31,528
CT	COASTAL CT			$5,029				$58,136	$124,944	$32,211
CT Total				$5,029				$58,136	$124,944	$32,211
Other		$1,474	$1,131	$1,740	$10,236	$1,299	$1,283	$395	$1,033	$1,158
Total		$98,637,293	$95,261,434	$80,814,800	$71,301,257	$72,226,979	$62,517,603	$64,483,613	$62,488,957	$57,676,221

Table 30 – Number of multispecies permit holders landing groundfish, by landing port group (FY 2001 – 2009) for major groundfish states

State		2001	2002	2003	2004	2005	2006	2007	2008	2009
ME	Downeast	2	1	0	0	4	4	6	6	9
	Lower MidCoast	148	139	130	115	111	96	77	77	54
	Southern ME	17	17	10	17	16	11	10	8	10
	Upper Midcoast	31	36	30	22	25	13	12	32	21
	Other ME	0	0	0	0	0	1	0	3	1
NH	Coastal NH	106	112	82	78	65	58	48	48	51
	Other NH	0	0	0	0	0	0	4	4	19
MA	Boston and South Shore	96	85	93	74	65	60	64	58	58
	Cape and Islands	252	210	186	152	125	93	83	75	58
	Gloucester and North Shore	294	277	257	218	220	177	175	181	176
	New Bedford/Fairhaven	232	220	232	183	160	158	166	126	111
	Other MA	8	3	0	0	0	0	0	0	0
RI	Coastal RI	144	120	117	108	112	109	99	98	88
	Other RI	0	0	0	0	0	1	0	1	1
CT				5				8	22	19
NY	Long Island	114	98	96	80	71	89	81	71	64
	Other NY	1	3	0	2	2	1	0	4	5
NJ	Northern NJ	51	38	43	39	43	48	42	41	14
	Southern NJ	16	8	13	8	6	12	9	7	13
	Other NJ	1	0	0	0	0	0	0	0	0

5.4.1.3 Groundfish Communities

The most recent identification of key groundfish communities occurred in Amendment 13 to the Northeast Multispecies FMP. That action listed several communities of interest as fishing-dependent communities with respect to the New England groundfish fishery. More details about these communities were provided in Framework 45 based on the Community Profiles for Northeast US Fisheries, by NEFSC (2009). The Amendment 13 analysis proposed the following ports (Table 31) to be considered as fishing communities, as defined by the MSFCMA. The primary ports have demonstrated a continued substantial engagement in fishing, here in particular the groundfish fishery. Secondary port groups consist of groups of ports in which some level of groundfish activity has been observed since 1994.

Table 31 – Primary and secondary ports in the New England groundfish fishery

State	Primary Multispecies Port(s)	Secondary Multispecies Port(s)
ME - Downeast	None	Jonesport, West Jonesport, Beals Island, Milbridge, Machias, Eastport, and Dyers Bay
ME – Upper Midcoast	None	Rockland, Port Clyde, Sprucehead, Owls Head, Friendship, Friendship Harbor, Camden, Vinalhaven, Stonington, Sunshine/Deer Isle, Winter Harbor, Southwest Harbor, Bar Harbor, Northeast Harbor, and Northwest Harbor
ME – Lower Midcoast	Portland	New Harbor, Bristol, South Bristol, Boothbay Harbor, East Boothbay, Medomak, Southport, Westport, Cundys Harbor, Orrs Island, Yarmouth, Harpswell, East Harpswell, South Harpswell, Bailey Island, Cape Elizabeth, Sebasco Estates, Small Point, West Point, Five Islands, and Phippsburg
ME - Southern	None	York, York Harbor, Camp Ellis, Kennebunkport, Kittery, Cape Porpoise, Ogunquit, Saco, and Wells
NH	Portsmouth	Rye, Hampton/Seabrook, Hampton, and Seabrook
MA – North Shore	Gloucester	Rockport, Newburyport, Beverly/Salem, Beverly, Salem, Marblehead, Manchester, and Swampscott
MA – Boston and South Shore	Boston	Scituate, Plymouth, and Marshfield (Green Harbor)
MA – Cape and Islands	Chatham/Harwichport	Provincetown, Sandwich, Barnstable, Wellfleet, Woods Hole, Yarmouth, Orleans, Eastham, Nantucket, Oak Bluffs, Tisbury, and Edgartown
MA – New Bedford Coast	New Bedford/Fairhaven	Dartmouth and Westport
RI	Point Judith	Charlestown, Westerly, South Kingstown (Wakefield), North Kingstown (Wickford), Newport, Tiverton, Portsmouth, Jamestown, Middletown, and Little Compton

(Table 31 continued)

CT	None	Stonington, New London, Noank, Lyme, Old Lyme, East Lyme, Groton, and Waterford
NY	Montauk, Hampton Bay, Shinnecock, and Greenport	Mattituck, Islip, Freeport, Brooklyn, Other Nassau County, and Other Suffolk County
NJ	None	Point Pleasant, Belford, Long Beach/Barnegat Light, Barnegat, Highlands, Belmar, Sea Bright, Manasquan, Cape May, Wildwood, Burleigh, Sea Isle City, Ocean City, Stone Harbor, and Avalon
Delaware	None	
Maryland	None	
Virginia	None	
North Carolina	None	

5.4.2 Atlantic Herring Fishery

The U.S. Atlantic herring fishery occurs over the Mid-Atlantic shelf region from Cape Hatteras to Maine, including an active fishery in the inshore Gulf of Maine and seasonally on Georges Bank. The Atlantic herring winter fishery is generally prosecuted south of New England in management Area 2 during the winter (January-April), and oftentimes as part of the directed mackerel fishery. There is significant overlap between the herring and mackerel fisheries in Area 2 and in Area 3 during the winter months, although catches in Area 3 tend to be relatively low. The herring summer fishery (May-August) is generally prosecuted throughout the Gulf of Maine in Areas 1A, 1B and in Area 3 (Georges Bank) as fish are available. Restrictions in Area 1A (including ASMFC days out measures implemented in response to quota reductions) have pushed the fishery in the inshore Gulf of Maine to later months (late summer). Fall fishing (September-December) tends to be more variable and dependent on fish availability; the Area 1A quota is always fully utilized, and the inshore Gulf of Maine fishery usually closes sometime around November. As the 1A and 1B quotas are taken, larger vessels become increasingly dependent on offshore fishing opportunities (Georges Bank, Area 3) when fish may be available.

Federally-permitted limited access Atlantic herring vessels that use midwater trawls and pair trawls are likely to be most affected by the management measures proposed in Framework 46 to the Multispecies FMP. These vessels are primarily larger vessels that possess Category A and B limited access herring permits (directed fishery), and to a lesser extent Category C (limited access incidental catch fishery); most of these vessels fish in all herring management areas. Because of the restrictions in the herring fishery (quota reductions, inshore Gulf of Maine purse seine/fixed gear only area, inshore spawning restrictions), these vessels have become increasingly dependent on herring from Areas 2 and 3 (southern New England and Georges Bank). Herring availability offshore is seasonal (late summer/fall) and variable; many of these vessels also prosecute the Atlantic mackerel fishery in similar areas during the winter.

5.4.2.1 Atlantic Herring Vessels

One of the major features of Amendment 1 was the establishment of a limited access program in the herring fishery. There are four permit categories:

1) limited access permit for all management areas (Category A);
2) limited access permit for access to Areas 2 and 3 only (Category B);
3) limited access incidental catch permit for 25 mt per trip (Category C); and
4) an open access incidental catch permit for 3 mt per trip (Category D).

Category A and B vessels comprise the majority of the directed Atlantic herring fishery. Many of the Category A, B, and C vessels are also active in the Atlantic mackerel fishery (managed by the MAFMC).

Table 32 summarizes the number of federally-permitted Atlantic herring vessels by Amendment 1 permit category and length. There were 101 vessels with limited access permits during the 2010 fishing year. The majority of participants in the directed Atlantic herring fishery are Category A and B vessels greater than 60 feet in length. There was a reduction of three vessels (from 49 to 46) in the limited access directed fishery (Categories A and B) in 2010 from the previous year, possibly due to significant cuts in herring catch limits in the 2010-2012 specifications (see following subsections for more information). There are 55 limited access incidental catch permit holders in the fishery, and over 2,000 open access permit holders.

Table 32 – Number of vessels by Atlantic herring permit category and length

	2008			
Category	**A**	**B**	**C**	**D**
Under 60	4	2	21	1,762
60-80	9	3	29	422
>80	32		8	225
Grand Total	**45**	**5**	**58**	**2,409**
	2009			
Category	**A**	**B**	**C**	**D**
Under 60	5	2	22	1,761
60-80	9	2	26	411
>80	31		7	222
Grand Total	**45**	**4**	**55**	**2,394**
	2010			
Category	**A**	**B**	**C**	**D**
Under 60	5	2	23	1,656
60-80	8	2	25	377
>80	29		7	225
Grand Total	**42**	**4**	**55**	**2,258**

Table 33 lists the number of limited access herring vessels during the 2010 fishing year by herring permit category and principal port (as reported on the permit). Principal port is the port in which the vessel/owner anticipates landing most of its fish. The majority of limited access directed fishery permit holders that fish in all herring management areas (Category A) list ports in Massachusetts (15), Maine (11), and New Jersey (5) as their principal ports. These are the States with shoreside infrastructure (processing plants) that supports the herring fishery. Category B vessels (limited access directed fishery in Areas 2 and 3 only) and Category C vessels (limited access incidental catch) tend to identify principle ports throughout mid-coast Maine, New Hampshire, southern New England, and the Mid-Atlantic region. Category D vessels (open access incidental catch) are high in number and participate in a wide variety of fisheries throughout the Northeast Region.

Table 33 – Number of limited access herring vessels by permit category and principal port, 2010

PRINCIPAL PORT	A	B	C
MAINE			
NEW HARBOR			2
PORTLAND	4		2
PROSPECT HARBOR	1		
ROCKLAND	3		
SOUTH BRISTOL			3
SOUTHWEST HARBOR	1		
STONINGTON	1		
VINALHAVEN	1		
TOTAL ME	**11**	**0**	**7**
NEW HAMPSHIRE			
PORTSMOUTH			2
RYE			2
TOTAL NH	**0**	**0**	**4**
MASSACHUSETTS			
DAVISVILLE	2		
FAIRHAVEN			1
GLOUCESTER	5		2
NEW BEDFORD	8		2
TOTAL MA	**15**	**0**	**5**
CONNECTICUT			
NEWINGTON	2		
TOTAL CT	**2**	**0**	**0**
RHODE ISLAND			
POINT JUDITH	2	3	12
TOTAL RI	**2**	**3**	**12**
NEW YORK			
HAMPTON	1		1
MONTAUK			4
TOTAL NY	**1**		**5**
NEW JERSEY			
CAPE MAY	5		8
TOTAL NJ	**5**	**0**	**8**
OTHER PORTS	6	1	14
GRAND TOTAL	42	4	55

Source: NMFS permit and VTR databases, March 2011
**BC permits are vessels that had both B and C permits during the same year*
***C permits are vessels that only had a C permit during a year*

5.4.2.2 Landings by Vessels with Herring Permits

5.4.2.2.1 Atlantic Herring Catch (IVR)

The Atlantic herring fishery is monitored using catch data provided by federally-permitted fishing vessels weekly through an interactive voice response (IVR) system and supplemented by other data sources where IVR data are not available. IVR data are compared to federal and state dealer data each week and dealer reports are used to supplement the IVR when necessary. These supplements include data from non-federally permitted inshore fisheries when provided by state agencies or from other sources. Although vessels are also required to report catches with vessel trip report (VTR) forms, near real-time data is obtained through the IVR system allowing the sub-ACLs to be monitored. ACL overages for each fishing year are tallied during the following fishing year using VTR data, for all vessels (including those that catch small amounts of herring incidentally and do not report through the IVR system).

Current regulations specify that the owner or operator of any vessel issued a limited access Atlantic herring permit (Category A, B, C) must submit an Atlantic herring catch report via the IVR system each week, regardless of how much herring is caught (including weeks when no herring is caught), unless exempted from this requirement by the Regional Administrator. In addition, the owner or operator of any vessel issued an open access permit for Atlantic herring that catches 2,000 pounds of Atlantic herring on any trip in a week must submit an Atlantic herring catch report via the IVR system for that week as required by the Regional Administrator.

The IVR system currently requires vessel owners/operators to submit herring catch reports through the IVR system even during weeks when the vessel may not have fished and/or may not have caught any herring. These are considered “negative reports,” i.e., reports of zero catch. Negative IVR reports ensure that catch data are more complete and affirm an action relative to vessels’ fishing activity during any given week. Negative reports help to resolve potential problems with “missing” data; for example, if a vessel has been submitting herring catch reports through the IVR system and does not fish or catch herring for several weeks, the negative reports allow database managers to know that the vessel did not fish or catch herring during those weeks, versus making assumptions about the vessel’s fishing activity and/or applying a proxy level of catch for the vessel’s missing reports. Data gaps must be addressed in a timely fashion in order to use the IVR system for real-time quota monitoring, so if negative reports are not filed, it is less clear whether the available data accurately characterize catch in the fishery for quota monitoring purposes.

The Atlantic herring fishery specifications process was revised in Amendment 4 to the Herring FMP to meet the new requirements in the 2007 reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act, including the specification of an overfishing level and standards for setting catch limits that consider both scientific and management uncertainty. The 2010-2012 specifications included substantial reductions in the available yield and management area sub-ACLs across the herring fishery. Through the new specifications process, optimum yield (OY) for the herring fishery was reduced from 145,000 mt to 91,200 mt (Table 34). All management area sub-ACLs consequently decreased, and the Area 1A sub-ACL was reduced by 41% from 45,000 metric tons in 2009 to 26,546 metric tons for 2010-2012. The Area 1B sub-

ACL was reduced by more than 50%. The revised specifications process still requires that the directed herring fishery be closed in any management area when 95% of the sub-ACL is projected to be reached.

Table 34 – 2010 – 2012 Atlantic herring fishery specifications (in metric tons)

SPECIFICATION	2010-2012 Allocation (mt)	Previous (2009) Allocation
OFL	**145,000 (2010) 134,000 (2011) 127,000 (2012)**	N/A
ABC	**106,000**	194,000
Stock-wide ACL/U.S. OY	**91,200**	145,000
Sub-ACL Area 1A	**26,546**	45,000
Sub-ACL Area 1B	**4,362**	10,000
Sub-ACL Area 2	**22,146**	30,000
Sub-ACL Area 3	**38,146**	60,000

Table 35 summarizes Atlantic annual Atlantic herring catch from IVR reports from 2000-2010. Table 36 summarizes annual Atlantic herring catch by management area, as reported through the IVR system from 2001-2010. Table 37 provides IVR catches by management area for the 2010 fishing year as a percentage of the sub-ACL for the area. The 2010 fishing year saw a great reduction in the amount of Atlantic herring caught in the U.S. fishery, as IVR catches totaled 67,296 metric tons, down 35% from the 2009 catch. Herring catch has been trending downward since the implementation of the Atlantic Herring FMP and throughout the time series of IVR reporting. The most recent five-year average herring catch (85,604 mt 2006-2010) is 15% lower than the previous five-year average catch (100,912 mt 2001-2005).

Overall, the 2010 IVR reports totaled 67,296 mt of herring across all management areas, which represents about 74% of the total ACL for the U.S. fishery (91,200 mt). About half of the 2010 herring catch was taken from the GOM (Area 1A and 1B), and the other half was taken in Areas 2 and 3. In 2010, the Area 1A and 1B sub-ACLs were fully utilized; the Area 1B fishery was the first to close on September 14, 2010, and after a premature closure and re-opening by NMFS, the Area 1A fishery eventually closed on November 17, 2010. IVR totals suggest that there was a sub-ACL overage in Area 1A and Area 1B during the 2010 fishing year; VTR data will be tallied during 2011 to determine the final overage amounts, if any, and any corresponding overage deductions (accountability measures) will be factored into the 2012 specifications.

Table 35 – Total IVR landings of Atlantic herring, 2000 – 2010

Year	Total IVR Landings (MT)
2000	107,387
2001	121,569
2002	91,831
2003	100,544
2004	93,722
2005	96,895
2006	98,710
2007	78,103
2008	81,017
2009	102,896
2010	67,296

Table 36 – Herring IVR catch (metric tons) by management area, 2001 – 2010

Year	Area 1A	Area 1B	Area 2	Area 3	Total
2001	58,370	8,866	17,160	37,174	**121,569**
2002	59,263	7,355	10,673	14,540	**91,831**
2003	61,867	5,271	12,530	20,876	**100,544**
2004	59,857	9,043	12,917	11,905	**93,722**
2005	61,570	7,873	14,423	13,029	**96,895**
2006	59,980	13,008	21,277	4,444	**98,710**
2007	46,852	6,859	14,763	9,629	**78,103**
2008	41,857	8,104	19,256	11,800	**81,017**
2009	43,588	1,796	28,066	29,446	**102,896**
2010	27,113	5,990	18,763	15,430	**67,296**

Table 37 – IVR herring catch for FY 2010

Management Area	IVR Catch (mt)	% of Sub-ACL
Area 1A (Jan 1st – May 31st)	0	0
Area 1A (June 1st – Dec 31st)	27,113	102% of 26,546
Area 1A TOTAL	27,113	102% of 26,546
Area 1B	5,990	137% of 4,362
Area 2	18,763	85% of 22,146
Area 3	15,430	40% of 38,146
Total	**67,296**	**74% of 91,200**

**Any final sub-ACL overages for the 2010 fishing year will be tallied during the 2011 fishing year using VTR data from all herring permit holders.*

In 2010, Atlantic herring vessels may have been precluded from fishing in offshore areas because of concerns related to exceeding the current haddock bycatch cap. Requirements for increased observer coverage, combined with reduced haddock TACs, led to smaller catch caps monitored through a higher level of observer coverage in areas where haddock are usually encountered by herring vessels. It is likely that herring vessels chose to not fish in offshore areas later in the year to prevent the entire fishery from being closed until May 1, 2011 (the time period to which the current catch cap applies). The vessels that would be accessing Area 3 are primarily midwater trawl and pair trawl vessels, limited access Category A permit holders. Table 38 shows that very little herring was reported from Area 3 in the last 12-14 weeks of the fishing year; as a result, only 40% of the Area 3 sub-ACL was utilized during 2010.

Table 38 – Weekly IVR catch reports by management area for last 18 weeks of FY 2010

WEEK	IVR CATCH REPORTS (MT)				
	AREA 1A	AREA 1B	AREA 2	AREA 3	TOTAL
35	358			355	713
36	472	1,446		419	2,337
37	83	1,358		55	1,496
38	1,205	1,062			2,267
39	1,342			931	2,273
40	185			454	639
41	1,859				1,859
42	3,860				3,860
43	1,367				1,367
44	859				859
45	5,202				5,202
46	1,555				1,555
47	1,315		1,289		2,604
48			208	182	390
49	4,120		53		4,173
50			1,567	55	1,622
51			1,113		1,113
52			843		843

5.4.2.2.2 Atlantic Herring Landings by Gear (VTR)

A complete summary of the types of gear used in the Atlantic herring fishery can be found in section 5.1.4. Table 39 summarizes all reported herring landings by gear type and permit category from VTR data for 2008-2010 (a small amount of landings reported on VTRs from herring carrier vessels were removed). Table 40 expresses 2010 herring landings by gear type and permit category as a percentage of total herring landings reported in the VTRs. The vast majority of herring is landed by the 42 Category A permit holders, i.e., the limited access directed fishery permit holders with access to all management areas. All midwater trawl and pair trawl herring landings are reported from Category A vessels (limited access directed fishery in all management areas). Changes in landings by gear type for Category A vessels (midwater trawl/pair trawl/purse seine) is indicative of the impacts of the Amendment 1 purse seine/fixed gear only area and the significant reductions in the Area 1A quota during 2010.

Category B/C vessels posses a limited access directed fishery permit for Areas 2/3 and a limited access incidental catch permit (25 mt) for Area 1A. All of these vessels caught herring with a small mesh bottom trawl during the 2010 fishing year. Vessels with Category C permits only caught a relatively small amount of herring using bottom trawls, shrimp trawls, and purse seines. The limited access permit holders – Categories A, B, and C – reported 99.5% of Atlantic herring landings during 2010; these 101 vessels truly represent the vessels that are participating in the Atlantic herring fishery. Over 80% of all Atlantic herring landed during the 2010 fishing year was landed by midwater trawl and pair trawl vessels. Purse seine vessels accounted for about 13% of the landings during 2010, and all of the purse seine landings were from Area 1A. The majority of the remainder of herring landings in 2010 came from bottom trawl vessels.

Table 39 – Atlantic herring landings (000's of lbs.) for herring-permitted vessels by gear type and permit category, 2008 – 2010

	2008				
Gear Type	**A**	**BC***	**C****	**D**	**2008 Total**
BOTTOM OTTER TRAWL, FISH	3,125.0	1,304.8	147.2	184.4	**4,761.3**
OTHER GEAR	0.0	0.0	0.0	11.8	**11.8**
MIDWATER TRAWL	8,816.6	0.0	0.0	0.0	**8,816.6**
SHRIMP TRAWL	0.0	0.0	4.4	7.7	**12.1**
HAG POT	550.0	0.0	0.0	0.0	**550.0**
MIDWATER PAIR TRAWL	110,455.8	0.0	0.0	0.0	**110,455.8**
PURSE SEINE	58,415.0	0.0	0.0	796.5	**59,211.5**
GRAND TOTAL	**181,431.4**	**1,304.8**	**151.6**	**1,000.5**	**183,888.2**
	2009				
Gear Type	**A**	**BC***	**C****	**D**	**2009 Total**
BOTTOM OTTER TRAWL, FISH	6,144.4	3,143.8	341.8	135.5	**9,765.6**
OTHER GEAR	0.0	0.0	0.0	22.2	**22.2**
MIDWATER TRAWL	13,875.1	0.0	0.0	0.4	**13,875.4**
SHRIMP TRAWL	0.0	0.0	140.7	4.2	**144.9**
MIDWATER PAIR TRAWL	153,346.9	0.0	0.0	0.0	**153,346.9**
PURSE SEINE	49,035.6	0.0	629.0	34.7	**49,699.3**
GRAND TOTAL	**222,402.0**	**3,143.8**	**1,111.5**	**215.0**	**226,872.3**
	2010				
Gear Type	**A**	**BC***	**C****	**D**	**2010 Total**
BOTTOM OTTER TRAWL, FISH	6,057.1	1,624.3	600.5	315.2	**8,597.1**
OTHER GEAR	0.0	0.0	0.0	15.6	**15.6**
MIDWATER TRAWL	19,563.0	0.0	0.0	0.9	**19,563.9**
SHRIMP TRAWL	0.0	0.0	348.4	263.5	**611.9**
LOBSTER POT	80.0	0.0	0.0	0.6	**80.6**
MIDWATER PAIR TRAWL	96,528.5	0.0	0.0	0.0	**96,528.5**
CONCH POT	635.9	0.0	0.0	0.0	**635.9**
PURSE SEINE	17,694.9	0.0	950.5	74.0	**18,719.3**
GRAND TOTAL	**140,577.4**	**1,624.3**	**1,899.3**	**669.8**	**144,770.8**

Source: NMFS permit and VTR databases, March 2011
**BC permits are vessels that had both B and C permits during the same year*
***C permits are vessels that only had a C permit during a year*

Table 40 – Atlantic herring landings by gear type and permit category, as a percent of total herring landings, FY 2010

Gear Type	A	BC*	C**	D	2010 % of Total
CARRIER VESSEL					0.0%
BOTTOM OTTER TRAWL, FISH					5.9%
OTHER GEAR					0.0%
MIDWATER TRAWL					13.5%
SHRIMP TRAWL					0.4%
HAG POT					0.0%
LOBSTER POT					0.1%
MIDWATER PAIR TRAWL					66.7%
CONCH POT					0.4%
PURSE SEINE					12.9%
% of TOTAL	97.1%	1.1%	1.3%	0.5%	

Source: NMFS permit and VTR databases, March 2011
**BC permits are vessels that had both B and C permits during the same year*
***C permits are vessels that only had a C permit during a year*

5.4.2.2.3 Landings of Other Species (VTR)

All federal permit holders are required to report landings and discards of all species through vessel trip reports (VTRs). Table 41 summarizes 2009 and 2010 landings of species other than Atlantic herring from federally-permitted herring vessels from the VTR data.

The 46 limited access directed herring vessels (Category A/B) land fewer species but in higher volumes. These vessels participate primarily in the herring, mackerel, squid, and other small mesh fisheries. In 2010, when herring quotas were greatly reduced, the landings of other species by the 42 remaining Category A vessels declined by almost 1/3; landings of other species increased for B and C vessel (59 vessels), and landings by 2,258 Category D vessels (open access) increased slightly.

Table 41 – Landings of other species (000's of lbs.) by herring permit category, 2009 – 2010

Species	2009					2010				
	A	BC*	C**	D	2009 Total	A	BC*	C**	D	2010 Total
Alewife	0.0	0.0	0.1	0.1	0.2	0.0	0.0	0.0	0.6	0.6
American Plaice	186.5	7.8	150.8	2,409.5	2,754.6	102.7	6.4	118.8	2,435.3	2,663.2
Black Sea Bass	4.9	2.0	51.1	816.1	874.1	3.9	3.9	69.4	1,137.7	1,214.9
Bluefin Tuna	0.1	0.0	0.0	89.7	89.7	0.0	0.0	0.6	201.8	202.4
Bluefish	47.2	15.0	141.3	2,035.3	2,238.7	35.4	8.5	116.5	2,208.2	2,368.6
Bonito	0.0	0.0	0.0	42.8	42.8	0.0	0.0	0.0	29.5	29.5
Butterfish	214.4	19.4	113.7	520.1	867.7	42.0	39.4	211.9	682.2	975.6
Cod	240.0	49.3	731.7	13,598.2	14,619.2	311.7	51.1	606.7	11,985.6	12,955.2
Croaker	0.0	0.0	1,080.3	3,829.5	4,909.7	0.0	0.0	1,139.5	3,313.6	4,453.1
Cusk	3.0	0.0	0.7	48.3	51.9	0.9	0.0	0.3	36.0	37.2
Fluke	64.4	74.9	957.5	6,533.9	7,630.8	98.7	76.0	960.7	8,389.3	9,524.7
Haddock	1,563.4	33.3	149.7	8,605.1	10,351.4	3,490.5	231.6	374.8	13,333.9	17,430.9
Hagfish	0.0	0.0	0.0	2,889.9	2,889.9	0.0	0.0	0.0	1,041.1	1,041.1
Hake, NS	21.6	0.0	0.0	605.5	627.2	13.0	0.0	2.4	581.5	596.9
Halibut	0.6	0.0	0.4	17.0	18.1	0.2	0.0	0.4	13.0	13.6
Illex Squid	31,805.5	463.0	1,022.6	5,828.6	39,119.6	27,503.2	465.7	2,118.1	3,871.2	33,958.2
Jonah Crabs	3.2	0.0	0.0	4,748.3	4,751.4	2.5	0.1	0.6	5,313.5	5,316.8
Lobster	45.7	0.6	56.3	9,966.4	10,069.0	28.9	0.2	56.3	10,914.3	10,999.7
Loligo Squid	1,408.2	1,135.9	3,853.9	15,423.5	21,821.5	1,879.8	700.4	2,486.5	11,047.5	16,114.3
Mackerel	48,886.2	88.3	226.2	925.9	50,126.6	21,095.1	8.3	156.7	320.5	21,580.6
Menhaden	3,752.0	0.0	7,632.2	17,333.7	28,717.9	4,518.0	0.0	10,291.3	16,349.5	31,158.8
Monkfish	139.4	12.1	70.1	5,616.4	5,838.0	67.6	14.8	46.3	4,589.2	4,717.8
Monkfish Liver	8.2	0.0	5.4	244.5	258.1	10.2	0.2	1.9	246.3	258.6
Monkfish Tails	92.6	0.4	89.5	1,772.6	1,955.0	44.5	0.9	81.3	1,556.5	1,683.2

Species	2009					2010				
	A	BC*	C**	D	2009 Total	A	BC*	C**	D	2010 Total
Other Species	56.8	1.0	198.6	4,112.6	4,369.0	193.3	1.4	92.6	4,686.4	4,973.7
Pollock	446.1	0.1	222.4	11,515.9	12,184.4	433.2	0.1	167.1	7,839.3	8,439.7
Red Crab	2.1	0.0	0.7	1,392.8	1,395.6	2.0	0.0	0.3	2,464.1	2,466.4
Red Hake	54.2	13.3	433.6	1,476.4	1,977.5	90.7	14.8	338.1	1,174.8	1,618.4
Redfish	159.4	0.0	26.2	2,440.6	2,626.2	109.5	0.0	33.1	2,988.2	3,130.8
Rock Crab	0.0	0.0	0.1	425.0	425.1	0.0	0.0	0.2	400.9	401.1
Scallop	765.0	0.2	1,312.9	44,700.4	46,778.4	792.2	0.0	1,389.8	44,094.3	46,276.3
Scallop/Shell	0.0	0.0	24.5	3,267.4	3,291.9	0.0	0.0	0.1	501.3	501.4
Sculpin	0.0	0.0	37.0	40.7	77.7	0.0	0.0	0.0	0.3	0.3
Scup	151.6	103.9	1,302.2	4,409.7	5,967.5	190.5	132.9	1,499.5	5,978.8	7,801.8
Shad	0.1	0.0	0.8	6.0	6.9	1.4	0.0	0.3	15.7	17.4
Shrimp	37.0	0.0	1,146.7	4,297.2	5,481.0	428.0	0.0	1,522.1	7,757.4	9,707.5
Silver Hake	312.1	324.6	3,618.8	12,415.2	16,670.7	376.4	98.6	3,951.4	12,049.5	16,476.0
Skate (All)	164.7	398.1	627.2	22,475.6	23,665.7	136.6	1,142.4	627.0	20,236.0	22,142.0
Smooth Dogfish	0.0	0.0	25.6	699.5	725.1	0.0	0.0	30.0	917.3	947.3
Southern Flounder	0.0	0.0	0.8	206.1	206.9	0.0	0.0	0.0	217.8	217.8
Spiny Dogfish	67.5	100.4	267.8	6,534.5	6,970.2	48.4	65.0	319.0	6,062.4	6,494.8
Spot	0.0	0.0	6.7	99.2	105.9	0.0	0.0	0.0	45.7	45.7
Striped Bass	0.4	0.2	19.4	608.9	628.9	0.5	0.4	44.7	506.7	552.2
Tilefish	0.3	0.5	9.2	372.2	382.2	1.5	0.6	9.9	581.7	593.7
White Hake	198.3	0.2	98.8	1,647.6	1,944.9	80.1	0.0	62.0	1,812.4	1,954.6
Windowpane Flounder	4.8	5.7	9.3	160.8	180.6	0.0	1.5	1.4	47.9	50.8
Winter Flounder	153.4	38.4	196.6	3,891.4	4,279.8	85.6	12.4	86.6	2,779.6	2,964.2
Witch Flounder	104.7	8.4	114.6	1,712.4	1,940.2	75.4	3.9	61.0	1,325.6	1,465.9
Wolffish	0.3	0.0	15.9	31.9	48.1	0.1	0.0	0.4	3.8	4.3

Species	2009					2010				
	A	BC*	C**	D	2009 Total	A	BC*	C**	D	2010 Total
Yellowtail Flounder	62.5	43.6	243.0	2,976.9	3,326.0	92.1	33.3	164.2	2,348.3	2,637.9
TOTAL	**91,228.3**	**2,940.4**	**26,293.2**	**235,817.5**	**356,279.5**	**62,386.5**	**3,115.0**	**29,242.1**	**226,434.0**	**321,177.5**

Source: NMFS permit and VTR databases, March 2011
**BC permits are vessels that had both B and C permits during the same year*
***C permits are vessels that only had a C permit during a year*

5.4.2.3 Herring Communities

Amendment 1 to the Atlantic Herring FMP identified several communities of interest with respect to the Atlantic herring fishery, based on the following criteria:

1. Atlantic herring landings of at least 10,000,000 pounds (4,536 mt) in each of five years from 1994-2002, or anticipated landings above this level based on interviews and documented fishery-related developments.
2. Infrastructure dependent in part or whole on Atlantic herring.
    - Infrastructure for the Atlantic herring fishery includes:
        - Shoreside processing facilities for food production (sardine canneries, whole frozen);
        - Shoreside processing facilities for bait production (salting, etc.);
        - Shoreside processing facilities for value-added production (pearl essence);
        - At-sea processing facilities (freezer vessels); and
        - Trucking and other essential services for distributing fish.
3. Dependence on herring as lobster and/or tuna bait.
4. Geographic isolation in combination with some level of dependence on the Atlantic herring fishery.
5. Utilization of Atlantic herring for value-added production.

Based on the five criteria described above, the following *communities of interest* were identified:

1. Portland, Maine
2. Rockland, Maine
3. Stonington/Deer Isle, Maine
4. Vinalhaven, Maine
5. Lubec/Eastport, Maine
6. Prospect Harbor, Maine
7. Bath, Maine
8. Sebasco Estates, Maine
9. NH Seacoast – Newington, Portsmouth, Hampton/Seabrook
10. Gloucester, Massachusetts
11. New Bedford, Massachusetts
12. Southern Rhode Island – Point Judith, Newport, North Kingstown
13. Cape May, New Jersey

The communities most likely to be affected by the measures proposed in Framework 46 are those that are home to the herring vessels engaged in the limited access directed fishery, particularly in offshore areas. These are the principal ports for the Category A and B permit holders:

Gloucester, MA, New Bedford, MA, Cape May, NJ, and, to a lesser extent, Portland and Rockland, ME.

Many things have changed in the Atlantic herring fishery since the implementation of Amendment 1, and the socioeconomic and fishing community information will be re-evaluated in the EIS for Amendment 5 to the Herring FMP (work in progress).

5.4.3 Mid-Water Trawl Catches of Haddock

5.4.3.1 Overview

The Northeast Fisheries Science Center observer program samples catches on commercial fishing vessels. The database extends from 1989 to the present. Coverage levels vary from year to year and in general the herring fishery was sparsely sampled prior to 2000. In recent years coverage has increased; this is particularly the case from 2006 to the present year. These data provide an overview of catches based on at–sea observations by the observer program. Changes in observer protocols over time complicate the interpretation of these data. In particular, the increased use of paired mid-water trawl vessels in the herring fishery necessitated changes to the sampling protocols that were implemented in 2006.

The observer data were used to determine the time and location of haddock catches in the herring fishery, to estimate the total catches of haddock by the herring fishery, and to examine the characteristics of mid-water trawl interactions with haddock on Georges Bank. In the following summaries, please note that the different analyses focus on different subsets of the fishery. Most of the analyses focus on the period from 2002 to 2009. While some preliminary data are available for 2010, they have not been fully audited and the complete year is not yet entered into the database.

GB haddock produced an exceptional year class (the largest on record) in 2003. This unusual year class may influence the results of these analyses. It is difficult to determine the extent of that influence, however. Until there is more experience with a rebuilt GB haddock stock it is uncertain if the analyses discussed below are representative of “normal” interactions between the herring fishery and haddock or are the result of the presence of an abnormally large year class.

5.4.3.2 Herring Fishery Catches of Haddock

Cournane (2011; appendix xx) examined the spatial and temporal nature of the interactions between the herring fishery and haddock. Directed herring fishing activity (defined as any trip landings more then 2,000 pounds of herring) was summarized for 2005 through 2009 using pooled Vessel Trip Reports (VTRs). Fishing effort was summarized by statistical area and two-month period. All gears were summarized. Observed fishing trips were then plotted over a chart of herring fishing activity (Figure 26). Tables were also developed for each two-month period to summarize the number of observed tows that caught haddock and the magnitude of those catches.

In general, the results indicate that most haddock catches occur along the 100 – fathom curve on the north side of GB and extending into the inshore GOM (Figure 27). Most catches occur in midwater trawl (including paired mid-water trawl) tows. Catches are generally low but start to increase in July and August and then peak in September and October on GB. This is the result of the movement of the herring fishery onto GB in the summer as well as the distribution of haddock along the northern edge of GB.

The tables summarizing the catch per tow (Table 42) indicate that during most of the year it is unusual to catch haddock on directed herring trips. The number of observed tows with haddock increases in the summer and peaks in September and October, where about 30 percent of the observed mid-water trawl tows caught haddock. Information in a following section, however, will indicate that in some areas haddock is more frequently encountered by MWT vessels.

Figure 26 – Directed herring fishing activity and observed haddock catches, 2005 – 2009 (from Cournane 2011; see appendix xx)

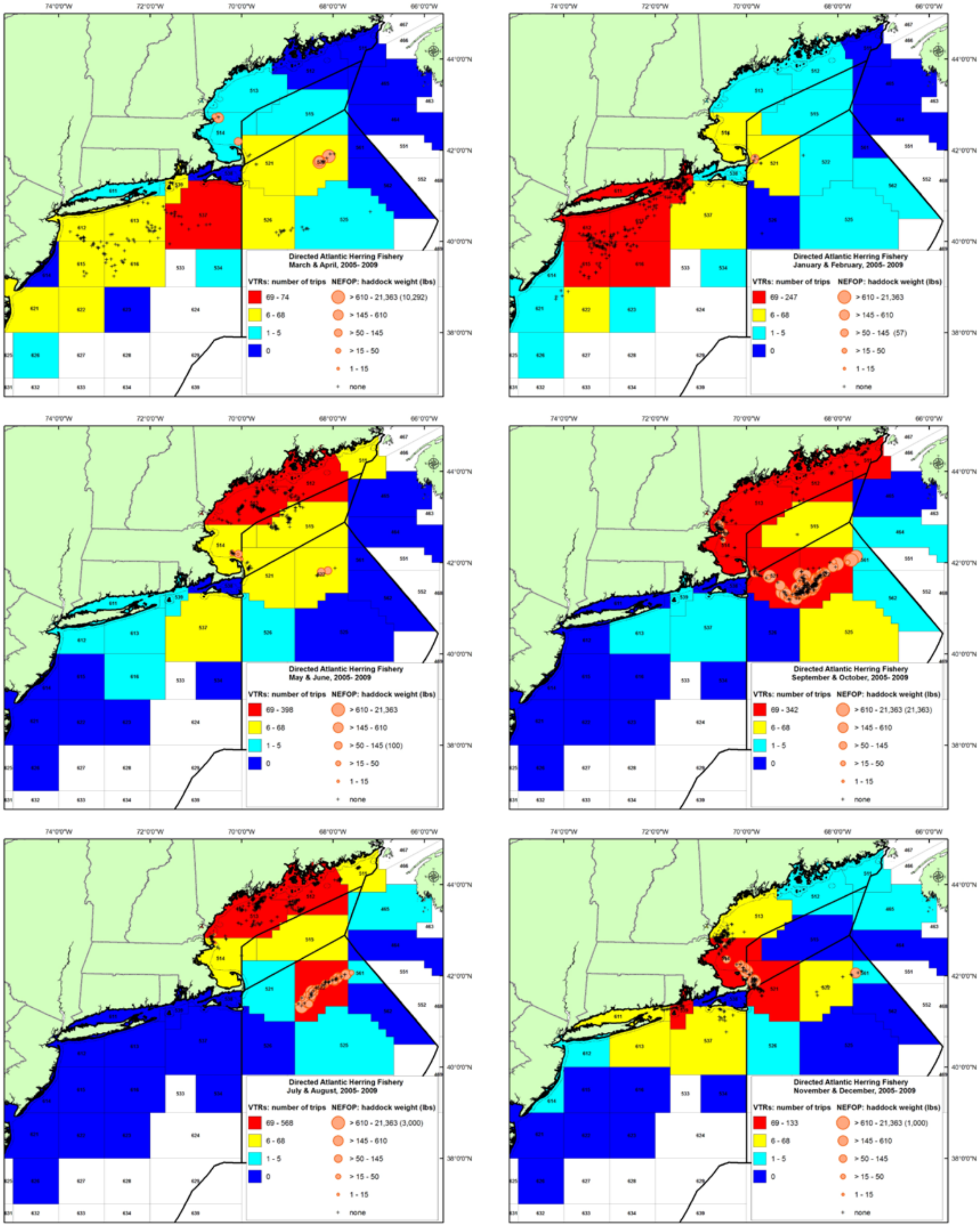


Figure 27 – Herring fishery observed catches of haddock in the GOM and GB areas (from Cournane 2011, appendix xx)

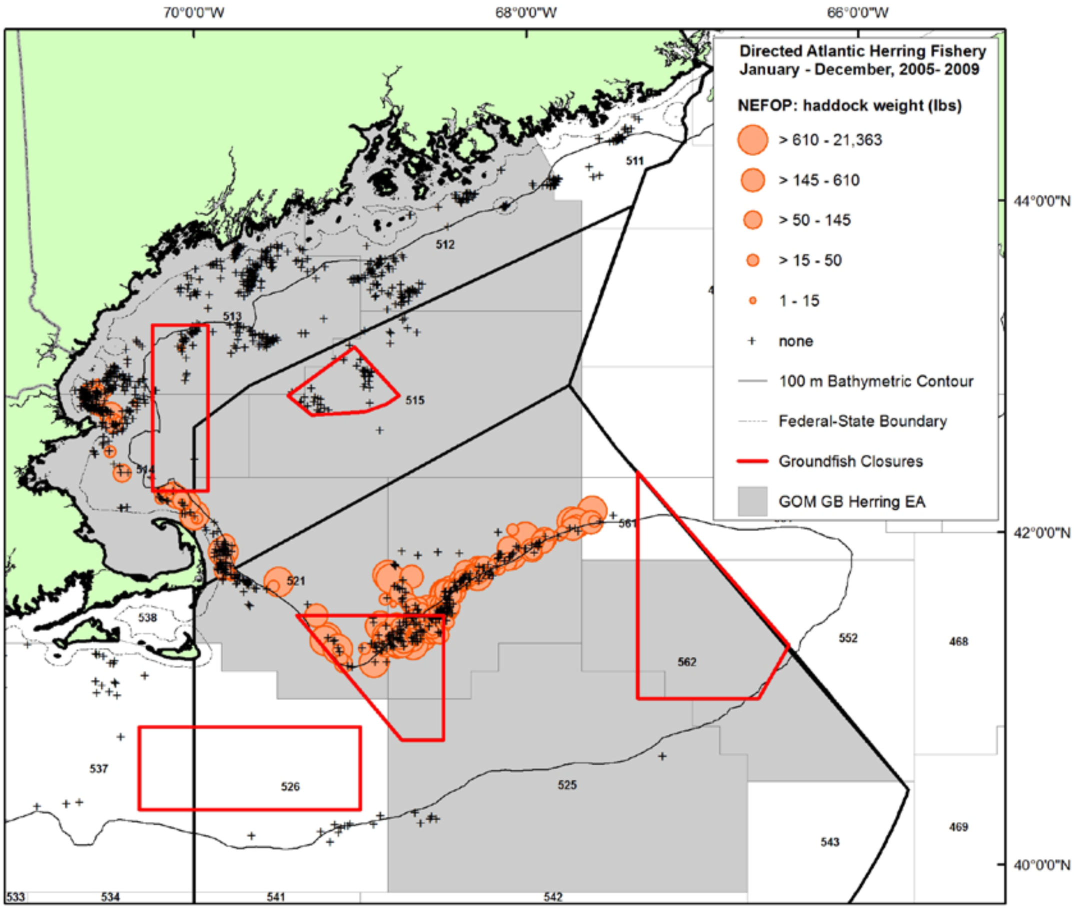


Table 42 - Frequency table of haddock bycatch (lbs) in observed hauls and sets for directed herring trips by gear type and bimonthly blocks. Gear categories include bottom otter-trawls (OT), purse seines (PS), and mid-water trawls-single and paired (PR). Directed herring trips are defined as 2,000 lbs of kept Atlantic herring on a trip. Note this table corresponds with the scaled orange circles in Figure 26. Source: NEFOP Database 2005-2009. From Cournane (2011, appendix xx)

Jan-Feb		Gear Category			
Haddock Weight (lbs)		OT	PR	PS	ALL
none		100	248	0	348
1 - 15		0	0	0	0
> 15 - 50		0	1	0	1
> 50 - 145		0	1	0	1
> 145 - 610		0	0	0	0
> 610 - 21,363		0	0	0	0
maximum= 57	ALL	100	250	0	350

Mar-Apr		Gear Category			
Haddock Weight (lbs)		OT	PR	PS	ALL
none		4	112	0	116
1 - 15		0	2	0	2
> 15 - 50		0	2	0	2
> 50 - 145		0	1	0	1
> 145 - 610		0	2	0	2
> 610 - 21,363		0	2	0	2
maxium= 10,292	ALL	4	121	0	125

May-Jun		Gear Category			
Haddock Weight (lbs)		OT	PR	PS	ALL
none		0	130	69	199
1 - 15		0	4	0	4
> 15 - 50		0	1	0	1
> 50 - 145		0	3	0	3
> 145 - 610		0	0	0	0
> 610 - 21,363		0	0	0	0
maximum= 100	ALL	0	138	69	207

Jul-Aug		Gear Category			
Haddock Weight (lbs)		OT	PR	PS	ALL
none		20	117	152	289
1 - 15		14	9	0	23
> 15 - 50		0	10	0	10
> 50 - 145		0	7	0	7
> 145 - 610		0	8	0	8
> 610 - 21,363		0	4	0	4
maximum= 3,000	ALL	34	155	152	341

Sep-Oct		Gear Category			
Haddock Weight (lbs)		OT	PR	PS	ALL
none		23	266	63	352
1 - 15		1	14	0	15
> 15 - 50		1	27	0	28
> 50 - 145		2	21	0	23
> 145 - 610		0	25	0	25
> 610 - 21,363		0	29	0	29
maximum= 21,363	ALL	27	382	63	472

Nov-Dec		Gear Category			
Haddock Weight (lbs)		OT	PR	PS	ALL
none		16	244	4	264
1 - 15		0	3	0	3
> 15 - 50		0	5	0	5
> 50 - 145		0	3	0	3
> 145 - 610		0	3	0	3
> 610 - 21,363		0	2	0	2
maximum= 1,000	ALL	16	260	4	280

5.4.3.3 Mid-Water Trawl Haddock Catches

The Standardized Bycatch Reporting Methodology (SBRM; NMFS 2007) provides an analytic technique for expanding observed discards or catches on a sample of the fleet to an estimate of total discards or catch. The NEFSC estimated catches of haddock by the herring fishery by expanding observed haddock catches using total landings. While initially this was done for both purse seine and mid-water trawl gear, the purse seine values were low and when combined with the data from Cournane (2011) it was decided to focus on mid-water trawl gear since this is the gear that catches most of the haddock caught by the herring fishery. Estimates developed in future assessments may differ slightly due to updated data or different analytic techniques.

This estimate used an analytic approach similar to the SBRM. Unlike the current method used to monitor the existing haddock catch cap (which only sums the observations by observers, dealer landings, and dockside monitoring by enforcement) these numbers provide a total estimate of catches by this gear. The analytic approach is detailed in (reference , attached as an appendix). A summary of the results is provided in Table 43 and Table 44. The first table estimates catches for trips where herring was 90 percent or more of the catch, while the second table looks at all MWT trips (the numbers are nearly identical because few trips targeting mackerel were observed in the Gulf of Maine or Georges Bank). The southern New England area has more trips targeting mackerel, but no haddock bycatch was observed in southern New England. Estimates before 2005/2006 are not considered as reliable given the low observer coverage and questions about observer procedures during this period. Coverage increased and practices were revised in recent years.

Generally, the estimates show that annual catches of haddock in the MWT fishery are usually less than 5 mt in the Gulf of Maine (GOM), near 0 in southern New England, and range from 0-280 mt on Georges Bank (GB). In some years the estimates have relatively large coefficients of variation (CVs), indicating that the estimates are less precise; this is a function of the number of observed trips and the variability of the catches on those few trips. The largest estimate is for 2006, a year when there were only four observed trips on GB; this estimate is accompanied with the highest CV of the time series.

The majority of the haddock catches in the herring fishery occur on GB. The MWT catch estimates for GB haddock are put into context in Table 46 by comparing them to GB haddock SSB, GB TACs/ACLs, commercial landings of GB haddock, and the estimated fishing mortality for GB haddock. The catch estimates are small compared to the available GB haddock TACs. They are larger than the amount tracked by the quota monitoring program since 2006. In only one year did they exceed the total haddock catch cap quota. The catches of GB haddock by MWT vessels was 7 percent of the U.S. catch in 2006 (280 mt). The estimates are all less than one percent of the U.S. TTAC/ACL.

Prior to the adoption of FW 43 in 2006 MWT vessels were prohibited from possessing groundfish. FW 43 required certain vessels to retain all haddock until the catch cap was reached and allowed retention of small amounts of other species. Haddock discards were estimated using the same approach as that used to estimate catch. As shown in Table 45, since 2006 discards have declined to very small amounts.

Table 43 - Estimation of haddock catches in the midwater trawl herring fishery. Midwater trawl trips have been filtered to include only those hauls/subtrips where the catch was composed of ≥ 90% herring

Gulf of Maine			
	Mid-water trawl (170, 370)		
Year	Observed trips	Catch (mt)	CV
1994			
1995	4	0.00	
1996			
1997			
1998			
1999	2	0.00	
2000	3	0.00	
2001			
2002			
2003	8	0.00	
2004	58	1.23	0.66
2005	87	3.89	0.37
2006	13	0.00	
2007	7	1.73	0.90
2008	14	0.00	
2009	31	0.04	0.65

Georges Bank			
	Mid-water trawl (170, 370)		
Year	Observed trips	Catch (mt)	CV
1994			
1995			
1996			
1997			
1998			
1999			
2000			
2001	1	0.00	
2002			
2003	10	0.35	0.77
2004	20	33.64	0.64
2005	34	54.16	0.35
2006	4	277.70	0.99
2007	8	1.44	0.54
2008	20	63.86	0.48
2009	38	57.46	0.30

Southern New England/mid-Atlantic			
	Mid-water trawl (170, 370)		
Year	Observed trips	Catch (mt)	CV
1994			
1995			
1996			
1997			
1998			
1999	1	0.00	
2000	8	0.00	
2001			
2002			
2003	1		
2004	2	0.00	
2005	19	0.00	
2006	12	0.00	
2007	1		
2008	9	0.00	
2009	16	0.00	

Table 44 - Estimation of haddock catches in the midwater trawl herring fishery. Data have not been filtered; all midwater trawl data are included, regardless of catch composition

Gulf of Maine			
	Mid-water trawl (170, 370)		
Year	Observed trips	Catch (mt)	CV
1994			
1995	4	0.00	
1996			
1997			
1998			
1999	2	0.00	
2000	3	0.00	
2001			
2002			
2003	8	0.00	
2004	59	1.23	0.66
2005	87	3.92	0.37
2006	14	0.06	1.07
2007	7	1.77	0.90
2008	14	0.00	
2009	32	0.04	0.65

Georges Bank			
	Mid-water trawl (170, 370)		
Year	Observed trips	Catch (mt)	CV
1994	1	0.00	
1995			
1996			
1997			
1998			
1999			
2000	1	0.00	
2001	1	0.00	
2002			
2003	10	0.35	0.77
2004	20	34.02	0.64
2005	37	52.19	0.35
2006	4	280.48	0.99
2007	10	1.62	0.60
2008	23	67.66	0.49
2009	39	56.78	0.30

Southern New England/mid-Atlantic			
	Mid-water trawl (170, 370)		
Year	Observed trips	Catch (mt)	CV
1994	31	0.00	
1995	33	0.00	
1996			
1997			
1998			
1999	1		
2000	9	0.00	
2001			
2002	1		
2003	6	0.06	0.92
2004	12	0.00	
2005	27	0.00	
2006	27	0.00	
2007	5	0.00	
2008	23	0.00	
2009	29	0.00	

Table 45 - Estimation of haddock discards in the midwater trawl herring fishery. Data have not been filtered; all midwater trawl data are included, regardless of catch composition

Gulf of Maine			
	Mid-water trawl (170, 370)		
Year	Observed trips	Catch (mt)	CV
1994			
1995	4	0.0	
1996			
1997			
1998			
1999	2	0.0	
2000	3	0.0	
2001			
2002			
2003	8	0.0	
2004	59	1.2	0.66
2005	87	3.4	0.36
2006	14	0.1	1.07
2007	7	1.8	0.90
2008	14	0.0	
2009	32	0.0	
2010	35	0.0	0.86

Georges Bank			
	Mid-water trawl (170, 370)		
Year	Observed trips	Catch (mt)	CV
1994	1	0.0	
1995			
1996			
1997			
1998			
1999			
2000	1	0.0	
2001	1	0.0	
2002			
2003	10	0.1	0.83
2004	20	30.3	0.72
2005	36	46.9	0.40
2006	4	280.5	0.99
2007	10	0.4	0.86
2008	23	7.4	0.43
2009	39	0.5	0.50
2010	88	3.1	0.39

Southern New England/mid-Atlantic			
	Mid-water trawl (170, 370)		
Year	Observed trips	Catch (mt)	CV
1994	31	0.0	
1995	33	0.0	
1996			
1997			
1998			
1999	1		
2000	9	0.0	
2001			
2002	1		
2003	6	0.0	
2004	12	0.0	
2005	27	0.0	
2006	27	0.0	
2007	5	0.0	
2008	23	0.0	
2009	29	0.0	
2010	29	0.0	

Table 46 – Comparison of MWT GB and GOM haddock catch to GB and GOM haddock SSB, landing, catch, bycatch cap. All weights in metric tons

Calendar Year	GB Haddock SSB	US GB Haddock Landings(1)	US GB Haddock Landings plus Discards(1)	US GB Haddock TAC/ACL	US GB Haddock Catch as % of TTAC/ACL	Bycatch Cap (GOM and GB combined)	Quota Monitoring Catch (GOM and GB combined)	Estimated MWT GB Haddock Catch (mt)	MWT Catch % of US Catch	MWT Catch % of TTAC/ACL
2000	75,111	3,203	3,280	6,252	52%			0.0	0.00%	0.00%
2001	90,118	4,820	5,037	11,700	43%			0.0	0.00%	0.00%
2002	104,085	6,532	6,741						0.00%	
2003	126,003	5,760	5,954					0.4	0.01%	
2004	115,770	7,375	8,415	14,955	56%			34.0	0.40%	0.23%
2005	142,954	6,604	7,278	12,282	59%			52.2	0.72%	0.42%
2006	265,994	2,643	3,938	35,309	11%	73.2	8.2	280.5	7.12%	0.79%
2007	315,975	2,930	4,864	90,599	5%	183.7	6.1	1.6	0.03%	0.00%
2008		*5,744*	*6,087*	106,731	6%	245.8	16.8	67.7	1.11%	0.06%
2009		*5,320*	*5,453*	76,515	7%	143.4	23.8	56.8	1.04%	0.07%

Calendar Year	GOM Haddock SSB	US GOM Haddock Landings(1)	US GOM Haddock Landings plus Discards(1)	US GOM Haddock TAC/ACL	US GOM Haddock Catch as % of TTAC/ACL	Bycatch Cap (GOM and GB combined)	Quota Monitoring Catch	Estimated MWT GOM Haddock Catch (mt)	MWT Catch % of US Catch	MWT Catch % of GOM TTAC/ACL
2000	6,501	866	903					0		
2001	10,517	1,120	1,147							
2002	13,667	1,143	1,166							
2003	11,747	1,215	1,237					0		
2004	9,743	1,376	1,403	4,831	29%			1	<0.1%	<0.1%
2005	7,789	1,679	1,716	4,735	36%			4	0.2%	<0.1%
2006	6,275	1,122	1,172	1,279	92%	73.2	8.2	<1		
2007	5,846	1,324	1,370	1,254	109%	183.7	6.1	2	0.2%	0.2%
2008		*1,186*	*1,197*	1,229	97%	245.8	16.8	<1		
2009		*1,042*	*1,055*	1,187	89%	143.4	23.8	<1		

(1) 2008 and 2009 catch estimates are preliminary. GOM catches include recreational harvest.

5.4.3.4 Relationship of Herring to Haddock Catches in Mid-water trawls

Mid-water trawl catches of haddock and herring were plotted on a tow by tow basis to see if there is evidence of a relationship between the catches of haddock and herring – for example, to see if large catches of herring result in large catches haddock. These plots are shown in Figure 28 through Figure 29. Based on these plots there does not appear to be a recognizable relationship at the tow level between haddock and herring catches by MWT. Most tows have no haddock bycatch regardless of the amount of herring caught. However large haddock bycatch tows can rarely occur. Only three tows had haddock bycatch estimates between 10 and 22 thousand pounds.

5.4.3.5 Length/Frequency of Haddock Catches in Mid-water trawls

The length/frequency of observed haddock in MWT tows was plotted by year and haddock stock area (Figure 30). There are few observations in the GOM. On GB the large number of haddock around 25 cm in 2005 shows the presence of the unusual 2003 year class of haddock. Limited observer coverage in 2004 makes it difficult to determine if this same exceptional year class would have been seen at smaller sizes. There are few fish below 25 cm measured in recent years but whether this is a function of weaker year classes and/or lower selectivity of smaller fish is unknown.

Figure 28 – Plot of herring/haddock on observed MWT tows, 1994 – 2009

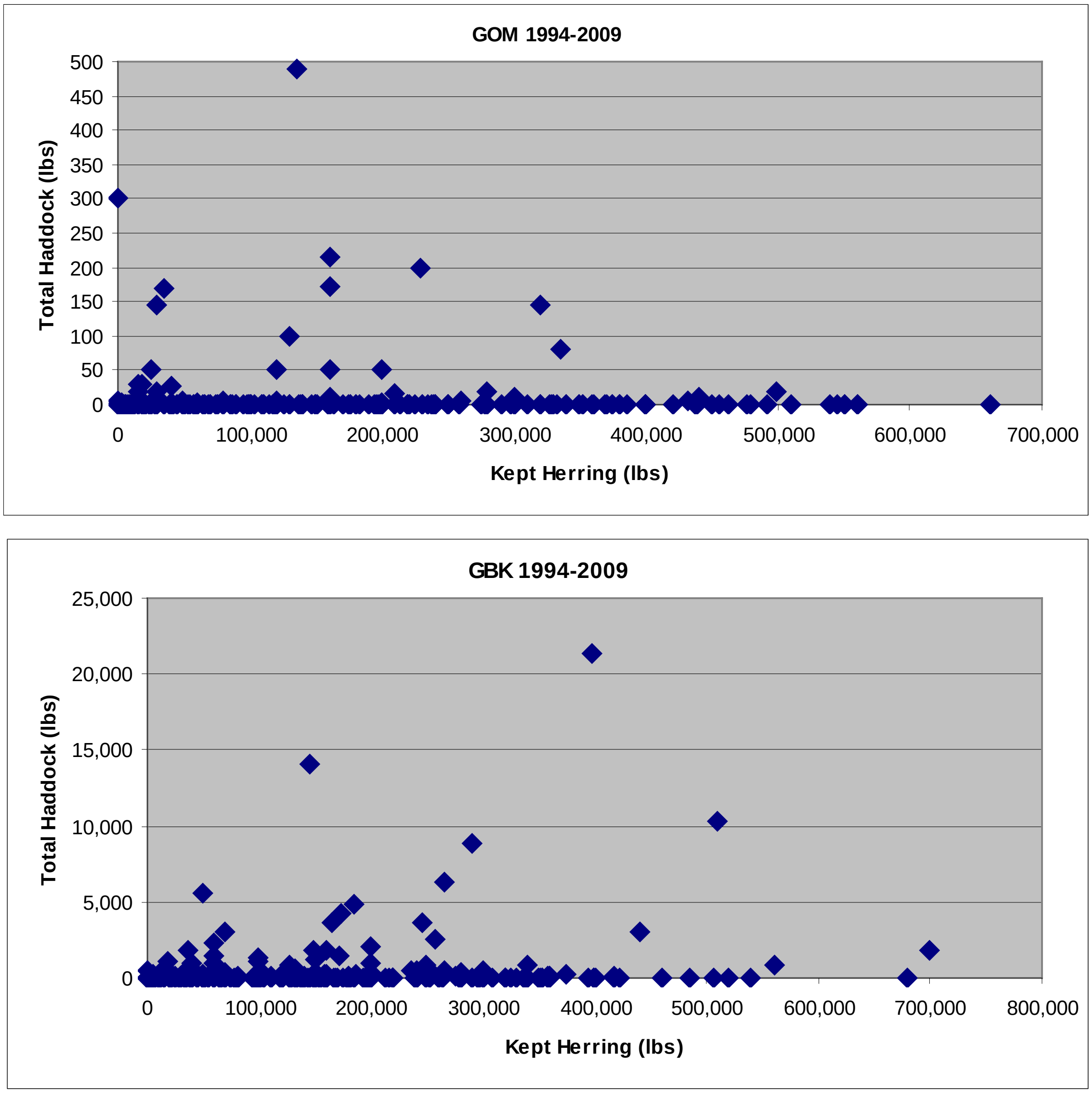
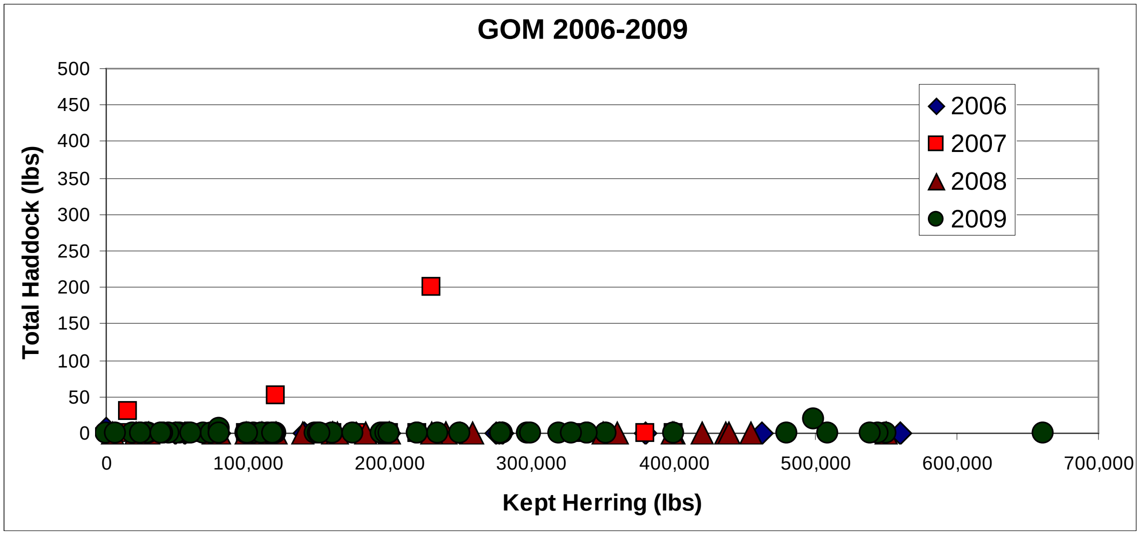


Figure 29 – Plot of herring/haddock on observed MWT tows. 2006-2009



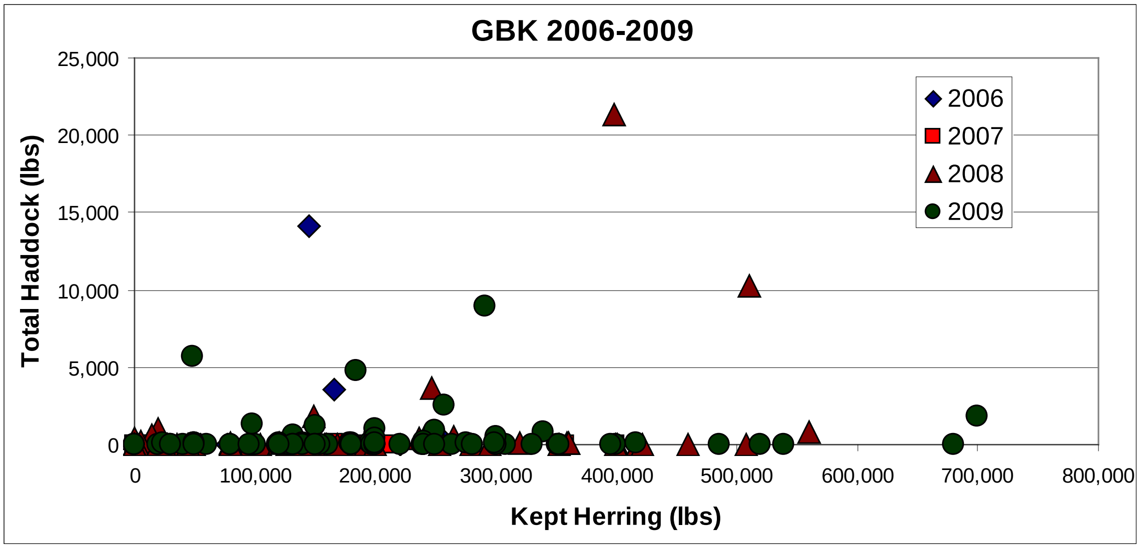
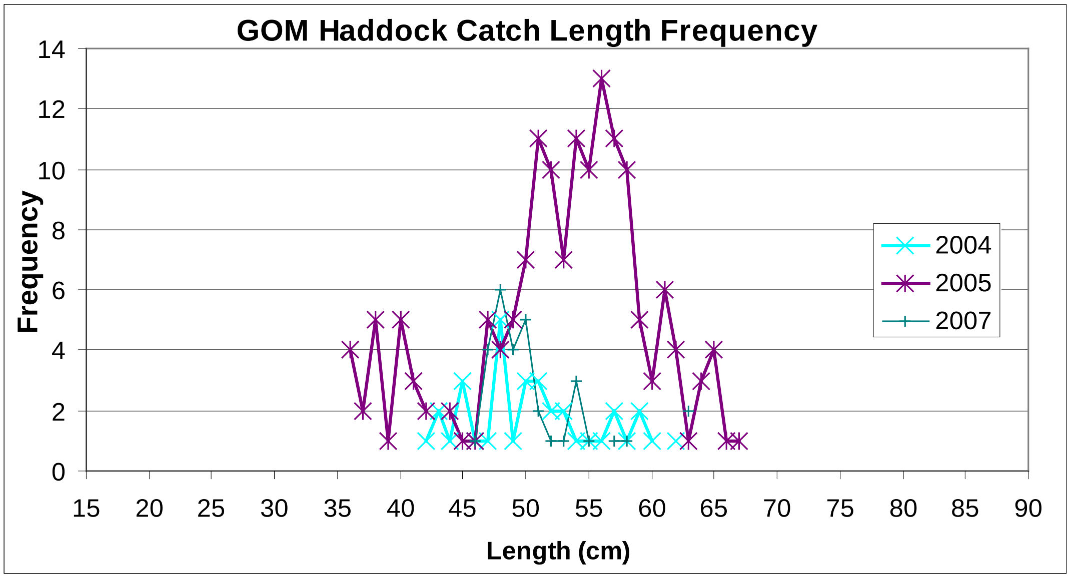
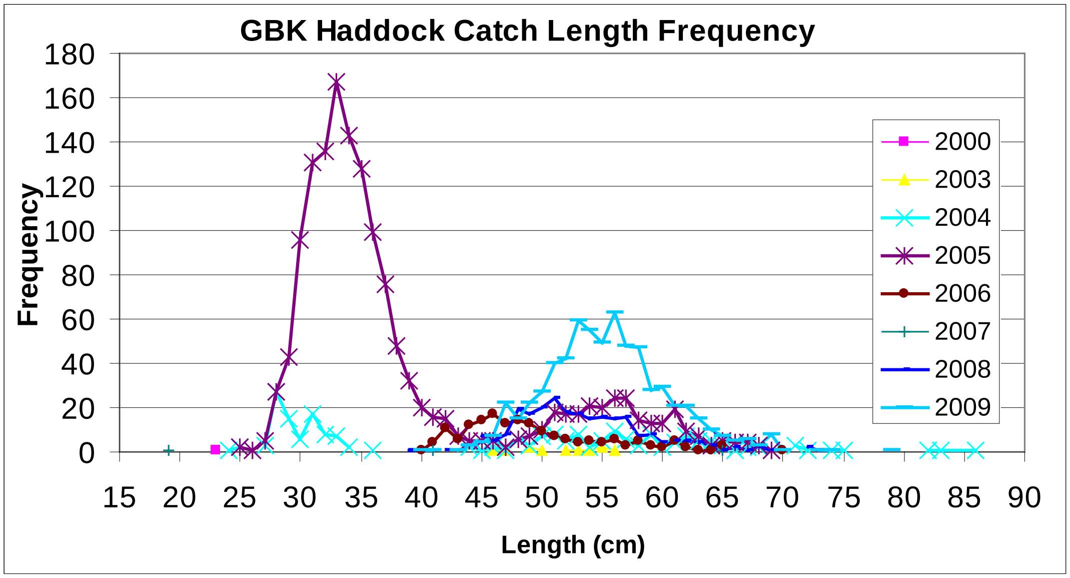


Figure 30 – Length-frequency of haddock on observed MWT tows, 200 - 2009





5.4.3.6 Location of Haddock Catches in the Water Column

The presence of haddock in midwater trawl tows is contentious in part because purse seine midwater trawl gear was originally defined as exempted gear by the Northeast Multispecies FMP in 1996 (NEFMC 1996, Amendment 7). These vessels were allowed to fish in groundfish closed areas based on a review of observer information. Exempted gear was deemed not capable of catching regulated groundfish – a definition clearly at odds with the facts. FW 43 removed this classification and treated midwater trawl vessels as an exempted or certified bycatch fishery – one that is recognized to catch a low level of regulated groundfish. The gear is still defined by the regulations as "…gear that is designed to fish for, is capable of fishing for, or is being used to fish for pelagic species, *no portion of which is designed to be or is operated in contact with the bottom at any time. The gear may not include discs, bobbins, or rollers on its footrope, or chafing gear as part of the net..."* (50 CFR 648.2; emphasis added). Arguments are sometimes made that the only reason that haddock are present in midwater trawl tows is because the gear is being fished illegally in contact with the bottom. Note that it is not illegal to fish in close proximity to the bottom as long as contact is not made.

Haddock are generally considered a groundfish after transition from larval to juvenile and adult stages. The EFH source document for haddock reports that juvenile and adult haddock are demersal (Brodziak 2005). But there is also considerable discussion in the literature that documents the presence of haddock in other parts of the water column. Many of these reports describe haddock in the eastern Atlantic and are not specific to the GB stock, but they may still be representative of haddock behavior. For example, Bergstad et al. (1987) noted that "The haddock is often characterized as a benthic species, but may frequently occur in midwater…Sonina (1980) described large midwater concentrations from the western Barents Sea. A floating long-line fishery takes place annually in July-August along the Finmark coast." Olsen et al. (2009) summarized haddock behavior in the Barents Sea by stating that "Mature haddock perform more extensive vertical migration than juveniles and are generally found higher in the water column at night. In late summer, large haddock are found high in the water column all day along the coast off eastern Finmark."

The location of haddock in the water column is of particular interest to the designers of fisheries trawl surveys as it affects the interpretation of survey results. Aglen et al. (1999) conducted a study that was characterized by a pelagic distribution (> 10m) of large haddock during the day and of juvenile haddock and redfish at night and noted that changes in vertical distribution can occur on an annual basis as a result of changes in size composition and fish density. In contrast, Petrakis et al. (2001) studied day-night and depth affects on bottom trawl survey catch rates in the North Sea and concluded that the proportion of haddock close to the bottom and vulnerable to the bottom trawl was higher during the day. The increased use of acoustic surveys has led to further investigation of the vertical distribution of haddock and other species in the water column. This is in part because there is a "dead zone" near the bottom where acoustic density cannot be accurately measured and as a result information is needed on vertical distribution in order to correctly interpret survey results at different times of the day. Stensholt et al. (2002) used data from surveys along the Norwegian coast, North Sea, Barents Sea, west of the British Isles, and in the Irminger Sea to examine vertical distribution density of blue whiting, cod, haddock, redfish, saithe (pollock), capelin, and haddock. They noted that haddock tend to be in the bottom half of the water column but adapt to pelagic living more often than cod and have a greater variation in vertical profiles in the summer as compared to winter. Year to year variation was also observed and in some cases more than half the haddock acoustic returns were in the upper half of the water column. Diurnal changes were noted as well.

This brief overview of the literature indicates that haddock can be found both in close proximity to the bottom and at other levels in the water column. This does little to resolve the question of where haddock caught in mid-water trawls on GB were taken – that is, are they being caught when the gear is fishing on the bottom or not. A sense of how often this may occur can be developed by examining the species caught in mid-water trawl tows, as reported by observers. Table 47 summarizes the number of times a species was reported by observers in mid-water trawl tows since 1989. Only tows with an observer flag <> 0; a flag of 0 historically meant discards were not observed for a tow. Only those species seen in at least 10 tows are shown here; another 97 species were observed in 9 or fewer tows. This table shows that in the case of observed tows the likelihood of observing a particular bottom-dwelling species was less than ten percent during this period.

It should be noted that even species that are considered bottom-dwelling may rise vertically in the water column. For example, Cadrin and Moser (2006), Cadrin and Westwood (2004), and Walsh and Morgan (2004) all documented instances when yellowtail flounder rose above the bottom, with instances documented of the fish rising to 18 m to 25 m above the sea floor. So the presence of typical bottom dwelling species in a haul is not a definitive indication the gear was fished in contact with the bottom.

A further analysis was performed for observed MWT tows in the area of GB since 2004, since this is the area where most haddock bycatch occurs and observer coverage increased in recent years. This analysis identified the number of tows that caught haddock and whether or not typical bottom-dwelling species were caught in the same tows. For this exercise GB was defined as statistical areas 521/522/525/526/561/562. The other species that were considered bottom-dwelling species were winter flounder, plaice, witch flounder, halibut, windowpane flounder, lobster, monkfish, all skate species, yellowtail flounder, and metal debris. Note that some of these species were observed in less than ten tows since 1989 and as a result are not included in Table 47.

As shown in Table 48**,** from 2004 through August 2010, 60 percent of the observed MWT tows on GB caught haddock. 13.7 percent of the tows that caught haddock (8.3 percent of the total observed tows) caught one of the species identified as a bottom dwelling species. There were 52 tows (10.3 percent) that caught the selected bottom-dwelling species but did not catch haddock. This means that 18.6 percent of the observed tows caught one of the selected bottom dwelling species. It also means that haddock was caught without one of these species observed 86.3 percent of the time. For the GB area, from 2004 through August 2010 there was a significant linear relationship (r^2=0.9491; p=0.026) between the number of observed tows and the number of observed tows with haddock (Figure 31). There is also a significant linear relationship between the number of observed tows and the tows with haddock in the GOM stock area (511/512/513/514/515; r2= 0.85; p=0. 25), but the slope of the line is not as steep as for the GB area.

Table 47 – Species observed in MWT tows, entire observer database. 1,596 tows total observed. Species in bold italics are usually considered bottom-dwellers.

Number of Tows	Species	Weight (pounds))
1231	HERRING, ATLANTIC	167,476,860.8
661	DOGFISH, SPINY	784,160.2
561	MACKEREL, ATLANTIC	32,946,194.5
380	HAKE, SILVER (WHITING)	158,754.1
356	SQUID, SHORT-FIN	1,146,524.7
346	HADDOCK	225,917.5
201	ALEWIFE	373,072.4
159	HERRING, BLUEBACK	330,203.3
159	FISH, NK	457,865.2
157	BUTTERFISH	71,637.6
137	SQUID, ATL LONG-FIN	421,326.8
109	SHAD, AMERICAN	43,306.9
95	LUMPFISH	3,596.5
93	COD, ATLANTIC	2,573.9
82	***MONKFISH (ANGLER, GOOSEFISH)***	2,395.8
70	HAKE, RED (LING)	6,079.4
70	REDFISH, NK (OCEAN PERCH)	28,646.9
69	HERRING, NK	195,484.1
62	TUNA, ALBACORE	40,073.0
60	SWORDFISH	7,327.0
56	BASS, STRIPED	5,941.0
54	POLLOCK	3,501.8
51	BLUEFISH	2,471.1
51	DORY, BUCKLER (JOHN)	7,142.9
49	DEBRIS, FISHING GEAR	6,479.4
45	TUNA, YELLOWFIN	20,378.0
44	TUNA, ALBACORE	46,050.0
34	***FLOUNDER, AMERICAN PLAICE***	358.0
34	TUNA, BIG EYE	23,173.0
33	SCULPIN, LONGHORN	643.9
30	HAKE, WHITE	1,678.2
24	HAKE, NK	5,503.6
23	***FLOUNDER, SUMMER (FLUKE)***	307.3
21	SEA BASS, BLACK	2,059.0
20	HAKE, SPOTTED	288.5
20	SQUID, NK	2,490.2
19	PELAGIC FISH, NK	142.0
18	***FLOUNDER, WITCH (GREY SOLE)***	17.8
18	SHAD, HICKORY	11,905.5
18	***SKATE, WINTER (BIG)***	519.1
17	FLOUNDER, FOURSPOT	278.0
16	SWORDFISH	2,638.0
15	***FLOUNDER, YELLOWTAIL***	88.1
15	***SKATE, NK***	227.0
15	SHRIMP, NK	696.7

Number of Tows	Species	Weight (pounds))
12	SCUP	43,233.4
12	SWORDFISH	2,949.0
11	***FLOUNDER, NK***	76.0
11	TUNA, YELLOWFIN	2,287.0
11	LANTERNFISH, NK	12.3
10	MACKEREL, CHUB	4,915.0
10	MENHADEN, ATLANTIC	1,773.0
10	SEAWEED, NK	254.0

Table 48 – Count of observed MWT tows on GB and instances of haddock and other species catches. See text for details. 2010 data through August

Year	Number of Observed Tows	Number of Observed Tows Catching Haddock	Number of Observed Tows Catching Haddock and Certain Other Species (see text)	Number of Observed Tows Catching Only Certain Other Species
2004	40	24	7	8
2005	91	63	21	23
2006	9	6	1	1
2007	21	3		1
2008	68	25		1
2009	91	44	3	6
2010	186	140	10	12
Total	506	305	42	52

Figure 31 – Relationship between the number of observed MWT tows and the number of observed MWT tows catching haddock, 2004 – August 2010, GB area.

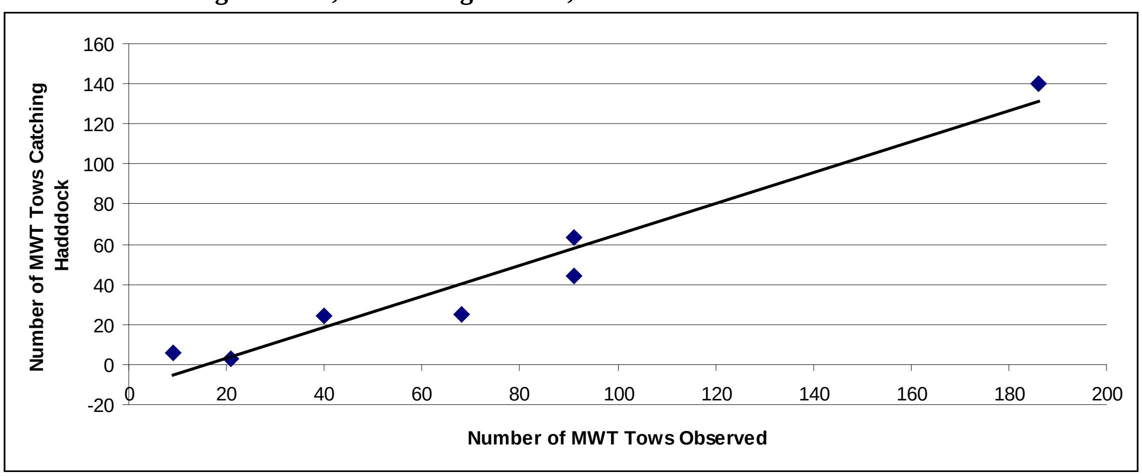
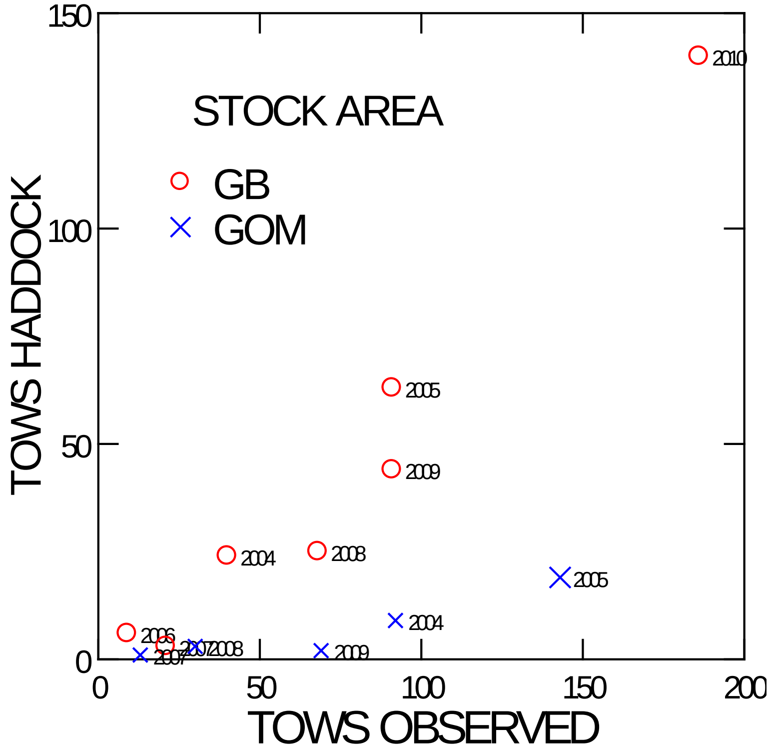


Figure 32 – Relationship between number of observed MWT tows and the number of observed MWT toes catching haddock, 2004 – August 2010, GOM and GB areas.



In the GB area, most of the MWT tows that capture haddock occur between the hours of 6 a.m. and 8 p.m. (Figure 33). This is also the period when most tows occur so this information is not particularly informative. There is also little indication that the depth of the water where the tow takes place has any influence on the presence or absence of haddock.

Figure 33 – Distribution by time of day of GB MWT tows not catching haddock ("NO") and catching haddock ("YES"); 2004 – August 2010. Time is the hour the tow ended.

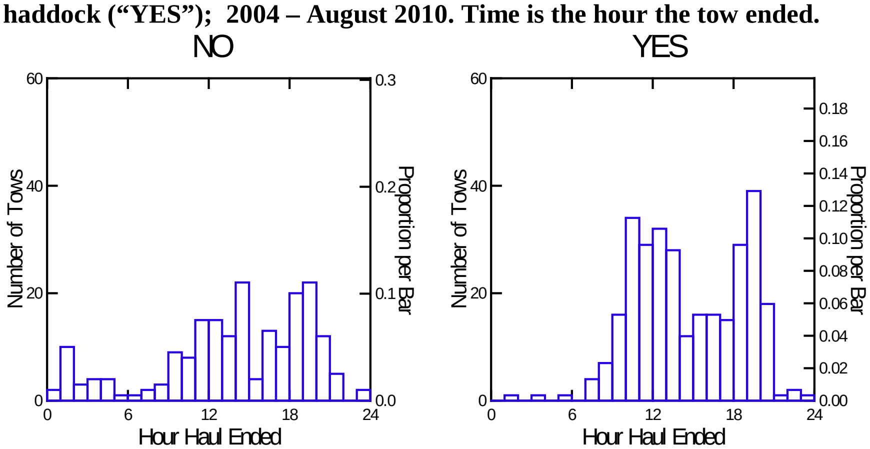
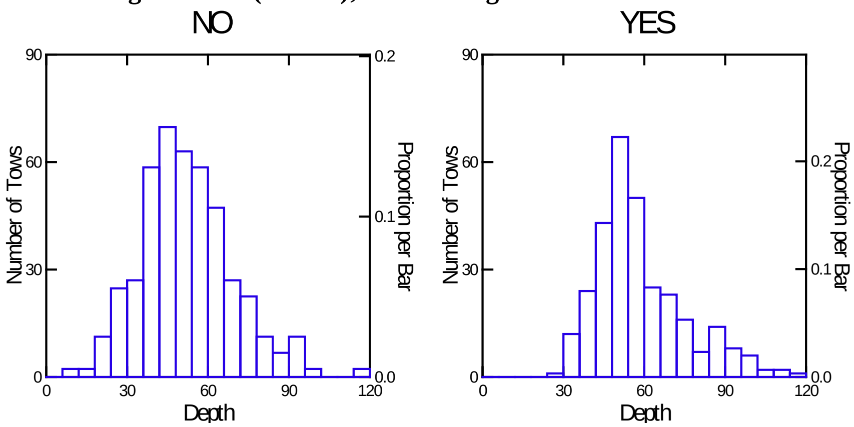
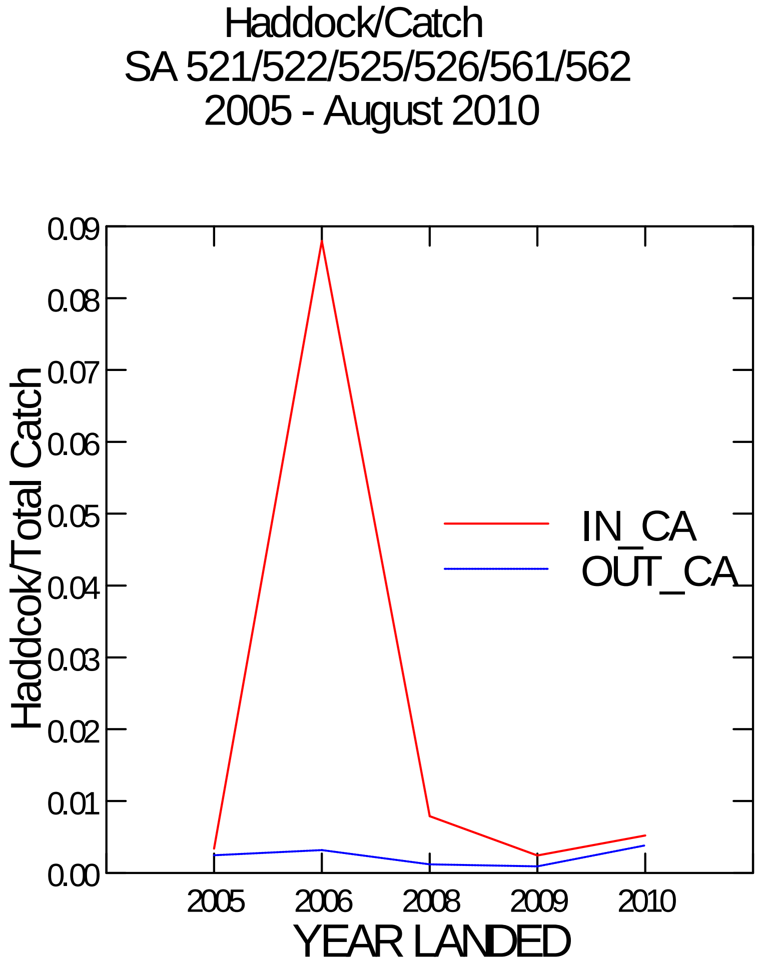


Figure 34 – Distribution by depth of water (fathoms) of GB MWT tows not catching haddock ("NO") and catching haddock ("YES"); 2004 – August 2010.



To determine if catch rates of haddock on GB are higher within the groundfish closed areas than outside the closed areas, an annual ratio of the catch of haddock to the total catch was calculated for tows that ended inside a closed area and those that ended outside a closed area. Only CAI had more than one observed tow during the period 2004 through August 2010 (see the following section for additional information on 2010); there were no tows observed in CAI in 2007. Figure 35 compares these annual ratios and reveals that the ratios were similar except for 2006. In all years, however, the ratio inside CAI was different than outside CAI, but a non-parametric sign test determined that the null hypothesis that the ratios are the same cannot be rejected at the 0.05 level of significance (p= 0.063). This result is driven by the small numbers of data points; a Wilcoxon sign test returns a result that rejects the null hypothesis that the ratios inside and outside the areas are the same.

Figure 35 – Comparison of haddock catch:total catch in and outside of CAI. No tows were observed in CAI during 2007.



5.4.3.7 Catches Not Brought Onboard

In the herring fishery, not all catch is brought onboard after every haul. These released catches include operational discards (fish sill in gear after pumping is completed), partial slippage (some fish pumped), full slippage (no fish pumped), and gear damage. Partial/full slippage accounted for about 1.5% of total observed catch. This issue was examined in detail by the herring PDT in July 2010; the following information is extracted from a Herring PDT report dated July 15, 2010. The focus of the Herring PDT analysis was the impact of released catch on total herring catches, but the report also noted that these events might influence estimates of bycatch species.

"When operational discards were observed, comments indicated fish "were left in net after pumping" or "fell out of gear when pumps were switched." Operational discarding events represent the smallest amounts of released catch (see Figure 36). Partial slippage events included comments like "vessel capacity filled," "too many dogfish," "poor quality haul," "pump jammed by dogfish," and "captain did not like the mackerel:herring ratio." Full slippage events included comments like "herring too small," "too many dogfish," "not enough to be worth pumping," and "undesired catch, thought he set on herring."

Table 49 Frequency of Released Catch Events 2008/2009

year	month	# hauls covered	kept lbs observed	# hauls w/ released catch	estimated lbs released
2008	Jan	18	822,447	0	
2008	Feb	13	2,621,846	0	
2008	Mar	17	2,184,187	5	17,000
2008	Apr	7	1,890,207	0	
2008	May	21	4,884,872	1	20,000
2008	Jun	27	2,560,004	2	280
2008	Jul	34	3,712,098	5	250,600
2008	Aug	14	2,626,778	0	
2008	Sep	5	110,020	1	200
2008	Oct	40	6,617,020	6	18,740
2008	Nov	24	5,181,209	2	130
2008	Dec	18	4,794,028	4	25,400
2009	Jan	38	7,432,979	2	10,201
2009	Feb	28	2,782,767	6	175,950
2009	Mar	16	1,958,569	2	226,000
2009	Apr	17	3,585,031	3	300
2009	May	33	3,711,450	10	107,675
2009	Jun	35	2,339,028	22	28,595
2009	Jul	43	5,773,521	23	181,580
2009	Aug	36	3,040,099	15	81,650
2009	Sep	85	17,204,553	27	402,117
2009	Oct	64	10,046,838	20	214,400
2009	Nov	67	11,730,652	34	938,215
2009	Dec	11	131,920	2	6,025

Figure 36 Analysis of Comments Regarding Released Catch

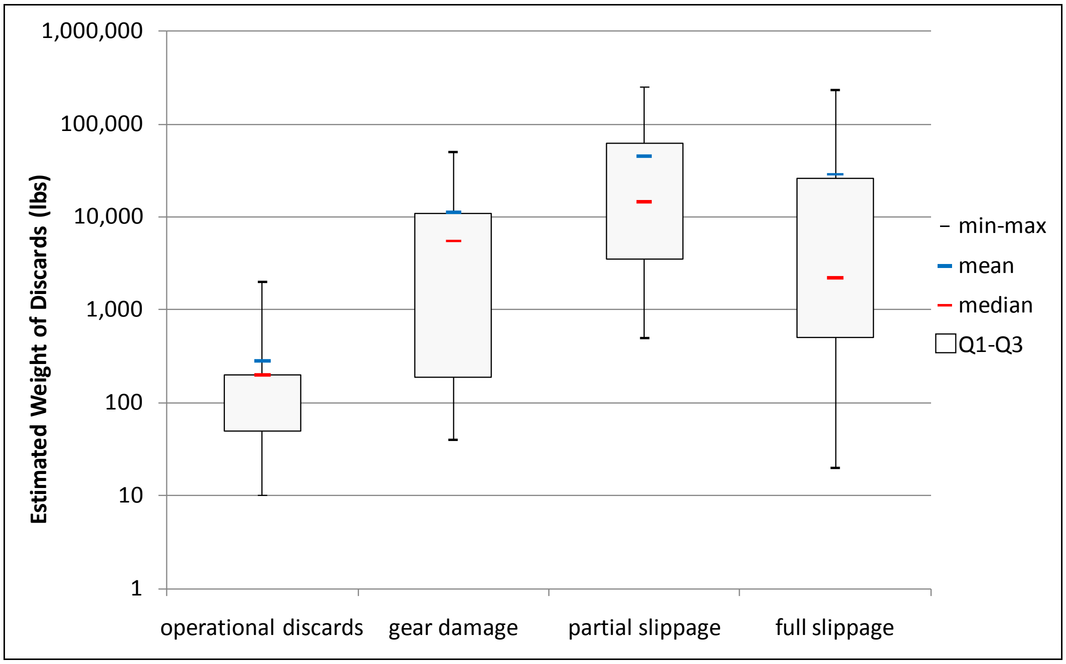


Figure 37 Analysis of Comments Regarding Released Catch (continued)

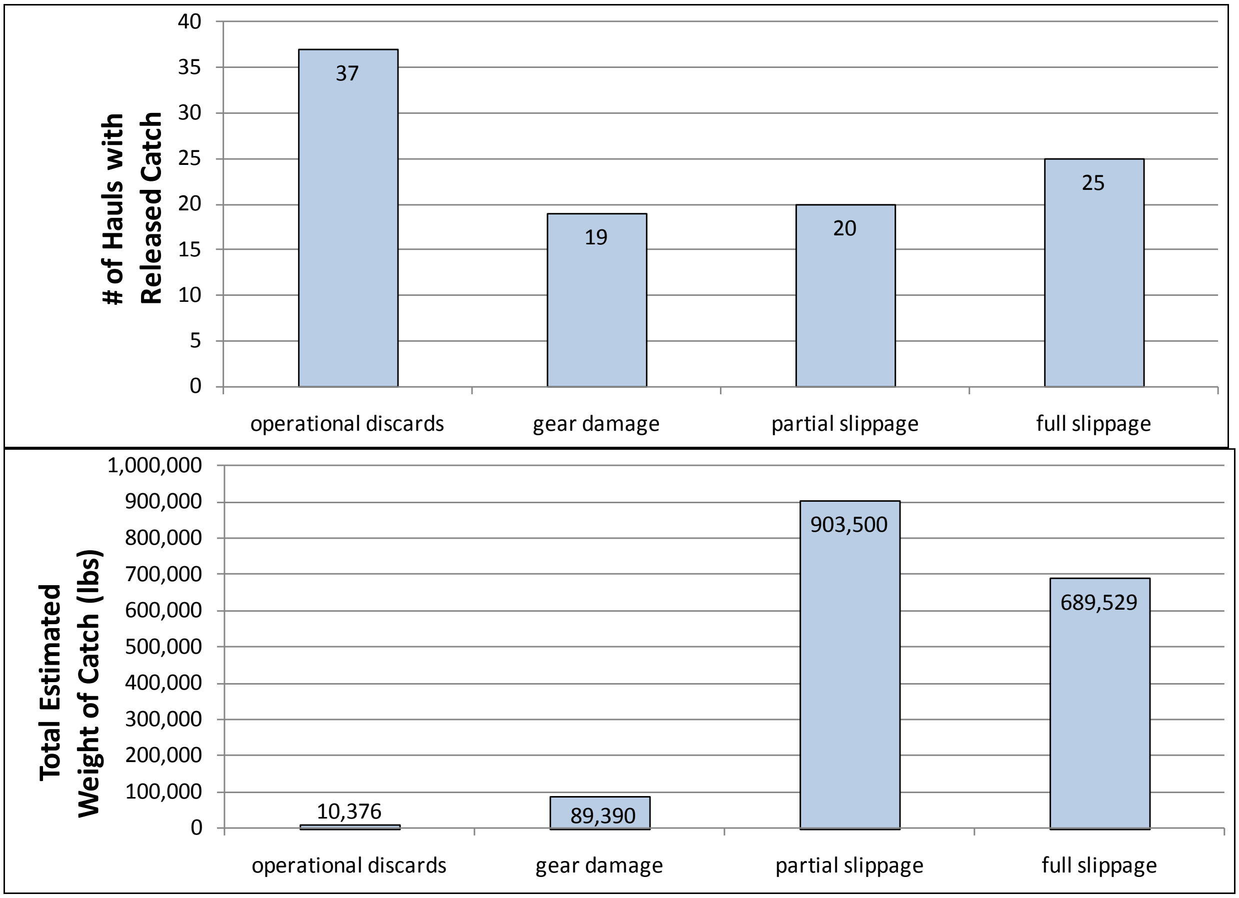
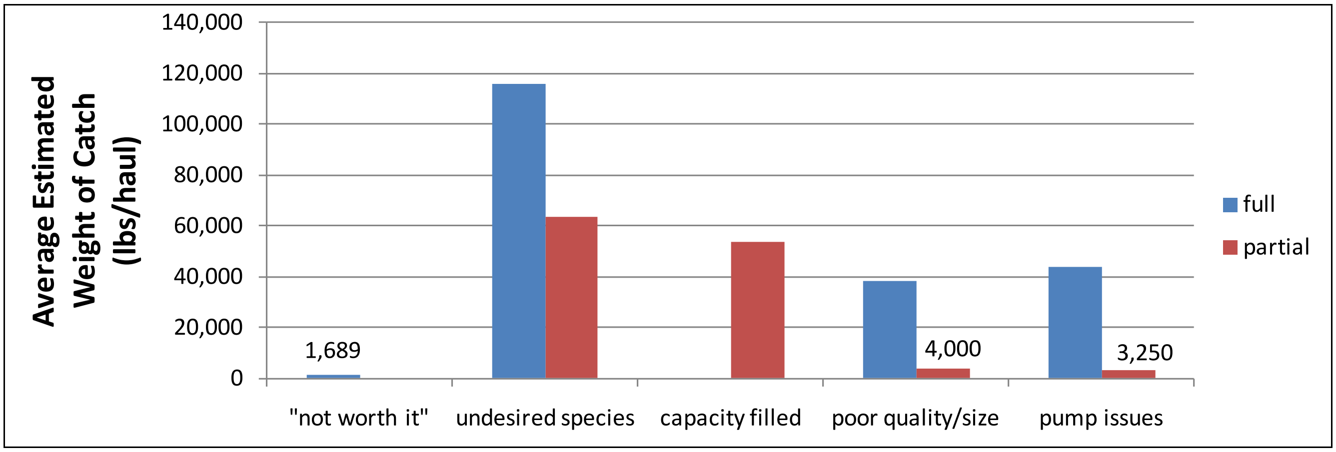


Figure 38 Information about Full and Partial Slippage Events 2008/2009



"Information about slippage events from observer data suggests that when breaking out observed "released catch" events into *full slippage*, *partial slippage*, *operational discards*, and *gear damage*, full/partial slippage only represents about 1.5% of the observed catch in 2008 and 2009, which are years during which observer coverage was relatively high (greater than 20%). The observer program reported that there are very few instances of slippage events where the captains report that they are slipping nets because they are not satisfied with the contents of the bag. Consequently, a slippage cap would only address a small proportion of "released catch" events and may be relatively ineffectual at motivating the herring fishery to take greater care to avoid non-target species. The PDT believes that that there are additional measures under consideration in Amendment 5 to continue to encourage the minimization of slippage in the fishery and to improve documentation of any slippage that may occur (see below for examples)."

The NEFOP has updated its observer training program to address new requirements for herring vessel access to Closed Area I as well as general training for observing high volume fisheries. In 2010, the NEFOP has conducted three high-volume fishery training classes to recertify 70 observers. The program is designed to improve sampling in fisheries that pump fish on board and ensure that only experienced observers who have proven high data quality will be assigned to these fisheries. The program was developed to improve fishery-specific training and focuses on defining gear, understanding bycatch issues, knowing and identifying species of concern, sub-sampling methodology, common scenarios, safety, and the process of pumping fish on board.

The NEFOP also implemented a discard log in 2010 to obtain more detailed information regarding discards in high-volume fisheries. The new discard log is completed for every trip during which fish are pumped, and it includes fields to provide information on what kind of discard event may have occurred, whether or not the observer could see the codend when pumping stopped, why catch may have been discarded, information about the composition of discarded catch, and any challenges the observer may have experienced when observing the haul. Observers are also bringing in samples of fish from every trip to confirm species identification.

5.4.3.8 MWT Observations on GB in 2010

On November 3, 2009, NMFS announced new regulations for any vessel issued an All Areas or an Areas 2 and 3 limited access herring permit fishing in Northeast Multispecies CAI. These requirements included 100 percent observer coverage on trips in the closed areas and a prohibition on releasing catch before it is sampled by an observer, except in certain circumstances. As a result of this observer requirement, vessels that intended to fish in the closed area were required to declare their intent when making a pre-trip notification to the observer program. As a result of this requirement, there was a high percentage of observer coverage on mid-water trawl trips to Herring Management Area 3 in 2010. There were 114 observed trips on GB in CY 2010; 105 in FY 2010. Through March, 2011, during FY 2010 there were 135 MWT trips on GB according to VTR records. As a result, about 84 percent of reported VTR trips carried an observer during the fishing year. Total herring landings from GB in CY 2010 were about 15,430 mt according to IVRs. Estimated landings on observed trips were about 14,700 mt, so about 95 percent of the landed herring came from observed trips. This provides a near census of MWT fishing activity on GB in CY and/or FY 2010. The analyses were performed when data were available through October 2010, so these data reflect an additional two months of data that were not used in the previous sections.

The analyses that follow differ slightly from those in a previous section. First, they are based on the ending tow locations to be consistent with how NMFS determines catch areas. Second, the data below are reported for all tows on trips with an observer unless otherwise specified, and not just those tows that are flagged as observed (which means discards were estimated). While this gives a higher count of tows and accounts for more MWT catch, it could be argued that by including tows where discards may not have been estimated it makes discards appear lower than actually occurred. Observer practices for pair trawl trips differ slightly from those used with other gear. A tow is only coded as observed if all the catch is observed and discards are estimated. In pair trawl operations, if the catch is split between the two vessels, the tow is coded as not observed because the observer does not see the catch that is take onto the other vessel. As shown in the table below, differences between the two approaches are minor. These analyses consider not just haddock, but all groundfish to reflect that there are regulatory requirements that set a standard for the amount of groundfish caught in closed areas as a proportion of the amount of herring and mackerel kept (50 CFR 648.81(a)(2)(iii)). Almost all the groundfish catch is haddock, and almost all the kept catch is Atlantic herring.

Table 50 – Summary of catches on observed MTW trips to GB in CY 2010. For this analysis GB defined as SAs 521/522/525/525/561/562 only

	Groundfish Caught	Alt Herring Kept	Mackerel Kept	Herring NK Kept	Ratio Groundfish/ (Herring + Mackerel)
		All tows on trips with an observer			
CAI	22,525	4,790,088	27,810	0	0.0047
CAII	44,248	1,423,605	0	0	0.0311
Open	87,623	26,165,111	121,174	4	0.0033
Total	154,396	32,378,804	148,984	4	0.0047
Combined CAs	66,773	6,213,693	27,810	0	0.0107
		Tows coded as observed only			
CAI	21,828	4,245,530	2,370	0	0.0051
CAII	43,772	1,254,462	0	0	0.0349
Open	86,603	24,201,905	121,169	4	0.0036
Total	152,203	29,701,897	123,539	4	0.0051
Combined CAs	65,600	5,499,992	2,370	0	0.0119

Table 50 shows that the observed ratio of groundfish to kept species (almost all of which is Atlantic herring) in 2010 was higher in the closed areas than in the open areas of GB. The difference between CAI and open areas was relatively small, but the ratio for CAII was noticeably higher. As will be seen below, the number of observed tows in CAII was small.

The ratio of haddock (as opposed to all groundfish) to herring was examined in CAI and CAII in two ways. Individual tows were plotted and assigned to the closed area based on where the haul ended. The tows were first summarized by trip and then individual tows were examined. Figure 39 illustrates the trip level data. In CAI the ratio of groundfish caught to herring and mackerel kept varied. Generally the ratio is highest on those trips with the smallest kept catches. The same relationship is not as evident for the trips in CAII, but with only five trips it is difficult to draw conclusions.

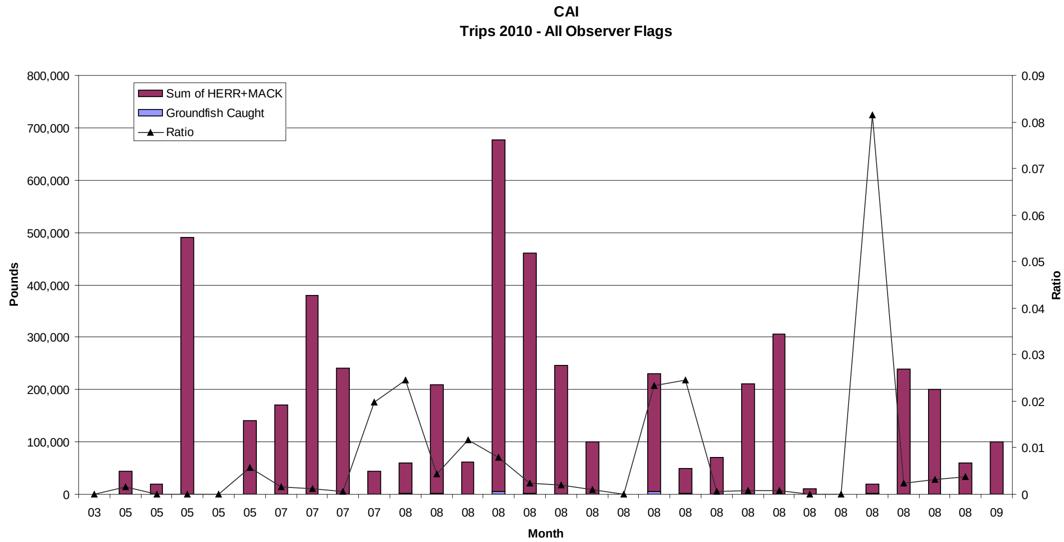
With respect to individual tows (Figure 40), again in CAI it appears that generally the higher ratios of groundfish to kept herring and mackerel occur with small kept catches, though this is not always the case. There are a limited number of tows in CAII that preclude drawing firm conclusions but it does appear that even on an individual tow basis more groundfish is caught in CAII.

The regulatory change in 2009 also limited when catch could be released without being brought onboard. When compared to previous years, it does appear that the magnitude of the catches (all species) that were released declined in 2010 (Figure 41; Table 51). The average catch not brought on board in 2010 was between 100 and 200 pounds, and unlike previous years there were no instances where the catch not brought on board exceeded 10,000 pounds. This is very different than in 2005, the last year before FW 43 modified the regulations for the herring fishery by establishing a haddock catch cap. While there were fewer tows observed, in 2005 the average released catch was about 3,500 pounds and there were several instances over 10,000 pounds, including one over 100,000 pounds.

The high level of observer coverage in CY 2010 for trips on GB also facilitates a comparison between the haddock quota-monitoring catch estimates used in 2010 and the expanded catch estimate approach under consideration in two of the options in this action. The method for in-season monitoring of haddock catches will be determined by NMFS but is likely to be similar to the cumulative ratio method used to estimate discards in the groundfish fishery. This method develops a ratio of the catch or discards of the species in question to the total kept catch on observed trips. The ratio is based on all observed trips as of a certain date – the numerator and the denominator are both cumulative sums. This ratio is then expanded to a catch estimate based on total kept catch. For this example analysis, IVR data from 2010 was used with the actual observed trips in 2010. Since the IVR only includes kept herring, the ratio for this example was based on kept herring and not total kept catch.

The results are shown in Figure 42. The cumulative ratio tends to fluctuate initially but settles out as more observed trips take place. As a result, there is some variability in the estimated catch of haddock. The ratio becomes less variable as the number of observed trips increases and the haddock catch is driven primarily on the amount of landings. The catch estimate totaled about 159,000 lbs., or 72 mt. This is slightly higher than the quota monitoring value of 153,000 pounds that was reported by NMFS. That these two numbers are similar should be expected since so many herring trips were observed in 2010. If the full 38,146 mt Area 3 herring TAC had been landed, and the ratio of haddock caught to herring landed remained similar to that shown here, the total catch of haddock would have approached 180 mt, or 0.45 percent of the FY 2010 GB haddock ACL, 0.55 percent of the FY 2011 GB haddock ACL, and 0.65 percent of the likely FY 2012 GB haddock ACL. Because herring accounts for almost all the kept catch in this area it is not likely the results would have been much different if total kept catch was used for the expansion.

Figure 39 – CY 2010 MWT trips in CAI and CAII (Source: NEFOP)



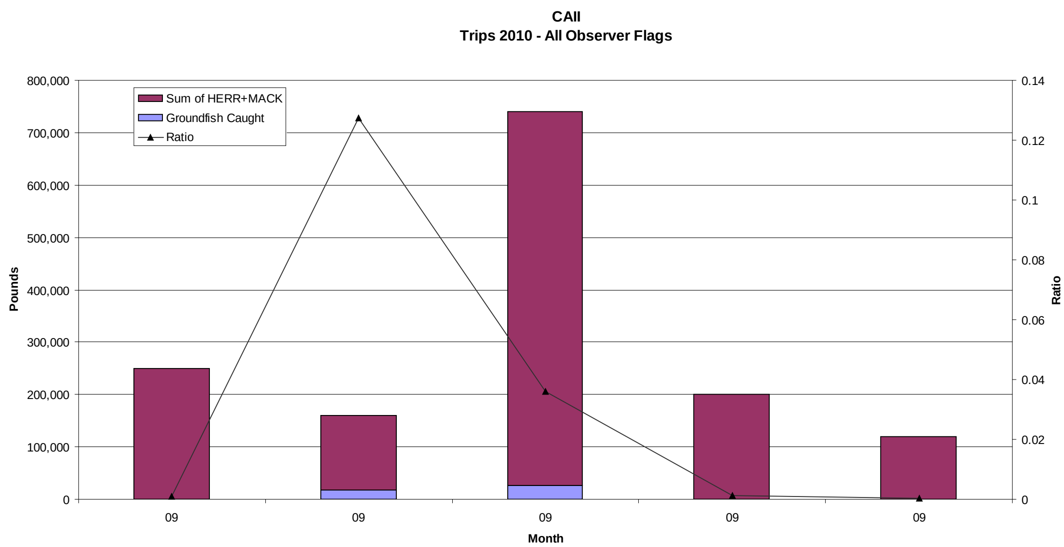
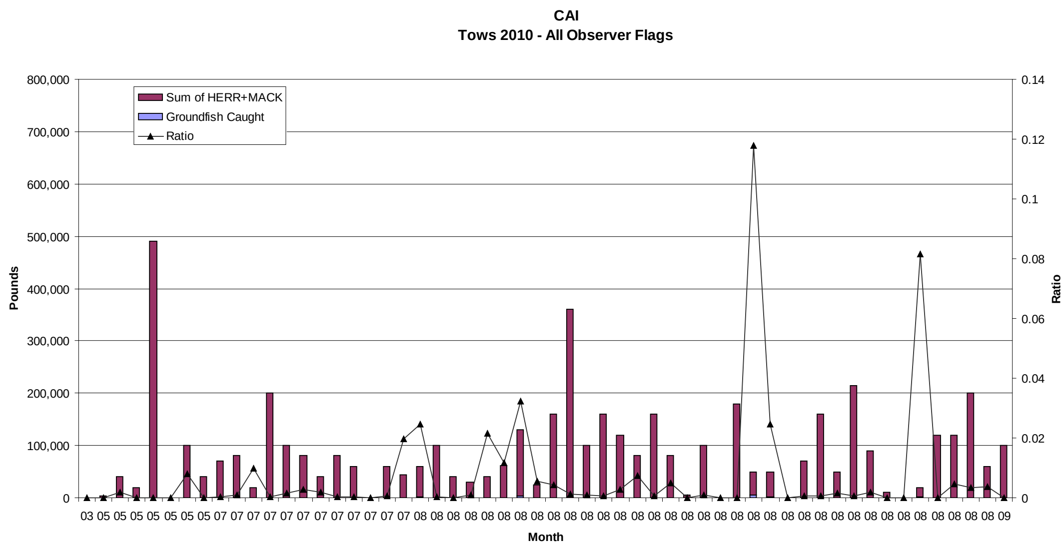


Figure 40 - 2010 MWT trips in CAI and CAII (Source: NEFOP)



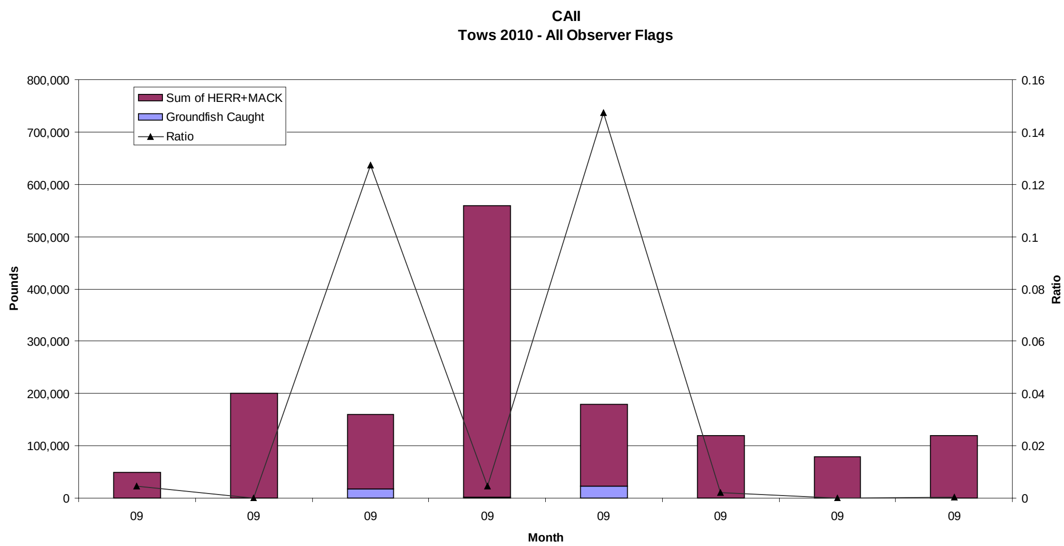


Figure 41 – Pounds not brought onboard, FY 2010 MWT tows on GB

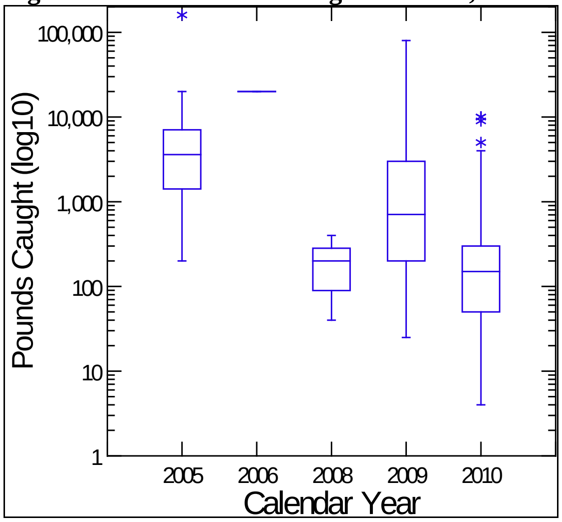
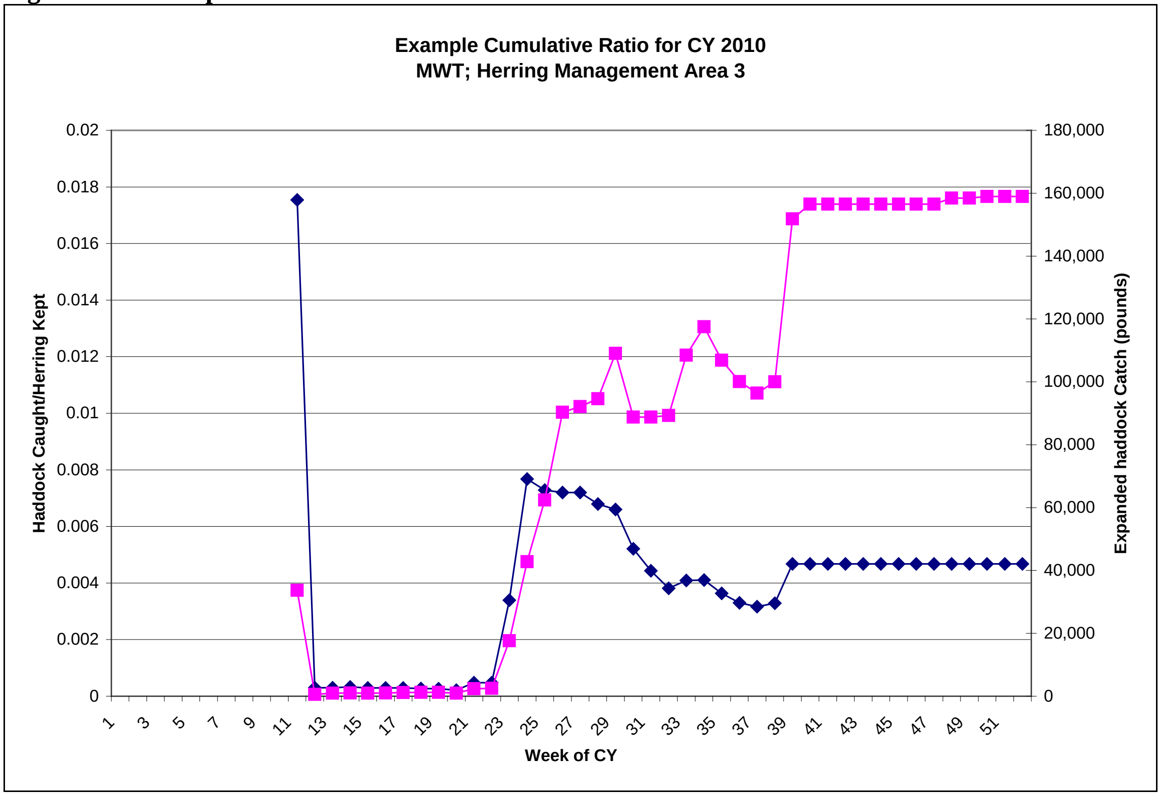


Table 51 – Summary of CY 2010 MWT observed tows with released catch on GB (through October 2010)

Area	Tows	Number of Tows Catch Not Brought Onboard	Catch Not Brought Onboard (lbs.)	Total Catch, Tows With Released Catch (lbs.)	Total Catch All Tows (lbs.)
CAI	56	20	3,703	1,190,357	4,850,133
CAII	8	4	2,800	1,469,219	4,900,062
Open	212	115	70,848	15,764,850	26,650,355

Figure 42 – Example cumulative ratio haddock catch estimate for CY 2010



6.0 Environmental Consequences – Analysis of Impacts of the Proposed Action

6.1 Biological Impacts

Biological impacts discussed below focus on expected changes in fishing mortality for regulated multispecies stocks (primarily GB and GOM haddock) and Atlantic herring. 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, Atlantic herring, other species, and bycatch (as defined by the M-S Act).

6.1.1 Option 1: No Action

If Option 1/No action is implemented, the herring fishery would be subject to a cap on haddock catch that is equal to 0.2% of the combined GB and GOM haddock ABC. Groundfish ABCs and the cap are calculated based on the calendar year (January-December), but monitored based on the groundfish fishing year (May-April). Only haddock catches that are seen or reported through one of three sources are counted against the cap.

Impacts on Regulated Multispecies
Determining the biological impacts of the haddock catch cap is something of an academic exercise for GB haddock. Because of the large difference between current ACLs and actual catch (in FY 2010 nearly 80 percent of the groundfish ACL will not be caught), the impacts of small changes in the catch of GB haddock by any component of the fishery are not likely to result in a measureable impact on fishing mortality for this stock. In the case of GOM haddock the stock status is not as large as for GB haddock. It is still unlikely that changes in catch of a percent or less of the ACL will have a significant effect on fishing mortality.

By FY 2012, the AMs adopted by Amendment 16 for the multispecies fishery will adopt a hard quota for most elements of the commercial fishery. Groundfish vessels fishing in the common pool will be subject to a hard quota beginning that year, while those vessels in sectors are already subject to hard quotas. Only the part of the non-federal commercial fishery in state waters, and the parts of the fishery that are included in the other sub-components part of the ACL will not be subject to a hard quota. This option would essentially subject the herring fishery to a hard quota for haddock as well by severely constraining herring fishing activity if the cap is reached. As a result, on the surface this option would not likely have any impact on fishing mortality for GB or GOM haddock since the total amount allocated will not exceed the ACL. As long as the various components of the fishery are adequately monitored, catches would remain at or below the ACL and as a result there would be little likelihood of exceeding mortality targets.

There are several elements of this measure that may affect this general conclusion. First, the overall cap would be monitored as a single cap, without respect to stock. The size of the cap would be determined by calculating the percentage from each haddock stock, but the two values would be combined into one value. As a result it is possible that more than 0.2 percent of the ABC could be taken from one stock area. Because of the current size of the GB haddock stock relative to GOM haddock, this would only be a possible concern if the cap was caught in the GOM stock area. As an example, the combined bycatch cap was 245.8 mt in 2008, the largest value of the past five years (see Table 44). This was twenty percent of the GOM haddock TTAC in FY 2008. Had the entire cap been caught in the GOM that year, it is possible that mortality targets for GOM haddock would have been exceeded. There are similar concerns for future years if this option is adopted. While this is possible, it is not likely given that most haddock bycatch occurs in the GB area (see section 5.4.3).

A second element of uncertainty that is embedded in this measure is that only catches that are documented through three sources are applied against the cap. As a result, in almost all instances the catch documented by the monitoring program will under-estimate the total catch of haddock by the herring fishery. Only if all herring trips and tows are observed is it likely that the monitored catch will be close to the actual catch. In years with low observer coverage the difference could be substantial. For example, the data in Table 44 shows that the quota monitoring catch in FY 2006 through 2009 ranged from 0.3 to 49 percent of the actual estimated haddock catch by midwater trawl vessels. Further, in 2006 the quota monitoring catch was only 8.2 mt while the estimated catch of haddock on GB by MWT was 280 mt. If total catches from all sources were approaching the ACL, then an under-estimate of up to several hundred metric tons would increase the risk of exceeding fishing mortality targets. This is unlikely to be an issue with GB haddock at current total catch levels. This is more of a concern for GOM haddock given the smaller size of that stock, but as already noted most haddock catches do not currently occur in this stock area. But it is clear that this catch cap does not necessarily control catches of haddock. It is dependent on the level of observer coverage and the amount of haddock that is counted by the three quota monitoring sources, and not actual catches.

Third, the ACLs incorporate the realized selectivity in the commercial fishery. The commercial groundfish fishery tends to select larger fish (the legal minimum size is now 18 inches). If the herring fishery catches smaller fish than are accounted for in the selectivity used in the projection, then the catches by the herring fishery may contribute more fishing mortality than is indicated by the weight of the catch. Length-frequency charts in section 5.4.3.5, however, show that the MWT vessels do catch a mix of fish sizes. The one exception seems to be in 2005 when the exceptional 2003 year class was caught in large numbers. It is dangerous to draw conclusions from a single year but this experience might be representative of what can be expected when an unusually large year class recruits to the fishery. In this case, the ACL – calculated on the basis of past catches – may not reflect the impacts on fishery selectivity of a large year class. If it does not, then large catches of small fish by herring vessels may sacrifice future yield and contribute more to total fishing mortality than is reflected by the weight of fish caught.

Finally, as discussed in section 5.4.3.8, there are instances when catches are not brought on board herring vessels. These catches cannot be accurately sampled and catch composition and quantity cannot be precisely determined. As a result these catches are not counted against the catch cap. To the extent this occurs, this will result in an under-estimate of the catch by the herring fishery.

With respect to other regulated groundfish species, there is little indication in the observer data that substantial quantities of these species are routinely caught by herring vessels (see Table 47). As a result, if this option were to be adopted it is likely there will be negligible impacts on fishing mortality of these stocks.

Impacts on Atlantic Herring

If the no action option would be selected in this framework adjustment, the Atlantic herring fishery would remain subject to a combined GOM/GB haddock catch cap equal to 0.2% of the ABC, and the directed herring fishery would close in the entire GOM/GB Exemption Area if the haddock cap is reached. In general, this option would not be expected to result in any significant impacts on the Atlantic herring resource. If the haddock catch cap would be reached and the directed herring fishery closed prior to full utilization of the herring ACL (or the sub-ACLs in any of the management areas), then fishing mortality on herring is likely to be lower than that which was predicted in the analysis of the 2010-2012 specifications, which assumes that all yield available to the herring fishery would be fully utilized.

The Atlantic herring resource is not considered to be in an overfished condition, and overfishing is not occurring. In 2009, the Council's SSC concluded that based on the recent updated assessment, the Atlantic herring resource was likely above B_{MSY} (i.e., rebuilt), and fishing mortality was well below the F_{MSY} level. However, significant uncertainty associated with the stock assessment influenced the derivation of the 2010-2012 catch limits; the assessment has a strong 'retrospective pattern,' which tends to over-estimate stock size and under-estimate fishing mortality. Given the magnitude of uncertainty in the herring assessment and reference points, the SSC recommended a "buffer" between the F_{MSY}-based catch level and acceptable biological catch (ABC) to account for scientific uncertainty. The Council further reduced ABC to address management uncertainty when it specified the stock-wide herring ACL (U.S. OY). The 2011 stock-wide ACL for herring (OY) is 68% of the F_{MSY}-based catch level (overfishing limit, OFL), and the 2012 ACL is 72% of the OFL.

Under the no action option, the U.S. OY for Atlantic herring may not be fully utilized if the haddock catch cap precludes the fishery in any management area. While direct benefits to the resource cannot be predicted, less harvest from the fishery increases the "buffer" between the predicted F_{MSY}-based catch level (OFL) and the level of yield actually realized from the fishery. The additional buffer may result in a lower fishing mortality rate and a higher herring biomass than those predicted in the analysis of the fishery specifications.

Impacts on Bycatch

The M-S Act uses the term "bycatch" to mean fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes discards and regulatory discards (16 U.S.C 1802). The M-S Act further requires that FMPs include conservation and management measures that, to the extent practicable and in the following priority, minimize bycatch and minimize the mortality of bycatch that cannot be avoided. NMFS guidelines (NSGs) for implementing this National Standard are published as 50 CFR 600.350. The NSGs note that bycatch includes fish discarded at sea or elsewhere, including economic and regulatory discards. The NSGs require that for each measure, Councils should:

> (1) assess the effects on the amount and type of bycatch and bycatch mortality in the fishery;
> (2) select measures that, to the extent practicable, will minimize bycatch and bycatch mortality.

The NSGs identify the following factors for consideration in determining whether bycatch is minimized to the extent practicable:

> (1) Population effects for the bycatch species.

(2) Ecological effects due to changes in the bycatch of that species (effects on other species in the ecosystem).
(3) Changes in the bycatch of other species of fish and the resulting population and ecosystem effects.
(4) Effects on marine mammals and birds.
(5) Changes in fishing, processing, disposal, and marketing costs.
(6) Changes in fishing practices and behavior of fishermen.
(7) Changes in research, administration, and enforcement costs and management effectiveness.
(8) Changes in the economic, social, or cultural value of fishing activities and non-consumptive uses of fishery resources.
(9) Changes in the distribution of benefits and costs.
(10) Social effects.

As can be seen from this NSG, evaluating whether bycatch has been reduced to the extent practicable is an issue that crosses with biological, protected species, economic, and social impacts analysis. The discussion in this section focuses on the biological effects and the magnitude of bycatch.

The primary species that have been observed in the MWT fishery are the species that are landed and sold: herring (various species, but primarily Atlantic herring), mackerel, and squid. While there are instances where these species are discarded and thus count as bycatch, they are for the most part sold. A wide variety of other species have been observed on an occasional basis (see Table 47). The two identified other species observed in the largest quantities are spiny dogfish and haddock. Spiny dogfish is rarely, if ever, landed by herring vessels and so all of this catch can be considered bycatch. Since the adoption of FW 43 Category A and B herring vessels are required to land haddock, but are not allowed to sell haddock for human consumption and so it can only be sold as bait. To the extent these fish are sold, they do not constitute bycatch, but there are few data in the dealer reports that indicate this routinely takes place. There are reports that some haddock are landed, held for a time by dealers to comply with regulatory requirements, and then taken back to sea and discarded. The haddock disposed of in this manner would meet the definition of bycatch since it is not being sold and not being kept for personal use.

Estimates of the MWT discards of spiny dogfish by MWT vessels were developed in the spiny dogfish assessment in 2006 (NEFSC 2006; SAW 43). Spiny dogfish accounted for less than 5 percent of the total discards in any given year of the 1989- 2005 time series. This assessment estimated discards using a different method than that adopted by the NEFSC in recent years. An updated estimate of MWT discards of spiny dogfish will be prepared as part of a periodic review of the SBRM in 2011.

The most recent specifications package for spiny dogfish estimates that the stock is not overfished. The SSB for 2010 was estimated to be 3 percent higher than the proxy for B_{MSY}, the third year in a row that the stock exceeded its target. The specific estimate of SSB is 164,111 mt. Overfishing was not occurring. Total removals were 11,503 mt. Near- term ABCs (2011-2015) range between 19,701 mt to 20,865 mt.

Estimates of haddock catches by MWT vessels are provided in Table 44. Estimates of discards of haddock by MWT vessels are provided in Table 45. At a minimum, the discards shown in the second table are bycatch. Total bycatch cannot exceed the catch estimate in the first table (but it should be noted that in some years the catch estimates are not precise and the uncertainty around the estimate can be considerable). Since 2006, discards have been minimal when compared to either the total haddock TTAC/ACL or the total haddock catch. When the total catch is considered, haddock bycatch has been less than 100 mt with the exception of 2006.

Under this No Action option, the total catch of haddock is likely to be similar to the values estimated since 2006. While there is year to year variation, catches have been less than 100 mt in most years. Some fraction of this catch is bycatch; there are only estimates for the portion that is discarded. Discards are such a small fraction of the available GB haddock ACL that these values are not likely to lead to any noticeable biological effects. Even if most of the catch is bycatch because it is not sold or kept for personal use it is unlikely that there will be noticeable effects. Based on experiences with the 2003 year class of haddock, it is possible that if there is an exceptionally large incoming year class that catches and bycatch will increase but even so there is little evidence this will damage the resource. Similar to the discussion of biological impacts, only if the majority of the bycatch was taken from the GOM haddock stock would there be a concern over the impacts.

Similar effects are likely with respect to spiny dogfish. Again – assuming discard rates are similar to the SAW 43 estimates – since discards are such a small proportion of removals it is not likely that there will be noticeable effects on the spiny dogfish stock.

One uncertainty with this option is that the amount of bycatch of any species will in part be a function of the observer coverage. In years with low observer coverage the haddock cap is less likely to be reached, more fishing will occur, and bycatch may increase. Conversely, in years with high coverage it may be more likely the cap will be reached and bycatch may decline.

Table 52 - Total spiny dogfish discard estimates (mt) by gear type, 1989-2005 using expansion based on discard to kept. Zero values mean that no trips were observed. Table reproduced from SAW 43.

Year	gill net	line trawl	longline	midwater trawl	otter trawl	pair trawl	purse seine	scallop dredge	scallop trawl	shrimp trawl	Grand Total	MWT as Percent
1989	5,360	-	-	-	28,286	-	-	-	-	6	33,652	
1990	6,062	-	-	-	34,243	-	-	-	-	-	40,305	
1991	11,030	97	-	1	19,322	-	-	32	-	2	30,484	0%
1992	5,953	650	-	-	32,618	-	-	827	-	0	40,048	
1993	9,814	-	44	-	17,285	235	-	209	-	-	27,587	
1994	2,887	-	-	-	13,909	-	-	723	-	-	17,519	
1995	6,731	-	-	6	16,997	-	-	378	-	-	24,112	0%
1996	3,890	-	-	-	9,402	-	-	121	-	-	13,413	
1997	2,326	-	-	-	6,705	-	-	198	-	-	9,228	
1998	1,965	-	-	-	5,268	-	-	120	-	-	7,353	
1999	2,005	-	-	-	7,685	-	-	41	-	-	9,731	
2000	4,684	-	-	155	2,728	-	-	14	-	-	7,580	2%
2001	7,204	-	-	-	4,919	-	-	30	-	-	12,153	
2002	4,997	4,015	-	147	5,541	-	-	58	-	-	14,757	1%
2003	5,413	2	-	150	3,853	-	0	103	-	0	9,521	2%
2004	4,031	497	-	481	8,299	-	65	53	32	0	13,457	4%
2005	3,338	1,175	-	217	7,515	-	3	15	3	-	12,266	2%

6.1.2 Option 2: Haddock Catch Cap of 1% for the Midwater Trawl Fleet

If this option is implemented, a stock-specific haddock catch cap would apply to the MWT fleet. The cap is 1 percent of the ABC for each stock. Total catches of haddock would be estimated from observer data and expanded to the entire MWT fleet using procedures developed by NMFS. If the cap is reached the MWT vessels would be prohibited from possessing in a defined area.

Determining the biological impacts of the haddock catch cap is something of an academic exercise for GB haddock. Because of the large difference between current ACLs and actual catch (in FY 2010 nearly 80 percent of the groundfish ACL will not be caught), the impacts of small changes in the catch of GB haddock by any component of the fishery are not likely to result in a measureable impact on fishing mortality for this stock. In the case of GOM haddock the stock status is not as large as for GB haddock. It is still unlikely that changes in catch of a percent or less of the ACL will have a significant effect on fishing mortality.

The 1 percent cap is similar to the largest estimated value for GB haddock catch by the herring fishery that was estimated for recent years (0.79 percent in 2006; see Table 41). It is a robust value that would account for fluctuations in GB haddock stock size. As discussed in section 5.4.3.8, using 2010 observer data the catch monitoring approach proposed in this option would have estimated the 2010 haddock catch at 0.65 percent of the 2012 GB haddock ABC. In most years the MWT catch of haddock was estimated to be between 50 and 100 mt. A 100 mt catch of haddock would be 1 percent of a 10,000 mt ABC. This is approximately the ABC associated with a GB haddock stock size of between ½ and 2/3 B_{MSY}. This suggests the 1 percent cap is likely to be sufficient to allow the herring fishery to operate on GB for a range of GB haddock stock sizes from about ½ B_{MSY} to B_{MSY} . If the experiences with the exceptionally large 2003 year class are indicative, this will also be the case if a large year class recruits to the fishery in the future. By using a percent of the ABC rather than a fixed value the cap will become more restrictive if GB haddock stock size declines below B_{MSY}. This will help contribute to rebuilding towards B_{MSY}.

One issue that must be considered is whether fishing behavior of the MWT fleet will change if this option is adopted. As can be seen from Table 44, the existing 0.2 percent catch cap did not constrain MWT fishing activity from 2006 through 2009. Given this result, it is not clear that modifying the cap provisions will necessarily result in an increase in haddock catches.

This option exercises more positive control on haddock removals than the No Action or Option 3 alternatives. Because the cap is monitored by expanding observed reports of haddock catches to an estimate for the total catch by the MWT fleet, it is less sensitive to changes in observer coverage level (Unlike Option 1, No Action). Different levels of observer coverage will affect the precision of the catch estimates but an estimate can still be developed. As a result, the cap becomes more of a limit on catches without regard to the level of observer coverage. Option 3 does not have a specific limit on catches of haddock by the herring fishery, but considers the catches an element of the other subcomponents portion of the ACL.

This option also adopts a separate cap for each haddock stock, monitors the catches of each stock, and if the cap is reached it closes an area that is appropriate for each haddock stock. As a result, unlike the No Action alternative, it is not likely that catches of haddock in either stock area will exceed the 1 percent of the ABC that determines the cap. While this was considered an unlikely event under the No Action alternative because of where haddock is usually caught, it was still possible that the entire cap could be caught from the GOM haddock stock, threatening mortality targets for that stock.

This option also extends catches that apply against the cap to all MWT vessels, not just part of the herring fishery as is the case with the No Action alternative. While this means purse seine catches of haddock do not count against the cap, those catches were inconsequential. By including all MWT vessels, and not just those in a particular permit category, the primary sources of haddock catch will be monitored for the cap.

Nominally, the amount of haddock that the MWT fishery will be allowed to catch will increase under this option, from 0.2 percent to1 percent of the haddock ABC. Since the existing cap only considered catches that were observed it did not actually limit overall catches. This was most clearly seen in 2006, when the estimated catch was nearly four times the cap amount and was 0.79 percent of the GB haddock TTAC (see Table 44). By using an estimate of haddock catch that is expanded from observer reports, this option makes the cap a more firm number. The precision of the catch estimate will be subject to uncertainty as a result of the level of observer coverage, but because observed reports are expanded to an estimate of total catch the cap is not as soft a number as under Option 1.

With respect to other groundfish species, this option may result in slight increases in fishing mortality if it allows MWT to occur for a longer period before the cap is reached. Given the small quantities of groundfish observed in this fleet (see Table 47) these effects are unlikely to be measurable.

While the removals of haddock are not expected to be a concern under this option, there could be other impacts from MWT fishing activity. Cod and haddock, for example, are known to exhibit specific spawning behaviors that may be disrupted by fishing activity. With respect to these two species, GB cod peak spawning activity is in February and March, while GB haddock is from February through April. The MWT fishery has not fished extensively on GB until later in the fishing year so it is unlikely that it will interfere with spawning of these two species.

Impacts on Atlantic Herring
This option would not be expected to result in any significant impacts on the Atlantic herring resource. It is intended to allow the herring fishery to continue its normal operations, particularly in Area 3 (GB). Atlantic herring biomass and fishing mortality are managed through the Council's Atlantic Herring FMP, which mandates that the annual catch limit (ACL) be distributed to four herring management areas (sub-ACLs) on an annual basis. The Council uses the best information available to estimate the proportion of each spawning component of the Atlantic herring stock complex in each area/season and distributes the sub-ACLs such that the risk of overfishing an individual spawning component is minimized. The Atlantic herring fishery specifications were set for the 2010-2012 fishing years using the ACL/AM framework mandated by the Magnuson-Stevens Act and implemented through Amendment 4 to the Atlantic Herring FMP in 2011. The Atlantic herring resource is not considered to be in an overfished condition, and overfishing is not occurring. In 2009, the Council's SSC concluded that based on the recent updated assessment, the Atlantic herring resource was likely above B_{MSY} (i.e., rebuilt) and fishing mortality was well below the F_{MSY} level.

Option 2 is intended, in part, to maximize the chance that the herring fishery can harvest the available herring yield (U.S. ACL/OY) provided for through the Atlantic herring fishery specifications. The direct and indirect impacts of the 2010-2012 ACL and sub-ACLs on the

Atlantic herring resource were thoroughly assessed in the 2010-2012 specifications package; the fishery specifications were determined to achieve the goals and objectives of the Herring FMP by preventing overfishing and maintaining the Atlantic herring resource at long-term sustainable levels. For the 2010-2012 specifications, the buffer between the F_{MSY}-based catch level and acceptable biological catch (ABC) was determined to adequately account for scientific uncertainty and ensure that fishing mortality will not exceed threshold levels, despite uncertainty associated with the stock assessment results (retrospective pattern). An additional buffer between ABC and the stock-wide ACL accounts for management uncertainty and further ensures that the fishery will be harvested at sustainable levels. These conclusions were reached through a technical evaluation by the Herring PDT, which assumes that **all yield** available to the herring fishery would be fully utilized. The 2011 stock-wide ACL for herring (OY) is 68% of the F_{MSY}-based catch level (overfishing limit, OFL), and the 2012 ACL is 72% of the OFL. Implementing Option 2 in this framework adjustment would not change the conclusions reached regarding the herring fishery specifications and therefore should not impact the herring resource beyond the impacts predicted in the evaluation of the specifications. In terms of impacts on the Atlantic herring resource, there are likely no differences between Options 2 and 3.

Impacts on Bycatch
Primary bycatch species of interest for this action are spiny dogfish and haddock. In past years MWT bycatch of spiny dogfish accounts for a small part of removals for this stock; new estimates are expected to be prepared as part of the review of the SBRM that will be conducted in 2011. To the extent that this option, if adopted, would allow increased MWT fishing activity in the GB area, bycatch of spiny dogfish may increase. Given the low size of current removals by this fleet, it is unlikely that any increase will be sufficient to cause a noticeable increase in spiny dogfish fishing mortality.

This option would result in a nominal increase in the amount of haddock that could be caught by the MWT fishery before the cap is reached and an AM is triggered. It may result in increased fishing activity since it is less likely that the cap will be reached and the AM implemented. As a result, haddock catches would be expected to increase if the catch rates remain similar to those in recent years. It does not eliminate the requirement that the haddock be landed, so while there may be a small increase in discards the low rate of discards that has been seen in recent years will likely continue. Other types of haddock bycatch may increase – such as fish landed but not sold and dumped or discarded at a later time. But if vessels sell the haddock or retain it for personal use then the increase will not be bycatch has defined by the M-S Act.

6.1.3 Option 3: Haddock Catch by Herring Fleet Included in “Other Subcomponents” Category for ACL Calculations

If this option is adopted, there would not be a specific haddock catch cap for the herring fishery and there would not be a specific AM. Catches of haddock by MWT vessels would still be monitored, but would be applied against the “other sub-components” portion of the ACL. Two sub-options would result in the adoption of Option 2 – the stock-specific catch cap – if MWT catches exceeded a specified amount. The option will first be analyzed without regard to the sub-options. Because of the large difference between available GB haddock ACLs and actual catches, analyzing the biological impacts of this measure on GB haddock is largely a paper exercise. There is little likelihood that catches of up to 5 percent of the GB haddock ABC will increase fishing mortality beyond acceptable levels since nearly 80 percent of the available catch is not being harvested.

This option would have the least direct control on herring fishery haddock catches. It is possible that herring fishery haddock catches could increase beyond the 1 percent level considered for the cap in option 2. As long as the total catches of haddock allocated to the "other sub-components" part of the fishery do not exceed 5 percent this would not threaten mortality targets. But if the total did exceed five percent, and all other components of the fishery harvested their complete ACL, fishing mortality might exceed targets. This is more of an issue for GOM haddock where catches are more likely to approach the ACL, than for GB haddock.

Because this basic option does not have an AM, if the other sub-components portion does exceed five percent then a management action would have to be considered and developed to account for the overage. Given the time it takes to prepare, review, and implement an action, the overage could continue for several years before a change could be in place. This increases the risk that exceeding the amount allocated to the "other subcomponents" portion of the ACL could have adverse effects on the stock. In order to address the time lag necessary to implement a change, two sub-options are considered to prevent excessive catch from continuing for several years.

Both sub-options would immediately implement the Option 2 measures in the year immediately following a determination that the haddock catch by MWT vessels was exceeding desired limits. The two options differ in the criteria they use to determine whether the Option 2 measures are adopted.

Sub-option A uses two criteria: the catch of haddock by MWT vessels must exceed one percent of the ABC and the total catch attributed to the other sub-components portion of the fishery must exceed five percent. Since both criteria must be met, this sub-option may result in more haddock being caught by the MWT fishery before the trigger is reached than in either the No Action alternation or Option 2 but does not necessarily result in more haddock being caught by all sources in the other sub-components category.

Sub-option B triggers the Option 2 measures if the haddock MWT catch exceeds 1 percent of the ABC, without regard to whether or not the other subcomponents portion exceeds five percent. As a result, haddock mortality due to MWT fishing is more closely controlled under this sub-option than under either sub-option A or the basic Option 3. But again it should be noted that these are relatively small quantities of haddock that are being discussed and particularly in the case of GB haddock these amounts are unlikely to affect fishing mortality to a noticeable degree.

While the removals of haddock are not expected to be a concern under this option, there could be other impacts from MWT fishing activity. Cod and haddock, for example, are known to exhibit specific spawning behaviors that may be disrupted by fishing activity. With respect to these two species, GB cod peak spawning activity is in February and March, while GB haddock is from February through April. The MWT fishery has not fished extensively on GB until later in the fishing year so it is unlikely that it will interfere with spawning of these two species.

Impacts on Atlantic Herring

This option would not be expected to result in any significant impacts on the Atlantic herring resource. It is intended to allow the herring fishery to continue its normal operations, particularly in Area 3 (GB). Atlantic herring biomass and fishing mortality are managed through the

Council's Atlantic Herring FMP, which mandates that the annual catch limit (ACL) be distributed to four herring management areas (sub-ACLs) on an annual basis. The Council uses the best information available to estimate the proportion of each spawning component of the Atlantic herring stock complex in each area/season and distributes the sub-ACLs such that the risk of overfishing an individual spawning component is minimized. The Atlantic herring fishery specifications were set for the 2010-2012 fishing years using the ACL/AM framework mandated by the Magnuson-Stevens Act and implemented through Amendment 4 to the Atlantic Herring FMP in 2011. The Atlantic herring resource is not considered to be in an overfished condition, and overfishing is not occurring. In 2009, the Council's SSC concluded that based on the recent updated assessment, the Atlantic herring resource was likely above B_{MSY} (i.e., rebuilt).

This option would be intended to maximize the chance that the herring fishery can harvest the available herring yield (U.S. ACL/OY) provided for through the Atlantic herring fishery specifications. The direct and indirect impacts of the 2010-2012 ACL and sub-ACLs on the Atlantic herring resource were thoroughly assessed in the 2010-2012 specifications package; the fishery specifications were determined to achieve the goals and objectives of the Herring FMP by preventing overfishing and maintaining the Atlantic herring resource at long-term sustainable levels. For the 2010-2012 specifications, the buffer between the F_{MSY}-based catch level and acceptable biological catch (ABC) was determined to adequately account for scientific uncertainty and ensure that fishing mortality will not exceed threshold levels, despite uncertainty associated with the stock assessment results (retrospective pattern). An additional buffer between ABC and the stock-wide ACL accounts for management uncertainty and further ensures that the fishery will be harvested at sustainable levels. These conclusions were reached through a technical evaluation by the Herring PDT, which assumes that **all yield** available to the herring fishery would be fully utilized. The 2011 stock-wide ACL for herring (OY) is 68% of the F_{MSY}-based catch level (overfishing limit, OFL), and the 2012 ACL is 72% of the OFL. Implementing Option 3 in this framework adjustment would not change the conclusions reached regarding the herring fishery specifications and therefore should not impact the herring resource beyond the impacts predicted in the evaluation of the specifications. In terms of impacts on the Atlantic herring resource, there are likely no differences between Options 2 and 3.

Impacts on Bycatch
Primary bycatch species of interest for this action are spiny dogfish and haddock. In past years MWT bycatch of spiny dogfish accounts for a small part of removals for this stock; new estimates are expected to be prepared as part of the review of the SBRM that will be conducted in 2011. To the extent that this option, if adopted, would allow increased MWT fishing activity in the GB area, bycatch of spiny dogfish may increase. Given the low size of current removals by this fleet, it is unlikely that any increase will be sufficient to cause a noticeable increase in spiny dogfish fishing mortality. But since this option does not have a specific AM for the herring fishery, there are fewer possible limits on herring fishing activity and bycatch my increase when compared either Option 1 or Option 2.

This option would eliminate an AM that is triggered if the haddock catch cap is exceeded, unless one of the sub-options is adopted. It may result in increased fishing activity. As a result, haddock catches would be expected to increase if the catch rates remain similar to those in recent years. It does not eliminate the requirement that the haddock be landed, so while there may be a small increase in discards the low rate of discards that has been seen in recent years will likely continue. Other types of haddock bycatch may increase – such as fish landed but not sold and dumped or discarded at a later time. But if vessels sell the haddock or retain it for personal use then the increase will not be bycatch has defined by the M-S Act.

6.1.4 Summary of Biological Impacts

In order to facilitate comparisons between the alternatives, the following table summarizes the expected biological impacts on haddock, other groundfish, and Atlantic herring.

In general, at current catches the impacts of any of the options on GB haddock fishing mortality are negligible. With respect to GOM haddock, Option 1/No Action has a risk that if a large portion of the cap is caught in the GOM it may threaten mortality targets; this risk does not exist for Option 2 because it has stock specific caps. Comparing total catches of haddock under Options 2 and 3 to Option 1 is difficult because the effects of Option 1 depend on observer coverage levels. At high observer coverage levels, haddock catches by the MWT fleet under Option 1 would be expected to be less than under either of the other two options. Because Option 3 (without a sub-option) has no specific limits on haddock catches by the herring fishery, haddock catches under this option could be higher than for Option 1 or 2.

Table 53 – Comparison of biological impacts of the options

	Option 1	Option 2	Option 3	Option 3 Sub A	Option 3 Sub B
General	Cap effectiveness dependent on observer coverage levels Monitored catch not a reliable indicator of total catch except at high observer coverage levels	Cap effectiveness as a limit not as dependent on observer coverage levels Cap set at 1 percent but monitored based on estimated catches – more reliable as indicator of total catch	No initial AM so effectively no cap that limits herring fishery or MWT catches of haddock	If trigger reached in year 1, impacts similar to Option 2 in following years; otherwise impacts as per Option 3	If trigger reached in year 1, impacts similar to Option 2 in following years; otherwise impacts as per Option 3
GOM haddock	Negligible; possible but unlikely mortality increase because cap not stock specific	Negligible; stock specific cap makes it less likely mortality will exceed targets	Negligible but increased risk that haddock catches by herring fishery may contribute to catches exceeding ACL		
GB haddock	Negligible effects because total catches well below ACL	Negligible effects because total catches well below ACL, but possibly higher mortality than if Option 1 has a high observer coverage level	Negligible effects on mortality because total catches well below ACL, but possibly higher than Option 1 or 2 since there is no specific cap on herring fisher y catches		
Other groundfish	Negligible because little evidence catches are substantial	Negligible because little evidence catches are substantial, but possibly higher than Option 1 with a high observer coverage level	Negligible because little evidence catches are substantial, but possibly higher than Option 1 or Option		
Atlantic Herring	Negligible but reduced mortality because Area 3 TAC unlikely to be caught	Negligible but increased mortality: less likely AM will be triggered, leading to higher Area 3 catches	Negligible but increased mortality: because no AM will be triggered, leading to higher Area 3 catches	Negligible but increased mortality: because no AM will be triggered, leading to higher Area 3 catches	Negligible but increased mortality: because no AM will be triggered, leading to higher Area 3 catches

6.2 Impacts to EFH

Since 1996, the MSA has included a requirement to evaluate the potential adverse effects of the fishery on the EFH of target and non-target species. The EFH final rule specifies that measures to minimize impacts to the extent practicable should be enacted when adverse effects that are more than minimal and not temporary in nature are anticipated. In essence, this framework proposes changes in the allocation of two stocks of haddock to the herring fishery. The overall impacts of the action in terms of EFH can therefore be characterized as changes in the level of fishing activity in the herring fleet.

An assessment of the potential effects of the directed Atlantic herring commercial fishery on EFH for Atlantic herring and other federally-managed species in the Northeast region of the U.S. was conducted as part of an EIS that evaluated impacts of the Atlantic herring fishery on EFH (NMFS 2005). It found that midwater trawls and purse seines do occasionally contact the seafloor and may adversely impact benthic habitats utilized by a number of federally-managed species, including EFH for Atlantic herring eggs. However, after reviewing all the available information, the gears used in the herring fishery were found to have only occasional bottom contact with the primary substrates used by herring for egg deposition, and the noises produced by herring fishing operations only temporarily disperse schools of juvenile and adult herring. The conclusion was reached that if the quality of EFH is reduced as a result of this contact, the impacts are minimal and/or temporary and, pursuant to MSA, do not need to be minimized. In other words, there was no need to take specific action to minimize the adverse effects of the herring fishery on benthic EFH. This conclusion also applied to pelagic EFH for Atlantic herring larvae, juveniles, and adults, and to pelagic EFH for any other federally-managed species in the region. In summary, therefore, it can be concluded that changes in the herring fishery arising from this action, as with previous herring actions, would continue to have no more than minimal and temporary impacts on EFH.

The Magnuson-Stevens Act EFH regulations (50 CFR §600.815(a)(7)) include the following language:

> "Loss of prey may be an adverse effect on EFH and managed species because the presence of prey makes waters and substrate function as feeding habitat, and the definition of EFH includes waters and substrate necessary to fish for feeding. Therefore, actions that reduce the availability of a major prey species, either through direct harm or capture, or through adverse impacts to the prey species' habitat that are known to cause a reduction in the population of the prey species, may be considered adverse effects on EFH if such actions reduce the quality of EFH."

To date, the Council, based on recommendations from its Herring PDT, has determined that the importance of herring as a forage species and the role of herring in the ecosystem is adequately addressed through analyses conducted as part of the benchmark stock assessment for Atlantic herring (accounting for predation and natural mortality) as well as through the specification-setting process and the SSC's determination of Acceptable Biological Catch, which includes a buffer for scientific uncertainty.

The role of herring in the ecosystem and the availability of herring as prey are two of several important considerations in the Council's ACL-setting process for the Atlantic herring fishery.

During the development of the 2010-2012 herring fishery specifications, the Council considered factors identified by the SSC when setting ABC and accounting for scientific uncertainty, including recruitment, biomass projections, and the importance of herring as a forage species. The approach selected by the Council for specifying ABC for 2010-2012 provided for a technically-sound way to address annual variability in catch and fishing effort while remaining consistent with SSC advice and slightly more conservative than some approaches that were considered. Future stock assessments and specifications for the herring fishery will continue to address this important issue.

In addition, although forage issues may be considered by the SSC as a part of scientific uncertainty when setting the ABC, if the Council decides to incorporate an additional buffer to specifically address the role of herring as forage, then it can do so between the ABC and OY, because OY includes consideration of social, economic, and ecological factors, and forage is an ecological factor. The additional buffer would not be included as a part of management uncertainty, but rather an allocation set by the council when specifying OY; Amendment 4 to the Herring FMP authorizes the Council to make this allocation in the future if/when it deems appropriate.

Because herring is an important prey species to several marine predators in the Northwest Atlantic, relative changes in its abundance could be considered as part of an EFH assessment. Any changes in the biomass of herring that could result from this action are discussed in the biological impacts section and summarized for each alternative below. It is important to note that any changes in mortality to either herring or haddock stocks will still fall within the catch limits that were adopted and analyzed in Amendment 4 to the Atlantic Herring FMP and Framework 44 to the Northeast Multispecies FMP, respectively.

6.2.1 Option 1: No Action

If no action is adopted, the herring fishery would be subject to a cap on haddock catch that is equal to 0.2% of the combined GB and GOM haddock ABC. The directed herring fishery would close in the entire GOM/GB Exemption Area if the haddock cap is reached.

As discussed in the biological impacts section (6.1), this option would generally not be expected to result in any significant impacts on the Atlantic herring resource. If the haddock catch cap would be reached and the directed herring fishery closed prior to full utilization of the herring ACL (or the sub-ACLs in any of the management areas), then fishing mortality on herring is likely to be lower than that which was predicted in the analysis of the 2010-2012 specifications, which assumes that all yield available to the herring fishery would be fully utilized. This would lead to the result that there would be more herring available in the water as a prey source for other species.

6.2.2 Option 2: Haddock Catch Cap of 1% for the Midwater Trawl Fleet

Under this option, the herring fishery's midwater trawl fleet would be subject to a cap on haddock catch that is equal to 1% of the Georges Bank haddock ABC and 1% of the Gulf of Maine haddock ABC. Catch estimations would be calculated by extrapolating sea sampling observations to the entire fleet by area.

The major issue for determining the impacts of this option on EFH is whether fishing behavior of the MWT fleet would change if this option is adopted. The existing 0.2 percent catch cap did not constrain MWT fishing activity from 2006 through 2009. Given this result, it is not clear that modifying the cap provisions will necessarily increase activity in the herring fishery and lead to the harvest of a greater amount of herring. However, insofar as this option would decrease the chance of a shutdown in the herring fishery, when compared to the No Action alternative, its adoption could theoretically lead to a greater chance that more herring will be removed from the ecosystem. This could reduce the availability of the herring as a prey source. It should be noted that the removal is restricted to an ACL that has been analyzed and found to have no impacts to EFH in the herring specifications measures.

6.2.3 Option 3: Haddock Catch by Herring Fleet Included in "Other Sub-Components" Category for ACL Calculations

If this option is adopted, catches of haddock by the herring fishery would be incorporated into the "other sub-components" portion of the haddock ACL. Haddock catch in the herring fishery would be monitored for future changes. This option has two sub-options that are being considered; the stand-alone option is discussed in addition to the predicted impacts of the adoption of either sub-option.

This option would not be expected to result in any significant impacts on the Atlantic herring resource. It would be intended to maximize the chance that the herring fishery can harvest the available herring yield provided for through the Atlantic herring fishery specifications. The direct and indirect impacts of the 2010-2012 ACL and sub-ACLs on the Atlantic herring resource were thoroughly assessed in the 2010-2012 specifications package; the fishery specifications were determined to achieve the goals and objectives of the Herring FMP by preventing overfishing and maintaining the Atlantic herring resource at long-term sustainable levels.

Adoption of this option would also provide the greatest assurance that the herring fishery will not be shut down due to its haddock catch levels. To the extent to which that chance is minimized, the herring fishery is slightly more likely to harvest more of its ACL and reduce the availability of herring in the water column as a prey source for other species. As with the other options being considered, the herring catch would be limited to harvest levels that were analyzed in the specifications package and found to have no impact to EFH.

Two sub-options are considered for Option 3: a combined MWT and subcomponent trigger and a MWT trigger. In terms of impacts on the Atlantic herring resource, there are likely no differences between Options 2 and 3. Further analysis of the impacts to the herring resource can be found in the biological impacts section of this document (6.1).

6.2.4 Summary of Impacts to EFH

The following table summarizes the EFH impacts of the Framework 46 proposed measures.

Table 54 – Summary of FW 46 EFH Impacts (0 = no impact)

Option	***EFH Impact***
1: No Action	0
2: Haddock Catch Cap of 1% for the Midwater Trawl Fleet	0
3: Haddock Catch by Herring Fleet Included in "Other Sub-Components" Category for ACL Calculations	0
3a. Option 3 with Combined MWT and Subcomponent Trigger	0
3b. Option 3 with MWT Trigger	0

6.3 Impacts to Endangered and Other Protected Species

Overall, the measures proposed in this framework are not likely to have impacts for protected species. If the various caps proposed in the measures are reached, the restrictions placed on the herring fishery as a result may increase forage and decrease negative interactions between protected resources and the fleet. All the measures under consideration would restrict fishing to the levels specified in the 2010-2012 herring specifications package, in which an analysis of the fishing levels would not jeopardize protected species present in the fishing areas. Some of the measures proposed may result in improved monitoring of both the herring fishery, which may, in turn, improve or increase data collection of encounters between the fishery and protected species. There is not likely to be any impact on Atlantic sturgeon as there is no history of bycatch for midwater trawls and herring purse-seine gear through 2010.

6.3.1 Option 1: No Action

If no action is adopted, the herring fishery would be subject to a cap on haddock catch that is equal to 0.2% of the combined GB and GOM haddock ABC. Groundfish ABCs and the cap are calculated based on the calendar year (January-December), but monitored based on the groundfish fishing year (May-April).The reporting requirements for the herring fishery implemented in the herring FMP would remain unchanged.

When the Regional Administrator has determined that the haddock incidental catch cap has been caught, all vessels issued a herring permit are prohibited from fishing for, possessing, or landing herring in excess of 2,000 lb per trip in the Gulf of Maine/Georges Bank Herring Exemption Area. Additionally, the haddock possession limit for all vessels issued All Areas or Areas 2/3 Limited Access permits is reduced to 0 lb in all of the herring management areas.

As with any cap on a fishery, the cap posed within this option may provide the opportunity for a positive impact for protected species in the area. The cap in this option is potentially the smallest, and therefore the most likely to shut down the fishery faster, than the other options. If the cap is reached, this option indicates that the herring fishery would be shut down in the GOM/GB herring exemption area, as it was in 2010. A closure of the fishery would mean herring effort in the area would decrease significantly, and although there is no direct correlation of protected species interaction with fishing gear and effort, the closure would likely lead to a decrease in protected species interaction. The timing of the herring fishery corresponds with the uncommon occurrences of hooded and harp seals, which are more likely to occur during the winter and spring; this option would allow for a decreased potential during these times. Overall, however, the impacts of this option are difficult to predict because of uncertainties associated with the timing of the fishery in the GOM and therefore the potential for interaction with protected resources.

The decrease in effort in the herring fishery would also allow for more herring to be left as a forage base for protected species in the area. If the haddock catch cap is reached and the directed herring fishery closes prior to full utilization of the herring ACL, then fishing mortality on herring is likely to be lower than that which was predicted in the analysis of the 2010-2012 specifications, thereby leaving more herring for a forage source.

One other potential benefit of this option, at a holistic level, would be better monitoring for the protected species. It has been noted elsewhere in this framework that it is assumed that observer coverage would remain at or above current (2009/2010) levels. While not a direct benefit, the knowledge base for protected resources in general could benefit greatly from further data collection of species interaction with the herring fleet and fisheries in general.

6.3.2 Option 2: Haddock Catch Cap of 1% for the Midwater Trawl Fleet

Under this option, the herring fishery's midwater trawl fleet would be subject to a cap on haddock catch that is equal to 1% of the Georges Bank haddock ABC and 1% of the Gulf of Maine haddock ABC. Catch estimations would be calculated by extrapolating sea sampling observations to the entire fleet by area.

When the Regional Administrator has determined that the haddock stock-specific catch cap has been caught, all midwater trawl vessels issued a herring permit are prohibited from fishing for, possessing, or landing herring in excess of 2,000 lb per trip on a stock-specific basis, where the GOM Areas are 513, 514, and 515 and the GB Areas are 521, 522, 525, 561, 562 and the portion of 526 within CA I. Additionally, the haddock possession limit for all midwater trawl vessels issued a herring permit is reduced to 0 lb in the appropriate AM area.

The consequences of reaching the caps described in this option are the same as described in Option 1, however the areas in which the consequences are implemented are specific to the areas in which the haddock overage occurs. The potential positive effects described above for Option 1 (No Action) when the cap is reached (lesser interaction, increased forage) are therefore also applicable for this option, however they are more limited than in Option 1 as the benefits will only extend to the stock-specific areas. The extent of the positive effects may also be lesser due to the potentially higher caps being reached later in the fishing year. There also may be slightly more impact on protected species from allowing more herring fishing to occur, however it is still likely to be slight. Again, although there is no direct correlation, increased fishing activity may lead to more interaction with the protected resources. The shift in timing of the herring fishery as a result allowing it to operate for a greater period of time are difficult to predict, however, large and small cetaceans and sea turtles are more prevalent during the spring and summer, although they are also relatively abundant during the fall and would have a higher potential for interaction during these seasons if the fishery were to extend into them. Overall, the impacts of this option can be considered neutral since the cap is already part of the groundfish allocation structure, which was specified and analyzed in a prior option, and is therefore status quo at this time. This option would only allow for the herring fishery to catch what has already been allocated and analyzed.

Although the monitoring and reporting requirements are as specified under the No Action alternative in this option, the reporting requirements would be extended to apply to any mid-water trawl vessel with any category herring permit that fishes in Herring Management Area 1A, 1B, or 3. An increase in reporting requirements, although slight, might allow for better information collection if and when the herring fishery encounters protected resources.

6.3.3 Option 3: Haddock Catch by Herring Fleet Included in "Other Sub-Components" Category for ACL Calculations

If this option is adopted, catches of haddock by the herring fishery would be incorporated into the "other sub-components" portion of the haddock ACL. Haddock catch in the herring fishery would be monitored for future changes. This option has two sub-options that are being considered; the stand-alone option is discussed here while the predicted impacts of the adoption of either sub-option are described in its respective section below.

Compared to Options 1 and 2, this action is more likely to adversely effect, but not jeopardize, the protected species present in the area, as there is no hard backstop to this stand alone option. This option is least likely to shut down the herring fishery and restrict catch, and effectively raises the amount of haddock that can be caught in the herring fishery. Again, although there is no direct correlation, increased fishing activity may lead to more interaction with the protected resources, and fishing in the herring industry will likely increase under this option, particularly when compared to Options 1 and 2. The shift in timing of the herring fishery as a result allowing it to operate for a greater period of time are difficult to predict; although harbor seals may be more likely to occur in the operations area between fall and spring, harbor and gray seals are year-round residents and therefore interactions could occur year-round. Although Option 3 increases the amount of haddock the herring fishery can catch before reaching its cap, it effectively does so by reallocating fish from the groundfish fishery. Under this option the limits already in place through specification packages will still apply, and the impacts of those limits have already been evaluated and packages established that catching the fishing limits would not result in jeopardizing the protected resources. Any impacts to protected resources resulting from future changes to the status of haddock bycatch in the herring fishery (i.e., if the catch reaches the five percent threshold to require a sub-ACL) would be analyzed in a future action.

Although the monitoring and reporting requirements are as specified under the No Action alternative in this option, the reporting requirements would be extended to apply to any mid-water trawl vessel with any category herring permit that fishes in Herring Management Area 1A, 1B, or 3. An increase in reporting requirements, although slight, might allow for better information collection if and when the herring fishery encounters protected resources.

6.3.3.1 Sub-Option A: Combined MWT and Subcomponent Trigger

Under this sub-option of Option 3, if the stock-specific catches of haddock by herring midwater trawl vessels exceeds 1 percent of the GOM haddock ABC or the GB haddock ABC, and the total other sub-components catch (including all herring fishery catches) of GOM haddock or GB haddock from federal waters exceeds four percent of the ABC, the herring midwater trawl fishery would be subject to the measures described in Option 2 for the relevant stock area.

The potential benefits for this sub-option are likely to be very similar to the impacts described for Option 2. The consequences for the herring fishery of reaching the cap described in this option are the same as described in Option 2; the potential benefits as a result of these restrictions are therefore also the same. Forage levels may increase and potential interaction between the protected resources and herring vessels may decrease. Sub-Option A is more restrictive than Option 3 alone, but less restrictive than the no action option, because it increases the chance that there could be restrictions on the herring fishery. It therefore leads to the potential for increased interactions between the herring fishery and the protected resources compared to Option 1 (No Action). The four percent set-aside to other federal fisheries is already incorporated into the groundfish FMP, however, and thus no new set-aside is created. The herring FMP also has incorporated catch limits that will restrict the herring vessels in a manner that has already been analyzed in the 2010-2012 specifications package, which found that the actions would not jeopardize protected species.

6.3.3.2 Sub-Option B: MWT Trigger

If this sub-option is adopted along with Option 3, the herring midwater trawl fishery would be subject to the measures described in Option 2 if the stock-specific catches of haddock by herring midwater trawl vessels exceed 1 percent of the GOM haddock ABC or the GB haddock ABC. The impacts and benefits of this sub-option are very similar to Option 2; the catch is capped at one percent of the ABC for each haddock stock. The only difference is that there could be one overage event before the cap is implemented. As such, forage may increase if the cap is reached and fishing is restricted, and similarly interactions with protected species may decrease as fewer vessels are allowed to fish in the areas. Compared to Option 1, however, this sub-option is less restrictive on the herring fishery before the cap is reached, and even less restrictive than Option 2, as it will allow one overage event. This increase in fishing compared to the other options, as well as the over event, may have a more adverse effect on protected species than the Options 1 and 2. Overall, however, the fishing levels would be equal to those that were set forth in the herring and groundfish specifications, the effects of which have already been analyzed in regards to protected species and are not likely to jeopardize any species.

6.4 Economic Impacts

The economic impacts discussed below focus on expected changes in economic conditions for vessels engaged in the groundfish and Atlantic herring fisheries.

Impacts on the Atlantic Herring Fishery
The action proposed in this framework adjustment is intended to achieve the following objectives:

1. Maximize the chance for the Georges Bank (Area 3) herring sub-ACL to be caught;
2. Provide incentives for the herring fleet to fish offshore;
3. Provide incentives for the herring fleet to fish in a manner, at times, and in areas when and where haddock bycatch is none to low; and
4. Reduce the impact of a haddock catch cap on the entire herring fishery.

The proposed management measures also address Objective #5 of Herring Amendment 1 (full utilization of OY), as well as National Standard 9 of the Magnuson-Stevens Act (minimize bycatch) without compromising the continued rebuilding of haddock and other important groundfish species. All options reduce bycatch (as defined in the M-S Act) because haddock discards are prohibited. This action builds on the measures implemented in Framework 43 to the

Multispecies FMP while addressing the need to provide the herring fishery adequate opportunity to utilize OY.

Atlantic herring vessels will be impacted positively by the measures implemented in this framework adjustment, to the extent that the proposed action can maintain or increase opportunities to harvest available herring yield. The herring vessels most likely to be impacted by the proposed action are the 42 Category A and 4 Category B vessels fishing in offshore areas. Category A and B vessels represent the limited access directed herring fleet and account for more than 97% of herring landings during the fishing year. More than 50% of these vessels are greater than 80 feet in length, and most of them fish with midwater trawl gear (single or paired), although some fish with a bottom trawl during times and in areas where small mesh bottom trawling is authorized. Because of the overlap between the Atlantic herring and Atlantic mackerel fisheries and the time/area overlap with haddock encounters on Georges Bank, the vessels most impacted will likely be those from Categories A and B that participate significantly in these two high-volume, small mesh fisheries. These vessels have a high dependence on herring, particularly from GB, due to their proximity to Areas 2 and 3 as well as increasing restrictions in the Gulf of Maine (sub-ACL reductions in Areas 1A and 1B, inshore purse seine/fixed gear only area, ASMFC days out of the fishery, ASMFC spawning restrictions). Some impacts are likely to be experienced by an additional group of Category C herring vessels; the most impacted Category C vessels are likely to be those who participate primarily in the mackerel fishery but catch herring seasonally (or in combination with mackerel) on Georges Bank.

The 18 Category A vessels from Gloucester MA, New Bedford MA, and Cape May NJ are likely to be most impacted because these are larger vessels that are most dependent on both the herring and mackerel fisheries in Areas 2 and 3 (section 5.4.2) and have been the most impacted by additional regulations in the Gulf of Maine (Areas 1A and 1B) and reduced herring ACLs in all management areas (2010-2012 herring specifications). In 2010, landings of all species by Category A herring vessels declined more than 30% from 2009 levels. Based on the Atlantic herring fishery specifications, similar impacts are anticipated for 2011 and 2012, so providing opportunities for these vessels to harvest the available herring yield will be very important to offset some of the losses experienced by the impacts of recent additional restrictions.

6.4.1 Option 1: No Action

Impacts on the Northeast Multispecies Fishery

Maintaining the current cap of 0.2% would have no economic impacts to vessels participating in the groundfish fishery relative to current conditions.

As discussed in section 6.1.1, this option would be expected to have a negligible effect on fishing mortality for both the Georges Bank and Gulf of Maine haddock stocks for the years 2012-2015. Consequently, the cap of 0.2% of the combined GB and GOM haddock ABC would not be likely to materially change the way in which vessels engaged in the groundfish fishery operate (see Table 55 and Table 56).

When compared to Options 2 and 3, there would likely be no difference in the economic impacts of this Option with one exception. As discussed in Options 2 and 3, the less restrictive cap in those options might lead to MWT vessels displacing groundfish fishing activity. An initial examination of this possibility does not support this concern (see section 6.4.2).

Table 55 – Georges Bank haddock ABC, landed pounds from the commercial fishery, and percentage of ABC caught by fishing year (*2010 fishing year landings current through March 1, 2011)

	ABC	landed pounds	*% ABC landed*
2008	268.26	16.56	*6.17%*
2009	196.33	16.56	*8.43%*
2010*	89.16	14.49	*16.25%*

Table 56 – Gulf of Maine haddock ABC, landed pounds from the commercial fishery, and percentage of ABC caught by fishing year (*2010 fishing year landings current through March 1, 2011)

	ABC	landed pounds	*% ABC landed*
2008	2.71	1.17	*43.19%*
2009	3.45	1.17	*33.93%*
2010*	1.82	0.33	*18.14%*

Impacts on the Atlantic Herring Fishery
The no action option would maintain the status quo. The herring fishery would continue to be allocated 0.2% of the Gulf of Maine/Georges Bank haddock combined ABC as a sub-ACL, to be monitored through observer coverage and dealer reporting. The sub-ACLs that would be allocated to the herring fishery under Option 1 are identified in Table 57. Under the no action option, the haddock catch cap would decrease to 66 mt in the 2011 fishing year and 56 mt in the 2012 fishing year.

As of early April 2011, almost 81% of the 2010 sub-ACL had been taken by the herring fishery (69.6 mt), but this amount was caught as of late September 2010 when the fleet reported that they ceased fishing operations on Georges Bank to avoid reaching the quota and closing the directed herring fishery until May 2011 (see more information below). No additional haddock catch has been reported since late September 2010.

Table 57 Proposed Haddock Sub-ACL Under Option 1 (No Action)

FISHING YEAR (GROUNDFISH)	GOM/GB HADDOCK SUB-ACL FOR HERRING FISHERY
2010 (until April 30, 2011)	86 mt
2011 (May 1, 2011 – April 30, 2012)	66 mt
2012 (May 1, 2012 – April 30, 2013)	56 mt

Under this option, it is assumed that observer coverage would remain at, near, or above current (2009/2010) levels, especially given the continuing requirement that herring vessels carry an observer on board on any fishing trip where the vessel may fish in Closed Area I (Georges Bank). Observer coverage levels across the herring fishery ranged between 20% and 30% in 2009 and

2010, with some variability between gear types and management areas. The Closed Area I provisions result in higher observer coverage levels for the fishery on Georges Bank, where the majority of haddock interactions are likely to occur. Based on haddock catch observed in 2010 and expectations that observer coverage will remain at similar (or higher) levels, it is reasonable to assume that the status quo for the haddock catch cap will constrain the herring fishery during the 2011 and 2012 fishing years.

Given the options under consideration in this framework adjustment, the potential for negative economic impacts on the herring fishery appears to be highest under Option 1. If the status quo is maintained, the directed herring fishery would close in the entire GOM/GB Exemption Area if the haddock catch cap is reached, which could result in foregone herring yield and lost revenue throughout Areas 1A, 1B, and 3. Depending on the time of year that the closure occurs, the economic impacts on the herring fishery could be substantial. While Areas 1A and 1B are almost always fully utilized, efforts are made by managers to slow catch in these areas and allow for a fishery late in the year. Closing the directed herring fishery throughout the GOM/GB Exemption Area could preclude fishing in the GOM areas, but the impacts are difficult to predict because of uncertainties associated with the timing of the fishery in the GOM and the pace at which the fleet would take the quotas in Areas 1A and 1B. Potential impacts on the Georges Bank (Area 3) fishery can be characterized somewhat better. For example, the Area 3 sub-ACL for herring will remain at 38,146 mt for the 2011 and 2012 fishing years. The herring industry reports to have ceased fishing operations on Georges Bank in the fall of 2010 because of concerns about reaching the haddock catch cap and closing the entire fishery. To provide some perspective regarding the potential impacts of an early closure, estimates can be generated based on potential foregone revenues from not fully utilizing OY in Area 3. Estimated foregone revenues from the un-utilized yield in Area 3 were $5.5M based an average price for herring of $242 per mt between 2007 and 2010 (applied to the difference between available yield in Area 3 and 2010 landings).

Without an increase in the haddock catch cap, it is likely that herring fishing in Area 3 would remain low during the late summer and fall, and herring landings would remain below the available yield for this area. Area 3 encompasses GB and represents an area where expansion/redirection of herring fishing effort is encouraged (versus the inshore GOM). While landings from Area 3 can be quite variable from year to year, a significant decrease in Area 3 landings was observed during the 2010 fishing year (down from 29,446 mt in 2009, see Table 58). The industry claims that the reduction in Area 3 herring catch during 2010 was primarily the result of concerns related to hitting the haddock catch cap and closing the directed fishery throughout the entire GOM/GB Exemption Area, which includes Areas 1A and 1B. Herring landings from Area 3 were as high as 37,100 metric tons in 2001, so the Atlantic herring fleet clearly has the capacity to harvest all of the available yield, assuming market conditions, fish availability, and other factors allow.

Table 58 2010-2012 Atlantic Herring Fishery Specifications (Metric Tons)

SPECIFICATION	2010-2012 ALLOCATION (MT)	2010 CATCH (MT)
OFL	145,000 (2010) 134,000 (2011) 127,000 (2012)	
ABC	106,000	
Stock-wide ACL/U.S. OY	**91,200**	**67,296 (74%)**
Sub-ACL Area 1A	**26,546**	**27,113 (102%)**
Sub-ACL Area 1B	**4,362**	**5,990 (137%)**
Sub-ACL Area 2	**22,146**	**18,763 (85%)**
Sub-ACL Area 3	**38,146**	**15,430 (40%)**

Table 59 provides weekly IVR-reported herring catches by management area for the 2010 fishing year and illustrates the seasonal nature of the fishery. Note that herring landings from Area 1A are prohibited (by ASFMC) from January – June, and midwater trawl vessels are further prohibited from fishing in Area 1A from June – September of each year. The majority of the offshore fishery (Area 3) occurs during the late summer/early fall; most Area 3 landings in 2010 were reported from July-September, but offshore fishing diminished greatly by October, and the fleet reported to the Council at this time that it ceased fishing on Georges Bank because of concerns about reaching the haddock catch cap and affecting the winter mackerel fishery (December-April). While the mackerel fishery occurs primarily in Area 2, it is likely that the small amount of herring catch from Area 3 during the late part of the year occurred while vessels were targeting mackerel.

Table 59 2010 Weekly IVR Catch Reports (IVR) by Management Area (Metric Tons)

WEEK	IVR CATCH REPORTS (MT)				
	AREA 1A	AREA 1B	AREA 2	AREA 3	TOTAL
1			1,032		1,032
2			2,242		2,242
3			1,098		1,098
4			1,796		1,796
5			612		612
6		73	2,430		2,503
7			251	650	901
8		21	701	221	944
9			687		687
10			825		825
11			763		763
12					0
13			20	577	597
14			293		293
15			425	39	465
16			262	127	389
17				184	184
18				275	275
19		335			335
20		61			61
21				206	206
22	30	909		84	1,023
23	152	365			590
24	177			164	596
25	64			1,359	1,437
26	61			1,806	1,873
27	94			115	209
28	50			515	565
29	210			1,171	1,381
30	138	84		234	456
31	190	271		1,362	1,822
32	282			1,533	1,815
33	710			1,399	2,109
34	430			959	1,389
35	358			355	713
36	472	1,446		419	2,337
37	83	1,358		55	1,496
38	1,205	1,062			2,267
39	1,342			931	2,273
40	185			454	639
41	1,859				1,859
42	3,860				3,860
43	1,367				1,367
44	859				859
45	5,202				5,202
46	1,555				1,555
47	1,315		1,289		2,604
48			208	182	390
49	4,120		53		4,173
50			1,567	55	1,622
51			1,113		1,113
52			843		843
TOTAL	**27,113**	**5,990**	**18,763**	**15,430**	**67,296**

A closure of the directed herring fishery in the GOM/GB Exemption Area under Option 1 would impact all herring vessels, including those that may not catch any haddock. Vessels fishing with midwater trawls accounted for over 80% of Atlantic herring landings during the 2010 fishing year, while purse seine vessels accounted for about 13.5% and bottom trawl vessels about 6%. Most haddock encounters in the herring fishery occur on GB, and all herring catch from GB comes from vessels using midwater trawls or bottom trawls. Purse seine vessels are not known to encounter haddock in substantial amounts and only fish in the GOM; these vessels would be impacted by a closure of the fishery in Areas 1A and 1B if the cap is reached under Option 1. Weekly catch reports shown in Table 59 suggest that there is a possibility for haddock catch on Georges Bank to preclude the Gulf of Maine fishery under Option 1, particularly in the later part of the year (October-December). Every year, significant efforts are made through the GOM States (ME, NH, MA) and the ASMFC (days out) to ensure that the Area 1A quota is available as late in the fishing year as possible, so the impacts of a closure of the GOM/GB Exemption Area could substantially affect all herring vessels participating in the 1A/1B fisheries.

As noted, timing is clearly an important consideration with respect to the potential impacts of a haddock catch cap for the herring fishery. The catch cap is set based on a groundfish fishing year (May-April) and monitored based on the herring fishing year (January – December). Therefore, if the catch cap is reached during the late part of the herring fishing year (November or December, for example), the directed herring fishery in the GOM/GB Exemption Area remains closed until May 1 of the following year under Option 1 (no action). Fishing for Atlantic mackerel could therefore be affected as well under the no action option. During the winter fishery, many of the larger herring vessels prosecute Atlantic mackerel on Georges Bank and in the southern New England area (mostly December – April). While the cap is monitored based on haddock catch observed on Category A and B vessels, the closure of the Exemption Area applies to all federally-permitted herring vessels.

Table 60 ranks the statistical areas in the GOM, GB, and southern New England (SNE) based on their importance to the Atlantic mackerel fishery by examining mackerel catch from 1997-2009. All of the Statistical Areas listed in Table 60 represent areas where at least 1,000 mt of mackerel have been caught between 1997 and 2009. Of these Statistical Areas, only SA514, 521, and 525 would be affected by a closure of the GOM/GB Exemption Area. For the most part, these three areas are of lesser importance to the mackerel fishery, as the vast majority of landings are coming from areas farther south. However, there is some mackerel fishing in these areas, and the fishery on GB can be quite variable, depending largely on environmental/weather conditions and fish availability. Available yield in the Atlantic mackerel fishery is largely underutilized at this time, so opportunities to prosecute this fishery should be encouraged when appropriate.

In 2008 and 2009, vessels participating in the Atlantic mackerel fishery harvested 20% of the available domestic annual harvest (23,000 mt of the available 115,000 mt); in 2010, the fishery only took 9% of the available harvest (10,656 mt). Low landings in 2010 are likely due to fish availability and other factors but may also be influenced by concerns of Category A/B vessels encountering haddock offshore. The information presented in section 5.4.2.2 shows that landings of all species by Category A vessels fell more than 30% from 2009 to 2010, which includes a more than 50% decrease in mackerel landings by these boats. While more information/analysis is necessary to make a clear determination, it is possible that these vessels may have eliminated fishing trips that otherwise would have been taken due to concerns about encountering haddock on Georges Bank (in addition to increasing herring restrictions in the inshore Gulf of Maine and overall reductions in herring quotas).

Table 60 Statistical Areas with at least 1,000 Metric Tons Reported Mackerel Catch, Sorted by Total Catch in the Area From 1997-2009

YEAR	613	615	616	612	621	537	622	526	539
1997	2,723	476	5,325	1,584	191	1,188	344	64	221
1998	36	242	479	15	5,652	285	286	2	36
1999	295	1,849	426	353	2,798	534	1,993	87	116
2000	768	1,074	629	788	519	330	251	2	18
2001	1,233	2,405	2,973	2,118	183	56	0	2	16
2002	9,008	2,005	198	4,021	2	6,422	0	6	3,452
2003	4,724	5,183	16,140	5,884	1,309	646	2,856	3	83
2004	18,021	6,179	4,608	922	14,921	4,252	2,637	3	571
2005	7,832	3,828	7,566	1,331	5,977	1,138	13,104	3	371
2006	12,152	16,498	8,105	10,355	0	3,035	5,506	0	1,706
2007	6,621	2,046	1,179	1,192	4	9,823	157	6,422	307
2008	1,564	6,344	1,930	5,425	0	169	3	4,374	398
2009	4,401	4,035	1,877	6,148	472	282	745	0	2,424
YEAR	**626**	**625**	**614**	**632**	**611**	**514**	**525**	**631**	**521**
1997	0	1,077	5	34	23	80	8	981	12
1998	1,066	2,312	1,434	0	15	1,410	6	807	5
1999	696	1,329	115	0	9	78	35	3	99
2000	156	142	263	220	4	51	2	81	14
2001	54	69	3	0	50	42	10	48	8
2002	1	9	4	0	169	89	249	0	24
2003	54	0	16	0	33	54	181	0	5
2004	3,617	35	47	2,413	176	139	35	3	252
2005	842	677	915	0	33	44	4	0	11
2006	2	0	39	0	355	2	3	0	182
2007	4	0	0	0	218	8	232	0	492
2008	0	0	0	0	130	4	864	0	273
2009	9	0	0	17	892	8	335	2	0

**Shaded columns represent Statistical Areas that would be affected by a closure of the GOM/GB Exemption Area under Option 1 (status quo). These Statistical Areas would be affected by a Gulf GOM or GB stock-specific closure under Option 2 as well (in addition to part of Area 526).*

Option 1 (no action) does not appear to achieve the specific objectives of this framework adjustment. Any option that includes a haddock catch cap provides an incentive for the fleet to fish in a manner that minimizes haddock bycatch. However, this particular cap (0.2% of the combined stocks) and its corresponding accountability measure (closure of directed herring fishery across a large Exemption Area) significantly impacts the opportunity for the herring fleet to harvest the Area 3 sub-ACL and could result in substantial lost revenue for the herring fleet, assuming that market conditions would otherwise allow for those herring to be harvested/sold. This option also does not provide incentives for the herring fleet to fish in offshore areas, as these are the areas with the greatest potential for encounters with haddock. Under this option, the closure applies to all herring vessels, including those that fish in areas with minimal potential haddock bycatch. It therefore does not reduce the impact of the haddock catch cap on the entire herring fishery.

6.4.2 Option 2: Haddock Catch Cap of 1% for the Midwater Trawl Fleet

Impacts on the Northeast Multispecies Fishery

Increasing the haddock catch cap to 1% for the MWT component of the herring fishery would likely have no measureable economic impacts to vessels participating in the groundfish fishery.

Increasing the haddock catch cap for the MWT fleet to 1% of the combined Georges Bank and Gulf of Maine haddock ABC would be unlikely to result in a change in fishing mortality on these stocks (see discussion in section 6.1.2 and Table 55 and Table 56 above). Four sources of uncertainty are noted in the section 6.1.2 discussion, however. If any or all of these four sources lead to over-exploitation of either haddock resource, future ABC levels and other management measures may limit fishing opportunities for the groundfish fishery. Countervailing this is that Option 2 would exercise more positive control on haddock removals through expanding observed discard rates to an estimate of total removals. The possibility of overfishing either haddock stock due to an increase in the haddock catch cap to 1% would be remote.

If the increased haddock catch cap allows vessels targeting herring to stay on Georges Bank longer than would occur under Option 1, it is possible that some groundfish fishing may be displaced by the presence of these herring vessels. To investigate this possibility, New England Fishery Observer Program (NEFOP) data were used to test whether fewer groundfish tows were made in the vicinity of, and at the time of, herring fishing. Because herring vessels make relatively long tows, on the order of 15-25 nautical miles, the vicinity for this investigation was 20nm. All observed herring tows in statistical areas 521, 522, 561 and 562 for 2008-2010 were assigned a latitude and longitude position at the location where the tow ended. Because herring fishing in these areas was highly clustered, a daily mean center location was calculated for all observed herring tows (the mean distance between same-day herring tow locations was 3.7nm). The number of observed tows or sets on trips targeting groundfish that ended within 20nm of that daily mean center location on the day of the herring tow were summed. This number is compared to the number of groundfish sets/tows observed within 20nm of the herring tow position on the days preceding and following the observed herring tow event.

This investigation showed that herring fishing does not correspond to fewer observed groundfish sets/tows. Rather, the opposite correspondence appeared—there were more observed groundfish sets/tows in the vicinity of herring fishing on that day than in that same location on the days before or the days after herring fishing. This investigation does not purport to show causality, there were far too many variables and uncertainties that could drive the result. However, it does not support the idea that groundfish fishing may be displaced by the presence of herring fishing and it seems unlikely that there would be a negative effect on groundfish fishing due solely to the spatial-temporal overlap of the fisheries if Option 2 were to be proposed for action.

When compared to Option 1, the only likely difference in the economic impacts of this option would be if more groundfish fishing activity is displaced – which the preceding analysis does not support. There would be no difference between the economic impacts of this option and Option 3.

Table 61 – Mean number of groundfish sets/tows occurring within 20nm of the daily mean center location of herring tows in the days preceding and following herring fishing. Total number of herring tows in the study area is 472. Differences between *n* and 472 represent herring tow locations with zero groundfish tows within the 20nm radius. (Data from NEFOP, for statistical areas 521, 522, 561 and 562 from 2008-2010)

	n	mean	stdev
5 days before	*119*	1.98	4.7
2 days before	*112*	2.82	5.2
1 day before	*106*	2.66	4.6
day of herring tow	***92***	**6.12**	**6.6**
1 day after	*111*	2.30	4.1
2 days after	*107*	2.01	3.6
5 days after	*119*	2.79	4.8

Impacts on the Atlantic Herring Fishery
Option 2 is likely to have a positive impact on vessels participating in the Atlantic herring fishery, as this option greatly reduces the possibility that a haddock catch cap would result in closure of the directed herring fishery throughout the majority of the Gulf of Maine and Georges Bank. Opportunities to prosecute the offshore fishery (Area 3, Georges Bank) and fully utilize the herring OY should be higher under Option 2 than under Option 1 (no action). Based on observed levels of haddock bycatch in the herring fishery and recent reductions in herring fishing effort (through greatly reduced ACLs in 2010), a 1% haddock catch cap is unlikely to be reached in the short-term, but provides a backstop and establishes a mechanism to estimate fleet-wide bycatch on a real-time basis. The proposed separation of the GOM and GB haddock stocks and related catch caps in Option 2 reduces the overall impact of a fishery closure, if one were to occur. It also eliminates impacts on purse seine vessels by restricting the cap and the accountability measure to midwater trawl vessels.

Table 62 lists the (preliminary) caps for GOM and GB haddock that would be established in 2011 and 2012 under Option 2. The caps are based on 1% of the ABC values for GOM and GB haddock. While the caps are considerably higher than the current (2010) combined cap, they will be monitored based on catch estimates from observer data expanded to the entire midwater trawl fleet. The current cap is monitored only based on what is observed and reported, without any expansion to the fleet. Expanded catch estimates based on observer data indicate that midwater trawl vessels have caught less than 5 mt of GOM haddock and less than 100 mt of GB haddock (although Georges Bank catch estimates range from 0-280 mt over the time series examined by the Groundfish PDT). Estimated midwater trawl catch of haddock in 2009 was about 57 mt from the GB stock and less than 1 mt from the GOM stock (2010 estimates are not yet available). The caps proposed in Option 2 will therefore not likely constrain the herring fishery in the short term, but they provide backstops to ensure that bycatch remains minimized and encourage the fleet to avoid haddock. The caps are expected to decline over the upcoming 2-3 years as well, based on projections of haddock stock biomass from the most recent assessment.

Table 62 Proposed Haddock Sub-ACL Under Option 2 (1% Stock Specific Cap)

FISHING YEAR (GROUNDFISH)	HADDOCK SUB-ACL FOR HERRING FISHERY
2010 (until April 30, 2011)	86 mt (combined)
2011 (May 1, 2011 – April 30, 2012)	**GOM** = 11 mt **GB** = 318 mt
2012 (May 1, 2012 – April 30, 2013)	**GOM** = 9 mt **GB** = 270 mt

Both Option 2 and Option 3 (discussed further below) appear to achieve the objectives of this framework adjustment more than Option 1 (no action). While Option 1 may provide more incentive for the fleet to fish in a manner, at times, and in areas when and where haddock bycatch is none to low, it is not likely to achieve the other objectives. Option 2 also provides a similar incentive by establishing a cap that is monitored through observer estimates of haddock catch that are expanded to the entire fleet. The increased cap (which is not expected to compromise the haddock resource), combined with stock-specific area closures if the cap is reached, maximizes the chance for the Georges Bank (Area 3) herring sub-ACL to be caught, provides incentives for the herring fleet to fish offshore, and greatly reduces the impact of a haddock catch cap on the entire herring fishery. Also, because Option 2 proposes to monitor the cap using fleet-wide estimates of haddock bycatch (expanded from observer data), changes in observer coverage levels would not affect the amount of the catch cap or the rate at which the cap is taken.

6.4.3 Option 3: Haddock Catch by Herring Fleet Included in "Other Sub-components" Category

Impacts on the Northeast Multispecies Fishery

Including haddock catch by the herring MWT fleet in the "other subcomponents" category for ACL calculations would likely have no measurable economic impact on the groundfish fishery.

Under this option, catches of haddock in the herring MWT fishery would be applied against the "other subcomponents" category for calculating ACLs in the groundfish fishery. The basic option does not contain an AM and as such exerts no direct control over haddock catch. Two sub-options are included, which may be enacted if haddock catch in the MWT fishery exceeds certain levels. These two sub-options would increase the direct control over haddock catch, but all three options would be highly unlikely to materially affect fishing mortality on either haddock stock. Allowing haddock catch in excess of the 1% called for in Option 2 may lengthen the time herring vessels spend on Georges Bank, but based on the investigation noted in the economic impacts discussion for Option 2, this would be unlikely to measurably affect groundfish fishing.

If the increased haddock catch cap allows vessels targeting herring to stay on Georges Bank longer than would occur under Option 1, it is possible that some groundfish fishing may be displaced by the presence of these herring vessels. To investigate this possibility, New England Fishery Observer Program (NEFOP) data were used to test whether fewer groundfish tows were made in the vicinity of, and at the time of, herring fishing. Because herring vessels make relatively long tows, on the order of 15-25 nautical miles, the vicinity for this investigation was 20nm. All observed herring tows in statistical areas 521, 522, 561 and 562 for 2008-2010 were assigned a latitude and longitude position at the location where the tow ended. Because herring fishing in these areas was highly clustered, a daily mean center location was calculated for all observed herring tows (the mean distance between same-day herring tow locations was 3.7nm). The number of observed tows or sets on trips targeting groundfish that ended within 20nm of that daily mean center location on the day of the herring tow were summed. This number is compared to the number of groundfish sets/tows observed within 20nm of the herring tow position on the days preceding and following the observed herring tow event.

This investigation showed that herring fishing does not correspond to fewer observed groundfish sets/tows. Rather, the opposite correspondence appeared—there were more observed groundfish sets/tows in the vicinity of herring fishing on that day than in that same location on the days before or the days after herring fishing. This investigation does not purport to show causality, there were far too many variables and uncertainties that could drive the result. However, it does not support the idea that groundfish fishing may be displaced by the presence of herring fishing and it seems unlikely that there would be a negative effect on groundfish fishing due solely to the spatial-temporal overlap of the fisheries if Option 2 were to be proposed for action. See Table 61.

When compared to Option 1, the only likely difference in the economic impacts of this option would be if more groundfish fishing activity is displaced – which the preceding analysis does not support. There would be no difference between the economic impacts of this option and Option 2.

Impacts on the Atlantic Herring Fishery

Option 3 is likely to have the most positive impact on vessels participating in the Atlantic herring fishery, as this option eliminates the possibility that a haddock catch cap would result in closure of the directed herring fishery throughout the majority of the GOM and GB. Both Options 2 and 3 should prevent direct economic loss resulting from foregone herring harvest, particularly in a management area that is not fully utilized and can support increased fishing effort (Area 3, GB). Opportunities to prosecute the offshore fishery and fully utilize the herring OY should be the highest under Option 3. The trigger backstops proposed in Option 3 would result in a delayed implementation of Option 2, so the long-term impacts would be similar to Option 2, if the trigger is reached.

Because Option 3 does not include a specific cap initially (triggers are set to establish a 1% stock-specific cap if necessary), this option maximizes opportunities and minimizes impacts on the herring fishery more than the other options but does not provide as much incentive for the fleet to fish in a manner, at times, and in areas when and where haddock bycatch is none to low. However, the trigger/backstop proposed in Option 3 should alleviate some concerns about this issue. Moreover, all of the options prohibit discarding of haddock in order to minimize bycatch and ensure the most accurate accounting of haddock catch possible.

6.4.4 Assessing the Impacts of Changes to the Haddock Catch Cap for the Herring Fishery

A general analysis was performed to examine the potential impacts of changing (increasing) the haddock catch cap for vessels participating in the Atlantic herring fishery. The analysis utilized

2005-2009 observer data and 2010 VTR data to characterize the impacts of the options under consideration and address the following questions:

- Under the status quo (Option 1), when would the herring fishery be likely to close? If the fishery could close, how much herring could remain un-harvested?
- Under Option 2, which proposes 1% Gulf of Maine and Georges Bank haddock sub-ACLs for the herring fishery, when would the herring fishery in the related areas be likely to close? If the fishery could close, how much herring could remain un-harvested?

6.4.4.1 Methods

For this analysis, 2005-2009 observer data is used to generate trip-level haddock bycatch rates for midwater trawl gear both inside and outside the exempted areas (i.e., the areas to which the catch cap and closure apply). In this database, there are 171 observed midwater trawl trips in the GOM area, 105 observed midwater trawl trips in the GB area, and another 102 observed midwater trawl trips outside of both areas. Two methods are used to generate bycatch rates for each of these trips:

1. A bycatch/catch ratio, defined as ratio of haddock to herring (see below as "*RATIO*"); and
2. A bycatch/effort measure, defined as haddock per trip (see below as "*RAW*").

The 2010 VTR database is utilized as a basis for fishing activities since the 2011 and 2012 herring ACLs/sub-ACLs are identical to those in 2010. 2010 VTR trips landing more than 2,000 pounds of herring are stratified by gear (only midwater trawl trips are used in this analysis) and by location (inside the GOM and GB exemption areas, or outside the exemption areas). In the 2010 database, there were 107 midwater trawl trips in the GOM area, 124 midwater trawl trips in the GB area, and 114 midwater trawl trips outside of both areas. Each of these trips is randomly assigned a bycatch rate based on the calculations described above.

- For Option 1 (no action), if there is X% observer coverage, each trip in the analysis is randomly assigned to be observed with probability X and not to be observed with probability (1-X).
- A time-series of cumulative fleet-level bycatch is then constructed. The beginning of the year is set to May 1, the beginning of the groundfish fishing year.
- The date at which a haddock sub-ACL would be exceeded and the amount of herring which has not been caught is calculated (foregone herring). If the haddock sub-ACL is not exceeded, then the foregone herring is set to zero.
- The above steps are repeated 1,000 times to generate a distribution of expected results.
- From this exercise, the percentage of times which the haddock sub-ACL is exceeded, the earliest date that the sub-ACL is exceeded, and the average "foregone" herring are calculated for trip simulations that result in a closure.

6.4.4.2 Results and Discussion

Table 63 summarizes the results of simulations for Option 1 (no action) based on different levels of observer coverage. Based on this simulation, the probability of the haddock sub-ACL being exceeded depends on the rate of observer coverage under Option 1 (no action). With 85% observer coverage, the probability of the haddock sub-ACL being exceeded may be as high as 13.5%. When interpreting these results, it is important to note that foregone herring does not necessarily imply that herring would not be caught. It is possible for herring to be caught in the non-exempt areas when the exempt areas are closed. Therefore, the value of this foregone herring should not be interpreted as costs or impacts. Finally, given the appropriate incentives, fishing vessels can undertake costly modifications to fishing practices in order to avoid haddock. These factors are not examined in detail in this analysis.

Under Option 1 (no action), vessels may even expend a bit more effort to avoid haddock than they did in 2010; incentives to avoid haddock may be stronger because the sub-ACL will be lower. Under Option 2 and Option 3, the incentives to avoid haddock would be lower, so catch of haddock may increase. It is extremely likely that herring vessels will expend less effort avoiding GB haddock under Option 2 than in 2010. There are still strong incentives to avoid exceeding the haddock sub-ACL under Option 2, though, while the incentives to avoid the haddock sub-ACL are weaker under Option 3. For Option 2, the incentives change a little bit more because there are triggers proposed as backstops.

Table 63 Simulation Results for Option 1 (No Action) – Simulated Closures and Foregone Herring

	OPTION 1 – 20% COVERAGE			
	Probability of Closure	**Average Closure Date**	**Earliest Closure Date**	**Average Foregone Herring (000's Lbs)**
RATIO	0	N/A	N/A	N/A
RAW	0	N/A	N/A	N/A
	OPTION 1 – 50% COVERAGE			
	Probability of Closure	**Average Closure Date**	**Earliest Closure Date**	**Average Foregone Herring (000's Lbs)**
RATIO	0.4%	11/10	11/3	19,061
RAW	0.5%	12/26	12/1	4,690
	OPTION 1 – 85% COVERAGE			
	Probability of Closure	**Average Closure Date**	**Earliest Closure Date**	**Average Foregone Herring (000's Lbs)**
RATIO	7%	12/14	8/5	14,024
RAW	13.5%	12/25	10/21	11,959

The above simulation was performed for Options 2 and 3 as well. Under Option 2, the GOM Exemption Area closes 0.2% of the time when bycatch rates are estimated by the *RAW* method (resulting in 11,807,000 pounds foregone herring) and does not close at all under the *RATIO* method. Therefore, Option 2 substantially decreases the probability of that either of the proposed haddock sub-ACLs would be exceeded and represents a positive economic impact to the herring fishery. There are no closures expected under Option 3 because there are no specific sub-ACLs established in that option, so the negative impacts on the herring fishery are likely to be the smallest under Option 3.

A very important caveat is that this analysis assumes that fishing for Atlantic herring in 2011 will be similar to fishing in 2010, that is, the distribution of fishing effort as well as the incentives for vessels to avoid haddock bycatch are similar to those in 2010. However, this is unlikely to be a correct assumption under any of the options being evaluated. It is important to understand that avoiding haddock can be costly for the herring vessel. Economically-rational agents should undertake costly behavior to avoid experiencing bad events (i.e., averting behavior). Exceeding the haddock sub-ACL and the associated closure of the directed herring fishery is a bad event; under Options 2 and 3, this behavior would be less likely to occur. Avoiding these costly behavioral changes is a benefit of Options 2 or 3 relative to the status quo; however, these benefits cannot be quantified at this time. It is important to acknowledge that this averting behavior may have occurred at the end of the 2010 calendar year – the midwater trawl herring fleet ceased fishing in Area 3 by September 2010. In 2010 the herring fishery only caught about 40 percent of the Herring Management Area 3 TAC. This fact is embedded in the analyses; it is difficult to determine how much catches might increase if Options 2 or 3 were adopted., or how this would change the probability of a closure.

Because the incentives to avoid haddock are likely to be different than they were in 2010, herring fishing activity is likely to be different. In particular, the spatial and temporal patterns of effort and landings under Options 1, 2, and 3 may be different from the spatial and temporal patterns of effort and landings during the 2010 fishing year. While every fishing year is unique, the fishing in 2010 was very different from 2009 and prior years. Prior to 2010, there was negligible catch of haddock and herring from Area 3 before September. However, in 2010, there were large catches of haddock in June and moderate catches of herring from May through September. Under Option 1 (no action), it is likely that there will be less fishing effort, lower landings of herring, and lower or similar levels of haddock catch in Area 3 (GB). Under Options 2 and 3, it is likely that there will be more fishing effort, higher landings, and higher haddock catch in Area 3. However, it is difficult to determine whether failing to account for changing incentives to avoid haddock will result in a upward or downward biased estimates of the probability that the sub-ACL(s) for haddock will be exceeded.

6.4.4.3 General Conclusions

Based on this assessment, the probability of the haddock sub-ACL being exceeded by the herring fishery depends on the rate of observer coverage under Option 1 (no action). With 85% observer coverage, the probability of the sub-ACL being exceeded may be as high as 13.5%. With full coverage, the probability of the sub-ACL being exceeded may be as high as 30%. These results are based on 2010 fishing activity, when only 40 percent of the Herring Management Area 3 TAC was caught. Presumably the possibility of the sub-ACL being exceeded would increase if more of the herring TAC was landed. While the haddock sub-ACL has never been exceeded, there is evidence that herring fishing practices changed in 2010 as the sub-ACL was approached. It is therefore likely that, if the catch of haddock approaches the sub-ACL(s), fishing practices will change in order to avoid triggering AMs under any of the options being considered in this framework adjustment.

Under Option 2, the sub-ACLs are sufficiently high that they are unlikely to be exceeded if fishing practices remain similar to 2010. Option 3 does not establish sub-ACLs initially, so there is no chance for closure of the fishery unless the trigger is reached and the Option 2 sub-ACL is implemented for future years. Relative to the no action alternative, Options 2 and 3 greatly increase the probability that the Area 3 sub-ACL for Atlantic herring can be harvested because they reduce the possibility the haddock sub-ACL will be exceeded, resulting in a closure of the AM area.

6.4.5 Summary of Economic Impacts

With respect to expected impacts on vessels participating in the Northeast Multispecies fishery, there is little difference between the options. Less than 20 percent of the GB haddock ACL is being harvested and small allocations to the herring fishery (0.2 – 1 percent in the case of Options 1 and 2; an unspecified amount but less than four percent in the case of Option 3) will have not effect on current revenues and only minor effects on possible future revenues. In the GOM, there is not as much of the ALC that has not been caught but the differences between the options are still minor. Concerns have been raised that Options 2 and 3 might result in more MWT activity on GB, displacing groundfish fishing activity, but an initial analysis does not indicate this may be a large problem.

The economic impacts of the options differ the most for the herring fishery. Under Option 1/No Action, there is a substantial risk the haddock catch cap will be caught, particularly at high observer coverage levels, and that available herring yield will not be taken on GB. If conditions for 2012-2014 are similar to the experience in 2010 when about 23,000 mt of herring were not caught[6], over the three years of the current herring specifications the loss in yield would be 69,000 mt. Options 2 and 3 substantially reduce this risk and make it more likely that the available herring yield will be harvested. Option 3 would have the least likelihood of limiting the harvest of herring, but also would provide the least incentive for the herring MWT fishery to avoid haddock.

[6] It is not clear that the only reason these fish were not caught was due to the haddock catch cap. While the cap likely contributed to the reduced catches, there may be other factors that limited catch.

6.5 Social Impacts

The need to assess social impacts emanating from federally mandated fishing regulations stems from National Environmental Policy Act (NEPA) and M-S Act mandates that the social impacts of management measures be evaluated. NEPA requires the evaluation of social and economic impacts in addition to the consideration of environmental impacts. National Standard 8 of the M-S Act demands that "Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of over fishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities" (16 U.S.C. §1851(2)(8)). The analysis that follows provides a context for understanding possible social impacts resulting from the proposed measures in Framework 46.

Detailed descriptions of the social aspects of the communities involved in the groundfish and herring industries can be found in Framework 45 to the Northeast Multispecies FMP and Amendment 1 to the Herring FMP, respectively. The five social impact factors of *regulatory discarding, safety, disruption in daily living, changes in occupational opportunities and community infrastructure, and formation of attitudes* were identified by Amendment 13 to the Northeast Multispecies FMP and can be used to assess impacts of changes in fishery management measures. For the actions proposed in this framework, the social impacts hinge on the ability of each fishery to be fully prosecuted without participation being limited by haddock availability. As a result, formation of attitudes is the factor most likely to be influenced by any option unless one option is more likely to lead to a shutdown of either fishery or severe restrictions on fishing activity. Overall, the measures proposed in this framework are not expected to have major social impacts on either fishery, as the abundance of haddock in the near term is likely to allow both fisheries to be prosecuted under any alternative (with the possible exception of the No Action alternative).

Notably, any impacts to the herring fishery for each alternative could lead to corresponding impacts on the lobster fishery as the herring vessels supply important lobster bait.

6.5.1 Option 1: No Action

If no action is adopted, the herring fishery would be subject to a cap on haddock catch that is equal to 0.2% of the combined GB and GOM haddock ABC.

This option poses a chance that the bycatch cap could shut down the herring fishery in the GOM/GB herring exemption area if haddock catch by that fishery is high, as it was in 2010. Of all the proposed options, this outcome would have the greatest social impacts on the herring fishery, as fishery closures are known to affect all five social impact categories. A shutdown of the fishery in that area would cause *disruptions in daily living* and *reduced occupational opportunities* for herring fishery participants. It could lead to *safety* concerns if vessels fished in more remote areas, and would certainly foster bad *attitudes* if the perception was that the fishery was shut down even when the overall haddock ACL had not been harvested. Finally, *regulatory discarding* would be increased on all non-observed trips so that reported haddock catch remained low. Even in the absence of a closure resulting from the 0.2% bycatch cap, this option would affect *attitudes* in the herring fishery because the cap is perceived to be low relative to the abundance of haddock, especially on GB, and the likely inability of the groundfish fishery to harvest the entire available TAC at least in the near future.

Impacts of this option on the groundfish fishery would be less severe than on the herring fishery, and can be considered neutral since the cap is already part of the groundfish allocation structure. This cap is generally perceived to be a low number, and there does not seem to be any feeling in the groundfish fishery that the small allocation to the herring fishery interferes with groundfishing operations.

6.5.2 Option 2: Haddock Catch Cap of 1% for the Midwater Trawl Fleet

Under this option, the herring fishery's midwater trawl fleet would be subject to a cap on haddock catch that is equal to 1% of the Georges Bank haddock ABC and 1% of the Gulf of Maine haddock ABC. Catch estimations would be calculated by extrapolating sea sampling observations to the entire fleet by area.

This option effectively raises the amount of haddock that can be caught in the herring fishery, and thus would be expected to have positive impacts on that fishery compared to the No Action alternative. Allowing more fishing before a potential shutdown would guarantee increased *occupational opportunities* throughout the year, and would lead to positive *attitudes* in that the fishery would be allowed to share the benefits of the currently high haddock stock sizes. Additionally, this option is unique in that it applies the cap exclusively to midwater trawl vessels. This should have positive social impacts – it will be perceived as logical and equitable since that portion of the fleet is responsible for most or all of the haddock bycatch.

Although Option 3 increases the amount of haddock the herring fishery can catch before reaching its cap, it effectively does so by reallocating fish from the groundfish fishery. This can lead to negative *attitudes*, especially by smaller operators in the groundfish fleet who perceive the much larger herring vessels to be unfairly benefitted by these types of measures. This may be partially offset by the perceived benefit of treating the haddock stocks separately, which should be seen as a sensible measure based on the status of each individual stock. Also, since the groundfish fishery is unlikely to catch the full haddock ACL in the near future, an increased allocation to the herring fishery is unlikely to affect groundfish operations or lead to tangible impacts that would exacerbate the formation of any negative attitudes.

6.5.3 Option 3: Haddock Catch by Herring Fleet Included in "Other Sub-Components" Category for ACL Calculations

If this option is adopted, catches of haddock by the herring fishery would be incorporated into the "other sub-components" portion of the haddock ACL. Haddock catch in the herring fishery would be monitored for future changes. This option has two sub-options that are being considered; the stand-alone option is discussed here while the predicted impacts of the adoption of either sub-option are described in its respective section below.

In practice, the approach in Option 3 is the least likely to lead to a shut down the herring fishery, at least in the near term, and therefore would be expected to have the most positive social impacts on that fishery compared to the other alternatives. The uninterrupted prosecution of the fishery will lead to consistent *occupational opportunities*, and the *formation of attitudes* will be positive in that the fishery would be allowed to share the benefits of the currently high haddock stock sizes. Any social impacts resulting from future changes to the status of haddock bycatch in the herring fishery (i.e., if the catch reaches the five percent threshold to require a sub-ACL) would be analyzed in a future action.

For the groundfish fishery, this option is likely to have slightly negative social impacts compared to the No Action alternative. Although it may result in an increase in haddock catch by the herring fishery in the near future, it may also be seen as an equitable approach to the problem, since the haddock bycatch would be treated the same as the bycatch of groundfish in all other fisheries. This could be expected to lead to a somewhat neutral *attitude* about the measures. However, there is also a chance that the adoption of this measure could lead to increased catches of haddock by the herring fishery compared to other measures, since there is no hard backstop that limits the catch. This could mean increased herring vessel activity in areas that are targeted by groundfish fishermen. There is a small chance this could lead to adverse fishery interactions and *negative attitudes* toward participants in the other fleet.

Sub-Option A: Combined MWT and Subcomponent Trigger

Under this sub-option of Option 3, if the stock-specific catches of haddock by herring midwater trawl vessels exceeds 1 percent of the GOM haddock ABC or the GB haddock ABC, and the total other sub-components catch (including all herring fishery catches) of GOM haddock or GB haddock from federal waters exceeds four percent of the ABC, the herring midwater trawl fishery would be subject to the measures described in Option 2 for the relevant stock area.

This sub-option is likely to have positive social impacts to the herring fishery in comparison to the No Action alternative, but negative social impacts to that fishery when compared to Option 3 alone. Because this measure defines an event that would lead to the implementation of Option 2, which is more restrictive to the herring fishery than Option 3, it increases the chance that there could be restrictions on the catch of herring. As noted in the discussion of social impacts for Option 1, any measure that could lead to a shut-down or area restrictions in the herring fishery is expected to have the greatest social impacts. This sub-option provides the most liberal cap of all of the options considered that provide a firm limit to herring fishery haddock catch (i.e. Options 1, 2, 3a, and 3b), so the social impacts to the herring fishery would be the least of all the options considered except the stand-alone Option 3.

Impacts of Option 3a to the groundfish fishery should be neutral, because in effect the herring fishery would not be receiving an allocation of groundfish that would subtract from the amount available to groundfish vessels. The four percent set-aside to other federal fisheries is already incorporated into the groundfish FMP, and thus no new set-aside is created. Unlike Option 3 alone, which does not create a new set-aside either, this sub-option ensures that the herring fishery will not create an overage that will be deducted from the groundfishery's ACL in the following year. This will create similar social impacts to the groundfish fleet as does the No Action alternative, because it merely continues an existing allocation and provides accountability measures to ensure that the allocation will not be exceeded.

Sub-Option B: MWT Trigger

If this sub-option is adopted along with Option 3, the herring midwater trawl fishery would be subject to the measures described in Option 2 if the stock-specific catches of haddock by herring midwater trawl vessels exceed 1 percent of the GOM haddock ABC or the GB haddock ABC.

In effect, this sub-option has nearly identical social impacts to Option 2. It effectively caps the catch at one percent of the ABC for each stock of haddock, with the distinction that there could be one overage event before the firm cap is implemented. This allowance would provide for more flexibility in the herring fishery, and therefore lead to social positive impacts if it leads to fewer restrictions in a fishing year. For the groundfish fishery, it would have slightly more negative social impacts than Option 2 because of the uncertainty associated with the possibility of one large haddock catch event in the herring fishery.

6.5.4 Summary of Social Impacts

The following table summarizes the social impacts of the Framework 46 proposed measures.

Table 64 – Summary of FW 46 Social Impacts

Option	***Herring Fishery Impact***	***Groundfish Fishery Impact***
1: No Action	Likely – (if cap reached early)	Neutral
2: Haddock Catch Cap of 1% for the Midwater Trawl Fleet	Likely +	Likely -
3: Haddock Catch by Herring Fleet Included in “Other Sub-Components” Category for ACL Calculations	Likely ++	Likely -
3a. Option 3 with Combined MWT and Subcomponent Trigger	Likely +	Neutral
3b. Option 3 with MWT Trigger	Likely +	Likely -

6.6 Cumulative Effects Analysis

6.6.1 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 46 together with past, present, and reasonably foreseeable future actions that affect the groundfish environment. It should also be noted that the predictions of potential synergistic effects from multiple actions, past, present and/or future will generally be qualitative in nature.

Consistent with the guidelines for CEA, cumulative effects can be more easily identified by analyzing the impacts of the Proposed Action on valued ecosystem components (VECs). The affected environment is described in this document based on VECs that were identified for consideration relative to the proposed specifications. The VECs described in this document and considered in this CEA are listed below.

VECs represent the resources, areas, and human communities that may be affected by a Proposed Action or alternatives and by other actions that have occurred or will occur outside the Proposed Action. VECs are generally the "place" where the impacts of management actions are exhibited. An analysis of impacts is performed on each VEC to assess whether the direct/indirect effects of an alternative adds to or subtracts from the effects that are already affecting the VEC from past, present and future actions outside of the Proposed Action (i.e., cumulative effects).

Valued Ecosystem Components (VEC)
As noted in Section 5.0 (Description of the Affected Environment), the VECs that exist within the groundfish fishery were identified in previous actions and the basis for their selection has been well-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).

The VECs that exist within the Atlantic herring fishery were established in Amendment 4 to the Atlantic Herring FMP as follows:

1. Atlantic herring resource;
2. Habitat and essential fish habitat (EFH);
3. Protected resources (marine mammals and protected species);

4. Non-target/bycatch species; and
5. The Atlantic herring fishery (fishery-related businesses and communities).

For this joint action, the VECs from each management plan are therefore combined and identified as the following:

1. Regulated groundfish stocks (target and non-target);
2. Atlantic herring resource;
3. Non-target species (incidental catch and bycatch);
4. Endangered and other protected species (including marine mammals);
5. Habitat and essential fish habitat (EFH); and
6. Human communities (including economic and social effects on the groundfish and herring 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-target species, habitat and the human environment is primarily focused on actions that have taken place since implementation of the initial NE Multispecies FMP in 1977. An assessment using this timeframe demonstrates the changes to resources and the human environment that have resulted through management under the Council process and through U.S. prosecution of the fishery, rather than foreign fleets. For endangered and other protected species, the context is largely focused on the 1980s and 1990s, when NMFS began generating stock assessments for marine mammals and turtles that inhabit waters of the U.S. EEZ. In terms of future actions, this analysis examines the period between implementation of this amendment (May 1, 2011) and the anticipated rebuilding of the fishery in 2026. This date was chosen because after the fishery is rebuilt, changes to the management of groundfish that are not possible to predict at this time are likely. The temporal scope for Atlantic herring is focused more on the time since the Council's original Herring FMP was implemented at the beginning of the 2001 fishing year. This FMP serves as the primary management action for the Atlantic herring fishery and has helped to shape the current condition of the resource. Consistent with the cumulative effects analysis in Amendment 1 to the Herring FMP, the temporal scope of future actions for all VECs for the herring fishery extends five years into the future. This period was chosen because of the dynamic nature of resource management and lack of specific information on projects that may occur in the future, which make it difficult to predict impacts beyond this time frame with any certainty. This is also the rebuilding time frame for the Atlantic herring resource, as defined in the Herring FMP, should the resource become overfished and subject to a rebuilding program in the future.

Geographic Scope of the VECs

The geographic scope of the analysis of impacts to regulated groundfish stocks, non-groundfish species and habitat for this action is the total range of these VECs in the Western Atlantic Ocean, as described in the Affected Environment section of the document (Section 5.0). However, the analyses of impacts presented in this amendment focuses primarily on actions related to the harvest of the managed resources. The result is a more limited geographic area used to define the core geographic scope within which the majority of harvest effort for the managed resources occurs. For endangered and protected species, the geographic range is the total range of each species (Section 5.3).

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 5.4.1.3) from the U.S.-Canada border to, and including, North Carolina. This range also encompasses fishing communities bordering the range of the herring fishery.

Analysis of Total Cumulative Effects

A cumulative effects assessment ideally makes effect determinations based on the culmination of the following: (1) impacts from past, present and reasonably foreseeable future actions; PLUS (2) the baseline condition for resources and human communities (note – the baseline condition consists of the present condition of the VECs plus the combined effects of past, present and reasonably foreseeable future actions); PLUS (3) impacts from the Proposed Action and alternatives.

A description of past, present and reasonably foreseeable future actions is presented immediately below in Table 65. 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.

6.6.2 Past, Present and Reasonably Foreseeable Future Actions

Table 65 summarizes the combined effects of other past, present and reasonably foreseeable future actions that affect the VECs, i.e., actions other than those alternatives under development in this document. A more detailed description of these actions can be found in the Appendix to Framework 45 to the Northeast Multispecies FMP and in Amendment 4 to the Atlantic Herring FMP.

Note that most of the actions affecting this framework and considered in Table 65 come from fishery-related activities (e.g., Federal fishery management actions). As expected, these activities have fairly straightforward effects on environmental conditions, and were, are, or will be taken, in large part, to improve those conditions. The reason for this is the statutory basis for Federal fisheries management - the reauthorized Magnuson-Stevens Act. That legislation was enacted to promote long-term positive impacts on the environment in the context of fisheries activities. More specifically, the act stipulates that management comply with a set of National Standards that collectively serve to optimize the conditions of the human environment. Under this regulatory regime, the cumulative impacts of past, present, and future Federal fishery management actions on the VECs should be expected to result in positive long-term outcomes. Nevertheless, these actions are often associated with offsetting impacts. For example, constraining fishing effort frequently results in negative short-term socio-economic impacts for fishery participants. However, these impacts are usually necessary to bring about the long-term sustainability of a given resource and as such should, in the long-term, promote positive effects on human communities, especially those that are economically dependent upon the managed resource.

Non-fishing activities were also considered when determining the combined effects from past, present and reasonably foreseeable future actions. Activities that have meaningful effects on the VECs include the introduction of chemical pollutants, sewage, changes in water temperature, salinity, dissolved oxygen, and suspended sediment into the marine environment. These activities pose a risk to the all of the identified VECs in the long term. Human induced non-fishing activities that affect the VECs under consideration in this document are those that tend to be concentrated in near shore areas. Examples of these activities include, but are not limited to agriculture, port maintenance, beach nourishment, coastal development, marine transportation, marine mining, dredging and the disposal of dredged material. Wherever these activities co-occur, they are likely to work additively or synergistically to decrease habitat quality and, as such, may indirectly constrain the sustainability of the managed resources, non-target species, and protected resources. Decreased habitat suitability would tend to reduce the tolerance of these VECs to the impacts of fishing effort. Mitigation of this outcome through regulations that would reduce fishing effort could then negatively impact human communities.

Table 65 – Summary effects of past, present and reasonably foreseeable future actions on the VECs identified for Framework 46

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
Atlantic Herring Resource	**Mixed** Combined effects of past actions have decreased effort and offshore stock has recovered from its collapse. Inshore stock shows recent decline	**Positive** Current regulations continue to manage for sustainable stocks	**Positive** Future regulations are being developed to improve monitoring and address river herring bycatch issues	**Positive** Stocks are being managed to meet sustainable fishing levels
Non-Target 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 rising fuel costs have had a negative economic	**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	**Short-term Negative** Lower revenues would likely continue until stocks are fully rebuilt **Long-term Positive** Sustainable resources should support viable communities and economies

		impact	have a positive impact	

Impact Definitions for Table 65:
-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

6.6.3 Baseline Conditions for Resources and Human Communities

For the purposes of a cumulative effects assessment, the baseline conditions for resources and human communities is considered the present condition of the VECs plus the combined effects of the past, present, and reasonably foreseeable future actions. The following table (Table 66) summarizes the added effects of the condition of the VECs (i.e., status/trends from section 5.0) and the sum effect of the past, present and reasonably foreseeable future actions (from Table 65 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 5.1 and 5.3, respectively. As mentioned above, this cumulative effects baseline is then used to assess cumulative effects of the proposed management actions below in Table 66.

Impact Definitions for Table 66 below:

Regulated Groundfish Stocks, Non-groundfish species, Endangered and Other Protected Species	Positive = actions that increase stock size Negative = actions that decrease stock size
Habitat	Positive = actions that improve or reduce disturbance of habitat Negative = actions that degrade or increase disturbance of habitat
Human Communities	Positive = actions that increase revenue and well being of fishermen and/or associated businesses Negative = actions that decrease revenue and well being of fishermen and/or associated businesses
All VECs	Mixed=both positive and negative

Table 66 – Cumulative effects assessment baseline conditions of the VECs

VEC		Status/Trends	Combined Effects of Past, Present Reasonably Foreseeable Future Actions (Table 65)	Combined CEA Baseline Conditions
Regulated Groundfish Stocks	**Georges Bank Cod**	Overfished and overfishing is occurring.	**Negative** – short term: Several stocks are currently overfished, have overfishing occurring, or both; **Positive** – long term: Stocks are being managed to attain rebuilt status	**Negative** – short term: Overharvesting in the past contributed to several stocks being overfished or where overfishing is occurring; **Positive –** long term: Regulatory actions taken over time have reduced fishing effort and with the addition of Amendment 16, stocks are expected to rebuild in the future
	Gulf of Maine Cod	Not overfished but overfishing is occurring.		
	Georges Bank Haddock	Not overfished and overfishing is not occurring.		
	Gulf of Maine Haddock	Not overfished and overfishing is not occurring.		
	Georges Bank Yellowtail	Overfished and overfishing is occurring.		
	SNE/Mid-Atlantic Yellowtail	Overfished and overfishing is occurring.		
	Cape Cod-Gulf of Maine Yellowtail	Overfished and overfishing is occurring.		
	American Plaice	Not overfished and overfishing is not occurring.		
	Witch Flounder	Overfished and overfishing is occurring.		
	Georges Bank Winter Flounder	Overfished and overfishing is occurring.		
	Gulf of Maine Winter Flounder	Overfished and overfishing is occurring.		
	SNE/Mid-Atlantic Winter Flounder	Overfished and overfishing is occurring.		
	Acadian Redfish	Not overfished and overfishing is not occurring.		
	White Hake	Overfished and overfishing is occurring.		
	Pollock	Not overfished and overfishing is not occurring.		
	Northern Windowpane	Overfished and overfishing is occurring.		
	Southern Windowpane	Not overfished but overfishing is occurring.		
	Ocean Pout	Overfished but overfishing is not occurring.		
	Atlantic Halibut	Overfished but overfishing is not occurring.		

(Table 66 continued)

VEC		Status/Trends	Combined Effects of Past, Present Reasonably Foreseeable Future Actions (Table 65)	Combined CEA Baseline Conditions
Atlantic Herring Resource		Not overfished and overfishing is not occurring.	**Positive -** Stocks are being managed to meet sustainable fishing levels	
Non-Target Species (principal species listed in section XXX)	**Monkfish**	Not overfished and overfishing is not occurring.	**Positive** – Continued management of directed stocks will also control incidental catch/bycatch.	**Positive** – Although prior groundfish management measures likely contributed to redirecting effort onto non-groundfish species, as groundfish rebuild this pressure should lessen and all of these species are also managed through their own FMP.
	Dogfish	Not overfished and overfishing is not occurring.		
	Skates	Winter, thorny and smooth skates are overfished and thorny is also subject to overfishing. Barndoor skate is not overfished and is rebuilding toward biomass target. Little skate is not overfished, although it is close to the overfished biomass threshold. Clearnose and rosette skates are not overfished and overfishing is not occurring.		
Habitat		Fishing impacts are complex and variable and typically adverse (see section 5.1.4); Non-fishing activities had historically negative but site-specific effects on habitat quality.	**Mixed** – Future regulations will likely control effort and thus habitat impacts but as stocks improve, effort will likely increase along with additional non-fishing activities.	**Mixed** - reduced habitat disturbance by fishing gear but impacts from non-fishing actions, such as global warming, could increase and have a negative impact.
Protected Resources	**Sea Turtles**	Leatherback, Kemp's ridley and green sea turtles are classified as endangered under the ESA and loggerhead sea turtles are classified as threatened.	**Positive** – reduced gear encounters through effort reductions and management actions taken under the ESA and MMPA have had a positive impact	**Positive** – reduced gear encounters through effort reductions and additional management actions taken under the ESA and MMPA.
	Large Cetaceans	Of the baleen whales (right, humpback, fin, blue, sei and minke whales) and sperm whales, all are protected under the MSA and with the exception of minke whales, all are listed as endangered under the ESA.		
	Small Cetaceans	Pilot whales, dolphins and harbor porpoise are all protected under the MSA. The most recent stock assessment for harbor porpoise shows that takes are increasing and nearing PBR.		
	Pinnipeds	ESA classification: Endangered, number of nesting females below sustainable level; taken by *Loligo* trawl		

(Table 66 continued)

VEC	Status/Trends	Combined Effects of Past, Present Reasonably Foreseeable Future Actions (Table 65)	Combined CEA Baseline Conditions
Human Communities	Complex and variable (see Section 5.3). 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

6.6.4 Summary Effects of Framework 46 Actions

TO BE COMPLETED

6.6.5 Cumulative Effects Summary

TO BE COMPLETED

7.0 Applicable Law

7.1 Magnuson-Stevens Fishery Conservation and Management Act

7.1.1 Consistency with National Standards

TO BE COMPLETED

7.1.2 Other MSFCMA requirements

TO BE COMPLETED

7.1.3 EFH Assessment

TO BE COMPLETED

7.2 National Environmental Policy Act (NEPA)

NEPA provides a mechanism for identifying and evaluating the full spectrum of environmental issues associated with federal actions, and for considering a reasonable range of alternatives to avoid or minimize adverse environmental impacts. This document is designed to meet the requirements of both the M-S Act and NEPA. The Council on Environmental Quality (CEQ) has issued regulations specifying the requirements for NEPA documents (40 CFR 1500 – 1508), as has NOAA in its agency policy and procedures for NEPA in NAO 216-6 §5.04b.1. All of those requirements are addressed in this document, as referenced below.

7.2.1 Environmental Assessment

The required elements of an Environmental Assessment (EA) are specified in 40 CFR 1508.9(b) and NAO 216-6 §5.04b.1. They are included in this document as follows:

- The need for this action is described in Section 2.2;
- The alternatives that were considered are described in Sections 3.0 (Proposed Action) and XXX (alternatives to the Proposed Action);
- The environmental impacts of the Proposed Action are described in Section 6.0;
- The agencies and persons consulted on this action are listed in Section XXX.

While not required for the preparation of an EA, this document includes the following additional sections that are based on requirements for an Environmental Impact Statement (EIS).

- An Executive Summary can be found in Section XXX.
- A table of contents can be found in Section 1.0.
- Background and purpose are described in Section 2.0.
- A summary of the document can be found in Section XXX.
- A brief description of the affected environment is in Section 5.0.
- Cumulative impacts of the Proposed Action are described in Section 6.6.
- A determination of significance is in Section 7.2.2.
- A list of preparers is in Section 7.2.3.
- The index is in Section 8.3.

7.2.2 Finding of No Significant Impact (FONSI)

TO BE COMPLETED

7.2.3 List of Preparers; Point of Contact

TO BE COMPLETED

7.2.4 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

7.2.5 Opportunity for Public Comment

The Proposed Action was developed during the period January 2011 through April 2011 and was discussed at the following meetings. Opportunities for public comment were provided at each of these meetings.

Groundfish Oversight	Clarion Hotel, Portland ME	1/19/2011
NEFMC Council	Sheraton Harborside, Portsmouth NH	1/26/2011
Groundfish Oversight	Crowne Plaza, Danvers MA	3/17/2011
Groundfish Oversight	Holiday Inn, Mansfield MA	4/18/2011
NEFMC Council	Hilton Hotel, Mystic CT	4/28/2011

7.3 Endangered Species Act

Section 7 of the Endangered Species Act requires federal agencies conducting, authorizing or funding activities that affect threatened or endangered species to ensure that those effects do not jeopardize the continued existence of listed species. The NEFMC has concluded, at this writing, that the proposed framework adjustment and the prosecution of the multispecies fishery is not likely to jeopardize any ESA-listed species or alter or modify any critical habitat, based on the discussion of impacts in this document and on the assessment of impacts in the Amendment 16 Environmental Impact Statement.

The Council does acknowledge that endangered and threatened species may be affected by the measures proposed, but impacts should be minimal especially when compared to the prosecution of the fishery prior to implementation of Amendment 16. The NEFMC is now seeking the concurrence of the National Marine Fisheries Service with respect to Framework Adjustment 45.

For further information on the potential impacts of the fishery and the proposed management action on listed species, see Section 6.3 of this document.

7.4 Marine Mammal Protection Act

The NEFMC has reviewed the impacts of the Proposed Action on marine mammals and has concluded that the management actions proposed are consistent with the provisions of the MMPA. Although they are likely to affect species inhabiting the multispecies management unit, the measures will not alter the effectiveness of existing MMPA measures, such as take reduction plans, to protect those species based on overall reductions in fishing effort that have been implemented through the FMP

For further information on the potential impacts of the fishery and the proposed management action on marine mammals, see Section 6.3 of this document.

7.5 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 45, 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 TBD.

7.6 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.

7.7 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.

7.7.1 Utility of Information Product

The information presented in this document is helpful to the intended users (the affected public) by presenting a clear description of the purpose and need of the Proposed Action, the measures proposed, and the impacts of those measures. A discussion of the reasons for selecting the Proposed Action is included so that intended users may have a full understanding of the Proposed Action and its implications.

Until a proposed rule is prepared and published, this document is the principal means by which the information contained herein is available to the public. The information provided in this document is based on the most recent available information from the relevant data sources. The development of this document and the decisions made by the Council to propose this action are the result of a multi-stage public process. Thus, the information pertaining to management measures contained in this document has been improved based on comments from the public, the fishing industry, members of the Council, and NOAA Fisheries Service.

This document is available in several formats, including printed publication, CD-ROM, and online through the Council's web page in PDF format. The Federal Register notice that announces the proposed rule and the final rule and implementing regulations will be made available in printed publication, on the website for the Northeast Regional Office, and through the Regulations.gov website. The Federal Register documents will provide metric conversions for all measurements.

7.7.2 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.

7.7.3 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 updated assessments were reviewed by the SAW 50 (NEFSC 2010), the Groundfish Assessment Review Meeting III (GARM III; NEFSC 2008), and the Northeast Data Poor Stocks Working Group (DPWG 2009), which all included participation by independent stock assessment scientists. Landing and revenue information is based on information collected through the Vessel Trip Report and Commercial Dealer databases. Information on catch composition, by tow, is based on reports collected by the NOAA Fisheries Service observer program and incorporated into the sea sampling or observer database systems. These reports are developed using an approved, scientifically valid sampling process. In addition to these sources, additional information is presented that has been accepted and published in peer-reviewed journals or by scientific organizations. Original analyses in this document were prepared using data from accepted sources, and the analyses have been reviewed by members of the Groundfish Plan Development Team/Monitoring Committee.

Despite current data limitations, the conservation and management measures proposed for this action were selected based upon the best scientific information available. The analyses conducted in support of the Proposed Action were conducted using information from the most recent complete calendar years, through 2009, and in some cases includes information that was collected during the first months of fishing year 2010. Complete data were not available for fishing year 2010. The data used in the analyses provide the best available information on the number of harvesters in the fishery, the catch (including landings and discards) by those harvesters, the sales and revenue of those landings to dealers, the type of permits held by vessels, the number of DAS used by those vessels, the catch of recreational fishermen and the location of those catches, and the catches and revenues from various special management programs. Specialists (including professional members of plan development teams, technical teams, committees, and Council staff) who worked with these data are familiar with the most current analytical techniques and with the available data and information relevant to the groundfish fishery.

The policy choices are clearly articulated, in Section 3.0 of this document, as the management alternatives considered in this action. The supporting science and analyses, upon which the policy choices are based, are summarized and described in Section 6.0 of this document. All supporting materials, information, data, and analyses within this document have been, to the maximum extent practicable, properly referenced according to commonly accepted standards for scientific literature to ensure transparency.

The review process used in preparation of this document involves the responsible Council, the Northeast Fisheries Science Center, the Northeast Regional Office, and NOAA Fisheries Service Headquarters. The Center's technical review is conducted by senior level scientists with specialties in population dynamics, stock assessment methods, demersal resources, population biology, and the social sciences. The Council review process involves public meetings at which affected stakeholders have opportunity to provide comments on the document. Review by staff at the Regional Office is conducted by those with expertise in fisheries management and policy, habitat conservation, protected species, and compliance with the applicable law. Final approval of the action proposed in this document and clearance of any rules prepared to implement resulting regulations is conducted by staff at NOAA Fisheries Service Headquarters, the Department of Commerce, and the U.S. Office of Management and Budget.

7.8 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 46. 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.

7.9 Executive Order 13158 (Marine Protected Areas)

The Executive Order on Marine Protected Areas requires each federal agency whose actions affect the natural or cultural resources that are protected by an MPA to identify such actions, and, to the extent permitted by law and to the maximum extent practicable, in taking such actions, avoid harm to the natural and cultural resources that are protected by an MPA. The E.O. directs federal agencies to refer to the MPAs identified in a list of MPAs that meet the definition of MPA for the purposes of the Order. The E.O. requires that the Departments of Commerce and the Interior jointly publish and maintain such a list of MPAs. As of the date of submission of this FMP, the list of MPA sites has not been developed by the departments. No further guidance related to this Executive Order is available at this time.

7.10 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 45 continues existing collection of information requirements implemented by previous amendments to the FMP that are subject to the PRA, including:

- Reporting requirements for SAPs and the Category B (regular) DAS Program
- Mandatory use of a Vessel Monitoring System (VMS) by all vessels using a groundfish DAS
- Changes to possession limits, which will change the requirements to notify NMFS of plans to fish in certain areas
- Provisions to allow vessel operators to notify NMFS of plans to fish both inside and outside the Eastern U.S./CA area on the same fishing trip

7.11 Regulatory Impact Review

TO BE COMPLETED

8.0 References

8.1 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.

Allowable Biological Catch (ABC): The amount of fish that can be safely harvested from a stock. It is usually calculated by applying the target fishing mortality to the estimated biomass size.

Amendment: A formal change to a fishery management plan (FMP). The Council prepares amendments and submits them to the Secretary of Commerce for review and approval. The Council may also change FMPs through a "framework adjustment procedure" (see below).

Amphipods: A small crustacean of the order Amphipoda, such as the beach flea, having a laterally compressed body with no carapace.

Anadromous species: fish that spawn in fresh or estuarine waters and migrate to ocean waters.

Anaerobic sediment: Sediment characterized by the absence of free oxygen.

Anemones: Any of numerous flowerlike marine coelenterates of the class Anthozoa, having a flexible cylindrical body and tentacles surrounding a central mouth.

Annual Catch Entitlement (ACE): Pounds of available catch that can be harvested by a particular sector. Based on the total PSC for the permits that join the sector.

Annual total mortality: Rate of death expressed as the fraction of a cohort dying over a period compared to the number alive at the beginning of the period (# total deaths during year / numbers alive at the beginning of the year). Optimists convert death rates into annual survival rate using the relationship

S=1-A.

ASPIC (A Surplus Production Model Incorporating Covariates): A non-equilibrium surplus production model developed by Prager (1995). ASPIC was frequently used by the Overfishing Definition Panel to define B_{MSY} and F_{MSY} reference points. The model output was also used to estimate rebuilding timeframes for the Amendment 9 control rules.

Bay: An inlet of the sea or other body of water usually smaller than a gulf; a small body of water set off from the main body; e.g. Ipswich Bay in the Gulf of Maine.

Benthic community: *Benthic* means the bottom habitat of the ocean, and can mean anything as shallow as a salt marsh or the intertidal zone, to areas of the bottom that are several miles deep in the ocean. *Benthic community* refers to those organisms that live in and on the bottom. (*In* meaning they live within the substrate; e.g, within the sand or mud found on the bottom. See *Benthic infauna,* below)

Benthic infauna: See *Benthic community*, above. Those organisms that live *in* the bottom sediments (sand, mud, gravel, etc.) of the ocean. As opposed to *benthic epifauna*, that live *on* the surface of the bottom sediments.

Benthivore: Usually refers to fish that feed on benthic or bottom dwelling organisms.

Berm: A narrow ledge typically at the top or bottom of a slope; e.g. a berm paralleling the shoreline caused by wave action on a sloping beach; also an elongated mound or wall of earth.

Biogenic habitats: Ocean habitats whose physical structure is created or produced by the animals themselves; e.g, coral reefs.

Biomass: The total mass of living matter in a given unit area or the weight of a fish stock or portion thereof. Biomass can be listed for beginning of year (Jan-1), Mid-Year, or mean (average during the entire year). In addition, biomass can be listed by age group (numbers at age * average weight at age) or summarized by groupings (e.g., age 1^+, ages 4+ 5, etc). See also spawning stock biomass, exploitable biomass, and mean biomass.

B_{MSY}: The stock biomass that would produce MSY when fished at a fishing mortality rate equal to F_{MSY}. For most stocks, B_{MSY} is about ½ of the carrying capacity. The proposed overfishing definition control rules call for action when biomass is below ¼ or ½ B_{MSY}, depending on the species.

B_{target}: A desirable biomass to maintain fishery stocks. This is usually synonymous with B_{MSY} or its proxy.

$B_{threshold}$: 1) A limit reference point for biomass that defines an unacceptably low biomass i.e., puts a stock at high risk (recruitment failure, depensation, collapse, reduced long term yields, etc). 2) A biomass threshold that the SFA requires for defining when a stock is overfished. A stock is overfished if its biomass is below $B_{threshold}$. A determination of overfished triggers the SFA requirement for a rebuilding plan to achieve B_{target} as soon as possible, usually not to exceed 10 years except certain requirements are met. In Amendment 9 control rules, $B_{threshold}$ is often defined as either $1/2B_{MSY}$ or $1/4\ B_{MSY}$. $B_{threshold}$ is also known as $B_{minimum}$.

Biomass weighted F: A measure of fishing mortality that is defined as an average of fishing mortality at age weighted by biomass at age for a ranges of ages within the stock (e.g., ages 1^+ biomass weighted F is a weighted average of the mortality for ages 1 and older, age 3^+ biomass weighted is a weighted average for ages 3 and older). Biomass weighted F can also be calculated using catch in weight over mean biomass. See also fully-recruited F.

Biota: All the plant and animal life of a particular region.

Bivalve: A class of mollusks having a soft body with platelike gills enclosed within two shells hinged together; e.g., clams, mussels.

Bottom roughness: The inequalities, ridges, or projections on the surface of the seabed that are caused by the presence of bedforms, sedimentary structures, sedimentary particles, excavations, attached and unattached organisms, or other objects; generally small scale features.

Bottom tending mobile gear: All fishing gear that operates on or near the ocean bottom that is actively worked in order to capture fish or other marine species. Some examples of bottom tending mobile gear are otter trawls and dredges.

Bottom tending static gear: All fishing gear that operates on or near the ocean bottom that I snot actively worked; instead, the effectiveness of this gear depends on species moving to the gear which is set in a particular manner by a vessel, and later retrieved. Some examples of bottom tending static gear are gillnets, traps, and pots.

Boulder reef: An elongated feature (a chain) of rocks (generally piled boulders) on the seabed.

Bryozoans: Phylum aquatic organisms, living for the most part in colonies of interconnected individuals. A few to many millions of these individuals may form one colony. Some bryozoans encrust rocky surfaces, shells, or algae others form lacy or fan-like colonies that in some regions may form an abundant component of limestones. Bryozoan colonies range from millimeters to meters in size, but the individuals that make up the colonies are rarely larger than a millimeter. Colonies may be mistaken for hydroids, corals or seaweed.

Burrow: A hole or excavation in the sea floor made by an animal (as a crab, lobster, fish, burrowing anemone) for shelter and habitation.

Bycatch: (v.) the capture of nontarget species in directed fisheries which occurs because fishing gear and methods are not selective enough to catch only target species; (n.) fish which are harvested in a fishery but are not sold or kept for personal use, including economic discards and regulatory discards but not fish released alive under a recreational catch and release fishery management program.

Capacity: the level of output a fishing fleet is able to produce given specified conditions and constraints. Maximum fishing capacity results when all fishing capital is applied over the maximum amount of available (or permitted) fishing time, assuming that all variable inputs are utilized efficiently.

Catch: The sum total of fish killed in a fishery in a given period. Catch is given in either weight or number of fish and may include landings, unreported landings, discards, and incidental deaths.

Closed Area Model: A General Algebraic Modeling System (GAMS) model used to evaluate the effectiveness of effort controls used in the Northeast Multispecies Fishery. Using catch data from vessels in the fishery, the model estimates changes in exploitation that may result from changes in DAS, closed areas, and possession limits. These changes in exploitation are then converted to changes in fishing mortality to evaluate proposed measures.

Coarse sediment: Sediment generally of the sand and gravel classes; not sediment composed primarily of mud; but the meaning depends on the context, e.g. within the mud class, silt is coarser than clay.

Commensalism: See *Mutualism*. An interactive association of two species where one benefits in some way, while the other species is in no way affected by the association.

Continental shelf waters: The waters overlying the continental shelf, which extends seaward from the shoreline and deepens gradually to the point where the sea floor begins a slightly steeper descent to the deep ocean floor; the depth of the shelf edge varies, but is approximately 200 meters in many regions.

Control rule: A pre-determined method for determining fishing mortality rates based on the relationship of current stock biomass to a biomass target. Amendment 9 overfishing control rules define a target biomass (B_{MSY} or proxy) as a management objective. The biomass threshold ($B_{threshold}$ or B_{min}) defines a minimum biomass below which a stock is considered overfished.

Cohort: see yearclass.

Crustaceans: Invertebrates characterized by a hard outer shell and jointed appendages and bodies. They usually live in water and breathe through gills. Higher forms of this class include lobsters, shrimp and crawfish; lower forms include barnacles.

Days absent: an estimate by port agents of trip length. This data was collected as part of the NMFS weighout system prior to May 1, 1994.

Days-at-sea (DAS): the total days, including steaming time that a boat spends at sea to fish. Amendment 13 categorized DAS for the multispecies fishery into three categories, based on each individual vessel's fishing history during the period fishing year 1996 through 2001. The three categories are: Category A: can be used to target any groundfish stock; Category B: can only be used to target healthy stocks; Category C: cannot be used until some point in the future. Category B DAS are further divided equally into Category B (regular) and Category B (reserve).

DAS "flip": A practice in the Multispecies FMP that occurs when a vessel fishing on a Category B (regular) DAS must change ("flip") its DAS to a Category A DAS because it has exceeded a catch limit for a stock of concern.

Demersal species: Most often refers to fish that live on or near the ocean bottom. They are often called benthic fish, groundfish, or bottom fish.

Diatoms: Small mobile plants (algæ) with silicified (silica, sand, quartz) skeletons. They are among the most abundant phytoplankton in cold waters, and an important part of the food chain.
Discards: animals returned to sea after being caught; see Bycatch (n.)

Dissolved nutrients: Non-solid nutrients found in a liquid.

Echinoderms: A member of the Phylum Echinodermata. Marine animals usually characterized by a five-fold symmetry, and possessing an internal skeleton of calcite plates, and a complex water vascular system. Includes echinoids (sea urchins), crinoids (sea lillies) and asteroids (starfish).

Ecosystem-based management: a management approach that takes major ecosystem components and services—both structural and functional—into account, often with a multispecies or habitat perspective

Egg stage: One of several marked phases or periods in the development and growth of many animals. The life history stage of an animal that occurs after reproduction and refers to the developing embryo, its food store, and sometimes jelly or albumen, all surrounded by an outer shell or membrane. Occurs before the *larval* or *juvenile stage*.

Elasmobranch: Any of numerous fishes of the class Chondrichthyes characterized by a cartilaginous skeleton and placoid scales: sharks; rays; skates.

Embayment: A bay or an indentation in a coastline resembling a bay.

Emergent epifauna: See *Epifauna*. Animals living upon the bottom that extend a certain distance above the surface.

Environmental Impact Statement (EIS): an analysis of the expected impacts of a fishery management plan (or some other Proposed Action) on the environment and on people, initially prepared as a "Draft" (DEIS) for public comment. After an initial EIS is prepared for a plan, subsequent analyses are called "Supplemental" (i.e., DSEIS, FSEIS).

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.

Euphotic zone: The zone in the water column where at least 1% of the incident light at the surface penetrates.

Eutrophication: A set of physical, chemical, and biological changes brought about when excessive nutrients are released into the water.

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 effort: The amount of time and fishing power used to harvest fish. Fishing power is a function of gear size, boat size and horsepower.

Fishery Management Plan (FMP): Also referred to as a "plan," this is a document that describes a fishery and establishes measures to manage it. The New England Fishery Management Council prepares FMPs and submits them to the Secretary of Commerce for approval and implementation.

Fishing mortality (F): A measurement of the rate of removal of fish from a population caused by fishing. This is usually expressed as an instantaneous rate (F) and is the rate at which fish are harvested at any given point in a year. Instantaneous fishing mortality rates can be either fully recruited or biomass weighted. Fishing mortality can also be expressed as an exploitation rate (see exploitation rate) or less commonly, as a conditional rate of fishing mortality (m, fraction of fish removed during the year if no other competing sources of mortality occurred. Lower case m should not be confused with upper case M, the instantaneous rate of natural mortality).

$F_{0.1}$: a conservative fishing mortality rate calculated as the F associated with 10 percent of the slope at origin of the yield-per-recruit curve.

F_{MAX}: a fishing mortality rate that maximizes yield per recruit. F_{MAX} is less conservative than $F_{0.1}$.

F_{MSY}: a fishing mortality rate that would produce MSY when the stock biomass is sufficient for producing MSY on a continuing basis.

$F_{threshold}$: 1) The maximum fishing mortality rate allowed on a stock and used to define overfishing for status determination. Amendment 9 frequently uses F_{MSY} or F_{MSY} proxy for $F_{threshold.}$ 2) The maximum fishing mortality rate allowed for a given biomass as defined by a control rule.

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.

Gonadosomatic Index (GSI): A measure of the stage of spawning condition.

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).

Gross Registered Tons: Measure of vessel size based on volume.

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.

Halocline: The zone of the ocean in which salinity increases rapidly with depth.

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.

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.

Landings: The portion of the catch that is harvested for personal use or sold.

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").

Limited entry: A management system that limits the number of participants in a fishery. Usually, qualification for this system is based on historic participation and the participants remain constant over time (with the exception of attrition).

Lutjanids: Fish of the genus of the Lutjanidae: snappers. Marine; rarely estuarine. Some species do enter freshwater for feeding. Tropical and subtropical: Atlantic, Indian and Pacific Oceans.

Macrobenthos: See *Benthic community* and *Benthic infauna*. Benthic organisms whose shortest dimension is greater than or equal to 0.5 mm.

Maturity ogive: A mathematical model used to describe the proportion mature at age for the entire population. A_{50} is the age where 50% of the fish are mature.

Mean biomass: The average number of fish within an age group alive during a year multiplied by average weight at age of that age group. The average number of fish during the year is a function of starting stock size and mortality rate occurring during the year. Mean biomass can be aggregated over several ages to describe mean biomass for the stock. For example the mean biomass summed for ages 1 and over is the 1^+ mean biomass; mean biomass summed across ages 3 and over is 3^+ mean biomass.

Megafaunal species: The component of the fauna of a region that comprises the larger animals, sometimes defined as those weighing more than 100 pounds.

Mesh selectivity ogive: A mathematical model used to describe the selectivity of a mesh size (proportion of fish at a specific length retained by mesh) for the entire population. L_{25} is the length where 25% of the fish encountered are retained by the mesh. L_{50} is the length where 50% of the fish encountered are retained by the mesh.

Meter: A measure of length, equal to 39.37 English inches, the standard of linear measure in the metric system of weights and measures. It was intended to be, and is very nearly, the ten millionth part of the distance from the equator to the north pole, as ascertained by actual measurement of an arc of a meridian.

Metric ton: A unit of weight equal to a thousand kilograms (1kgs = 2.2 lbs.). A metric ton is equivalent to 2,205 lbs. A thousand metric tons is equivalent to 2.2 million lbs.

Microalgal: Small microscopic types of algae such as the green algae.

Microbial: Microbial means of or relating to microorganisms.

Minimum spawning stock threshold: the minimum spawning stock size (or biomass) below which there is a significantly lower chance that the stock will produce enough new fish to sustain itself over the long term.

Mobile organisms: organisms that are not confined or attached to one area or place, that can move on their own, are capable of movement, or are moved (often passively) by the action of the physical environment (waves, currents, etc.).

Molluscs: Common term for animals of the phylum Mollusca. Includes groups such as the bivalves (mussels, oysters etc.), cephalopods (squid, octopus etc.) and gastropods (abalone, snails). Over 80,000 species in total with fossils back to the Cambrian period.

Mortality: see Annual total mortality (A), Exploitation rate (u), Fishing mortality (F), Natural mortality (M), and instantaneous total mortality (Z).

Motile: Capable of self-propelled movement. A term that is sometimes used to distinguish between certain types of organisms found in water.

Multispecies: the group of species managed under the Northeast Multispecies Fishery Management Plan. This group includes whiting, red hake and ocean pout plus the regulated species (cod, haddock, pollock, yellowtail flounder, winter flounder, witch flounder, American plaice, windowpane flounder, white hake and redfish).

Mutualism: See *Commensalism*. A symbiotic interaction between two species in which both derive some benefit.

Natural disturbance: A change caused by natural processes; e.g. in the case of the seabed, changes can be caused by the removal or deposition of sediment by currents; such natural processes can be common or rare at a particular site.

Natural mortality: A measurement of the rate of death from all causes other than fishing such as predation, disease, starvation, and pollution. Commonly expressed as an instantaneous rate (M). The rate of natural mortality varies from species to species, but is assumed to be M=0.2 for the five critical stocks. The natural mortality rate can also be expressed as a conditional rate (termed n and not additive with competing sources of mortality such as fishing) or as annual expectation of natural death (termed v and additive with other annual expectations of death).

Nearshore area: The area extending outward an indefinite but usually short distance from shore; an area commonly affected by tides and tidal and storm currents, and shoreline processes.

Nematodes: a group of elongated, cylindrical worms belonging to the phylum Nematoidea, also called thread-worms or eel-worms. Some non-marine species attack roots or leaves of plants, others are parasites on animals or insects.

Nemerteans: Proboscis worms belonging to the phylum Nemertea, and are soft unsegmented marine worms that have a threadlike proboscis and the ability to stretch and contract.

Nemipterids: Fishes of the Family Nemipteridae, the threadfin breams or whiptail breams. Distribution: Tropical and sub-tropical Indo-West Pacific.

Northeast Shelf Ecosystem: The Northeast U.S. Shelf Ecosystem has been described as including the area from the Gulf of Maine south to Cape Hatteras, extending from the coast seaward to the edge of the continental shelf, including the slope sea offshore to the Gulf Stream.

Northwest Atlantic Analysis Area (NAAA): A spatial area developed for analysis purposes only. The boundaries of this the area are within the 500 fathom line to the east, the coastline to the west, the Hague line to the north, and the North Carolina/ South Carolina border to the south. The area is approximately 83,550 square nautical miles, and is used as the denominator in the EFH analysis to determine the percent of sediment, EFH, and biomass contained in an area, as compared to the total NAAA.

Nutrient budgets: An accounting of nutrient inputs to and production by a defined ecosystem (e.g., salt marsh, estuary) versus utilization within and export from the ecosystem.

Observer: Any person required or authorized to be carried on a vessel for conservation and management purposes by regulations or permits under this Act

Oligochaetes: See *Polychaetes*. Oligochaetes are worms in the phylum Annelida having bristles borne singly along the length of the body.

Open access: Describes a fishery or permit for which there is no qualification criteria to participate. Open-access permits may be issued with restrictions on fishing (for example, the type of gear that may be used or the amount of fish that may be caught).

Opportunistic species: Species that colonize disturbed or polluted sediments. These species are often small, grow rapidly, have short life spans, and produce many offspring.

Optimum Yield (OY): The amount of fish which A) will provide the greatest overall benefit to the nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems; B) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and C) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery.

Organic matter: Material of, relating to, or derived from living organisms.

Overfished: A conditioned defined when stock biomass is below minimum biomass threshold and the probability of successful spawning production is low.

Overfishing: A level or rate of fishing mortality that jeopardizes the long-term capacity of a stock or stock complex to produce MSY on a continuing basis.

Peat bank: A bank feature composed of partially carbonized, decomposed vegetable tissue formed by partial decomposition of various plants in water; may occur along shorelines.

Pelagic gear: Mobile or static fishing gear that is not fixed, and is used within the water column, not on the ocean bottom. Some examples are mid-water trawls and pelagic longlines.

Phytoplankton: Microscopic marine plants (mostly algae and diatoms) which are responsible for most of the photosynthetic activity in the oceans.

Piscivore: A species feeding preferably on fish.

Plan Development Team (PDT): A group of technical experts responsible for developing and analyzing management measures under the direction of the Council.

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.

Proposed rule: A federal regulation is usually published in the *Federal Register* as a proposed rule with a time period for public comment. After the comment period closes, the proposed regulation may be changed or withdrawn before it is published as a final rule, along with its date of implementation and response to comments.

Rebuilding schedule: A plan to increase the biomass of a fishery stock, based on a target fishing mortality applied over a period of time.

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.

Regional Administrator: Regional Administrator, NOAA/NMFS Northeast Region, Gloucester, MA.

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.

Secretarial review process: A process which normally takes 140 days from the time the Council submits a plan or amendment to the Secretary of Commerce until its implementation. The

Secretary of Commerce reviews and possibly approves the plan or amendment which must meet the National Standards established by the Magnuson Stevens Fishery Conservation and Management Act as well as other federal requirements (the National Environmental Policy Act, the Marine Mammal Protection Act, the Endangered Species Act and other applicable law.)

Sedentary: See *Motile* and *Mobile organisms*. Not moving. Organisms that spend the majority of their lives in one place.

Sediment: Material deposited by water, wind, or glaciers.

Sediment suspension: The process by which sediments are suspended in water as a result of disturbance.

Sediment types: Major combinations of sediment grain sizes that form a sediment deposit, e.g. mud, sand, gravel, sandy gravel, muddy sand, among others.

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.

Spawning adult stage: See *adult stage*. Adults that are currently producing or depositing eggs.

Spawning component: Reference to a group of herring that spawn in a general location. There is evidence herring return to the same areas to spawn. These fish may, in fact, comprise different "stocks" but the evidence is ambiguous; they are identified as components to allow the development of measures for their protection. A healthy herring resource depends on maintaining spawning in as many areas as possible.

Spawning stock biomass (SSB): the total weight of fish in a stock that sexually mature, i.e., are old enough to reproduce.

Species assemblage: Several species occurring together in a particular location or region

Species composition: A term relating the relative abundance of one species to another using a common measurement; the proportion (percentage) of various species in relation to the total on a given area.

Species diversity: The number of different species in an area and their relative abundance

Species richness: See *Species diversity*. A measurement or expression of the number of species present in an area; the more species present, the higher the degree of species richness.

Species with vulnerable EFH: If a species was determined to be "highly" or "moderately" vulnerable to bottom tending gears (otter trawls, scallop dredges, or clam dredges) then it was included in the list of species with vulnerable EFH. Currently there are 23 species and life stages that are considered to have vulnerable EFH for this analysis.

Status Determination: A determination of stock status relative to $B_{threshold}$ (defines overfished) and $F_{threshold}$ (defines overfishing). A determination of either overfished or overfishing triggers a SFA requirement for rebuilding plan (overfished), ending overfishing (overfishing) or both.

Stock: A grouping of fish usually based on genetic relationship, geographic distribution and movement patterns. A region may have more than one stock of a species (for example, Gulf of Maine cod and Georges Bank cod). A species, subspecies, geographical grouping, or other category of fish capable of management as a unit.

Stock assessment: determining the number (abundance/biomass) and status (life-history characteristics, including age distribution, natural mortality rate, age at maturity, fecundity as a function of age) of individuals in a stock

Stock of concern: a regulated groundfish stock that is overfished, or subject to overfishing.

Structure-forming organisms: Organisms, such as corals, colonial bryozoans, hydroids, sponges, mussel beds, oyster beds, and seagrass that by their presence create a three-dimensional physical structure on the bottom. See *biogenic habitats.*

Submerged aquatic vegetation: Rooted aquatic vegetation, such as seagrasses, that cannot withstand excessive drying and therefore live with their leaves at or below the water surface in shallow areas of estuaries where light can penetrate to the bottom sediments. SAV provides an important habitat for young fish and other aquatic organisms.

Surficial sediment: Sediment forming the sea floor or land surface; thickness of the surficial layer may vary.

Surplus production: Production of new stock biomass defined by recruitment plus somatic growth minus biomass loss due to natural deaths. The rate of surplus production is directly proportional to stock biomass and its relative distance from the maximum stock size at carrying capacity (K). B_{MSY} is often defined as the biomass that maximizes surplus production rate.

Surplus production models: A family of analytical models used to describe stock dynamics based on catch in weight and CPUE time series (fishery dependent or survey) to construct stock biomass history. These models do not require catch at age information. Model outputs may include stock biomass history, biomass weighted fishing mortality rates, MSY, F_{MSY}, B_{MSY}, K, (maximum population biomass where stock growth and natural deaths are balanced) and r (intrinsic rate of increase).

Survival rate (S): Rate of survival expressed as the fraction of a cohort surviving the a period compared to number alive at the beginning of the period (# survivors at the end of the year /

numbers alive at the beginning of the year). Pessimists convert survival rates into annual total mortality rate using the relationship A=1-S.

Survival ratio (R/SSB): an index of the survivability from egg to age-of-recruitment. Declining ratios suggest that the survival rate from egg to age-of-recruitment is declining.

TAC: Total allowable catch. This value is calculated by applying a target fishing mortality rate to exploitable biomass.

Taxa: The plural of taxon. Taxon is a named group or organisms of any rank, such as a particular species, family, or class.

Technical Committee: A group of biologists assembled by the Commission to assess the (herring) resource.

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.

Tolerance: A reference to a management measure used in the original Commission herring management plan. This measure allows fishing in a spawning closure as long as only a certain percentage of the fish caught contain spawn (roe or milt).

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.

VMS: An electronic vessel monitoring system, which may also be used for communications. Previously referred to as a vessel tracking system, or VTS.

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.

Year class: also called cohort. Fish that were spawned in the same year. By convention, the "birth date" is set to January 1st and a fish must experience a summer before turning 1. For example, winter flounder that were spawned in February-April 1997 are all part of the 1997 cohort (or year-class). They would be considered age 0 in 1997, age 1 in 1998, etc. A summer flounder spawned in October 1997 would have its birth date set to the following January 1 and would be considered age 0 in 1998, age 1 in 1999, etc.

Z: instantaneous rate of total mortality. The components of Z are additive (i.e., Z = F+M)

Zooplankton: See *Phytoplankton*. Small, often microscopic animals that drift in currents. They feed on detritus, phytoplankton, and other zooplankton. They are preyed upon by fish, shellfish, whales, and other zooplankton.

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8.3 Index

TO BE COMPLETED