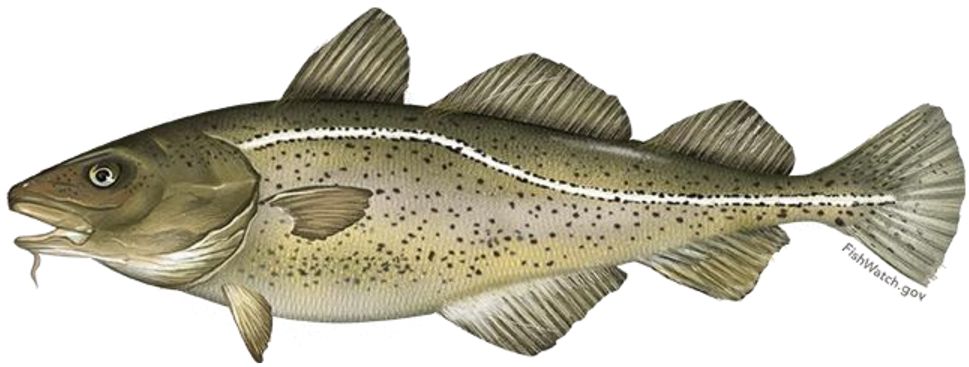
Northeast Multispecies Fishery Management Plan

Framework Adjustment 61

Including an Environmental Assessment,

Regulatory Flexibility Analysis, and

Stock Assessment and Fishery Evaluation



FINAL

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FRAMEWORK ADJUSTMENT 61

TO THE NORTHEAST MULTISPECIES FISHERY MANAGEMENT PLAN

Proposed Action: Propose specifications for groundfish stocks for fishing years 2021-2023.

Responsible Agencies:

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Abstract: The New England Fishery Management Council, in consultation with NOAA's National Marine Fisheries Service, has prepared Framework Adjustment 61 to the Northeast Multispecies Fishery Management Plan, which includes a final environmental assessment that presents the range of alternatives to achieve the goals and objectives of the action. The proposed action focuses on setting specifications for certain groundfish stocks. The document describes the affected environment and valued ecosystem components and analyzes the impacts of the alternatives on both. It addresses the requirements of the National Environmental Policy Act, the Magnuson Stevens Fishery Conservation and Management Act, the Regulatory Flexibility Act, and other applicable laws.

1.0 EXECUTIVE SUMMARY

Purpose and Need

The purpose of Framework Adjustment 61 (FW61) is to set specifications for several groundfish stocks and management units. FW61 incorporates the results of new stock assessments. The need for this action is to prevent overfishing, ensure rebuilding, and help achieve optimum yield in the commercial and recreational groundfish fisheries consistent with the status of stocks and the requirements of the Magnuson-Stevens Fishery Conservation and Management Act.

Proposed Action

Status Determination Criteria. The preferred alternative updates status determination criteria (SDCs) for Georges Bank (GB) winter flounder and Southern New England/Mid-Atlantic (SNE/MA) winter flounder.

Formal Rebuilding Plan. The preferred alternative establishes a revised rebuilding plan for white hake.

Specifications: The preferred alternative includes revised specifications to:

- Set 2021 total allowable catches for US/Canada management units of Eastern GB cod and Eastern GB haddock, and 2021-2022 specifications for the GB yellowtail flounder stock, and
- Set 2021-2023 specifications for 9 other groundfish stocks: GB winter flounder, SNE/MA winter flounder, Gulf of Maine (GOM) winter flounder, Acadian redfish, Atlantic halibut, Northern windowpane flounder, Southern windowpane flounder, Atlantic wolffish, and ocean pout,

Commercial Fishery Measures for Sectors: The preferred alternative adds a universal sector exemption allowing fishing for redfish under certain requirements and performance standards.

Summary of Impacts

Biological Impacts
The Preferred Alternatives are expected to result in mixed (positive, neutral, and negative) biological impacts on regulated groundfish species and other species when compared to the No Action alternative and FY 2020. The preferred alternative would increase FY 2021 ACLs, relative to FY 2020 ACLs, for GB cod, SNE/MA yellowtail flounder, Cape Cod (CC)/GOM yellowtail flounder, witch flounder, GB winter flounder, northern windowpane flounder and wolffish. There would be decreases in FY 2021 ACLs, relative to FY 2021 ACLs, for GOM cod, GB haddock, GB yellowtail flounder, American plaice, GOM winter flounder, SNE/MA winter flounder, redfish, pollock, southern windowpane flounder, ocean pout, and Atlantic halibut. Relative to No Action, the preferred alternative would increase FY 2021 ACLs for several stocks from those established in Framework Adjustment 59 (FW59), and Eastern GB cod, Eastern GB haddock, GOM winter flounder, SNE/MA winter flounder, redfish, ocean pout, and wolffish quota would be specified and replace default specifications. For these reasons under the preferred alternative an increase in overall fishing mortality is expected, therefore, low negative impacts on regulated groundfish species are likely when compared with No Action and relative to FY 2020. The preferred alternatives also include a universal sector exemption for redfish, which is expected to have low negative impacts on regulated groundfish and other species. The exemption could result in greater retention of sub-legal regulated groundfish species. Performance standards for monthly and annual thresholds are expected to have low positive biological impacts, as these may result in a reduction in exemption fishing activity. The preferred alternative would establish a revised rebuilding strategy for white hake, and biological impacts on regulated groundfish species (mainly white hake) and other species,

are likely to be low positive. Finally, the preferred alternative would adjust SDCs for GB winter flounder and SNE/MA winter flounder, resulting in no direct or indirect biological impacts in the short-term, and positive impacts in the long-term, since updating SDCs for both stocks according to the most recent assessments decreases the risk of overfishing over the long-term.

Essential Fish Habitat (EFH) Impacts

The Preferred Alternatives are expected to result in mixed (positive, neutral, and negative) habitat impacts when compared to the No Action alternative and FY 2020. For the same reasons identified in the Biological Impacts summary of the preferred alternative for revised ACLs, an increase in overall fishing mortality is expected. Therefore, low negative impacts on EFH are likely when compared with No Action and relative to FY 2020. The preferred alternatives also include a universal sector exemption for redfish, which could potentially have negative impacts on EFH because the exemption area includes additional areas of deep-sea coral habitat as compared to the exemption area authorized in FY2020. The preferred alternative would establish a revised rebuilding strategy for white hake, and EFH impacts are likely to be low positive if there are reductions in effort due to the lower fishing mortality rate. Finally, the preferred alternative would adjust status determination criteria for GB winter flounder and SNE/MA winter flounder, resulting in potential low positive impacts in the short-term indirectly due to lower ACLs, and potentially low negative impacts in the long-term, assuming updated criteria lead to increases in stock size and increased effort.

Impacts on Endangered and Other Protected Species

The Preferred Alternatives would likely result in slight negative to slight positive impacts on protected species. Further, the impacts of the Preferred Alternatives on endangered and other protected species are negligible relative to No Action because the impacts do not exceed what NMFS already analyzed in the 2013 Biological Opinion. When compared to recent fishing activity, the preferred alternatives for revised ACLs would likely lead to slight negative to slight positive impacts on protected species (i.e., ESA listed and MMPA protected). The preferred alternatives also include a universal sector exemption for redfish, which is expected to have impacts to protected species (i.e., ESA-listed and MMPA protected) are expected to be slight negative to slight positive impacts on protected species. The preferred alternative would establish a revised rebuilding strategy for white hake and impacts on protected species are likely to be slight negative to moderately positive if there are reductions in effort due to the lower fishing mortality rate. Finally, the preferred alternative would adjust status determination criteria for GB winter flounder and SNE/MA winter flounder, which will have no direct impact to protected species.

Economic Impacts

The Preferred Alternatives would likely result in mostly positive impacts for the commercial groundfish fishery. Mixed (positive, neutral, and negative) economic impacts are expected based on revisions to allocations for commercial and recreational groundfish fisheries and other fisheries, mainly Atlantic sea scallop, midwater trawl Atlantic herring, small-mesh (squid and whiting), large-mesh non-groundfish (trawl fisheries for summer flounder and scup). The preferred alternative would likely result in an increase in groundfish fishing vessel revenues when compared to No Action for ACLs. This is not informative, however, since No Action would adopt default specifications for the first three months of the fishing year for several stocks, and would go to zero after July 31st, 2021, curtailing sector fishing for the rest of the fishing year. The preferred alternatives would be $46.3M, representing a $1.7M decrease from the FY2019 realized value of $48.0M. Total gross revenues from groundfish trips for FY2021 is estimated to be $64.1M, representing a $2.0M decrease from FY2019. The economic impacts of the preferred alternatives are not expected to be uniformly distributed across vessel size class and port. The preferred alternative would also increase the area available for sectors to use selective gear to target redfish which is expected to have mostly positive economic impacts, since it may allow for increased fishing opportunities and revenue, as compared to the smaller area under No Action. The preferred alternative also includes additional performance standards and administrative measures for fishing under the redfish exemption which may have negligible to low negative economic impacts. The preferred alternative for white hake rebuilding is expected to result in negligible to low negative impacts relative to No Action, since it would reduce ACLs to promote rebuilding the stock. Finally, the preferred alternative would adjust status determination criteria for GB winter flounder and SNE/MA winter flounder and overall would have low negative impacts, due to a combination of short run negative economic impacts and long run positive economic impacts due to lower ACLs in the short run but lower likelihood of the stock becoming overfished and eroding long-run fishing revenues.

Social Impacts

The Preferred Alternatives would likely result in mostly positive social impacts for the commercial groundfish fishery. Mixed (positive, neutral, and negative) economic impacts are expected based on revisions to allocations for commercial and recreational groundfish fisheries and other fisheries, mainly Atlantic sea scallop, midwater trawl Atlantic herring, small-mesh (squid and whiting), large-mesh non-groundfish (trawl fisheries for summer flounder and scup). The preferred alternative to revise ACLs would increase groundfish fishermen’s earning potential relative to No Action, which would have positive social impacts on the *Size and Demographic Characteristics* of the groundfish fishery and would likely have a positive impact on groundfish fishermen’s *Attitudes, Beliefs, and Values* towards management. The preferred alternatives also include a universal sector exemption for redfish, which is anticipated to have positive social impacts for commercial vessels participating in the sector system. A universal sector exemption for redfish will reduce the administrative responsibility for sectors and vessels, improve flexibility for vessels to retain more redfish than the current minimum mesh size allows, and increase the stability of access to the redfish resource. The preferred alternative for a revised rebuilding strategy for white hake is expected to have relatively negligible to low negative social impacts relative to No Action, since quotas are lower but has a higher probability of rebuilding the stock. Finally, the preferred alternative would adjust status determination criteria for GB winter flounder and SNE/MA winter flounder and overall would have low negative social impacts, due to a combination of lower ACLs in the short run but lower likelihood of the stock becoming overfished and eroding long-run fishing revenues.

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2.5 Acronyms

ABC	Acceptable Biological Catch
ACL	Annual Catch Limit
AIM	An Index Method of Analysis
ALWTRP	Atlantic Large Whale Take Reduction Plan
AM	Accountability Measure
ANPR	Advanced Notice of Proposed Rulemaking
AP	Advisory Panel
APA	Administrative Procedures Act
ASMFC	Atlantic States Marine Fisheries Commission
B_{MSY}	Biomass that would allow for catches equal to Maximum Sustainable Yield when fished at the overfishing threshold (FMSY)
BiOp, BO	Biological Opinion, a result of a review of potential effects of a fishery on Protected Resource species
CAI	Closed Area I
CAII	Closed Area II
CEQ	Council on Environmental Quality
CPUE	Catch per unit of effort
DAM	Dynamic Area Management
DAS	Day(s)-at-sea
DFO	Department of Fisheries and Oceans (Canada)
DMF	Division of Marine Fisheries (Massachusetts)
DMR	Department of Marine Resources (Maine)
DPWG	Data Poor Working Group
DSEIS	Draft Supplemental Environmental Impact Statement
EA	Environmental Assessment
EEZ	Exclusive economic zone
EFH	Essential fish habitat
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
F	Fishing mortality rate
FEIS	Final Environmental Impact Statement
FMP	Fishery management plan
FW	Framework
FY	Fishing year
GARFO	Greater Atlantic Regional Fisheries Office
GARM	Groundfish Assessment Review Meeting
GB	Georges Bank
GIS	Geographic Information System
GOM	Gulf of Maine
GRT	Gross registered tons/tonnage
HAPC	Habitat area of particular concern
HPTRP	Harbor Porpoise Take Reduction Plan
IFM	Industry-funded monitoring
IFQ	Individual fishing quota
ITQ	Individual transferable quota
IVR	Interactive voice response reporting system
IWC	International Whaling Commission
LOA	Letter of authorization

MA	Mid-Atlantic
MAFAC	Marine Fisheries Advisory Committee
MAFMC	Mid-Atlantic Fishery Management Council
MMPA	Marine Mammal Protection Act
MPA	Marine protected area
MRI	Moratorium Right Identifier
MRIP	Marine Recreational Information Program
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSY	Maximum Sustainable Yield
NEAMAP	Northeast Area Monitoring and Assessment Program
NEFMC	New England Fishery Management Council
NEFOP	Northeast Fisheries Observer Program
NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act
NLSA	Nantucket Lightship closed area
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OBDBS	Observer database system
OLE	Office for Law Enforcement (NMFS)
OY	Optimum yield
PBR	Potential Biological Removal
PDT	Plan Development Team
PRA	Paperwork Reduction Act
RFA	Regulatory Flexibility Act
RMA	Regulated Mesh Area
RPA	Reasonable and Prudent Alternatives
SA	Statistical Area
SAFE	Stock Assessment and Fishery Evaluation
SAP	Special Access Program
SARC	Stock Assessment Review Committee
SAS	Stock Assessment Subcommittee
SAW	Stock Assessment Workshop
SBNMS	Stellwagen Bank National Marine Sanctuary
SIA	Social Impact Assessment
SNE	Southern New England
SNE/MA	Southern New England-Mid-Atlantic
SSB	Spawning stock biomass
SSC	Scientific and Statistical Committee
TAL	Total allowable landings
TED	Turtle excluder device
TEWG	Technical Expert Working Group
TMS	Ten minute square
TRAC	Trans boundary Resources Assessment Committee
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
VMS	Vessel monitoring system
VEC	Valued ecosystem component
VPA	Virtual population analysis
VTR	Vessel trip report
WGOM	Western Gulf of Maine
YPR	Yield per recruit

3.0 BACKGROUND AND PURPOSE

3.1 BACKGROUND

The Northeast Multispecies (Groundfish) Fishery Management Plan (FMP) specifies the management measures for thirteen groundfish species, both target (cod, haddock, yellowtail flounder, pollock, American plaice, witch flounder, white hake, winter flounder, redfish and Atlantic halibut) and non-target (windowpane flounder, ocean pout, and Atlantic wolffish) off the New England and Mid-Atlantic coasts. Some of these species (cod, haddock, yellowtail flounder, winter flounder, and windowpane flounder) are further sub-divided into individual stocks that are attributed to different geographic areas. Two stocks, Georges Bank (GB) cod and GB haddock, also have management units. The FMP therefore consists of 20 stocks and 2 management units. Commercial and recreational fisheries catch these species.

The New England Fishery Management Council (NEFMC or Council) makes proposals, through various management actions, to the National Marine Fisheries Service (NMFS) on the management of the fishery. As such, the FMP has been updated through a series of amendments and framework adjustments. Amendment 16 (A16), which became effective in 2010, adopted a broad suite of management measures to achieve the fishing mortality targets necessary to rebuild overfished stocks and meet other requirements of the Magnuson-Stevens Fishery Conservation and Management Act (MSA). Amendment 16 greatly expanded the sector management program and adopted a process for setting annual catch limits (ACLs) that requires catch levels to be set in biennial specifications packages. Amendment 17, effective in 2011, allows for NOAA-sponsored state-operated permit banks to function within the structure of A16. Amendment 18, effective in 2017, addresses fleet diversity and accumulation limits. Sixteen framework adjustments have updated the measures in A16. Amendment 23, which would improve monitoring in the commercial groundfish fishery, is being prepared for submission to NMFS.

A16 made major changes to the FMP. The management action adopted a system of ACLs and accountability measures (AMs) that are designed to ensure catches remain below desired targets for each stock in the management complex. AMs are management controls to prevent ACLs from being exceeded and to correct or mitigate overages of the ACL if they occur. AMs should address and minimize both the frequency and magnitude of overages and correct the problems that caused the overages in as short a time as possible. AMs can be either in season AMs or AMs for when the ACL is exceeded.

There is no requirement that AMs and ACLs be implemented as hard total allowable catches (TACs) or quotas, but conservation and management measures must prevent the ACL from being exceeded and AMs must apply if the ACL is exceeded (74 FR 3184). While many measures in the management program are intended to control fishing mortality and might be interpreted to be AMs since they are "management controls to prevent the ACL from being exceeded," the term AM is usually applied to specific, automatic measures that are implemented either as an ACL is approached or after an ACL is exceeded.

3.2 PURPOSE AND NEED

The purpose of Framework Adjustment 61 (FW61) is to set specifications for several groundfish stocks and management units. FW61 incorporates the results of new stock assessments.

The need for this action is to prevent overfishing, ensure rebuilding, and help achieve optimum yield in the commercial and recreational groundfish fisheries consistent with the status of stocks and the requirements of MSA.

This framework includes alternatives (Table 1) that would:

- Update status determination criteria (SDC) for GB winter flounder and Southern New England/Mid-Atlantic (SNE/MA),

- Develop a revised rebuilding plan for white hake
- Set 2021 total allowable catches for US/Canada management units of Eastern GB cod and Eastern GB haddock, and 2021-2022 specifications for the GB yellowtail flounder stock,
- Set 2021-2023 specifications for 9 other groundfish stocks: GB winter flounder, SNE/MA winter flounder, Gulf of Maine (GOM) winter flounder, Acadian redfish, Atlantic halibut, Northern windowpane flounder, Southern windowpane flounder, Atlantic wolffish, and ocean pout, and
- Add a universal sector exemption allowing fishing for redfish.

Table 1- Purpose and need for Framework 61.

Purpose	Need
Measure to revise the rebuilding plan for white hake.	Ensure that groundfish stocks are managed consistent with the status of stocks, and the requirements of the MSA.
Measure to adopt new SDCs. Measures to adopt ACLs, including relevant sub-ACLs and incidental catch TACs. Measure to adopt TACs for U.S./Canada area.	Ensure that groundfish stocks are managed consistent with the status of stocks, and the requirements of the MSA. Ensure that levels of catch for fishing years 2021-2023 are consistent with recent assessments, the ABC control rules in the Northeast Multispecies FMP, the International Fisheries Agreement Clarification Act, and the most recent relevant law. Help prevent overfishing and achieve optimum yield.
Measures to adopt a universal section exemption for redfish for sectors in the commercial groundfish fishery.	Help achieve optimum yield.

4.0 ALTERNATIVES UNDER CONSIDERATION

4.1 Action 1 – Status Determination Criteria

4.1.1 Alternative 1 - No Action

Under Alternative 1 (No Action), there would be no revisions to the status determination criteria (SDC) for Georges Bank (GB) winter flounder and Southern New England/Mid-Atlantic (SNE/MA) winter flounder (Table 2). Numerical estimates for these two stocks are provided (Table 3) under the current SDCs.

Rationale: The No Action alternative would maintain the SDCs from the previous assessment.

Table 2 – Alternative 1/No Action status determination.

Stock	Biomass Target (SSB_{MSY} or proxy)	Minimum Biomass Threshold	Maximum Fishing Mortality Threshold (F_{MSY} or proxy)
Georges Bank Winter Flounder	SSB_{MSY}	½ Btarget	F_{MSY}
Southern New England/Mid-Atlantic Winter Flounder	SSB_{MSY}	½ Btarget	F_{MSY}

Table 3 – Alternative 1/No Action numerical estimates of SDCs (provided for informational purposes).

Stock	Model/ Approach	B_{MSY} or Proxy (mt)	F_{MSY} or Proxy	MSY (mt)
Georges Bank Winter Flounder	VPA	7,394	0.358	2,612
Southern New England/Mid-Atlantic Winter Flounder	ASAP	31,567	0.26	9,102

4.1.2 Alternative 2 – Updated Status Determination Criteria (*Preferred Alternative*)

Alternative 2 would adopt revised SDCs for GB winter flounder and SNE/MA winter flounder (Table 4).

The NEFSC conducted management track assessments in 2020 for several stocks. This option updates the SDCs and numerical estimates of the SDCs for these stocks, based on the peer review recommendations.

Rationale: This option would update the SDCs for GB winter flounder and SNE/MA winter flounder to reflect the results of the 2020 peer reviewed management track stock assessments.

Table 4 - Alternative 2 status determination criteria.

Stock	Biomass Target (SSB_{MSY} or proxy)	Minimum Biomass Threshold	Maximum Fishing Mortality Threshold (F_{MSY} or proxy)
Georges Bank Winter Flounder	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40% MSP
Southern New England/Mid-Atlantic Winter Flounder	SSB_{MSY}: SSB/R (40% MSP)	½ Btarget	F40% MSP

Table 5 - Alternative 2 numerical estimates of SDCs (provided for informational purposes).

Stock	Model/ Approach	B_{MSY} or Proxy (mt)	F_{MSY} or Proxy	MSY (mt)
Georges Bank Winter Flounder	VPA	7,267	0.358	2,573
Southern New England/Mid-Atlantic Winter Flounder	ASAP	12,322	0.284	3,906

4.2 Action 2 – Formal Rebuilding Program

The current rebuilding plan for white hake developed under Amendment 13 ended in 2014. It was not revised at the end of the rebuilding period because based on the 2015 assessment the stock was rebuilding (making adequate progress). In a letter in August 2017, NMFS advised the Council to continue setting catch limits to maintain fishing mortality at 75% F_{MSY}. However, following the 2019 assessment in March 2020, the Council was notified that the stock was now overfished and, given that the rebuilding plan date had past and the stock was not rebuilt, a new rebuilding plan was required, per 304(e)(3). The letter explains that the Council must implement a new rebuilding plan within 2 years of the date of notice (i.e., by March 5, 2022), as required by Section 304(e)(3) of the M-S Act. National Standard 1 (NS1) guidelines and recommendations from the SSC (see Appendix I) were considered when developing rebuilding strategies in this section.

The following NS1 guidelines shaped the development of rebuilding strategies for white hake – using the stock assessment projections.

Minimum time for rebuilding a stock (T_{min}): *Tmin means the amount of time the stock or stock complex is expected to take to rebuild to its MSY biomass level in the absence of any fishing mortality. In this context, the term "expected" means to have at least a 50 percent probability of attaining the B_{MSY}, where such probabilities can be calculated. The starting year for the Tmin calculation should be the first year that the rebuilding plan is expected to be implemented.*

Maximum time for rebuilding a stock to its B_{MSY} (T_{max}): *If T_{min} for the stock or stock complex is 10 years or less, then the maximum time allowable for rebuilding (T_{max}) that stock to its B_{msy} is 10 years.* Additional guidance is also provided when T_{max} exceeds 10 years. (See next page for details).

Target time for rebuilding a stock (T_{target}): *T_{target} is the specified time period for rebuilding a stock that is considered to be as short a time as possible, taking into account the factors described in paragraph (j)(3)(i) of this section. T_{target} shall not exceed T_{max}, and the fishing mortality associated with achieving T_{target} is referred to as $F_{rebuild}$.*

The factors include: *The status and biology of any overfished stock, the needs of fishing communities, recommendations by international organizations in which the U.S. participates, and interaction of the stock within the marine ecosystem. In addition, the time period shall not exceed 10 years, except where biology of the stock, other environmental conditions, or management measures under an international agreement to which the U.S. participates, dictate otherwise.*

The NS1 guidelines also explain: *(v) While a stock or stock complex is rebuilding, revising rebuilding timeframes (i.e., Ttarget and Tmax) or Frebuild is not necessary, unless the Secretary finds that adequate progress is not being made. (vi) A stock or stock complex has not rebuilt by Tmax, then the fishing mortality rate should be maintained at its current Frebuild or 75 percent of the MFMT, whichever is less, until the stock or stock complex is rebuilt or the fishing mortality rate is changed as a result of the Secretary finding that adequate progress is not being made.*

Prior recommendations from the SSC on rebuilding plans as well as white hake specific recommendations (see Appendix I) were considered when developing rebuilding strategies (see Appendix III) in this section.

4.2.1 **Alternative 1 - No Action**

No Action. If this option is adopted, fishing mortality (set at 75% F_{MSY}) would be maintained for white hake.

Rationale: Fishing mortality would be maintained at 75%F_{MSY} for white hake, consistent with NS1 guidelines.

4.2.2 **Alternative 2 – Revised Rebuilding Strategy for White Hake (*Preferred Alternative*)**

Based on the 2019 peer review, white hake is overfished but overfishing is not occurring (NEFSC 2020). This was a change in status, as the 2017 assessment concluded the stock was not overfished.

Projection assumptions and projections

- Year one - The first year of the rebuilding plan would be 2021 with no revision to the ABC in place.
- Bridge year - Rebuilding plans assume an updated estimated bridge year catch in CY2019 and fishing year ACLs plus the Canadian catch assumption in 2020 and 2021.
- Recruitment – Rebuilding plans are based on projections that assumes a CDF of recruitment from the full time series, consistent with the estimated SSB_{MSY} from the benchmark assessment.
- Fishing Mortality/ $F_{rebuild}$ – These fishing mortality rates were used to develop a range of options with some projection runs conducted for comparison purposes: F0, F25, F50, F70, F75, and FMSY.

T_{min} = 4 years. When F=0, the stock is projected to rebuild in 4 years (by 2025).

T_{max} = 10 years. T_{min} is less than 10 years, and therefore T_{max} is defined as 10 years (by 2031).

T_{target} = 10 years. The T_{target} was defined given other factors described under NS1 and discussed in the following section.

Projections suggest that white hake can rebuild in 5 years (by 2026) at 50%F_{MSY} or 7 years (by 2028) at 75%F_{MSY}, with a 50 percent probability of achieving SSB_{MSY}. Additional factors were considered in determining T_{target}, which are discussed in the rationale. Rebuilding plan options between 50%F_{MSY} and 75%F_{MSY} were examined, such that in general, a lower F rate increases the probability of rebuilding.

The Council considered the options below: Option A, Option B, or Option C. The Council chose Option B as its preferred option.

The $F_{rebuild}$ would be in place for the 10 years of the plan, unless the Council was notified by NMFS that white hake is rebuilt, or the rebuilding plan was modified.

Options - *T_{target} = T_{max}, which is 10 years (2031).*

A. T_{target} of 10 years, rebuilding by 2031, at $F_{rebuild}$ of 50%F_{MSY} = 0.084, which results in a 98.6% probability of achieving B_{MSY},
B. T_{target} of 10 years, rebuilding by 2031, at $F_{rebuild}$ of 70%F_{MSY}= 0.117, which results in a 87.4% probability of achieving B_{MSY}, or
C. T_{target} of 10 years, rebuilding by 2031, at $F_{rebuild}$ of 75%F_{MSY} = 0.126, which results in a 81.7% probability of achieving B_{MSY}.

Rationale: The preferred alternative was selected to rebuild white hake. While projections suggest the stock could rebuild in less than ten years, additional factors were considered in determining T_{target}. Fishing mortality of zero for white hake is unrealistic given the multispecies nature of the groundfish fishery. Therefore, consistent with NS1, additional factors - specifically biology and fishery needs - were included in the development of these options. First, this stock has exhibited below average recruitment in recent years, and recruitment may not increase suddenly to the average values, as is assumed in the rebuilding projections. Second, based on experience with many groundfish projections, concerns remain that long term projections tend to be overly optimistic such that future levels of biomass are overestimated, and fishing mortality is underestimated. Third, recent commercial fishery utilization of the white hake ACL is high. This also shows in the sector system that white hake is an important component. Therefore, the longer rebuilding period considers the needs of fishing communities.

4.3 ACTION 3 – SPECIFICATIONS

4.3.1 Alternative 1 - No Action

Under Alternative 1 (No Action), there would be no changes to the specifications for FY2021 (Table 6). Default specifications for Eastern GB cod, Eastern GB haddock, GOM winter flounder, SNE/MA winter flounder, redfish, ocean pout, and wolffish would be in effect from May 1, 2021, to July 31, 2021, and would equal 35% of the FY2020 catch limits, after which no specifications would be in place for these stocks. All other stocks have FY2021 specifications adopted in FW59. There would be no new FY2021 quotas specified for the transboundary Georges Bank stocks (i.e. GB cod, GB haddock, GB yellowtail flounder), which are managed through the US/CA Resource Sharing Understanding (as provided in Table 7 and Table 8), and therefore updated Canadian quotas would not be accounted. These quotas are specified annually.

***Rationale**:* The No Action alternative uses OFLs/ABCs/ACLs adopted in FW59. These values are based on previous assessments. However, more recent assessments for several of the groundfish stocks occurred in 2020.

Table 6 - Alternative 1/No Action - Northeast Multispecies OFLs, ABC, ACLs, and other ACL sub-components for FY2021-FY2022 (metric tons, live weight), adjusted for final sector 2020 rosters following the final rule for FW59, published July 30, 2020. Values are rounded to the nearest metric ton or tenth. Underlined stocks are subject to adjustments in 2021 and 2022 based on US/CA quotas, 2020 CA quotas were used to adjust in the interim. Stocks shaded in gray would be subject to default specifications in 2021.

Stock	FY	OFL	US ABC	State-Waters Sub-Component	Other sub-component	Scallops	Groundfish Sub-ACL	Comm. Ground-fish Sub-ACL	Rec Ground-fish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non-sector Groundfish Sub-ACL	MWT or Small mesh Sub-ACL	Total ACL
GB Cod	2021		1,291	19	142		1,073	1,072.7		1,041	31		1,234
	2022		1,291	19	142		1,073	1,072.7		1,041	31		1,234
GOM Cod	2021	929	552	48	7		468	275.3	193	267	9		523
	2022	1,150	552	48	7		468	275.3	193	267	9		523
GB Haddock	2021	116,883	76,537		383		70,892	70,892.4		69,465	1,428	1,424	72,699
	2022	114,925	75,056		375		69,521	69,520.6		68,120	1,400	1,396	71,292
GOM Haddock	2021	21,521	16,794	56	56		15,575	10,280.8	5,295	10,022	258	156	15,843
	2022	14,834	11,526	38	38		10,690	7,055.9	3,634	6,879	177	107	10,873
GB Yellowtail Flounder*	2021		120			19	95	95.4		92	3	2	116
SNE/MA Yellowtail Flounder	2021	71	22	0	4	2	15	15.4		12	3		21
	2022	184	22	0	4	2	15	15.4		12	3		21
CC/GOM Yellowtail Flounder	2021	1,076	823	58	41		688	688.0		656	32		787
	2022	1,116	823	58	41		688	688.0		656	32		787
American Plaice	2021	3,740	2,881	29	29		2,682	2,682.2		2,611	71		2,740
	2022	3,687	2,825	28	28		2,630	2,630.1		2,560	70		2,687

Stock	FY	OFL	US ABC	State-Waters Sub-Component	Other sub-component	Scallops	Groundfish Sub-ACL	Comm. Ground-fish Sub-ACL	Rec Ground-fish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non-sector Groundfish Sub-ACL	MWT or Small mesh Sub-ACL	Total ACL
Witch Flounder	2021		1,483	44	59		1,310	1,310.2		1,275	35		1,414
	2022		1,483	44	59		1,310	1,310.2		1,275	35		1,414
GB Winter Flounder*	2021	944	561		22		522	522.4		502	21		545
	2022	1,590	561		22		522	522.4		502	21		545
GOM Winter Flounder	2021												
SNE/MA Winter Flounder	2021												
Redfish	2021												
White Hake*	2021	2,906	2,147	11	11		2,019	2,019.3		1,995	24		2,041
	2022	2,986	2,147	11	11		2,019	2,019.3		1,995	24		2,041
Pollock	2021	28,475	22,062	882	882		19,282	19,282.2		19,092	190		21,047
	2022	21,744	16,812	672	672		14,694	14,693.7		14,549	145		16,039
Northern Windowpane Flounder	2021	84	59	1	5	12	38	38.4			38		55
	2022	84	59	1	5	12	38	38.4			38		55
Southern Windowpane Flounder	2021	568	426	26	196	143	48	47.5			48		412
	2022	568	426	26	196	143	48	47.5			48		412
Ocean Pout	2021												
Atlantic Halibut*	2021		106	21	4		77	76.5			77		102
	2022		106	21	4		77	76.5			77		102

Stock	FY	OFL	US ABC	State-Waters Sub-Component	Other sub-component	Scallops	Groundfish Sub-ACL	Comm. Ground-fish Sub-ACL	Rec Ground-fish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non-sector Groundfish Sub-ACL	MWT or Small mesh Sub-ACL	Total ACL
Atlantic Wolffish	2021												

4.3.2 Alternative 2 – Revised Specifications (*Preferred Alternative*)

Under Alternative 2, the annual specifications for FY2021 – FY2022 for GB cod, GOM cod, GB haddock, GOM haddock, GB yellowtail flounder, SNE/MA yellowtail flounder, CC/GOM yellowtail flounder, American plaice, witch flounder, white hake, and pollock and FY2021-FY2023 for GB winter flounder, GOM winter flounder, SNE/MA winter flounder, redfish, northern windowpane flounder, and southern windowpane flounder, ocean pout, Atlantic halibut, and Atlantic wolffish would be as specified as in Table 9. Alternative 2 includes adjustments to the state waters and other sub-component values from those specified in FW59 (see Appendix II). All other specifications would remain unchanged from those adopted through FW59.

<u>U.S./Canada Total Allowable Catches</u>

This alternative would specify total allowable catches (TACs) for the U.S./Canada Management Area for FY2021 for Eastern GB cod, Eastern GB haddock, and GB yellowtail flounder as indicated in Table 7. If NMFS determines that FY2020 catch of GB cod, haddock, or yellowtail flounder from the U.S./Canada Management Area exceeded the respective 2020 TAC, the U.S./Canada Resource Sharing Understanding and the regulations require that the 2021 TAC be reduced by the amount of the overage. Any overage reduction would be applied to the components of the fishery that caused the overage of the U.S. TAC in 2020. To minimize any disruption to the fishing industry, NMFS would attempt to make any necessary TAC adjustment in the first quarter of the fishing year.

A comparison of the proposed FY2021 U.S. TACs and the FY2020 U.S. TACs is shown in Table 8. Changes to the U.S. TACs reflect changes to the percentage shares, stock status, and the Transboundary Management Guidance Committee's (TMGC) recommendations.

Table 7 - Proposed FY2021 U.S./Canada TACs (mt).

	Eastern GB Cod	**Eastern GB Haddock**	**GB Yellowtail Flounder**
Total Shared TAC	635	14,100	125
U.S. TAC	190.5	6,486	80
Canada TAC	444.5	7,614	45

Table 8 - Comparison of the Proposed FY2021 U.S. TACs and the FY2020 U.S. TACs (mt).

Stock	**U.S. TAC**		**Percent Change** ((FY2021-FY2020) /FY2020)*100
	FY2021	**FY2020**	
Eastern GB cod	190.5	188.5	*+1.1%*
Eastern GB haddock	6,486	16,200	*- 60%*
GB yellowtail flounder	80	120	*-33%*

Table 9- Alternative 2 Revised Northeast Multispecies OFLs, ABC, ACLs, and other ACL sub-components for FY2021-FY2023 (metric tons, live weight), based on final 2020 sector rosters. Values are rounded to the nearest metric ton or tenth. Underlined stocks are subject to adjustments in 2022 based on US/CA quotas, 2021 CA quotas were used to adjust in the interim. Includes adjustments for Canadian catches (*), and state waters component and other sub-component for most stocks. Specifications in gray are unadjusted from FW59.

Stock	FY	OFL	US ABC	State-Waters Sub-Component	Other sub-component	Scallops	Groundfish Sub-ACL	Comm. Ground-fish Sub-ACL	Rec Ground-fish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non-sector Groundfish Sub-ACL	MWT or Small mesh Sub-ACL	Total ACL
GB Cod	2021		1,308	20	137		1,093	1,093.1		1,061	32		1,250
	2022		1,308	20	137		1,093	1,093.1		1,061	32		1,250
GOM Cod	2021	929	552	48	12		463	270.4	193	262	8.6		523
	2022	1,150	552	48	12		463	270.4	193	262	8.6		523
GB Haddock	2021	116,883	82,723		414		76,622	76,622.2		75,079	1,543	1,539	78,574
	2022	114,925	81,242		406		75,250	75,250.4		73,735	1,516	1,511	77,168
GOM Haddock	2021	21,521	16,794	56	56		15,575	10,280.8	5,295	10,022	258	156	15,843
	2022	14,834	11,526	38	38		10,690	7,055.9	3,634	6,879	177	107	10,873
GB Yellowtail Flounder*	2021		80			12	64	63.6		61	2.3	1.5	78
	2022		80			12	64	63.6		61	2.3	1.5	78
SNE/MA Yellowtail Flounder	2021	71	22	0.2	3.3	2.0	16	15.6		13	2.9		21
	2022	184	22	0.2	3.3	2.0	16	15.6		13	2.9		21
CC/GOM Yellowtail Flounder	2021	1,076	823	58	37		692	691.9		660	32		787
	2022	1,116	823	58	37		692	691.9		660	32		787

Stock	FY	OFL	US ABC	State-Waters Sub-Component	Other sub-component	Scallops	Groundfish Sub-ACL	Comm. Ground-fish Sub-ACL	Rec Ground-fish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non-sector Groundfish Sub-ACL	MWT or Small mesh Sub-ACL	Total ACL
American Plaice	2021	3,740	2,881	29	29		2,682	2,682.2		2,611	71		2,740
	2022	3,687	2,825	28	28		2,630	2,630.1		2,560	70		2,687
Witch Flounder	2021		1,483	44	52		1,317	1,317.3		1,282	36		1,414
	2022		1,483	44	52		1,317	1,317.3		1,282	36		1,414
GB Winter Flounder*	2021	865	608		27		563	563.2		541	22		591
	2022	974	608		27		563	563.2		541	22		591
	2023	1,431	608		27		563	563.2		541	22		591
GOM Winter Flounder	2021	662	497	194	7.5		281	280.9		267	14		482
	2022	662	497	194	7.5		281	280.9		267	14		482
	2023	662	497	194	7.5		281	280.9		267	14		482
SNE/MA Winter Flounder	2021	1,438	456	21	132		288	288.1		254	34		441
	2022	1,438	456	21	132		288	288.1		254	34		441
	2023	1,438	456	21	132		288	288.1		254	34		441
Redfish	2021	13,519	10,186				9,677	9,676.7		9,550	126		9,677
	2022	13,354	10,062				9,559	9,558.9		9,434	125		9,559
	2023	13,229	9,967				9,469	9,468.7		9,345	124		9,469
White Hake*	2021	2,906	2,147	11	11		2,019	2,019.3		1,995	24		2,041
	2022	2,986	2,147	11	11		2,019	2,019.3		1,995	24		2,041

Stock	FY	OFL	US ABC	State-Waters Sub-Component	Other sub-component	Scallops	Groundfish Sub-ACL	Comm. Ground-fish Sub-ACL	Rec Ground-fish Sub-ACL	Preliminary Sectors Sub-ACL	Preliminary Non-sector Groundfish Sub-ACL	MWT or Small mesh Sub-ACL	Total ACL
Pollock	2021	28,475	22,062	1,434	1,103		18,549	18,548.6		18,366	183		21,086
	2022	21,744	16,812	1,093	841		14,135	14,134.7		13,995	139		16,068
Northern Windowpane Flounder	2021		160	0.8	10	31	108	107.9			108		150
	2022		160	0.8	10	31	108	107.9			108		150
	2023		160	0.8	10	31	108	107.9			108		150
Southern Windowpane Flounder	2021	513	384	23	177	129	43	42.9			43		371
	2022	513	384	23	177	129	43	42.9			43		371
	2023	513	384	23	177	129	43	42.9			43		371
Ocean Pout	2021	125	87	0	33		50	49.8			50		83
	2022	125	87	0	33		50	49.8			50		83
	2023	125	87	0	33		50	49.8			50		83
Atlantic Halibut*	2021		101	20	3.5		73	73.4			73		97
	2022		101	20	3.5		73	73.4			73		97
	2023		101	20	3.5		73	73.4			73		97
Atlantic Wolffish	2021	122	92				86	85.6			86		86
	2022	122	92				86	85.6			86		86
	2023	122	92				86	85.6			86		86

Rationale: This measure would adopt new specifications for ten groundfish stocks consistent with the most recent stock assessment information. The U.S. and Canada coordinate management of three management units that overlap the boundary between the two countries on Georges Bank. Agreement on the amount to be caught is reached each year by the TMGC. This framework includes the recommendations of the TMGC, which are consistent with the most recent Transboundary Resource Assessment Committee (TRAC) assessments.

4.4 Action 4 – Commercial Fishery Measures For Sectors

4.4.1 Alternative 1 – No Action

No Action. There would continue to be no universal sector exemption for redfish in the Northeast (NE) Multispecies (Groundfish) fishery management plan (FMP). The Regional Administrator may exempt sector vessels from any federal fishing regulation implementing the NE Multispecies FMP, except: specific times and areas within the NE Multispecies year-round closure areas; permitting restrictions (e.g., vessel upgrades, etc.); gear restrictions designed to minimize habitat impacts (e.g., roller gear restrictions, etc.); reporting requirements; and accountability measures, in order to allow vessels to fish in accordance with an approved operations plan, provided such exemptions are consistent with the goals and objectives of the FMP. In recent years, sectors have requested through their operations plans an exemption from the currently required 6.5-inch minimum groundfish mesh for trawl vessels to target redfish. Vessels enrolled in sectors that are not granted this exemption, as well as common pool vessels, are not allowed to fish with this exemption.

If Alternative 1/No Action is selected, sectors may continue to request an exemption through their operations plans to use a smaller mesh size to target redfish. Sector proposals submitted to NMFS could include the elements of the industry proposal described in Alternative 2.

For FY 2020, NMFS granted a sector exemption to allow vessels to target redfish with 5.5-inch mesh codends, as described below (see FY 2020 Interim Final Sector Rule; 85 FR 23229; April 27, 2020). Vessels enrolled in sectors with the exemption are allowed to use a 5.5-inch (or larger) codend mesh within the Redfish Exemption Area (Table 10, Map 1) with the stipulations below. Vessels are subject to the at-sea monitoring (ASM) target coverage levels. During the smaller mesh portion of the trip in the Redfish Exemption Area, the allocated[1] groundfish kept must be 50% or greater redfish landings, and on observed trips, total groundfish discards (including redfish) may not exceed 5% of all kept catch. See the Final Rule for details (85 FR 23229; April 27, 2020). NMFS monitors these thresholds monthly for each sector.

Stipulations:

1) Prior to leaving the dock, vessel operators are required to declare their intent to fish under the provisions of the Redfish Exemption through the Vessel Monitoring System (VMS) by checking the box next to "Redfish Trip" under sector exemptions;
2) In Part 1 of the trip, vessel operators may fish with conventional groundfish codends (6.5-inch) outside the Redfish Exemption Area, except when fishing with a haddock separator trawl or

[1] *Allocated stocks. Each sector shall be allocated a TAC in the form of an ACE for each NE multispecies stock, with the exception of Atlantic halibut, ocean pout, windowpane flounder (both the GOM/GB and the SNE/MA stocks), and Atlantic wolffish based upon the cumulative PSCs of vessels/permits participating in each sector during a particular fishing year, as described in paragraph (b)(1)(i)(E) of this section*.

Ruhle trawl in the Georges Bank (GB) Regulated Mesh Area (RMA), where the codend may be 6 inches;

3) Vessel operators are allowed to switch to 5.5-inch (or larger) codend for Part 2 of the trip after transiting to the Redfish Exemption Area and submitting VMS Multispecies Catch Report detailing all catch on board and indicating that the vessel is switching to smaller mesh. Fishing outside of the Redfish Exemption Area first is optional, but once a vessel switches mesh under Part 2 the vessel cannot fish outside the Redfish Exemption Area. Alternatively, a vessel may choose to immediately transit to the Redfish Exemption Area and begin fishing on Part 2 of the Redfish Exemption Trip;
4) Vessel operators must report kept catch each day from the entire trip (including redfish and non-redfish portions) through the VMS prior to returning to port; and
5) Vessel operators must submit a separate Vessel Trip Report to report catch for each codend mesh size for each statistical area where it is fished.

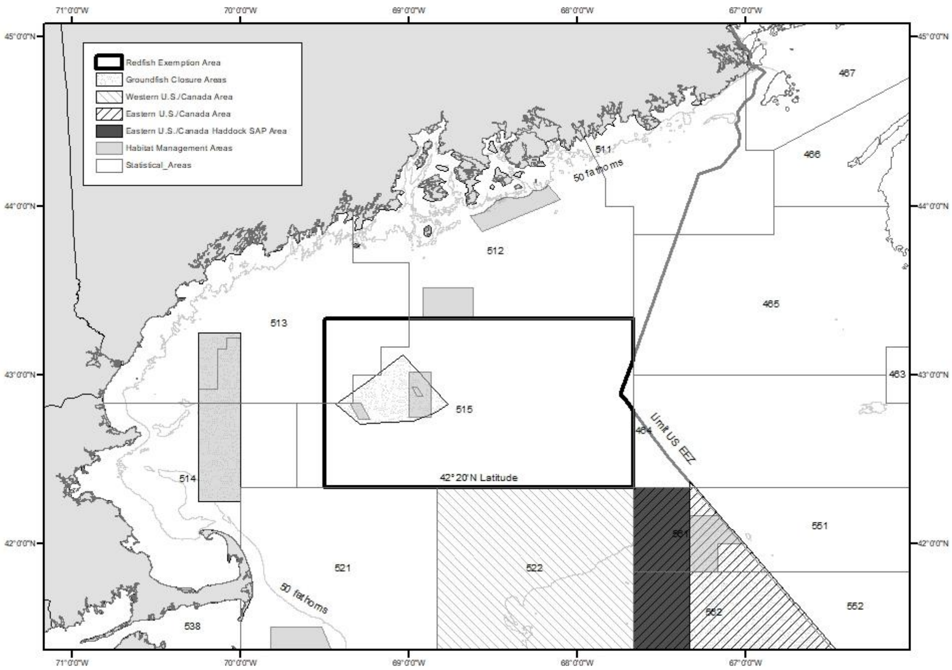
Rationale: Sectors may request exemptions from the regulations implementing the NE Multispecies FMP as part of their operations plans. The annual (or biennial) sector exemption approval process allows NMFS to determine if requested exemptions are appropriate for groundfish sectors in a given fishing year, and/or if they could potentially be modified in response to a management need or opportunity (e.g., changing stock status, or improved catch efficiency). The Redfish Exemption Area approved for FY 2020 is reduced in size compared to the area previously approved under the exemption from FY 2015 to FY 2019. This reduction is intended to address harvest performance issues with the exemption, more specifically to reduce bycatch and potential targeting of other groundfish stocks using smaller mesh than would otherwise be allowed under the FMP, particularly GB cod, white hake, pollock, and haddock. Both GB cod and white hake are overfished and in rebuilding plans.

Table 10 - Coordinates for the sector redfish exemption area approved for FY 2020.

Point	N. Lat.	W. Long.
A	43°20.00'	69°30.00'
B	43°20.00'	67°40.00'
C*	43°06.23'	67°40.00'
D*	42°53.24'	67°44.55'
E*	42°47.17'	67°40.00'
F	42°20.00'	67°40.00'
G	42°20.00'	69°30.00'
A	43°20.00'	69°30.00'

*Approximate points corresponding to the intersections of 67°40' W. longitude and the U.S.-Canada Maritime Boundary, and the area's eastern boundary following the U.S.-Canada Maritime Boundary.

Map 1 - Map of the sector redfish exemption area approved for FY 2020.



4.4.2 Alternative 2 – Universal sector exemption for redfish (*Preferred Alternative*)

Alternative 2 would add a universal sector exemption to the NE Multispecies FMP that would allow commercial trawl vessels enrolled in sectors to fish for redfish using a 5.5-inch (or larger) mesh codend within the defined Redfish Exemption Area (Table 11, Map 2) according to the stipulations below. Approval through the annual (or biennial) sector operations plan approval process would not be necessary.

The Redfish Exemption Area would include a seasonal cod closure that would be closed in February and March due to potential catch of GOM cod, and an additional seasonal closure that would be closed in September through December to reduce bycatch of other groundfish stocks (mainly pollock) (Table 12 and Table 13, Map 2). Vessels would be subject to the annual ASM target coverage levels for sectors. During the smaller mesh portion of the trip in the Redfish Exemption Area, on a monthly basis, the allocated groundfish kept on Part 2 of the trip (the redfish portion of the trip, described below) must be 50% or greater redfish landings, and on observed trips, total groundfish discards (including redfish) may not exceed 5% of all kept catch. Additionally, the total pounds of allocated groundfish landed on Part 2 of all redfish trips taken by a sector during each fishing year would need to be comprised of at least 55% redfish (see Option B below). NMFS would be responsible for monitoring thresholds and making the determination of whether a sector failed to meet any of the thresholds. Sectors would be responsible for complying with the exemption including the thresholds. Options for performance standards and administrative measures, in addition to the performance standards already required under the current approved sector exemption, are described below. Sectors may continue to request other exemptions related to redfish or mesh size.

Stipulations:

1) Prior to leaving the dock, vessel operators would be required to declare their intent to fish under the provisions of the Redfish Exemption through the VMS as required by the Regional Administrator;
2) In Part 1 of the trip, vessel operators could fish with conventional groundfish codends (6.5-inch) inside or outside of the Redfish Exemption Area, except when fishing with a haddock separator trawl or Ruhle trawl in the GB RMA, where the codend may be 6 inches;
3) Vessel operators would be allowed to switch to 5.5-inch (or larger) codends for Part 2 of the trip after transiting to the Redfish Exemption Area and submitting VMS Multispecies Catch Report detailing all catch on board and indicating that that the vessel is switching to smaller mesh. Fishing outside of the Redfish Exemption Area first is optional, but once a vessel switches mesh under Part 2 the vessel cannot fish outside the Redfish Exemption Area. Alternatively, a vessel may choose to immediately transit to the Redfish Exemption Area and begin fishing on Part 2 of the Redfish Exemption Trip;
4) Vessel operators would be required to report kept catch each day from the entire trip (including redfish and non-redfish portions) through the VMS prior to returning to port; and
5) Vessel operators would submit the standard requirement of a separate Vessel Trip Report to report catch for each codend mesh size for each statistical area where it is fished.

Purpose and goal: The purpose of establishing a universal sector exemption for redfish, rather than an annual exemption, is to increase stability and certainty for current and potential participants and improve Council control and oversight of the fishery. The goal of the redfish universal sector exemption is to achieve optimum yield of the redfish resource.

Objectives: The objectives of the redfish universal sector exemption include:

1. Allow use of an efficient mesh size codend to facilitate harvest of redfish.
2. Increase the harvest of redfish while reducing to the extent practicable bycatch of other groundfish stocks.
3. Restore flexibility lost with 2020 contraction of the redfish exemption area.
4. Remove areas from the exemption which provide little opportunity to effectively target redfish, or little ability to achieve exemption performance thresholds.

Review: A review of the universal sector exemption for redfish will occur the next time the redfish stock is assessed. For example, if the redfish stock is assessed through a management track review in September of 2022, the Council would anticipate the management review to occur after the peer review – of which may span from 2022 into 2023. The review may include evaluation of the monthly and annual thresholds performance, vessel-level performance, bycatch of other groundfish stocks, any observed changes in selectivity, as well as the purpose, goals, and objectives, but is not limited to these criteria. The Groundfish Plan Development Team would conduct the review and prepare a report to the Groundfish Committee.

Rationale: Under Alternative 2, sectors would no longer need to request a redfish exemption through their operations plans, reducing administrative responsibility for sectors and NMFS of the exemption request process and potentially adding consistency and predictability for fishing operations. All sector vessels would be automatically eligible to participate in the universal exemption. The mesh size would allow greater retention of redfish than the current minimum mesh size in the FMP. Studies of the REDNET project showed that vessels could selectively target redfish with minimal bycatch (Pol & He 2014). The intent is to not to supersede or allow fishing under this exemption in any existing or future closed areas within the Redfish Exemption Area boundary. Alternative 2 would increase the size of the Redfish Exemption Area from that specified under the FY 2020 Interim Final Sector Rule, to restore some areas previously included in the footprint of the redfish area (FY 2015 – FY 2019) for vessels participating in the exemption program. Vessels would not be able to use the exemption in Block 131 (Cod Closure) in February and March, due to the presence of GOM cod and the potential for bycatch of this stock. Additionally, vessels would not be able to use the exemption in Seasonal Closure II in September through December, to reduce bycatch of other groundfish stocks, especially pollock. Including a planned review of the universal sector exemption to occur the next time the redfish stock is assessed will allow the Council to evaluate performance of the exemption alongside any possible changes in the condition of the redfish stock, at which point the Council could decide whether any adjustments may be needed.

Table 11 - Coordinates for the sector redfish exemption area under Alternative 2.

Point	N. Lat.	W. Long.
A	43°00’	69°55’
B	43°00’	69°30’
C	43°20’	69°30’
D	43°20’	(US EEZ longitude)
E	42°53.24’	67°44.55’
F	42°20’	(US EEZ longitude)
G	42°20’	67°40’
H	42°00’	67°40’
I	42°00’	69°37’
J	42°20’	69°55’
A	43°00’	69°55’

[a] The intersection of 42°00' N. latitude and the U.S.-Canada Maritime Boundary. Longitude is approximate.

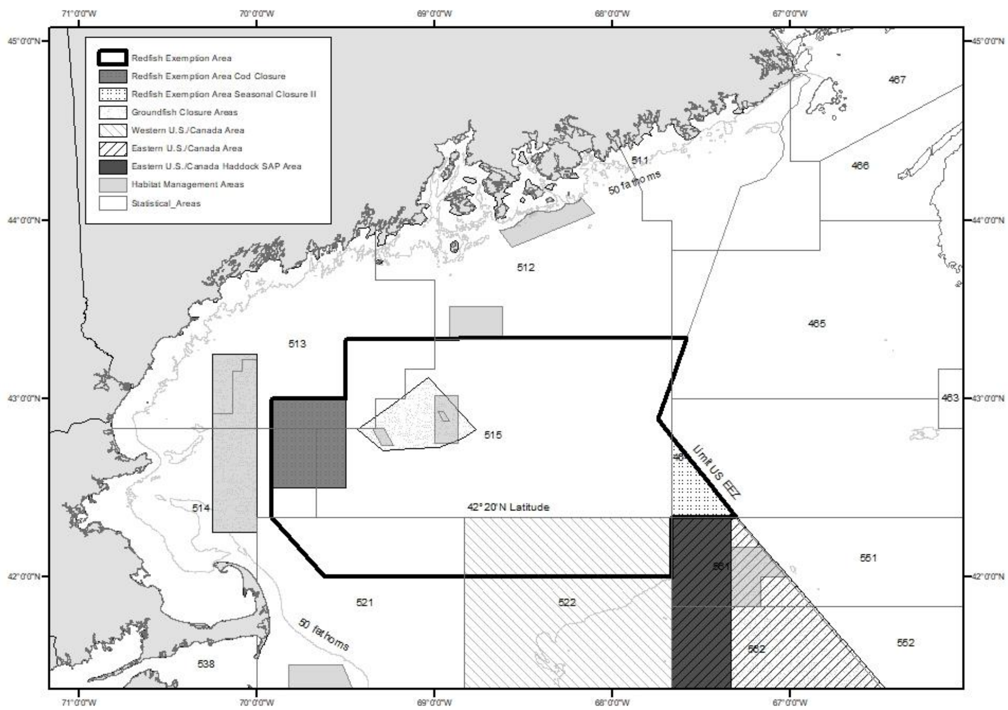
Table 12 - Coordinates for the sector redfish exemption area cod closure under Alternative 2.

Point	N. Lat.	W. Long.
A	43°00’	69°55’
B	43°00’	69°30’
K	42°30’	69°30’
L	42°30’	69°55’
A	43°00’	69°55’

Table 13 - Coordinates for the sector redfish exemption area seasonal closure II under Alternative 2.

Point	N. Lat.	W. Long.
M	42°47.17’	67°40’
F	42°20’	(US EEZ longitude)
G	42°20’	67°40’
M	42°47.17’	67°40’
M	42°47.17’	67°40’

Map 2- Map of the sector redfish exemption area under Alternative 2.



4.4.2.1 Performance Standards/Administrative Measures

If necessary, the Regional Administrator will place a sector on probation, or revoke a sector’s authorization to use this universal exemption within the fishing year, by modifying letters of authorization for a sector’s vessels, an approved sector operations plan ,or through the sector operations plan approval process. The monthly and annual thresholds are intended to provide more defined performance standards, accountability, and transparency to achieve the goals and objectives of the universal sector exemption for redfish (defined above in Section 4.4.2).

The Council selected both of these options: Option A and Option B.

4.4.2.1.1 Option A - Performance Standards for Monthly Redfish Landings Threshold and Groundfish Discards (*Preferred Alternative*)

The current exemption, as approved by NMFS, requires that at least 50% of the monthly cumulative allocated groundfish kept on Part 2 of those trips using the exemption must be redfish. For observed trips (NEFOP/ASM/EM) declaring the redfish exemption and fishing a smaller than 6.5-inch mesh codend during Part 2 of the trip, total groundfish discards (including redfish) may not exceed 5% of all kept catch during Part 2 of the trip. GARFO will monitor these thresholds using available data and make compliance determinations. For any month GARFO determines that the sector is not meeting either of these two thresholds, the sector will be notified, and the sector is expected to modify fishing behavior in order to meet both thresholds.

This option would set additional performance standards and administrative measures for the monthly redfish landings threshold of 50% and the monthly groundfish discards of 5%, such that a sector may not fail to meet either monthly threshold for (a) four or more months per fishing year, or (b) three consecutive months. If either limit is breached, the sector will have its use of the redfish exemption program revoked for the remainder of that fishing year (year 1). Additionally, the sector will be placed on a 'probationary' status for the following fishing year (year 2). For example, a sector could fail to meet the monthly threshold in October, December, and January and would not have its use of the exemption revoked. But, if the sector failed to meet the monthly threshold in September, October, and November, its use of the exemption would then be revoked for the remainder of the fishing year and the sector would be placed on probation for the following fishing year.

In the fishing year when a sector is on 'probationary' status, if the sector again fails to meet either monthly threshold for (a) four or more months of a fishing year or (b) three consecutive months in a fishing year, the sector will have its use of the redfish exemption program revoked for the remainder of that fishing year (year 2) and have its use of the exemption revoked for the following fishing year (year 3), with its use of the exemption reinstated in year 4. Otherwise, the sector's probationary period would expire at the end of the following year (year 2).

Rationale: This option would help ensure vessels are targeting redfish by requiring sectors to achieve the 50% monthly redfish landings threshold and not fall below this threshold too often, and to not exceed 5% groundfish discards. Sectors are expected to adjust fishing practices within the year to stay within the performance standards. This option is intended to improve performance of the exemption.

4.4.2.1.2 Option B – Annual Redfish Landings Threshold and Performance Standards (*Preferred Alternative*)

Sectors would be required to achieve a mandatory annual exempted redfish landings composition threshold of 55% of allocated groundfish (a sector's total annual landed pounds of groundfish landed on Part 2 of redfish exemption trips must be comprised of at least 55% redfish). If a sector fails to meet this threshold (in year 1), it would be placed on 'probationary' status for the following fishing year (year 2) as soon as the data is available.

In the following 'probationary' fishing year (year 2), if the sector again fails to meet this annual threshold, the sector will have its redfish exemption revoked for the following fishing year (year 3). But if in the following 'probationary' fishing year (year 2) the sector meets the annual threshold, the sector's probationary period would expire at the end of the following year (year 2)..

***Rationale*:** Sectors are expected to stay within the performance standards and adjust fishing practices as necessary. This option would help ensure vessels are targeting redfish, while not setting the performance standard too high for new entrants.

5.0 AFFECTED ENVIRONMENT

5.1 INTRODUCTION

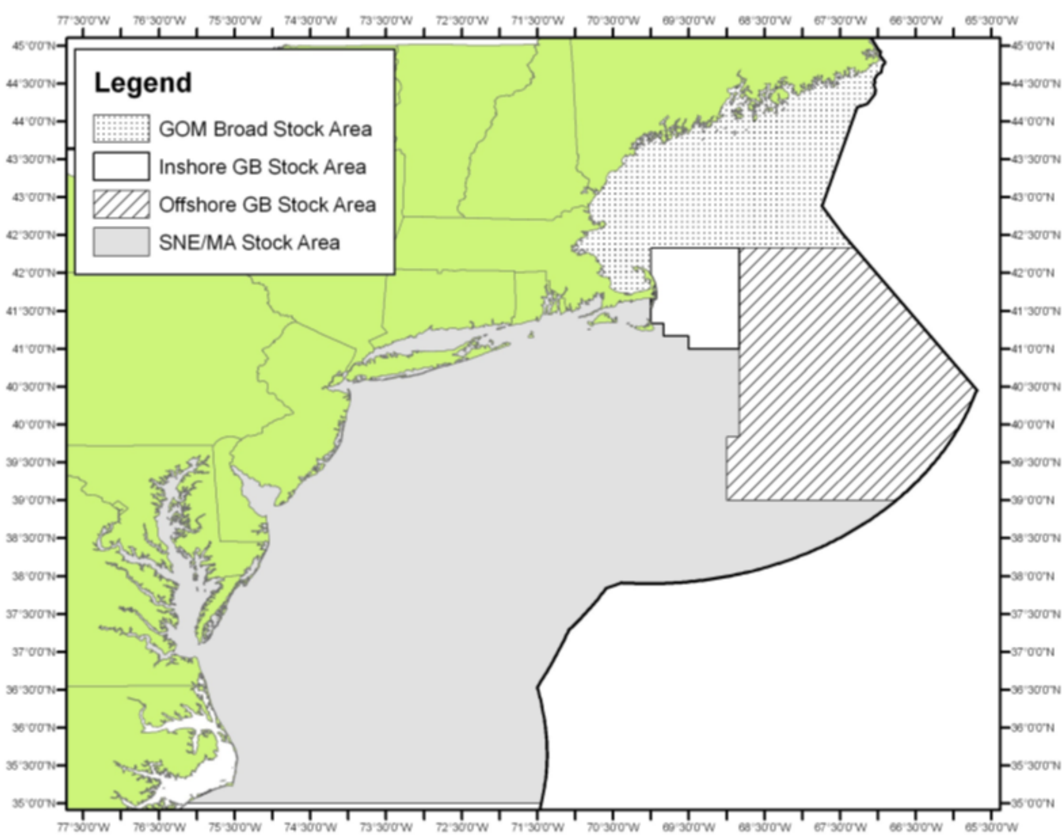
The Affected Environment is described in this action based on valued ecosystem components (VECs), including: regulated groundfish species, non-groundfish species/bycatch, the physical environment and Essential Fish Habitat (EFH), protected resources, and human communities. VECs represent the resources, areas and human communities that may be affected by the alternatives under consideration in this amendment. VECs are the focus, since they are the "place" where the impacts of management actions occur.

5.2 REGULATED GROUNDFISH SPECIES

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

The allocated target stocks for the Northeast Multispecies FMP are: GOM cod, GB cod, GOM haddock, GB haddock, American Plaice, witch flounder, GOM winter flounder, GB winter flounder, SNE/MA winter flounder, CC/GOM yellowtail flounder, GB yellowtail flounder, SNE/MA yellowtail flounder, redfish, pollock and white hake. These species are discussed in Sections 5.2.1 - 5.2.15.

Map 3 - Northeast Multispecies Broad Stock Areas.



The Northeast Multispecies FMP also manages Atlantic halibut, ocean pout, windowpane flounder (GB/GOM- northern and SNE/MA- southern stocks), and wolffish. While OFLs, ABCs, and ACLs are specified for these stocks, they were not allocated to sectors through Amendment 16. These species are discussed in Sections 5.2.16 - 5.2.20.

Discussions have been adapted from the most recent stock assessment reports (NEFSC 2017b, NEFSC 2020b, and NEFSC 2020).

Additional information following the most recent stock assessments is also provided in Sections 5.2.21- 5.2.23.

5.2.1 Gulf of Maine Cod

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

Population Status. The inshore GOM stock appears to be relatively distinct from the offshore cod stocks on the banks of the Scotian Shelf and Georges Bank based on tagging studies. GOM cod spawning stock biomass is estimated to have been just over 22,000 mt in 1982. After a period of decline in the 1980's, SSB returned to roughly 20,000 mt in 1990 before decreasing again in the 1990's. The use of separate assessment models (M=0.2 and M-ramp) in the last three assessments yield two estimates for SSB in recent years, though both indicate a sharp decline in SSB since 2010, when SSB was estimated at 8,638 mt and 10,645 mt (respectively). The stock remains low relative to historic levels and is subject to a formal stock rebuilding plan. The 2018 SSB estimates (M=0.2 and M-ramp models) are 3,752 mt and 3,838 mt (respectively), which are 9% and 6% (respectively) of the biomass target. The 2018 fully selected fishing mortality was estimated to be 0.188 and 0.198, which is 109% and 113% of the F_{MSY} proxy (respectively) (NEFSC 2020b). Recreational catch estimates were re-estimated in this update by using the re-calibrated Marine Recreational Intercept Program (MRIP) data. In general, inclusion of the re-calibrated data resulted in an increase in SSB, F, and recruitment (NEFSC 2020b). Currently, the GOM cod stock is overfished and overfishing is occurring (NEFSC 2020b). The stock shows a truncated size and age structure, consistent with a population experiencing high mortality. Additionally, there are only limited signs of incoming recruitment, continued low survey indices, and the current spatial distribution of the stock is considerably less than its historical range within the Gulf of Maine (NEFSC 2020b).

5.2.2 Georges Bank Cod

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

Population Status. GB cod is a transboundary stock co-managed by the U.S. and Canada. The GB cod stock underwent a benchmark assessment in 2012 (SAW55, NEFSC 2013a), which indicated that the stock is overfished and overfishing is occurring. The 2015 peer review concluded that the GB cod model was not acceptable as a scientific basis for catch advice, and that stock status and catch advice should be based an alternative approach, but did conclude that the stock was qualitatively determined to be overfished based on poor stock condition. The update to the ASAP model was rejected, not the underlying benchmark formulation from SAW 55. Because a stock assessment model framework is lacking, no historical estimates of biomass, fishing mortality rate, or recruitment can be calculated. Status determination relative to reference points is not possible because reference points cannot be defined. Overfishing status is considered unknown and the peer review concluded that evidence suggests this stock should still be considered overfished due to poor stock condition (NEFSC 2017b). NMFS determined that the stock status for GB cod will remain overfished, with overfishing occurring, consistent with the determination from the 2013 GB cod benchmark assessment. Based on the 2019 assessment, overfishing status is considered unknown and stock status remains overfished based on a qualitative evaluation of poor stock condition (NEFSC 2020b). Recreational catch estimates were re-estimated in this update by using the re-calibrated MRIP data, which results in higher average total catch (NEFSC 2020b). The GB cod stock continues to show a truncated age structure. The most recent survey values remain below the mean of their time series. The assessment suggests some evidence of a relatively strong 2013 year class compared with recent year classes. However, this year class is considered small in comparison to year classes in the 1970s. Furthermore, the 2013 year class does not track as well into the older age classes (NEFSC 2020b).

5.2.3 Gulf of Maine Haddock

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

Population Status. The GOM haddock underwent a benchmark assessment in 2014 at SAW 59, which indicated that the stock was not overfished and overfishing was not occurring. The 2013 SSB was estimated at 4,153 mt, above the <2,452 mt overfishing threshold, a change from the 2012 assessment update when the stock was experiencing overfishing (NEFSC 2014). As of the 2019 groundfish operational assessments, the stock is not overfished and overfishing is not occurring, with 2018 SSB estimated to be at 82,763 mt, which is 1,035% of the biomass target (NEFSC 2020b). Recreational catch estimates were re-estimated in this update by using the re-calibrated MRIP data. In general, inclusion of the re-calibrated data resulted in an increase in SSB, F, and recruitment. The GOM haddock stock has experienced several large recruitment events since 2010. The population biomass is currently at an all time high and overall, the population is experiencing low mortality (NEFSC 2017b).

5.2.4 Georges Bank Haddock

Life History. The life history of GB haddock, *Melanogrammus aeglefinus*, is comparable to the GOM haddock (Section 5.2.3). On Georges Bank, spawning occurs from January to June, usually peaking from February to early-April. This is the principal haddock spawning area in the Northeast U.S. Shelf Ecosystem, concentrating on the northeast peak of Georges Bank. Median age and size of maturity differ slightly between the GB and GOM haddock stocks (NEFSC 2011c).

Population Status. The GB haddock stock is a transboundary stock co-managed by the U.S. and Canada. The stock is not overfished and overfishing is not occurring (NEFSC 2020b). There has been a steady increase in SSB from ~15,000 mt in the early 1990s, to about 252,000 mt in 2007. The dramatic increase 2005 - 2007 is due to the exceptionally large 2003 year class reaching maturity. From 2007 - 2010, SSB decreased 35% as that 2003 year class decreased due to natural and fishing mortality. The fishing mortality rate for this stock has been low in recent years. The retrospective adjusted 2018 SSB was estimated to be at 507,130 mt, which is 365% of the biomass target (NEFSC 2020b). The GB haddock stock shows a broad age structure, and broad spatial distribution. This stock has produced several exceptionally strong year classes in the last 15 years, leading to record high SSB in recent years. Catches in recent years have been well below the total quota (US+Canada). While all survey indices support the finding that this stock reached an all-time high, weights at age have been declining since the large 2003 year class, and show further declines with the most recent data (NEFSC 2020b).

5.2.5 American Plaice

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

Population Status. In the Gulf of Maine and Georges Bank, the American plaice is not overfished and overfishing is not occurring (NEFSC 2020b). The stock was in a rebuilding plan, but based on the 2019 assessment, the stock is now considered rebuilt (NEFMC 2020b). The retrospective adjusted spawning stock biomass in 2018 was estimated to be at 17,748 mt, which is 116% of the biomass target The 2018 fully selected fishing mortality was estimated to be 0.089, which is 34% of the FMSY proxy (NEFSC 2020b). The current fishing mortality rate is relatively low, and so recent above average recruitment has resulted in an increase in SSB. SSB is projected to decrease in the short term, however, even at current fishing rates (NEFSC 2020b).

5.2.6 **Witch Flounder**

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

Population Status. Witch flounder is overfished and overfishing status is unknown (NEFSC 2020b). The 2016 benchmark assessment (SARC 62) peer review panel did not accept the analytical assessment models for witch flounder (NEFSC 2017a). Because a stock assessment model framework is lacking, no historical estimates of biomass, fishing mortality rate, or recruitment can be calculated. Status determination relative to reference points is not possible because reference points cannot be defined. An area-swept empirical approach indicates the stock condition remains poor (NEFSC 2020b). NMFS determined that the stock status for witch flounder will remain overfished, with overfishing unknown, consistent with the 2016 benchmark assessment for this stock. Based on the 2017 peer review, witch flounder was overfished and overfishing was unknown (NESFC 2017b). The 2019 assessment did not recommend a change to the stock status. The fishery landings and survey catch by age indicate a truncation of age structure and a reduction in the number of older fish in the population. NEFSC relative indices of abundance and biomass remain below their time series average (NEFSC 2020b).

5.2.7 **Gulf of Maine Winter Flounder**

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

Population Status. Based on the recommendation of the 2020 Peer Review Panel, overfishing is not occurring for GOM winter flounder, but the overfished status is unknown (NEFSC 2020). The survey area-swept biomass estimate is calculated from three separate trawl fall surveys. The 2020 Peer Review Panel recommended using a revised average catchability estimate (0.71) from the recent cooperative research project survey catchability experiment which decreased from 0.87 in 2017 (Miller et al 2020). A moving average approach to estimating catch advice (rather than based on a single year) was considered in this assessment to stabilize catch advice and to use a greater amount of the available updated information. The Peer Review Panel agrees that catch advice be based on 75% of E40% (75% EMSY proxy) using the most recent two years of information from fall surveys for the biomass estimate and catch advice.

5.2.8 Georges Bank Winter Flounder

Life History: The life history of Georges Bank winter flounder, *Pseudopleuronectes americanus*, is comparable to the Gulf of Maine winter flounder life history, which is described in Section 5.2.7. GB winter flounder growth is different than either GOM or SNE winter flounder stocks, with winter flounder on Georges Bank growing larger in size than the inshore stocks of winter flounder.

Population Status: Based on the 2020 Peer Review Panel, GB winter flounder is overfished and overfishing is not occurring. Biomass in 2019 was estimated to be 2,587 mt, which is 38% of the biomass target (NEFSC 2020). GB winter flounder is in a rebuilding plan with $F_{Rebuild}$ rate defined as 70%FMSY with an end date of 2029. A retrospective adjustment was applied to the terminal year of the assessment. The 2020 peer review panel accepted biological reference points based on F40% proxy due to concerns with a residual pattern based with the SARC 52 stock recruitment relationship. The 2020 Peer Review Panel notes that recruitment from the 2019 year class is likely to be underestimated. The index for GB winter flounder has high variation and does not provide enough information to estimate this year class. The panel also notes that alternative projections should be considered that assume future recruitment will be similar to recent recruitment. Sensitivity analyses were conducted and presented at the peer review to evaluate various recruitment scenarios which suggests that increases in the projections are attributed to the assumption of incoming relative higher recruitment from using the entire times series of recruitment in the projections.

5.2.9 Southern New England/Mid-Atlantic Winter Flounder

Life History: The life history of SNE/MA winter flounder, *Pseudopleuronectes americanus*, is comparable to the Gulf of Maine winter flounder life history, which is described in Section 5.2.7.

Population Status: Based on the recommendations of the 2020 Peer Review Panel, SNE/MA winter flounder is overfished, but overfishing is not occurring. SNE/MA winter flounder is in a rebuilding plan with a rebuild by date of 2023. In 2019, SSB is at 30% of the SSBMSY target (NEFSC 2020). A projection using assumed catch in 2020 and F = 0 through 2023 indicated a less than a 5% chance of reaching the SSB target. The SSB trends appear to be declining over the time series with a continued declining trend in recruitment. There are no signs of stock rebuilding. The 2020 Peer Review Panel accepted biological reference points based on a F40% proxy due to concerns with a residual pattern based on the SARC 52 stock recruitment relationship. The panel also accepted a change in selectivity from a dome shaped pattern to flat-top with the catch.

5.2.10 Cape Cod/Gulf of Maine Yellowtail Flounder

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

Population Status: Based on the 2019 operational assessment, the CC/GOM yellowtail flounder stock is not overfished and overfishing is not occurring. This is a change from the 2017 assessment update when the stock was overfished and was experiencing overfishing (NEFSC 2017b). The retrospective adjusted 2018 spawning stock biomass was estimated to be 2,125 mt, which is 62% of the biomass target. The 2018 fully selected fishing mortality was estimated to be 0.092, which is 29% of the F_{MSY} proxy (NEFSC 2020b). The change in status is supported by an above average estimated 2016 incoming year class coupled with very low exploitation of the fishery resource. The estimated 2018 catch was the lowest in the time series. There is an above average estimated 2016 incoming year class which has contributed to the increase in total biomass. The reductions in fishing mortality and above average 2016 year class has resulted in the stock biomass to increase. However, SSB is projected to decrease in the short-term if fished at $F_{40\%}$ (NEFSC 2020b).

5.2.11 Georges Bank Yellowtail Flounder

Life History: The general life history of the GB yellowtail flounder, *Limanda ferruginea*, is comparable to the CC/GOM yellowtail described in Section 5.2.10. The median age at maturity for females is 1.8 years on Georges Bank. Spawning takes place along continental shelf.

Population Status: The GB yellowtail flounder stock is a transboundary stock co-managed by the U.S. and Canada. The GB yellowtail flounder stock status is unknown due to a lack of biological reference points. Because a stock assessment model framework is lacking, no historical estimates of biomass, fishing mortality rate, or recruitment can be calculated. Status determination relative to reference points is not possible because reference points cannot be defined. In the absence of an assessment model, an empirical approach based on survey catches indicates stock condition is poor, given a declining trend in survey biomass despite reductions in catch to historical low levels. 2020 stock assessment results for GB yellowtail flounder continue to indicate low stock biomass and poor productivity (TRAC 2020). Recent catches are at historic low amounts, with combined catches for Canada and USA at 9 mt for 2019. NMFS determined that the stock status for GB yellowtail flounder is overfished, with overfishing occurring.

5.2.12 Southern New England Yellowtail Flounder

Life History: The general life history of the SNE/MA yellowtail flounder, *Limanda ferruginea*, is comparable to the Cape Cod/GOM yellowtail described in Section 5.2.10. The median age at maturity for females is 1.6 years in southern New England.

Population: Based on the 2019 operational assessment, the SNE/MA yellowtail flounder stock is overfished and overfishing is not occurring (NEFSC 2020b). This is a change from the 2017 assessment update when the stock was experiencing overfishing (NEFSC 2017). The retrospective adjusted 2018 spawning stock biomass was estimated to be 90 mt, which is 5% of the biomass target. The 2018 fully selected fishing mortality was estimated to be 0.259, which is 73% of the F_{MSY} proxy (NEFSC 2020b). The 2018 total catch for SNE/MA yellowtail flounder was estimated to be the lowest on record. In 2017, the relatively strong incoming year class has resulted in a moderate increase in SSB in 2018, but remains well below SSB_{MSY}. In the short term, SSB is projected to increase due to another estimated incoming year class in 2018, but the projected increase is still below the biomass reference point (NEFSC 2020b).

5.2.13 Acadian Redfish

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

Population Status: Based on the recommendation of the 2020 Peer Review Panel, redfish is not overfished and overfishing is not occurring. Redfish is rebuilt. A retrospective adjustment was applied to the terminal year of the assessment. The 2020 Peer Review Panel stated: *The first review by Peer Review Panel observed that the two stock size indices used in the ASAP model had been declining more steeply than the estimated biomass in the assessment. The Peer Review Panel considered rejecting the assessment on that basis, but given that the ASAP modelling did not show other problems, the analyst was asked to explore ways to better fit recent survey indices. The analyst found that altering the weighting of the various data sources provided a better fit to recent indices and improved the retrospective pattern. The Peer Review Panel accepted the base case assessment but cautioned that it may overestimate stock size as indicated by the sensitivity run where a different weighting scheme was used* (NEFSC 2020). Total removals of redfish increased starting in the early 2000s and have been relatively constant since the early 2010s. Fall survey data suggests the existence of relatively strong year classes in 2007/2008 and 2013, and suggests that older fish have begun to reappear in the stock since the 1990s (NEFSC 2020).

5.2.14 Pollock

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

Population Status: Based on the 2019 operational assessment, the pollock stock is not overfished and overfishing is not occurring. There are two population assessment models brought forward from the 2017 operational assessment: the base model (dome-shaped survey selectivity), which is used to provide management advice; and the flat sel sensitivity model (flat-topped survey selectivity), which is included for the sole purpose of demonstrating the sensitivity of assessment results to survey selectivity assumptions. The retrospective adjusted spawning stock biomass in 2018 was estimated to be 212,416 mt under the base model and 71,322 under the flat sel sensitivity model (respectively), which are 170% and 101% (respectively) of the biomass target (NEFSC 2020b). Total removals of pollock have declined since 2008. Fishery and survey data suggests the existence of a relatively strong 2013 year class, which has just begun to enter the commercial fishery. Survey data suggests that older fish have begun to reappear in the stock since the 1990s (NEFSC 2020b).

5.2.15 White Hake

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

Population Status: Based on the 2019 operational assessment, the white hake stock is overfished and overfishing is not occurring. This is a change from the 2017 operational assessment, in which white hake was not overfished (NEFSC 2017b). The retrospective adjusted 2018 spawning stock biomass is estimated to be 15,891 mt, which is 50% of the biomass target. The 2018 fully selected fishing mortality was estimated to be 0.129, which is 77% of the F_{MSY} proxy (NEFSC 2020b). The stock shows no truncation of age structure. Estimates of commercial landings and discards have decreased over time. The rebuilding deadline for this stock was 2014, and the stock is not yet rebuilt and is now likely overfished. (NEFSC 2020b).

5.2.16 Gulf of Maine/Georges Bank Windowpane Flounder

Life History: Windowpane flounder or sand dab, *Scophthalmus aquosus,* is a left-eyed, flatfish species that occurs in the northwest Atlantic from the Gulf of St. Lawrence to Florida (Collette & Klein-MacPhee 2002). Windowpane prefer sandy bottom habitats and occur at depths from the high water mark to 656 ft (200 m), with the greatest abundance at depths < 180 ft (55 m), and at temperatures of 32º-80ºF (0º-26.8ºC) (Moore 1947). On Georges Bank, it is most abundant at depths < 60 m during late spring through autumn but overwintering occurs in deeper waters to 366 m (Chang et al. 1999). Windowpane flounders are assessed and managed as two stocks: Gulf of Maine-Georges Bank (GOM/GB or northern) and Southern New England-Mid-Atlantic Bight (SNE/MA or southern) due to differences in growth rates, size at maturity, and relative abundance trends. Windowpane generally reach sexual maturity between ages 3 and 4 (Moore 1947), though males can mature at age 2 (Grosslein & Azarovitz 1982). On Georges

Bank, median length at maturity is nearly the same for males (8.7 in, 22.2 cm) and females (8.9 in, 22.5 cm) (O'Brien et al. 1993). Spawning occurs on Georges Bank during July and August and peaks again between October and November at temperatures of 55º- 61ºF (13º-16ºC) (Morse & Able 1995). Eggs incubate for 8 days at 50º-55ºF (10º-13ºC) and eye migration occurs approximately 17- 26 days after hatching (Collette & Klein-MacPhee 2002). During the first year of life, spring-spawned fish have significantly faster growth rates than autumn-spawned fish, which may result in differential natural mortality rates between the two cohorts (Neuman et al. 2001). Young windowpanes settle inshore and then move offshore to deeper waters as they grow. Windowpane on Georges Bank aggregate in shallow water during summer and early fall and move offshore in the winter and early spring (Grosslein & Azarovitz 1982).

Population Status: Based on the recommendations of the 2020 Peer Review Panel, northern windowpane flounder stock status is unknown (NEFSC 2020). The NOAA current official status is that the stock is overfished and overfishing is not occurring. Northern windowpane flounder is in a rebuilding plan with an end date of 2029. The rebuilding plan specifies a fishing mortality rate of 70%Fmsy. The peer review panel rejected the AIM model due to a lack of a relationship between the catch and the survey index. The updated assessment is based on a survey area swept assessment. Biological reference points are not specified under this approach. However, the Peer Review Panel did not recommend continued use of the AIM-based FMSY proxy due to the mismatch in assessment methods and time series of exploitation rates exceeding the proxy in nearly all years. Without a FMSY proxy, 70%Fmsy cannot be directly calculated.

5.2.17 Southern New England/Mid-Atlantic Windowpane Flounder

Life History: The life history of Southern New-England/Mid-Atlantic Bight (southern) windowpane flounder, *Scophthalmus aquosus*, is comparable to Northern Windowpane Flounder (Section 5.2.16). In Southern New England, median length at maturity is nearly the same for males (8.5 in, 21.5 cm) and females (8.3 in, 21.2 cm) (O'Brien, et al. 1993). A split spawning season occurs between Virginia and Long Island with peaks in spring and fall (Chang, et al. 1999). Spawning occurs in the southern Mid-Atlantic during April and May and then peaks again in October or November (Morse & Able 1995).

Population Status: Based on the recommendations of the 2020 Peer Review Panel, Southern windowpane flounder is not overfished and overfishing is not occurring (status has not changed from the 2018 assessment) (NEFSC 2020). Southern windowpane flounder is rebuilt as of 2012.

5.2.18 Ocean Pout

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

Population Status: Based on the 2017 operational assessment, ocean pout is overfished but overfishing is not occurring. The stock is not rebuilding as expected, despite low catch. Discards comprise most of the catch since the no possession regulation was implemented in May 2010. The NEFSC survey indices remain at near-record low levels; there are few large fish in the population. The ocean pout stock remains in poor condition. (NEFSC 2017b).

5.2.19 Atlantic Halibut

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

Population Status: Halibut is assessed using a data-poor method (First Second Derivative model), and projections are not possible using this method. Biological reference points are unknown for halibut, but the stock is considered overfished. Halibut is currently in a rebuilding plan with an end date of 2056. Catch advice for halibut is derived by multiplying the recent catch by the rate of change in 3 indices (NEFSC fall survey, trawl D:K, gillnet D:K). The rate of change has decreased to 0.83 in the 2020 assessment. Table 12 summarizes possible ABCs using a constant approach for three years. The 2020 stock assessment report states: *Stock status cannot be determined and remains unchanged. Rago in his 2018 report argued that because the catch multiplier estimated in the FSD model had been greater than one for several years, that overfishing was unlikely. Because the catch multiplier is now less than one, overfishing may be the more likely determination in 2020. There is however, no way to credibly determine stock status without reference points* (NEFSC 2020).

5.2.20 Atlantic Wolffish

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

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

Population Status: Based on the recommendations of the 2020 Peer Review Panel, wolffish is overfished but overfishing is not occurring. Wolffish is in a rebuilding plan but the end date in not defined. In 2019, biomass is at 44% of the SSB_{MSY} target (NEFSC 2020).

5.2.21 Summary of Stock Status

Table 14 summarizes the status of the northeast groundfish stocks as determined by NOAA Fisheries, noting which groundfish stocks are overfished or are experiencing overfishing.

Table 14 - Current status of groundfish stocks, determined by NOAA Fisheries.

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

Table 15 provides the status determination criteria (SDC) and Table 16 summaries the updated numerical estimates of the SDCs for all groundfish stocks, based on most resent assessment – either the 2017 or 2020 operational assessments. The MSA requires that every fishery management plan specify "objective and measurable criteria for identifying when the fishery to which the plan applies is overfished." Guidance on this requirement identifies two elements that must be specified: a maximum fishing mortality threshold (or reasonable proxy) and a minimum stock size threshold.

The MSA also requires that FMPs specify the maximum sustainable yield and optimum yield for the fishery. The Northeast Fisheries Science Center (NEFSC) conducted assessments for 10 groundfish stocks in 2020. The peer review recommended updated numerical values are provided in Table 16.

Table 15 – Current status determination criteria.

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

Table 16 - Current numerical estimates of Status Determination Criteria, based on 2019 or 2020 assessments.

Stock	Model/ Approach	B_{MSY} or Proxy (mt)	F_{MSY} or Proxy	MSY (mt)
Georges Bank Cod	empirical	NA	NA	NA
Gulf of Maine Cod	ASAP M=0.2	42,692	0.173	7,580
	ASAP M-ramp	63,867	0.175	11,420
Georges Bank Haddock	VPA	138,924	0.33	30,489
Gulf of Maine Haddock	ASAP	7,993	0.369	1,597
Georges Bank Yellowtail Flounder	empirical	NA	NA	NA
Southern New England/Mid-Atlantic Yellowtail Flounder	ASAP	1,779	0.355	492
Cape Cod/Gulf of Maine Yellowtail Flounder	VPA	3,439	0.32	1,138
American Plaice	VPA	15,293	0.258	3,301
Witch Flounder	empirical area swept	NA	NA	NA
Georges Bank Winter Flounder	VPA	8,910	0.519	4,260
Gulf of Maine Winter Flounder	empirical area swept	NA	0.23 (exploitation rate)	NA
Southern New England/Mid-Atlantic Winter Flounder	ASAP	24,687	0.34	7,532
Acadian Redfish	ASAP	247,918	0.038	9,318
White Hake	ASAP	31,828	0.1677	4,601
Pollock	ASAP	124,639	0.272	19,856
Northern Windowpane Flounder	AIM	3.489 kg/tow	0.185 c/i	647
Southern Windowpane Flounder	AIM	0.187 kg/tow	1.780 c/i	333
Ocean Pout	index	4.94 kg/tow	0.76 c/i	3,754
Atlantic Halibut	FSD	NA	NA	NA
Atlantic Wolffish	SCALE	1,612	0.222	232

5.2.22 Rebuilding Plan Status for Groundfish Stocks in Formal Rebuilding Plans

Table 17 summarizes the rebuilding status for each groundfish stock in a formal rebuilding plan.

Table 17- Summary of rebuilding status for groundfish stocks in a formal rebuilding plan based on the most recent assessment in 2019 or 2020.

Groundfish Stock	Rebuilding Plan Start of the Current Plan	Planned Rebuilding Date	Years Remaining in Plan, starting with FY2021	Total ACLs exceeded within past three completed FYs? *If yes, identify the FYs.*	Has the original rebuilding F been achieved? Or is this unknown? *Indicate the current F estimate relative to F rebuild at the start of the plan.*	What is current SSB estimate relative to SSBMSY? Or is this unknown?
Georges Bank cod	5/1/2004	2026	6	No	Unknown	Unknown
Gulf of Maine cod	5/1/2014	2024	4	Yes: [129.5% of the total ACL in FY2017]	F rebuild (plan start) = 0.161 (m=0.2 model) and 0.177 (m-ramp model) F2018 = 0.188 (m=0.2 model) and 0.198 (m-ramp model)	SSB2018 =3,752 mt (m=0.2 model) and 3,838 mt (m-ramp model) 9% and 6%, respectively of SSBMSY
Georges Bank yellowtail flounder	11/22/2006	2032	12	No	Unknown	Unknown
Southern New England/Mid-Atlantic yellowtail flounder	7/18/2019	2029	9	No	F rebuild (plan start) = 0.243 F2018 = 0.259	SSB2018 = 90 mt 5% of SSBMSY

Cape Cod/Gulf of Maine yellowtail flounder	5/1/2004	2023	3	No	F rebuild (plan start) = 0.26 F2018 = 0.092	SSB2018 = 2,125 mt 62% of SSBMSY
Witch Flounder	7/18/2019	2043	23	No	Unknown	Unknown
Georges Bank winter flounder	7/18/2019	2029	9	No	F rebuild (plan start) = 0.365 F2019 = 0.133	SSB2019 = 2,587 mt 36% SSBMSY
Southern New England/Mid-Atlantic winter flounder	5/1/2004	2023	3	No	F rebuild (plan start) = 0.175 F2019 = 0.077	SSB2019 = 3,638 mt 30% of SSBMSY
White hake	5/1/2004	2014	0	No	F rebuild (plan start) = 1.03 F2018 = 0.1677	SSB2018 = 15,891 mt 50% of SSBMSY
Northern windowpane flounder	7/18/2019	2029	9	No	Unknown	Unknown
Ocean pout	7/18/2019	2029	9	No	Unknown	Unknown
Atlantic halibut	5/1/2004	2055	35	Yes: [103.5% of the total ACL in FY2018 and 102.9% of the total ACL in FY 2019]	Unknown	Unknown
Atlantic wolffish	5/1/2010	Undefined	n/a	No	Unknown	Unknown

5.2.23 Revised Recreational Catches in Recent Groundfish Assessments

Of the 10 groundfish stocks assessed in 2020, three stocks (Gulf of Maine (GOM) winter flounder, Southern New England/Mid-Atlantic (SNE/MA) winter flounder, and wolffish) include recreational catches. The time series of recreational catches were updated in the assessments.

Gulf of Maine winter flounder - The 2020 management track assessment for GOM winter flounder revised the time series of recreational catches to account for the re-calibrated MRIP data (Figure 1). The re-calibrating of the MRIP data resulted in a 2.4 times average increase in the GOM winter flounder recreational catch across the time series since the early 1980s. However, the overall trends in the recreational fishery have not changed. There was a large decrease in the recreational catch in the early 1990s and has remained relatively low for three decades.

Southern New England/Mid-Atlantic winter flounder- The 2020 management track assessment for SNE/MA winter flounder revised the time series of recreational catches to account for the re-calibrated MRIP data (Figure 2). The re-calibrated MRIP data resulted in a 2.4 times average increase in the SNE/MA winter flounder recreational catch across the time series since the early 1980s. However, the overall trends in the recreational fishery have not changed. There was a more gradual decline in the recreational catch from the early 1980s to the early 2000s with recreational catch remaining very low since 2003

Wolffish- The 2020 management track assessment for wolffish revised the time series of recreational catches to account for the re-calibrated MRIP data (Figure 3). Wolffish has relatively low recreational landings (20 mt average). Discards were assumed to be minor and not included in the estimated removals within the assessment model. Landings of wolffish became prohibited in the recreational fishery with the inclusion of this stock to the multispecies fishery management plan. The re-calibrated MRIP data resulted in a 26% average increase in wolffish recreational landings from 1982 to 2011.

Figure 1- MRIP data comparison for Gulf of Maine winter flounder.

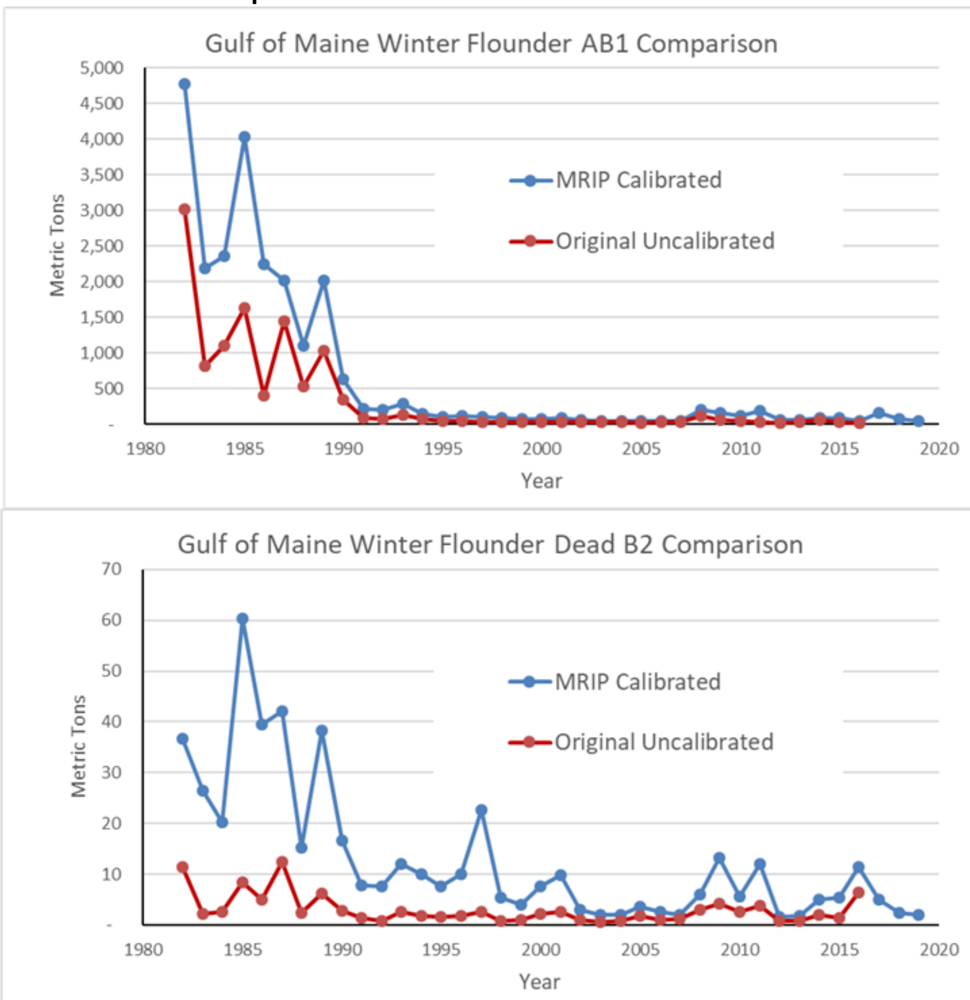


Figure 2- MRIP data comparison for Southern New England/Mid-Atlantic winter flounder.

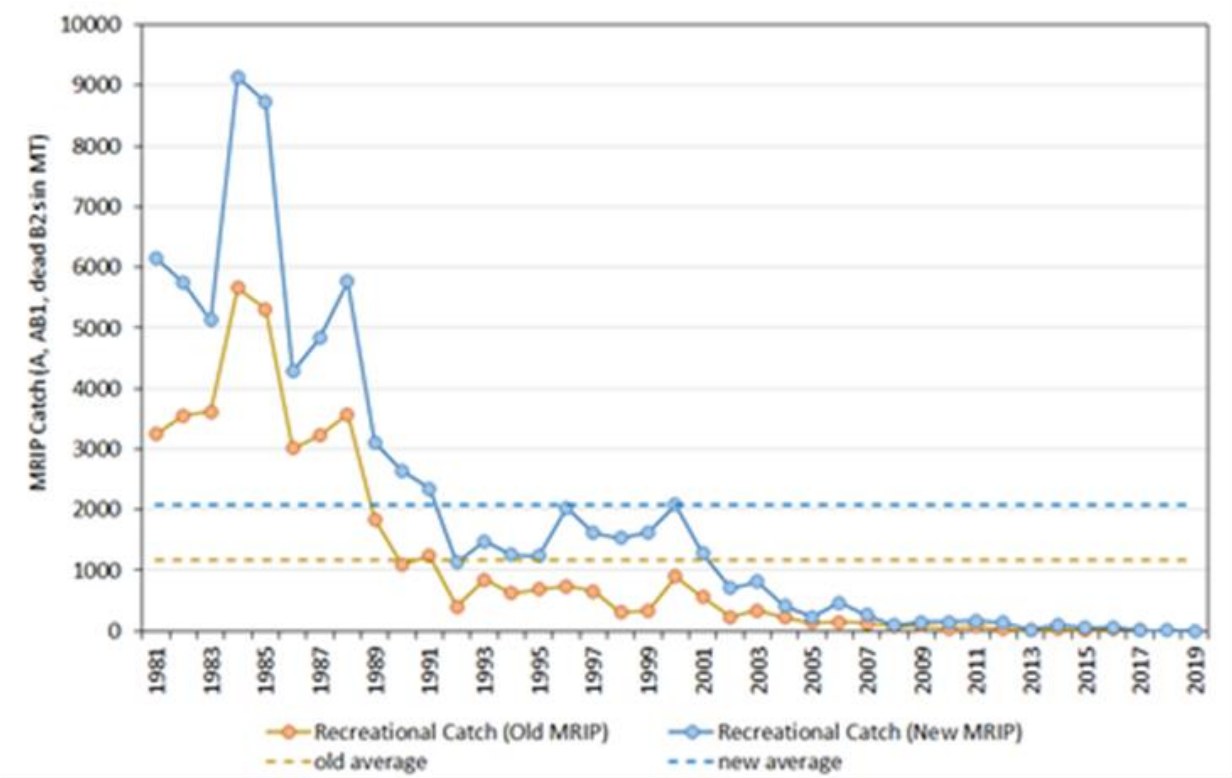
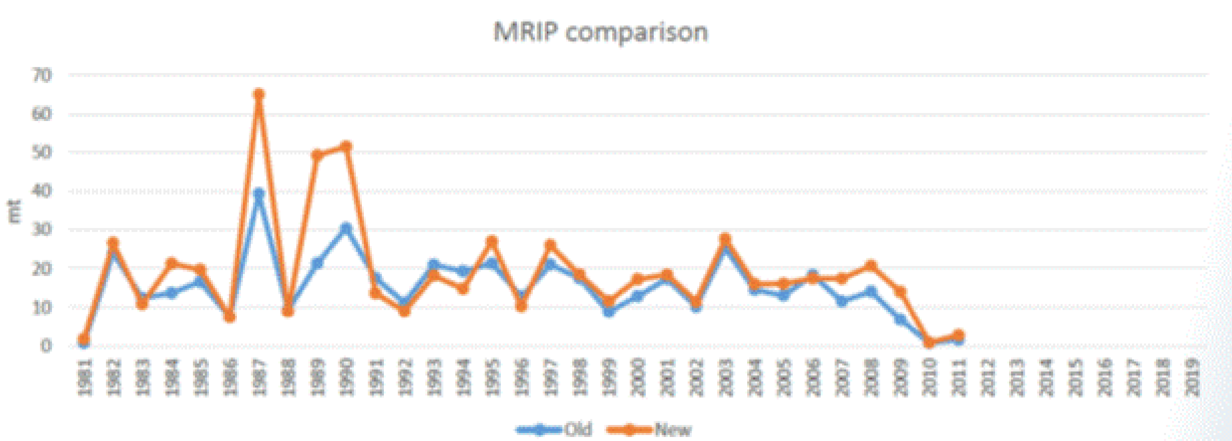


Figure 3- MRIP data comparison for wolffish.



5.3 Non-Groundfish Species

The following are non-groundfish species routinely caught by the commercial groundfish fishery.

5.3.1 Spiny Dogfish

Life History. Spiny dogfish, *Squalus acanthias*, occurs in the northwest Atlantic from Labrador to Florida. Spiny dogfish is considered to be a unit stock in the northwest Atlantic. In summer, dogfish migrate northward to the Gulf of Maine-Georges Bank region and into Canadian waters. They return southward in autumn and winter. Recent research has suggested that migratory patterns may be more complex (Carlson et al 2014). Spiny dogfish tend to school by size and, when mature, by sex. The species bears live young, with a gestation period of 18 – 22 months, and produce 2 - 15 pups (average of 6). Size at maturity for females is ~31 in (80 cm), but can vary from 31 - 33 in (78 - 85 cm) depending on the abundance of females (NEFSC 2013h).

Population and Management Status. The NEFMC and MAFMC jointly manage spiny dogfish FMP for federal waters and the Atlantic States Marine Fisheries Commission (ASMFC) has a state waters plan. Spawning stock biomass of spiny dogfish declined rapidly in response to a directed fishery during the 1990's. NFMS initially implemented management measures adopted by the Councils for spiny dogfish in 2001. These measures have been effective in reducing landings and fishing mortality. At the 2010 TRAC, managers agreed to determine stock status using the model from SAW 43 (2006) and NEFSC spring survey data through 2009. NMFS declared the spiny dogfish stock rebuilt for the purposes of federal management in May 2010 (TRAC 2010). As of the 2018 update, the stock was not overfished, and overfishing was not occurring, but the population declined to 67% of the target (Sosebee and Rago 2018) so quotas were lowered from 2018 to 2019 but then are scheduled to increase somewhat in 2020 and 2021. A research track assessment is expected in 2022.

5.3.2 Skates

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

Population and Management Status. NMFS implemented the Northeast Skate Complex Fishery Management Plan (Skate FMP) in September 2003. The FMP required both dealers and vessels to report skate landings by species. Framework Adjustment 2 modified the VTR and dealer reporting codes to further improve species specific landing reports. Possession prohibitions of barndoor, thorny, and smooth skates in the Gulf of Maine were also provisions of the FMP. The FMP implemented a trip limit of 10,000 lbs (4,536 kg) for winter skate, and required fishermen to obtain a Letter of Authorization to exceed trip limits for the little skate bait fishery. In 2010, Amendment 3 to the Skate FMP implemented a rebuilding plan for smooth skate and established an ACL and annual catch target for the skate complex, total allowable landings for the skate wing and bait fisheries, and seasonal quotas for the bait fishery. Possession limits were reduced, in-season possession limit triggers were implemented, as well as other measures to improve management of the skate fisheries. Due to insufficient information about the population dynamics of skates, there remains considerable uncertainty about the status of skate stocks. Based on NEFSC bottom trawl survey data through autumn 2018/spring 2019, one skate species remains overfished (thorny) and overfishing is not occurring in any of the seven skate species. Barndoor skate is considered to be rebuilt for the purposes of federal management as of August 2016. Smooth skate is also considered rebuilt. Recent skate landings have fluctuated between approximately 30 and 45 million pounds. The landings and catch limits proposed by Amendment 3 have an acceptable probability of promoting biomass growth and achieving the rebuilding (biomass) targets for thorny skates. A stabilization of total catch below the median relative exploitation ratio should cause skate biomass and future yield to increase.

5.3.3 Monkfish

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

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

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

The Monkfish FMP defines two management areas for monkfish (northern and southern), divided roughly by an east-west line bisecting Georges Bank. As of 2013 data, monkfish in both management areas are not overfished and overfishing is not occurring (NEFSC 2013c). Operational assessments for monkfish were conducted in 2016 and 2019, but it was recommended that stock status not be updated during these data updates due to a lack of biological reference points (Richards 2016, NEFSC 2020). According to the 2019 assessment, strong recruitment in 2015 fueled an increase in stock biomass in 2016-2018, though abundance has since declined as recruitment returned to average levels. Biomass increases were greater in the northern area than in the southern area, and biomass has declined somewhat in the south, as abundance of the 2015 year class declined. In the north, landings and catch have fluctuated around a steady level since 2009, but increased after 2015, with discards increasing only slightly. In the south, landings and catch had been declining since around 2000, but catch increased after 2015 due to discarding of a strong 2015 year class, with almost a doubling of the discard rate.

5.3.4 Summer Flounder

Life History. Summer flounder, *Paralichthys dentatus*, occur in the western North Atlantic from the southern Gulf of Maine to South Carolina. Summer flounder are concentrated in bays and estuaries from late spring though early autumn, when an offshore migration to the outer continental shelf is undertaken. Spawning occurs during autumn and early winter, and the larvae are transported toward coastal areas by prevailing water currents. Development of post larvae and juveniles occurs primarily within bays and estuarine areas. Most fish are sexually mature by age 2. The largest fish are females, which can attain lengths over 90 cm (36 in) and weights up to 11.8 kg (26 lbs.; NEFSC 2011c). Recent NEFSC trawl survey data indicate that while female summer flounder grow faster (reaching a larger size at the same age), the sexes attain about the same maximum age (currently age 15 at 56 cm for males, and age 14 at 76 cm for females). Unsexed commercial fishery samples currently indicate a maximum age of 20 for a 57 cm fish (NEFSC 2019b).

Population and Management Status. The FMP was developed by the MAFMC in 1988, and scup and black sea bass were later incorporated into the FMP. Amendment 2, implemented in 1993, established a commercial quota allocated to the states, a recreational harvest limit, minimum size limits, gear restrictions, permit and reporting requirements, and an annual review process to establish specifications for the coming fishing year. In 1999, Amendment 12 revised the overfishing definitions for all three species, established rebuilding programs, addressed bycatch and habitat issues and established a framework adjustment procedure for the FMP to allow for a streamlined process for relatively minor changes to management measures. Results from the 2021 Management Track Assessment indicate that the summer flounder stock was not overfished, and overfishing was not occurring in 2019 relative to the updated biological reference points (NEFSC 2021 In prep). The estimated SSB in 2019 was 47,397 mt, which is 86% of the updated biomass target reference point of 55,217 mt. Fully selected fishing mortality was estimated to be 0.340 in 2019, which is 81% of the updated FMSY proxy of 0.422 (NEFSC 2021 In prep.).

5.3.5 American Lobster

Life History. American lobster, *Homarus americanus*, occurs in continental shelf waters from Maine to North Carolina. There are two biological stock units: the Gulf of Maine/Georges Bank stock, and Southern New England stock. The American lobster is long-lived and known to reach more than 40 pounds in body weight (Wolff 1978). Lobsters are encased in a hard exoskeleton that is periodically cast off (molted) for growth and mating to occur. Eggs are carried under the female's abdomen during a 9 - 11 month incubation period. Larger lobsters produce eggs with greater energy content and thus, may produce larvae with higher survival rates (Attard & Hudon 1987). Seasonal timing of egg extrusion and larval hatching is somewhat variable among areas and may also vary due to seasonal weather patterns. Hatching tends to occur over a five month period from May – September, occurring earlier and over a longer period in the southern part of the range. The pelagic larvae molt four times before they resemble adults and settle to the bottom. Lobsters molt more than 20 times over 5 - 8 years before they reach the minimum legal harvest size.

Population and Management Status. The states, in cooperation with NMFS, manage the American lobster resource through the ASMFC under the provisions of the Atlantic Coastal Fisheries Cooperative Management Act (ACFCMA). States have jurisdiction for implementing measures in state waters, while NMFS implements complementary regulations in federal waters. Over the last four decades, landings in the lobster fishery have exponentially increased, with 41.1 million pounds landed in 1982 and 144.8 million pounds landed in 2018. Most of this increase in landings can be attributed to the Gulf of Maine, which has accounted for over 90% of coastwide landings since 2006. Total Gulf of Maine/Georges Bank (GOM/GBK) landings increased from the late 1980s from approximately 35 million pounds through the

2000s, exceeding 100 million pounds for the first time in 2010. Landings since 2012 have been relatively stable at the highest levels on record, averaging 145 million pounds. In contrast, landings in the Southern New England (SNE) stock have declined in conjunction with a decrease in stock health to the lowest on record in 2018, at 2.7 million pounds, accounting for only 2% of the U.S. landings. The fishery has also shifted to a predominantly offshore fishery as inshore abundance has declined. Results of the 2020 benchmark stock assessment showed a mixed picture, with increasing abundance in the GOM/GBK stock and a sharp decline in abundance for the SNE stock to record low levels. In particular, the 2020 stock assessment concluded that the abundance indicators for the SNE stock reflect the stock's very poor condition and continuing recruitment failure (ASMFC 2020). Overall, the SNE stock is considered significantly depleted but overfishing is not occurring; the GOM/GBK unit is not depleted, and overfishing is not occurring, though abundances of young-of-year in the GOM/GBK stock have been neutral to negative since the 2015 assessment (ASMFC 2020).

5.3.6 **Whiting (Silver Hake)**

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

Population and Management Status. Due to their abundance and availability, silver hake have supported important U.S. and Canadian fisheries as well as distant-water fleets. Landings increased to 137,000 mt in 1973 and then declined sharply with increased restrictions on distant-water fleet effort and implementation of the Magnuson Fishery Conservation and Management Act (MFCMA) in 1977. U.S. landings during 1987-1996 were relatively stable, averaging 16,000 mt per year, but have gradually declined to a historic low of 6,035 mt in fishing year 2017. The small-mesh otter trawl remains the principal gear used in the U.S. fishery, and recreational catches have been low since 1985. Fishing in the Gulf of Maine and Georges Bank regulated mesh areas are managed via six exemption areas, each having specific specifications for gear, possession limits for incidental species, and boundaries (see NEFMC 2017 for details). In the northern management area, all but the Cultivator Shoals Area require vessels to use a more selective raised footrope trawl when using small-mesh trawls.

Silver hake are managed under the NEFMC's Northeast Multispecies FMP ("non-regulated multispecies" category). In 2000, the NEFMC implemented Amendment 12 to this FMP, and placed silver hake into the "small mesh multispecies" management unit, along with red hake and offshore hake. This amendment established retention limits based on net mesh size, adopted overfishing definitions for northern and southern stocks, identified essential fish habitat for all life stages, and set requirements for fishing gear (NEFMC 2000). As of the last assessment in 2020, silver hake is not overfished and overfishing is not occurring in the northern or southern management area (NEFSC 2020). Biomass in the northern management area has increased in recent years and trends continue to indicate that the stock is in good condition. Biomass in the southern management area continues to show a steady increase though recruitment is more sporadic compared to the northern management area; however, the survey indicates a strong 2019 incoming year class. As a result, the Council proposed to adjust the annual catch specifications for 2021-2023, decreasing by 32% in the northern area and increasing by 94% in the southern area (NEFMC 2021), reflecting changes in the three-year average survey biomass estimate which is a major component of the specification-setting procedures.

5.3.7 **Loligo Squid**

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

Population and Management Status. The longfin squid stock was last assessed in 2020 with 2019 data and is not overfished and overfishing is unknown because there are no fishing mortality reference points for this stock (though the previous benchmark assessment did describe the stock as "lightly exploited") (NEFSC 2020). The domestic fishery occurs primarily in Southern New England and Mid-Atlantic waters, but some fishing also occurs along the edge of Georges Bank. Fishing patterns reflect seasonal distribution patterns and effort is generally directed offshore during October through April and inshore during May through September. The fishery is dominated by small-mesh otter trawlers, but some near-shore pound net and fish trap fisheries occur during spring and summer. Summer or winter landings may dominate in any given year. The stock is managed by the MAFMC under the Atlantic Mackerel, Squid, and Butterfish FMP. Management measures include annual TACs, which have been partitioned into 3 four-month seasonal trimesters since 2007. There is a moratorium on directed and incidental fishery permits (an open access permit with a low trip limit may still be acquired for free). A minimum codend mesh size of 2 1/8 inches applies from September-April and 1 7/8 inches from May-August. The fishery can also be closed if butterfish discards exceed a discard cap (via in-season monitoring).

5.3.8 **Atlantic Sea Scallops**

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

Population and Management Status. The commercial fishery for sea scallops is conducted year round, primarily using New Bedford style and turtle deflector scallop dredges. A small percentage of the fishery employs otter trawls, mostly in the Mid-Atlantic. The principal U.S. commercial fisheries are in the Mid-Atlantic (from Virginia to Long Island, New York) and on Georges Bank and neighboring areas, such as the Great South Channel and Nantucket Shoals. There is also a small, primarily inshore fishery for sea scallops in the Gulf of Maine. The NEFMC established the Scallop FMP in 1982. The scallop resource was last assessed through a management track assessment in 2020, and it was not overfished, and overfishing was not occurring (NEFSC 2020).

5.3.9 Scup

Life History. Scup are found in a variety of habitats in the Mid-Atlantic. Essential fish habitat (EFH) for scup includes demersal waters, areas with sandy or muddy bottoms, mussel beds, and sea grass beds from the Gulf of Maine through Cape Hatteras, North Carolina. Scup undertake extensive seasonal migrations between coastal and offshore waters. They are mostly found in estuaries and coastal waters during the spring and summer. In the fall and winter, they move offshore and to the south, to outer continental shelf waters south of New Jersey. Scup spawn once annually over weedy or sandy areas, mostly off of southern New England. Spawning takes place from May through August and usually peaks in June and July (Steimle et al. 1999). About 50% of scup are sexually mature at two years of age and about 17 cm (about 7 inches) total length. Nearly all scup older than three years of age are sexually mature. Scup reach a maximum age of at least 14 years. They may live as long as 20 years; however few scup older than age 7 are caught in the Mid-Atlantic (DPSWG 2009, NEFSC 2015).

Population and Management Status. The scup fishery is cooperatively managed by the MAFMC and the ASMFC under the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan (FMP). The primary commercial fishery management measure is a quota that is distributed to three trimester periods and to individual states. Other federal regulations include minimum mesh size, gear restricted areas, and a minimum fish size. States typically restrict harvest to their quota using seasons and trip limits. Scup were under a formal rebuilding plan from 2005 through 2009. NMFS declared the scup stock rebuilt in 2009 based on the findings of the Data Poor Stocks Working Group (DPSWG 2009). The most recent stock assessment update indicates that scup was not overfished, and overfishing was not occurring in 2019, relative to the updated biological reference points (NEFSC 2021 In prep.). SSB has declined since its peak in 2013 but remains very high. Estimated SSB in 2019 was 389 million pounds (176,404 mt), 2 times SSB at maximum sustainable yield (SSBMSY = 198 million pounds, or 90,019 mt). The fishing mortality rate in 2019 was 0.136, which is 32% below the fishing mortality threshold reference point ($F_{MSY\ PROXY}$ = F40%) of 0.200. Fishing mortality has been below the $F_{MSY\ PROXY}$ reference point for the last 19 years. The average recruitment from 1984 to 2019 is 136 million fish at age 0. The 2015 year class is estimated to be 415 million fish, the largest on record, while the 2019 year class is estimated to be the smallest on record at 34 million fish (NEFSC 2021 In prep.).

5.3.10 Atlantic Herring

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

Population and Management Status. The Atlantic herring fishery is cooperatively managed by both the NEFMC and ASMFC. Presently, herring from the GOM (inshore) and GB (offshore) stock components are combined for assessment purposes into a single coastal stock complex. The fishery uses quotas by area and season. Prosecuted primarily by mid water trawls (single and paired), purse seines, and a lesser degree bottom trawls, management measures include restrictions on the incidental catch of haddock and other regulated groundfish. Mid-water trawls are allowed access to the groundfish closed areas as an exempted fishery but their use of the areas is subject to numerous regulatory restrictions. The Atlantic herring stock was last assessed in 2020 and is overfished and overfishing is not occurring through 2019 (NEFSC 2020). This is a change in stock status from the previous assessment, in which the stock was not overfished (NEFSC 2018). Continued poor recruitment is the main issue driving stock status. Management decisions that reduced US catches had the effect of avoiding overfishing (NEFSC 2020). According to the 2020 stock assessment, SSB in 2019 was estimated to be 77,883 mt. Catch limits are expected to continue to be much lower in 2021-2023 compared to levels set in the previous specification packages. For example, catch limits proposed for 2021 are under 5,000 mt compared to catch limits of below 15,000 mt that were in place for 2019-2020, and over 100,000 mt that were in place for the handful of years before.

5.3.11 **Bycatch**

The MSA defines bycatch as fish which are harvested in a fishery, but which are not sold or kept for personal use, including economic discards and regulatory discards. Fish released alive under a recreational catch and release fishery management program are not included. The MSA requires that, to the extent practicable, bycatch and the mortality of bycatch that cannot be avoided should both be minimized. To consider whether these objectives are being met, bycatch must be reported and assessed. To this end, the MSA requires that a standardized reporting methodology assess the amount and type of bycatch occurring in a fishery. The primary tools used to report bycatch in the multispecies fishery are the Vessel Trip Report system (VTR), the NEFSC Observer Program (NEFOP), and the groundfish sector At-Sea Monitoring Program (ASM). Each federally permitted groundfish vessel is required to report discards and landings on every trip from each statistical area they fish in. The sea sampling/observer program places personnel on boats to observe and estimate the amount of discards on a haul-by-haul basis. More information on bycatch may be found at: http://www.greateratlantic.fisheries.noaa.gov/

5.4 Assemblages of Fish Species

Georges Bank and the Gulf of Maine have historically had high levels of fish production. Several studies have identified demersal fish assemblages over large spatial scales. Overholtz and Tyler (1985) found five depth-related groundfish assemblages for Georges Bank and the Gulf of Maine that were persistent temporally and spatially. The study identified depth and salinity as major physical influences explaining assemblage structure. Table 18 compares the six assemblages identified in Gabriel (1992) with the five assemblages from Overholtz and Tyler (1985). This EA considers these assemblages and relationships to be relatively consistent. Therefore, these descriptions generally describe the affected area. The assemblages include allocated target species, as well as non-allocated target species and bycatch. The terminology and definitions of habitat types in Table 18 vary slightly between the two studies. For further information on fish habitat relationships, see Table 19.

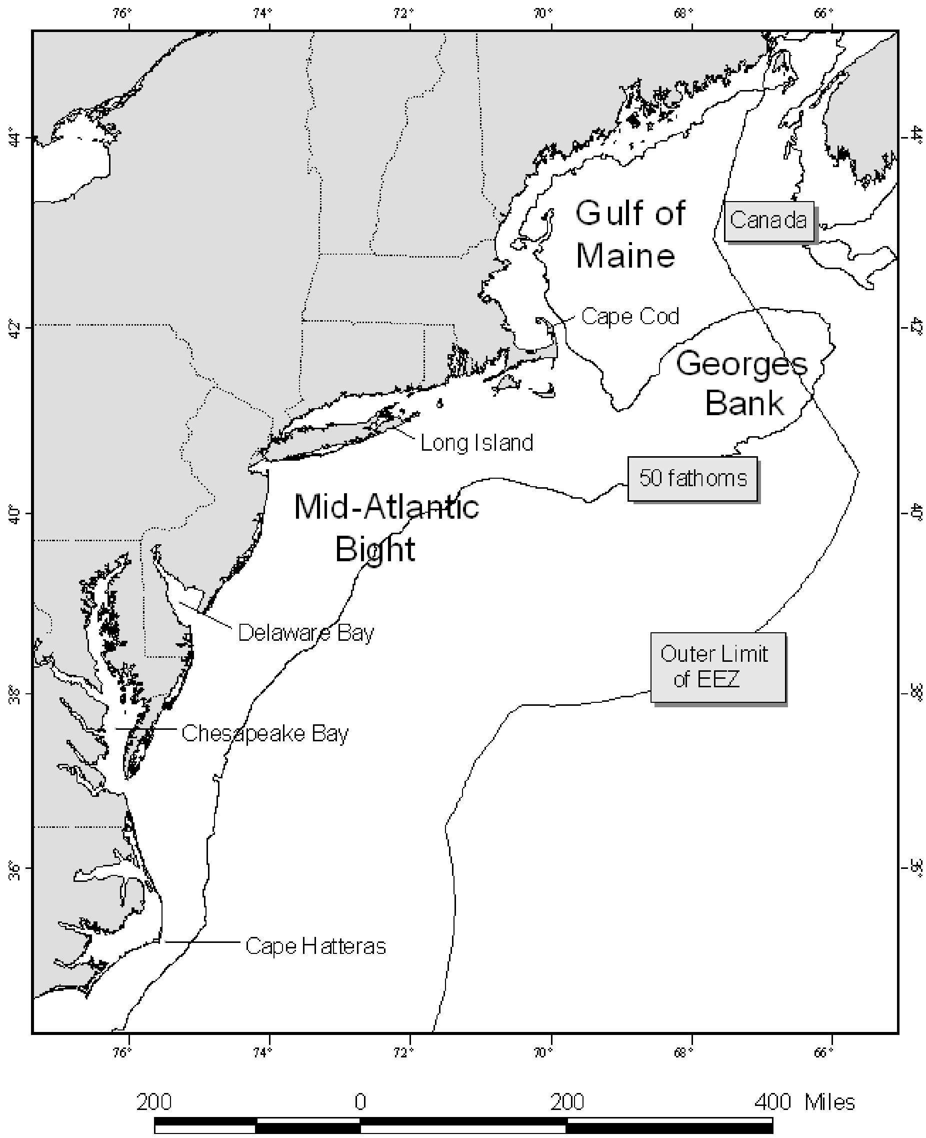
Table 18 - Comparison of Demersal Fish Assemblages of Georges Bank and the Gulf of Maine.

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

5.5 Physical Environment and Essential Fish Habitat

The Northeast U.S. Shelf Ecosystem (Map 4) includes 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 (Sherman et al. 1996). The continental slope includes the area east of the shelf, out to a depth of 6,562 ft (2,000 m). Four distinct sub-regions are identified, including the Gulf of Maine, Georges Bank, the Mid-Atlantic Bight, and the continental slope. The groundfish fishery primarily occurs in the inshore and offshore waters of the Gulf of Maine, Georges Bank, and the Southern New England/Mid-Atlantic areas. Therefore, the description of the physical environment focuses on these sub-regions. The distinctive features of Southern New England are included in the sections describing Georges Bank and the Mid-Atlantic Bight.

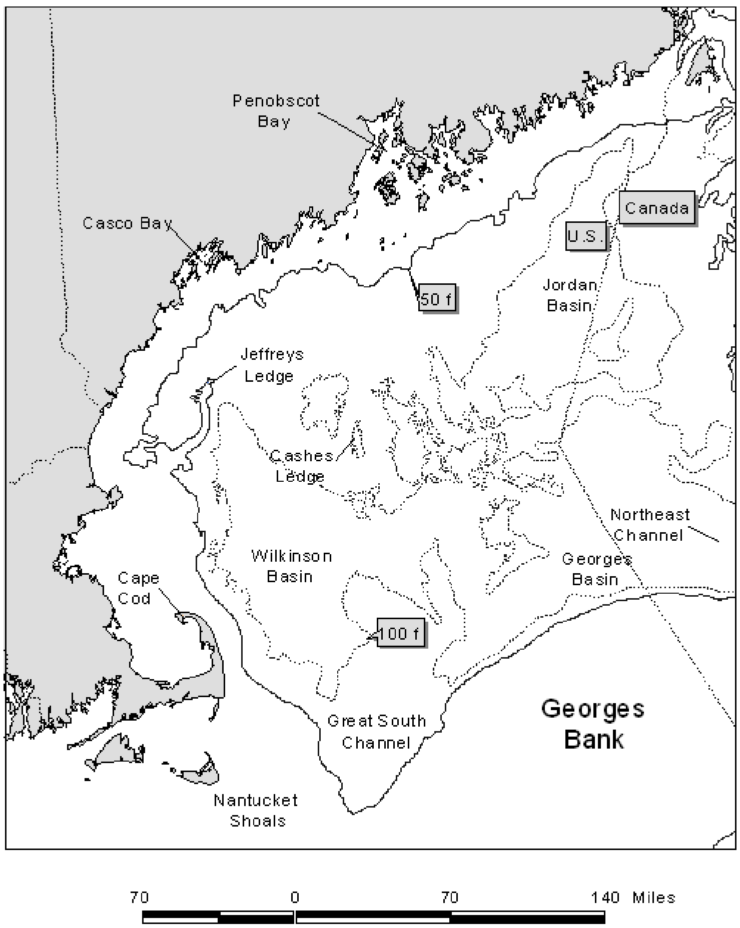
Map 4 - Northeast U.S. Shelf Ecosystem. Source: Stevenson et al. (2004).



5.5.1 Gulf of Maine

The Gulf of Maine is an enclosed coastal sea, glacially derived, bounded on the east by Browns Bank, on the north by the Nova Scotia (Scotian) Shelf, on the west by the New England states, and on the south by Cape Cod and Georges Bank (Map 5). The Gulf of Maine is a boreal environment characterized by relatively cold waters and deep basins, with a patchwork of various sediment types, topographically diverse from the rest of the continental border along the U.S. Atlantic coast. There are 21 distinct basins separated by ridges, banks, and swells. Depths in the basins exceed 820 ft. (250 m), with a maximum depth of 1,148 ft (350 m) in Georges Basin, just north of Georges Bank. High points within the Gulf of Maine include irregular ridges, such as Cashes Ledge, which peaks at 30 ft (9 m) below the surface.

Map 5 - Gulf of Maine Source: 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. In the basins, these mud deposits blanket and obscure the irregularities of the underlying bedrock, forming topographically smooth terrains, although localized rocky features are present, for example in Jordan Basin (see the Council's Draft Deep-Sea Coral Amendment). In the rises between the basins, other materials are usually at the surface.

Unsorted glacial till covers some morainal areas, sand predominates on some high areas, and gravel,[2] sometimes with boulders, predominates others. Bedrock is the predominant substrate along the western edge of the Gulf of Maine, north of Cape Cod in a narrow band out to a water depth of about 197 ft. (60 m). Mud predominates in coastal valleys and basins that often abruptly border rocky substrates. Gravel, often mixed with shell, is common adjacent to bedrock outcrops and in fractures in the rock. Gravel is most abundant at depths of 66 - 131 ft. (20 - 40 m), except off eastern Maine where a gravel-covered plain exists to depths of at least 328 ft. (100 m). Sandy areas are relatively rare along the inner shelf of the western Gulf of Maine, but are more common south of Casco Bay, especially offshore of sandy beaches (Stevenson, et al. 2004). Stellwagen Bank offshore Massachusetts includes large areas of sand sediment, in addition to gravel sediments and boulder ridges (Valentine et al. 2005, Valentine and Gallea 2015).

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

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

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

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

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[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 GOM.

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

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

5.5.2 **Georges Bank**

Georges Bank is a shallow (10 - 492 ft. [3 - 150 m depth]), elongated (100 mi.(161 km) wide by 20 mi (322 km) long) extension of the continental shelf that was formed during the Wisconsinian glacial episode (Map 4). It has a steep slope on its northern edge, a broad, flat, gently sloping southern flank, and steep submarine canyons on its eastern and southeastern edges. It has highly productive, well-mixed waters and strong currents. The Great South Channel lies to the west. Natural processes continue to erode and rework the sediments on Georges Bank. Erosion and reworking of sediments by the action of rising sea level as well as tidal and storm currents may reduce the amount of sand and cause an overall coarsening of the bottom sediments (Valentine & Lough 1991).

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

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

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

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

5.5.3 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 (Map 4). The northern portion of the Mid-Atlantic Bight is sometimes referred to as southern New England. It generally includes the area of the continental shelf south of Cape Cod from the Great South Channel to Hudson Canyon. The Mid-Atlantic Bight consists of the sandy, relatively flat, gently sloping continental shelf from southern New England to Cape Hatteras, North Carolina. The shelf slopes gently from shore out to 62 - 124 ft (100 - 200 km) offshore, where it transforms to the slope (328 - 656 ft. [100 - 200 m water depth]) at the shelf break. In both the Mid-Atlantic Bight and on Georges Bank, numerous canyons incise the slope, and some cut up onto the shelf itself (Stevenson, et al. 2004). Like the rest of the continental shelf, sea level fluctuations during past ice ages largely shaped the topography of the Mid-Atlantic Bight. Since that time, currents and waves have modified this basic structure.

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

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

While substrate is the primary factor influencing demersal species distribution in the Gulf of Maine and Georges Bank, latitude and water depth are the primary influence in the Mid-Atlantic Bight area. In terms of numbers, amphipod crustaceans and bivalve mollusks dominate the benthic fauna of this primarily sandy environment. Mollusks (70%) dominate the biomass (Stevenson, et al. 2004). Pratt (1973) identified three broad faunal zones related to water depth and sediment type:

1. The "sand fauna" zone is dominated by polychaetes and was defined for sandy sediments (≤1% silt) that are at least occasionally disturbed by waves, from shore out to a depth of about 164 ft. (50 m).
2. The "silty sand fauna" zone is dominated by amphipods and polychaetes and occurs immediately offshore from the sand fauna zone, in stable sands containing a small amount of silt and organic material.
3. Silts and clays become predominant at the shelf break and line the Hudson Shelf Valley supporting the "silt-clay fauna."

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

- Northern (boreal) portions: hake (white, silver, red), goosefish (monkfish), longhorn sculpin, winter flounder, little skate, and spiny dogfish;
- Warm temperate portions: black sea bass, summer flounder, butterfish, scup, spotted hake, and northern sea robin;
- 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.

5.5.4 Essential Fish Habitat Designations

The Sustainable Fisheries Act defines EFH as "[t]hose waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The proposed action could potentially affect EFH for benthic life stages of species that are managed under the Northeast Multispecies FMP; as well as EFH for species managed under the Atlantic Sea Scallop; Monkfish; Northeast Skate Complex; Atlantic

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

Herring; Summer Flounder, Scup, and Black Sea Bass; Golden Tilefish; Atlantic Mackerel, Squid, and Butterfish; and Atlantic Surfclam and Ocean Quahog FMPs. EFH for deep-sea red crab is designated beyond the operating depths of the multispecies fishery. EFH for the species managed under these FMPs includes a wide variety of benthic habitats in state and federal waters throughout the Northeast U.S. shelf ecosystem.

Table 19 - Summary of Geographic distributions and habitat characteristics of Essential Fish Habitat designations for benthic fish and shellfish species managed by the New England and Mid-Atlantic fishery management councils in the Greater Atlantic region, as of October 2019.

Species	Life Stage	Geographic Area	Depth (meters)	Habitat Type and Description
Acadian redfish	Juveniles	Gulf of Maine and the continental slope north of 37°38'N	50-200 in Gulf of Maine, to 600 on slope	Sub-tidal coastal and offshore rocky reef substrates with associated structure-forming epifauna (e.g., sponges, corals), and soft sediments with cerianthid anemones
	Adults	Gulf of Maine and the continental slope north of 37°38'N	140-300 in Gulf of Maine, to 600 on slope	Offshore benthic habitats on finer grained sediments and on variable deposits of gravel, silt, clay, and boulders
American plaice	Juveniles	Gulf of Maine and bays and estuaries from Passamaquoddy Bay to Saco Bay, Maine and from Massachusetts Bay to Cape Cod Bay, Massachusetts Bay	40-180	Sub-tidal benthic habitats on mud and sand, also found on gravel and sandy substrates bordering bedrock
	Adults	Gulf of Maine, Georges Bank and bays and estuaries from Passamaquoddy Bay to Saco Bay, Maine and from Massachusetts Bay to Cape Cod Bay, Massachusetts Bay	40-300	Sub-tidal benthic habitats on mud and sand, also gravel and sandy substrates bordering bedrock
Atlantic cod	Juveniles	Gulf of Maine, Georges Bank, and Southern New England, including nearshore waters from eastern Maine to Rhode Island and the following estuaries: Passamaquoddy Bay to Saco Bay; Massachusetts Bay, Boston Harbor, Cape Cod Bay, and Buzzards Bay	Mean high water-120	Structurally-complex intertidal and sub-tidal habitats, including eelgrass, mixed sand and gravel, and rocky habitats (gravel pavements, cobble, and boulder) with and without attached macroalgae and emergent epifauna
	Adults	Gulf of Maine, Georges Bank, Southern New England, and the Mid-Atlantic to Delaware Bay, including the following estuaries: Passamaquoddy Bay to Saco Bay; Massachusetts Bay, Boston Harbor, Cape Cod Bay, and Buzzards Bay	30-160	Structurally complex sub-tidal hard bottom habitats with gravel, cobble, and boulder substrates with and without emergent epifauna and macroalgae, also sandy substrates and along deeper slopes of ledges
Atlantic halibut	Juveniles & Adults	Gulf of Maine, Georges Bank, and continental slope south of Georges Bank	60-140 and 400-700 on slope	Benthic habitats on sand, gravel, or clay substrates
Atlantic wolffish	Eggs	U.S. waters north of 41˚N latitude and east of 71˚W longitude	<100	Sub-tidal benthic habitats under rocks and boulders in nests
	Juveniles	U.S. waters north of 41˚N latitude and east of 71˚W longitude	70-184	Sub-tidal benthic habitats
	Adults	U.S. waters north of 41˚N latitude and east of 71˚W longitude	<173	A wide variety of sub-tidal sand and gravel substrates once they leave rocky spawning habitats, but not on muddy bottom

Species	Life Stage	Geographic Area	Depth (meters)	Habitat Type and Description
Haddock	Juveniles	Inshore and offshore waters in the Gulf of Maine, on Georges Bank, and on the continental shelf in the Mid-Atlantic region	40-140 and as shallow as 20 in coastal Gulf of Maine	Sub-tidal benthic habitats on hard sand (particularly smooth patches between rocks), mixed sand and shell, gravelly sand, and gravel
	Adults	Offshore waters in the Gulf of Maine, on Georges Bank, and on the continental shelf in Southern New England	50-160	Sub-tidal benthic habitats on hard sand (particularly smooth patches between rocks), mixed sand and shell, gravelly sand, and gravel and adjacent to boulders and cobbles along the margins of rocky reefs
Ocean pout	Eggs	Georges Bank, Gulf of Maine, and the Mid-Atlantic, including certain bays and estuaries in the Gulf of Maine	<100	Sub-tidal hard bottom habitats in sheltered nests, holes, or rocky crevices
	Juveniles	Gulf of Maine, on the continental shelf north of Cape May, New Jersey, on the southern portion of Georges Bank, and including certain bays and estuaries in the Gulf of Maine	Mean high water-120	Intertidal and sub-tidal benthic habitats on a wide variety of substrates, including shells, rocks, algae, soft sediments, sand, and gravel
	Adults	Gulf of Maine, Georges Bank, on the continental shelf north of Cape May, New Jersey, and including certain bays and estuaries in the Gulf of Maine	20-140	Sub-tidal benthic habitats on mud and sand, particularly in association with structure forming habitat types; i.e. shells, gravel, or boulders
Pollock	Juveniles	Inshore and offshore waters in the Gulf of Maine (including bays and estuaries in the Gulf of Maine), the Great South Channel, Long Island Sound, and Narragansett Bay, Rhode Island	Mean high water-180 in Gulf of Maine, Long Island Sound, and Narragansett Bay; 40-180 on Georges Bank	Intertidal and sub-tidal pelagic and benthic rocky bottom habitats with attached macroalgae, small juveniles in eelgrass beds, older juveniles move into deeper water habitats also occupied by adults
	Adults	Offshore Gulf of Maine waters, Massachusetts Bay and Cape Cod Bay, on the southern edge of Georges Bank, and in Long Island Sound	80-300 in Gulf of Maine and on Georges Bank; <80 in Long Island Sound, Cape Cod Bay, and Narragansett Bay	Pelagic and benthic habitats on the tops and edges of offshore banks and shoals with mixed rocky substrates, often with attached macro algae
White hake	Juveniles	Gulf of Maine, Georges Bank, and Southern New England, including bays and estuaries in the Gulf of Maine	Mean high water - 300	Intertidal and sub-tidal estuarine and marine habitats on fine-grained, sandy substrates in eelgrass, macroalgae, and un-vegetated habitats
	Adults	Gulf of Maine, including coastal bays and estuaries, and the outer continental shelf and slope	100-400 offshore Gulf of Maine, >25 inshore Gulf of Maine, to 900 on slope	Sub-tidal benthic habitats on fine-grained, muddy substrates and in mixed soft and rocky habitats
Windowpane flounder	Juveniles	Estuarine, coastal, and continental shelf waters from the Gulf of Maine to	Mean high water - 60	Intertidal and sub-tidal benthic habitats on mud and sand substrates

Species	Life Stage	Geographic Area	Depth (meters)	Habitat Type and Description
		northern Florida, including bays and estuaries from Maine to Maryland		
	Adults	Estuarine, coastal, and continental shelf waters from the Gulf of Maine to Cape Hatteras, North Carolina, including bays and estuaries from Maine to Maryland	Mean high water - 70	Intertidal and sub-tidal benthic habitats on mud and sand substrates
Winter flounder	Eggs	Eastern Maine to Absecon Inlet, New Jersey (39° 22´N) and Georges Bank	0-5 south of Cape Cod, 0-70 Gulf of Maine and Georges Bank	Sub-tidal estuarine and coastal benthic habitats on mud, muddy sand, sand, gravel, submerged aquatic vegetation, and macroalgae
	Juveniles	Coastal Gulf of Maine, Georges Bank, and continental shelf in Southern New England and Mid-Atlantic to Absecon Inlet, New Jersey, including bays and estuaries from eastern Maine to northern New Jersey	Mean high water - 60	Intertidal and sub-tidal benthic habitats on a variety of bottom types, such as mud, sand, rocky substrates with attached macro algae, tidal wetlands, and eelgrass; young-of-the-year juveniles on muddy and sandy sediments in and adjacent to eelgrass and macroalgae, in bottom debris, and in marsh creeks
	Adults	Coastal Gulf of Maine, Georges Bank, and continental shelf in Southern New England and Mid-Atlantic to Absecon Inlet, New Jersey, including bays and estuaries from eastern Maine to northern New Jersey	Mean high water - 70	Intertidal and sub-tidal benthic habitats on muddy and sandy substrates, and on hard bottom on offshore banks; for spawning adults, also see eggs
Witch flounder	Juveniles	Gulf of Maine and outer continental shelf and slope	50-400 and to 1500 on slope	Sub-tidal benthic habitats with mud and muddy sand substrates
	Adults	Gulf of Maine and outer continental shelf and slope	35-400 and to 1500 on slope	Sub-tidal benthic habitats with mud and muddy sand substrates
Yellowtail flounder	Juveniles	Gulf of Maine, Georges Bank, and the Mid-Atlantic, including certain bays and estuaries in the Gulf of Maine	20-80	Sub-tidal benthic habitats on sand and muddy sand
	Adults	Gulf of Maine, Georges Bank, and the Mid-Atlantic, including certain bays and estuaries in the Gulf of Maine	25-90	Sub-tidal benthic habitats on sand and sand with mud, shell hash, gravel, and rocks
Silver hake	Juveniles	Gulf of Maine, including certain bays and estuaries, and on the continental shelf as far south as Cape May, New Jersey	40-400 in Gulf of Maine, >10 in Mid-Atlantic	Pelagic and sandy sub-tidal benthic habitats in association with sand-waves, flat sand with amphipod tubes, shells, and in biogenic depressions
	Adults	Gulf of Maine, including certain bays and estuaries, the southern portion of Georges Bank, and the outer continental shelf and some shallower coastal locations in the Mid-Atlantic	>35 in Gulf of Maine, 70-400 on Georges Bank and in the Mid-Atlantic	Pelagic and sandy sub-tidal benthic habitats, often in bottom depressions or in association with sand waves and shell fragments, also in mud habitats bordering deep boulder reefs, on over deep boulder reefs in the southwest Gulf of Maine
Offshore hake	Juveniles	Outer continental shelf and slope from Georges Bank to 34° 40’N	160-750	Pelagic and benthic habitats
	Adults	Outer continental shelf and slope from Georges Bank to 34° 40’N	200-750	Pelagic and benthic habitats

Species	Life Stage	Geographic Area	Depth (meters)	Habitat Type and Description
Red hake	Juveniles	Gulf of Maine, Georges Bank, and the Mid-Atlantic, including Passamaquoddy Bay to Cape Cod Bay in the Gulf of Maine, Buzzards Bay and Narragansett Bay, Long Island Sound, Raritan Bay and the Hudson River, and lower Chesapeake Bay	Mean high water-80	Intertidal and sub-tidal soft bottom habitats, especially those that that provide shelter, such as depressions in muddy substrates, eelgrass, macroalgae, shells, anemone and polychaete tubes, on artificial reefs, and in live bivalves (e.g., scallops)
	Adults	In the Gulf of Maine, the Great South Channel, and on the outer continental shelf and slope from Georges Bank to North Carolina, including inshore bays and estuaries as far south as Chesapeake Bay	50-750 on shelf and slope, as shallow as 20 inshore	Sub-tidal benthic habitats in shell beds, on soft sediments (usually in depressions), also found on gravel and hard bottom and artificial reefs
Monkfish	Juveniles	Gulf of Maine, outer continental shelf in the Mid-Atlantic, and the continental slope	50-400 in the Mid-Atlantic, 20-400 in the Gulf of Maine, and to 1000 on the slope	Sub-tidal benthic habitats on a variety of habitats, including hard sand, pebbles, gravel, broken shells, and soft mud, also seek shelter among rocks with attached algae
	Adults	Gulf of Maine, outer continental shelf in the Mid-Atlantic, and the continental slope	50-400 in the Mid-Atlantic, 20-400 in the Gulf of Maine, and to 1000 on the slope	Sub-tidal benthic habitats on hard sand, pebbles, gravel, broken shells, and soft mud, but seem to prefer soft sediments, and, like juveniles, utilize the edges of rocky areas for feeding
Smooth skate	Juveniles	Offshore Gulf of Maine, some coastal bays in Maine and New Hampshire, and on the continental slope from Georges Bank to North Carolina	100-400 offshore Gulf of Maine, <100 inshore Gulf of Maine, to 900 on slope	Benthic habitats, mostly on soft mud in deeper areas, but also on sand, broken shells, gravel, and pebbles on offshore banks in the Gulf of Maine
	Adults	Offshore Gulf of Maine and the continental slope from Georges Bank to North Carolina	100-400 offshore Gulf of Maine, to 900 on slope	Benthic habitats, mostly on soft mud in deeper areas, but also on sand, broken shells, gravel, and pebbles on offshore banks in the Gulf of Maine
Thorny skate	Juveniles	Offshore Gulf of Maine, some coastal bays in the Gulf of Maine, and on the continental slope from Georges Bank to North Carolina	35-400 offshore Gulf of Maine, <35 inshore Gulf of Maine, to 900 on the slope	Benthic habitats on a wide variety of bottom types, including sand, gravel, broken shells, pebbles, and soft mud
	Adults	Offshore Gulf of Maine and on the continental slope from Georges Bank to North Carolina	35-400 offshore Gulf of Maine, <35 inshore Gulf of Maine, to 900 on the slope	Benthic habitats on a wide variety of bottom types, including sand, gravel, broken shells, pebbles, and soft mud
Little skate	Juveniles	Coastal waters in the Gulf of Maine, Georges Bank, and the continental shelf in the Mid-Atlantic region as far south as Delaware Bay, including certain bays and estuaries in the Gulf of Maine	Mean high water-80	Intertidal and sub-tidal benthic habitats on sand and gravel, also found on mud
	Adults	Coastal waters in the Gulf of Maine, Georges Bank, and the continental shelf in the Mid-Atlantic region as far	Mean high water-100	Intertidal and sub-tidal benthic habitats on sand and gravel, also found on mud

Species	Life Stage	Geographic Area	Depth (meters)	Habitat Type and Description
		south as Delaware Bay, including certain bays and estuaries in the Gulf of Maine		
Winter skate	Juveniles	Coastal waters from eastern Maine to Delaware Bay, including certain bays and estuaries from eastern Maine to Chincoteague Bay, Virginia, and on Georges Bank and the continental shelf in Southern New England and the Mid-Atlantic	0-90	Sub-tidal benthic habitats on sand and gravel substrates, are also found on mud
	Adults	Coastal waters from eastern Maine to Delaware Bay, including certain bays and estuaries in Maine and New Hampshire, and on Georges Bank and the continental shelf in Southern New England and the Mid-Atlantic	0-80	Sub-tidal benthic habitats on sand and gravel substrates, are also found on mud
Barndoor skate	Juveniles and adults	Primarily on Georges Bank and in Southern New England and on the continental slope	40-400 on shelf and to 750 on slope	Sub-tidal benthic habitats on mud, sand, and gravel substrates
Clearnose skate	Juveniles	Inner continental shelf from New Jersey to the St. Johns River in Florida and certain bays and certain estuaries including Raritan Bay, inland New Jersey bays, Chesapeake Bay, and Delaware Bays	0-30	Sub-tidal benthic habitats on mud and sand, but also on gravelly and rocky bottom
	Adults	Inner continental shelf from New Jersey to the St. Johns River in Florida and certain bays and certain estuaries including Raritan Bay, inland New Jersey bays, Chesapeake Bay, and Delaware Bays	0-40	Sub-tidal benthic habitats on mud and sand, but also on gravelly and rocky bottom
Rosette skate	Juveniles and adults	Outer continental shelf from approximately 40˚N to Cape Hatteras, North Carolina	80-400	Benthic habitats with mud and sand substrates
Atlantic herring	Eggs	Coastal Gulf of Maine, Georges Bank, and Southern New England	5-90	Sub-tidal benthic habitats on coarse sand, pebbles, cobbles, and boulders and/or macroalgae
Atlantic sea scallop	Eggs	Gulf of Maine coastal waters and offshore banks, Georges Bank, and the Mid-Atlantic, including the following estuaries: Passamaquoddy Bay to Sheepscot River; Casco Bay, Massachusetts Bay, and Cape Cod Bay	18-110	Inshore and offshore benthic habitats (see adults)
	Larvae	Gulf of Maine coastal waters and offshore banks, Georges Bank, and the Mid-Atlantic, including the following estuaries: Passamaquoddy Bay to Sheepscot River; Casco Bay, Massachusetts Bay, and Cape Cod Bay	No information	Inshore and offshore pelagic and benthic habitats: pelagic larvae ("spat"), settle on variety of hard surfaces, including shells, pebbles, and gravel and to macroalgae and other benthic organisms such as hydroids
	Juveniles	Gulf of Maine coastal waters and offshore banks, Georges Bank, and the Mid-Atlantic, including the following estuaries: Passamaquoddy Bay to	18-110	Benthic habitats initially attached to shells, gravel, and small rocks (pebble, cobble), later free-swimming juveniles found in same habitats as adults

Species	Life Stage	Geographic Area	Depth (meters)	Habitat Type and Description
		Sheepscot River; Casco Bay, Great Bay, Massachusetts Bay, and Cape Cod Bay		
	Adults	Gulf of Maine coastal waters and offshore banks, Georges Bank, and the Mid-Atlantic, including the following estuaries: Passamaquoddy Bay to Sheepscot River; Casco Bay, Great Bay, Massachusetts Bay, and Cape Cod Bay	18-110	Benthic habitats with sand and gravel substrates
Deep-sea red crab	Eggs	Outer continental shelf and slope throughout the region, including two seamounts	320-640	Benthic habitats attached to female crabs
	Juveniles	Outer continental shelf and slope throughout the region, including two seamounts	320-1300 on slope and to 2000 on seamounts	Benthic habitats with unconsolidated and consolidated silt-clay sediments
	Adults	Outer continental shelf and slope throughout the region, including two seamounts	320-900 on slope and up to 2000 m on seamounts	Benthic habitats with unconsolidated and consolidated silt-clay sediments
Summer flounder	Juveniles	Continental shelf and estuaries from Cape Cod, Massachusetts, to Cape Canaveral, Florida	To maximum 152	Benthic habitats, including inshore estuaries, salt marsh creeks, seagrass beds, mudflats, and open bay areas
	Adults	Continental shelf from Cape Cod, Massachusetts, to Cape Canaveral, Florida, including shallow coastal and estuarine waters during warmer months	To maximum 152 in colder months	Benthic habitats
Scup	Juveniles	Continental shelf between southwestern Gulf of Maine and Cape Hatteras, North Carolina and in nearshore and estuarine waters between Massachusetts and Virginia	No information	Benthic habitats, in association with inshore sand and mud substrates, mussel and eelgrass beds
	Adults	Continental shelf and nearshore and estuarine waters between southwestern Gulf of Maine and Cape Hatteras, North Carolina	No information, generally overwinter offshore	Benthic habitats
Black sea bass	Juveniles and adults	Continental shelf and estuarine waters from the southwestern Gulf of Maine and Cape Hatteras, North Carolina	Inshore in summer and spring	Benthic habitats with rough bottom, shellfish and eelgrass beds, man-made structures in sandy-shelly areas, also offshore clam beds and shell patches in winter
Golden tilefish	Juveniles and adults	Outer continental shelf and slope from U.S.-Canada boundary to the Virginia-North Carolina boundary	100-300	Burrows in semi-lithified clay substrate, may also utilize rocks, boulders, scour depressions beneath boulders, and exposed rock ledges as shelter
Blueline tilefish	Juveniles and adults	Outer continental shelf from eastern Georges Bank to the Virginia / North Carolina boundary	46 to 256	Horizontal or vertical burrows in sediments composed of silt, clay, and sand
Longfin inshore squid	Eggs	Inshore and offshore waters from Georges Bank southward to Cape Hatteras	Generally <50	Bottom habitats attached to variety of hard bottom types, macroalgae, sand, and mud

Species	Life Stage	Geographic Area	Depth (meters)	Habitat Type and Description
Spiny dogfish	Juveniles	Primarily the outer continental shelf and slope between Cape Hatteras and Georges Bank and in the Gulf of Maine	Deep water	Pelagic and epibenthic habitats
	Female sub-adults	Throughout the region	Wide depth range	Pelagic and epibenthic habitats
	Male sub-adults	Primarily in the Gulf of Maine and on the outer continental shelf from Georges Bank to Cape Hatteras	Wide depth range	Pelagic and epibenthic habitats
	Female adults	Throughout the region	Wide depth range	Pelagic and epibenthic habitats
	Male adults	Throughout the region	Wide depth range	Pelagic and epibenthic habitats
Atlantic surfclam	Juveniles and adults	Continental shelf from southwestern Gulf of Maine to Cape Hatteras, North Carolina	Surf zone to about 61, abundance low >38	In substrate to depth of 3 ft
Ocean quahog	Juveniles and adults	Continental shelf from southern New England and Georges Bank to Virginia	9-244	In substrate to depth of 3 ft

5.5.5 **Gear Types and Interaction with Habitat**

A variety of gears are used in the multispecies fishery (Table 20). Groundfish vessels fish for target species with: trawl, gillnet, and hook and line gear (including jigs, handline, and non-automated demersal longlines). This section discusses the characteristics of each of the gear types, as well as the typical impacts to the physical habitat associated with each of these gear types. In general, EFH for species and life stages that rely on the seafloor for shelter (e.g., from predators), reproduction, or food is vulnerable to disturbance by bottom tending gear. The most vulnerable habitat is more likely to be hard or rough bottom with attached epifauna. The Council's recently published Omnibus Habitat Amendment 2 includes an assessment of relative habitat vulnerability to the gear types used in the northeast region. This analysis was recently updated (NEFMC 2019).

Table 20 - Description of the gear types used by the multispecies fishery

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

5.5.5.1 Trawl Gear

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

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

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

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

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

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

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

5.5.5.2 Gillnet Gear

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

Individual sink/anchor gillnets are about 295 ft. (90 m) long. They are usually fished as a series of 5 - 15 nets attached end-to-end. A vast majority of “strings” consist of 10 gillnets. Gillnets typically have three components: the leadline, webbing, and floatline. In New England, leadlines are approximately 66 lbs/net (30 kg/net). Webs are monofilament, with the mesh size depending on the species of interest. Nets are anchored at each end using materials such as pieces of railroad track, sash weights, or Danforth anchors, depending on currents. Anchors and leadlines have the most contact with the bottom. For Northeast groundfish, gillnets are tended daily to semiweekly (NEFSC 2002c).

5.5.5.3 Fish Traps and Pots

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

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

5.5.5.4 Hook and Line Gear

5.5.5.4.1 Hand Lines/Rod and Reel

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

5.5.5.4.2 Mechanized Line Fishing

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

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

5.5.5.4.3 Bottom Long Lines

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

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

5.5.5.5 Gear Interaction with Habitat

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

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

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

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

In general, the panel determined that impacts from trawling are greater in gravel/rock habitats with attached epifauna. The panel ranked impacts to biological structure higher than impacts to physical structure. Effects of trawls on major physical features in mud (deep water clay-bottom habitats) and gravel bottom were described as permanent. Impacts to biological and physical structure were given recovery times of months to years in mud and gravel. Impacts of trawling on physical structure in sand were estimated to be of shorter duration (days to months) given the exposure of most continental shelf sand habitats to strong bottom currents and/or frequent storms. Impacts of sink gillnets and bottom longlines on sand and gravel habitats were estimated to be less than bottom trawl impacts. The duration of impacts to physical structures from these gear types would be expected to last days to months on soft mud, but could be permanent on hard bottom clay structures along the continental slope. Impacts to mud would be caused by gillnet lead lines and anchors. Physical habitat impacts from sink gillnets and bottom longlines on sand would not be expected. The workshop report (NEFSC 2002c) noted that factors such as frequency of disturbance from fishing and from natural events are important when evaluating impacts.

The Council's Omnibus Essential Fish Habitat Amendment 2 (OHA2) evaluated existing habitat management areas and developed new habitat management areas. To assist with this effort, the Council developed an analytical approach to characterize and map habitats and to assess the extent to which different habitat types are vulnerable to different types of fishing activities. This body of work, termed the Swept Area Seabed Impact approach, includes a quantitative, spatially-referenced model that overlays fishing activities on habitat through time to estimate both potential and realized adverse effects to EFH. The approach is summarized in Volume 1 of the FEIS and detailed in Appendix D. Both documents are available at http://www.nefmc.org/library/omnibus-habitat-amendment-2. The SASI approach builds on previous fishing impacts assessments including the 2002 workshop, and reached similar conclusions, but made the assessment more explicitly spatial. This spatial approach facilitated the use of the assessment when developing management areas. In 2018-2019, the Council updated SASI with additional years of fishing effort data and sediment data, and some changes to the structure of the model. The updated analysis is referred to the Fishing Effects Model, or FE Model. A version of the FE Model was previously developed for the North Pacific region of the U.S. (Smeltz et al. 2019). The FE model includes many elements of SASI as well as elements from another model developed for the North Pacific region (Fujioka 2006). The FE Model report is available at https://www.nefmc.org/library/fishing-effects-model. The discussion below summarizes both the SASI and FE models.

The spatial domain of the models is U.S. waters from Cape Hatteras to the U.S.-Canada border. SASI included federal waters (3-200 miles) only, but FE includes state waters as well. Within this region, habitats were defined based on natural disturbance regime and dominant substrate, given previous assessments that natural disturbance may mask or interact with human-caused disturbance. Energy at the seabed was inferred from an oceanography model (flow) and a coastal relief model (depth) and was binned into two categories, either high or low energy. Substrate type is an important determinant of habitat because it influences the distribution of managed species, structure-forming epifauna, and prey species by providing spatially discrete resources such as media for burrowing organisms, attachment points for vertical epifauna, etc. The dominant substrate map used in SASI/FE was composed of thousands of visual and grab-sample observations, with grid size based on the spacing of the observations. The underlying spatial resolution of the substrate grid is much higher on Georges Bank and on the tops of banks and ledges in the Gulf of Maine than it is in deeper waters. Habitat definitions for both SASI and FE are based on five sediment grain sizes, mud, sand, pebble, cobble, and boulder. The FE model adds a steep and deep habitat category to account for areas of high relief where deep-sea coral ecosystems occur.

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

The FE model in particular emphasizes the realized impacts of fishing by modeling how the magnitude of fishing in different locations across the model domain influences patterns of habitat disturbance. Habitat impacts are expressed as percent disturbance in 5 km by 5 km grid cells. The model is run continuously over time, with monthly changes in fishing effort by gear type. As time progresses and habitats begin to recover from previous impacts, new fishing impacts can continue to affect the condition of the seabed. Thus, the percent disturbance at a given time and location represents a combination of current and prior habitat impacts.

5.6 Protected Species

5.6.1 Species Present in the Area

Numerous protected species inhabit the environment within the Northeast multispecies FMP management unit (Table 21) and have the potential to be impacted by the proposed action (i.e., there have been observed/documented interactions in the fishery or with gear type(s) similar to those used in the fishery (bottom trawl or gillnet gear)). These species are under NMFS jurisdiction and are afforded protection under the Endangered Species Act (ESA) of 1973 and/or the Marine Mammal Protection Act (MMPA) of 1972.

Table 21 - Species protected under the ESA and/or MMPA that may occur in the affected environment of the Northeast multispecies fishery. Marine mammal species (cetaceans and pinnipeds) italicized and in bold are considered MMPA strategic stocks.[1]

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

Ocean DPS		
Hawksbill sea turtle (*Eretmochelys imbricate*)	Endangered	No
Fish		
Shortnose sturgeon (*Acipenser brevirostrum*)	Endangered	No
Giant manta ray (*Manta birostris*)	Threatened	Yes
Atlantic salmon (*Salmo salar*)	Endangered	Yes
Atlantic sturgeon *(Acipenser oxyrinchus)*		
Gulf of Maine DPS	Threatened	Yes
New York Bight DPS, Chesapeake Bay DPS, Carolina DPS & South Atlantic DPS	Endangered	Yes
Cusk (*Brosme brosme)*	Candidate	Yes
Pinnipeds		
Harbor seal (*Phoca vitulina*)	Protected (MMPA)	Yes
Gray seal (*Halichoerus grypus*)	Protected (MMPA)	Yes
Harp seal (*Phoca groenlandicus*)	Protected (MMPA)	Yes
Hooded seal (*Cystophora cristata*)	Protected (MMPA)	Yes
Critical Habitat		
North Atlantic Right Whale	ESA (Protected)	No
Northwest Atlantic DPS of Loggerhead Sea Turtle	ESA (Protected)	No

Notes:

[1] A strategic stock is defined under the MMPA as a marine mammal stock for which: (1) the level of direct human-caused mortality exceeds the potential biological removal level; (2) based on the best available scientific information, is declining and is likely to be listed as a threatened species under the ESA within the foreseeable future; and/or (3) is listed as a threatened or endangered species under the ESA, or is designated as depleted under the MMPA (Section 3, 1972) (Hayes et al. 2020).

[2] The status of the species is defined by whether the species is listed under the ESA as endangered (species are at risk of extinction) or threatened (species at risk of endangerment), or protected under the MMPA. Note, marine mammals listed under the ESA are also protected under the MMPA. Candidate species are those species in which ESA listing may be warranted.

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

[4] This includes the following Stocks of Bottlenose Dolphins: Western North Atlantic Offshore, Northern Migratory Coastal (strategic stock), and Southern Migratory Coastal (strategic stock).

Cusk are NMFS "candidate species" under the ESA. Candidate species are those petitioned species for which NMFS has determined that listing may be warranted under the ESA and those species for which NMFS has initiated an ESA status review through an announcement in the Federal Register. If a species is proposed for listing the conference provisions under Section 7 of the ESA apply (see 50 CFR 402.10); however, candidate species receive no substantive or procedural protection under the ESA. Thus, this species will not be discussed further in this action; however, NMFS recommends that project proponents consider implementing conservation actions to limit the potential for adverse effects on candidate species from any proposed action. Additional information on cusk is at: https://www.fisheries.noaa.gov/endangered-species-conservation/candidate-species-under-endangered-species-act.

5.6.2 Species and Critical Habitat Not Likely Impacted by the Proposed Action

Based on available information, it has been determined that this action is not likely to impact multiple ESA listed and/or marine mammal protected species or any designated critical habitat (Table 21). This determination has been made because either the occurrence of the species is not known to overlap with the area primarily affected by the action and/or, based on the most recent 10 years of observer, stranding, and/or marine mammal serious injury and mortality reports, there have never been documented interactions between the species and the primary gear type (i.e., gillnet and bottom trawl) used to prosecute the multispecies fishery (Greater Atlantic Region (GAR) Marine Animal Incident Database, unpublished data; Marine Mammal Stock Assessment Reports (SAR) for the Atlantic Region: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; NEFSC observer/sea sampling database, unpublished data; NMFS NEFSC reference documents (marina mammal serious injury and mortality reports): https://apps-nefsc.fisheries.noaa.gov/rcb/publications/center-reference-documents.html; MMPA List of Fisheries (LOF): https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries).[6] In the case of critical habitat, this determination has been made, because the action will not impact the essential physical and biological features of North Atlantic right whale or loggerhead (NWA DPS) critical habitat and therefore, will not result in the destruction or adverse modification of any species critical habitat (NMFS 2014a, NMFS 2015a,b).

5.6.3 Species Potentially Impacted by the Proposed Action

Table 21 has a list of protected species of sea turtle, marine mammal, and fish species present in the affected environment of the multispecies fishery, and that may also be impacted by the operation of this fishery; that is, have the potential to become entangled or bycaught in the fishing gear used to prosecute the fishery. To aid in the identification of MMPA protected species potentially impacted by the action, the MMPA LOFs and marine mammal SARs and serious injury and mortality reports were referenced (see Marine Mammal SARs for the Atlantic Region: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; MMPA LOF: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries; NEFSC observer/sea sampling database, unpublished data; NMFS NEFSC reference documents (marine mammal serious injury and mortality reports): https://apps-nefsc.fisheries.noaa.gov/rcb/publications/center-reference-documents.html).

To help identify ESA listed species potentially impacted by the action, the most recent 10 years of marine animal incidence (e.g., entanglement) and NEFSC observer data (i.e., 2010-2018 and 2010-2019,

[6] For marine mammals protected under the MMPA the most recent 10 years of observer, stranding, and/or marine mammal serious injury and mortality reports are from 2008-2017; however, confirmed large whale entanglement data is available through 2018. For ESA listed species, the most recent 10 years of information on observed or documented interactions with fishing gear is from 2010-2019.

respectively)[7], as well as the 2013 Biological Opinion issued by NMFS on the operation of seven commercial fisheries, including the multispecies) FMP, and its impact on ESA listed species was referenced (NMFS 2013). The 2013 Opinion, which considered the best available information on ESA listed species and observed or documented ESA listed species interactions with gear types used to prosecute the 7 FMPs (e.g., gillnet, bottom trawl, and pot/trap), concluded that the seven fisheries may adversely affect, but was not likely to jeopardize the continued existence of any ESA listed species. The Opinion included an incidental take statement (ITS) authorizing the take of specific numbers of ESA listed species of sea turtles, Atlantic salmon, and Atlantic sturgeon.[8] Reasonable and prudent measures and terms and conditions were also issued with the ITS to minimize impacts of any incidental take.

New information indicates that North Atlantic right whale abundance has been in decline since 2010 (Pace et al. 2017). This new information is different from that considered and analyzed in the 2013 Opinion and; therefore, reveals effects from this fishery that were not previously considered. As a result, per an October 17, 2017, ESA 7(a)(2)/7(d) memorandum issued by NMFS, the 2013 Opinion, as well as several other fishery Opinions, has been reinitiated. However, the October 17, 2017, ESA 7(a)(2)/7(d) memorandum issued by NMFS, determined ".....For the consultations being reinitiated..…. Allowing these fisheries to continue during the reinitiation period will not increase the likelihood of interactions with these species above the amount that would otherwise occur if consultation had not been reinitiated, because allowing these fisheries to continue does not entail making any changes to any fishery during the reinitiation period that would cause an increase in interactions with whales, sea turtles, sturgeon, or Atlantic salmon. Because of this, the continuation of these fisheries during the reinitiation period would not be likely to jeopardize the continued existence of any whale, sea turtle, Atlantic salmon, or sturgeon species." Until replaced, the multispecies FMP is currently covered by the October 17, 2017, memorandum.

As the primary concern for both MMPA protected and ESA listed species is the potential for the fishery to interact (e.g., bycatch, entanglement) with these species it is necessary to consider (1) species occurrence in the affected environment of the fishery and how the fishery will overlap in time and space with this occurrence; and (2) data and observed records of protected species interaction with particular fishing gear types, to understand the potential risk of an interaction. Information on species occurrence in the affected environment of the multispecies fishery is below, information on protected species interactions with specific fishery gear is in Section 5.6.3.5.

5.6.3.1 Sea Turtles

This section contains a brief summary of the status and trends, and occurrence and distribution of leatherback and hard-shelled sea turtles (i.e., green (North Atlantic DPS), loggerhead (Northwest Atlantic Ocean DPS), Kemp's ridley) in the affected environment of the Northeast multispecies fishery. Additional background information on the range-wide status of the other four species, as well as a description and life history of the species, is in several published documents, including sea turtle status reviews and biological reports (NMFS and USFWS 1995; Turtle Expert Working Group [TEWG] 1998, 2000, 2007, 2009; Conant *et al*. 2009; NMFS and USFWS 2013; NMFS and USFWS 2015; Seminoff *et al*. 2015), and recovery plans for the loggerhead sea turtle (Northwest Atlantic DPS; NMFS and USFWS 2008), leatherback sea turtle (NMFS and USFWS 1992), Kemp's ridley sea turtle (NMFS *et al.* 2011), and green sea turtle (NMFS and USFWS 1991).

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[7] NEFSC observer/sea sampling database (unpublished data) and GAR Marine Animal Incident Database (unpublished data).

Status and Trends

As provided in Table 21, four sea turtle species were identified as having the potential to be impacted by the proposed action: Northwest Atlantic Ocean DPS of loggerhead, Kemp's ridley, North Atlantic DPS of green, and leatherback sea turtles. Nest counts inform population trends for sea turtle species. For the Northwest Atlantic Ocean DPS of loggerhead sea turtles, there are five unique recovery units that comprise the DPS. Nesting trends for each of these recovery units are variable; however, recent data from Florida index nesting beaches, which comprise most of the nesting in the DPS, indicate a 19% increase in nesting from 1989 to 2018 (https://myfwc.com/research/wildlife/sea-turtles/nesting/loggerhead-trends/). Overall, short-term trends for loggerhead sea turtles (Northwest Atlantic Ocean DPS) have shown increases; however, over the long-term the DPS is considered stable. For Kemp's ridley sea turtles, from 1980 through 2003, the number of nests at three primary nesting beaches (Rancho Nuevo, Tepehuajes, and Playa Dos) increased 15 percent annually (Heppell et al. 2005); however, due to recent declines in nest counts, decreased survival of immature and adult sea turtles, and updated population modeling, this rate is not expected to continue and therefore, the overall trend is unclear (NMFS and USFWS 2015; Caillouett et al. 2018). The North Atlantic DPS of green sea turtle is showing a positive trend in nesting; however, increases in nester abundance for the North Atlantic DPS in recent years must be viewed cautiously as the datasets represent a fraction of a green sea turtle generation which is between 30 and 40 years (Seminoff et al. 2015). Leatherback turtle nesting in the Northwest Atlantic is showing an overall negative trend, with the most notable decrease occurring during the most recent time frame of 2008 to 2017 (NW Atlantic Leatherback Working Group 2018).

Occurrence and Distribution

Hard-shelled sea turtles

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

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

Leatherback sea turtles

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

5.6.3.2 Marine Mammals

This section contains a summary of the status and trends, and occurrence and distribution of large whales, small cetaceans, and pinnipeds in the affected environment of the multispecies fishery.

5.6.3.2.1 Large Whales

Status and Trends

As provided in Table 21, North Atlantic right, fin, sei, minke, and humpback whales have the potential to be impacted by the proposed action. Review of the most recent NMFS Marine Mammal (Atlantic Ocean) SARs (Hayes *et al.* 2020) indicates that, as a trend analysis has not been conducted, the population trajectory for fin, sei, and minke whales are unknown.[9] North Atlantic right whales; however, are showing a declining trend, likely since 2011, and are considered critically endangered (Hayes et al. 2020). In regards to humpback whales, abundance estimates between the years 2000-2016 suggest an increasing population trend; however, there are some uncertainties with this assessment and therefore, the level of increase is unclear (Hayes *et al.* 2020).

Occurrence and Distribution

North Atlantic right, humpback, fin, sei, and minke whales are found throughout the waters of the Northwest Atlantic Ocean. In general, these species follow an annual pattern of migration between low latitude (south of 35ºN) wintering/calving grounds and high latitude spring/summer foraging grounds (primarily north of 41ºN; see marine mammal (Atlantic Ocean) SARs: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region). This, however, is a simplification of whale movements, particularly as it relates to winter movements. It remains unknown if all individuals of a population migrate to low latitudes in the winter, although, increasing evidence suggests that for some species (e.g., right and humpback whales), some portion of the population remains in higher latitudes throughout the winter (Hayes *et al.* 2020; Khan *et al*. 2009, 2010, 2011, 2012; Brown *et al*. 2002; NOAA 2008; Cole *et al*. 2013; Clapham *et al*. 1993; Swingle *et al*. 1993; Vu *et al*. 2012; Davis *et al.* 2017; Davis *et al*. 2020)).Although further research is needed to provide a clearer understanding of large whale movements and distribution in the winter, the distribution and movements of large whales to foraging grounds in the spring/summer is well understood. Movements of whales into higher latitudes coincide with peak productivity in these waters. As a result, the distribution of large whales in higher latitudes is strongly governed by prey availability and distribution, with large numbers of whales coinciding with dense patches of preferred forage (Mayo and Marx 1990;

[9] https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region

Kenney *et al*. 1986, 1995; Baumgartner *et al*. 2003; Baumgartner and Mate 2003; Payne *et al*.1986, 1990; Brown *et al*. 2002; Kenney and Hartley 2001; Schilling *et al.* 1992; Davis *et al.* 2017; Davis *et al.* 2020). For additional information on North Atlantic right, humpback, fin, sei, and minke whales, refer to the marine mammal (Atlantic Ocean) SARs provided at: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region.

To further assist in understanding how the multispecies fishery may overlaps in time and space with the occurrence of large whales, a general overview on species occurrence and distribution in the area of operation for the multispecies fishery is in Table 22.

Table 22 - Large whale occurrence, distribution, and habitat use in the affected environment of the multispecies fishery (SNE=Southern New England; GOM=Gulf of Maine; GB=Georges Bank).

Species	Occurrence/Distribution/Habitat Use in the Affected Environment
North Atlantic Right Whale	Occur and are distributed throughout all continental shelf waters along the U.S. eastern seaboard throughout the year. Although whales can be found consistently in particular locations throughout their range, there is a high interannual variability in right whale use of some habitats. ● Visual and acoustic surveys demonstrate areas of the Greater Atlantic Region where North Atlantic right whales aggregate seasonally: the Great South Channel; Jordan Basin; Georges Basin (along the northeastern edge of Georges Bank); Cape Cod and Massachusetts Bays. Although whales are consistently found in these areas, there is high interannual use of these habitats. ● Since 2010, acoustic and visual surveys indicate a shift in habitat use patterns. Fewer individuals are detected in the Great South Channel, use of Cape Cod and Massachusetts Bays seems to have increased, and a large portion of the right whale population is using an area south of Nantucket and Martha’s Vineyard from late winter through early spring. ● Passive acoustic studies of right whales have demonstrated their year-round presence in the Gulf of Maine, New Jersey, and Virginia. ● Mid-Atlantic waters: Migratory corridor to/from northern (high latitude) foraging and southern calving grounds. Can be present in these waters year round. ● Passive acoustic and telemetry data shows excursions into deeper water off the continental shelf (e.g., shelf edge along southern Georges Bank and Mid-Atlantic) ● Location of much of the population unknown in winter; however, increasing evidence of wintering areas (~November – January) in: › Cape Cod Bay; › Jeffreys and Cashes Ledges; › Jordan Basin; and › Massachusetts Bay (e.g., Stellwagen Bank).
Humpback Whale	● Distributed throughout all continental shelf waters of the Mid-Atlantic (SNE included), GOM, and GB throughout the year. ● New England waters (GOM and GB regions) = Foraging Grounds (~March-November). ● Mid-Atlantic waters: Migratory pathway to/from northern (high latitude) foraging and southern (West Indies) calving grounds. Increasing evidence

Species	Occurrence/Distribution/Habitat Use in the Affected Environment
	that mid-Atlantic areas are becoming an important habitat for juvenile humpback whales. • Since 2011, increased sightings of humpback whales in the New York-New Jersey Harbor Estuary, in waters off Long Island, and along the shelf break east of New York and New Jersey. • Increasing visual and acoustic evidence of whales remaining in mid- and high-latitudes throughout the winter (e.g., Mid- Atlantic: waters near Chesapeake and Delaware Bays, peak presence about January through March; Massachusetts Bay: peak presence about March-May and September-December).
Fin	• Distributed throughout all continental shelf waters of the Mid-Atlantic (SNE included), GOM, and GB throughout the year; recent review of sighting data shows evidence that, while densities vary seasonally, fin whales are present in every season throughout most of the EEZ north of 35ºN. • Mid-Atlantic waters: › Migratory pathway to/from northern (high latitude) foraging and southern (low latitude) calving grounds; and › Possible calving area (October-January). • New England waters = Foraging Grounds (greatest densities March-August; lower densities September-November). Important foraging grounds include, but are not limited to: > Massachusetts Bay (esp. Stellwagen Bank); > Great South Channel; > Waters off Cape Cod (~40-50 meter contour); > GOM; > Perimeter (primarily eastern) of GB; and > Mid-shelf area off the east end of Long Island. • Evidence of wintering areas in mid-shelf areas east of New Jersey (NJ), Stellwagen Bank; and eastern perimeter of GB.
Sei	• General pattern of offshore distribution, although occasional incursions into shallower inshore waters during peak prey availability and abundance. • Primarily found in deep waters along the shelf edge, shelf break, and ocean basins between banks. • Spring through summer, found in greatest densities in the Gulf of Maine and Georges Bank.Sightings concentrated along the northern, eastern (into Northeast Channel) and southwestern (in the area of Hydrographer Canyon) edge of Georges Bank, and south of Nantucket, MA. • The wintering habitat remains largely unknown. Passive acoustic monitoring conducted in 2015-2016 off Georges Bank detected sei whales calls from late fall through the winter along the southern Georges Bank region (off Heezen and Oceanographer Canyons).
Minke	• Widely distributed within the U.S. EEZ. • Spring to Fall: widespread (acoustic) occurrence on the continental shelf; most abundant in New England waters during this period of time. • September to April: high (acoustic) occurrence in deep-ocean waters.

Species	Occurrence/Distribution/Habitat Use in the Affected Environment
Sources: Baumgartner *et al*. 2007; Baumgartner *et al*. 2011; Baumgartner and Mate 2005; Bort *et al*. 2015; Brown *et al*. 2002, 2017; CETAP 1982; Cholewiak et al. 2018; Clapham *et al*. 1993; Clark and Clapham 2004; Cole *et al*. 2013; Davis *et al.* 2017; Good 2008; Hain *et al.* 1992; Hamilton and Mayo 1990; Hayes *et al*. 2017, 2018, 2019, 2020; Kenney *et al.* 1986, 1995; Khan *et al*. 2009, 2010, 2011, 2012; Kraus et al. 2016; Leiter *et al.* 2017; Mate *et al*. 1997; McLellan *et al*. 2004; Morano et al. 2012; Murray et al. 2013; NMFS 1991, 2005, 2010, 2011, 2012; 2015; NOAA 2008; Pace and Merrick 2008; Palka et al. 2017; Palka 2020;Payne *et al*. 1984; Payne *et al*.1990; Pendleton *et al*. 2009; Record *et al*. 2019; Risch *et al*. 2013; Robbins 2007; Roberts et al. 2016; Salisbury et al. 2016; Schevill *et al*. 1986; Stanistreet et al. 2018; Swingle *et al*. 1993; Vu *et al*. 2012; Watkins and Schevill 1982; Whitt et al. 2013; Winn *et al.* 1986; 50 CFR 224.105; 81 FR 4837 (January 27, 2016).	

5.6.3.2.2 Small Cetaceans

Status and Trends

Risso's, white-sided, short beaked common, and bottlenose dolphins (Western North Atlantic Offshore, Northern Migratory Coastal, and Southern Migratory Coastal stocks); long and short –finned pilot whales; and, harbor porpoise are identified as having the potential to be impacted by the proposed action (Table 21). Review of the most recent stock assessment (Hayes et al. 2020) indicates that as a trend analysis has not been conducted for Risso's, white-sided, short-beaked common dolphins; long-finned pilot whales; or harbor porpoise, the population trajectory for these species is unknown. For short-finned pilot whales a generalized linear model indicated no significant trend in these abundance estimates (Hayes et al 2020). For the Western North Atlantic Offshore stock, review of the most recent information on the stock shows no statistically significant trend in population size for this species; however, the high level of uncertainty in the estimates limits the ability to detect a statistically significant trend (Hayes et al. 2020). In regards to the Northern and Southern Migratory Coastal stocks (both considered a strategic stock under the MMPA), the most recent analysis of trends in abundance suggests a probable decline in stock size between 2010– 2011 and 2016, concurrent with a large UME in the area; however, there is limited power to evaluate trends given uncertainty in stock distribution, lack of precision in abundance estimates, and a limited number of surveys (Hayes et al. 2018).

Occurrence and Distribution

Atlantic white sided dolphins, short and long finned pilot whales, Risso's dolphins, short beaked common dolphins, harbor porpoise, and several stocks of bottlenose dolphins are found throughout the year in the Northwest Atlantic Ocean (see Marine Mammal (Atlantic Ocean) SARs at: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region). Within this range, however, there are seasonal shifts in species distribution and abundance. To further assist in understanding how fisheries may overlap in time and space with the occurrence of small cetaceans, a general overview of species occurrence and distribution in the area of operation for the multispecies fishery is in

Table **23**. For additional information on the biology and range wide distribution of each species of small cetacean refer to the marine mammal (Atlantic Ocean) SARs provided at: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region

Table 23 - Small cetacean occurrence in the area of operation of the multispecies fishery.

Species	Prevalence and Month of Occurrence
Atlantic White Sided Dolphin	• Distributed throughout the continental shelf waters (primarily to 100 m) of the Mid-Atlantic (north of 35ºN), SNE, GB, and GOM; however, most common in continental shelf waters from Hudson Canyon (~ 39ºN) to GB, and into the GOM. • **January-May**: low densities found from GB to Jeffreys Ledge. • **June-September**: Large densities found from GB, through the GOM. • **October-December**: intermediate densities found from southern GB to southern GOM. • South of GB (SNE and Mid-Atlantic), particularly around Hudson Canyon, low densities found year-round, • Virginia (VA) and North Carolina (NC) waters represent southern extent of species range during winter months.
Short Beaked Common Dolphin	• Regularly found throughout the continental shelf-edge-slope waters (primarily between the 100-2,000 m isobaths) of the Mid-Atlantic, SNE, and GB (esp. in Oceanographer, Hydrographer, Block, and Hudson Canyons). • Less common south of Cape Hatteras, NC, although schools have been reported as far south as the Georgia/South Carolina border. • **January-May**: occur from waters off Cape Hatteras, NC, to GB (35º to 42ºN). • **Mid-summer-autumn**: Occur in the GOM and on GB; *Peak abundance* found on GB in the autumn.
Risso's Dolphin	• **Spring through fall**: Distributed along the continental shelf edge from Cape Hatteras, NC, to GB. • **Winter**: distributed in the Mid-Atlantic Bight, extending into oceanic waters. • Rarely seen in the GOM; primarily a Mid-Atlantic continental shelf edge species (can be found year-round).
Harbor Porpoise	• Distributed throughout the continental shelf waters of the Mid-Atlantic, SNE, GB, and GOM. • **July-September**: Concentrated in the northern GOM (waters <150 meters); low numbers can be found on GB. • **October-December**: widely dispersed in waters from New Jersey (NJ) to Maine (ME); seen from the coastline to deep waters (>1,800 meters). • **January-March**: intermediate densities in waters off NJ to NC; low densities found in waters off New York (NY) to GOM.

Species	Prevalence and Month of Occurrence
	• **April-June**: widely dispersed from NJ to ME; seen from the coastline to deep waters (>1,800 meters).
Bottlenose Dolphin	**Western North Atlantic Offshore Stock** • Distributed primarily along the outer continental shelf and continental slope in the Northwest Atlantic from GB to Florida (FL). • Depths of occurrence: ≥40 meters **Western North Atlantic Northern Migratory Coastal Stock** • Most common in coastal waters <20 m deep. • Warm water months (e.g., July-August): distributed from the coastal waters from the shoreline to about 25-m isobaths between the mouth of the Chesapeake Bay and Long Island, NY. • Cold water months (e.g., January-March): stock occupies coastal waters from Cape Lookout, NC, to the NC/VA border. **Western North Atlantic Southern Migratory Coastal Stock** • Most common in coastal waters <20 m deep. • **October-December**: appears stock occupies waters of southern NC (south of Cape Lookout) • **January-March**: appears stock moves as far south as northern FL. • **April-June**: stock moves north to waters of NC. • **July-August**: stock is presumed to occupy coastal waters north of Cape Lookout, NC, to the eastern shore of VA (as far north as Assateague).
Pilot Whales: *Short- and Long-Finned*	**Short- Finned Pilot Whales** • Except for area of overlap (see below), primarily occur south of 40ºN (Mid-Atlantic and SNE waters); although low numbers have been found along the southern flank of GB, but no further than 41ºN. • May through December (about): distributed primarily near the continental shelf break of the Mid-Atlantic and SNE (i.e., off Nantucket Shoals); individuals begin shifting to southern waters (i.e., 35ºN and south) beginning in the fall. **Long-Finned Pilot Whales** • Except for area of overlap (see below), primarily occur north of 42ºN.

Species	Prevalence and Month of Occurrence
	• Winter to early spring (November - April): primarily distributed along the continental shelf edge-slope of the Mid-Atlantic, SNE, and GB. • Late spring through fall (May - October): movements and distribution shift onto/within GB, the Great South Channel, and the GOM. **Area of Species Overlap:** between approximately 38°N and 40°N.
Notes: Information is representative of small cetacean occurrence in the Northwest Atlantic continental shelf waters out to 2,000 m depth ***Sources*:** Hayes *et al*. 2017; Hayes *et al.* 2018; Hayes *et al.* 2019; Hayes *et al*. 2020; Payne and Heinemann 1993; Payne *et al.* 1984; Jefferson *et al*. 2009.	

5.6.3.2.3 Pinnipeds

Status and Trends

Harbor, gray, harp and hooded seals are identified as having the potential to be impacted by the proposed action (Table 21). Review of the most recent stock assessment (Hayes et al. 2020) indicates that as a trend analysis has not been conducted for harbor seals, the population trajectory for this species is unknown. The status of the gray, harp, and hooded seal population relative to optimum sustainable population (OSP)[10] in U.S. Atlantic EEZ waters is unknown; however, gray seal stock's abundance appears to be increasing in Canadian and U.S. waters, harp seal stock abundance appears to have stabilized, and hooded seal stock abundance is uncertain (Hayes et al. 2019; Hayes et al. 2020).

Occurrence and Distribution

Harbor, gray, harp, and hooded seals are found in the nearshore, coastal waters of the Northwest Atlantic Ocean. They are primarily found throughout the year or seasonally from New Jersey to Maine; however, increasing evidence indicates that some species (e.g., harbor seals) may be extending their range seasonally into waters as far south as Cape Hatteras, North Carolina (35°N). For additional information on the biology and range wide distribution of each pinniped species refer to the marine mammal (Atlantic Ocean) SARs provided at: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region.

[10] *OSP is "the number of animals which will result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element." 16 U.S.C. § 1362(9).*

To help understand how the multispecies fishery may overlap in time and space with the occurrence of pinnipeds, a general overview of species occurrence and distribution in the area of operation of the multispecies fishery is provided in the following table (Table 24).

Table 24 - Pinniped occurrence in the area of operation of the multispecies fishery.

Species	Prevalence
Harbor Seal	• Primarily distributed in waters from New Jersey to Maine; however, increasing evidence indicates that their range is extending into waters as far south as Cape Hatteras, NC (35ºN). • **Year Round**: Waters north of 42.5ºN • **September-May**: Waters from MA to NJ.
Gray Seal	• **Year Round**: Waters from Maine to just south of Cape Cod, MA. • **September-May**: Waters from southern MA to NJ. • Stranding records: Southern NJ to Cape Hatteras, NC
Harp Seal	• Winter-Spring (approx.. January-May): Waters from New Jersey to Maine.
Hooded Seal	• Winter-Spring (approx. January-May): Waters of New England.
Sources**:** Waring *et al*. 2007 (for hooded seals); Hayes *et al.* 2019; Hayes *et al.* 2020.	

5.6.3.3 Atlantic Sturgeon

This section contains a summary of the status and trends, and occurrence and distribution of Atlantic sturgeon (5 DPSs) in the affected environment of the multispecies fishery.

Status and Trends

Atlantic sturgeon, from any DPS, are identified as having the potential to be impacted by the proposed action (Table 21). The ASMFC released a new benchmark stock assessment for Atlantic sturgeon in October 2017 (ASMFC 2017). Based on historic removals and estimated effective population size, the 2017 stock assessment concluded that all five Atlantic sturgeon DPSs are depleted relative to historical levels. However, the 2017 stock assessment does provide some evidence of population recovery at the coastwide scale, and mixed population recovery at the DPS scale (ASMFC 2017). The 2017 stock assessment also concluded that a variety of factors (i.e., bycatch, habitat loss, and ship strikes) continue to impede the recovery rate of Atlantic sturgeon (ASMFC 2017).

Occurrence and Distribution

The marine range of U.S. Atlantic sturgeon extends from Labrador, Canada, to Cape Canaveral, Florida. All five DPSs of Atlantic sturgeon have the potential to be located anywhere in this marine range; in fact, results from genetic studies show that, regardless of location, multiple DPSs can be found at any one location along the Northwest Atlantic coast (ASSRT 2007; Dovel and Berggren 1983; Dadswell *et al*. 1984; Kynard *et al*. 2000; Stein *et al*. 2004a; Dadswell 2006; Laney *et al*. 2007; Dunton *et al*. 2010; Dunton *et al*. 2012; Dunton *et al*. 2015; Erickson *et al*. 2011; Wirgin *et al*. 2012; O'Leary *et al*. 2014; Waldman *et al.* 2013; Wirgin *et al*. 2015a,b; ASMFC 2017).

Based on fishery-independent and -dependent data, as well as data collected from tracking and tagging studies, in the marine environment, Atlantic sturgeon appear to primarily occur inshore of the 50 meter depth contour (Stein *et al*. 2004 a,b; Erickson *et al*. 2011; Dunton *et al*. 2010); however, Atlantic sturgeon are not restricted to these depths, as excursions into deeper continental shelf waters have been documented (Timoshkin 1968; Collins and Smith 1997; Stein *et al*. 2004a,b; Dunton *et al*. 2010; Erickson *et al*. 2011). Data from fishery-independent surveys and tagging and tracking studies also indicate that some Atlantic sturgeon may undertake seasonal movements along the coast (Erickson *et al.* 2011; Dunton *et al*. 2010; Wipplehauser 2012); however, there is no evidence to date that all Atlantic sturgeon make these seasonal movements and therefore, may be present throughout the marine environment throughout the year.

Within the marine range of Atlantic sturgeon, several marine aggregation areas have been identified adjacent to estuaries and/or coastal features formed by bay mouths and inlets along the U.S. eastern seaboard (i.e., waters off North Carolina, Chesapeake Bay; Delaware Bay; New York Bight; Massachusetts Bay; Long Island Sound; and Connecticut and Kennebec River Estuaries); depths in these areas are generally no greater than 25 meters (Bain *et al.* 2000; Savoy and Pacileo 2003; Stein *et al*. 2004a; Laney *et al*. 2007; Dunton *et al*. 2010; Erickson *et al*. 2011; Oliver *et al*. 2013; Waldman *et al.* 2013; O'Leary *et al*. 2014; Wipplehauser 2012; Wipplehauser and Squiers 2015). Although additional studies are still needed to clarify why these sites are chosen by Atlantic sturgeon, there is some indication that they may serve as thermal refuge, wintering sites, or marine foraging areas (Stein *et al*. 2004a; Dunton *et al*. 2010; Erickson *et al*. 2011).

For additional information on the biology and range wide distribution of each distinct population segment (DPS) of Atlantic sturgeon please refer to 77 FR 5880 and 77 FR 5914, as well as the Atlantic Sturgeon Status Review Team's (ASSRT) 2007 status review of Atlantic sturgeon (ASSRT 2007) and the Atlantic States Marine Fisheries Commission 2017 Atlantic Sturgeon Benchmark Stock Assessment and Peer Review Report (ASMFC 2017).

5.6.3.4 Atlantic Salmon (Gulf of Maine DPS)

This section contains a summary of the status and trends, and occurrence and distribution of Atlantic salmon (Gulf of Maine (GOM) DPS) in the affected environment of the multispecies fishery

Status and Trends

Atlantic salmon (GOM DPS) are identified as having the potential to be impacted by the proposed action (Table 21). The GOM DPS of Atlantic salmon currently exhibits critically low spawner abundance and poor marine survival (USASAC 2020). The abundance of GOM DPS Atlantic salmon has been low and either stable or declining over the past several decades and the proportion of fish that are of natural origin is small and displays no sign of growth (USASAC 2020).

The freshwater range of Atlantic salmon (GOM DPS) occurs from the watersheds of the Androscoggin River northward along the Maine coast to the Dennys River, while the marine range of the GOM DPS extends from the GOM (primarily northern portion of the GOM), to the coast of Greenland (Fay *et al.* 2006; NMFS & USFWS 2005, 2016). In general, smolts, post- smolts, and adult Atlantic salmon may be present in the GOM and coastal waters of Maine in the spring (beginning in April), and adults may be present throughout the summer and fall months (Baum 1997; Fay *et al.* 2006; Hyvarinen *et al.* 2006; Lacroix & Knox 2005; Lacroix & McCurdy 1996; Lacroix *et al.* 2004; NMFS & USFWS 2005; Reddin 1985; Reddin & Friedland 1993; Reddin & Short 1991). For additional information on the on the biology, status, and range wide distribution of the GOM DPS of Atlantic salmon, refer to NMFS and USFWS

(2005, 2016); and Fay et al. (2006). Thus, as the multispecies fishery operates throughout the year, and operates in the GOM, the fishery could overlap in time and space with Atlantic salmon migrating northeasterly between U.S. and Canadian waters.

5.6.3.5 Giant Manta Ray

This section contains a summary of the status and trends, and occurrence and distribution of giant manta rays in the affected environment of the multispecies fishery.

Status and Trends

Giant Manta Rays may be impacted by the proposed action (Table 21). While there is considerable uncertainty regarding the species' current abundance throughout its range, the best available information indicates that the species has experienced population declines of potentially significant magnitude within areas of the Indo-Pacific and eastern Pacific portions of its range (Miller and Klimovich 2017). Yet, larger subpopulations of the species still exist, including off Mozambique, Ecuador, and potentially Thailand. While we assume that declining populations within the Indo-Pacific and eastern Pacific will likely translate to overall declines in the species throughout its entire range, there is very little information on the abundance, and thus, population trends in the Atlantic portion of its range (Miller and Klimovich 2017).

Occurrence and Distribution

Giant manta rays may occur in coastal, nearshore, and pelagic waters off the U.S. east coast (Miller and Klimovich 2017). Along the U.S. East Coast, giant manta rays are usually found in water temperatures between 19 and 22 degrees Celsius (Miller and Klimovich 2017) and have been observed as far north as New Jersey. Given that the species is rarely identified in the fisheries data in the Atlantic, it may be assumed that populations within the Atlantic are small and sparsely distributed (Miller and Klimovich 2017).

5.6.4 Interactions Between Gear and Protected Species

Protected species are at risk of interacting with various types of fishing gear, with interaction risks associated with gear type, quantity, soak or tow duration, and degree of overlap between gear and protected species. Information on observed or documented interactions between gear and protected species is available from as early as 1989 (Marine Mammal (Atlantic Ocean) SARs: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; NEFSC observer/sea sampling database, unpublished data). As the distribution and occurrence of protected species and the operation of fisheries (and, thus, risk to protected species) have changed over the last 30 years, we use the most recent 10 years of available information to best capture the current risk to protected species from fishing gear. For marine mammals protected under the MMPA, this primarily covers the period from 2008-2017[11]; however, the Greater Atlantic Region (GAR) Marine Animal Incident Database (unpublished data) contains confirmed large whale entanglement reports

[11] Waring et al. 2015a; Waring et al. 2016; Hayes et al. 2017; Hayes et al. 2018; Hayes et al. 2019; Hayes et al. 2020; MMPA List of Fisheries (LOF): https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries; NMFS NEFSC reference documents (marine mammal serious injury and mortality reports): https://nefsc.noaa.gov/publications/crd/.

through 2018. For ESA listed species, the most recent 10 years of data on observed or documented interactions is available from 2010-2019[12].

Available information on gear interactions with a given species (or species group) is provided in the sections below. The sections to follow are not a comprehensive review of all fishing gear types known to interact with a given species; emphasis is only being placed on the primary gear types used to prosecute the multispecies fishery (i.e., recreational: hook and line; commercial: sink gillnet and bottom trawl gear).

5.6.4.1 Recreational Fisheries Interactions

The recreational multispecies fishery is primarily prosecuted with rod and reel and handline (i.e., hook and line gear). In the absence of an observer program for recreational fisheries, records of recreational hook and line interactions with protected resources are limited. However, as a dedicated observer program exists for all commercial fisheries, there is a wealth of information on observed protected species interactions with all fishing gear types and years of data assessing resultant population level effects of these interactions. Other sources of information, such as state fishing records, stranding databases, and marine mammal stock assessment reports, provide additional information that can assist in better understanding hook and line interaction risks to protected species.

Large Whales

Large whales have been documented entangled with hook and line gear or monofilament line (GAR Marine Animal Incident Database, unpublished data; marine mammal (Atlantic Ocean) SARs: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region). Review of the most recent (2012-2016) mortality and serious injury determinations for baleen whales, the majority of cases identified with confirmed hook and line or monofilament entanglement did not result in the serious injury or mortality to the whale (84.8 % observed/reported whales had a serious injury value of 0; 15.2 % had a serious injury value of 0.75; none of the cases resulted in mortality; Cole and Henry 2013; Henry *et al.* 2017; Henry *et al.* 2019; Henry *et al.* 2020). In fact, 76.0 % of the whales observed or reported with a hook/line or monofilament entanglement were resighted gear free and healthy; confirmation of the health of the other remaining whales remain unknown as no resightings had been made over the timeframe of the assessment (Cole and Henry 2013; Henry *et al.* 2017; Henry *et al.* 2019; Henry *et al.* 2020). Based on this information, while large whale interactions with hook and line gear are possible, there is a low probability that an interaction will result in serious injury or mortality to any large whale species. Therefore, relative to other gear types, such as fixed gear, hook and line gear represents a low source of serious injury or mortality to any large whale (Cole and Henry 2013; Henry *et al*. 2017; Henry *et al.* 2019; Henry *et al.* 2020).

Small Cetaceans and Pinnipeds

Table 21 provides a list of small cetaceans and pinnipeds that will occur in the affected environment of the multispecies fisheries. Reviewing the most recent 10 years of data provided in the marine mammal (Atlantic Ocean) SARs (i.e., 2008-2017), of these species, only bottlenose dolphin stocks have been identified (primarily through stranding records/data) as entangled in hook and line gear (https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-

[12] ASMFC 2017; GAR Marine Animal Incident Database, unpublished data; Kocik et al. 2014; Marine Mammal (Atlantic Ocean) SARs: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; Miller and Shepard 2011; Murray 2015; Murray 2018; Murray 2020; NMFS NEFSC reference documents (marine mammal serious injury and mortality reports): https://nefsc.noaa.gov/publications/crd/; NEFSC observer/sea sampling database, unpublished data.

reports-region). In some cases, these entanglements have resulted in the serious injury or mortality to the animal. Specifically, reviewing stranding data provided in marine mammal (Atlantic Ocean) SARs from 2008-2017, estimated mean annual mortality for each bottlenose stock due to interactions with hook and line gear was approximately one animal (Palmer 2017; https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region). Based on this, although interactions with hook and line gear are possible, relative to other gear types, such as trawl gear, hook and line gear represents a low source of serious injury or mortality to any bottlenose dolphin stock.

Sea Turtles

Interactions between ESA listed species of sea turtles and hook and line gear have been documented, particularly in nearshore waters of the Mid-Atlantic (e.g., GAR Sea Turtle and Disentanglement Network, unpublished data; NMFS Sea Turtle Stranding and Salvage Network, unpublished data; Palmer 2017). Interactions with hook and line gear have resulted in sea turtle injury and mortality and therefore, poses an interaction risk to these species. However, the extent to which these interactions are impacting sea turtle populations is still under investigation, and therefore, no conclusions can currently be made on the impact of hook and line gear on the continued survival of sea turtle populations.

Atlantic Sturgeon

Interactions between ESA-listed species of Atlantic sturgeon and hook and line gear have been documented, particularly in nearshore waters (ASMFC 2017). Interactions with hook and line gear have resulted in Atlantic sturgeon injury and mortality and therefore, poses an interaction risk to these species. However, the extent to which these interactions are impacting Atlantic sturgeon DPSs is still under investigation and therefore, no conclusions can currently be made on the impact of hook and line gear on the continued survival of Atlantic sturgeon DPSs (NMFS 2011b; ASMFC 2017).

Atlantic Salmon

Review of the most recent 10 years of data on observed or documented interactions between Atlantic salmon and fishing gear indicates there have been no observed/documented interactions between Atlantic salmon and hook and line gear (NEFSC observer/sea sampling database, unpublished data). Based on this information, hook and line gear is not expected to pose an interaction risk to any Atlantic salmon and therefore, is not expected to be source of injury or mortality to this species.

Giant Manta Rays

Review of the most recent 10 years of data on observed or documented interactions between giant manta rays and fishing gear, there have been no observed/documented interactions between giant manta rays and hook and line gear (NEFSC observer/sea sampling database, unpublished data). Based on this information, hook and line gear is not expected to pose an interaction risk to giant manta rays and therefore, is not expected to be source of injury or mortality to this species

5.6.4.2 Commercial Fisheries Interactions

5.6.4.2.1 Marine Mammals

Depending on species, marine mammals have been observed seriously injured or killed in bottom trawl and/or sink gillnet gear. Pursuant to the MMPA, NMFS publishes a List of Fisheries (LOF) annually, classifying U.S. commercial fisheries into one of three categories based on the relative frequency of incidental serious injuries and/or mortalities of marine mammals in each fishery (i.e., Category I=frequent; Category II=occasional; Category III=remote likelihood or no known interactions). In the Northwest Atlantic, the 2021 LOF (86 FR 3028, January 14, 2021) categorizes commercial gillnet fisheries (Northeast or Mid-Atlantic) as Category I fisheries and commercial bottom trawl fisheries (Northeast or Mid-Atlantic) as Category II fisheries.

5.6.4.2.1.1 Large Whales

Bottom Trawl Gear

With the exception of minke whales, there have been no observed interactions with large whales and bottom trawl gear[13]. In 2008, several minke whales were observed dead in bottom trawl gear attributed to the northeast bottom trawl fishery; estimated annual mortality attributed to this fishery in 2008 was 7.8 minke whales (Waring et al. 2015). Since 2008, serious injury and mortality records for minke whales in U.S. waters have shown zero interactions with bottom trawl (northeast or Mid-Atlantic) gear[14]. Based on this information, large whale interactions with bottom trawl gear are expected to be rare to nonexistent.

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

Large whale interactions (entanglements) with fishing gear have been documented in the waters of the Northwest Atlantic.[15] Information available on interactions with large whales comes from reports documented in the GAR Marine Animal Incident Database (unpublished data). For instance, review of the Database shows that between 2010 and 2018, the most recent years of validated data, there have been a total of 107 confirmed North Atlantic right whale entanglements; these entanglements include those confirmed to country and unknown country of origin (see Table 25).[16] The best available data also shows that fin, minke, humpback, and to a lesser extent, sei whales, have also been observed and documented entangled in fishing gear (see footnote 13).

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[13] Refer to: GAR Marine Animal Incident Database (unpublished data); Marine Mammal (Atlantic Ocean) SARs: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; NEFSC observer/sea sampling database, unpublished data ; MMPA LOF: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries; NMFS NEFSC reference documents (marine mammal serious injury and mortality reports): https://apps-nefsc.fisheries.noaa.gov/rcb/publications/center-reference-documents.html

[14] Refer to: GAR Marine Animal Incident Database (unpublished data); Waring et al. 2016; Hayes et al. 2017; Hayes et al. 2018; Hayes et al. 2019; Hayes et al. 2020; Cole and Henry 2013; and, Henry et al. 2014, 2015, 2016, 2017, 2019, 2020; MMPA LOF: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries.

[15] NMFS Atlantic Large Whale Entanglement Reports: https://www.fisheries.noaa.gov/new-england-mid-atlantic/marine-mammal-protection/atlantic-large-whale-take-reduction-plan (for years prior to 2014, contact David Morin, Large Whale Disentanglement Coordinator, David.Morin@NOAA.gov; GAR Marine Animal Incident Database (unpublished data); NMFS Marine Mammal (Atlantic Ocean) SARs: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; NMFS NEFSC Marine Mammal Serious Injury and Morality Reference Documents: https://apps-nefsc.fisheries.noaa.gov/rcb/publications/center-reference-documents.html; MMPA List of Fisheries: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries

[16] The data included in Table 25, includes entanglement events categorized as serious injury, mortality, or a non-serious injury. These observed events are considered a minimum estimate and the actual entanglement rate is likely higher.

Table 25 - Observed entanglements of North Atlantic right whales from 2010 through 2018 by country of origin. Entanglements resulting in SI/M are presented in the parentheses.

	Number of Entanglements	Confirmed Canada	Confirmed U.S.	Unknown Country of Origin
2010	6 (4)	0	1	5 (4)
2011	14 (5.5)	0	2	12 (5.5)
2012	12 (4)	0	1 (1)	11 (3)
2013	5 (0.75)	0	0	5 (0.75)
2014	17 (8)	1	1 (1)	15 (7)
2015	9 (3.5)	1	0	8 (3.5)
2016	15 (9.5)	3 (3)	1	11 (6.5)
2017	15 (6)	8 (3)	1	6 (3)
2018	14 (7.25)	3 (1.75)	1	10 (5.5)
Total	107 (48.5)	16 (7.75)	8 (2)	83 (38.75)

Source: GAR Marine Animal Incident Database

Based on the best available information, the greatest entanglement risk to large whales is posed by fixed gear used in trap/pot or sink gillnet fisheries (Angliss and Demaster 1998; Cassoff et al. 2011; Kenney and Hartley 2001; Knowlton and Kraus 2001; Hartley et al. 2003; Johnson et al. 2005;Whittingham et al. 2005a,b; Knowlton et al. 2012; NMFS 2014; Hamilton and Kraus 2019; Henry et al. 2014; Henry et al. 2015; Henry et al. 2016; Henry et al. 2017; Henry et al. 2019; Henry et al. 2020; Sharp et al. 2019; see Marine Mammal SARs: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region). Specifically, while foraging or transiting, large whales are at risk of becoming entangled in vertical endlines, buoy lines, or groundlines of gillnet and pot/trap gear, as well as the net panels of gillnet gear that rise into the water column (Baumgartner et al. 2017; Cassoff et al. 2011; Hamilton and Kraus 2019; Hartley et al. 2003; Henry et al. 2014; Henry et al. 2015; Henry et al. 2016; Henry et al. 2017; Henry et al. 2019; Henry et al. 2020; Johnson et al. 2005; Kenney and Hartley 2001; Knowlton and Kraus 2001;Knowlton et al. 2012; NMFS 2014; Whittingham et al. 2005a,b; see NMFS Marine Mammal SARs: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region).[17] Large whale interactions (entanglements) with these features of trap/pot and/or sink gillnet gear often result in the serious injury or mortality to the whale (Angliss and Demaster 1998; Cassoff et al. 2011; Henry et al. 2014, Henry et al. 2015, Henry et al. 2016; Henry et al. 2017; Henry et al. 2019; Henry et al. 2020; Knowlton and Kraus 2001, Knowlton et al. 2012; Moore and Van der Hoop 2012; NMFS 2014; Pettis et al. 2019; Sharp et al. 2019; van der Hoop et al. 2016; van der Hoop et al. 2017). As many entanglements, and therefore, serious injury or mortality events, go unobserved, and because the gear type, fishery, and/or country of origin for reported entanglement events are often not traceable, the rate of large whale entanglement, and thus, rate of serious injury and mortality due to entanglement, are likely underestimated (Hamilton et al. 2018; Hamilton et al. 2019; Knowlton et al. 2012; Pace et al. 2017; Robbins 2009).

As provided in Section 5.6.4.2.1, pursuant to the MMPA, NMFS publishes a LOF annually, classifying U.S. commercial fisheries into one of three categories based on the relative frequency of incidental

[17] Through the ALWTRP, regulations have been implemented to reduce the risk of entanglement in in vertical endlines, buoy lines, or groundlines of gillnet and pot/trap gear, as well as the net panels of gillnet gear. For ALWTRP regulations currently implemented: see https://www.fisheries.noaa.gov/action/atlantic-large-whale-take-reduction-plan-regulations-1997-2015.

serious injurious and mortalities of marine mammals in each fishery. Large whales, especially humpback, fin, minke, and North Atlantic right whales, are known to interact with Category I and II fisheries in the (Northwest) Atlantic Ocean. As fin and North Atlantic right whales are listed as endangered under the ESA, these species are considered strategic stocks under the MMPA; Humpback whales are also considered strategic stocks as the detected level of U.S. fishery caused mortality and serious injury exceeds the PBR level (Hayes et al. 2020; Table 21). MMPA Section 118(f)(1) requires the preparation and implementation of a Take Reduction Plan (TRP) for any strategic marine mammal stock that interacts with Category I or II fisheries. In response to its obligations under the MMPA, in 1996, NMFS established the Atlantic Large Whale Take Reduction Team (ALWTRT) to develop a plan (Atlantic Large Whale Take Reduction Plan (ALWTRP or Plan)) to reduce serious injury to, or mortality of large whales, specifically, humpback, fin, and North Atlantic right whales, due to incidental entanglement in U.S. commercial fishing gear, specifically pot/trap and gillnet gears.[18] In 1997, the ALWTRP was implemented; however, since 1997, the Plan has been modified; recent adjustments include the Sinking Groundline Rule and Vertical Line Rules (72 FR 57104, October 5, 2007; 79 FR 36586, June 27, 2014; 79 FR 73848, December 12, 2014; 80 FR 14345, March 19, 2015; 80 FR 30367, May 28, 2015).

The Plan consists of regulatory (e.g., universal gear requirements, modifications, and requirements; area- and season- specific gear modification requirements and restrictions; time/area closures) and non-regulatory measures (e.g., gear research and development, disentanglement, education and outreach) that, in combination, seek to assist in the recovery of North Atlantic right, humpback, and fin whales by addressing and mitigating the risk of entanglement in gear employed by commercial fisheries, specifically trap/pot and gillnet fisheries (http://www.greateratlantic.fisheries.noaa.gov/Protected/whaletrp/; 73 FR 51228; 79 FR 36586; 79 FR 73848; 80 FR 14345; 80 FR 30367). The Plan recognizes trap/pot and gillnet Management Areas in Northeast, Mid-Atlantic, and Southeast regions of the U.S, and identifies gear modification requirements and restrictions for Category I and II gillnet and trap/pot fisheries in these regions; these Category I and II fisheries must comply with all regulations of the Plan.[19] For further details on the ALWTRP, see: http://www.greateratlantic.fisheries.noaa.gov/Protected/whaletrp/.

5.6.4.2.1.2 Small Cetaceans and Pinnipeds

Sink Gillnet and Bottom Trawl Gear

Small cetaceans and pinnipeds are vulnerable to interactions with sink gillnet and bottom trawl gear.[20] Reviewing marine mammal stock assessment and serious injury reports that cover the most recent 10 years data (i.e., 2008-2017), as well as the MMPA LOF's covering this time frame (i.e., issued between 2016 and 2021), Table 26 provides a list of species that have been observed (incidentally) seriously

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

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

[20] For additional information on small cetacean and pinniped interactions, see: Chavez-Rosales et al. 2017; Hatch and Orphanides 2014, 2015, 2016, 2019; Josephson et al. 2017; Josephson et al. 2019; Lyssikatos 2015; Lyssikatos et al. 2020; Orphanides 2020; Read *et al*. 2006; Waring et al. 2015b; Marine Mammal (Atlantic Ocean) SARS: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; MMPA LOF at: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries

injured and/or killed by MMPA LOF Category I (frequent interactions) gillnet and/or Category II (occasional interactions) bottom trawl fisheries that operate in the affected environment of the multispecies fishery . Of the species provided in Table 26, gray seals, followed by harbor seals, harbor porpoises, short beaked common dolphins, and harps seals are the most frequently bycaught small cetacean and pinnipeds in sink gillnet gear in the Greater Atlantic Region (GAR; Hatch and Orphanides 2014, 2015, 2016, 2019, Orphanides 2020). In terms of bottom trawl gear, short-beaked common dolphins, Risso's dolphins, and Atlantic white-sided dolphins are the most frequently observed bycaught marine mammal species in the GAR, followed by gray seals, long-finned pilot whales, bottlenose dolphin (offshore), harbor porpoise, harbor seals, and harp seals (Lyssikatos 2015; Chavez-Rosales et al. 2017; Lyssikatos et al. 2020).

Table 26 - Small cetacean and pinniped species observed seriously injured and/or killed by Category I and II sink gillnet or bottom trawl fisheries in the affected environment of the multispecies fisheries.

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

		Bottlenose dolphin (offshore)
		Risso's dolphin
Mid-Atlantic Bottom Trawl	II	Atlantic white-sided dolphin
		Short-beaked common dolphin
		Risso's dolphin
		Pilot whale
		Bottlenose dolphin (offshore)
		Gray seal
		Harbor seal
Source: MMPA 2016-2021 LOFs at: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries.		

As noted above, numerous species of small cetaceans and pinnipeds interact with Category I and II fisheries in the GAR; however, several species (Table 26) have experienced such great losses to their populations due to interactions with Category I and/or II fisheries that they are now considered strategic stocks under the MMPA (Table 21). These include several stocks of bottlenose dolphins, pilot whales, and until recently, the harbor porpoise.[21] MMPA Section 118(f)(1) requires the preparation and implementation of a TRP for any strategic marine mammal stock that interacts with Category I or II fisheries. Thus, the Harbor Porpoise TRP (HPTRP) and the Bottlenose Dolphin TRP (BDTRP) were developed and implemented for these species.[22] Also, due to the incidental mortality and serious injury of small cetaceans, incidental to bottom and midwater trawl fisheries operating in both the Northeast and Mid- Atlantic regions, the Atlantic Trawl Gear Take Reduction Strategy (ATGTRS) was implemented. Additional information on each TRP or Strategy is at: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-take-reduction-plans-and-teams.

5.6.4.2.2 **Sea Turtles**

Bottom Trawl Gear

Bottom trawl gear poses an injury and mortality risk to sea turtles (Sasso and Epperly 2006; NMFS Observer Program, unpublished data). Since 1989, the date of our earliest observer records for federally managed fisheries, sea turtle interactions with trawl gear have been observed in the Gulf of Maine, Georges Bank, and/or the Mid-Atlantic; however, most of the observed interactions have been observed south of the Gulf of Maine (Murray 2008; Murray 2015b; Murray 2020; NMFS Observer Program, unpublished data; Warden 2011 a, b). As few sea turtle interactions have been observed in the Gulf of Maine, there is insufficient data available to conduct a robust model-based analysis and bycatch estimate of sea turtle interactions with trawl gear in this region. As a result, the bycatch estimates and discussion below are for trawl gear in the Mid-Atlantic and Georges Bank.

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[21] In the most recent U.S. Atlantic and Gulf of Mexico Marine Mammal SARs (Hayes et al. 2020); harbor porpoise is no longer designated as a strategic stock.

[22] Although the most recent U.S. Atlantic and Gulf of Mexico Marine Mammal SARs (Hayes et al. 2020) no longer designates harbor porpoise as a strategic stock, HPTRP regulations are still in place per the mandates provided in Section 118(f)(1).

Murray (2020)[23] provided information on sea turtle interaction rates from 2014-2018 (the most recent five-year period that has been statistically analyzed for trawls). Interaction rates were stratified by region, latitude zone, season, and depth. The highest loggerhead interaction rate (0.43 turtles/day fished) was in waters south of 37º N during November to June in waters greater than 50 meters deep. The greatest number of estimated interactions occurred in the Mid-Atlantic region north of 39º N, during July to October in waters less than 50 meters deep. Within each stratum, interaction rates for non-loggerhead species were lower than rates for loggerheads (Murray 2020).

Sink Gillnet Gear

Interactions between sink gillnet gear and green, Kemp's ridley, loggerhead, and leatherback sea turtles have been observed in the Greater Atlantic region since 1989 (NEFSC observer/sea sampling database, unpublished data). Specifically, sea turtle interactions with gillnet gear have been observed in the Gulf of Maine, Georges Bank, and/or the Mid-Atlantic; however, most of the observed interactions have been observed south of the Gulf of Maine (Murray 2009a,b; Murray 2013; Murray 2018; NEFSC observer/sea sampling database, unpublished data). As few sea turtle interactions have been observed in the Gulf of Maine, there is insufficient data available to conduct a robust model-based analysis and bycatch estimate of sea turtle interactions with sink gillnet gear in this region . As a result, the bycatch estimates and discussion below are for sink gillnet gear in the Mid-Atlantic and Georges Bank.

From 2012-2016 (the most recent five-year period that has been statistically analyzed for gillnets), Murray (2018) estimated that sink gillnet fisheries in the Mid-Atlantic and Georges Bank bycaught 705 loggerheads (CV=0.29, 95% CI over all years: 335-1116), 145 Kemp's ridleys (CV =0.43, 95% CI over all years: 44-292), 27 leatherbacks (CV =0.71, 95% CI over all years 0-68), and 112 unidentified hard-shelled turtles (CV=0.37, 95% CI over all years (64-321).[24] Of these, mortalities were estimated at 557 loggerheads, 115 Kemp's ridley, 21 leatherbacks, and 88 unidentified hard-shelled sea turtles. Total estimated loggerhead bycatch was equivalent to 19 adults. The highest bycatch rate of loggerheads occurred in the southern Mid-Atlantic stratum in large mesh gear during November to June. Though only one sea turtle was observed in this stratum, observed effort was low, leading to a high bycatch rate. Bycatch rates of all other species were lower relative to loggerheads. Highest estimated loggerhead bycatch occurred in the northern mid-Atlantic from July to October in large mesh gears due to the higher levels of commercial effort in the stratum. Mean loggerhead bycatch rates were ten times those of Kemp's ridley bycatch rates in large mesh gear in the northern Mid-Atlantic from July to October (Murray 2018). Although interactions between sink gillnet gear and green sea turtles have been observed (NEFSC observer/sea sampling database, unpublished data); green sea turtles were excluded from the bycatch rate calculations in Murray (2018) because the observed interaction occurred in waters of North Carolina, and therefore, outside the study region.

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[23] Murray (2020) estimated interaction rates for each sea turtle species with stratified ratio estimators. This method differs from previous approaches (Murray 2008; Murray 2015; Warden 2011a,b), where rates were estimated using generalized additive models (GAMs). Ratio estimator results may be similar to those using GAM or generalized linear models (GLM) if ratio estimators are stratified based on the same explanatory variables in a GAM or GLM model (Murray 2007, Murray and Orphanides 2013, Orphanides 2010).

[24] Murray (2018) estimated interaction rates for each sea turtle species with stratified ratio estimators. This method differs from previous approaches (Murray 2009, 2013), where rates were estimated using generalized additive models (GAMs). Ratio estimator results may be similar to those using GAM or generalized linear models (GLM) if ratio estimators are stratified based on the same explanatory variables in a GAM or GLM model (Murray 2007, Murray and Orphanides 2013, Orphanides 2010).

5.6.4.2.3 **Atlantic Sturgeon**

Sink Gillnet and Bottom Trawl Gear

Since 1989, Atlantic sturgeon interactions (i.e., bycatch) with sink gillnet and bottom trawl gear have frequently been observed in the Greater Atlantic Region, with most sturgeon observed captured falling within the 100 to 200cm total length range; however, both larger and small individuals have been observed (ASMFC 2007; ASMFC 2017; Miller and Shepard 2011; NEFSC observer/sea sampling database, unpublished data; Stein et al. 2004). For sink gillnets, higher levels of Atlantic sturgeon bycatch have been associated with depths of less than 40 meters, mesh sizes of greater than 10 inches, and the months of April and May (ASMFC 2007). For otter trawl fisheries, the highest incidence of Atlantic sturgeon bycatch have been associated with depths less than 30 meters (ASMFC 2007). More recently, over all gears and observer programs that have encountered Atlantic sturgeon, the distribution of haul depths on observed hauls that caught Atlantic sturgeon was significantly different from those that did not encounter Atlantic surgeon, with Atlantic sturgeon encountered primarily at depths less than 20 meters (ASMFC 2017).

The ASMFC (2017) Atlantic sturgeon benchmark stock assessment represents the most accurate predictor of annual Atlantic sturgeon interactions in fishing gear (e.g., otter trawl, gillnet). The stock assessment analyzes fishery observer and VTR data to estimate Atlantic sturgeon interactions in fishing gear in the Mid-Atlantic and New England regions from 2000-2015, the timeframe which included the most recent, complete data at the time of the report. The total bycatch of Atlantic sturgeon from bottom otter trawls ranged between 624-1,518 fish over the 2000-2015 time series, while the total bycatch of Atlantic sturgeon from gillnets ranged from 253-2,715 fish. Focusing on the most recent five-year period of data provided in the stock assessment report[25], the estimated average annual bycatch during 2011-2015 of Atlantic sturgeon in bottom otter trawl gear is 777.4 individuals and in gillnet gear is 627.6 individuals.

5.6.4.2.4 **Atlantic Salmon**

Sink Gillnet and Bottom Trawl Gear

Atlantic salmon are at risk of interacting with bottom trawl or gillnet gear (NEFSC observer/sea sampling database, unpublished data; Kocik *et al*. 2014). NEFOP data from 1989-2019 show records of incidental bycatch of Atlantic salmon in seven of the 31 years, with a total of 15 individuals caught, nearly half of which (seven) occurred in 1992 (NEFSC observer/sea sampling database, unpublished data).[26] Of the observed incidentally caught Atlantic salmon, ten were listed as “discarded,” which is assumed to be a live discard (Kocik, pers comm.; February 11, 2013). Five of the 15 were documented as lethal interactions. The incidental takes of Atlantic salmon occurred in bottom otter trawls (4) and gillnets (11). Observed captures occurred in March (2), April (2), May (1), June (3), August (1), and November (6).

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[25] The period of 2011-2015 was chosen as it is the period within the stock assessment that most accurately resembles the current trawl fisheries in the region.

[26] There is no information available on the genetics of these bycaught Atlantic salmon, so it is not known how many of them were part of the GOM DPS. It is likely that some of these salmon, particularly those caught south of Cape Cod, may have originated from the stocking program in the Connecticut River. Those Atlantic salmon caught north of Cape Cod and/or in the Gulf of Maine are more likely to be from the GOM DPS.

Given the very low number of observed Atlantic salmon interactions in gillnet and bottom trawl gear, interactions with these gear types are believed to be rare in the Greater Atlantic Region.

5.6.4.2.5 Giant Manta Ray

Sink Gillnet and Bottom Trawl Gear

Giant manta rays are potentially susceptible to capture by bottom trawl and gillnet gear based on records of their capture in fisheries using these gear types (NEFSC observer/sea sampling database, unpublished data). Review of the most recent 10 years of NEFOP data showed that between 2010-2019, two (unidentified) Giant Manta Rays were observed in bottom trawl gear and two were observed in gillnet gear (NEFSC observer/sea sampling database, unpublished data). Additionally, all of the giant manta ray interactions in gillnet or trawl gear recorded in the NEFOP database (13 between 2001 and 2019) indicate the animals were encountered alive and released alive. However, details about specific conditions such as injuries, damage, time out of water, how the animal was moved or released, or behavior on release is not always recorded. While there is currently no information on post-release survival, NMFS Southeast Gillnet Observer Program observed a range of 0 to 16 giant manta rays captured per year between 1998 and 2015 and estimated that approximately 89% survived the interaction and release (see NMFS reports available at: http://www.sefsc.noaa.gov/labs/panama/ob/gillnet.htm).

5.7 HUMAN COMMUNITIES

This EA considers and evaluates the effect management alternatives may have on people's way of life, traditions, and community. These economic and social impacts may be driven by changes in fishery flexibility, opportunity, stability, certainty, safety, and/or other factors. While it is possible that these impacts could be solely experienced by individual fishermen, it is more likely that impacts would be experienced across communities, gear types, and/or vessel size classes. This section reviews the Northeast multispecies fishery and describes the human communities potentially impacted by the Proposed Action. This includes a description of the sector, common pool, and recreational participants' groundfish fishing and the important port communities in the fishery. Table 27 contains a summary of major trends in the groundfish fishery, reproduced in figures as well (Figure 4-Figure 5). This section focuses on the groundfish component of fishery participants activities and generally does not report out revenue or landed pounds landed on trips other than groundfish trips. Additional information may be found in the FY2010, FY2011, FY2012, FY2013, and FY2015 performance reports for this fishery by the NEFSC (Kitts et al. 2011; Murphy et al. 2012; Murphy et al. 2014; Murphy et al. 2015; Murphy et al. 2018). Generally, fishery data in this section comes from the Greater Atlantic Regional Office, specifically their Data Matching and Imputation System (DMIS) tables, but other tables may use information from vessel trip reports, permit databases, and dealer landing reports, as noted.

Table 27- Summary of major trends in the Northeast multispecies fishery by fishing year and group ($2020). Pounds and revenue reflect total landings on groundfish trips in millions of pounds/dollars. FY2020 represents a partial year of data (May through September). Source: GARFO DMIS data. Accessed January 2021.

FY	group	GF pounds	GF revenue	GF price	NGF pounds	NGF revenue	NGF price	vessels	trips	days absent
2010	common pool	1.23	2.29	1.86	3.88	4.90	1.26	129	2,081	1,488
2010	sector	56.19	93.46	1.66	17.80	21.43	1.20	299	10,779	16,455
2011	common pool	0.44	0.84	1.88	4.69	6.40	1.36	117	2,191	1,432
2011	sector	60.93	101.93	1.67	23.01	30.21	1.31	299	13,504	19,801
2012	common pool	0.23	0.52	2.21	3.71	4.60	1.24	97	1,582	982
2012	sector	46.86	78.51	1.68	23.74	25.43	1.07	302	12,884	18,898
2013	common pool	0.59	1.10	1.85	2.94	3.56	1.21	97	1,472	1,016
2013	sector	41.48	63.39	1.53	17.04	22.12	1.30	245	9,110	16,348
2014	common pool	0.49	0.95	1.94	2.48	2.74	1.10	76	1,094	806
2014	sector	42.51	63.95	1.50	22.42	27.25	1.22	228	8,672	15,902
2015	common pool	0.67	1.37	2.05	3.57	1.33	0.37	64	934	657
2015	sector	40.77	58.85	1.44	19.31	22.78	1.18	213	7,392	14,381
2016	common pool	0.33	0.86	2.64	2.55	1.07	0.42	59	816	536
2016	sector	33.50	52.12	1.56	21.13	24.66	1.17	209	6,507	12,083

2017	common pool	0.19	0.46	2.47	1.96	0.78	0.40	54	594	377
2017	sector	37.05	47.63	1.29	22.10	22.43	1.01	198	6,757	11,269
2018	common pool	0.15	0.30	2.02	1.97	0.85	0.43	54	564	368
2018	sector	44.14	50.40	1.14	20.57	21.77	1.06	179	7,136	10,551
2019	common pool	0.11	0.23	2.12	1.63	0.94	0.58	42	514	310
2019	sector	42.57	48.18	1.13	19.29	17.91	0.93	167	6,702	10,319
2020*	common pool	0.08	0.11	1.48	0.65	0.37	0.57	33	306	166
2020*	sector	30.52	31.78	1.04	14.77	10.55	0.71	165	5,031	7,164

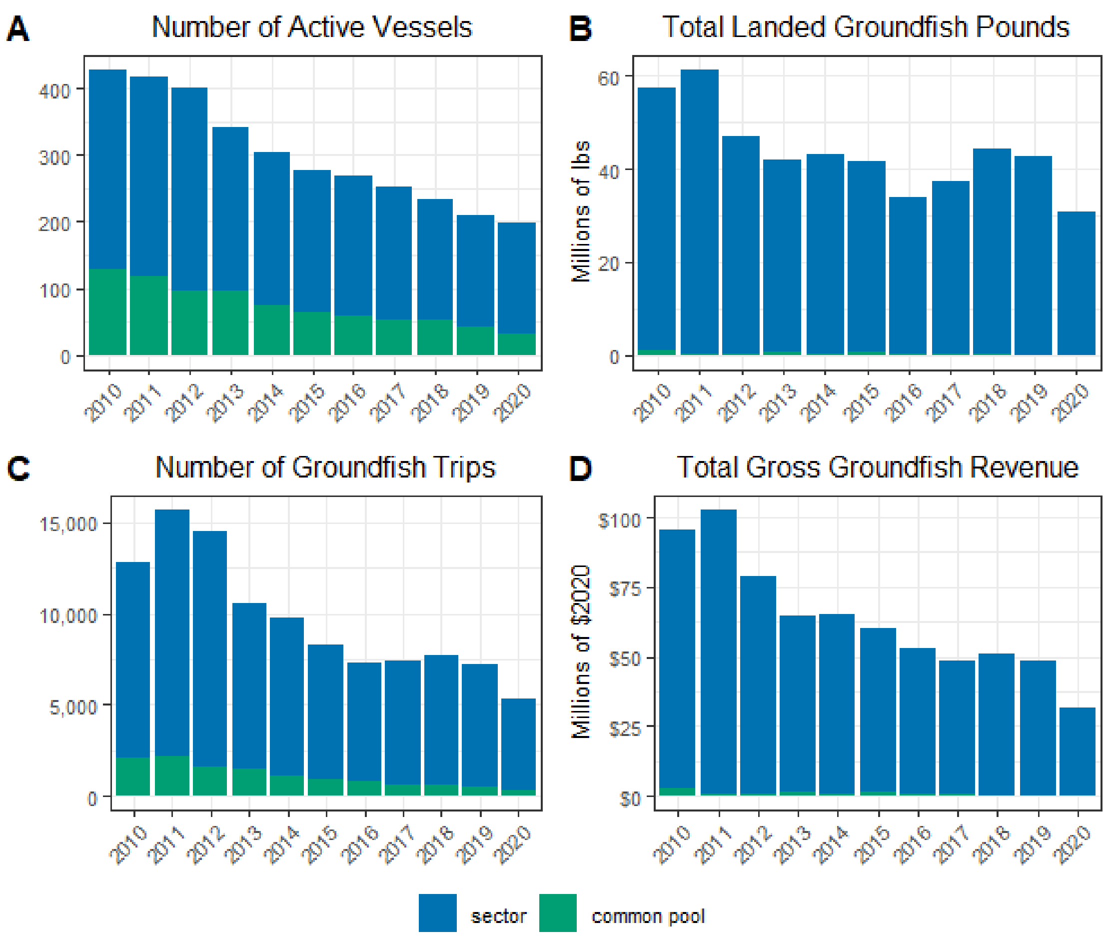


Figure 4- (A) Number of active (at least one groundfish trip) vessels by fishing year and group; (B) Number of groundfish trips with >1 lb landed of any species; (C) Total landed pounds of allocated groundfish stocks; (D) Total ex-vessel revenue from allocated groundfish stocks ($2020) FY2020 represents a partial year of data (May through September). Source: GARFO DMIS data. Accessed January 2021.

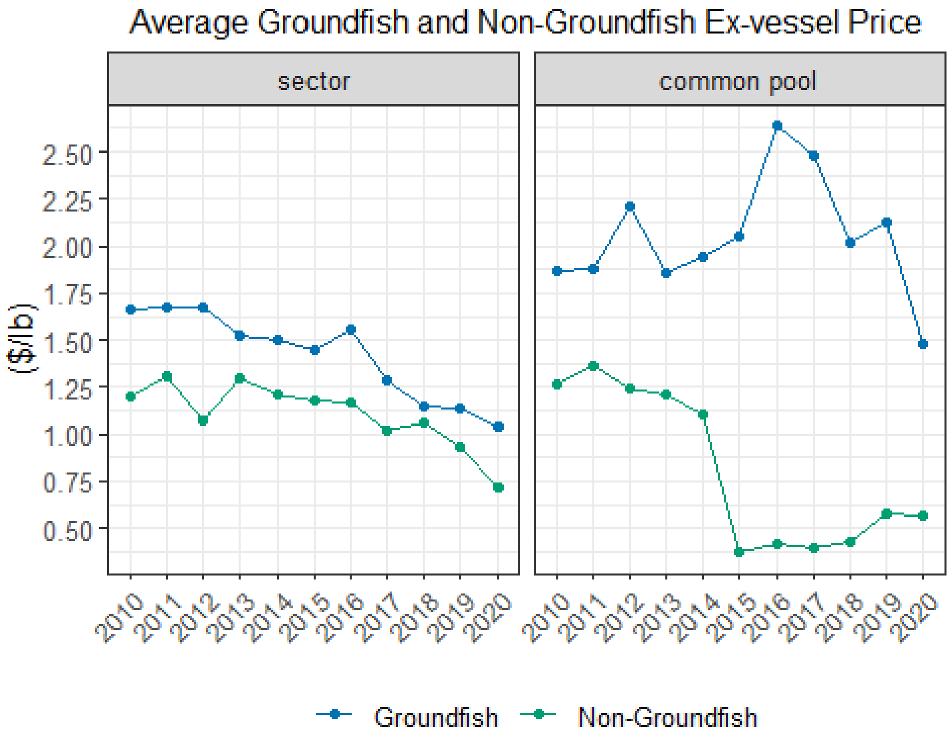


Figure 5- Average groundfish and non-groundfish price by fishing year. FY2020 represents a partial year of data (May through September). Source: GARFO DMIS data. Accessed January 2021.

5.7.1 Groundfish Fishery Overview

Amendment 16 to the Northeast Multispecies FMP was implemented for the New England groundfish fishery starting on May 1, 2010, the start of the 2010 fishing year. There were two substantial changes meant to adhere to the catch limit requirements and stock rebuilding deadlines of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (MSA). The first change developed "hard quota" annual catch limits (ACLs) for all 20 stocks in the groundfish complex. The second change expanded the use of Sectors, which are allocated subdivisions of ACLs called Annual Catch Entitlements (ACE) based on each sector's collective catch history.[27] Sectors received ACE for nine of 13 groundfish species (14 stocks + quotas for Eastern US/Canada cod and haddock; 16 ACEs) in the FMP and became exempt from many of the effort controls previously used to manage the fishery. During the first year of sector management, 17 sectors operated, each establishing its own rules for using its allocations. Vessels with limited access permits that joined sectors were allocated 98% of the total commercial groundfish sub-ACL, based on their collective level of historical activity in the groundfish fishery. Approximately half (45%) of the limited access groundfish permits opted to remain in the common pool (Table 28) [28]. Common pool vessels act independently of one another, with each vessel constrained by the number of DAS it can fish, by trip limits, and by all of the time and area closures. These restrictions help ensure that the groundfish catch of common pool vessels does not exceed the common pool's portion of the commercial groundfish sub- ACL for all stocks (about 2% for 2010) before the end of the fishing year. In the second year of sector management, 58% of limited access permits enrolled in one of 16 sectors or one of two lease-only sectors. This proportion of vessels has remained stable over time, with around 42% to 44% of permits enrolling in the common pool between 2011 and 2018 (Table 28). In this section, "groundfish trips", unless otherwise stated, are defined as vessels with a limited access groundfish permit that landed at least 1 pound of any stock on a trip that declared into the groundfish fishery. Groundfish landings only refer to landing stocks that are allocated species in the Northeast Multispecies plan (cod, haddock, pollock, redfish, yellowtail flounder, witch flounder, American plaice, etc.), but may have been caught on either sector or common pool trips. Non-groundfish landings include all other species caught, including whiting, lobster, skates, dogfish, and any other federally reported catch.

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

[28] The number of LA permits overall has changed relatively little since the beginning of the sector program, the decline in number of vessels is due to the number of permits not currently affiliated with a vessel, but is eligible for renewal based on the previous vessels' fishing and permit history (i.e., Confirmation of Permit History, or CPH, see 50 CFR 648.4).

Table 28- Number of eligibilities (MRIs), eligibilities in CPH, permitted vessels, and active vessels (landing on groundfish trips) by fishing year. Total MRIs and those in CPH represent the the number of MRIs not in CPH as of May 1st of the fishing year, while the total number of eligible vessels reflects the number of non-CPH eligible permits at any point in the fishing year. Over time the number of vessels will differ from the number of eligibilities since eligibilities can be transferred from vessel to vessel during the fishing year. Amendment 16 authorized CPH owners to join sectors and to lease DAS. From: NMFS Greater Atlantic Regional Fisheries Office, Summary tables for FY 2019 Northeast Multispecies Fishery. Accessed February 2021.

fishing year	group	MRIs	CPH	elig. vessels	not renewed	permitted vessels	Any revenue	GF revenue	No landings	% inactive
2010	sector	762	22	765	12	753	436	292	317	0.42
2010	common	679	72	650	14	636	421	100	215	0.34
2011	sector	828	88	781	9	772	445	290	327	0.42
2011	common	594	80	547	33	514	339	82	175	0.34
2012	sector	850	145	728	8	720	445	285	275	0.38
2012	common	558	83	501	38	463	319	72	144	0.31
2013	sector	851	190	688	14	674	419	231	255	0.38
2013	common	529	83	468	22	446	315	80	131	0.29
2014	sector	845	218	642	10	632	406	218	226	0.36
2014	common	526	85	456	24	432	317	60	115	0.27
2015	sector	838	272	592	19	573	383	206	190	0.33
2015	common	520	97	444	26	418	295	63	123	0.29
2016	sector	840	298	575	12	563	394	198	169	0.30
2016	common	502	101	425	19	406	293	60	113	0.28
2017	sector	834	313	546	11	535	377	188	158	0.30
2017	common	499	102	419	15	404	297	50	107	0.26
2018	sector	833	321	529	7	522	359	170	163	0.31
2018	common	491	103	410	14	396	279	53	117	0.30
2019	sector	827	325	543	15	528	349	157	179	0.34
2019	common	489	98	400	23	377	272	43	105	0.28

5.7.2 Fleet Characteristics

The overall trend since the start of sector management has been a slow decline in the number of groundfish eligibilities (Moratorium Right Identifiers, MRIs), from 1,439 in FY2010 to 1,316 in FY2019 (Table 28). This represents the number of individual fishing privileges and catch histories associated with each Northeast multispecies permit, through which Potential Sector Contributions (PSC) are calculated. While a given set of privileges may move from one vessel to another, and change permit numbers, the MRI always stays the same. Over time, the number of eligibilities in CPH (Confirmation of Permit History) has increased, from 94 in at the start of FY2010 to 424 in FY2018 (Figure 6). The increase of eligibilities in CPH represents a decline in the number of permits associated with vessels, but because eligibilities in CPH may still join sectors, the number of eligibilities in CPH does not necessarily change individuals' PSC, nor the ability for participants to passively obtain income from the groundfish fishery by leasing their ACE. Eligibilities may also move out of CPH during the fishing year, allowing the number of Limited Access permitted vessels to exceed the number of eligible permits at the start of the FY. Overall, there has been a decline in the number of permitted vessels in any year, from 1,389 in FY2010 to 903 in FY 2019. While over 900 vessels were associated with groundfish permits in FY 2019, 31% are inactive and did not land any groundfish or non-groundfish species on groundfish trips, only roughly 45% of permitted vessels reported landing allocated groundfish stocks (Figure 7). A key aspect of Amendment 16 is the ability of a sector to jointly decide how its ACE will be harvested, through redistribution within a sector and/or transferring ACE between sectors. Because inactive sector vessels may benefit if they lease their allocation, changes in the number of inactive vessels may result from a transfer of allocation and not necessarily vessels exiting the fishery.

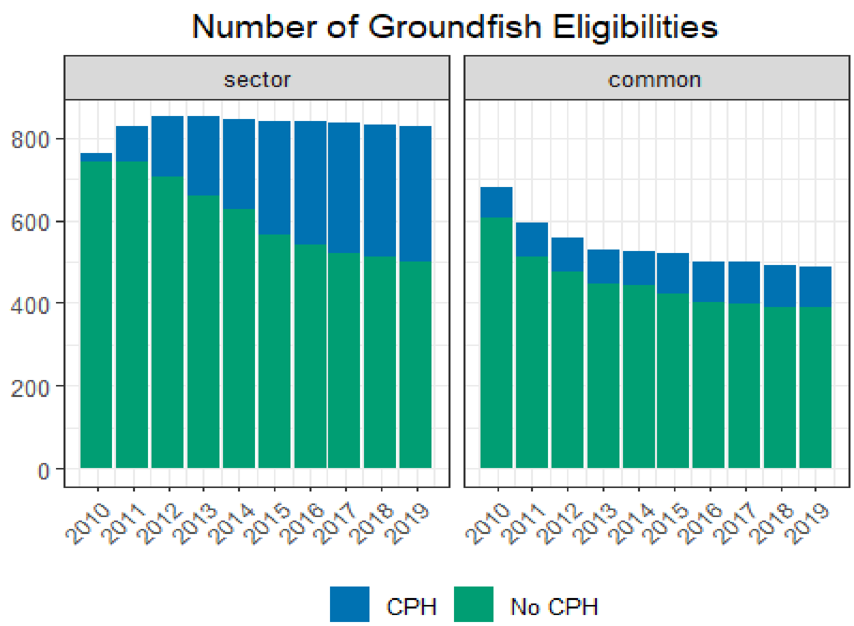


Figure 6- Number of eligibilities (MRIs) not in Confirmation of Permit History (CPH) and in CPH as of May 1 of each year. From: NMFS Greater Atlantic Regional Fisheries Office, Summary tables for FY 2019 Northeast Multispecies Fishery. Accessed February 2021.

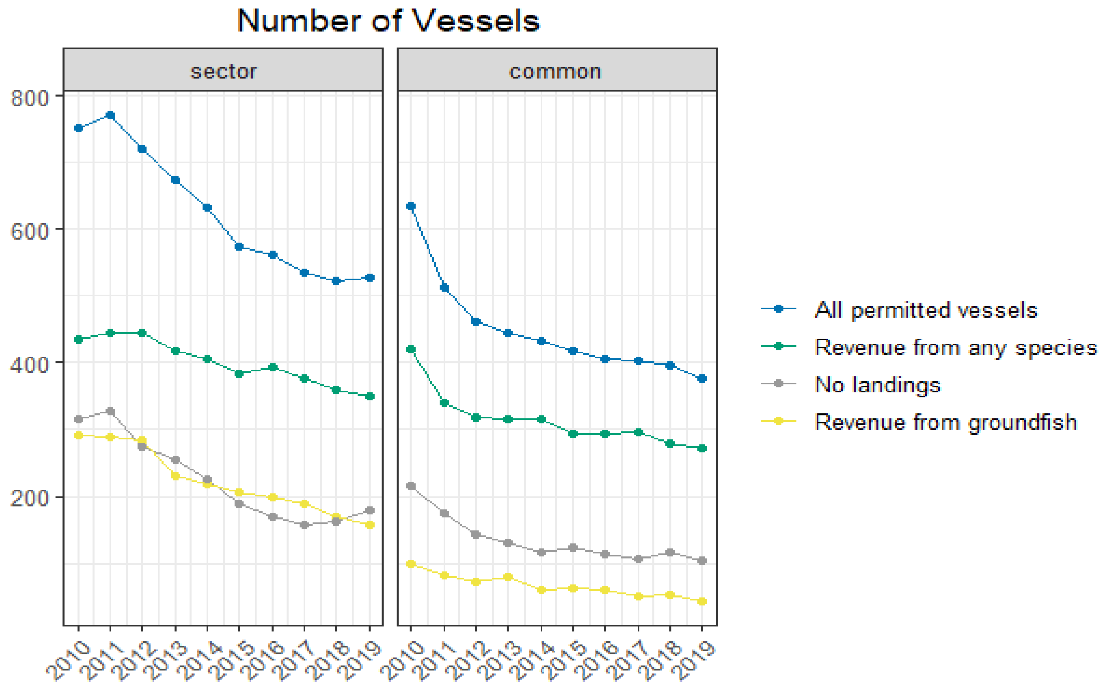


Figure 7- At any time in the fishing year, the total number of permitted groundfish vessels, those with revenue from any species, those with no landings, and those with revenue from allocated groundfish. From: NMFS Greater Atlantic Regional Fisheries Office, Summary tables for FY 2019 Northeast Multispecies Fishery. Accessed February 2021.

5.7.3 Effort

The groundfish fishery has traditionally been made up of a diverse fleet, comprised of a range of vessel sizes and gear types. The number of active vessels has generally declined across all years and size classes during the sector program (Table 29). From FY 2010 to 2019, the 30' to < 50' vessel size category, which has the largest number of active groundfish sector vessels, declined from 160 to 96 active sector vessels, with a low of 93 active vessels in 2015. 85 vessels in the same size class were active in the common pool in 2010 while only 28 were active in 2019. Only one sector vessel in the <30' vessel size category has ever participated and only between 2011-2014, while common pool vessels declined from 16 to 9 vessels. Active vessels in the 50' to <75' vessel size category and 75' and above vessel size category have also declined, from a maximum of 94 50'-75' vessels in 2012 to 51 in 2018. The number of sector vessels 75 feet in length or greater has not decreased as much as other size classes, from a high of 51 vessels in 2011 to 28 in 2019. Preliminary data from the first several months of FY2020 show that the number of active vessels in this category increased between FY2018 and FY2019, up to 35. Primary gear types in the groundfish fishery are trawls (primarily otter trawls) and gillnet, but several other gear types including handline, longline, and pot gear may be used on groundfish trips, even if not used primarily to target groundfish stocks (Table 30). Historically, effort has been mostly evenly distributed across trawl and gillnet gears, with approximately 4,000 total trips each in 2010, but while the number of sector trawl trips was around 3,800 and 1,400 sector gillnet trips in recent years. The number of sector handline trips has increased in recent years, from 182 sector trips in 2010 to 226 in 2018. Common pool trips utilizing other gear types other than trawl, including extra-large mesh (ELM) gear, have decreased significantly while the number of trips utilizing trawl gear has remained relatively constant despite large reductions in the number of active vessels.

Table 29- Number of permitted vessels by length class, group and fishing year. * FY2020 represents a partial year of data (May through September). Source: GARFO DMIS data. Accessed January 2021.

fishing year	group	<30 ft	>=30 <50 ft	>=50 <75 ft	>= 75 ft
2010	common pool	16	85	25	3
2010	sector	0	160	89	50
2011	common pool	16	72	24	5
2011	sector	1	156	91	51
2012	common pool	13	58	21	5
2012	sector	1	156	94	51
2013	common pool	15	60	19	3
2013	sector	1	119	80	45
2014	common pool	13	44	19	0
2014	sector	1	105	79	43
2015	common pool	12	34	16	2
2015	sector	0	93	77	43
2016	common pool	12	38	8	1
2016	sector	0	97	69	43
2017	common pool	9	37	7	1
2017	sector	0	98	59	41
2018	common pool	9	33	11	1
2018	sector	0	100	51	28
2019	common pool	10	28	4	0
2019	sector	0	96	43	28
2020*	common pool	9	21	3	0
2020*	sector	0	83	47	35

Note: trips do not sum to total groundfish trips since multiple gear types may be used on the same trip.
Source: GARFO DMIS tables. Accessed 2/18/2021.

Table 30- Number of groundfish trips by permitted vessels and gear type used. *FY2020 represents a partial year of data (May through September). Source: GARFO DMIS data. Accessed January 2021.

fishing year	group	Trawl	Gillnet	ELM	Handline	Longline	Pot	Other
2010	common pool	382	334	1183	182	29	21	1
2010	sector	4326	3914	2243	142	470	1	1
2011	common pool	311	133	1316	410	20	24	0
2011	sector	5609	5420	2273	151	717	0	0
2012	common pool	200	215	997	159	11	20	0
2012	sector	5977	4935	1841	23	746	21	0
2013	common pool	409	85	832	152	4	6	0
2013	sector	4517	2882	1896	19	114	6	0
2014	common pool	281	128	520	173	1	1	0
2014	sector	4048	2830	2272	17	33	1	2
2015	common pool	570	129	44	186	0	8	0
2015	sector	4016	1836	2177	76	39	11	26
2016	common pool	460	40	58	253	0	5	0
2016	sector	3399	1779	2076	98	151	3	0
2017	common pool	413	38	15	126	1	3	0
2017	sector	3551	1380	2254	269	126	8	0
2018	common pool	346	57	73	92	0	1	0
2018	sector	3761	1432	2282	226	159	13	0
2019	common pool	273	71	78	89	1	2	0
2019	sector	3714	1379	2031	129	142	25	2
2020*	common pool	169	25	37	74	3	0	0
2020*	sector	2615	1140	1811	68	74	16	0

5.7.4 Dealer Activity

All federally permitted groundfish vessels are required to sell to a federally permitted dealer. Federally permitted dealers are required to report all purchases of seafood, regardless of whether the vessels held a Federal or state-waters only permit. Dealers may obtain product from many other sources, so the groundfish activity levels are likely to capture only a portion of business activity by seafood wholesalers. Since 2010, the number of registered dealers that reported buying any species from groundfish trips (any vessel that declared into the groundfish fishery) has fluctuated over time, with increasing numbers of dealers between 2010 and 2013 (around 120 to over 150), to a general decrease in the number of dealers over the last six years (Figure 8). The number of dealers reporting buying allocated groundfish decreased from around 60 in the first few years of the sector program and decreased to around 40 dealers between 2014 and 2017, but have rebounded recently to 59 and 54 dealers in FY2018 and FY2019, respectively. The number of only non-groundfish dealers, by contrast have been slowly declining since FY2015.

Where the dealer is registered, similar to homeport, may better represent where revenue ultimately flows in the country, while the location of sale best represents where fish is landed, either to a truck, an auction, or a processing facility (see landings and revenue section). Table 31 shows the number of dealers by registered state, specifically those buying any allocated groundfish species from groundfish trips. Massachusetts has the most registered dealers in any year, but has declined by roughly 50% since 2010. New York, Maine, Rhode Island, and North Carolina each have historically had at least ten groundfish dealers, but each has experienced declines over the last five years.

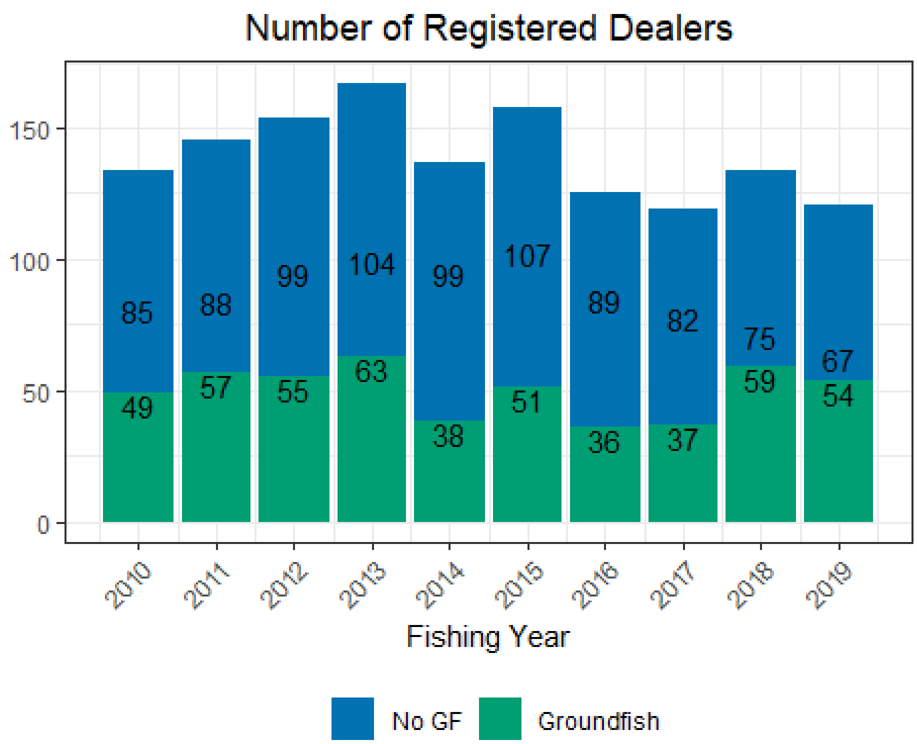


Figure 8- Number of registered dealers buying groundfish stocks or any species from groundfish trips between fishing years 2010 and 2019. Source: GARFO DMIS data and dealer data. Accessed January 2021.

Table 31- Number of Registered Dealers reporting buying allocated groundfish stocks by registered state and fishing year. Total may not be accurate since registrations may vary by calendar year. Source: GARFO DMIS data and dealer data. Accessed January 2021.

Registered Dealer State	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
CT	2	2	2	2	2	3	3	2	2	2
FL	0	0	0	0	0	0	0	0	1	1
IL	0	0	0	0	0	0	1	1	1	1
MA	41	36	46	40	37	35	34	31	27	22
MD	1	1	3	1	0	1	1	1	1	1
ME	7	10	9	10	11	10	5	8	10	9
NC	0	0	0	9	10	11	7	8	0	6
NH	3	4	3	3	4	4	4	5	4	4
NJ	2	4	2	4	3	4	2	1	3	0
NY	18	20	20	20	20	25	21	17	16	11
RI	11	10	11	13	9	9	8	5	6	6
TX	0	0	0	0	1	1	1	1	1	1
VA	0	1	2	2	2	3	1	2	3	3
VT	0	0	1	0	0	1	1	0	0	0

5.7.5 Landings and Revenue

Table 28 and Figure 4 summarize major landings and revenues trends for the groundfish fishery. While total landed groundfish pounds have decreased over the sector period (from around 60 million pounds to 40 million pounds), the value of the groundfish fishery has declined more rapidly from nearly a $100 million dollar fishery in FY2011 to less than $50 million dollars in FY2019. This is reflected in the average price for groundfish, which declined from around $1.88 per pound in FY2011 to $1.13 per pound in FY2019. Preliminary data from FY2020 also shows continued declines in average prices, for both groundfish and non-groundfish stocks. In March of 2020, the COVID-19 pandemic caused the closure of restaurants around the country, as part of a global trend of closures worldwide. While the full extent of impacts are still unknown, it is likely that such severe market perturbations have had impacts for both the final months of FY2019 and for most, in not all, of FY2020.

Table 32 shows the distribution of groundfish landings by dealer state. In 2019, Massachusetts by far made up the majority share of groundfish landings (95%), followed by Maine (4%), and New Hampshire (1%). While Massachusetts has consistently received the majority of all groundfish pounds since 2010, the share has fluctuated across years; decreasing from 89% in 2010 to 82% in 2012 but rebounding to greater than 90% from 2016 to 2019. New Hampshire and Rhode Island have both experienced declines in their shares of groundfish landings in recent years. In 2012, Maine landings increased from 7% to 11% of total groundfish landings, but has declined in every year since 2015. Similarly, New Hampshire also had a larger share of landings in 2011-2012, between 4% and 5%, but has fallen to 1% in each year between 2015 and 2018 and in 2019 fell below 1%. When looking at the distribution of fishing revenue by state, Massachusetts again accounts for the majority share of groundfish revenue, fluctuating between 81% in 2012 and 92% in 2019 (Table 33). Maine, New Hampshire, and Rhode Island make up the bulk of the remaining share of groundfish revenue, but all three states have experienced a decline over the past five years. In comparison to changes in volume, the distribution of revenue the distribution of revenue is more evenly spread across states than pounds; in 2018, Maine accounted for 8% of groundfish revenue, New Hampshire accounted for 2%, while Connecticut and Rhode Island each accounted for approximately 1% of total groundfish revenue. This trend appears to be weakening, however as of 2019, as fishery landings and revenue become more concentrated in Massachusetts. Other states, including New York, New Jersey, Virginia, Maryland, and North Carolina each had positive landings and revenue in most years but the share of groundfish revenue was less than half a percent in any given year. More detailed information on groundfish landings and revenue by state is provided in Section 5.7.7.

Table 32- Share of allocated groundfish landings by dealer sale state FY2010-2019. Source: GARFO DMIS data and dealer data. Accessed January 2021.

Dealer Sale State	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
CT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
MA	0.89	0.86	0.83	0.84	0.85	0.87	0.91	0.92	0.92	0.95
MD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ME	0.05	0.07	0.11	0.09	0.10	0.08	0.07	0.06	0.05	0.04
NC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NH	0.03	0.05	0.04	0.03	0.02	0.01	0.01	0.01	0.01	0.01
NJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NY	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00
RI	0.02	0.02	0.02	0.03	0.02	0.02	0.01	0.01	0.01	0.00
VA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 33- Share of allocated groundfish revenue by dealer sale state FY2010-2019. Source: GARFO DMIS data and dealer data. Accessed January 2021.

Dealer Sale State	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
CT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
MA	0.89	0.86	0.82	0.81	0.82	0.83	0.86	0.88	0.88	0.92
MD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ME	0.05	0.07	0.10	0.11	0.12	0.10	0.09	0.08	0.08	0.05
NC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NH	0.04	0.05	0.05	0.04	0.03	0.01	0.01	0.02	0.02	0.02
NJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NY	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00
RI	0.02	0.02	0.02	0.04	0.03	0.04	0.03	0.02	0.01	0.01
VA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Recent (FY2016-2018) utilization rates for allocated groundfish stocks are presented in Table 34, and recent catch and ex-vessel price by stock are shown in Table 35. Groundfish revenue and total revenue derived from groundfish trips in the Gulf of Maine and Georges Bank combined with Southern New England/Mid-Atlantic during FY2016-FY2018 is presented in Table 36, and Table 37 shows the distribution of revenue by port.

Table 34- Commercial (sector and common pool) groundfish fishery Utilization rates for allocated groundfish stocks, FY2016-FY2018. Rates >75% are highlighted.

Stock	FY2016 Utilization	FY2017 Utilization	FY2018 Utilization
GB Cod East	60.6	30.5	42.3
GB Cod	97.6	84.4	71.1
GOM Cod	96	96.1	86.7
GB Haddock East	3.6	1.4	4
GB Haddock	8.6	7.8	11.6
GOM Haddock	65.9	75.4	32.8
GB Yellowtail Flounder	9.7	19.4	14.9
SNE/MA Yellowtail Flounder	26.3	6	19.9
CC/GOM Yellowtail Flounder	76.2	60.3	43.3
American Plaice	96.5	89.4	68.6
Witch Flounder	97	67.8	97.9
GB Winter Flounder	72.2	61.4	57.9
GOM Winter Flounder	18	18.3	26.7
SNE Winter Flounder	75.8	72.2	50.1
Redfish	43	45.9	50.1
White Hake	42.9	60.7	77.2
Pollock	16.7	16.9	9.4

Table 35- Stock-level commercial (sector and common pool) landings (thousands of lbs., landed weight) and ex-vessel prices (2018 dollars/lb.)

	Landings				Ex-Vessel Price			
Stock	**2016**	**2017**	**2018**	**Avg.**	**2016**	**2017**	**2018**	**Avg.**
GB Cod East	144	78	198	140	$2.61	$2.83	$2.44	$2.57
GB Cod West	924	734	1,369	1,009	$2.81	$2.76	$2.26	$2.55
GOM Cod	481	469	575	508	$3.13	$3.04	$2.80	$2.98
GB Winter Flounder	929	831	924	895	$3.63	$3.29	$3.26	$3.40
GOM Winter Flounder	234	244	197	225	$2.92	$2.84	$2.67	$2.82
SNE Winter Flounder	978	885	544	802	$3.16	$3.00	$2.77	$3.01
GB Haddock East	847	615	1,085	849	$1.33	$0.96	$0.93	$1.07
GB Haddock West	5,815	6,212	8,021	6,683	$1.30	$1.01	$0.96	$1.07
GOM Haddock	2,902	4,179	5,399	4,160	$1.58	$1.25	$1.15	$1.29
Atlantic Halibut	40	49	52	47	$8.61	$7.01	$6.63	$7.33
White Hake	2,359	3,318	3,433	3,037	$1.95	$1.37	$1.26	$1.48
American Plaice	2,300	2,222	2,248	2,257	$2.65	$2.50	$2.16	$2.43
Pollock	5,674	5,771	6,580	6,008	$1.12	$0.99	$0.82	$0.97
Redfish	8,872	10,181	11,669	10,241	$0.62	$0.55	$0.50	$0.55
Witch Flounder	647	986	1,660	1,097	$3.33	$2.25	$1.67	$2.17
CC/GOM Yellowtail Flounder	537	413	328	426	$1.86	$1.55	$1.16	$1.58
GB Yellowtail Flounder	51	68	61	60	$2.29	$1.80	$1.67	$1.90
SNE Yellowtail Flounder	131	29	16	59	$2.65	$2.67	$2.10	$2.60
Total	***33,865***	***37,283***	***44,358***	***38,502***	***$1.52***	***$1.25***	***$1.11***	***$1.27***

Table 36- Commercial (sector and common pool) groundfish landings and revenue and total landings and revenue (on groundfish trips) in Georges Bank and Southern New England/Mid-Atlantic and the Gulf of Maine. Landings in millions of lbs.; revenue in millions of 2018 dollars.

	Groundfish Landings				Groundfish Revenue			
	2016	**2017**	**2018**	**Avg.**	**2016**	**2017**	**2018**	**Avg.**
GB and SNE/MA	15,741	13,376	16,819	15,312	$25.3	$19.2	$21.2	$21.9
GOM	18,124	23,908	27,539	23,190	$26.1	$27.5	$28.1	$27.2
Total	33,865	37,284	44,358	38,502	$51.4	$46.7	$49.3	$49.1

	Total Landings				Total Revenue			
	2016	**2017**	**2018**	**Avg.**	**2016**	**2017**	**2018**	**Avg.**
GB and SNE/MA	35,356	33,169	35,198	34,575	$41.8	$33.1	$35.3	$36.7
GOM	22,723	28,582	32,090	27,798	$34.4	$36.1	$35.9	$35.5
Total	58,079	61,751	67,288	62,373	$76.2	$69.2	$71.2	$72.2

Table 37- Groundfish revenue (in millions of 2018 dollars) by major port derived from catch in Georges Bank and Southern New England/Mid-Atlantic and the Gulf of Maine.

GB and SNE/MA	2016	2017	2018	Avg.	Avg. % of Total
Boston	$2.7	$2.5	$2.6	$2.6	11.9%
Gloucester	$3.3	$2.1	$2.9	$2.8	12.6%
New Bedford	$12.4	$8.5	$9.6	$10.2	46.5%
Portland	$4.1	$3.6	$3.6	$3.8	17.2%
Other	$2.8	$2.5	$2.4	$2.6	11.8%
Total	***$25.3***	***$19.2***	***$21.2***	***$21.9***	

GOM	2016	2017	2018	Avg.	Avg. % of Total
Boston	$5.2	$5.5	$6.5	$5.7	21.1%
Gloucester	$7.8	$9.6	$9.5	$8.9	32.9%
New Bedford	$1.6	$0.8	$0.3	$0.9	3.2%
Portland	$6.7	$6.7	$6.2	$6.5	24.0%
Other	$4.8	$4.9	$5.7	$5.1	18.8%
Total	***$26.1***	***$27.5***	***$28.1***	***$27.2***	

5.7.6 ACE Leasing

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

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

A hedonic price model of reported inter- and intra-sector ACE leases between FY 2010 and FY 2018 shows quarterly price trends in ace leasing over time (Figure 9). Several stocks do not have many reported trades, or are not associated with prices greater than $0, such as haddock, redfish, and in most periods, pollock. Other stocks show dramatic changes in price over time, yellowtail flounder stocks, traded for higher prices in the early 2010s, but have shown declines in recent years. GOM cod ACE lease prices have increased over time overall, but remains variable quarter to quarter.

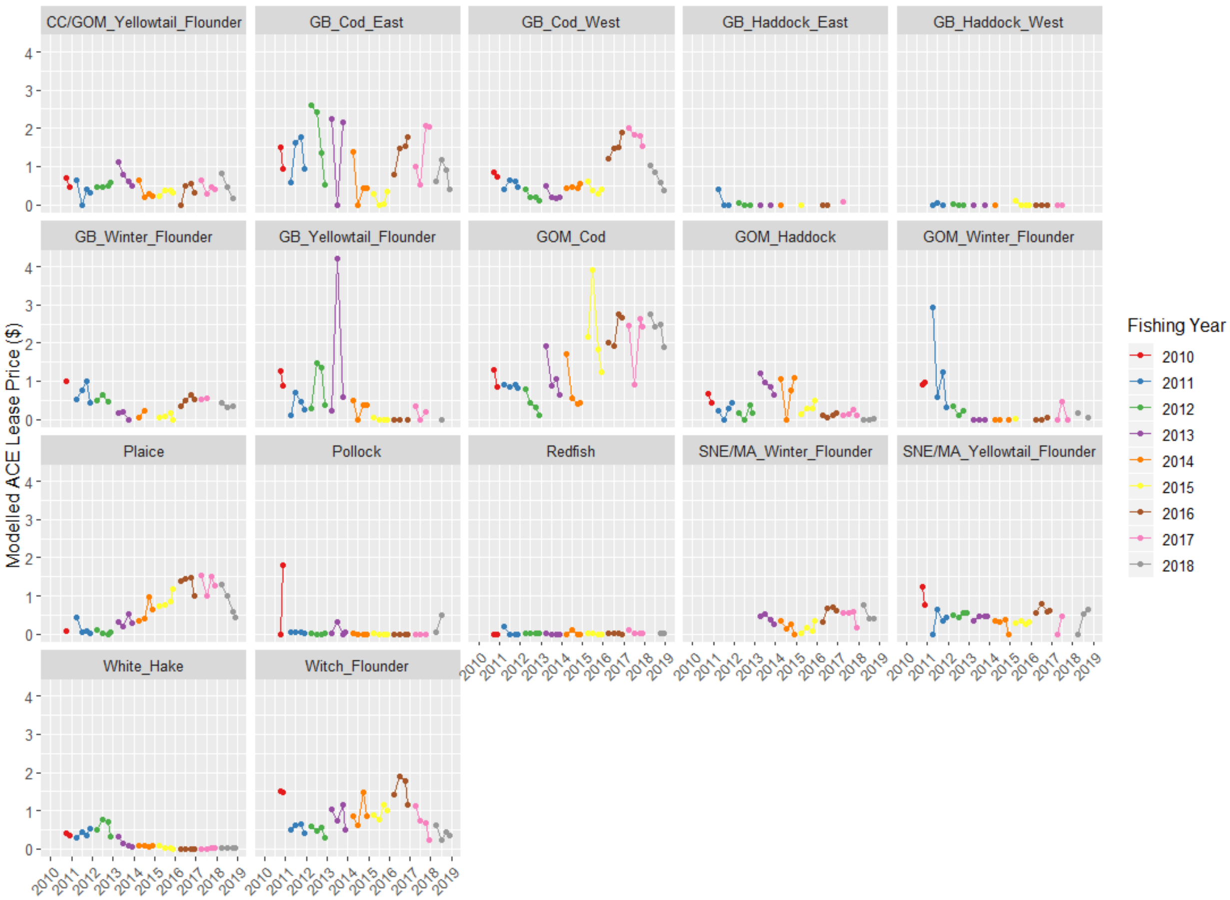


Figure 9- Hedonic model of quarterly ACE lease prices FY 2010 to FY 2018 for allocated groundfish stocks.

Source: SSB model, data from GARFO inter-sector trade tables and sector year end reports.

5.7.7 **Fishing Communities**

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

A “fishing community” is defined in the Magnuson-Stevens Act, as amended in 1996, as “a community which is substantially dependent on or substantially engaged in the harvesting or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew and United States fish processors that are based in such community” (16 U.S.C. § 1802(17)). Determining which fishing communities are “substantially dependent” on and “substantially engaged” in the groundfish fishery can be difficult. Although it is useful to narrow the focus to individual communities in the analysis of fishing dependence, there are a number of potential issues with the confidential nature of the information. There are privacy concerns with presenting the data in such a way that proprietary information (landings, revenue, etc.) can be attributed to an individual vessel or a small group of vessels. This is particularly difficult when presenting information on ports that may only have a small number of active vessels. Table 38 - Table 47 summarize trends by community, when possible, showing the number of dealers, vessels, trips landing in that community or state, as well as the associated groundfish and non-groundfish volume and revenue.

As discussed in Section 6.6.4, Massachusetts has the largest share of groundfish landings and revenue in the region in every year 2010 to 2019 and has several communities that each have high levels of groundfish landings and revenue. At the top, New Bedford and Gloucester each have been the highest grossing communities over the years (Table 38). Over time, revenue in both ports declined, but more slowly in New Bedford than in Gloucester. But in recent years Gloucester has surpassed New Bedford as the top grossing groundfish port at over $18 million in 2019 while New Bedford had around $12 million. Boston is consistently the third highest grossing port in the region, grossing anywhere between $9 and $12 million dollars in any given fishing year. In addition, few vessels deliver to Boston considering the volume it receives; in FY 2018, over $12.5 million dollars of groundfish were landed by 21 vessels. This is in comparison to ports like Chatham, where 27 vessels landed less than a half million dollars of groundfish, in part because majority of the catch being landed on groundfish trips in this port is not groundfish, but mostly because the average trip volume is much lower. In 2018, vessels landing in Chatham earned almost 11.5 times as much from non-groundfish stocks than groundfish stocks (Table 38). This trend has been apparent in most fishing years during the sector program. However, the consolidation of revenue to few dealers is striking even in comparison to ports where the majority of revenue landed on groundfish trips comes from groundfish stocks. For example, in Portland, Maine 29 vessels landed $2.9 million dollars of groundfish in 2018 and only $0.6 million dollars of non-groundfish, a fraction of what was landed in Boston (Table 39). In addition, despite there being 24 to 50 vessels fishing on groundfish trips landing in Point Judith, revenue from groundfish stocks have not exceeded $1 million since 2016 and declined to $0.35 million in 2019 (Table 41). From 2010 to 2016 groundfish revenue in Point Judith typically exceeded $2 million. Fishery landings are highly concentrated in Point Judith compared to the rest of the state, with roughly 97% of groundfish landings (280,000 pounds) going to roughly 15 different dealers. This is also true in Maine, where the majority of groundfish revenue is landed in Portland in recent years, but a slightly larger share of revenue is landed in other ports (10-20% in most years), but no other ports could be separated out, due to confidentiality concerns. Total groundfish revenue in other Maine ports was less than $1 million since 2013 and generally around half a million, except revenue increased to almost three-quarters of a million dollars in 2018. Portland gross revenue has been around $3 million over the last three fishing years, but was highest in 2014 with nearly $6.78 million dollars (Table 39). Due to confidentiality reasons, no New Hampshire communities could be individually separated, in part because of limited activity in the state, compared to other areas. Less than 20 vessels have reported landings on groundfish trips since 2014, declining from a high of 31 in 2010 (Table 40). In addition, less than a million dollars worth of groundfish revenue has been landed in the state over the last five fishing years, which is down from $4.87 million in 2011. Generally, in New Hampshire the majority of total revenue landed on groundfish trips comes from groundfish stocks, especially in the early years of the sector program, but near equal amounts of revenue have been generated from non-groundfish stocks in recent years.

Unlike many of the other port areas discussed, Connecticut has increased its presence in the groundfish fishery over time. Groundfish revenue has increased from roughly $10,000 dollars in 2010 to $400,000 in 2018, despite the number of dealers and vessels remaining relatively constant, if not declining somewhat from early sector years (Table 42). In early years, majority of revenue on groundfish trips was derived from non-groundfish stocks, but in 2018 the ratio of revenue from groundfish to non-groundfish was closer to 1:1, with just over a half million dollars in revenue coming from non-groundfish stocks. This trend may not be lasting, however since groundfish revenue was around $10,000 in each year.

Finally, groundfish revenue from groundfish trips in other port areas south of Connecticut, from New Jersey to North Carolina, has been minimal over the sector period (Table 43, Table 45-Table 47). An exception is Montauk, where $450,000 of groundfish revenue and $270,000 in non-groundfish revenue was landed in 2015, but recently, groundfish and non-groundfish landings and effort has declined every year since 2016, with no recorded groundfish landings in 2019 (Table 44). For all other southern-most states and communities, less than $10,000 in groundfish revenue has been landed in most years, though for many groundfish trips landing non-groundfish is more common; approximately $1.9 million in non-groundfish stocks were landed across these states in 2018, whereas only $428,000 in groundfish was landed in the same states that year.

Table 38- Massachusetts Communities. Highly engaged communities separated, when data confidentiality allows. Landings and revenue represents total groundfish and non-groundfish revenue landed on groundfish trips, by dealer location (Millions of pounds/millions of $2020). Source: GARFO DMIS data. Accessed January 2021.

Dealer Sale Port/State	Metric	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
BOSTON	GF Revenue	13.38	14.08	12.98	11.41	12.4	11.16	9.05	10.69	12.6	12.01
	GF Landings	8.74	9.21	9	8.29	9.22	8.44	6.37	9.23	12.9	11.62
	Dealers	7	6	4	4	4	4	3	3	4	4
	Trips	464	538	499	436	490	436	367	425	461	505
	Vessels	26	26	20	20	23	21	20	19	21	22
	NGF Revenue	2.59	3.01	2.32	2.44	2.53	2.51	2.52	2.72	2.7	2.44
	NGF Landings	0.73	0.97	0.85	0.86	0.84	0.92	0.94	1.23	1.24	1.41
CHATHAM	GF Revenue	2.55	2.76	1.13	0.86	0.58	0.59	0.24	0.49	0.38	0.29
	GF Landings	1.4	1.32	0.47	0.41	0.28	0.27	0.1	0.2	0.17	0.15

CHATHAM	Dealers	5	10	10	10	6	9	8	9	6	8
	Trips	1650	1989	1809	1274	1540	1335	1488	1501	1780	1388
	Vessels	33	29	27	27	19	25	25	29	27	26
	NGF Revenue	2.68	4.02	3.01	2.34	4.36	2.44	3.53	3.49	4.36	2.94
	NGF Landings	4.18	5.63	5.9	3.37	6	4.97	8.42	8.21	8.33	6.31
GLOUCESTER	GF Revenue	32.58	34.06	23.86	17	16.2	16.26	18.62	18.22	18.8	18.91
	GF Landings	19.15	20.97	15.57	12.06	11.65	13.09	14.69	17.37	19.34	19.27
	Dealers	20	24	25	30	24	26	26	30	35	29
	Trips	4479	5267	4498	2464	2065	1906	1692	1852	1950	2056
	Vessels	123	110	98	85	74	69	67	65	63	60
	NGF Revenue	5.31	6.14	4.72	3.95	4.4	4.27	4.99	5.37	4.56	3.91
	NGF Landings	3.26	3.07	3.59	1.87	2.63	2.23	2.32	2.7	2.02	2.38
OTHER MA	GF Revenue	2.03	2.31	0.85	0.37	0.25	0.5	0.19	0.52	0.3	0.43
	GF Landings	0.88	1.01	0.43	0.19	0.11	0.23	0.08	0.21	0.14	0.2
	Dealers	31	28	37	29	24	27	22	20	19	21
	Trips	600	749	567	365	248	343	336	339	340	371
	Vessels	52	42	52	39	34	35	49	40	30	33
	NGF Revenue	0.51	0.69	0.71	0.59	0.68	0.87	1.39	0.9	1.24	1.24
	NGF Landings	0.45	0.7	0.86	0.66	0.49	0.76	0.75	0.27	0.6	0.72
NEW BEDFORD	GF Revenue	33.74	34.18	24.39	21.63	23.26	20.97	16.87	11.75	12.06	12.13
	GF Landings	20.59	19.58	12.74	13.84	15.06	13.66	9.26	7.07	7.95	8.74
	Dealers	18	21	25	22	20	20	21	24	19	19
	Trips	1174	1358	1306	1106	1233	1138	1002	757	471	558
	Vessels	90	90	85	65	61	73	59	52	28	32
	NGF Revenue	6.02	9.37	7.39	6.4	7.1	6.39	7.46	5.35	4.45	3.77
	NGF Landings	3.08	4.81	4.19	3.14	3.75	3.54	3.71	3.51	2.41	2.61
SCITUATE	GF Revenue	0.86	1.29	1.49	0.91	0.56	0.76	0.77	0.73	0.76	0.59
	GF Landings	0.41	0.57	0.72	0.46	0.29	0.41	0.29	0.32	0.4	0.37
	Dealers	12	14	18	13	11	11	9	9	8	10

	Trips	473	568	931	520	370	416	368	388	406	457
	Vessels	12	13	15	9	7	7	10	6	11	10
	NGF Revenue	0.45	0.35	0.54	0.38	0.45	0.66	0.55	0.57	0.45	0.46
	NGF Landings	0.34	0.2	0.88	0.45	0.51	0.25	0.38	0.25	0.21	0.24

Table 39- Maine Communities. Highly engaged communities separated, when data confidentiality allows. Landings and revenue represents total groundfish and non-groundfish revenue landed on groundfish trips, by dealer location (Millions of pounds/millions of $2020). Source: GARFO DMIS data. Accessed January 2021.

Dealer Sale Port/State	Metric	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
OTHER ME	GF Revenue	4.88	1.26	1.11	0.41	0.52	0.52	0.54	0.54	0.74	0.39
	GF Landings	3.01	0.76	0.63	0.22	0.26	0.26	0.2	0.21	0.34	0.22
	Dealers	11	8	11	5	9	10	11	12	10	8
	Trips	783	452	373	178	226	168	158	173	226	156
	Vessels	40	20	24	11	10	8	9	11	8	10
	NGF Revenue	0.55	0.28	0.29	0.08	0.09	0.11	0.07	0.1	0.14	0.11
OTHER ME	NGF Landings	0.37	0.24	0.3	0.12	0.24	0.03	0.02	0.04	0.06	0.06
PORTLAND	GF Revenue	ND	5.53	6.99	6.26	7.05	5.61	4.08	3.17	2.93	2.16
PORTLAND	GF Landings	ND	3.68	4.62	3.63	4.09	3.2	1.91	1.86	1.97	1.29
PORTLAND	Dealers	ND	9	9	9	11	10	5	7	7	8
PORTLAND	Trips	ND	769	792	754	701	467	367	400	425	420
PORTLAND	Vessels	ND	42	44	33	33	28	28	23	29	25
PORTLAND	NGF Revenue	ND	0.88	0.9	0.72	0.63	0.67	0.49	0.67	0.61	0.68
PORTLAND	NGF Landings	ND	0.39	0.32	0.27	0.26	0.27	0.22	0.41	0.42	0.58

Table 40- New Hampshire Communities. Highly engaged communities separated, when data confidentiality allows. Landings and revenue represents total groundfish and non-groundfish revenue landed on groundfish trips, by dealer location (Millions of pounds/millions of $2020). Source: GARFO DMIS data. Accessed January 2021.

Dealer Sale Port/State	Metric	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
NH	GF Revenue	3.54	4.87	3.84	2.27	1.61	0.74	0.73	0.73	0.99	0.87
	GF Landings	1.96	2.89	1.79	1.3	0.76	0.41	0.29	0.32	0.51	0.46
	Dealers	12	12	13	7	7	6	11	13	13	9
	Trips	1242	1732	1737	1108	998	628	487	554	641	597
	Vessels	31	31	28	24	17	15	16	17	18	17
	NGF Revenue	0.44	0.68	0.75	0.42	0.74	0.68	0.5	0.65	0.71	0.66
	NGF Landings	0.72	1.42	1.8	0.61	1.85	1.09	0.83	0.86	0.84	1.05

Table 41- Rhode Island Communities. Highly engaged communities separated, when data confidentiality allows. Landings and revenue represents total groundfish and non-groundfish revenue landed on groundfish trips, by dealer location (Millions of pounds/millions of $2020). Source: GARFO DMIS data. Accessed January 2021.

Dealer Sale Port/State	Metric	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
POINT JUDITH	GF Revenue	1.84	2.19	1.91	2.49	2.04	2.18	1.34	1	0.68	0.35
	GF Landings	1.09	1.24	0.88	1.2	1.06	1.02	0.44	0.33	0.29	0.12
	Dealers	17	20	22	26	24	19	19	14	15	14
	Trips	755	879	989	1172	1042	1069	828	785	772	668
	Vessels	50	43	50	50	48	47	43	35	31	24
	NGF Revenue	3.13	4.58	3.5	3.21	3.77	2.04	1.56	1.26	1.38	1.33
	NGF Landings	4.86	5.68	4.83	4.92	5.47	5	3.46	4.86	4.57	3.97
OTHER RI	GF Revenue	0.12	0.08	0.13	0.06	0.01	0	0.01	0	0.02	0.01
	GF Landings	0.06	0.04	0.05	0.02	0	0	0	0	0.01	0.01
	Dealers	12	8	10	14	10	9	4	5	7	5
	Trips	319	483	436	328	157	73	58	35	42	38
	Vessels	17	16	17	14	14	6	3	3	9	5
	NGF Revenue	1.16	2.06	1.6	1.06	0.52	0.17	0.16	0.12	0.08	0.12
	NGF Landings	1.04	1.83	1.4	1.03	0.5	0.15	0.21	0.12	0.16	0.31

Table 42- Connecticut Communities. Highly engaged communities separated, when data confidentiality allows. Landings and revenue represents total groundfish and non-groundfish revenue landed on groundfish trips, by dealer location (Millions of pounds/millions of $2020). Source: GARFO DMIS data. Accessed January 2021.

Dealer Sale Port/State	Metric	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
CT	GF Revenue	0.01	0.05	0.09	0.21	0.05	0.27	0.21	0.14	0.4	0.1
	GF Landings	0.01	0.03	0.04	0.14	0.03	0.12	0.08	0.05	0.24	0.05
	Dealers	6	11	10	11	7	16	13	11	12	12
	Trips	146	202	170	202	140	239	196	162	186	139
	Vessels	14	15	13	17	14	16	14	11	10	12
	NGF Revenue	0.64	0.78	0.9	0.7	0.58	0.86	0.56	0.43	0.58	0.48
	NGF Landings	0.72	0.53	0.54	0.5	0.4	2.62	1.76	1.19	1.21	0.83

Table 43- New Jersey Communities. Highly engaged communities separated, when data confidentiality allows. Landings and revenue represents total groundfish and non-groundfish revenue landed on groundfish trips, by dealer location (Millions of pounds/millions of $2020). "c" indicates confidential data while "ND" represents no data were available for a given year/location. Source: GARFO DMIS data. Accessed January 2021.

Dealer Sale Port/State	Metric	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
NJ	GF Revenue	0.02	0.02	0.03	0.12	0.02	0.03	0.01	0	0.01	ND
	GF Landings	0.01	0.02	0.02	0.06	0.01	0.02	0	0	0	ND
	Dealers	8	12	11	15	13	15	4	5	9	ND
	Trips	250	265	81	175	110	41	9	13	20	ND
	Vessels	25	24	13	20	19	14	4	6	9	ND
	NGF Revenue	0.97	1	0.25	0.42	0.36	0.22	0.08	0.03	0.09	ND
	NGF Landings	0.62	0.6	0.15	0.36	0.28	0.12	0.03	0.01	0.04	ND

Table 44- New York Communities. Highly engaged communities separated, when data confidentiality allows. Landings and revenue represents total groundfish and non-groundfish revenue landed on groundfish trips, by dealer location (Millions of pounds/millions of $2020). "c" indicates confidential data while "ND" represents no data were available for a given year/location. Source: GARFO DMIS data. Accessed January 2021.

Dealer Sale Port/State	Metric	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
HAMPTON BAYS	GF Revenue	0.04	0.02	0.04	0.05	0.09	0.17	0.11	0.05	0.02	0
	GF Landings	0.02	0.01	0.02	0.02	0.04	0.09	0.04	0.02	0.01	0
	Dealers	10	13	15	15	15	10	13	12	10	11
	Trips	202	205	200	225	408	126	210	255	222	136

	Vessels	12	13	9	11	8	7	9	9	8	7
	NGF Revenue	0.39	0.54	0.51	0.49	1.11	0.17	0.63	0.81	0.69	0.45
	NGF Landings	0.19	0.26	0.3	0.31	0.36	0.07	0.16	0.14	0.11	0.07
MONTAUK	GF Revenue	0.19	0.06	0.19	0.41	0.24	0.45	0.2	0.07	0.01	0.01
	GF Landings	0.09	0.03	0.1	0.21	0.13	0.2	0.07	0.02	0.01	0
	Dealers	19	21	25	27	17	19	17	14	14	16
	Trips	302	333	341	317	192	258	153	84	92	78
	Vessels	19	23	27	21	14	21	20	16	11	12
	NGF Revenue	0.84	1.16	1.31	0.81	0.58	0.27	0.22	0.15	0.16	0.16
	NGF Landings	0.59	0.71	0.81	0.58	0.37	0.17	0.14	0.09	0.17	0.12
OTHER NY	GF Revenue	0	0.01	0	0.01	0.02	0.01	c	c	ND	c
	GF Landings	0	0.01	0	0	0.01	0	c	c	ND	c
	Dealers	8	9	4	7	5	5	2	2	ND	1
	Trips	50	73	9	53	16	11	2	3	ND	8
	Vessels	7	10	4	9	5	5	2	2	ND	1
	NGF Revenue	0.13	0.14	0.01	0.07	0.03	0.01	c	c	ND	c
	NGF Landings	0.08	0.08	0	0.04	0.03	0	c	c	ND	c

Table 45- Maryland Communities. Highly engaged communities separated, when data confidentiality allows. Landings and revenue represents total groundfish and non-groundfish revenue landed on groundfish trips, by dealer location (Millions of pounds/millions of $2020). "c" indicates confidential data while "ND" represents no data were available for a given year/location. Source: GARFO DMIS data. Accessed January 2021.

Dealer Sale Port/State	Metric	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
MD	GF Revenue	0	0	0	0	c	ND	ND	ND	ND	ND
	GF Landings	0	0.01	0	0	c	ND	ND	ND	ND	ND
	Dealers	3	3	5	4	4	ND	ND	ND	ND	ND
	Trips	26	50	35	30	13	ND	ND	ND	ND	ND
	Vessels	3	3	4	3	2	ND	ND	ND	ND	ND
	NGF Revenue	0.07	0.15	0.13	0.09	c	ND	ND	ND	ND	ND
	NGF Landings	0.04	0.11	0.08	0.09	c	ND	ND	ND	ND	ND

Table 46- Virginia Communities. Highly engaged communities separated, when data confidentiality allows. Landings and revenue represents total groundfish and non-groundfish revenue landed on groundfish trips, by dealer location (Millions of pounds/millions of $2020). "c" indicates confidential data while "ND" represents no data were available for a given year/location. Source: GARFO DMIS data. Accessed January 2021.

Dealer Sale Port/State	Metric	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
VA	GF Revenue	0	0	0	0.03	0	0	0	0	0	0
	GF Landings	0	0	0	0.02	0	0	0	0	0	0
	Dealers	4	5	11	11	9	9	5	3	6	3
	Trips	180	183	146	134	93	50	16	5	8	6
	Vessels	11	10	16	19	20	15	9	4	5	3
	NGF Revenue	0.5	0.75	1.19	1.16	0.96	0.7	0.52	0.14	0.24	0.14
	NGF Landings	0.42	0.49	0.68	0.65	0.5	0.28	0.17	0.04	0.08	0.07

Table 47- North Carolina Communities. Highly engaged communities separated, when data confidentiality allows. Landings and revenue represents total groundfish and non-groundfish revenue landed on groundfish trips, by dealer location (Millions of pounds/millions of $2020). "c" indicates confidential data while "ND" represents no data were available for a given year/location. Source: GARFO DMIS data. Accessed January 2021.

Dealer Sale Port/State	Metric	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
NC	GF Revenue	ND	ND	ND	0	0	0	0	0	0	0.01
	GF Landings	ND	ND	ND	0	0	0	0	0	0	0
	Dealers	ND	ND	ND	22	14	28	16	12	24	24
	Trips	ND	ND	ND	13	30	36	16	12	7	7
	Vessels	ND	ND	ND	8	11	12	10	8	4	5
	NGF Revenue	ND	ND	ND	3.75	9.86	9.45	2.84	3.77	1.29	1.21
	NGF Landings	ND	ND	ND	1.91	3.75	3.41	0.81	1.09	0.43	0.59

5.7.7.1 Community Fishing Engagement and Social Vulnerability Indicators

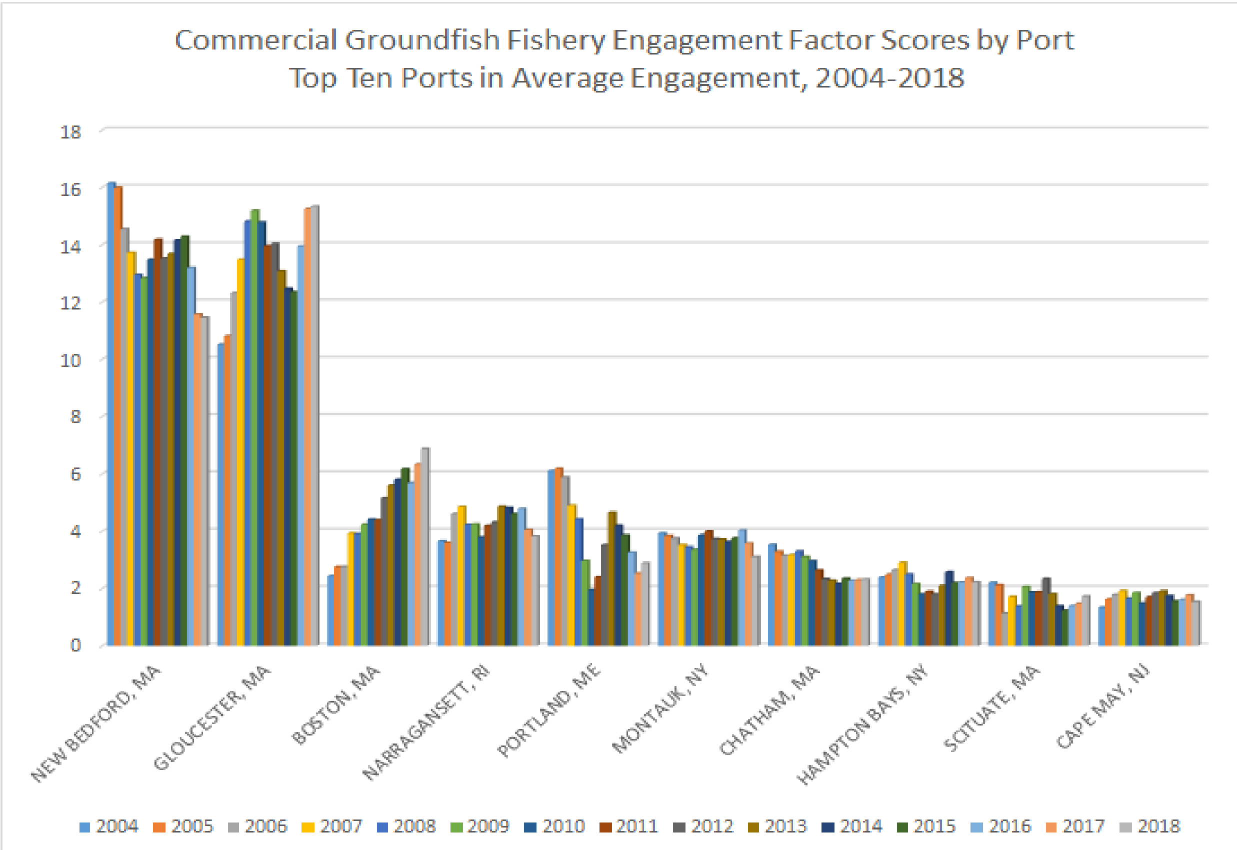
In addition to primary and secondary port classifications for groundfish landings and revenue, fishing communities can also be understood in terms of overall engagement in the commercial groundfish fishery and other social and economic community conditions. NOAA Fisheries social scientists produce indicators of commercial fishing engagement, reliance, and other community characteristics for virtually all fishing communities throughout United States, referred to as the Social Indicators of Fishing Community Vulnerability and Resilience (Colburn and Jepson 2012). The Social Indicators are composite indices of factors that comprise community-level latent constructs, such as commercial fishing engagement or social vulnerability. The strength of these indicators is that they provide greater depth and contextualization to our understanding of fishing communities than the more commonly utilized landings and revenue statistics. The Social Indicators provide a more comprehensive view of fishing communities by including social and economic conditions that can influence the viability of commercial fishing activities, such as gentrification pressure, poverty, and housing characteristics, among other factors.

5.7.7.1.1 2004-2018 Groundfish-Specific Commercial Engagement

The Groundfish-Specific Engagement Indicator is a numerical index that reflect the level of a community's engagement in the groundfish fishery relative to other communities in the Northeast. This index was generated using a principal components factor analysis (PCFA) of variables related to groundfish fishing activity from NOAA Fisheries regional datasets. PCFA is a common statistical technique used to identify factors that are related, yet linearly independent, and likely represent a latent or unobservable concept when considered together, such as factors that contribute to the level of a community's social vulnerability or engagement in commercial fishing. The variables that were identified to best reflect community engagement in the groundfish fishery were the value of groundfish landings (in dollars), the groundfish pounds landed, the number of federally permitted dealers that purchased at least one pound of groundfish, and the number of vessels with at least one category of large mesh groundfish permit (multiple permits on one vessel in a given year are not double counted). It should be noted that a high engagement score does not necessarily mean that a community or its fishery participants are solely dependent upon commercial groundfish fishing activities. There may be other commercial fishing or economic activities that may sustain the livelihoods of individuals or entities within these communities that have relied on groundfish historically.

Figure 10 displays the factor scores for the Groundfish-Specific Commercial Engagement Indicator for the ten communities that have the highest average commercial engagement with groundfish between 2004 and 2018. The index factor scores are commonly categorized from low to high based on the number of standard deviations from the mean, which is set at zero. Categories rank from 0.00 or below as "low", 0.00 – 0.49 as "medium," and 0.50 – 0.99 as "medium-high," and 1 standard deviation or above as "high." All of the ports displayed in Figure 10 have "high" commercial groundfish engagement, but New Bedford and Gloucester have had dramatically higher levels of engagement in commercial groundfish than other highly engaged ports over the last fifteen years. These two communities had more than twice the level of engagement in commercial groundfish than the third most highly engaged community, Boston, MA. The remaining seven highly engaged communities included, in order of their levels of engagement: Narragansett/Point Judith, RI, Portland, ME, Montauk, NY, Chatham, MA, Hampton Bays/Shinnecock, NY, Scituate, MA, and Cape May, NJ. Most of these communities have fluctuated in engagement over time, but New Bedford, Portland, and Chatham have displayed a clear trend of declining engagement over the fifteen-year period from 2004 to 2018. Boston has been the only community with a clear trend of increasing engagement over this period. In recent years, Narragansett/Point Judith and Montauk have declined in engagement in commercial groundfish.

Figure 10- Commercial Groundfish Fishery Engagement Scores



5.7.7.1.2 2012-2016 Community Social Vulnerability and Gentrification Pressure Indicators

The Community Social Vulnerability Indicators include indices of labor force structure, housing characteristics, poverty, population composition, and personal disruption. The labor force structure index measures the makeup of the labor force and is reversed scored so that a higher factor score represents fewer employment opportunities and greater labor force vulnerability. The housing characteristics index measures vulnerability related to infrastructure and home and rental values. It is also reversed score so that a higher score represents more vulnerable housing infrastructure. The poverty index captures multiple different factors that contribute to an overall level of poverty in a given area. A higher poverty index score would indicate a greater level of vulnerability due to a higher proportion of residents receiving public assistance and below federal poverty limits. The population composition index measures the presence of vulnerable populations (i.e., children, racial/ethnic minorities, and/or single-parent, female-headed households) and a higher score would indicate that a community's population is composed of more vulnerable individuals. Finally, the personal disruption index considers variables that affect individual-level vulnerability primarily and include factors such as low individual-level educational attainment or unemployment. Higher scores of personal disruption likely indicate greater levels of individual vulnerability within a community, which can in turn impact the overall level of community social vulnerability.

Gentrification Pressure Indicators include housing disruption, urban sprawl, and retiree migration. The Housing Disruption Index combines factors that correspond to unstable or shifting housing markets in which home values and rental prices may cause residents to become displaced. The Urban Sprawl Index indicates the extent of population increase due to migration from urban centers to suburban and rural areas, which often results in cost of living increases and gentrification in the destination communities. The Retiree Migration Index characterizes communities by the concentration of retirees or individuals above retirement age whose presence often raises the home values and rental rates, as well as increase the need for health care and other services.

Data used to develop these indices come from multiple secondary data sources, but primarily the U.S. Census American Community Survey (ACS) at the place level (Census Designated Place (CDP) and Minor Civil Division (MCD)). More information about the data sources, methods, and other background details can be found online at https://www.st.nmfs.noaa.gov/humandimensions/social-indicators/.

Table 48- Community Social Vulnerability Indicator Categorical Scores

Community	Total Population	Poverty	Labor Force	Housing Characteristics	Population Composition	Personal Disruption
New Bedford, MA	94,988	High	Low	Med-High	Med-High	Med-High
Gloucester, MA	29,546	Low	Low	Medium	Low	Low
Boston, MA	658,279	Med-High	Low	Low	Med-High	Medium
Narragansett, RI	15,672	Low	Medium	Low	Low	Low
Portland, ME	66,649	Med-High	Low	Medium	Low	Low
Montauk, NY	3,510	Low	Medium	Low	Low	Low
Chatham, MA	1,429	Medium	Med-High	Medium	Low	Low
Hampton Bays, NY	13,040	Low	Low	Low	Low	Low
Scituate, MA	18,390	Low	Low	Low	Low	Low
Cape May, NJ	3,529	Low	High	Medium	Low	Low

Table 49- Community Gentrification Pressure Indicator Categorical Scores

Community	Housing Disruption	Retiree Migration	Urban Sprawl
New Bedford, MA	Medium	Low	Med-High
Gloucester, MA	Medium	Low	Medium
Boston, MA	Med-High	Low	High
Narragansett, RI	Med-High	Medium	Low
Portland, ME	Med-High	Low	Medium
Montauk, NY	High	Med-High	Med-High
Chatham, MA	Medium	High	Medium
Hampton Bays, NY	High	Medium	Med-High
Scituate, MA	Med-High	Low	Med-High
Cape May, NJ	High	High	Low

5.7.7.2 Employment

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

Throughout the Northeast, many communities benefit indirectly from the multispecies fishery, but these benefits are often difficult to attribute. The direct benefit from employment in the fishery can be estimated by the number of crew positions. However, crew positions do not equate to the number of jobs in the fishery and do not make the distinction between full and part-time positions. In FY 2018, vessels with limited access groundfish permits provided 1,877 crew positions, with 46% coming from vessels with homeports in Massachusetts (Table 50). Since at least FY 2010, the total number of crew positions provided by limited access groundfish vessels has declined by 17.6%. Changes in crew positions vary across homeport states.

A crew day[29] is a measure of employment that incorporates information about the time spent at sea earning a share of the revenue. Conversely, crew days can be viewed as an indicator of time invested in the pursuit of "crew share" (the share of trip revenues received at the end of a trip). The time spent at sea has an opportunity cost. For example, if crew earnings remain constant, a decline in crew days would reveal a benefit to crew in that less time was forgone for the same amount of earnings. In FY 2018, vessels with limited access groundfish permits used 144,400 crew days, with 46% coming from vessels with homeports in Massachusetts (Table 50). Since at least FY 2010, the total number of crew days used by limited access groundfish vessels across the Northeast has declined, with a slight increase from FY 2014 to FY 2016. The number of crew positions and crew days give some indication of the direct benefit to communities from the multispecies fishery through employment. But these measures, by themselves, do not show the benefit or lack thereof at the individual level. Many groundfish captains and crew are second- or third-generation fishermen who hope to pass the tradition on to their children. This occupational transfer is an important component of community continuity as fishing represents a valued occupation in many of the smaller port areas.

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

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

		FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2016	FY 2018
CT	positions	38	41	39	39	46	50	44	44	41
	days	4016	3002	4478	3576	2946	3412	3616	3309	3519
MA	positions	1134	1070	1050	984	979	950	963	930	886
	days	81848	84021	81687	73646	73782	76411	75355	66523	65823
ME	positions	252	228	243	223	220	185	189	199	189
	days	15475	14781	16546	15270	14309	12344	12928	12528	10572
NH	positions	107	105	96	87	77	57	72	66	72
	days	3883	4939	5166	4512	4070	3306	3146	2741	3249
NJ	positions	149	145	149	153	149	155	157	169	162
	days	10084	9906	10333	9664	9334	10219	11603	12071	11803
NY	positions	209	217	209	194	192	173	170	178	168
	days	15802	16048	15114	14636	14365	13658	14579	14738	14314
RI	positions	253	248	232	224	225	223	216	225	221
	days	26769	25165	24258	25629	23107	23699	23707	23532	24447
Other	positions	130	128	128	134	131	138	145	139	139
	days	11867	11597	11648	11199	9567	11521	11900	11837	10673
Total	**Total crew positions**	2271	2183	2147	2038	2019	1931	1956	1950	1877
	Total crew days	169744	169459	169231	158132	151479	154570	156835	147280	144400

Source: GARFO DMIS tables. Accessed 8/14/2019.

5.7.8 Consolidation and Redirection

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

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

5.7.9 Regulated Groundfish Stock Catch

The Northeast Multispecies FMP specifies Annual Catch Limits (ACLs) for 20 stocks. Exceeding an ACL for a stock results in the implementation of Accountability Measures (AMs) to prevent overfishing. The ACL is sub-divided into different components. Those components that are subject to AMs are referred to as sub-ACLs. There are also components of the fishery that are not subject to AMs. These include state waters catches that are outside of federal jurisdiction, and a category referred to as “other sub-components” that combines small catches from various fisheries. The tables in this section summarizes the most recent completed fishing year (2019) catches.

Table 51- FY2019 Northeast Multispecies Percent of Annual Catch Limit Caught (%)

Stock	Components with ACLs and sub-ACLs: With Accountability Measures (AMs)								Sub-components: No AMs	
	Total	Groundfish Fishery	Sector	Common Pool	Recreational	Midwater Trawl Herring Fishery	Scallop Fishery	Small Mesh Fisheries	State Water	Other
	A to H	A+B+C	A	B	C	D	E	F	G	H
GB Cod	36.9	34.0	35.0	3.5					78.1	61.4
GOM Cod	59.6	60.1	80.3	53.3	36.3				61.4	17.1
GB Haddock	9.6	9.9	10.1	0.1		0.0			0.8	4.2
GOM Haddock	35.2	34.6	43.1	13.7	13.3	0.1			164.6	23.7
GB Yellowtail Flounder	4.7	3.1	3.2	-			96.0	1.5	NA	NA
SNE Yellowtail Flounder	10.4	6.3	7.0	3.2			112.6		2.3	11.0
CC/GOM Yellowtail Flounder	47.2	36.7	37.4	23.9					83.5	104.1
Plaice	56.8	57.3	58.2	14.2					38.6	56.3
Witch Flounder	87.3	89.5	91.6	12.7					51.1	78.0
GB Winter Flounder	41.9	39.6	41.3	-					NA	189.7
GOM Winter Flounder	34.3	16.6	16.9	9.9					126.6	47.7
SNE/MA Winter Flounder	42.2	27.8	30.4	11.8					12.4	130.7
Redfish	44.3	45.2	45.4	0.7					4.3	0.5
White Hake	74.7	75.5	75.8	32.3					1.7	80.4
Pollock	9.3	8.3	8.3	6.3					50.0	70.3
Northern Windowpane	79.0	34.5	NA	NA			140.9		8.4	689.5
Southern Windowpane	76.6	61.7	NA	NA			36.5		56.9	111.8
Ocean Pout	54.8	19.8	NA	NA					17.1	202.6
Halibut	102.9	106.4	NA	NA					102.8	38.4
Wolffish	3.1	3.0	NA	NA					6.3	7.7

Source: NMFS Greater Atlantic Regional Fisheries Office, October 20, 2020, run date of September 17, 2020.

Table 52- FY 2019 Northeast Multispecies Total Catch (mt)

Stock	Total Catch	Groundfish Fishery	Sector	Common Pool	Recreational	Midwater Trawl Herring Fishery	Scallop Fishery[1]	Small Mesh Fisheries	State Water	Other
	A to H	A+B+C	A	B	C	D	E	F	G	H
GB Cod	641.7	532.4	530.5	1.9					14.1	95.2
GOM Cod	396.8	366.4	280.9	5.8	79.8				28.9	1.5
GB Haddock	5323.4	5294.1	5293.5	0.6		0.2			4.8	24.3
GOM Haddock	4152.3	3980.8	3544.4	13.1	423.2	0.1			149.8	21.6
GB Yellowtail Flounder	4.8	3.1	3.1	-			1.7	0.0	-	0.0
SNE/MA Yellowtail Flounder	6.9	2.8	2.5	0.3			2.1		0.0	1.9
CC/GOM Yellowtail Flounder	231.4	146.2	141.1	5.1					42.6	42.7
Plaice	870.9	840.6	836.1	4.5					12.3	18.0
Witch Flounder	827.3	764.0	761.0	2.9					20.4	42.9
GB Winter Flounder	329.0	306.2	306.2	-					-	22.8
GOM Winter Flounder	146.9	58.7	56.9	1.8					84.8	3.3
SNE/MA Winter Flounder	295.4	143.8	135.1	8.7					9.1	142.5
Redfish	4963.0	4957.3	4956.9	0.4					5.1	0.6
White Hake	2088.0	2064.2	2057.4	6.8					0.5	23.3
Pollock	3569.6	3085.6	3070.1	15.6					201.2	282.7
Northern Windowpane	68.0	21.8	21.7	0.0			25.4		0.2	20.7
Southern Windowpane	350.0	32.7	30.0	2.7			57.7		15.9	243.6
Ocean Pout	65.7	18.6	18.4	0.2					0.5	46.6
Halibut	102.9	79.8	76.6	3.2					21.6	1.5
Wolffish	2.6	2.4	2.4	0.0					0.1	0.1

[1] Based on scallop fishing year April 2019 through March 2020
Values in metric tons of live weight
Sector and common pool include estimate of missing dealer reports
Source: NMFS Greater Atlantic Regional Fisheries Office, October 20, 2020, run date of September 17, 2020.

Any value for a non-allocated species may include landings of that stock or misreporting of species and/or stock area. These are northern windowpane, southern windowpane, ocean pout, halibut, and wolffish.

Table 53- FY2019 Northeast Multispecies Other Sub-Component Catch Detail (mt)

Stock	Total	SCALLOP[1]	FLUKE	HAGFISH	HERRING	LOBSTER/ CRAB[2]	MACKEREL	MENHADEN	MONKFISH	REDCRAB	RESEARCH
GB Cod	95.2	3.7	0.0	-	0.0	0.3	0.0	-	0.2	-	0.3
GOM Cod	1.5	0.2	-	-	0.1	0.1	0.0	-	-	-	0.5
GB Haddock	24.3	7.2	0.3	-	0.1*	-	0.2	-	0.1	-	9.4
GOM Haddock	21.6	-	-	-	1.5*	0.0	0.0	-	-	-	7.2
GB Yellowtail Flounder	0.0	-*	-	-	0.0*	-	0.0	-	-	-	-
SNE Yellowtail Flounder	1.9	-*	0.2	-	0.0	-	0.0	-	0.0	-	0.0
CC/GOM Yellowtail Flounder	42.7	10.8	-	-	5.7	0.1	0.0	-	0.0	-	0.3
American Plaice	18.0	11.2	0.1	-	0.1	-	0.2	-	0.0	-	0.1
Witch Flounder	42.9	23.9	1.0	0.0	0.2	0.0	0.4	-	0.0	0.0	0.2
GB Winter Flounder	22.8	22.7	-	-	0.0	-	0.0	-	-	-	-
GOM Winter Flounder	3.3	1.3	-	-	0.2	0.0	-	-	-	-	0.2
SNE Winter Flounder	142.5	39.0	5.4	-	1.0	0.0	2.4	-	0.1	-	0.4
Redfish	0.6	0.0	-	-	0.0	-	0.0	-	-	-	0.1
White Hake	23.3	1.9	0.1	0.0	0.3	0.0	0.5	-	0.0	0.0	1.2
Pollock	282.7	-	-	-	0.0	-	0.0	-	0.0	-	0.2
Northern Windowpane	20.7	-*	-	-	0.4	-	0.0	-	0.0	-	0.0
Southern Windowpane	243.6	-*	39.3	-	0.8	-	2.7	-	0.5	-	0.0
Ocean Pout	46.6	3.7	0.2	-	0.6	-	1.1	-	0.0	-	0.0
Halibut	1.5	0.5	-	-	-	0.8	-	-	0.0	-	0.0
Wolffish	0.1	0.1	-	-	-	-	0.0	-	-	-	0.0

¹ Based on scallop fishing year April 2019 through March 2020

² Landings only. Discard estimates not applicable. Lobster/crab discards were not attributed to the ACL, consistent with the most recent assessments for these stocks used to set the respective quotas.

*Some or all catch attributed to separate sub-ACL, and so is not included above.

Values in metric tons of live weight

Source: NMFS Greater Atlantic Regional Fisheries Office, October 20, 2020, run date of Sept 17, 2020.

Table 53 Continued.

Stock	Total	SCUP	SHRIMP	SQUID	SQUID/ WHITING	SURFCLAM	WHELK/ CONCH	WHITING	UNCATEGORIZED	RECREATIONAL
GB Cod	95.2	0.0	0.0	1.1	0.1	0.0	-	0.0	0.6	88.9
GOM Cod	1.5	-	-	0.0	0.2	0.0	-	0.1	0.4	-*
GB Haddock	24.3	0.2	0.0	5.2	0.4	0.2	-	0.0	1.2	
GOM Haddock	21.6	-	-	0.3	5.3	0.0	-	2.3	4.9	-*
GB Yellowtail Flounder	0.0	-	-*	0.0*	0.0	-	-	-	0.0*	
SNE Yellowtail Flounder	1.9	0.1	0.0	1.1	0.1	0.0	-	0.0	0.3	
CC/GOM Yellowtail Flounder	42.7	-	-	2.1	15.9	0.9	-	3.1	3.7	
American Plaice	18.0	0.1	0.0	4.8	0.4	0.2	-	0.0	0.9	
Witch Flounder	42.9	0.7	0.1	12.0	0.9	0.4	0.0	0.1	3.1	
GB Winter Flounder	22.8	-	-	0.0	0.0	-	-	-	0.0	
GOM Winter Flounder	3.3	-	-	0.0	0.6	0.0	-	0.3	0.5	0.2
SNE Winter Flounder	142.5	3.4	0.5	66.4	4.8	2.9	-	0.0	16.0	0.2
Redfish	0.6	0.0	0.0	0.3	0.0	0.0	-	0.0	0.1	
White Hake	23.3	0.1	0.1	14.9	1.2	0.5	0.0	0.1	2.5	
Pollock	282.7	-	0.0	0.9	0.1	0.0	-	0.0	0.3	281.3
Northern Windowpane	20.7	-	-	17.3	1.5	0.2	-	0.2	1.0	
Southern Windowpane	243.6	27.5	0.5	101.8	7.6	6.0	-	0.0	56.8	
Ocean Pout	46.6	0.1	0.2	31.9	2.4	1.0	-	0.1	5.3	
Halibut	1.5	-	-	0.0	0.1	-	-	-	0.0	
Wolffish	0.1	-	-	0.0	-	0.0	-	-	0.0	

Values in metric tons of live weight
*Some or all catch attributed to separate sub-ACL, and so is not included above.
Values in metric tons of live weight
Source: NMFS Greater Atlantic Regional Fisheries Office, October 20, 2020, run date of Sept 17, 2020.

5.7.10 Fishery Sub-Components

5.7.10.1 Sector Harvesting Component

In FY2010, the sector vessels landed the overwhelming majority of groundfish landed. Each sector receives a total amount of fish it can harvest for each stock, its Annual Catch Entitlement (ACE). Since the ACE is dependent on the amount of the ACL in a given fishing year, the ACE may be higher or lower from year to year even if the sector's membership remains the same. There have been substantial shifts in commercial groundfish sub-ACLs for various stocks between FY2010 and FY2015. There has been a general decrease in trips, and catch for sector vessels, and there has been a shift in effort out of the groundfish fishery into other fisheries. However, these changes may correlate to a certain extent with the decrease in ACL.

Combined, 138.7 million (live) pounds of ACE were allotted to the sectors in 2015 but only 47.1 million (live) pounds were landed. Of the 16 ACEs allocated to sectors in 2015, 5 stocks approached or exceeded the catch limit (>80% conversion) set by the total allocated ACE (Table 54). This is an increase from 2014 when the fleet caught over 80% of the allocation for 2 stocks. Overall, the fleet landed 34% of the total allocated ACE in 2015. As has been the case in previous years, Georges Bank haddock, particularly East GB haddock, accounted for a majority of the unrealized landings. East GB haddock comprises almost 24% of total allocated ACE, yet only 5% of total catch. In general, total allocations have decreased since 2010 and total catch has never been above 40% of the allocation.

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

	2010			2011			2012		
	Allocated ACE	Sector Catch	% Caught	Allocated ACE*	Sector Catch	% Caught	Allocated ACE*	Sector Catch	% Caught
GB Cod East	717,431	568,399	79.2%	431,348	357,402	82.9%	350,826	145,249	41.4%
GB Cod West	6,563,092	5,593,020	85.2%	9,544,288	6,826,211	71.5%	10,542,396	3,360,445	31.9%
GOM Cod	9,540,380	8,074,730	84.6%	11,357,667	9,663,695	85.1%	9,008,547	4,798,617	53.3%
GB Haddock East	26,262,687	4,131,306	15.7%	21,122,567	2,343,807	11.1%	15,126,206	813,955	5.4%
GB Haddock West	62,331,174	14,118,062	22.7%	54,741,822	6,191,370	11.3%	51,898,287	1,825,266	3.5%
GOM Haddock	1,761,196	845,909	48.0%	1,871,947	1,082,224	57.8%	1,599,126	539,838	33.8%
GB Yellowtail Flounder	1,770,443	1,637,353	92.5%	2,474,650	2,194,655	88.7%	802,645	472,983	58.9%
SNE/MA Yellowtail	517,366	335,628	64.9%	941,753	824,232	87.5%	1,422,806	942,096	66.2%
CC/GOM Yellowtail	1,608,077	1,268,597	78.9%	2,169,507	1,792,853	82.6%	2,448,231	2,100,705	85.8%
American Plaice	6,058,141	3,355,510	55.4%	7,302,366	3,614,121	49.5%	7,771,243	3,528,323	45.4%
Witch Flounder	1,824,114	1,568,774	86.0%	2,847,243	2,205,548	77.5%	3,409,449	2,162,764	63.4%
GB Winter Flounder	4,018,487	3,081,050	76.7%	4,796,100	4,261,052	88.8%	7,752,474	4,255,918	54.9%
GOM Winter Flounder	293,728	186,156	63.4%	716,979	351,182	49.0%	1,590,291	568,974	35.8%
SNE Winter Flounder	Not			Not allocated			Not allocated		
Redfish	14,894,611	4,717,742	31.7%	18,034,598	6,016,717	33.4%	19,933,111	9,748,226	48.9%
White Hake	5,522,667	5,023,212	91.0%	7,038,737	6,690,235	95.0%	7,527,504	5,397,291	71.7%
Atlantic Pollock	35,666,736	12,191,019	34.2%	34,096,301	16,743,220	49.1%	30,670,578	14,075,466	45.9%
Grand Total	**179,350,330**	**66,696,468**	**37.2%**	**179,487,873**	**71,158,525**	**39.6%**	**171,853,720**	**54,736,115**	**31.9%**

Table 54 cont.

	2013			2014			2015		
	Allocated ACE*	Sector Catch	% Caught	Allocated ACE*	Sector Catch	% Caught	Allocated ACE*	Sector Catch	% Caught
GB Cod East	199,316	73,459	36.9%	320,115	151,481	47.3%	267,438	180,790	67.6%
GB Cod West	4,701,617	3,323,371	70.7%	3,711,231	2,856,702	77.0%	3,794,124	3,348,94	88.3%
GOM Cod	1,932,983	1,614,154	83.5%	1,942,248	1,438,207	74.0%	487,714	400,325	82.1%
GB Haddock East	8,249,374	1,276,536	15.5%	20,842,603	3,386,572	16.2%	33,169,495	2,332,37	7.0%
GB Haddock West	55,258,296	5,288,353	9.6%	18,772,954	8,619,232	45.9%	16,937,341	8,854,75	52.3%
GOM Haddock	549,390	372,967	67.9%	990,983	712,427	71.9%	2,176,822	1,601,08	73.6%
GB Yellowtail Flounder	336,520	123,102	36.6%	552,360	137,458	24.9%	438,775	84,653	19.3%
SNE/MA Yellowtail	1,203,202	625,321	52.0%	1,095,787	687,783	62.8%	1,090,289	384,410	35.3%
CC/GOM Yellowtail	1,245,854	830,842	66.7%	1,075,286	548,892	51.0%	1,016,665	819,382	80.6%
American Plaice	3,770,923	3,068,524	81.4%	3,150,789	2,847,669	90.4%	3,208,080	3,011,60	93.9%
Witch Flounder	1,334,426	1,409,406	105.6%	1,243,356	1,132,978	91.1%	1,384,796	1,153,36	83.3%
GB Winter Flounder	8,457,031	3,796,413	44.9%	7,630,025	2,533,764	33.2%	4,257,628	1,915,35	45.0%
GOM Winter Flounder	1,666,641	370,582	22.2%	1,589,104	272,652	17.2%	862,903	259,179	30.0%
SNE Winter Flounder	2,367,906	1,477,347	62.4%	2,483,812	1,078,323	43.4%	2,679,320	1,286,15	48.0%
Redfish	24,061,105	8,826,237	36.7%	24,420,595	10,361,980	42.4%	25,431,305	11,649,8	45.8%
White Hake	9,130,460	4,513,217	49.4%	9,861,411	3,840,528	38.9%	10,003,287	3,524,83	35.2%
Atlantic Pollock	30,933,568	10,755,436	34.8%	30,498,020	8,753,123	28.7%	31,543,570	6,342,46	20.1%
Grand Total	**155,398,612**	**47,745,266**	**30.7%**	**130,180,679**	**49,359,772**	**37.9%**	**138,749,552**	**47,149,5**	**34.0%**

*includes sector carryover
Catch amounts updated using the most recent available data.

Source: NMFS Greater Atlantic Regional Fisheries Office, Summary Tables for FY 2015 Northeast Multispecies Fishery, Accessed February 2018 (Table 31).

5.7.10.2 Common Pool Harvesting Component

With the adoption of Amendment 16, most commercial groundfish fishing activity occurs under sector management regulations. Some vessels have elected to not join sectors, and continue to fish under the effort control system. Collectively, this part of the fishery is referred to as the "common pool." These vessels fish under both limited access and open access groundfish fishing permits. Common pool vessels accounted for only a small amount of groundfish catch in FY2018 (Table 27).

Groundfish landings and revenue from common pool vessels have fluctuated over time (Table 27). Common pool vessels with limited access permits landed 1.2M lbs. (landed lbs.) of regulated groundfish in FY2010, worth $2.2M in ex-vessel revenues (Table 27). Landings declined to 445K lbs., worth about $815,000 in FY2011and declined again in FY2012 to 234K lbs., worth $503,000. In FY2013, groundfish landings and revenue from common pool vessels rose to 595Klbs, worth about $1.1M. In FY2014, groundfish landings and revenue from common pool vessels fell to 490Klbs., worth $923,000, followed by a rise in FY2015 to 670Klbs, worth $1.3M. Groundfish landings and revenue from common pool vessels have fallen in recent years, to 328Klbs. in FY2016, worth $843,000, and to the lowest point in FY2017, 186Klbs., worth $448,000.

5.7.10.3 Recreational Harvesting Component

The recreational fishery includes private anglers, party boat operators, and charter vessel operators. Several groundfish stocks are targeted by the recreational fishery, including GOM cod, GOM haddock, pollock, GOM winter flounder, and GB cod. GB haddock is targeted as well, but to a lesser extent. SNE/MA winter flounder and redfish are also target species. Wolffish was occasionally caught in the past. A16 (Section 6.2.5, NEFMC 2009) included a detailed overview of recreational fishing activity.

This section provides data on trends in landings, permits, and effort over the last 10-20 years. Table 55 provides a summary of groundfish and non-groundfish landings (fish kept, not pounds) by state and year. Table 56 provides information on active party/charter permits by state and year. Table 57 provides information on the number of party/charter trips by state and year.

Table 55- Number of fish kept for groundfish and non-groundfish by state for groundfish party and charter permitted vessels, for fishing years (FY) 2010 to 2019. *Other includes CT, DE, MD, NC, PA, SC, and VA. Source: Vessel Trip Reports (VTRs), FY2010 through FY2019. For VTRs that did not include state of landing, homeport state from permit was utilized.

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Groundfish	**585,055**	**431,127**	**372,032**	**379,231**	**219,028**	**217,113**	**284,322**	**269,453**	**296,354**	**258,705**
MA	250,289	172,998	153,877	160,739	86,233	62,449	126,234	107,932	101,948	69,755
ME	60,111	31,784	31,239	38,461	27,225	24,803	30,718	26,546	27,304	28,205
NH	183,345	168,040	164,410	168,350	85,212	88,796	99,621	118,472	148,598	145,052
NJ	12,255	14,049	2,339	2,677	9,822	11,532	6,140	6,809	7,769	8,188
NY	59,301	19,932	12,050	6,520	7,023	16,514	13,449	6,714	8,413	5,043
OTHER*	2,110	14,254	112	72	447	1,853	1,311	867	795	1,239
RI	17,644	10,070	8,005	2,412	3,066	11,166	6,849	2,113	1,527	1,223
Non-Groundfish	**1,766,237**	**2,030,042**	**2,215,307**	**1,788,746**	**1,906,441**	**1,877,429**	**1,965,444**	**2,027,110**	**2,013,382**	**2,255,022**
MA	212,417	198,373	238,709	205,638	232,583	202,353	96,487	119,477	136,618	179,681
ME	11,568	9,174	9,087	10,724	12,651	14,405	15,375	11,438	9,374	11,181
NH	86,450	177,879	171,167	103,990	150,096	116,442	107,424	128,786	55,943	59,851
NJ	545,502	650,710	726,829	474,129	443,127	475,863	440,695	534,985	545,552	606,490
NY	620,431	654,194	728,755	651,897	647,818	721,662	841,437	870,941	807,392	869,661
OTHER*	193,371	240,104	241,139	260,145	329,403	253,895	375,130	298,174	376,142	476,487
RI	96,498	99,608	99,621	82,223	90,763	92,809	88,896	63,309	82,361	51,671
Grand Total	**2,351,292**	**2,461,169**	**2,587,339**	**2,167,977**	**2,125,469**	**2,094,542**	**2,249,766**	**2,296,563**	**2,309,736**	**2,513,727**

Table 56- Count of the number of active party and charter groundfish permits by homeport state, FY 2000 to 2019. Other includes DE, FL, NC, PA, and WV. "Active" is defined as taking any party or charter trip among those groundfish party or charter permit holders, independent of what was caught. Source: VTRs and permit database. A vessel is included if they: 1) have a groundfish party or charter permit (Category I) and 2) took at least one party or charter trip, as indicated on the VTR.

Year	CT	MA	MD	ME	NH	NJ	NY	OTHER	RI	VA	Grand Total
2000	10	78	3	16	13	108	100	36	29	17	410
2001	15	90	5	14	21	113	89	26	32	18	423
2002	14	107	3	17	23	97	94	27	32	19	433
2003	14	111	5	18	27	101	95	23	29	17	440
2004	12	107	4	17	24	100	95	23	30	15	427
2005	14	105	8	16	17	95	90	50	30	15	440
2006	16	98	14	22	20	119	82	52	46	18	487
2007	17	92	12	22	22	117	91	56	48	17	494
2008	17	95	20	22	21	115	93	52	47	19	501
2009	17	93	13	23	22	112	104	49	48	16	497
2010	17	102	14	23	21	124	101	43	48	18	511
2011	16	95	12	23	20	107	92	36	40	13	454
2012	15	88	13	22	19	105	97	35	39	11	444
2013	14	79	10	24	23	97	93	38	39	9	426
2014	11	69	10	23	24	93	93	33	35	9	400
2015	11	59	12	24	20	94	90	28	30	11	379
2016	11	51	10	19	16	78	84	25	31	12	337
2017	13	53	12	17	14	73	83	24	29	13	331
2018	13	57	5	20	16	90	82	29	32	12	356
2019	16	64	7	17	13	84	81	30	35	11	358

Table 57- Number of trips that kept groundfish by state for groundfish party and charter permitted vessels, for FY 2010 to 2019. *Other includes CT, DE, FL, MD, NC, PA, and VA. Source: VTRs, FY 2010 to FY 2019. For VTRs that did not include state of landing, homeport state from permit data was utilized.

State	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
MA	2,863	2,575	2,436	2,163	1,793	1,068	1,389	1,101	994	895
ME	745	578	557	572	522	460	563	439	466	439
NH	1,724	1,526	1,552	1,521	1,285	952	981	870	963	935
NJ	715	871	410	373	695	794	421	420	462	469
NY	719	924	478	335	416	705	504	344	386	397
OTHER*	102	156	39	18	52	120	42	58	70	90
RI	244	294	205	108	148	266	224	186	99	170
Grand Total	**7,112**	**6,924**	**5,677**	**5,090**	**4,911**	**4,365**	**4,124**	**3,418**	**3,440**	**3,395**

5.7.10.3.1 Gulf of Maine Cod and Gulf of Maine Haddock Recreational Effort and Catch

Table 58 provides a breakdown of the number of vessels active in the for-hire component of the recreational fishery for FY 1998 to FY 2018. An overview of the management history and recreational fishery performance is provided for GOM cod and GOM haddock (see Table 59 and Table 60).

Table 58- For-hire recreational vessels catching cod or haddock from the Gulf of Maine

Fishing Year	Party	Charter	Total*
1998	52	108	137
1999	53	100	129
2000	48	108	130
2001	63	117	153
2002	43	127	152
2003	58	130	164
2004	63	127	164
2005	57	133	165
2006	65	130	163
2007	51	128	153
2008	55	129	154
2009	53	130	161
2010	53	140	167
2011	46	127	150
2012	43	109	133
2013	40	114	134
2014	39	103	119
2015	34	74	92
2016	37	71	88
2017	52	59	91
2018	43	89	95

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

Based on vessel reporting via vessel log book.

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

Source: NMFS Greater Atlantic Regional Fisheries Office, January 2020.

Table 59- Summary of Gulf of Maine cod recreational catch performance and federal management (fishing years 2010–2020).

Fishing Year	Sub-Annual Catch Limit (mt)	Catch (mt)	Percent of catch limit taken (%)	Minimum Size (inches)	Bag Limit Fish per angler - daily	Season Open	Season Closed	Additional Measures/Notes
2010	2,673	1506.9	56.4	24	10	5/1/10 to 10/31/10 and 4/16/11 to 4/30/11	11/1/10 to 4/15/11	First year of sub-ACL 33.7% of ACL Groundfish Regulations: Only one line per angler, and Fillets landed by private recreational and charter/party vessels must have at least 2 sq. inches (5.08 sq. cm) of contiguous skin that allows for the ready identification of the fish species. Such fillets are required to be from legal-sized fish, but the fillets themselves would not need to meet the minimum size requirements in the regulations.
2011	2,824	1640.3	58.1	24	10	5/1/11 to 10/31/11 and 4/16/12 to 4/30/12	11/1/11 to 4/15/12	First Year: Gulf of Maine (Whaleback) Cod Spawning Protection Area: From April 1 through June 30 of each year, all recreational vessels, including private recreational and charter/party vessels, may only use pelagic hook-and-line gear, as defined below, when fishing in the Whaleback Cod Spawning Protection Area.[30]

[30] **Pelagic hook-and-line gear** is defined as handline or rod and reel gear that is designed to fish for, or that is being used to fish for, pelagic species. No portion of this gear may be operated in contact with the bottom at any time.

Fishing Year	Sub-Annual Catch Limit (mt)	Catch (mt)	Percent of catch limit taken (%)	Minimum Size (inches)	Bag Limit Fish per angler - daily	Season Open	Season Closed	Additional Measures/Notes
2012	2,215	937.4	42.3	19	9	5/1/12 to 10/31/12 and 4/16/13 to 4/30/13	11/1/12 to 4/15/13	
2013	486	639.3	131.5	19	9	5/1/13 to 10/31/13 and 4/16/14 to 4/30/14	11/1/13 to 4/15/14	
2014	486			21	9	5/1/14 to 8/31/14 and 4/15/14 to 4/30/14	9/1/14 to 4/14/15	Replaced by interim action on 11/15/14
		623.3	128.3	n/a	0	closed	11/15/14 to 4/30/15	2014 interim action: Seasonal 30-minute block closures, no recreational gear capable of catching groundfish in closures
2015	121	84.5	69.8	n/a	0	Closed year-round		Interim action Seasonal closures removed on 5/1/16
2016	157	280.9	178.9	24	1	8/1/16 to 9/30/16	5/1/16 to 7/31/16	

Possession Restrictions: Any vessel fishing in the Gulf of Maine Whaleback Cod Spawning Protection Area, or the Winter Massachusetts Bay Spawning Protection Area, including pelagic hook-and-line gear by recreational vessels, is prohibited from possessing or retaining regulated species or ocean pout from April 1 through June 30 of each year.

Transiting: Recreational vessels are allowed to transit the Gulf of Maine Cod Spawning Protection Area, and Winter Massachusetts Bay Spawning Protection Area provided all gear is stowed in accordance with the regulations.

Fishing Year	Sub-Annual Catch Limit (mt)	Catch (mt)	Percent of catch limit taken (%)	Minimum Size (inches)	Bag Limit Fish per angler - daily	Season Open	Season Closed	Additional Measures/Notes
							and 10/1/16 to 4/30/17	
2017	157			24	1	8/1/17 to 9/30/17	5/1/17 to 7/31/17 and 10/1/18 to 4/30/18	Replaced by final rule effective on 7/27/17
		245.4	156.3	n/a	0	Closed year-round		
2018	220	146.9	66.8	n/a	0	Closed year-round		First Year: Winter Massachusetts Bay Spawning Protection Area: From November 1 through January 31 of each year, all recreational vessels, including private recreational and charter/party vessels, may only use pelagic hook-and-line gear, as defined below, when fishing in the Winter Massachusetts Bay Spawning Protection Area.[1]
2019	220	79.8	36.3	21	1	9/15/19 to 9/30/19	5/1/19 to 9/14/19 and 10/1/19 to 4/30/20	Previous year's regulations were in effect until July 5, 2019, when these measures were implemented. Based on comments received on the proposed rule there will not be an open season in April 2020.
2020	193			21	1	9/15/20-9/30/20 and		

Fishing Year	Sub-Annual Catch Limit (mt)	Catch (mt)	Percent of catch limit taken (%)	Minimum Size (inches)	Bag Limit Fish per angler - daily	Season Open	Season Closed	Additional Measures/Notes
						4/1/21-4/14/21 (Private) 9/8/20-10/7/20 and 4/1/21-4/14/21 (Charter/Party)		

Table 60- Summary of Gulf of Maine haddock recreational catch performance and federal management (fishing years 2010–2020).

Fishing Year	Sub-Annual Catch Limit (mt)	Catch (mt)	Percent of catch limit taken (%)	Minimum Size (inches)	Bag Limit Fish per angler - daily	Season Open	Season Closed	Additional Measures/Notes
2010	324	297.4	91.8	18	no limit		n/a	First year of sub-ACL 27.5% of ACL Groundfish Regulations: Only one line per angler, and Fillets landed by private recreational and charter/party vessels must have at least 2 sq. inches (5.08 sq. cm) of contiguous skin that allows for the ready identification of the fish species. Such fillets are required to be from legal-sized fish, but the fillets themselves would not need to meet the minimum size requirements in the regulations.
2011	308			18	no limit	5/1/11 to 1/5/12	n/a	First Year: Gulf of Maine (Whaleback) Cod Spawning Protection Area: From April 1 through June 30 of each year, all recreational vessels, including private recreational and charter/party vessels, may only use pelagic hook-and-line gear, as defined below, when fishing in the Whaleback Cod Spawning Protection Area.[1]
				19	9	1/6/12 to 4/19/12	n/a	Accountability Measure (AM) for 2010 overage

Fishing Year	Sub-Annual Catch Limit (mt)	Catch (mt)	Percent of catch limit taken (%)	Minimum Size (inches)	Bag Limit Fish per angler - daily	Season Open	Season Closed	Additional Measures/Notes
		238.5	77.4	18	no limit	4/20/12 to 4/30/12	n/a	AM lifted after re-evaluation of data showing no 2010 overage
2012	259	280.7	108.4	18	no limit		n/a	
2013	74	231.5	312.2	21	no limit		n/a	
2014	173	658.6	380.7	21	3	5/1/14 to 8/31/14 and 11/1/14 to 2/28/15	9/1/14 to 10/31/14 and 3/1/15 to 4/30/15	*See Cod interim action*
2015	372	381.9	102.7	17	3	5/1/15 to 8/31/15 and 11/1/15 to 2/29/16	9/1/15 to 10/31/15 and 3/1/16 to 4/30/16	
2016	928	887.0	95.6	17	15	5/1/16 to 2/28/17 and 4/15/17 to 4/30/17	3/1/17 to 4/14/17	

Fishing Year	Sub-Annual Catch Limit (mt)	Catch (mt)	Percent of catch limit taken (%)	Minimum Size (inches)	Bag Limit Fish per angler - daily	Season Open	Season Closed	Additional Measures/Notes
2017	1,160	795.0	68.5	17	15	5/1/17 to 2/28/18 and 4/15/18 to 4/30/18	3/1/18 to 4/14/18	Replaced by final rule effective 7/27/17
				17	12	5/1/17 to 9/16/17 and 11/1/17 to 2/28/18 and 4/15/18 to 4/30/18	9/17/17 to 10/31/17 and 3/1/18 to 4/14/18	
2018	3,358	595.0	17.7	17	12	5/1/18 to 9/16/18 and 11/1/18 to 2/28/19 and 4/15/19 to 4/30/19	9/17/18 to 10/31/18 and 3/1/19 to 4/14/19	First Year: Winter Massachusetts Bay Spawning Protection Area: From November 1 through January 31 of each year, all recreational vessels, including private recreational and charter/party vessels, may only use pelagic hook-and-line gear, as defined below, when fishing in the Winter Massachusetts Bay Spawning Protection Area.[1]

Fishing Year	Sub-Annual Catch Limit (mt)	Catch (mt)	Percent of catch limit taken (%)	Minimum Size (inches)	Bag Limit Fish per angler - daily	Season Open	Season Closed	Additional Measures/Notes
2019	3,194	423.2	13.3	17	15	5/1/19 to 2/29/20 and 4/15/20 to 4/30/20	3/1/20 to 4/14/20	Previous year's regulations were in effect until July 5, 2019, when these measures were implemented. The possession limit increased from 12-15 fish, and the fall closure has been removed to increase access to this healthy stock.
2020	6,210			17	15	5/1/20-2/28/21 and 4/1/21-4/30/21	3/1/21-3/31/21	

5.7.10.3.2 Evaluation of recent recreational catches using new MRIP data

Gulf of Maine winter flounder: Examining the last five calendar years (2015-2019) in the 2020 assessment, recreational catches on average are 32% of total catches. However, overall utilization for the past five fishing years (2014-2018) on average is 38%. Therefore, the stock is not fully utilized. The PDT recommends continuing to monitor recreational catches and utilization of GOM winter flounder in future assessments and monitoring. If overall utilization relative to the ACL becomes high, consider creating a sub-ACL for the recreational fishery for GOM winter flounder. Recreational catches would continue to be accounted for through the sub-component analysis.

Southern New England/Mid-Atlantic winter flounder: Examining the last five calendar years (2015-2019) in the 2020 assessment, recreational catches on average are 4% of total catches. However, overall utilization for the past five fishing years (2014-2018) on average is 62%. Therefore, the stock is not fully utilized, and recreational catches are less than 5% on average. The PDT recommends continuing to monitor recreational catches and utilization of SNE/MA winter flounder in future assessments and monitoring. If overall utilization relative to the ACL becomes high and recreational catches exceed 5%, consider creating a sub-ACL for the recreational fishery for SNE/MA winter flounder. Recreational catches would continue to be accounted for through the sub-component analysis.

Wolffish: Recreational landings are 0 and discards are not a part of the stock assessment. Overall utilization is very low. The PDT recommends continuing to monitor recreational catches and utilization of wolffish in future assessments and monitoring.

Table 61- Gulf of Maine winter flounder - evaluation of recent recreational catches. Data sources: 2020 Management Track Assessments (NEFSC) and Year-End Multispecies Fishery Catch Reports (GARFO).

Gulf of Maine Winter Flounder
2020 Assessment

	Recreational			Commercial					Recent Monitoring			
Calendar Year	discards	landings	total	discards	landings	total	Assessment Catch	% Recreational (Recreational Total Catch/Assessment Catch)	Fishing Year	ACL	Total Catch	Utilization
2014	5	89	94	5	215	220	315	29.8%	2014	1040	240.8	23.1%
2015	5	85	90	2	179	181	271	33.2%	2015	489	205.8	42.1%
2016	11	41	52	3	185	188	241	21.6%	2016	776	247.7	31.9%
2017	5	161	166	3	210	213	378	43.9%	2017	776	308.1	39.7%
2018	2	80	82	3	158	161	244	33.6%	2018	428	233.9	54.6%
2019	2	42	44	4	102	106	150	29.3%				

Table 62- Southern New England/Mid-Atlantic winter flounder - evaluation of recent recreational catches. Data sources: 2020 Management Track Assessments (NEFSC) and Year-End Multispecies Fishery Catch Reports (GARFO).

Southern New England / Mid-Atlantic Winter Flounder
2020 Assessment

	Recreational			Commercial					Recent Monitoring			
Calendar Year	discards	landings	total	discards	landings	total	Assessment Catch	% Recreational (Recreational Total Catch/Assessment Catch)	Fishing Year	ACL	Total Catch	Utilization
2014	4	99	103	64	660	724	827	12.5%	2014	1612	703.2	43.6%
2015	13	39	52	82	661	743	795	6.5%	2015	1607	886.7	55.2%
2016	3	61	64	125	516	641	704	9.1%	2016	749	597.2	79.7%
2017	2	10	12	101	495	596	608	2.0%	2017	749	550.5	73.5%
2018	4	10	14	108	326	434	449	3.1%	2018	700	398	56.9%
2019	2	1	3	105	202	307	310	1.0%				

Table 63- Wolffish - evaluation of recent recreational catches. Data sources: 2020 Management Track Assessments (NEFSC) and Year-End Multispecies Fishery Catch Reports (GARFO).

Wolffish
2020 Assessment

	Recreational	Commercial					Recent Monitoring			
Calendar Year	landings	discards	landings	total	Assessment Catch	% Recreational (Recreational Total Catch/Assessment Catch)	Fishing Year	ACL	Total Catch	Utilization
2014	0	1	0	1	1	0.0%	2014	65	15.1	23.1%
2015	0	1	0	1	1	0.0%	2015	65	30.1	46.3%
2016	0	1	0	1	1	0.0%	2016*	77	0.8	1.0%
2017	0	2	0	2	2	0.0%	2017	77	1.7	2.2%
2018	0	3	0	3	3	0.0%	2018	84	1.6	1.9%
2019	0	3	0	3	3	0.0%				

*change in discard mortality assumption

5.7.10.4 Evaluation of other fisheries catches of groundfish stocks

Summaries of recent catches of GB yellowtail flounder, SNE/MA yellowtail flounder, northern windowpane flounder, and southern windowpane flounder in the scallop and groundfish fisheries are provided (Table 64 to Table 68). A summary of recent catches by the small-mesh fisheries is provided (Table 69). A summary of recent catches in the midwater trawl Atlantic herring fishery is provided for GOM haddock (Table 70) and GB haddock (Table 71).

Table 64- Recent GB yellowtail flounder TACs, groundfish fishery sub-ACLs, and catches for fishing years 2015 through in-season 2020, March 16, 2021. Values shown in metric tons (mt). Source: GARFO year-end catch reports.

	Groundfish Fishery- GB Yellowtail Flounder						
Fishing Year	Total Shared TAC – US & CA (mt)	US % Share	US TAC (mt)	% US TAC Caught	Groundfish sub-ACL (mt)	Groundfish catch (mt)	Percent Groundfish ACL Caught (%)
2015	354	70%	248	27.5%	202.9	38.4	18.9%
2016	354	76%	269	11.4%	250.8	23.9	9.5%
2017	300	69%	207	40.6%	162.6	31.4	19.1%
2018	300	71%	213	18.9%	187.9	27.6	14.7%
2019	140	76%	106	4.6%	99.8	3.1	3.1%
In-season 2020	162	74%	120	n/a	95.4	6.3	6.6%

Table 65- Recent GB yellowtail TACs and scallop fishery sub-ACLs and catches for fishing years 2015 through 2019. Values shown in metric tons (mt). Source: GARFO year-end catch reports. FY2019 underlined sub-ACL accounts for mid-year transfer from scallop fishery to groundfish fishery of 15.2mt.

	Scallop Fishery- GB Yellowtail Flounder						
Groundfish Fishing Year	Total Shared TAC	US % Share	US TAC	% US TAC Caught	Scallop sub-ACL	Scallop catch	%Scallop sub-ACL Caught
FY2015*	354	70%	248	28%	38	29.7	78%
FY2016*	354	76%	269	12%	42	2.1	5%
FY2017*	300	69%	207	44%	32	52.6	164%
FY2018*	300	71%	213	19%	15	12.7	87.5%
FY2019*	140	76%	106	4.6%	1.8	1.7	96%
FY2020*	162	74%	120	n/a	19	n/a	n/a

* retention of GB yellowtail prohibited for scallop fishery
n/a = data not yet finalized.

Table 66- Recent SNE/MA yellowtail flounder ACLs, scallop fishery sub-ACLs and catches, and groundfish fishery sub-ACLs and catches. Values shown in metric tons (mt). FY2019 underlined accounts for mid-year transfer from scallop fishery to groundfish fishery of 13.1mt.

	Scallop and Groundfish Fishery—SNE/MA Yellowtail Flounder								
Groundfish Fishing Year	Total ACL (mt)	Total Catch (mt)	Percent Total ACL Caught	Scallop sub-ACL (mt)	Scallop Catch (mt)	Percent Scallop ACL Caught	Groundfish sub-ACL (mt)	Groundfish Catch (mt)	Percent Groundfish ACL Caught
FY2015*	666	326.6	49%	44	34.6	79.1%	579	283.5	48.9%
FY2016*	256	85.2	33.3%	17	10.7	63.9%	204	62.5	30.6%
FY2017*	256	24.4	9.6%	4	4.3	104.1	187.5	14.5	6.7%
FY2018*	66	14.7	22.3%	3	2.6	79.7%	43	8.5	19.6%
FY2019*	66	6.9	10.4%	2	2.1	112.6%	45	2.8	6.3%
* Indicates that retention of SNE/MA YT was prohibited for scallop fishery									

Table 67- Final year-end catch data (mt) for northern windowpane flounder. Sources: FY2015 – FY2019 final year-end multispecies catch reports, GARFO. *In FY2017 a scallop-specific AM was created, in previous years scallop landings were part of the 'other' fisheries catch, reflected here.

			Northern Windowpane Flounder Catch (mt)				
			Groundfish Fishery		**Sub-Components**		
FY	**ACL**	**Total Catch**	**Sector**	**Common Pool**	**Scallop Fishery**	**State Waters**	**Other**
2015	144	189.8	73.6	0	*114.6*	1.3	114.9
2016	177	83.7	45.0	0	*31.8*	.7	37.9
2017*	170	87.4	33.9	1.2	44.1	.5	7.7
2018	86	56.7	33	.3	22.3	.4	.7
2019	86	68.0	21.7	0	25.4	.2	20.7

Table 68- Final year-end catch data (mt) for southern windowpane flounder. Sources: FY2015 – FY2019 final year-end multispecies catch reports, GARFO.

			Southern Windowpane Flounder Catch (mt)				
			Groundfish Fishery		Sub-Components with AMs		
FY	ACL	Total Catch	Sector	Common Pool	Scallop Fishery	State Waters	Other
2015	527	22.7	-	.2	-	22.1	0.5
2016	599	417.2	45	0	84.4	28	178.1
2017	599	440.9	33.9	1.2	44.1	0.5	7.7
2018	457	454.7	49.7	16.8	157.1	26.1	205
2019	457	350.0	30.0	2.7	57.7	15.9	243.6

Table 69- Recent GB yellowtail flounder small-mesh fisheries sub-ACLs and catches (mt) for fishing years 2015 through 2019. Values shown in metric tons (mt). Source: GARFO year-end catch reports. Sources: FY2015 – FY2019 final year-end multispecies catch reports, GARFO.

	Small Mesh Fishery- GB Yellowtail Flounder		
Groundfish Fishing Year	Small-mesh fisheries sub-ACL (mt)	Small-mesh fisheries (mt)	Percent small-mesh fisheries Caught (%)
FY2015	5	0.1	1.0%
FY2016	5	4.8	95.2%
FY2017	4	0.4	9.7%
FY2018	4	0.1	2.5%
FY2019	2	0.0	0.0%

Table 70- Summary of recent catches (mt) of GOM haddock by the commercial midwater trawl herring fishery, groundfish FY2015-FY2019. Sources: FY2015 – FY2019 final year-end multispecies catch reports, GARFO.

	Midwater Trawl Atlantic Herring Fishery- Gulf of Maine Haddock				
Groundfish Fishing Year	**Sub-ACL**	**Landings**	**Discards**	**Catch**	**Percentage of sub-ACL**
2015	14	-	-	-	-
2016	34	1.9	-	1.9	5.7%
2017	42	-	-	-	-
2018	122	-	-	0.0	-
2019	116	0.1	-	0.1	0.1%

Table 71- Summary of recent catches (mt) of Georges Bank haddock by the midwater trawl Atlantic herring fishery, groundfish FY2015- FY2019. Source: Groundfish FY2015 – FY2019 final year-end catch reports, GARFO.

	Midwater Trawl- Georges Bank Haddock				
Groundfish Fishing Year	**Sub-ACL**	**Landings**	**Discards**	**Catch**	**Percentage of sub-ACL**
2015	227	235.0	0.6	235.5	103.9%
2016	512	115.3	3.6	118.9	23.2%
2017	801	47.9	0	47.9	6.0%
2018	680	43.9	0	43.9	6.5%
2019	811	0.2	0	0.2	0.0%

6.0 ENVIRONMENTAL IMPACTS OF ALTERNATIVES

6.1 INTRODUCTION

The impacts of the alternatives under consideration are evaluated herein relative to the valued ecosystem components (VECs) described in the Affected Environment (Section 5.0) and to each other.

6.1.1 Evaluation Criteria

This action evaluates the potential impacts of alternatives using the criteria in Table 72.

Table 72- General definitions for impacts and qualifiers relative to resource condition (i.e., baseline).

VEC	**Resource Condition**	**Impact of Action**		
		Positive (+)	Negative (-)	No Impact (0)
Target and Non-target Species	Overfished status defined by the MSA	Alternatives that would maintain or are projected to result in a stock status above an overfished condition*	Alternatives that would maintain or are projected to result in a stock status below an overfished condition*	Alternatives that do not impact stock / populations
ESA-listed Protected Species (endangered or threatened)	Populations at risk of extinction (endangered) or endangerment (threatened)	Alternatives that contain specific measures to ensure no interactions with protected species (e.g., no take)	Alternatives that result in interactions/take of listed resources, including actions that reduce interactions	Alternatives that do not impact ESA listed species
MMPA Protected Species (not also ESA listed)	Stock health may vary but populations remain impacted	Alternatives that will maintain takes below PBR and approaching the Zero Mortality Rate Goal	Alternatives that result in interactions with/take of marine mammal species that could result in takes above PBR	Alternatives that do not impact MMPA Protected Species
Physical Environment / Habitat / EFH	Many habitats degraded from historical effort and slow recovery time (see condition of the resources table for details)	Alternatives that improve the quality or quantity of habitat	Alternatives that degrade the quality, quantity or increase disturbance of habitat	Alternatives that do not impact habitat quality
Human Communities (Socioeconomic)	Highly variable but generally stable in recent years (see condition of the resources table for details)	Alternatives that increase revenue and social well-being of fishermen and/or communities	Alternatives that decrease revenue and social well-being of fishermen and/or communities	Alternatives that do not impact revenue and social well-being of fishermen and/or communities

Impact Qualifiers		
A range of impact qualifiers is used to indicate any existing uncertainty	Negligible	To such a small degree to be indistinguishable from no impact
	Slight (sl) or low (L), as in slight/low positive or slight negative	To a lesser degree / minor
	Moderately (M) positive or negative	To an average degree (i.e., more than "slight", but not "high")
	High (H), as in high positive or high negative	To a substantial degree (not significant unless stated)
	Significant (in the case of an EIS)	Affecting the resource condition to a great degree, see 40 CFR 1508.27.
	Likely	Some degree of uncertainty associated with the impact
*Actions that will substantially increase or decrease stock size, but do not change a stock status may have different impacts depending on the particular action and stock. Meaningful differences between alternatives may be illustrated by using another resource attribute aside from the MSA status, but this must be justified within the impact analysis.		

6.1.2 Approach to Impacts Analysis

The specific approach to impacts analysis is described under each of the VECs – regulated groundfish and other species (Section 6.2), essential fish habitat (Section 6.3) endangered and other protected species (Section 6.4), human communities – economic (Section 6.5), and human communities – social (Section 6.6). Cumulative effects analysis is also provided (Section 0). The Council's preferred alternatives and options are identified in the impacts sections.

6.2 IMPACTS ON REGULATED GROUNDFISH AND OTHER SPECIES – BIOLOGICAL

Biological impacts discussed below focus on expected changes in fishing mortality for regulated multispecies stocks. Changes in fishing mortality may result in changes in stock size. Impacts on essential fish habitat and endangered or threatened species are discussed in separate sections. Impacts are discussed in relation to impacts on regulated multispecies (groundfish) and other species. The impacts associated with the measures are anticipated to not be significant in comparison to the No Action alternatives.

Throughout this section, impacts are often evaluated using an analytic technique that projects future stock size based on a recent age-based assessment. These projections are known to capture only part of the uncertainties that are associated with the assessment projections. There is evidence, that in the case of multispecies stocks, that the projections tend to be overly optimistic when they extend beyond a short-term period (i.e., 1-3 years), although recent work suggests some improvements. This means, generally, that the projections tend to over-estimate future stock sizes and under-estimate future fishing mortality. These uncertainties in the projection methodology should be considered when reviewing impacts that use this tool. Long term projections (greater than 3 years) should not be over interpreted since they are imprecise and are often overly optimistic. The uncertainty estimates (90% confidence intervals on SSB) from the projections do not cover the true uncertainty in the population. This is the justification for why the SSC did not use the projection uncertainty estimates to determine the scientific uncertainty buffer between the ABC and the OFL. In addition, for stocks in rebuilding plans, see the overview in the Affected Environment (Section 5.2.22) for additional information.

6.2.1 **Action 1 – Status Determination Criteria**

A management track assessment for GB winter flounder and SNE/MA winter flounder, along with seven other groundfish stocks, was completed in September 2020. The assessment determined that GB winter flounder and SNE/MA winter flounder are both overfished and overfishing is not occurring (Table 14 in Affected Environment). The peer review accepted both the GB winter flounder age-structured VPA assessment model, and the SNE/MA winter flounder age-structured ASAP assessment model. The peer review recommended updating biological references points for both GB winter flounder and SNE/MA winter flounder.

For GB winter flounder, the assessment and the peer review recommended changing the current MSY biological reference points (calculated from the stock-recruitment relationship) to proxy-based biological reference points (F40%, SSB40%) as recommended by the panel review in the 2019 assessment. Similarly, for SNE/MA winter flounder, the assessment and the peer review recommended changing the MSY biological reference points calculated in previous assessments (based on the stock-recruitment relationship) to proxy-based biological reference points (F40%, SSB40%), from SSC concerns with recent recruitment being estimated below predicted values from the stock recruitment relationship, and from recommendations by the 2018 peer review panel in considering an F40%proxy. There was concern that the estimate F_{MSY} from the stock recruitment relationship could be too high relative to the estimate of F40%. Additionally for SNE/MA winter flounder, a change from a dome-shaped fishery selectivity pattern to a flat-topped selectivity pattern also contributed to a change in the numeric estimates of the SDCs.

6.2.1.1 Alternative 1 - No Action

Impacts on regulated groundfish

Under Alternative 1 (No Action), there would be no revisions to the status determination criteria (SDC) for GB winter flounder and SNE/MA winter flounder (Table 2), and numerical estimates would be updated based on the current SDCs (Table 3). 2020 management track assessments were completed for GB winter flounder and SNE /MA winter flounder, and so the use of SDCs from the previous approved assessment would conflict with using information from the most recent review.

Alternative 1/No Action would not be expected to have direct or indirect impacts on groundfish species in the short-term. This measure is primarily administrative in that it establishes the criteria used to determine if overfishing is occurring or the stock is overfished. For these reasons when comparing Alternative 1/No Action to Alternative 2, the likely impacts on regulated groundfish species are neutral, since this alternative will not directly change the estimated OFLs, ABCs, or ACLs. However, the projected estimates of OFLs and their respective ABCs and ACLs will no longer be consistent with the SDCs. Over the long-term, impacts of Alternative 1/No Action may be negative, as biomass targets would be based on outdated information, increasing the risk of overfishing over the long-term.

Impacts on other species

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

6.2.1.2 Alternative 2 – Updated Status Determination Criteria (*Preferred Alternative*)

Impacts on regulated groundfish

Alternative 2 would adopt revised SDCs for GB winter flounder and SNE/MA winter flounder (Table 4). The NEFSC conducted management track assessments in 2020 for several stocks, including GB winter flounder and SNE/MA winter flounder. This option changes the SDCs and numerical estimates of the new SDCs for these stocks (Table 4 and Table 5), based on the peer review recommendations.

Alternative 2 would not be expected to have direct or indirect impacts on groundfish species in the short-term. This measure is primarily administrative in that it establishes the criteria used to determine if overfishing is occurring or the stock is overfished. For these reasons when comparing Alternative 1/No Action to Alternative 2, the likely impacts on regulated groundfish species are neutral. Over the long-term, impacts of Alternative 2 may be positive, since updating SDCs for both stocks according to the most recent assessments decreases the risk of overfishing over the long-term. Alternative 2 would make the SDCs consistent with the updated OFLs being proposed.

Impacts on other species

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

6.2.2 Action 2 – Formal Rebuilding Program

Based on the 2019 peer review, white hake is overfished but overfishing is not occurring (NEFSC 2020). This was a change in status, as the 2017 assessment concluded the stock was not overfished. Retrospective adjustments were made to the model results in the terminal year and the retrospective pattern appears to be worsening. The current rebuilding plan for white hake ended in 2014, with the stock not achieving rebuilt status by the rebuilding plan end date.

A summary of the rebuilding plan analysis is in Appendix III.

6.2.2.1 Alternative 1 - No Action

Impacts on regulated groundfish

Under Alternative 1/No Action, fishing mortality (set at 75% F_{MSY}) would be maintained. The stock would still be expected to rebuild under Alternative 1/No Action, as the current management strategy would continue. Alternative 1/No Action would result in a fishing mortality that would be higher than that under Alternative 2, Option A and Option B, and thus Alternative 1/No Action would be expected to result in slower rebuilding of the stock, yet would result in a low positive impact on the stock in the medium to long term. Alternative 1/ No Action would not be expected to reduce mortality on other regulated groundfish stocks, as opposed to Alternative 2, Option A and Option B where there is potential for the reduced fishing mortality on white hake to become quota limiting for the groundfish fishery, and therefore, would have negative impacts on regulated groundfish stocks compared to these options. ACL and AM systems for other regulated groundfish stocks, however, should prevent overfishing from occurring and so the possible impacts of Alternative 1/ No Action would not be expected to compromise mortality targets. Alternative 1/No Action would result in the same fishing mortality as that under Option C, and therefore would result in similar impacts to Alternative 2, Option C.

Impacts on other species

Alternative 1/No Action would result in a fishing mortality for white hake that would be higher than that under Alternative 2, Option A and Option B. Alternative 1/No Action would continue to allow interactions between the groundfish fishery and other species that are caught as target and bycatch on groundfish fishing trips. It would likely lead to similar groundfish fishing trips in the white hake stock area. ACL and AM systems for other stocks should prevent overfishing from occurring and so the possible impacts would not be expected to compromise mortality targets. Therefore under no action, low positive impacts would be expected on most other species. However, relative to Alternative 2, Option A and Option B, Alternative 1/No Action might indirectly increase interactions and may result in low negative impacts on other species as compared to those alternatives. Alternative 1/No Action would result in the same fishing mortality as that under Option C, and therefore would result in similar impacts to Alternative 2, Option C.

6.2.2.2 Alternative 2 – Revised Rebuilding Strategy for White Hake (*Preferred Alternative – Option B*)

Impacts on regulated groundfish

For white hake, Alternative 2, Option A would result in lower fishing mortality at 50%F_{MSY} and therefore more rapid rebuilding than Option B (Council Preferred) or Option C at 70%F_{MSY} and 75%F_{MSY}, respectively. If fishing mortality were set at 50%F_{MSY}, this action may also reduce mortality on other regulated groundfish stocks, if white hake quota became limiting to the groundfish fishery, and therefore would be expected to have positive impacts on other regulated groundfish stocks in addition to white hake, as compared to Alternative 1/No Action. Alternative 2, Option B would result in a fishing mortality that would be slightly lower than that under Alternative 1/No Action. Alternative 2, Option B would be expected to result in more rapid rebuilding of the stock and would have a low positive impact on white hake and other regulated groundfish species as compared to Alternative 1/No Action. Alternative 2, Option C would result in the same fishing mortality as that under Alternative 1/No Action, and therefore would result in similar impacts to Alternative 2, Option C.

Impacts on other species

Alternative 2, Option A would result in lower fishing mortality for white hake at 50%F_{MSY} and therefore interactions between the groundfish fishery and other species that are caught as target and bycatch on groundfish fishing trips could be reduced, and impacts on other species would be positive as compared to Alternative 1/No Action. Relative to Alternative 1/No Action, Alternative 2, Option B might indirectly reduce interactions between the groundfish fishery and other species that are caught as target and bycatch on groundfish fishing trips, because it would likely lead to fewer groundfish fishing trips in the white hake stock area, and therefore would be expected to have low positive impacts on other species. ACL and AM systems for other stocks, however, should prevent overfishing from occurring and so the possible impacts of Alternative 1/ No Action would not be expected to compromise mortality targets. Option C would result in the same fishing mortality as that under Alternative 1/No Action, and therefore would result in similar impacts to Alternative 2, Option C. All options are not expected to cause any other species to become overfished, primarily due to ACL and AM systems, and should have low positive impacts on other species.

6.2.3 Action 3 – Specifications

6.2.3.1 Alternative 1 - No Action

Impacts on regulated groundfish

Under Alternative 1/No Action, the ACLs specified for FY2021 would be unchanged from those adopted through FW59. There would be no changes to the specifications for FY2021 and default specifications would be set for Eastern GB cod, Eastern GB haddock, GOM winter flounder, SNE/MA winter flounder, redfish, ocean pout, and wolffish for the first three months of FY2021. Under Alternative 1/No Action, there would be no new FY2021 quotas specified for the transboundary Georges Bank stocks of GB cod, GB haddock and GB yellowtail flounder, which are managed through the US/CA Resource Sharing Understanding. These quotas are specified annually.

Under Alternative 1/No Action, the directed groundfish fishery would be expected to operate in all broad stock areas through July 31, 2021. As of August 1, 2021, Eastern GB cod, Eastern GB haddock, GOM winter flounder, SNE/MA winter flounder, redfish, ocean pout, and wolffish would not have ACLs specified. In the absence of these specifications, commercial groundfish vessels would not be allowed to fish in all broad stock areas without an allocation. It is anticipated that Alternative 1/No Action would result in minimal changes in fishing effort during the first three months of the fishing year. After July 31, 2021, Alternative 1/No Action would be expected to halt commercial groundfish fishing effort in all broad stock areas. Without specification of an ACL, a catch would not be allocated to the commercial groundfish fishery (sectors or common pool vessels) and targeted groundfish fishing activity would not occur for these stocks. Catches would not be eliminated because there would probably be incidental catches or bycatch from other fisheries. AMs in the multispecies fishery would be maintained but are expected to have a low probability of being triggered without allocations.

In addition to the lack of targeted groundfish fishing activity in all broad stock areas, certain provisions of the sector management system probably would constrain fishing even for stocks with an ACL within the fishing season. For example, current management measures require that a sector stop fishing in a stock area if it does not have ACE for a stock. Fishing can continue on stocks for which the sector continues to have ACE only if the sector can demonstrate it would not catch the ACE-limited stock. What these provisions mean is that in most cases there would be little opportunity for sector vessels to fish on stocks in all broad stock areas that have an ACL under Alternative 1/No Action, and so most commercial groundfish fishing activity would not occur.

The default specifications for Eastern GB cod, Eastern GB haddock, GOM winter flounder, SNE/MA winter flounder, redfish, ocean pout, and wolffish would continue to allow fishing for the first three months of the fishing year, but after that, fishing on groundfish trips would stop and biological impacts on regulated groundfish species would decline for stocks managed or located in each broad stock area. As a result, in general Alternative 1/No Action would be expected to result in low positive impacts on managed stocks.

An age-based assessment was used to assess the following stocks in 2022:

- GB winter flounder
- SNE/MA winter flounder
- Redfish

These models project the estimated median stock sizes expected to result by limiting catches to the ABC. In general, recent experience suggests that the projections tend to be biased high, predicting stocks sizes that are larger than realized and fishing mortality rates that are higher than expected (Groundfish Plan Development Team, pers. comm.). A preliminary analysis for four groundfish stocks suggests recent projections performed reasonably well for American plaice, GOM haddock and pollock. The analysis also suggests GB haddock did not perform as well (see Section 5.2.23 of FW59 for additional details). There may be catches of these stocks by the groundfish fishery under default specifications through July 31, 2021 and by other fisheries throughout the year under Alternative 1/No Action. In this section, SSB is used as a proxy for impact designation. Generally, lower fishing mortality under Alternative 1/No Action leads to increases in SSB, relative to Alternative 2 and is considered a positive impact on stocks that are not rebuilding sufficiently. For stocks that have a rebuilt status, Alternative 1/No Action may reduce fishing effort to levels substantially less than the F_{MSY}, however this is considered to be a negligible impact on the stock depending on the uncertainties in the stock projections.

Georges Bank Winter Flounder, Southern New England/Mid-Atlantic Winter Flounder, and Redfish - Under Alternative 1/No Action catches are expected to occur for the first three months in FY2021 is versus the full year under Option 2. Therefore, SSB increases are expected to be greater under Alternative 1/No Action than Alternative 2.

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

- GB Yellowtail Flounder
- GOM Winter Flounder
- Northern Windowpane Flounder
- Southern Windowpane Flounder
- Ocean Pout
- Atlantic Halibut
- Wolffish

For index-assessed stocks an estimate of the probability of overfishing cannot be determined but the proposed ABC is based on the default control rule applied at 75% of F_{MSY}, an exploitation rate (such as the ratio of catch to a survey index), or an alternative approach applied to the most recent estimate of stock size. Because the proposed ABCs for stocks with an empirical assessment are determined using control rules which are intended to account for scientific uncertainty when setting ABCs in the absence of other information, the proposed ABCs are not expected to lead to declines in biomass for these stocks. Impacts of Alternative 1/No Action on these index-assessed stocks are expected to be low positive.

For stocks without projections and in some cases for stocks with projections, the SSC has recommended constant ABCs and the Council adopted these recommendations. An overview of the history of the SSC's use of constant ABCs is found in Appendix IV of FW59.

Impacts on other species

Alternative 1/No Action is expected to have low positive indirect effects on non-groundfish species such as monkfish, dogfish, skates, and Atlantic sea scallops that are captured incidentally during groundfish trips. Indirect effects are generally likely to be beneficial given the expected reduced groundfish fishing activity. Catches of other species that occur on groundfish trips would decline as a result. There are only limited opportunities for groundfish vessels to target other stocks in other fisheries, so the shifting of effort into other fisheries is not likely to occur on a large scale. These other fisheries will also have ACLs and AMs so while such effort shifts may have economic effects the biological impacts should not be negative. Considering the differences between the ACLs of Alternative 1/No Action and Alternative 2, the fishing mortality on other stocks that are caught incidentally during groundfish trips would probably be lower under Alternative 1/No Action.

Lastly, sub-ACLs are designed to limit the incidental catch of GOM and GB haddock by mid-water trawl (MWT) herring fisheries, and exceeding the allocations results in triggering AMs in-season. No Action for GOM haddock and GB haddock would maintain the current sub-ACLs. Sub-ACLs for GOM haddock would remain unchanged and for GB haddock would decrease under Alternative 2. Since the No Action sub-ACL for GB haddock is slightly higher than Alternative 2, this increases the likelihood that the sub-ACL for GB haddock would be exceeded under Alternative 2, and the in-season AM would be triggered. An in-season closure of the herring fishery would reduce fishing mortality of Atlantic herring, which would have low positive biological benefits for the Atlantic herring stock.

6.2.3.2 Alternative 2 – Revised Specifications (*Preferred Alternative*)

Impacts on regulated groundfish

Alternative 2 would reflect the results of the 2020 management track assessments, and the 2020 Transboundary Resource Assessment Committee stock assessments for U.S./Canada stocks. Alternative 2 would adopt new ABC's that are consistent with the most recent science. Option 2 would also specify total allowable catches (TACs) for the U.S./Canada Management Area for FY2021. Details on the SSC's recommendations are located in Appendix I. For stocks in formal rebuilding plans, a summary of is provided in the Affected Environment (section 5.2.22). This summary incorporates the assessment results from the most recent stock assessments – 2019 or 2020, as appropriate.

Because this alternative would adopt FY2021 – FY2023 ABCs for all stocks that had assessments in 2020, short-term projections can be used to estimate the probability of overfishing and short-term changes in stock size for those stocks listed. These projections use catches equal to the ABCs that would be adopted if this alternative is selected. Since the management goal is to keep catches at or below ACLs, and ACLs are always less than the ABC, the projection results would be expected to slightly over-estimate the risk of overfishing and under-estimate future stock size. However, experience demonstrates that projections tend to be overly optimistic, and therefore, concerns about over-estimating the risk of overfishing and under-estimating future stock size are expected to be minimal.

Projected stock sizes are provided in Table 73 to Table 75 for these stocks and the probability of overfishing is listed in Table 76. This table compares projected future stock size. A comparison of probability of overfishing between the two alternatives is difficult as Alternative 1/No Action has no OFLs defined for some stocks.

Relative to FY2020, FY2021 ACLs under Alternative 2 would increase for several stocks including GB cod, SNE/MA yellowtail flounder, CC/GOM yellowtail flounder, witch flounder, GB winter flounder, northern windowpane flounder and wolffish. There would also be decreases in the ACLs for GOM cod, GB haddock, GB yellowtail flounder, American plaice, GOM winter flounder, SNE/MA winter flounder, redfish, pollock, southern windowpane flounder, ocean pout, and Atlantic halibut, while others (GOM haddock and white hake) would remain unchanged.

Georges Bank Winter Flounder- SSB increases are expected to be greater under Alternative 1/No Action than Alternative 2.

Table 73- Projection results for Georges Bank winter flounder (FMSY proxy = 0.358 and SSBMSY = 7,267 mt).

Year	OFL	ABC	F	SSB
2021	865	634	0.25	2,405
2022	974	634	0.22	2,404
2023	1,431	634	0.15	3,980

Southern New England/Mid Atlantic Winter Flounder - SSB increases are expected to be greater under Alternative 1/No Action than Alternative 2.

Table 74- Projection results for SNE/MA winter flounder (FMSY proxy = 0.284 and SSBMSY = 12,322 mt).

Year	OFL	ABC	F	SSB
2021	1,438	456		
2022	1,438	456		
2023	1,438	456		

Redfish- SSB increases are expected to be greater under Alternative 1/No Action than Alternative 2.

Table 75- Projection results for redfish (FMSY proxy = 0.038 and SSBMSY = 200,586 mt).

Year	OFL	ABC	F	SSB
2021	13,519	10,186	0.029	354,027
2022	13,354	10,062	0.029	352,630
2023	13,229	9,967	0.029	349,907

Table 76- Estimated probability of overfishing if catch is equal to ABC. Note these results are from the projection output alone. Uncertainty comes from the model and projections; therefore, these probabilities do not account for the true uncertainty and therefore should not be considered as absolutes. These estimates are likely an underestimate of the true uncertainty based on experience with model and projection results.

		Probability of Overfishing		
Species	Stock	2021	2022	2023
Winter Flounder	GB	0.094	0.081	0.013
Winter Flounder	SNE/MA	0	0	0
Redfish		0	0	0

It is not possible to project stock sizes for the following stocks, because these stocks do not have an accepted analytical assessment model:

- GB Yellowtail Flounder
- GOM Winter Flounder
- Northern Windowpane Flounder
- Southern Windowpane Flounder
- Ocean Pout
- Atlantic Halibut
- Wolffish

For index-assessed stocks an estimate of the probability of overfishing cannot be determined but the proposed ABC is based on an exploitation rate (e.g., GB yellowtail flounder and GOM winter flounder) or an alternative Plan-B smooth approach (e.g., Atlantic halibut) or 75% of FMSY (remaining stocks on the above list) applied to the most recent estimate of stock size. Empirical approaches are simple approaches that do not implicitly account for population dynamics. Nevertheless, ABCs set from empirical approaches which are determined using control rules are not expected to lead to further declines in biomass. Impacts of Alternative 2 on index-assessed stocks are expected to be low positive. Details on the SSC's recommendations are located in Appendix I.

Georges Bank yellowtail flounder- The ABC is recommended to remain constant for each year of the specification period (Table 77).

Table 77- OFLs and ABCs (mt) for Georges Bank yellowtail flounder based on recommendations from the SSC.

Year	OFL	ABC
2021	Unknown	125
2022	Unknown	125

Gulf of Maine Winter Flounder - The OFL and ABC is recommended to remain constant for each year of the specification period (Table 78).

Table 78- OFLs and ABCs (mt) for Gulf of Maine winter flounder based on recommendations from the SSC.

Year	OFL	ABC
2021	662	497
2022	662	497
2023	662	497

Northern windowpane flounder- The OFL and ABC is recommended to remain constant for each year of the specification period (Table 79).

Table 79- OFLs and ABCs (mt) for Northern windowpane flounder based on recommendations from the SSC.

Year	OFL	ABC
2021	Unknown	160
2022	Unknown	160
2023	Unknown	160

Southern windowpane flounder- The OFL and ABC is recommended to remain constant for each year of the specification period (Table 80).

Table 80- OFLs and ABCs (mt) for Southern windowpane flounder based on recommendations from the SSC.

Year	OFL	ABC
2021	513	384
2022	513	384
2023	513	384

Ocean Pout- The OFL and ABC is recommended to remain constant for each year of the specification period (Table 81).

Table 81- OFLs and ABCs (mt) for ocean pout based on recommendations from the SSC.

Year	OFL	ABC
2021	125	87
2022	125	87
2023	125	87

Atlantic halibut - The ABC is recommended to remain constant for each year of the specification period (Table 82).

Table 82- OFLs and ABCs (mt) for Atlantic halibut based on recommendations from the SSC.

Year	OFL	ABC
2021	Unknown	150
2022	Unknown	150
2023	Unknown	150

Wolffish- The OFL and ABC is recommended to remain constant for each year of the specification period (Table 83).

Table 83- OFLs and ABCs (mt) for wolffish based on recommendations from the SSC.

Year	OFL	ABC
2021	122	92
2022	122	92
2023	122	92

Sub-ACLs for Other Fisheries

The ABCs and ACLs under Alternative 2 include specification of sub-ACLs for other fisheries. Sub-ACLs are designed to limit the incidental catch of yellowtail flounder and windowpane flounder by the scallop fishery. Exceeding catch limits may trigger Accountability Measures for the scallop fishery. A comparison of the Alternative 2 specifications and the Scallop PDT's estimates of projected catch by the scallop fishery indicates that scallop fishery catches of SNE/MA yellowtail flounder, GB yellowtail flounder, southern windowpane flounder, and northern windowpane flounder are lower, similar to, or greater than the respective sub-ACLs, depending on the specification chosen in draft Scallop FW33 (Table 84 below). The Council's preferred alternative in Scallop FW33 is projected to lead to catches of GB yellowtail flounder of 16.4 mt (12 mt sub-ACL), SNE/MA yellowtail flounder of 3 mt (2 mt sub-ACL), Northern windowpane flounder of 29.2 mt (31 mt sub-ACL), and Southern windowpane flounder of 72.2 mt (129 mt sub-ACL). Summaries of recent catches of GB yellowtail flounder, SNE/MA yellowtail flounder, northern windowpane flounder, and southern windowpane flounder in the scallop and groundfish fisheries are provided (Table 64 to Table 68 in section 5.7.10.4. Therefore, the overall impact of Alternative 2 ABCs and ACLs are likely to be low positive, neutral, or low negative with respect to the Atlantic sea scallop resource.

Table 84- Overview of FY2021 projected scallop fishery bycatch estimates for each specification run under consideration in FW32, including the anticipated FY2021 scallop sub-ACL for each stock. Council's preferred option is bolded. Anticipated sub-ACL represents Alternative 2 scallop sub-ACLs in this action.

Alternative	Scenario	GB YT	SNE YT	NWP	SWP
Anticipated sub-ACL		*12 mt*	*2 mt*	*31 mt*	*129 mt*
4.3.1	No Action 1 MAAA 18 DAS	3.8	2.6	16.8	36.7
4.3.2.1	1.5 NLS S 1 MAAA 1 CAII 24 DAS	12.5	3.0	26.0	72.5
4.3.2.2	1.5 NLS S 1 MAAA 1 CAII 26 DAS	12.8	3.2	27.3	74.7
4.3.3.1	1.5 NLS S 1.5 MAAA 1 CAII 24 DAS	12.5	3.0	26.0	77.4

4.3.3.2	1.5 NLS S 1.5 MAAA 1 CAII 26 DAS	12.8	3.2	27.3	79.7
4.3.4.1	1 NLS S 1.5 MAAA 1.5 CAII 24 DAS	16.4	2.9	29.2	65.9
4.3.4.2	1 NLS S 1.5 MAAA 1.5 CAII 26 DAS	16.7	3.1	30.5	68.1
4.3.5.1 (*Council Preferred*)	1.5 NLS S 1 MAAA 1.5 CAII 24 DAS	**16.4**	**3.0**	**29.2**	**72.2**
4.3.5.2	1.5 NLS S	16.7	3.2	30.5	74.5

In addition, sub-ACLs are designed to limit the incidental catch of GB yellowtail flounder by small-mesh fisheries, and exceeding the allocations results in triggering AMs in subsequent years. A summary of recent catches by the small-mesh fisheries is provided (Table 69 in section 5.7.10.4). The Accountability Measure requires vessels to fish an approved selective trawl gear that reduces the catch of flatfish in the GB yellowtail flounder stock area. As small-mesh species can be effectively prosecuted using modified trawl gear, it is difficult to predict if groundfish sub-ACLs may affect fishing mortality and stock size of small-mesh species (e.g., whiting and squid). The overall impact of Alternative 2 ABCs and ACLs are likely to be low positive to negligible with respect to the squid and whiting resource on Georges Bank.

Sub-ACLs are designed to limit the incidental catch of GOM and GB haddock by mid-water trawl (MWT) herring fisheries, and exceeding the allocations results in triggering AMs in-season. A summary of recent catches in the midwater trawl Atlantic herring fishery is provided for GOM haddock (Table 70 in section 5.7.10.4) and GB haddock (

Table 71 in section 5.7.10.4). Option 2 for GOM and GB haddock may reduce fishing mortality of Atlantic herring which would have positive biological benefits for the Atlantic herring stock.

Lastly, the other sub-component of Southern windowpane flounder is used to evaluate if an AM would be triggered for large-mesh non-groundfish fisheries (e.g., summer flounder and scup trawl fisheries). Exceeding the component and the overall ACL results in triggering AMs in a future year. AMs are GRAs designed to reduce catches of flatfish, which would have positive biological benefits for summer flounder and to a lesser extent scup by reducing fishing mortality. A summary of recent catches for other sub-components is found in

Table **97**. Under Alternative 2, the ABC for Southern windowpane flounder would decrease and would have low positive impacts when compared with Alternative 1/No Action.

6.2.4 **Action 4 – Commercial Fishery Measures for Sectors**

6.2.4.1 Alternative 1 – No Action

Impacts on regulated groundfish species

The impacts of Alternative 1/No Action on regulated groundfish species, including redfish and other groundfish stocks caught on redfish trips, could be either positive or negative, depending on the details of the sector exemption in any given fishing year. Because the sector exemptions are specified annually, Alternative 1/No Action creates greater uncertainty in the direction and magnitude of potential impacts relative to Alternative 2, though impacts are expected to be minor, as total catch is not expected to exceed the ACLs. Alternative 1/No Action does provide greater flexibility in allowing NMFS to make any changes to the exemption that might be necessary to protect groundfish stocks on an annual basis, compared to having the exemption in the regulations and requiring Council action to make changes. Alternative 1/No Action would likely have positive impacts on regulated groundfish species compared to Alternative 2. Under Alternative 1/No Action, the exemption area may be either larger, smaller, or the same as the Status Quo area (FY2020 area, Map 1). Impacts of Status Quo (FY2020) relative to Alternative 2 on regulated groundfish species are likely positive, since the exemption area would be smaller in extent and further offshore in deeper water relative to the Alternative 2 exemption area. The Status Quo area should focus effort on larger redfish and help avoid impacts to juvenile redfish further inshore, as well as avoid impacts to juveniles of other groundfish stocks.

The FY 2014 and FY 2015-2020 Sector Environmental Assessments, EAs, (NMFS 2014b; 2015b) analyzed the results from recent sector exemptions for redfish and the REDNET research program and determined that the impacts of the exemption on regulated groundfish species are expected to be low negative (The EA considered impacts to this exemption through FY 2020). The exemption could result in greater retention of sub-legal regulated groundfish species. The FY 2020 Interim Final Sector Rule revised the redfish exemption, reducing the size of the area from previous versions that had been approved in FY 2015 to FY 2019, which is expected to further reduce impacts on regulated groundfish species. The FY 2020 Interim Final Sector Rule (NMFS 2020) modified the exemption area to reduce bycatch of other groundfish stocks, particularly GB cod, white hake, pollock, and haddock. If in the future the exemption area is increased to the FY2019 area, or similar area, impacts on regulated groundfish species may be neutral to negative relative to Alternative 2.

Analysis of observer-recorded length information for several stocks showed that there were no identifiable shifts in selectivity towards smaller fish when using medium mesh versus large mesh trawl gear, but potentially some shifts toward larger fish for some stocks, which may suggest neutral biological impacts in the past (Appendix IV, Figures 7 and 8). However, caution is needed in the interpretation of possible shifts in selectivity in the future since selectivity is a function of multiple factors, such as fishery targeting behavior, targeting effort, and gear selectivity.

Impacts on other species

The impacts of Alternative 1/No Action on other non-groundfish species could be either positive or negative, depending on the particulars of the sector exemption in any given fishing year. Because the sector exemptions are specified annually, Alternative 1/No Action creates greater uncertainty in the direction and magnitude of potential impacts relative to Alternative 2, though impacts are expected to be minor, as total catch is not expected to exceed the ACLs. Alternative 1/No Action does provide greater flexibility in allowing NMFS to make any changes to the exemption that might be necessary to protect groundfish stocks on an annual basis, compared to having the exemption in the regulations and requiring Council action to make changes. Alternative 1/No Action would likely have positive impacts on other species relative to Alternative 2. Under Alternative 1/No Action, the exemption area may be either larger, smaller, or the same as the Status Quo area (FY2020 area, Map 1). Impacts of Status Quo relative to Alternative 2 are likely positive, since the exemption area would be smaller in extent relative to the Alternative 2 exemption area.

The FY 2014 and FY 2015-2020 Sector EAs (NMFS 2014b; 2015b) analyzed the results from recent sector exemptions for redfish and the REDNET research program and determined that the impacts of the exemption on other non-groundfish species are expected to be low negative, especially for dogfish, the principle non-groundfish species from REDNET project (The EA considered impacts to this exemption through FY 2020). The exemption could result in greater retention of sub-legal other non-groundfish species. The FY 2020 Interim Final Sector Rule revised the redfish exemption, reducing the size of the area from previous versions that had been approved in FY 2015 to FY 2019, which is expected to further reduce impacts on other species. If in the future the exemption area is increased to the FY2019 area, or similar area, impacts on other species may be neutral to negative relative to Alternative 2.

6.2.4.2 Alternative 2 – Universal sector exemption for redfish (*Preferred Alternative*)

Impacts on regulated groundfish

The FY 2014 and FY 2015-2020 Sector EAs (NMFS 2014b; 2015b) analyzed the results from recent sector exemptions for redfish and the REDNET research program and determined that the overall impacts of the exemption to regulated groundfish species, including redfish and other groundfish stocks caught on redfish trips, are expected to be low negative (The EA considered impacts to this exemption through FY 2020). The exemption could result in greater retention of sub-legal regulated groundfish species. The exemption area proposed in Alternative 2 is larger than the Status Quo area under the FY 2020 Interim Final Sector Rule, and smaller than previous versions of the exemption area approved under the exemption from FY 2015 to FY 2019. Alternative 2 is expected to continue to have low negative impacts on regulated groundfish species. Compared to the Status Quo area under Alternative 1/No Action, impacts to regulated groundfish species are expected to be low negative. However, under Alternative 1/No Action, the exemption area could differ each year depending on the area approved annually in the sector exemption, and so impacts could differ in direction and magnitude across years, though it is expected that the Agency would take steps to minimize the impacts of any changes. Alternative 2 does not provide the same flexibility as Alternative 1/No Action, since any changes to the exemption would require a Council action, while under Alternative 1/No Action the Agency can make any changes to the exemption that might be necessary to protect groundfish stocks on an annual basis. This could potentially result in negative impacts on regulated groundfish species compared to Alternative 1/No Action.

Analysis of observer-recorded length information for several stocks showed that there were no identifiable shifts in selectivity towards smaller fish when using medium mesh versus large mesh trawl gear, which may suggest neutral biological impacts in the past (Appendix IV, Figures 7 and 8). However, caution is needed in the interpretation of possible shifts in selectivity in the future since selectivity is a function of multiple factors, such as fishery targeting behavior, targeting effort, and gear selectivity.

Alternative 2 includes two seasonal areas, the cod closure and seasonal closure II (Map 2), intended to minimize, respectively, bycatch of GOM cod and other groundfish, particularly pollock. Analysis shows lower proportions of redfish catch on trips that occur in these seasonal areas, accounting for the closure months (see Figure 15). With respect to the seasonal closure II, it is expected that limiting effort in an area with overall lower redfish catch would provide some benefit to regulated groundfish species, especially non-redfish, given analysis which shows it is more difficult for sectors to meet the monthly redfish landings threshold in the last four months of the year, which are the months of the closure (see Figure 15).

Impacts on other species

The FY 2014 and FY 2015-2020 Sector EAs (NMFS 2014b; 2015b) analyzed the results from recent sector exemptions for redfish and the REDNET research program and determined that the overall impacts of the exemption to other non-groundfish species are expected to be low negative, especially for dogfish (The EA considered impacts to this exemption through FY 2020). The exemption could result in greater retention of sub-legal other non-groundfish species. The exemption area proposed in Alternative 2 is larger than the Status Quo area under the FY 2020 Interim Final Sector Rule, and smaller than previous versions of the exemption area approved under the exemption from FY 2015 to FY 2019. Alternative 2 is expected to continue to have low negative impacts on other species. Compared to the Status Quo area under Alternative 1/No Action, impacts to other species are expected to be low negative. However, under Alternative 1/No Action, the exemption area could differ each year depending on the area approved annually in the sector exemption, and so impacts could differ in direction and magnitude across years, though it is expected that the Agency would take steps to minimize the impacts of any changes. Alternative 2 does not provide the same flexibility as Alternative 1/No Action, since any changes to the exemption would require a Council action, while under Alternative 1/No Action the Agency can make any changes to the exemption that might be necessary to protect groundfish stocks on an annual basis. This could potentially result in negative impacts on other species compared to Alternative 1/No Action.

6.2.4.2.1 **Performance Standards/Administrative Measures**

The Council selected both options as preferred.

6.2.4.2.1.1 Option A - Performance Standards for Monthly Redfish Landings Threshold and Groundfish Discards (*Preferred Alternative*)

<u>*Impacts on regulated groundfish species*</u>

Impacts of the proposed performance standards for the monthly redfish landings threshold and groundfish discards threshold on regulated groundfish species are expected to be low positive. This has the potential to result in less exemption fishing activity, which would have low positive benefits to regulated groundfish relative to No Action/Status Quo under the FY2020 sector exemption. There have been occurrences of multiple months in a fishing year over the last five years where sectors did not meet the redfish landings threshold requirements, and analysis shows that based on the last five fishing years of data, at least two sectors would have been put on probation for the following fishing year based on effort within the FY 2019 area (see section 6.5.4.2.1.1, Figure 15). No sector has exceeded the 5% groundfish discards threshold in the last five years. If the Council also selects Option B (Annual Redfish Landings Threshold), potential positive impacts to regulated groundfish species would be expected to be greater with the additional performance standards and administrative standards.

<u>*Impacts on other species*</u>

Impacts of the proposed performance standards for the monthly redfish landings threshold and groundfish discards threshold on other non-groundfish species are expected to be low positive. This has the potential to result in less exemption fishing activity, which would have low positive benefits to other species relative to No Action/Status Quo under the FY2020 sector exemption. There have been occurrences of multiple months in a fishing year over the last five years where sectors did not meet the redfish landings threshold requirements, and analysis shows that based on the last five fishing years of data, at least two sectors would have been put on probation for the following fishing year based on effort within the FY 2019 area (see section 6.5.4.2.1.1, Figure 15). No sector has exceeded the 5% groundfish discards threshold in the last five years.

6.2.4.2.1.2 Option B – Annual Redfish Landings Threshold and Performance Standards (*Preferred Alternative)*

Impacts on regulated groundfish species

This has the potential to result in less exemption fishing activity, which would have low positive benefits to regulated groundfish species relative to No Action/Status Quo. However, no sector has achieved less than 62% redfish landings over the last five fishing years (see Figure 16), and so unless catch proportions change significantly, impacts of Option B could be neutral.

Impacts on other species

This has the potential to result in less exemption fishing activity, which would have low positive benefits to other species relative to No Action/Status Quo. However, no sector has achieved less than 62% redfish landings over the last five fishing years (see Figure 16), and so unless catch proportions change significantly, impacts of Option B could be neutral.

6.3 IMPACTS ON PHYSICAL ENVIRONMENT AND ESSENTIAL FISH HABITAT

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

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

6.3.1 **Action 1 – Status Determination Criteria (Alternative 2 – *Preferred Alternative*)**

This action considers adjustments to the status determination criteria (SDC) for the Georges Bank and Southern New England/Mid-Atlantic winter flounder stocks. Alternative 1/No Action maintains the existing criteria, as shown in Table 2 (SDC) and Table 3 (numerical estimates). Alternative 2 updates these criteria, based on recommendations developed through the assessment process, as shown in Table 4 (SDC) and Table 5 (numerical estimates). For both stocks, the resulting fishing mortality and biomass thresholds are lower under Alternative 2.

From a habitat perspective, the SDC themselves are less important than the catch limits that result from implementing those criteria to generate annual catch limits (ACL). In the short term, Alternative 2 SDCs may lead indirectly, via lower ACLs, to decreases in fishing effort and therefore reduce negative impacts of fishing on EFH as compared to Alternative 1/No Action. Over the long term, it is assumed that the Alternative 1 criteria, which are based on dated scientific advice, may lead to decreases in stock size and/or overfishing, relative to criteria based on updated advice (Alternative 2). Thus, over time, maintaining the Alternative 1 SDCs could lead to reduced CPUE and a resulting increase in seabed area swept and habitat impacts as compared to implementing new SDC under Alternative 2. That being stated, many factors interact to produce the amount and location of effort in a particular fishery, such that the effect of SDC on the amount of habitat impacts is uncertain at best. Given that the Council would use recent catch and survey data to inform catch limits, regardless of the SDC in effect, the impacts of the two SDC options on habitat are likely similar.

6.3.2 **Action 2 – Formal Rebuilding Program (Alternative 2 Option B – *Preferred Alternative*)**

For FY2021, there are no differences in impacts between Alternative 1/No Action and Alternative 2 (including Option A, B, and C). Over the longer time horizon associated with the 10-year rebuilding program, the different fishing mortality rates associated with the various alternatives and options will lead to changes in ACLs. If these differences in ACLs translate to differences in fishing effort, the alternatives and options will have varying effects on habitat, with lower fishing effort associated with lower habitat impacts.

The analysis in section 6.5.2 explores net present value of implementing the three fishing mortality rates for the duration of the rebuilding plans, considering the white hake resource in isolation. Higher values are assumed to be associated with more fishing effort, and thus more fishery impacts. Although due to the complexity of the management system, a change in the white hake ACL could have little effect on overall effort. The highest F rate, 75% F_{MSY} (Alternative 1 and Alternative 2, Option C) are expected to have the largest magnitude of negative impacts to EFH, while the lowest impacts are likely associated with the lowest F rate (Alternative 2, Option A). Alternative 2, Option B is expected to have slightly less impacts than Alternative 1 or Alternative 2, Option C. If as projected, the stock rebuilds over time, the various rates applied to larger stocks will lead to larger catch limits but be limited by 75%FMSY. As discussed in the analysis of impacts to groundfish resources (section 6.2.2), projections of rebuilding rates/trajectories are often uncertain, and depend on factors beyond fishing mortality, including recruitment rates.

Because groundfish are fished as a complex, fishing mortality rates and thus availability of quota for white hake may influence the ability to target other co-occurring stocks, especially at the lower value of 50% F_{MSY}. Thus, Alternative 2, Option A could lead to further reductions in effort, thus further reducing impacts to habitat, as compared to the more similar Options B and C, with values of 70%F_{MSY} and 75% F_{MSY}, respectively.

6.3.3 **Action 3 – Specifications (Alternative 2 – *Preferred Alternative*)**

This action considers specifications values for various stocks for FY 2021. Alternative 1/No Action maintains default specifications for a range of stocks, including Eastern GB cod, Eastern GB haddock, GOM winter flounder, SNE/MA winter flounder, redfish, ocean pout, and wolffish. The default values are in effect through July 31, 2021, and equal 35% of the FY 2020 limits. Under Alternative 1/No Action other stocks in the fishery already have specifications set for the full 2021 fishing year. Table 6 summarizes both the default and the full-year 2021 specifications set in Framework 59. Alternative 2 revises specifications for the stocks listed above. Table 9 summarizes these updated specifications as well as existing full-year specifications for other stocks, set in Framework 59.

After July 31, 2021, ACLs would not be defined for the stocks listed above, which occur throughout the geographic range of the fishery. Without specification of these ACLs, catches would not be allocated to the groundfish fishery (sectors or common pool vessels) and targeted groundfish fishing activity would not occur for these stocks. In addition to the lack of targeted groundfish fishing activity for these stocks, certain provisions of the sector management system would probably constrain fishing even for stocks with an ACL. Regulations require that a sector stop fishing in a stock area if it does not have ACE for a stock. Fishing can continue on other stocks only if the sector can demonstrate it would not catch the ACE-limited stock. Thus, there would be little opportunity for sector vessels to fish once these quotas go to zero.

Alternative 1 would result in low negative impacts on EFH as fishing activity, mainly bottom-trawl gears which have adverse impacts to EFH, would continue for the first three months of the fishing year. After that, effort and impacts to EFH would decline substantially, or potentially cease altogether, unless sectors can demonstrate that they would be able to fish in a particular broad stock area without catching the ACE-limited stock. The analyses presented in sections 6.2.3 and 6.5.3 suggest that effort in the groundfish fishery would be much lower under Alternative 1 as compared to Alternative 2. Thus, Alternative 1 would be expected to have positive impacts compared to the alternative specifications under Alternative 2.

6.3.4 Action 4 – Commercial Fishery Measures for Sectors (Alternative 2 and Options A and B – *Preferred Alternative*)

This action considers adjustments to the way that a redfish sector exemption program is managed. This program authorizes the use of 5.5-inch mesh within a specific exemption area (versus 6.5-inch mesh generally required in the fishery), with requirements for VMS declarations and the proportion of redfish in the catch. Currently under Alternative 1/No Action, this exemption is administered annually at NOAA Fisheries' discretion, via the rulemaking that approves the sectors' annual operations plans. Under Alternative 2, this program, including the exemption area and the operational stipulations around trip declarations and redfish catch ratios, would be established as part of the FMP. Alternative 2 also includes some seasonal, spatial closures where this exemption would not be allowed to minimize bycatch of other groundfish stocks.

Bottom trawls, the gear that is regulated under this action, can have adverse effects on fish habitats. However, all else being equal, there is no reason to expect that fishing with 5.5 vs. 6.5-inch mesh would directly influence the magnitude of impacts associated with the fishery. In general, the redfish smaller mesh exemption could lead to differences in EFH impacts in the fishery as compared to a case where no exemption exists if the exemption led to more fishing effort overall, and/or led to fishing in locations and habitat types that are particularly vulnerable to impact. It is difficult to compare the no action and action alternatives under Action 4 because there is discretion for NOAA Fisheries associated with Alternative 1, including some flexibility around the exemption area boundaries. The discussion below focuses on the difference between the two sets of exemption areas in terms of the occurrence of corals.

One concern in terms of habitat vulnerability to trawling in the Gulf of Maine is the occurrence of deep-sea coral habitats. Deep-sea corals are relatively long lived sessile, benthic, invertebrates that either burrow into soft sediments (the sea pens) or attach to structures on the seafloor including bedrock and gravel substrates (the soft, hard, and black corals)[31]. Of these groups, sea pens are widespread throughout the Gulf of Maine, while soft corals (mostly two species, *Primnoa resaediformes* and *Paramuricea placomus*) are spatially rare but locally very abundant in specific locations. Some species of corals, including *Primnoa* and *Paramuricea*, are high relief and branching, and therefore can be snagged in fishing gear as it moves over the seabed. This can lead to breakage or removal of the corals. Beyond their inherent conservation value and fragility, corals provide important habitat for fishes, including Acadian redfish.

Beginning in 2012, the Council began to evaluate the locations of deep-sea coral habitats throughout the New England region, identifying a range of potential management zones where these animals are concentrated (colored areas in Figure 11 and Figure 12). These zones were initially considered as part of the Council's Omnibus Habitat Amendment 2, but later pulled out of that action and considered in a separate Omnibus Deep-Sea Coral Amendment. Within the Gulf of Maine, some of these sites, such as Mt. Desert Rock and Outer Schoodic Ridge, were proposed as closures to mobile bottom-tending fishing gears while other areas considered, such as Jordan Basin and Lindenkohl Knoll (Georges Basin) sites, were not recommended for implementation by the Council and will remain open fishing grounds. In addition, an area in Jordan Basin was identified as a research area but with no associated fishing restrictions. Other zones were recommended for the canyons, slope, and seamounts south of Georges Bank. The amendment was approved by NOAA Fisheries in November 2019, and the final rule is pending.

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[31] Most types of hard and black corals that occur in New England are not found in the Gulf of Maine, but these species occur in the canyons south of Georges Bank and on the New England seamounts.

Various sources were used to document coral habitats during development of the amendment. Some coral presence records are from a database that spans the late 1800s through 2012 (colored dots in Figure 11 and Figure 12). Other records show the results of remotely operated vehicle surveys conducted between 2003 and 2019 (black and black outlined stars in Figure 11 and Figure 12; data through 2017 were considered when developing management alternatives for the coral amendment). These ROV surveys provided particularly important evidence of recent coral occurrence when the Council drafted coral protection zones.

Figure 11 and Figure 12 show the 2020 exemption area and the pre-2020 and Alternative 2 exemption areas in comparison with coral data and coral management zones proposed in the Council's Omnibus Deep-Sea Coral Amendment. There are differences between the 2020 exemption area and the pre-2020 and Alternative 2 exemption areas in terms of overlap with coral habitats. Specifically, the Alternative 2 and pre-2020 exemption areas include additional deep-sea coral habitats in Jordan Basin and Georges Basin.

The spatial distribution of fishing activity in the exemption areas is heterogeneous (See Appendix IV, Figure 6) and the extent to which fishing might occur in the future in and around coral sites is uncertain, and likely to vary over time. The Council convened extensive discussions during development of the coral amendment around the spatial patterns of fishing in and around coral habitats. Based on ROV surveys, the corals in Jordan Basin generally occur on high relief humps of hardbottom (~20 meters tall) that emerge from the floor of the basin. Industry members indicated that they fish around these high relief sites when targeting groundfish with trawl gear in the basin, and that trawl vessels work among gillnet and lobster pot gear to harvest stocks like redfish, pollock, and white hake. Additional coral habitats in Jordan Basin will remain open to fishing once the Council's coral amendment is implemented but are outside the 2020 and Alternative 2 redfish exemption areas. The habitats at Lindenkohl Knoll also consists of rock outcroppings but that site is generally lower relief and different, topographically, from the Jordan Basin sites.

Overall, the eastward expansion of the exemption area under Alternative 2 would allow for redfish exemption program fishing to occur in additional areas of deep-sea coral habitat as compared to the exemption area authorized in FY2020 and could therefore potentially have negative impacts to EFH relative to the smaller exemption area.

Figure 11– Coral occurrence relative to redfish exemption areas.

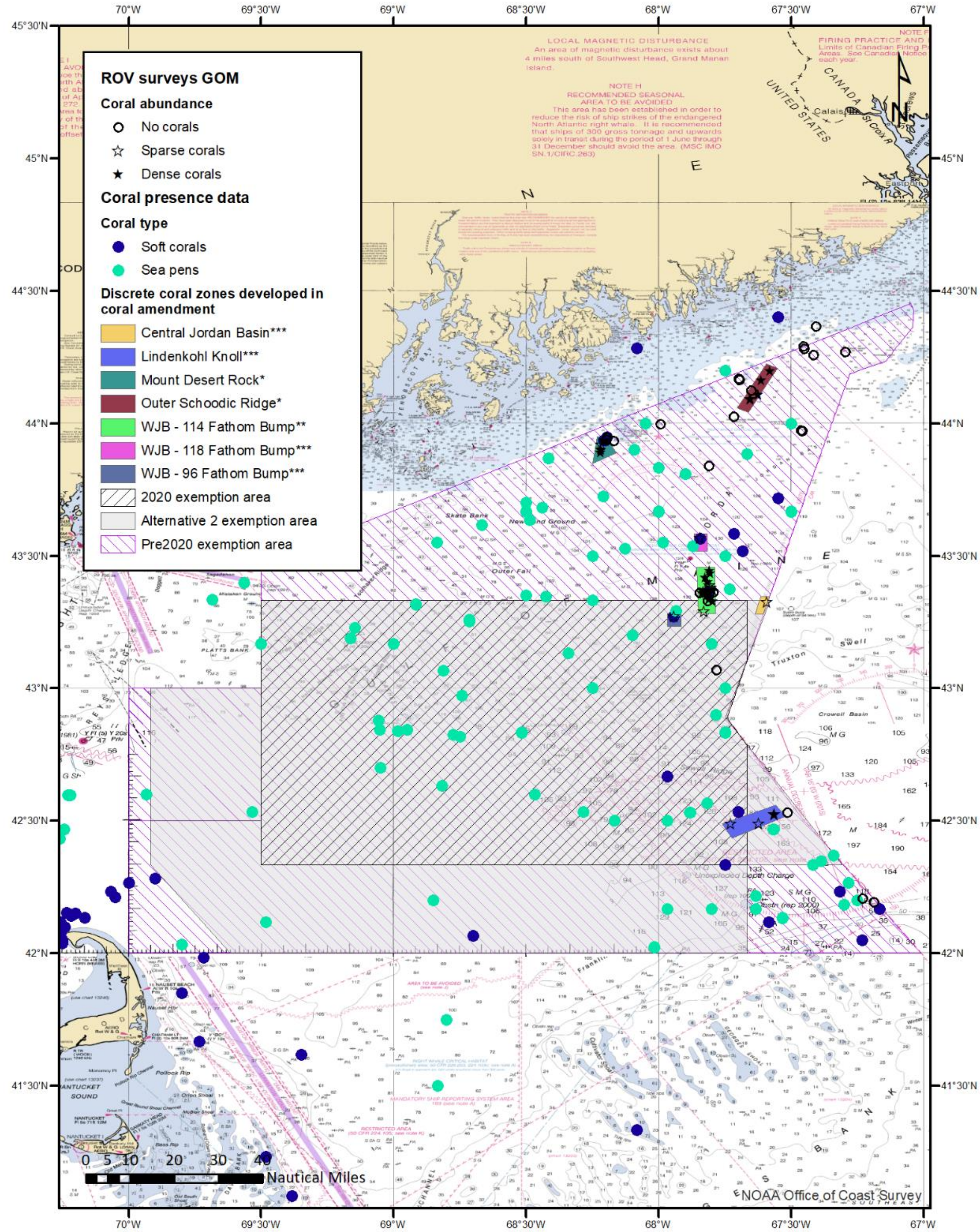
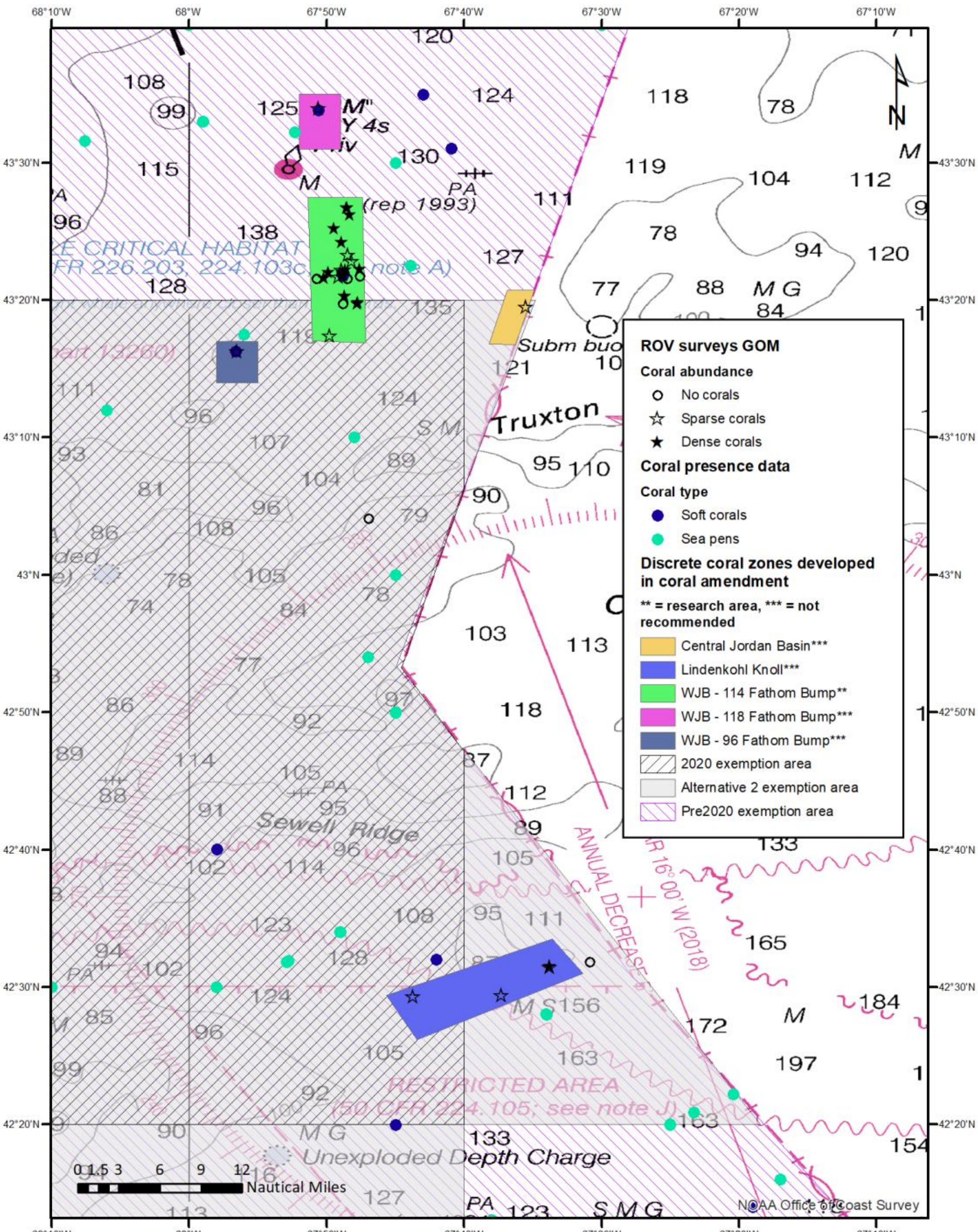


Figure 12– Coral occurrence relative to redfish exemption areas, with a focus on Jordan and Georges Basin sites.



6.4 IMPACTS ON ENDANGERED AND OTHER PROTECTED SPECIES

The FW61 alternatives are evaluated for their impacts on species protected under the Endangered Species Act (ESA) of 1973 and/or the Marine Mammal Protection Act (MMPA) of 1972. The current conditions of the protected species VEC is summarized in Table 72 and described in more detail in section 5.6. Impacts to protected species are described both in terms of their direction (negative, positive, or no impact) and their magnitude (slight, moderate, or high) based on the guidelines shown in Table 72.

The following impact analysis considers how the fishery may overlap with protected species in time and space, as well as records of protected species interaction with particular gear types (e.g., commercial: primarily gillnet and bottom otter trawl; recreational: rod and reel/hook and line gear). In addition, the impacts of the alternatives on protected species take into account impacts to ESA-listed species, as well as impacts to MMPA protected species in good condition (i.e., marine mammal stocks whose PBR level have not been exceeded) or poor (i.e., marine mammal stocks that have exceeded or are near exceeding their PBR level) condition. For ESA-listed species, any action that results in interactions or take is expected to have some level of negative impacts, including actions that reduce interactions. Actions expected to result in positive impacts on ESA-listed species include only those that contain specific measures to ensure no interactions (i.e., no take). By definition, all ESA-listed species are in poor condition and any take can negatively impact that species' recovery. The stock conditions for marine mammals not listed under the ESA varies by species; however, all are in need of protection. For marine mammal stocks that have their PBR level reached or exceeded, some level of negative impacts would be expected from alternatives that result in the potential for interactions between fisheries and those stocks. For species that are at more sustainable levels (i.e., PBR levels have not been exceeded), alternatives not expected to change fishing behavior or effort relative to current operating conditions in the fishery may have some level of positive impacts by maintaining takes below the PBR level and approaching the zero mortality rate goal (Table 72).

6.4.1 Action 1 – Status Determination Criteria

6.4.1.1 Alternative 1 - No Action

Under Alternative 1/No Action, there would be no revisions to the SDCs for GB winter flounder and SNE/MA winter flounder. As Alternative 1/No Action is an administrative measure, it will have no direct impact to protected species because it does not, in and of itself, change fishing effort or behavior. For these reasons when comparing Alternative 1/No Action to Alternative 2, the likely impacts to protected species are negligible.

6.4.1.2 Alternative 2 – Updated Status Determination Criteria (*Preferred Alternative*)

Alternative 2 would adopt updated SDCs for GB winter flounder and SNE/MA winter flounder. Updating the SDCs is an administrative measure, and this will have no direct impact to protected species because it does not, in and of itself, change fishing effort or fishing behavior. For these reasons when comparing Alternative 2 to Alternative 1/No Action, the likely impacts to protected species are negligible. However, Alternative 2 may result in indirect impacts to protected species. Whatever impact indirectly precipitates from changes to SDCs or mortality targets will be discussed in the context of other alternatives (Section

6.4.3) – including ACLs – which the Council adopts in order to meet mortality targets derived from the new SDCs and control rules.

6.4.2 Action 2 – Formal Rebuilding Program

6.4.2.1 Alternative 1 - No Action

Alternative 1/No Action would not establish a revised rebuilding strategy for white hake. Quotas (based on 75%F_{MSY}) would be maintained. This option does not alter fishing mortality, and therefore, changes in fishing effort with bottom trawl or gillnet gear (e.g., increased soak or tow time, increased quantity of gear towed or set in the water) are not expected. Understanding expected fishing behavior/effort in a fishery informs potential interaction risks with protected species (ESA listed and MMPA protected species). Specifically, interaction risks with protected species are strongly associated with the amount of gear in the water, the time the gear is in the water (e.g., soak time, tow time), and the presence of protected species in the same area and time as the gear, with risk of an interaction increasing with increases of any or all these factors. As Alternative 1/No Action is not expected to change any of these operating conditions and is not expected to result in significant changes in effort, increased interaction risks with protected species are not expected. Based on this, and the information provided in section 6.4, the impacts of Alternative 1/No Action on protected species are expected to be slight positive to slight negative impacts on protected species (i.e., ESA-listed and MMPA protected), with slight negative to slight positive impacts likely on MMPA (non-ESA listed) protected species, and negligible to slight negative impacts likely for ESA-listed species.[32]

Relative to Alternative 1, Alternative 2 would result in a fishing mortality that is either the same or lower than that under Alternative 1/No Action. Given this, there is the potential for effort, and therefore, interaction risks, to be lower under Alternative 2 when compared to Alternative 1. Based on this, compared to Alternative 2, Alternative 1 is expected to have negligible to moderate negative impacts on protected species (i.e., ESA-listed and MMPA protected).

6.4.2.2 Alternative 2 – Revised Rebuilding Strategy for White Hake (*Preferred Alternative – Option B*)

Under Alternative 2, Option C would result in quotas at 75%F_{MSY}; this is the same fishing mortality rate set under Alternative 1/No Action (section 6.4.2.1). Given this, impacts to protected resources are expected to be similar to Alternative 1/No Action (i.e., slight negative to slight positive). Options A and B are expected to require a decrease in catch (Option A more so than Option B), which may provide some benefit to protected species in areas where fishing for white hake occurs. As noted above, interaction risks with protected species are strongly associated with the amount of gear in the water, the time the gear is in the water (e.g., soak time, tow time), and the presence of protected species in the same area and time as the gear, with risk of an interaction increasing with increases of any or all these factors. The required decrease in catch under Options A and B may equate to a decrease in fishing effort (e.g., soak or tow time, duration of time gear is placed in the water), and therefore a decrease in interaction risks with

[32] Negligible impacts of an Alternative are associated with those species in which interactions with gear types used in the groundfish fishery have never been observed or documented (e.g., bottom trawl gear and North Atlantic right, humpback, fin, or sei whales) (see section 5.6.4).

protected species. However, even under a scenario of decreased fishing effort, interactions with protected species are still possible under Options A and B. Based on this and the information provided in section 6.4, impacts of Options A and B on protected species (i.e., ESA-listed and MMPA protected) are expected to be slight negative to moderately positive, with slight negative to moderate positive impacts likely on MMPA (non-ESA listed) protected species, and negligible to slight negative impacts likely for ESA-listed species.

Compared to Alternative 1/No Action, Options A and B are expected to potentially provide some benefit to protected species (i.e., ESA listed and MMPA protected) given the potential for effort to decrease with a decrease in quotas from those based on 75%F_{MSY}. Therefore, relative to Alternative 1/No Action, Options A and B may result in slight to moderately positive impacts to protected species. Compared to Options B and C, Option A affords the lowest F and therefore, is likely to constrain fishing effort relative to Options B and C. Based on this, relative to Options B and C, Option A is expected to result in slight to moderately positive impacts to protected species during the length of the rebuilding plan. Option B would require a slight decrease in F compared to Option C and would allow for an increase in F compared to Option A; however, the difference in F between Options B (70%F_{MSY}) and C (75%F_{MSY}) is small and may be difficult to detect. Based on this, Option B would have slight to moderately negative impacts on protected resources compared to Option A, and negligible impacts on protected resources compared to Option C, during the length of the rebuilding plan. Option C would allow for an increase in F compared to Option A and a slight increase in F compared to Option B; however, as provided above, the difference in F between Options B and C is small and may be difficult to detect. Based on this, relative to Option A, Option C is expected to have slight to moderately negative impacts on protected resource, and relative to Option B, impacts of Option C on protected species are expected to be negligible, during the length of the rebuilding plan.

6.4.3 **Action 3 – Specifications**

Action 1 encompasses adjustments to ACLs certain stocks (Alternative 2.

6.4.3.1 Alternative 1 - No Action

Under Alternative 1/No Action, the ACLs specified for FY2021 would be unchanged from those adopted through FW59. There would be no changes to the specifications for FY2021 and default specifications would be set for Eastern GB cod, Eastern GB haddock, GOM winter flounder, SNE/MA winter flounder, redfish, ocean pout, and wolffish for the first three months of FY2021. Under Alternative 1/No Action, there would be no new FY2021 quotas specified for the transboundary Georges Bank stocks of GB cod, GB haddock and GB yellowtail flounder, which are managed through the US/CA Resource Sharing Understanding. These quotas are specified annually.

See biological impacts (section 6.2.3.1) for an overview of Alternative 1/No Action. Briefly, fishing effort and behavior under Alternative 1/No Action is expected to remain similar to current operating conditions for the first three months of FY2021 with an expected halt to commercial groundfish fishing effort in all broad stock areas after July 31, 2021.

Understanding expected fishing behavior/effort in a fishery informs potential interaction risks with protected species (ESA listed and MMPA protected species). Specifically, interaction risks with protected species are strongly associated with the amount of gear in the water, gear soak or tow time, as well as the area of overlap, either in space or time, of the gear and a protected species (with risk of an interaction increasing with increases in of any or all of these factors). Taking into consideration the latter, as well as fishing behavior/effort under the Alternative 1/No Action, impacts of Alternative 1/No Action to protected species are provided below.

MMPA (Non-ESA listed) Protected Species Impacts

The potential impacts of Alternative 1/No Action/ on non-ESA listed MMPA protected species have not been analyzed quantitatively. This is largely due to the fact that these potential impacts are dependent upon fishing behavior and effort, which although expected to remain similar to current conditions, are not possible to predict for quantitative analysis. In order to best classify the potential impacts of Alternative 1/No Action on MMPA protected species, we have reviewed marine mammal serious injury and mortality reports, as well as the US Atlantic and Gulf of Mexico Marine Mammal Stock Assessments that cover that most recent 10 years of data (Waring et al. 2015a; Waring et al. 2016; Hayes et al. 2017; Hayes et al. 2018; Hayes et al. 2019; Hayes et al. 2020).

Aside from several stocks of bottlenose dolphin, there has been no indication that takes of non-ESA listed species of marine mammals in commercial fisheries has gone above and beyond levels which would result in the inability of each species population to sustain itself. Specifically, aside from MMPA strategic stocks identified in Table 21 in section 5.6.1 (i.e., several stocks of bottlenose dolphin), potential biological removal (PBR) levels have not been exceeded for any of the non-ESA listed marine mammal species identified in section 5.6.1. Although several stocks of bottlenose dolphin have experienced levels of take that have resulted in the exceedance of each species PBR level, take reduction strategies and/or plans have been implemented and are currently in place to reduce bycatch in the fisheries affecting these species (Atlantic Trawl Gear Take Reduction Strategy, Bottlenose Dolphin Take Reduction Plan; see sections 5.6.4.2.1.1 and 5.6.4.2.1.2 for additional information). Although the most recent information presented in Hayes et al. (2020) is a collective representation of commercial fisheries interactions with non-ESA listed species of marine mammals, and does not address the effects of the groundfish fishery specifically, the information does demonstrate that thus far, current management measures are keeping most marine mammal species below their PBR level; exceptions include marine mammal strategic stocks of bottlenose dolphin stocks.

Taking into consideration the above information, and the fact that there are non-ESA listed marine mammal stocks/species whose populations may or may not be at optimum sustainable levels, the impacts of Alternative 1 on non-ESA listed species of marine mammals are likely to range from slight negative to slight positive, depending on the species/stock. As provided above, some bottlenose dolphin stocks are experiencing levels of interactions that have resulted in exceedance of their PBR levels. These stocks/populations are not at an optimum sustainable level and therefore, the continued existence of these stocks/species is at risk. As a result, any potential for an interaction is a detriment to the species/stocks ability to recover from this condition. As previously noted, the risk of an interaction is strongly associated with the amount of gear in the water, the time the gear is in the water (e.g., soak or tow time), and the presence of protected species in the same area and time as the gear, with risk of an interaction increasing with increases in of any of these factors. As commercial fishing effort under Alternative 1 is expected to remain unchanged from current operating conditions, Alternative 1 is not expected to introduce new or elevated interaction risks to these non-ESA listed marine mammal stocks in poor condition. Specifically, the amount of gear in the water, tow times, and overlap between protected species and fishing gear is expected to remain unchanged relative to current conditions. Given this information, and the information provided in section 5.6, Alternative 1 is likely to result in slight negative impacts to non-ESA listed marine mammal stocks/species in poor condition (i.e., bottlenose dolphin stocks).

Alternatively, there are also many non-ESA listed marine mammals that, even with continued fishery interactions, are maintaining an optimum sustainable level (i.e., PBR levels have not been exceeded) over the last several years. For these stocks/species, it appears that the fishery management measures that have been in place over this timeframe have resulted in levels of effort that result in interaction levels that are not expected to impair the stocks/species ability to remain at an optimum sustainable level. These fishery management measures, therefore, have resulted in indirect low positive impacts to these non-ESA listed marine mammal species/stocks. Should future fishery management actions maintain similar operating condition as they have over the past several years, it is expected that these low positive impacts would remain. As provided above, Alternative 1 is expected to result in *status quo* commercial fishing effort relative to recent levels. Given this, the impacts of Alternative 1 on these non-ESA listed species of marine mammals are expected to be negligible to slight positive (i.e., continuation of current operating conditions is not expected to result in exceedance of any of these stocks/species PBR level), with negligible impacts are associated with those species in which interactions with gear types used in the groundfish fishery have never been observed or documented (i.e., hook and line: small cetaceans (except for bottlenose dolphin stocks); bottom trawl gear: humpback whale; see section 5.6.4).

Based on the above information, information provided in sections 5.6 and 6.4, and the fact that the groundfish fishery must comply with specific take reduction plans (i.e., HPTRP, the BDTRP, ALWTRP; see sections 5.6.4.2.1.1 and 5.6.4.2.1.2); and that voluntary measures exist that reduce serious injury and mortality to marine mammal species incidentally caught in trawl fisheries (see the Atlantic Trawl Gear Take Reduction Team in section 5.6.4.2.1.1), Alternative 1/No Action is expected to have slight negative to slight positive impacts on non-ESA listed species of marine mammals.

ESA Listed Species

The commercial groundfish fishery is prosecuted primarily with bottom otter trawl and gillnet gear; the recreational component primarily uses hook and line gear. As provided in section 5.6.1, ESA listed species of whales, sea turtles, Atlantic sturgeon, and Atlantic salmon are at risk of interacting with all or some of these gear types, with interactions often resulting in injury or mortality to the species. Based on this, the groundfish fishery is likely to result in some level of negative impacts to ESA listed species. Taking into consideration fishing behavior/effort under Alternative 1/No Action, as well the fact that interaction risks with protected species are strongly associated with the amount of gear in the water, the time the gear is in the water (e.g., soak time, tow time), and the presence of protected species in the same area and time as the gear, with risk of an interaction increasing with increases of any or all of these factors, we determined the level of negative impacts to ESA listed species to be slight. Below, we provide support for this determination.

As provided above, Alternative 1/No Action alternative will set specifications for FY2021 - FY2023; these specifications would remain unchanged from those adopted in FW59. As specifications under Alternative 1/No Action are no greater than those authorized over the last 5 or more years, resultant fishing behavior and effort in the groundfish fishery is expected to remain similar to what has been observed in the fishery over this timeframe. Specifically, the amount of gear (i.e., bottom trawls gillnets, hook and line), tow or soak times, and area fished are not expected to change significantly from current operating conditions. As noted above, interaction risks with protected species are strongly associated with the amount of gear in the water, the time the gear is in the water (e.g., soak time, tow time), and the presence of protected species in the same area and time as the gear, with risk of an interaction increasing with increases of any or all of these factors. Continuation of "status quo" fishing behavior/effort is not expected to change any of these operating conditions. Based on this, the information provided in sections 5.6 and 6.4), and the fact that the groundfish fishery must comply with the ALWTRP, the impacts of

Alternative 1/No Action alternative on ESA listed species is expected to be negligible to slight negative. Negligible impacts are associated with those species in which interactions with gear types used in the groundfish fishery have never been observed or documented (i.e., bottom trawl gear: North Atlantic right, sei, and fin whales), and slight negative impacts are associated with those species in which interactions (based on observed or documented take) are possible with gillnet, bottom trawl, and/or hook and line gear (see section 5.6.3.5).

Overall Impacts to Protected Species

Based on the above protected species (i.e., ESA-listed and MMPA protected) impact analysis, overall impacts of Alternative 1/No Action on protected species are expected to be slight negative to slight positive. Relative to Alternative 2, Alternative 1/No Action may result in negligible to moderately positive impacts to protected species. Although the total ACLs between Alternative 1/No Action and Alternative 2 do vary, all proposed ACLs are within the range of ACLs authorized within the fishery over the last 5 (or more) years. As a result, any changes in fishing effort or behavior between either Alternative are not expected to be significant. However, as Alternative 1/No Action will not have specifications specified for Eastern GB cod, Eastern GB haddock, GOM winter flounder, SNE/MA winter flounder, redfish, ocean pout, and wolffish after July 31, 2021, which would be expected to halt commercial groundfish fishing effort in all broad stock areas. The latter potentially equates to less fishing time, and therefore, less gear being present in the water. As protected species (ESA listed and MMPA species) interactions with gear, regardless of listing status, is greatly influenced by the amount of gear, the time the gear is in the water (e.g., soak time, tow time), and the presence of protected species in the same area and time as the gear, any decrease in either of these factors will reduce the potential for protected species interactions with gear. Based on this information, Alternative 1/No Action may provide benefit to protected species relative to Alternative 2.

6.4.3.2 Alternative 2 – Revised Specifications (*Preferred Alternative*)

In general, relative to Alternative 1/No Action, the new specifications adopted under Alternative 2 will result in 11 of the stocks (8 allocated and 3 non-allocated) experiencing a decrease in the total ACL, 7 stocks (5 allocated and 2 non-allocated) experiencing some increase in the total ACL, and 2 stocks (allocated) experiencing no change in ACL (see Table 89).

Annual catch limits can be considered a proxy for relative fishing effort. Information on fishing effort in turn informs potential interaction risks to protected species. Specifically, interaction risks to protected species (i.e., ESA-listed and MMPA protected) are associated with the amount of gear in the water, the time the gear is in the water (e.g., soak time, tow time), and the presence of protected species in the same area and time as the gear, (i.e., components of fishing effort); however, this information is often unavailable. As a result, assessments of protected species interaction with an associated fishery are often dependent on looking at changes (if any) in ACL as a means to identify potential changes in fishing behavior/effort from one year to the next, and therefore, identification of new or additional interaction risks to a protected species. As Alternative 2 will result in an increase in the ACL for multiple stocks, some increase in effort is possible under Alternative 2. However, any potential increase in effort is expected to be tempered by constraining stocks that are spread out across broad stock areas (see section 6.2.3.2). Based on this, and the fact that the proposed specifications under Alternative 2 are no greater than or are within the range of the specifications that have been authorized by the fishery over the last 5 or more years, resultant fishing behavior and effort in the groundfish fishery is expected to remain similar to what has been observed in the fishery over this timeframe. Specifically, the amount of gear (hook and line, bottom trawls and gillnets), tow or soak times, and areas fished are not expected change significantly from current operating conditions.

As noted above, interaction risks with protected species are strongly associated with amount of gear in the water, the time the gear is in the water (e.g., soak time, tow time), and the presence of protected species in the same area and time as the gear, with risk of an interaction increasing with increases of any or all these factors. As Alternative 2 is not expected to change any of these operating conditions, and is not expected to result in significant changes in effort, increased interaction risks with protected species are not expected. Based on this, the information provided in sections 5.6 and 6.4, and the fact that the groundfish fishery must comply with the take reduction plans (i.e., HPTRP, the BDTRP, ALWTRP; see sections 5.6.4.2.1.1 and 5.6.4.2.1.2), impacts of Alternative 2 on protected species (i.e., ESA listed and MMPA protected) are expected to be slight negative to slight positive (see Alternative 1/No Action for rationale behind negligible vs slight negative determination). Relative to Alternative 1/No Action, Alternative 2 is likely to result in negligible to more negative impacts to protected species as there is the potential for an increase in effort relative to Alternative 1/No Action. Any potential increase in effort is expected to be tempered by constraining stocks that are spread out across broad stock areas. Additionally, under Alternative 1/No Action, after July 31, 2021, Eastern GB cod, Eastern GB haddock, GOM winter flounder, SNE/MA winter flounder, redfish, ocean pout, and wolffish would not have ACLs specified and no targeted groundfish fishing effort could occur in any broad stock area, with an expected halt to commercial groundfish fishing effort in all broad stock areas after July 31, 2021.

6.4.4 **Action 4 – Commercial Fishery Measures for Sectors**

6.4.4.1 Alternative 1 – No Action

Under Alternative 1/No Action, there would continue to be no universal sector exemption for redfish. Sectors could continue to request an exemption annually through their operations plans to use a smaller trawl mesh size of 5.5-inch mesh (versus 6.5-inch mesh generally required in the fishery) within a defined exemption area to target redfish.

The impacts of Alternative 1/No Action on protected species (i.e., ESA listed and MMPA protected) are expected to be slight negative to slight positive. If no universal redfish exemption area is established (Alternative 1/No Action), fishing effort and distribution would not be expected to change from how the fishery currently operates. Alternative 1/No Action will not provide any incentive to increase effort or change fishing behavior of bottom trawl vessels fishing in the portion of the GOM and GB delineated as the redfish exemption area in a manner that differs from how the fishery currently operates (e.g., no changes to gear tow times, gear quantity, or area fished). Understanding expected fishing behavior/effort in a fishery helps to inform potential interaction risks with protected species (ESA listed and MMPA protected species). Specifically, interaction risks with protected species are strongly associated with the amount of gear in the water, the time the gear is in the water (e.g., soak time, tow time), and the presence of protected species in the same area and time as the gear, with risk of an interaction increasing with increases of any or all these factors. As Alternative 1 is not expected to change any of these operating conditions, and is not expected to result in significant changes in effort, increased interaction risks with protected species are not expected.

It is somewhat difficult to compare impacts of Alternative 1/No Action and Alternative 2 because under Alternative 1/No Action, the sector exemptions are requested annually, and so the details of the sector exemption including the exemption area boundaries could vary each year. For example, as noted in section 4.4.1, the Redfish Exemption Area approved for FY 2020 is reduced in size compared to the area previously approved under the exemption from FY 2015 to FY 2019. Given this, it is difficult to compare the size of the exemption area, and its potential effects to fishing behavior and effort, between Alternative 1/No Action and Alternative 2. In some instances, the relative size of the exemption area under Alternative 1/No Action may be similar to that proposed under Alternative 2, and therefore, result in little difference in fishing behavior and effort when compared to Alternative 2. In addition, under Alternative 1/No Action, while sectors may request specific exemptions annually, the NMFS Regional Administrator may not authorize the exemption; this may provide some constraints on the level of redfish fishing effort in the portion of the GOM and GB where the redfish exemption area is delineated. Taking into consideration these factors, relative to Alternative 2, Alternative 1/No Action may result in negligible to slight positive impacts on protected species (i.e., ESA-listed and MMPA protected).

6.4.4.2 Alternative 2 – Universal sector exemption for redfish (*Preferred Alternative*)

Alternative 2 would add a universal sector exemption to the NE Multispecies FMP that would allow commercial trawl vessels enrolled in sectors to fish using a 5.5-inch (or larger) mesh codend within a defined exemption area (see Map 2) to target redfish. Approval through the annual (or biennial) sector operations plan approval process would not be necessary.

The impacts of Alternative 2 on protected species (i.e., ESA-listed and MMPA protected) are expected to be slight negative to slight positive. The redfish exemption area under Alternative 2 is larger than that under Status Quo (the FY2020 sector exemption), but within the size of the previously approved exemption area. Because of this, Alternative 2 is not expected to introduce any new risks to protected species that have not already been considered and assessed under Alternative 1/No Action. Risks to protected species would be expected to be similar to those under Alternative 1/No Action. Given this, impacts to protected species (i.e., ESA-listed and MMPA protected) are expected to be slight negative to slight positive (see Alternative 1/No Action for rationale).

Alternative 2 could lead to differences in protected species impacts compared to Alternative 1/No Action if the universal sector exemption led to more fishing effort overall; however, it is difficult to determine if and how fishing effort may shift as a result of establishing the redfish exemption as a universal sector exemption. Taking into consideration these factors, as well as the Performance Standards/Administrative Measure Options under Alternative 2 (see below), relative to Alternative 1/No Action, Alternative 2 is expected to result in slight to moderately positive impacts to protected species.

6.4.4.2.1 Performance Standards/Administrative Measures

The Council selected both Option A and Option B.

6.4.4.2.1.1 Option A - Performance Standards for Monthly Redfish Landings Threshold and Groundfish Discards (*Preferred Alternative*)

Under the proposed performance standards under Option A for the monthly thresholds, a sector that fails to meet either threshold for (a) four or more months per fishing year or (b) three consecutive months would have its use of the exemption revoked for the remainder of that fishing year and would be placed on a probationary status for the following year, and if the sector continues to fail to meet the threshold, would have use of the exemption revoked in subsequent years. This has the potential to result in less exemption fishing activity, which could provide some benefits to protected species (i.e., ESA-listed and

MMPA protected). While fishing effort and activity would be expected to continue in the area outside of redfish exemption fishing activity, redfish exemption trips account for the majority of total sector trawl effort in much of the exemption area (see Figure 11), and so a reduction in redfish exemption fishing may potentially result in a reduced risk of an interaction between bottom trawl gear and protected species in the portion of the GOM and GB delineated as the redfish exemption area. This could provide some benefits to protected species; however, as interactions with protected species are still possible, some level of risk to protected species is expected. Based on this, and the information provided in sections 5.6 and 6.4, the impacts of Option A on protected species (i.e., ESA-listed and MMPA protected) are expected to be slight negative to slight positive. Relative to No Action/Status Quo, which does not include performance standards and administrative measures that have the potential to constrain fishing effort, impacts of Option A on protected species could potentially be slight to moderately positive. The Council also selected Option B (Annual Redfish Landings Threshold), and so potential positive impacts to protected species compared to No Action/Status Quo would be expected to be greater with the additional performance standards and administrative measures.

6.4.4.2.1.2 Option B – Annual Redfish Landings Threshold and Performance Standards (*Preferred Alternative*)

Under Option B, the performance standards for this threshold means that a sector that fails to meet the threshold would be placed on a probationary status, and if the sector continues to fail to meet the threshold, would have use of the exemption revoked. This has the potential to result in less exemption fishing activity, which could provide some benefits to protected species (i.e., ESA-listed and MMPA protected). As described above, while fishing effort and activity would be expected to continue in the area outside of redfish exemption fishing activity, redfish exemption trips account for the majority of total sector trawl effort in much of the exemption area (see Figure 11), and so a reduction in redfish exemption fishing may potentially result in a reduced risk of an interaction between bottom trawl gear and protected species in the portion of the GOM and GB delineated as the redfish exemption area. This could provide some benefits to protected species; however, as interactions with protected species are still possible, some level of risk to protected species is expected. Based on this, and the information provided in sections 5.6 and 6.4, the impacts of Option B on protected species are expected to be slight negative to slight positive. Relative to No Action/Status Quo which does not include performance standards and administrative measures that have the potential to constrain fishing effort, impacts of Option B on protected species could potentially be slight to moderately positive. The Council also selected Option A (Performance Standards for Monthly Redfish Landings Threshold and Groundfish Discards), and so potential positive impacts to protected species compared to No Action/Status Quo would be expected to be greater with the additional performance standards and administrative measures.

6.5 IMPACTS ON HUMAN COMMUNITIES- ECONOMICS

Introduction

Consideration of the economic impacts of the changes made in this framework is required pursuant to the National Environmental Policy Act (NEPA) of 1969 and the Magnuson-Stevens Fishery Conservation and Management Act (MSA) of 1976. NEPA requires that before any federal agency may take “actions significantly affecting the quality of the human environment,” that agency must prepare an Environmental Assessment (EA) or Environmental Impact Statement (EIS) that includes the integrated use of the social sciences (NEPA Section 102(2) (C)). The MSA stipulates that the social and economic impacts to all fishery stakeholders should be analyzed for each proposed fishery management measure to provide advice to the Council when making regulatory decisions (Magnuson-Stevens Section 1010627, 109-47).

The National Marine Fisheries Service (NMFS) provides guidelines to use when performing economic reviews of regulatory actions. The key dimensions for this analysis are expected changes in net benefits to fishery stakeholders, the distribution of benefits and costs within the industry, and changes in income and employment (NMFS 2007). Where possible, cumulative effects of regulations are identified and discussed. Non-economic social concerns are discussed in Section 6.6. The economic impacts presented here consist of both qualitative and quantitative analyses dependent on available data, resources, and the measurability of predicted outcomes. It is assumed throughout this analysis that changes in revenues would have downstream impacts on income levels and employment; however, these are only mentioned if directly quantifiable.

6.5.1 Action 1 – Status Determination Criteria

6.5.1.1 Alternative 1 - No Action

Economic Impacts

Under Alternative 1/No Action there would be no revisions to the SDCs for GB winter flounder and SNE/MA winter flounder, the numerical estimates for these stocks would not change since the 2018 and 2019 groundfish stock assessments, respectively.

Under Alternative 1, there would not be any immediate economic impacts, since it does not alter the current methodology used for setting the ABC for each species. Long term impacts of Alternative 1 would be that biomass targets would be based on outdated information, increasing the risk of overfishing over the long run, and eroding long-run fishery net revenues as a result.

Overall, Alternative 1 is expected to have negative economic impacts. Compared to Alternative 2, impacts would be positive in the short run but negative in the long run.

6.5.1.2 Alternative 2 – Updated Status Determination Criteria (*Preferred Alternative*)

Economic Impacts

Under Alternative 2, SDCs for GB winter flounder and SNE/MA winter flounder would be changed as a result of the 2020 management track assessments. This would result in a lower FMSY for each stock, and consequently, lower ACLs, compared to No Action/Alternative 1. In the short run, the lower ACLs for these stocks may result in fishermen experiencing lower net revenues as a result of anticipated catch reductions.

Alternative 2 is expected to have positive long run economic impacts relative to Alternative 1, since updating SDCs for both stocks according to the most recent scientific assessments decreases the likelihood of overfishing or the stock becoming overfished over the long run, which allows for increased fishery revenues.

Overall, Alternative 2 is expected to have low negative economic impacts. Compared to Alternative 1, short run economic impacts are expected to be negative and long run economic impacts would be positive.

6.5.2 **Action 2 – Formal Rebuilding Program**

6.5.2.1 Alternative 1 - No Action

Commercial Groundfish Fishery Economic Impacts

Maintaining quotas under No Action would provide neutral or positive economic impacts relative to Alternative 2. The impacts of No Action relative to Alternative 2, Option C would be similar if quotas were set at 75%FMSY under No Action. Under Alternative 2, Options A and B, reducing quotas would negatively affect the groundfish fishery, largely to the extent that catches could constrain the harvest of other targeted species. If avoiding white hake catches results in a change in fishing practices, total groundfish revenue could decrease and potentially variable costs could increase. On the other hand, the shift could be to other species that are more profitable. Recent catches of white hake in the commercial groundfish fishery have increased from around 1,500 mt in FY2015 and FY2016 to over 2,000 mt in FYs 2018 and 2019. This increased catch is despite declining commercial groundfish ACLs of 4,343 mt in FY 2015 to 2,735 mt in FY 2019. Because of increased catch, and a decreasing ACL, utilization has increased from 37% in FY 2015 to 76% in FY 2019. Utilization was similarly high in FY 2018 at 77%. In FY2021, white hake is predicted to be a constraining species for the sector component fishery (see Action 3 impacts for more information). This demonstrates the fishery is reliant on white hake. Because of this, ACLs for white hake may be least constraining under 75%FSMY in either No Action or Alternative 2 Option C.

6.5.2.2 Alternative 2 – Revised Rebuilding Strategy for White Hake (*Option B - Preferred Alternative*)

Commercial Groundfish Fishery Economic Impacts

There are no differences in economic impacts between any Alternative 2 options and the No Action alternative in FY 2021. There are, however, differences in impacts along the rest of the 10-year rebuilding time horizon outlined in each of the Options (A, B, the preferred alternative, or C) and each of the Options may have neutral to negative economic impacts relative to a No Action alternative. The impacts of No Action relative to Option C would be similar if quotas were set at 75%F_{MSY} under No Action.

The following analysis does not consider an adjustment to the Ftarget if rebuilding occurs before the end of the period (e.g., the Council is notified by NMFS the stock is rebuilt). In such as case, 75%FMSY may be in place for part of, what would have been, the full 10 years of the plan. If we assume that quotas as projected in each rebuilding scenario remain in place for the duration of the rebuilding timeframe, and also that the fishing industry is able to capture 100% of the allocated quota (per Table 9), it is possible to compare the net present value (NPV) of the different rebuilding scenarios in 2020 dollars. To compare alternative benefit streams over time, discount rates of 0%, 3%, and 7% were selected to convert all benefit streams to a present value. For this purpose, a discount rate of 3% was selected as recommended by NOAA to reflect the Social Rate of Time Preference (SRTP) (NOAA 2003). In addition, the Executive Branch's Office of Management and Budget recommends a discount rate of 7% to estimate the rate of return on average investments. Both discount rates (3% and 7%) are included here for the purpose of comparison with a 0% discount rate as a baseline. NPVs are calculated through 2031, the selected T_{target} and T_{max} timeframe for rebuilding this stock.

This analysis assumes all allocated fish of particular stock are caught in each year (Table 85), varying by fishing mortality target in each Option and reduced by a discount rate (Table 86). Here, Alternative 1 (the No Action alternative) is the same as Option C, but zero landings after 2021 (F=0) are included in the analysis for the sake of comparison. Total value is calculated in each year by applying an average price from historical price and landings information for white hake (2006-2020). Average price was applied because there was not a significant relationship between price and quantity over the entire time period. This analysis does not account for the potential revenue changes associated with other stocks. Because of this and the other simplifying assumptions, estimates should be compared in relative terms and not by absolute values.

Results illustrate that if mortality targets specified in each Option are maintained through the entire rebuilding period (T_{max}, or 10 years), that NPV is directly related to the proportion of allowable catch permitted in any Option (Table 86). Therefore, regardless of discount rate (0%, 3% or 7%), No Action and Option C allows the largest fishing mortality rate (75%F_{MSY}) and results in the largest NPV relative to the other options, while Option A would confer the lowest NPV over time. Comparing across options under Alternative 2, Option C would increase NPV by 22% compared to Option A and 4% relative to Option B, the preferred alternative, regardless of the choice of discount rate. Therefore, impacts of the Options, when compared against each other, show that Option A likely has negative impacts relative to the status-quo Option (Option C and No Action), while Option B, the preferred alternative, has relatively low negative impacts.

All the Options under Alternative 2 have the same target rebuilding date, but have different probabilities of attaining the target. Furthermore, while Option C yields the highest NPV, if the Option fails to rebuild the white hake stock within the rebuilding period, long-term economic benefits might instead be optimized under either Option B, the preferred alternative, or under Option A. If quantity landed were to have a negative influence on price in the future, differences in NPV under the three Alternative 2 Options would decrease, assuming full quota utilization. If the stock rebuilds sooner than the target rebuilding date of 10 years, mortality rates could be increased in subsequent years, which would further decrease the differences in NPV between the three Options.

Table 85- Total simulated white hake catch under each mortality target (mt). Assumes 100% attainment in every year. See biological impacts for more information on analysis. *Option 2.B., is the preferred alternative.

Rebuilding year	Fishing Year	**2.A** Fmsy50	***2.B** Fmsy70	**2.C** Fmsy75
0	2021	2080	2080	2080
1	2022	1615	2218	2376
2	2023	1774	2374	2525
3	2024	1951	2552	2699
4	2025	2179	2799	2945
5	2026	2394	3026	3172
6	2027	2605	3246	3390
7	2028	2818	3472	3614
8	2029	2980	3635	3775
9	2030	3107	3759	3895
10	2031	3202	3845	3980

Table 86- Net Present Value of white hake 10 year projected catches (millions of $2018) for different rebuilding options (Alternative 2/ Option A, *B (the preferred alternative), C), F=0, and F_{MSY} , a low recruitment scenario of 75% F_{MSY} and discount rates (0%, 3%, and 7%).

Discount rate	**2.A**(50%F_{MSY})	***2.B**(70%F_{MSY})	**2.C**(75%F_{MSY})
0	58.87	72.77	75.95
3	50.04	61.85	64.58
7	41.10	50.80	53.06

6.5.3 Action 3 – Specifications

The Quota Change Model (QCM) was used to analyze the impacts of changes in Annual Catch Limits (ACLs) to the sector portion of the groundfish fishery for fishing year 2021 (FY2021). The model was developed during FY2011 to make predictions for FW47 (FY2012) and has since been used in analyzing the impacts of all subsequent groundfish management actions that included ACL changes in the fishery. To predict FY2021 fishery revenue, a sample pool of trips was first constructed using data from FY2019. During FY2019, 99% of commercial groundfish landings and revenues were associated with sectors.

Each trip in the sample pool then received a probability score of being selected into the synthetic 2021 fishing year. Probability scores were based on the trip's net revenue divided by catch, with net revenue calculated as gross revenue – (operating cost[33] + sector cost + quota cost). The model was run to form 250 synthetic fishing years and mean or median values (indicated in table captions) are presented. By running simulations based on actual fishing trips, the model implicitly includes the following assumptions:

- Stock conditions, fishing practices and harvest technologies existing during the data period are representative[34];
- Trips are repeatable;
- Demand for groundfish is constant, noting that fish prices vary between the reference population and the sample population, but this variability is consistent with the underlying price/quantity relationship observed during the reference period;
- Quota opportunity costs and operating costs are constant;
- ACE flows seamlessly from lessor to lessee such that fishery-wide caps can be met without leaving ACE for constraining stocks stranded; and,
- At-sea monitoring (ASM) is fully subsidized. The condition of a trip being observed has no explicit effect on its ability to be chosen into the selection pool.

Because the QCM uses FY2019 data, for both the No Action and Alternative 2 specifications it is assumed that the redfish exemption area from FY2019 was unmodified. The implications are that some trips that were selected for the synthetic 2021 fishing year may not be possible under an exemption area that differs from the FY2019 area, such as was true in FY2020 when the exemption area was reduced in size. Another action in this framework, Action 4, considers changing the redfish exemption area for FY2021. For Action 4, Alternative 2: Universal Sector Exemption for Redfish, the QCM was run separately under the FY2019 (Scenario 1), FY2020 (Scenario 2), and Alterative 2 exemption areas (Scenario 3). These QCM runs all incorporated the Alternative 2 Specifications.

To understand the QCM's ability to predict groundfish fishery catch and revenues, we offer a retrospective look at its performance since FY2016 (Table 87). Information on the performance of the QCM during earlier years (FY2011-FY2015) can be found in Groundfish FW58. Groundfish revenues have been over-predicted in recent years, with annual realized values being 8-16% lower than predicted values during FY2016-2019. A downward trend in ex-vessel prices, which is discussed in further detail under the Alternative 2 impacts, is a contributing factor in these recent overestimations. Since the prediction year is two years after the input year in the QCM, a decline in price over that two year period will increase the likelihood of the model overestimating revenues. Predictions for operating profit, have generally been closer to realized values. The greatest deviation occurred for FY2017, in which realized operating profit was 10.2% lower than the predicted value from FW56. Realized operating profit for FY2019 was 7.1% lower than the predicted value from FW58. The realized value of 50.1 million may

[33] Operating costs are trip-level costs, such as fuel, oil, bait, ice, and fuel. Information on these costs is collected by at-sea observers in both the NEFOP and ASM programs.

[34] This assumption is particularly important because of the ways the fishery has been affected by the COVID-19 pandemic and may limit the ability of FY2019 data to predict FY2021 fishery outcomes. The COVID-19 pandemic has had potentially long-term shifts in demand and supply trends, affected by persistent global disruptions, and also by domestic interventions such as a USDA purchasing program that included $20,000,000 of Atlantic haddock, pollock, and redfish, to commence in the third quarter of 2020 (https://www.ams.usda.gov/press-release/usda-announces-additional-food-purchase-plans). As of March 2021, it is unclear if similar programs may be put in place under additional COVID-19 relief packages that could affect FY2021 outcomes.

have been higher, and closer to the predicted value of 53.9 million, in the absence of the COVID-19 pandemic. At the end of FY2019, fleetwide commercial groundfish revenue was approximately $2.4 million less than the average from the past three fishing years, and groundfish prices generally dropped in March and April 2020, especially for cod, winter flounder, and yellowtail flounder.[35]

[35] GF PDT memo to the GF Committee dated June 17th, 2020. https://s3.amazonaws.com/nefmc.org/3c_200617-GF-PDT-memo-to-GF-Committee-re-COVID-19-carryover-requests-for-commercial-fishery_Final.pdf

Table 87- QCM predictions (median values) and realized revenues and costs for FY2016-2020, 2019 dollars (millions).

	FY2016		FY2017		FY2018		FY2019		FY2020
	Predicted[36]	Realized	Predicted[37]	Realized	Predicted[38]	Realized	Predicted[39]	Realized	Predicted[40]
Groundfish Revenue	56.4	51.8	50.9	46.7	58.9	49.4	54.7	48.0	49.0
Total Revenue	74.3	78.3	73.5	70.1	83.9	72.1	78.0	66.1	70.1
Operating Cost	17.9	14.1	13.5	13.0	15.6	12.5	14.6	10.7	12.5
Sector Cost	2.0	1.7	1.7	1.8	1.7	2.0	1.9	1.8	1.9
Quota Cost	6.1	10.2	7.1	9.4	12.0	5.4	7.5	3.5	5.4
Operating Profit	48.4	52.4	51.2	46.0	54.5	52.2	53.9	50.1	50.3

[36] FW55, reference pool=FY2014-15 (full year FY2014, FY2015 through Oct. 2015)

[37] FW56, reference pool=FY2015-16 (full year FY2015, FY2016 through Nov. 2016); FY2017 prediction incorporating Sector NEFS IX stranded quota

[38] FW57, reference pool=FY2016

[39] FW58, reference pool=FY2017

[40] FW59, reference pool=FY2019

6.5.3.1 Alternative 1 - No Action

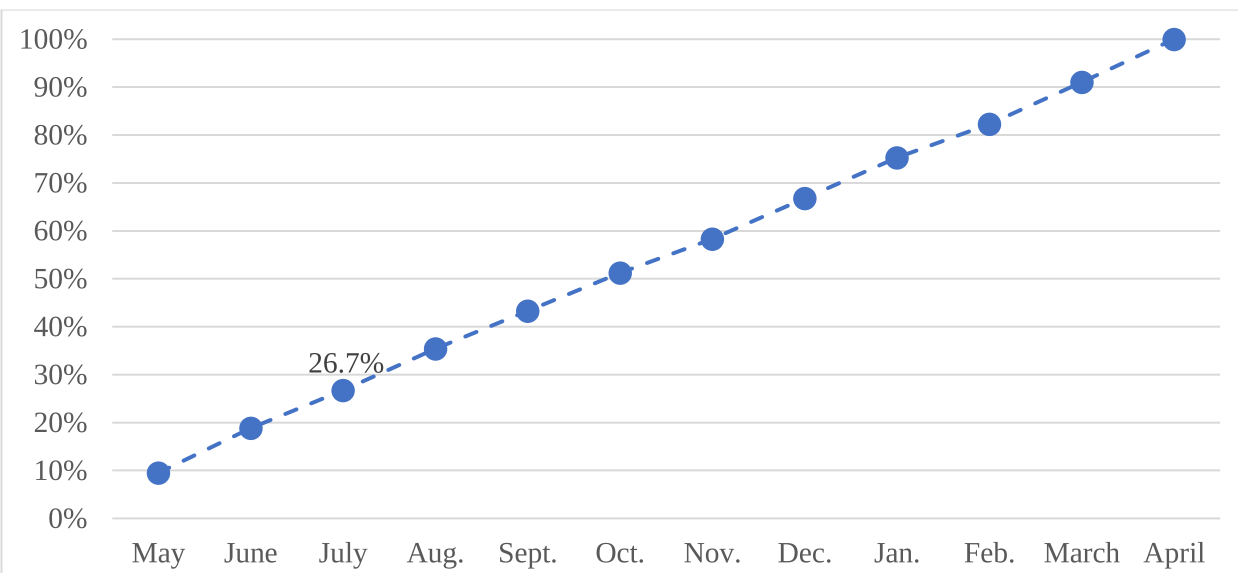
Impacts of No Action ACLs on the sector component of the commercial groundfish fishery

Under Alternative 1/No Action, default specifications for FY2021 would remain in place until July 31, 2021. Following that date, commercial groundfish ACLs for Eastern GB cod, Eastern GB haddock, GOM winter flounder, SNE/MA winter flounder, redfish, ocean pout, and wolffish would go to 0 lbs. Collectively, these stocks cover all broadstock areas in the groundfish fishery. The QCM runs until full utilization is achieved for a stock in each broadstock area, or until a unit stock is fully utilized. Since meeting these conditions over the course of three months was considered an unrealistic scenario, the QCM results were instead pro-rated based on recent fishery performance. During fishing years 2015-2019, 26.7% of groundfish revenue was generated during the months of May – July (Figure 13).

Alternative 1/No Action would yield negative impacts to the commercial groundfish fishery relative to FY2019. Predicted groundfish revenue for FY2021 is $11.4M, representing a $37.6M decrease from the FY2020 prediction in FW59, and a $36.6M decrease from the FY2019 realized value of $48.0M (Table 91). Predicted total gross revenues from groundfish trips for FY2021 under No Action is $16.0M. This represents a $54.1M decrease from the FY2020 (FW59 preferred alternative) prediction of $70.1M, and a $50.1M decrease from the FY2019 realized value of $66.1M.

Relative to Alternative 2, No Action would result in negative impacts to the sector component of the groundfish fishery for FY2021. Predicted groundfish revenue is $34.9M lower under No Action ($11.4M) relative to Alternative 2 ($46.3M), and total revenue from groundfish trips is $48.1M lower under No Action ($16.0M under No Action; $64.1M under Alternative 2).

Figure 13- Cumulative percentage of groundfish revenues by month, fishing years 2015-2019.



Commercial Fishery - Common Pool

Alternative 1/No Action would likely have negative impacts on the common pool fishery relative to FY 2020 and negative impacts relative to Alternative 2.

The following changes from the non-sector FY2020 sub-ACL would go into place for FY2021 under No Action/Alternative 1: GB cod sub-ACL would decrease by 6 mt, GB haddock would decrease by 503 mt, GOM haddock would increase by 89 mt, CC/GOM yellowtail flounder would decrease by 5 mt, American Plaice would increase by 8 mt, white hake would increase by 8 mt, pollock would increase by 31 mt. For Eastern GB cod, Eastern GB haddock, GOM winter, SNE/MA winter flounder, redfish, ocean pout, and wolffish, default specifications would be in effect from May 1, 2021, to July 31, 2021, and would equal 35% of the FY2020 catch limits. After July 31st, quotas would go to 0.

The absence of allocations after July 31st for several stocks would have negative economic impacts on the common pool fishery both relative to FY 2020 and Alternative 2, since some stocks with 0 quotas, namely redfish and GOM winter flounder, would cause trimester TAC closures throughout the Gulf of Maine and Georges Bank (Figure 14). Furthermore, common pool trawl groundfish fishing would not be allowed throughout the entire redfish trimester TAC area and the inshore Gulf of Maine would be closed to both gillnet and trawl effort.[41] Over the last three years, between 4 and 6 common pool vessels and would have been impacted by either closure, affecting between $40,000 and $100,000 worth of total landings (Table 88). After July in both FY2017 and FY2018, the majority of common pool effort and revenue in the affected statistical areas would have been subject to the closures, while in FY2019 the minority of effort would have been affected, suggesting either more gillnet, handgear, or other excluded gear types were more commonly used. Economic impacts could be reduced somewhat if NMFS, by follow-on action, changed trip limits to zero for stocks without allocations. This would allow for non-zero total catches due to mandatory discarding but would allow targeting to continue for other stocks. In FY 2019, common pool landings were highest for pollock (15.6 mt), GOM haddock (13 mt), and SNE/MA winter flounder (8.6 mt, GARFO final year-end catch results for fishing year 2019).

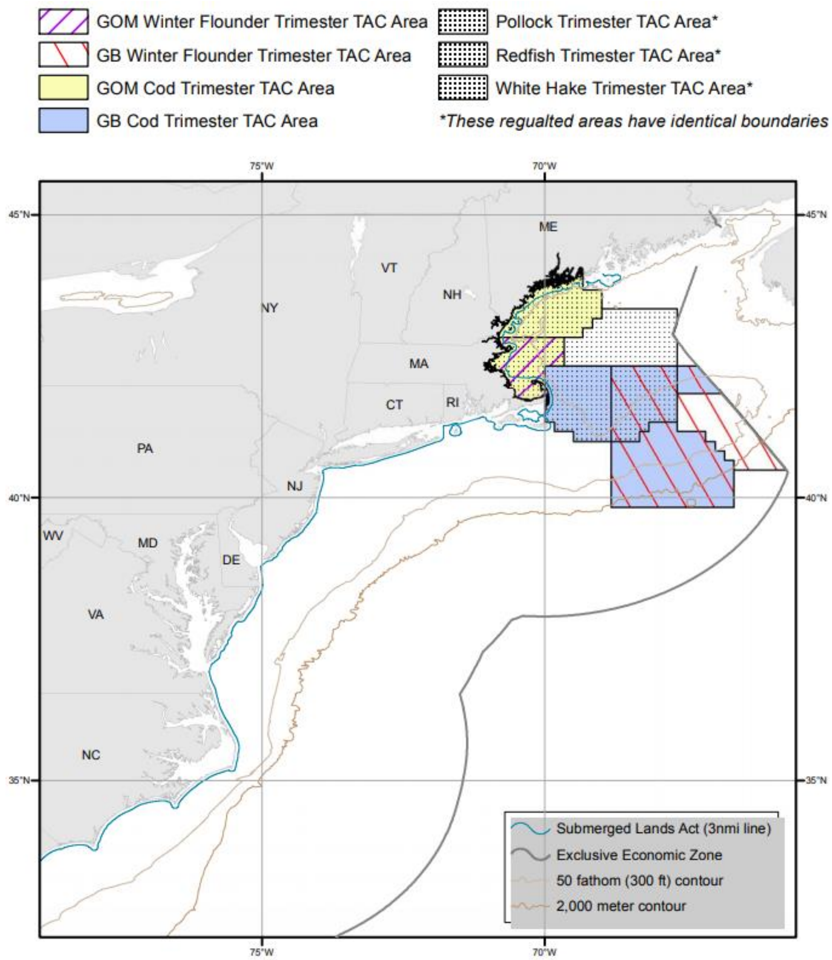
In addition, if the sub-ACL for SNE/MA winter flounder is exceeded by the common pool, this would trigger an AM in FY2022 that would make trawl vessels convert to using haddock separator gear, which also could have negative economic impacts in that year, considering relatively high landings of SNE/MA winter flounder by common pool vessels in recent years.

Table 88- Total common pool landings and revenue between August 1st and April 30th that would be either subject to either the GOM winter flounder trimester TAC area closure or the redfish trimester TAC closure under the No Action Alternative. Revenue is in nominal dollars. Only includes effort in the areas subject to closure— statistical areas 513, 514, 515, 522, and 521.

Fishing Year	Subject to No Action Closure (August-May)	Vessels	Trips	Total Revenue ($)	Total Landings (lbs)
2017	closed	4	74	100,036	67318
2017	open	12	69	48,263	20735
2018	closed	6	35	67,786	75588
2018	open	7	26	8,416	5497
2019	closed	5	42	39,894	31531
2019	open	11	52	150,909	137312

[41] More information on common pool regulations can be found at: https://www.fisheries.noaa.gov/new-england-mid-atlantic/commercial-fishing/northeast-multispecies-common-pool-fishery

Figure 14- Common Pool Trimester TAC areas for stocks affected by No Action. Source: https://www.fisheries.noaa.gov/resource/map/northeast-groundfish-trimester-total-allowable-catch-areas



Recreational Groundfish Fishery

Impacts on the recreational groundfish fishery Alternative 1/No Action would be neutral relative to FY2020 and Alternative 2 (no change from the 193 mt GOM cod sub-ACL). The recreational sub-ACL for GOM haddock would decrease under No Action and Alternative 2 (from 6,210 mt in FY2020 to 5,295 in FY2021 and 3,634 in FY2022, as set in FW 59) but access to this stock is limited by incidental catch of GOM cod so the impact of this decrease is expected to be neutral.

Impacts on other fisheries

Atlantic Sea Scallop Fishery

Under Alternative 1/No Action, the following sub-ACLs would be allocated to the scallop fishery during FY2021: 19 mt of GB yellowtail flounder, 2 mt of SNE/MA yellowtail flounder, 143 mt of SNE/MA windowpane flounder, and 12 mt of GOM/GB windowpane flounder.

Under Alternative 1/No Action, the FY2021 sub-ACLs for GB yellowtail and SNE/MA yellowtail would be unchanged from FY2020 levels. Alternative 1/No Action could have negative impacts to the scallop fishery relative to FY2020 since the sub-ACLs for GB yellowtail and SNE/MA yellowtail would be smaller than the projected catch for FY2021 year (see Table 84). In particular, the difference for SNE/MA yellowtail could be large enough to trigger the AM. Currently, the AMs for yellowtail and windowpane flounder stocks are triggered if either the sub-ACL is exceeded by over 50% or if the total ACL is exceeded. Compared to Alternative 2, No Action/Alternative 1 could potentially have a positive impact on the scallop fishery since the sub-ACL for GB yellowtail flounder would be 7 mt higher under No Action/Alternative 1, while neutral with respect to SNE/MA yellowtail flounder since the sub-ACL would remain at 2 mt. It is not very likely that the total ACL would be exceeded for either stock, since total utilization of the ACL has been very low in recent years (see Table 65 and Table 66 in section 5.7.10.4).

Under Alternative 1/No Action the sub-ACL for GOM/GB windowpane flounder would be 19 mt less than under Alternative 2 (31 mt compared to 12 mt), potentially having negative economic impacts since FY2021 projected catch by the scallop fishery is estimated to be around 29.2 mt (Table 84). If accurate, this would be high enough to trigger an AM under the No Action sub-ACL (>50% of the sub-ACL). For SNE/MA windowpane flounder, economic impacts under No Action/Alternative 1 could be neutral to positive relative to Alternative 2, since the sub-ACL would be 14 mt higher (at 143 mt) and FY2020 bycatch projections estimated at 72.2 mt. Because projected catch is much lower than both the No Action and Alternative 2 sub-ACLs, impacts are likely neutral, but could be positive if realized catch by the scallop fishery is higher.

AMs for the scallop fishery could also be triggered if both the total ACL and the scallop sub-ACL is exceeded. Under No Action, the total ACL would be 55 mt for GOM/GB windowpane flounder and 412 mt for SNE/MA windowpane flounder. If total catches across all fisheries are similar to FY2019, it is possible that the total ACL could be exceeded for GOM/GB windowpane flounder since total catch has exceeded 55 mt in every year between FY2015 and FY2019. It is less likely that the total ACL would be exceeded for SNE/MA windowpane flounder if catch is similar to FY2019, since total catch was 350 mt, but could be exceeded if total catch is more similar to FY2016-FY2018 levels, or is much higher than observed in recent years, which is possible. The "Other" category, which includes the large-mesh non-groundfish fisheries, is the largest sub-component for SNE/MA windowpane flounder. Higher quotas for summer flounder relative to 2016-2018 could potentially result in higher catch of SNE/MA windowpane flounder in FY2021. Projections for FY2020, however, indicate decreased catch of SNE/MA windowpane flounder in the summer flounder fishery, as well as across all fisheries (

Table **97** and Table 98).

Midwater trawl directed Atlantic herring fishery

Alternative 1/No Action would have neutral impacts on the midwater trawl herring fishery. Sub-ACLs for GB haddock and GOM haddock between FY2020 and FY2021 would decrease from 2,447 mt to 1,424 mt for GB haddock and decrease from 183 mt to 156 mt for GOM haddock. However, GB haddock catches by the herring fishery have been low in recent years— less than 50 mt in FY2017 and FY2018, and 0.2 mt in FY 2019 due to lower herring ACLs. If trends continue, decreases in the GB haddock sub-ACL are unlikely to confer negative economic benefits in FY2021 and beyond, either with respect to status quo or Alternative 2 sub-ACLs. Alternative 2 sub-ACLs for the MWT directed herring fishery would be higher for GB haddock (1,539 mt) and the same for GOM haddock but impacts of No Action/Alternative 1 relative to Alternative 2 are expected to be neutral due to low utilization by the MWT directed herring fishery. In FY2017 and FY2018 GOM haddock catch by the midwater trawl herring fishery was less than 0.1 mt, and approximately 0.1 mt of catch in FY 2019. Unless effort shifts considerably, neutral economic impacts would be expected. Atlantic herring quotas for 2020 and 2021 were lower than for 2019, and substantially lower than in prior years (NEFMC, Atlantic Herring FW6).

Small-mesh fisheries

Under Alternative 1/No Action the sub-ACL for GB yellowtail flounder for the small mesh fisheries (e.g., whiting and squid) would remain the same as FY2020 levels at 2 mt in FY2020, but decrease for FY2021 to 1.5 mt under Alternative 2. Economic impacts on the small mesh fishery are expected to be neutral since catches in recent years have been low (less than 1 mt in FY2017 and FY2018, 0 mt in FY2019). If effort remains similar to recent fishing years, it is unlikely that this change in the sub-ACL will be constraining for the fishery. According to the FY2019 SAFE report for the small-mesh multispecies fishery, effort has decreased in the fishery since 2012 and the number of vessels with landings in the fishery hit a historical low in 2019.

Large-mesh non-groundfish fisheries

The southern windowpane flounder "other fisheries" sub-component is used to evaluate when an AM could be triggered for large-mesh non-groundfish fisheries (e.g., summer flounder and scup trawl fisheries). Under Alternative 1/No Action, the other sub-component would remain at the FY2020 level of 196 mt in FY2021. In FY 2019, the sub-ACL of 218 mt was exceeded (total catch in the other subcomponent was 243.6 mt), but the total ACL was not exceeded (total utilization was 76.6%), so the AM was not triggered. While this recent catch history suggests the possibility of an AM being triggered from windowpane catch in FY2021, inseason catch for FY2020 is trending lower than in previous years as of January 2021, both for the other sub-component and compared to the total sub-ACL (

Table **97** and Table 98, respectively). In addition, despite higher quotas for summer flounder in FY2020, projected catch for the remainder of the fishing year is unlikely to exceed either the other sub-component sub-ACL and would not exceed the No Action/Alternative 1 sub-ACL. Catches in other fisheries may be declining, potentially as a result of declining status of the resource, or total effort across fisheries may have continued to be impacted throughout FY2020 as a result of the COVID-19 pandemic. If catches of southern windowpane flounder remain similarly low in FY2021, there would be neutral economic impacts of the sub-ACL decrease under No Action/Alternative 1 compared to Alternative 2. However, if catches are more similar to FY2019, impacts could be positive relative to Alternative 2 or status quo since a higher sub-ACL would reduce the risk of triggering the AM.

6.5.3.2 Alternative 2 – Revised Specifications (*Preferred Alternative*)

Comparison between FY2020 and proposed FY2021 commercial sub-ACLs, recreational sub-ACLs, and other fisheries sub-ACLs for groundfish are provide in Table 89 and Table 90.

Table 89- Comparison of commercial (sector and common pool) groundfish sub-ACLs (mt) for FY2020 and proposed FY2021, including the percent change between years. Proposed FY2021 sub-ACLs as indicated under Alternative 2/Revised Specifications.

		Commercial groundfish sub-ACL		
Stock		FY2020	FY2021	% Change
Allocated Stocks	GB Cod	1,073	1,093	2%
	GOM Cod	275	270	-2%
	GB Haddock	121,864	76,622	-37%
	GOM Haddock	10,281	10,281	0%
	GB Yellowtail Flounder	95	64	-33%
	SNE/MA Yellowtail Flounder	15	16	4%
	CC/GOM Yellowtail Flounder	688	692	1%
	American Plaice	2,937	2,682	-9%
	Witch Flounder	1310	1,317	1%
	GB Winter Flounder	522	563	8%
	GOM Winter Flounder	287	281	-2%
	SNE/MA Winter Flounder	539	288	-47%
	Redfish	11,231	9,677	-14%
	White Hake	2,019	2,019	0%
	Pollock	23,989	18,549	-23%
Non-allocated Stocks	GOM/GB Windowpane Flounder	38	108	184%
	SNE/MA Windowpane Flounder	48	43	-11%
	Ocean Pout	92	50	-46%
	Atlantic Halibut	77	73	-5%
	Atlantic Wolffish	82	86	4%

Table 90- Comparison of other fisheries sub-ACLs (mt) for FY2020 and proposed FY2021, including the percent change between years. Proposed FY2021 sub-ACLs as indicated under Alternative 2/Revised Specifications.

Fishery	Stock	FY2020	FY2021	% Change
Recreational Groundfish	GOM Cod	193	193	0%
	GOM Haddock	6,210	5,295	-15%
Sea Scallop	GB Yellowtail Flounder	19	12	-35%
	SNE/MA Yellowtail Flounder	2	2	0%
	GOM/GB Windowpane Flounder	12	31	160%
	SNE/MA Windowpane Flounder	143	129	-10%
Midwater Trawl	GB Haddock	2447	1,539	-37%
	GOM Haddock	183	156	-15%
Small-Mesh	GB Yellowtail Flounder	2	1.5	-26%
Other Sub-components – Large-Mesh Non-Groundfish[1]	SNE/MA Windowpane Flounder	196	177	-10%

[1]The value for Other Sub-components for SNE/MA Windowpane Flounder includes the other sub-component value for Large-Mesh Non-Groundfish Trawl Fisheries.

Impacts of Alternative 2 ACLs on the sector component of the commercial groundfish fishery

Predicted groundfish revenue for FY2021 under Alternative 2 is $46.3M, representing a $2.7M decrease from the FY2020 prediction in FW59, and a $1.7M decrease from the FY2019 realized value of $48.0M (Table 91). Total gross revenues from groundfish trips for FY2021 is $64.1M. This value represents a $6.0M decrease from the FY2020 prediction of $70.1M, and a $2.0M decrease from the FY2019 realized value of $66.1M. Operating profit predictions for FY2021 are lower than predictions from the previous two years, as well as the realized FY2019 value.

Relative to No Action, Alternative 2 would result in positive impacts to the sector component of the groundfish fishery for FY2021. Predicted groundfish revenue is $34.9M higher under Alternative 2 ($46.3M) relative to No Action ($11.4M), and total revenue from groundfish trips is $48.1M higher under Alternative 2 ($16.0M under No Action; $64.1M under Alternative 2).

QCM results under different redfish exemption areas are presented in Table 92. The results of the different scenarios are discussed under section 6.5.4.2. Results by stock, port, and vessel length category under the various redfish exemption area scenarios are included in Appendix IV.

At the stock-level, GB haddock and GOM haddock are predicted to be the two highest revenue generating stocks in FY2021 (Table 93). White hake is predicted to be a constraining stock, with full (100%) utilization of the sector sub-ACL of 1,995mt. Since white hake is a unit stock, the QCM does not allow any more groundfish fishing to occur once the sector sub-ACL is reached. A constraining unit stock generally increases the variability in the QCM estimates relative to a situation in which there are constraining stocks in each broad stock area. FY2021 revenue predictions from GB cod and GB winter flounder are lower than in previous years, though realized revenues may exceed these predictions if white hake is not as constraining as the model predicts. The other stock with a high predicted utilization rate is GOM cod (98.4%). Predicted utilization rates for all other stocks are below 70%. The predicted top four revenue-generating stocks (GB haddock, GOM haddock, pollock, and redfish) all have predicted utilization rates below 50%. Combined ex-vessel revenue from these four stocks is predicted to be $27.7M, which amounts to roughly 60% of total groundfish fishery revenue. Haddock, pollock, and redfish were subject to a USDA purchasing agreement during FY2020, which may have caused an increase in catch and/or ex-vessel price. The FY2021 QCM prediction does not consider this purchasing program, because it was not in place during FY2019.

At the port level (Table 94), many of the major groundfish ports have lower predicted values for FY2021 than were predicted for FY2019 or FY2020. Gloucester is predicted to continue to be the top groundfish port ($11.9M), accounting for ~25% of ex-vessel value in the sector groundfish fishery. Boston is predicted to be the second highest grossing port ($11.0M), followed by New Bedford ($9.1M), and Portland ($3.8M).

By vessel length (Table 95), vessels >75'+ are predicted to generate $27.7M in FY2021, accounting for over 50% of sector groundfish revenue. Vessels in the 50 to <75' category are predicted to generate ~30% of sector groundfish revenue ($14.7M), and vessels in the 30' to <50' category are predicted to generate ~12% of sector groundfish revenue ($5.8M).

Continued low ex-vessel prices are a contributor to predicted revenues for FY2021 (Table 96). For example, prices for American plaice were at a 5-year low in FY2019, resulting in a decline in predicted revenue generated from that stock (Table 93). Low prices across groundfish species may be the product of a multitude of factors, such as changes in landings, changes in the size of fish being landed, and a shift in consumer demand. The COVID-19 pandemic may also continue to affect demand and regional supply chains in hard to predict ways into FY2021.

Table 91- Summary of realized FY2019 and predicted FY2020 and FY2021 revenues and costs (median values) for the sector portion of the commercial groundfish fishery, real dollars (millions, 2019).

Option	Groundfish Gross Revenues	Total Gross Revenues	Operating Cost	Sector Cost	Quota Cost	Operating Profit	Days Absent
FY2019 Realized	48.0	66.1	10.7	1.8	3.5	50.1	9,749
FY2019 Prediction (FW58)	54.7	78.0	14.6	1.9	7.5	53.9	13,900
FY2020 Prediction (FW59)	49.0	70.1	12.5	1.9	5.4	50.3	10,919
FY2021 Prediction (No Action)	11.4	16.0	2.8	0.4	0.9	11.8	1,780
FY2021 Prediction (Option 2)	46.3	64.1	10.9	1.8	3.6	47.7	9,942
FY2021 Prediction - FY2019 Realized	*-1.7*	*-2.0*	*0.2*	*-0.0*	*0.1*	*-2.4*	*193*

Table 92- Predicted FY2021 revenues and costs (median values, millions of 2019 dollars) for the sector portion of the commercial groundfish fishery under five redfish exemption area scenarios.

Scenario	Groundfish Gross Revenues	Total Gross Revenues	Operating Cost	Sector Cost	Quota Cost	Operating Profit	Days Absent
1: FY2019 Area	46.3	64.1	10.9	1.8	3.6	47.7	9,942
2a: FY2020 Area	42.6	59.9	10.5	1.7	3.6	44.2	9,644
2b: FY2020 Area	43.5	61.3	10.7	1.7	3.6	45.2	9,809
3a: Action Alt. Area	44.9	62.7	11.0	1.8	3.6	46.4	9,964
3b: Action Alt. Area	45.3	63.5	10.9	1.8	3.6	47.1	9,954

Table 93- Alternative 2 stock-level catch and revenue predictions (median values) with 5% and 95% confidence intervals, nominal dollars (millions). Stocks are presented in order of FY2021 predicted ex-vessel value.

	Sub-ACL (mt)	Predicted Catch (mt)	Predicted Utilization	FY2021 Prediction	p (5%) Revenue	p (95% Revenue)	FY2020 Predicted Revenue	FY2019 Predicted Revenue	FY2019 Realized Revenue
GB Haddock West	68,724	4,425	6.4%	9.0	7.2	16.5	7.6	7.1	9.2
GOM Haddock	10,022	3,312	33.0%	7.7	7.3	8.2	6.1	6.8	8.2
Pollock	18,366	3,034	16.5%	5.5	4.9	6.1	4.6	6.0	5.5
Redfish	9,550	4,634	48.5%	5.5	4.8	6.1	5.4	5.9	5.8
White Hake	1,995	1,995	100.0%	4.0	3.9	4.1	4.0	5.9	4.2
Plaice	2,611	818	31.3%	3.0	2.8	3.3	5.0	7.3	3.1
Witch Flounder	1,282	716	55.8%	2.7	2.5	3.2	2.9	2.9	2.8
GB Cod West	876	468	53.4%	2.4	2.0	3.8	3.5	2.5	2.3
GB Winter Flounder	541	292	54.0%	1.9	1.4	3.8	3.6	3.5	2.0
GOM Cod	262	258	98.4%	1.5	1.3	1.5	1.4	1.8	1.6
SNE Winter Flounder	254	163	64.4%	0.9	0.7	1.4	1.7	2.7	0.8
GB Haddock East	6,355	481	7.6%	0.9	0.6	1.5	1.2	0.7	1.2
CC/GOM Yellowtail Flounder	660	124	18.8%	0.3	0.3	0.3	0.4	0.8	0.3
GOM Winter Flounder	267	48	18.1%	0.3	0.2	0.3	0.5	0.9	0.3
GB Cod East	185	40	21.6%	0.2	0.1	0.4	0.6	0.3	0.3
SNE/MA Yellowtail Flounder	13	3	25.0%	0.0	0.0	0.0	0.0	0.1	0.0
GB Yellowtail Flounder	61	2	3.6%	0.0	0.0	0.0	0.1	0.1	0.0

Table 94- Alternative 2 groundfish species revenue prediction (mean values) by port, with 5% and 95% confidence intervals and average fish prices on groundfish trips, nominal dollars.

State/Port	FY2021 Prediction	p (5%) Revenue	p (95% Revenue)	Avg. Price	FY2020 Prediction	FY2019 Prediction
Massachusetts						
Gloucester	11.9	10.6	13.1	$0.81	12.5	14.6
Boston	11.0	9.5	12.7	$1.02	11.6	13.5
New Bedford	9.1	5.9	15.1	$1.20	8.0	8.1
Chatham	0.4	0.2	0.6	$1.43	0.5	0.6
Other MA ports	4.4	3.1	6.3	$1.18	3.7	4.3
Maine						
Portland	3.8	3.0	4.7	$0.98	7.4	9.2
Other ME ports	2.9	2.4	3.5	$1.28	1.8	2.1
Rhode Island						
Point Judith	0.7	0.4	1.4	$1.75	1.2	1.4
Other RI ports	0.2	0.0	0.4	$1.52	0.4	0.3
New Hampshire (all ports)	1.7	1.5	1.9	$1.11	1.4	1.6
Other Northeast Ports	2.3	1.6	3.1	$0.76	0.5	0.2

Table 95- Alternative 2 groundfish species revenue prediction (mean values) by size class, with 5% and 95% confidence intervals, nominal dollars (millions).

	FY2021 Prediction	p (5%) Revenue	p (95% Revenue)	FY2020 Prediction
75'+	27.7	22.2	37.5	25.3
50'to<75'	14.7	13.2	16.0	16.8
30'to<50'	5.8	5.3	6.3	6.7
<30'	0.1	0.0	0.1	0.0

Table 96- Average ex-vessel price by groundfish species, fishing years 2015-2019 (2019 dollars).

	2015	2016	2017	2018	2019
Cod	2.18	2.94	2.92	2.47	2.78
Haddock	1.32	1.41	1.12	1.05	1.12
Plaice	2.05	2.69	2.54	2.19	1.75
Pollock	1.30	1.14	1.01	0.83	0.94
Redfish	0.61	0.63	0.56	0.51	0.54
White Hake	2.02	1.98	1.39	1.28	1.24
Winter Flounder	2.23	3.39	3.16	3.08	2.75
Witch Flounder	2.71	3.38	2.29	1.70	1.77
Yellowtail Flounder	1.73	2.07	1.67	1.30	1.16

Commercial Fishery - Common Pool

Alternative 2 would have a range of low negative, neutral, to low positive impacts on the common pool fishery relative to FY 2020 and positive impacts relative to Alternative 1/No Action.

The following changes from the non-sector FY2020 sub-ACL would go into place for FY2021 under Alternative 2: GB cod sub-ACL would decrease by 5 mt, GOM cod would increase by 0.6 mt, GB haddock would decrease by 388 mt, GOM haddock would increase by 119 mt, GB yellowtail flounder would decrease by 0.7 mt, SNE/MA yellowtail flounder would decrease by 0.1 mt, CC/GOM yellowtail flounder would decrease by 5 mt, American Plaice would increase by 8 mt, witch flounder would increase by 1 mt, GB winter flounder would increase by 1 mt, GOM winter flounder would decrease by 1 mt, SNE/MA winter flounder would decrease by 43 mt, redfish would increase by 67 mt, white hake would increase by 8 mt, pollock would increase by 31 mt. All other stocks would remain the same as FY 2020. Under No Action/Alternative 1, for Eastern GB cod, Eastern GB haddock, GOM winter, SNE/MA winter flounder, redfish, ocean pout, and wolffish, default specifications would be in effect from May 1, 2021, to July 31, 2021, and would equal 35% of the FY2020 catch limits. After July 31st, quotas would go to 0.

The presence of allocations after July 31st for a few stocks would have positive economic impacts on the common pool fishery relative to Alternative 1, since stocks with 0 quotas would trigger Trimester TAC closures and not allow for common pool trawl groundfish fishing in most of Gulf of Maine or Georges Bank, and would not allow gillnet or trawl fishing in the inshore Gulf of Maine. In addition, if the sub-ACL for SNE/MA winter flounder was exceeded, it would trigger an AM for the following fishing year.

Impacts on the recreational groundfish fishery

Impacts on the recreational groundfish fishery Alternative 2 would be neutral relative to FY2020 and Alternative 1/No Action (no change from the 193 mt. GOM cod sub-ACL). The recreational sub-ACL for GOM haddock would decrease under No Action and Alternative 2 (from 6,210 mt in FY2020 to 5,295 in FY2021 and 3,634 in FY2022) but access to this stock is limited by incidental catch of GOM cod so the impact of this decrease is expected to be neutral.

Impacts on other fisheries

Atlantic Sea Scallop Fishery

Under Alternative 2, the following sub-ACLs would be allocated to the scallop fishery during FY2021: 12 mt of GB yellowtail flounder, 2 mt of SNE/MA yellowtail flounder, 129 mt of SNE/MA windowpane flounder, and 31 mt of GOM/GB windowpane flounder.

Under Alternative 2, the FY2021 sub-ACL for SNE/MA yellowtail would be unchanged from FY2020 levels conferring neutral economic impacts for the scallop fishery relative to No Action, but potentially negative impacts overall if projected bycatch is greater than the sub-ACL, potentially triggering the AM. The sub-ACL for GB yellowtail flounder under Alternative 2 would decrease by 35% relative to FY 2020 levels and compared to No Action/Alternative 1 (decreasing from 19 mt to 12 mt). Changes in sub-ACLs for both stocks could have overall neutral to negative impacts to the scallop fishery since the sub-ACLs for GB yellowtail and SNE/MA yellowtail would be smaller than the projected catch for FY2021 year (See Table 84). Projected catch for SNE/MA yellowtail could be high enough to trigger the AM (50% over the sub-ACL), projected catch of GB yellowtail flounder is less likely to trigger the AM (less than 50% over the sub-ACL). It is less likely that the total ACL for either stock would be exceeded given low predicted utilization by the commercial groundfish fishery under Alternative 2 (Table 93).

Under Alternative 2 the sub-ACL for GOM/GB windowpane flounder would be 19 mt greater than under Alternative 1/No Action (increasing from 12 mt to 31 mt).As a result, Alternative 2 results in potentially positive economic impacts relative to No Action/Alternative 1, since FY2021 projected catch by the scallop fishery is estimated to be around 29.2 mt (Table 84), and therefore is less likely to trigger the AM. For SNE/MA windowpane flounder, economic impacts under Alternative 2 could be neutral relative to No Action/Alternative 1, since the sub-ACL would be 129 (14 mt less than No Action/Alternative 1) and FY2021 bycatch projections are estimated to be around 72.2 mt. If bycatch is substantially higher than expected, Alternative 2 may have negative impacts relative to No Action/Alternative 1.

AMs for the scallop fishery could also be in place if both the total ACL and the scallop sub-ACL is exceeded. Under Alternative 2, total ACLs would be 150 mt for GOM/GB windowpane flounder and 371 mt for SNE/MA windowpane flounder. For both stocks, it is unlikely that the total ACL will be exceeded if effort remains similar to FY2019, where total catch of both stocks in that year would not exceed Alternative 2 ACLs in this action. If effort is more similar to FY2018, however, where catch of SNE/MA windowpane was higher, there may be a greater likelihood of an exceedance and the AM being triggered (see Table 67 and Table 68 in section 5.7.10.4). The “Other” category, which includes the large-mesh non-groundfish fisheries, is the largest sub-component for SNE/MA windowpane flounder. Higher quotas for summer flounder relative to 2016-2018 could potentially result in higher catch of SNE/MA windowpane flounder. Projections for FY2020, however, indicate decreased catch of SNE/MA windowpane flounder in the summer flounder fishery, as well as across all fisheries (

Table **97** and Table 98)

Overall economic impacts for the scallop fishery are positive for GOM/GB windowpane flounder and neutral to negative for SNE/MA windowpane flounder under Alternative 2 compared to No Action/Alternative 1.

Midwater trawl directed Atlantic herring fishery

The midwater trawl herring fishery will have negative changes in sub-ACL values. Under Alternative 2, the GB haddock sub-ACL is proposed to decrease by 37% between FY2020 and FY2021 (from 2,447 mt to 1,539 mt), and GOM haddock would decrease by 15% (from 183 mt to 156 mt). Impacts are expected to be neutral both in respect to Alternative 1 (where quotas would decrease for GB haddock and stay the same for GOM haddock) and status quo given recent low catches of both haddock stocks, relative to the sub-ACLs. In FY2017 and FY2018 there were no recorded catch or discards of GOM haddock by the midwater trawl herring fishery, and approximately 0.1 mt of catch in FY 2019, so unless effort shifts considerably, neutral economic impacts would be expected. Atlantic herring quotas for 2020 and 2021 were lower than for 2019, and substantially lower than in prior years (NEFMC, Atlantic Herring FW6).

Small-mesh fisheries

Under Alternative 2 the sub-ACL for GB yellowtail flounder for the small mesh fisheries (e.g., whiting and squid) would decrease from FY 2020 levels, from 2 mt to 1.5 mt in FY 2021. This is expected to have neutral economic impacts on the small mesh fishery since catches in recent years have been low (less than 1 mt in FY2017 and FY2018, 0 mt in FY2019). If effort remains similar to recent fishing years, it is unlikely that this change in the sub-ACL will be constraining for the fishery. According to the FY2019 SAFE report for the small-mesh multispecies fishery, effort has decreased in the fishery since 2012 and the number of vessels with landings in the fishery hit a historical low in 2019. Overall economic impacts are expected to be neutral both in respect to status quo and with respect to Alternative 1/No Action, since neither the Alternative 2 sub-ACL of 1.5 mt or the Alternative 1/No Action sub-ACL of 2 mt are expected to be constraining.

Large Mesh non-groundfish fisheries

The southern windowpane flounder “other fisheries” sub-component is used to evaluate when an AM could be triggered for large-mesh non-groundfish fisheries (e.g., summer flounder and scup trawl fisheries). Under Alternative 2, the other sub-component would reduce from 196 mt in FY2020 to 177 mt in FY2021, a decrease of 10%. The triggering of an AM implements gear-restricted areas (GRAs) to reduce incidental catch of windowpane flounder. The conditions for triggering an AM in the large-mesh non-groundfish fisheries are as described below: The AM for southern windowpane for large-mesh non-groundfish fisheries is implemented if the total ACL is exceeded by more than the management uncertainty buffer (currently set at approximately 5%), and if the large-mesh non-groundfish fishery also exceeds its sub-ACL (evaluated using the “other sub-component”).

Table **97** and Table 98 show “other” sub-component and total catch and utilization rates for SNE/MA windowpane flounder in recent years and projected catch for FY2020.[42] The “other” sub-component ACL exceeded the Alternative 2 FY2021 sub-ACL in all five of the previous FYs, for which complete data are available. Likewise, the total ACL for SNE/MA windowpane would have been exceeded by >5% in at least three FYs. While this recent catch history suggests the possibility of an AM being triggered from windowpane catch in FY2021, in-season catch for FY2020 is trending lower than in previous years as of January 2021, both for the other sub-component and compared to the total sub-ACL. In addition, projected catch for the remainder of the fishing year is unlikely to exceed either the other sub-component sub-ACL or the total ACL. Bycatch in other fisheries may be declining, potentially as a result of declining status of the resource, or total effort across fisheries may have continued to be impacted throughout FY2020 as a result of the COVID-19 pandemic. If bycatch of southern windowpane flounder remains similarly low in FY2021, there would be neutral economic impacts of the sub-ACL decrease under Alternative 2 compared to No Action or FY2020. However, if effort bycatch is more similar to FY2019, impacts could be negative relative to No Action/Alternative 1 or status quo since a higher sub-ACL would reduce the risk of triggering the AM.

[42] Catch projections for the current fishing year were generated for the “other” subcomponent as well as for the total ACL. Available catch data up to January 2021 was used, observer data was available until October 2020. Remaining months of data were estimated using best professional judgment based on total catch in recent fishing years (specifically FY2018 and FY2019).

FW57 made a few adjustments to the size and timing of the AM areas to limit potential impacts to large mesh non-groundfish fisheries. The impacts of these smaller AM areas have not been quantified, but revenue generated from these areas in recent years should be lower than those previously estimated for summer flounder and scup. Furthermore, the impacts of AMs may be more cost-driven than revenue driven if fishermen elect to continue fishing for these species outside of the AM areas, potentially increasing operating costs. A more detailed analysis of the economic impacts of AMs on the large-mesh non-groundfish fisheries can be found in FW57 (NEFMC, 2018).

The expected impacts of Alternative 2 relative to Alternative 1/No Action for the large-mesh non-groundfish fisheries are neutral to negative, depending on whether or not an AM is triggered in future FYs.

Table 97- SNE/MA windowpane flounder other sub-component limits and catch (mt) and utilization rates, fishing years 2015-2020. Records marked with an asterisk (*) represent a total catch projection using inseason catch from FY2020 (up to January 2021) and the latest 12 months of observer data (up to October 2020), with information from prior years (FY18 and FY19) used to estimate discards between February 2021 and April 2021 and discards after October 2020.

FY	S. Windowpane sub-ACL (mt)	S. Windowpane "other" catch (mt)	Utilization
2015	186	256.1	137.5%
2016	249	178.1	71.5%
2017	249	201	80.7%
2018	218	205	94.0%
2019	218	243.6	111.7%
2020	196	*105.4	*53.8%

Table 98- SNE/MA windowpane flounder total ACLs and catch (mt) and utilization rates, fishing years 2015-2020. Records marked with an asterisk (*) represent a total catch projection using inseason total catch from FY2020 (up to January 2021), with information from prior years (FY18 and FY19) used to estimate catch between February 2021 and April 2021.

FY	S. Windowpane Total ACL	S. Windowpane Total catch	Utilization
2015	527	643.4	122.1%
2016	599	417.2	69.7%
2017	599	440.9	73.6%
2018	457	454.7	99.5%
2019	457	350	76.6%
2020	412	*239.2	*58.1%

6.5.4 Action 4 – Commercial Fishery Measures for Sectors

6.5.4.1 Alternative 1 – No Action

The economic impacts of Alternative 1/No Action are expected to be positive, negative, or neutral depending on the particulars of the sector exemption in any given year. Because the sector exemptions are specified annually, the exemption area extent may be either larger, smaller, or the same as the status quo area (FY2020 area, Map 1). Economic impacts of Status Quo relative to Alternative 2 are likely negative, since the exemption area would be smaller in extent and further offshore relative to the Alternative 2 exemption area, therefore provides less flexibility to harvesters to fish for redfish and maximize fishing revenues. Quota Change Model (QCM results) estimate that total commercial groundfish revenues in FY2021 would be lower under the FY2020 area compared to the FY2019 area or the Alternative 2 (See Appendix IV, Table 2). In FY2019, 73% of redfish revenue and 64% of total revenue on exemption trips was harvested by vessels declaring fishing activity within the FY2020 area (Table 1). Shifting operations to only fish within the smaller area may also increase operating costs and may be a disadvantage for smaller vessels who cannot fish as far offshore. In November 2020, redfish landings on redfish exemption trips in the first seven months of the fishing year are trending lower than most previous years (See Appendix IV, Figure 6), despite total redfish landings trending higher (8.1 million pounds as of November 30th, 2020 and 12.3 million pounds as of March 2021; GARFO catch monitoring reports). It is difficult to draw conclusions about the impact of the exemption area change however, due to extreme market perturbations resulting from the COVID-19 pandemic.

If the area is increased to the FY2019 area, or similar, impacts may be neutral to positive relative to Alternative 2. QCM model results estimate that the FY2019 area would maximize fishery-wide revenues ($46.3 million from groundfish, Table 2) relative to either the Status Quo ($42.6-$43.5 million) or the Alternative 2 area ($44.9-$45.3 million).

6.5.4.2 Alternative 2 – Universal sector exemption for redfish (*Preferred Alternative*)

Differences between Alternative 2 and the exemption granted in the FY 2020 Interim Final Sector Rule (Status Quo):

1. Alternative 2 would incorporate this exemption into the FMP, so that sectors would no longer need to request the exemption through their operations plans (though they could still do so for other exemptions including exemptions related to redfish or mesh size).
2. Alternative 2 would approve the Universal sector exemption for redfish until changed through future Council action, rather than requiring Agency action to reapprove or change the exemption beyond FY 2020.
3. Area differences between Alternative 2 and the FY 2020 Interim Final Sector Rule, including seasonal closure areas (described in Table 11 and Map 2).
4. Modifications to thresholds and implementation of performance standards and administrative measures for the exemption in Alternative 2.
5. NMFS would have the authority to and would be required to implement administrative measures based on the performance standards and would place a sector on probation or revoke a sector's authorization to use this universal exemption through modification of the sector's approved operations plan if that sector fails to meet the performance requirements (see Performance Standards/Administrative Measures below). Under the status quo (the FY 2020 Interim Final

Sector Rule) NMFS has the authority to implement administrative measures but is not required to do so.

The economic impacts of Alternative 2 compared to Alternative 1/No Action depend on the specifics of the annual exemption in any given year, since under Alternative 1/No Action, GARFO would retain the authority to change the exemption area and requirements, or authorize any given sector to participate in the exemption, for any given fishing year. Therefore, the exemption area could be larger or smaller than the area proposed under Alternative 2. If the area remains similar to Status Quo, or the FY 2020 area (Map 1) economic impacts of Alternative 2 are expected to be positive since over FY 2015 through FY2019, 91% of redfish revenue and 86% of total revenue on exemption trips came from the Alternative 2 area, compared to 73% of redfish revenue and 64% of total revenue which came from the FY2020 area (Table 99).

Section 6.5.3 provides the methodology for the Quota Change Model (QCM), which was used to predict groundfish fishery revenue in FY2021. As noted, the input data for the model is from FY2019. Since the redfish exemption area from that fishing year was larger than in FY2020 or under FW61 Alternative 2, certain trips taken in FY2019 may not be possible during FY2021.[43] Sector groundfish revenue and total revenue from sector trips were estimated under three different redfish exemption areas- the FY2019 area (Scenario 1), the FY2020 area (Scenario 2), and the Alternative 2 area (Scenario 3). In the case of the FY2021 exemption area being identical to the FY2020 exemption area, two different approaches were taken to predict fishery revenues. The first (Scenario 2a) was to eliminate all trips from the (FY2019) pool of exemption trips (a total of 226 trips) that would not be possible under the FY2020 exemption area. There were 114 exemption trips eliminated under this approach, bringing the number of exemption trips eligible for selection to 112. The second approach to predict fishery revenues under the FY2020 exemption area (Scenario 2b) was to replace the 114 trips eliminated under Scenario 2a with an equal number of exemption trips that would be possible under the FY2020 area. That is, trips in which all exemption fishing occurred within the FY2020 area were drawn in at random. The resulting pool of trips was the same size as in Scenario 1, but with multiple records for some of the exemption trips within the FY2020 area. For the Alternative 2 area, the same two approaches were taken as under the FY2020 area. However, fewer modifications to the pool of trips eligible for selection was necessary, given the larger exemption area size for the action alternative (Map 2). Under Scenario 3a, all exemption trips from the (FY2019) pool of trips that would not be possible under the action alternative were removed; a total of 46 such trips occurred in FY2019. Under Scenario 3b, the 46 trips eliminated from pool of trips under Scenario 3a were randomly replaced with an equal number of exemption trips that would be possible under the action alternative. Further details on the methods for analysis under these three different areas can be found in Appendix IV.

QCM model results estimate that the FY2019 area would maximize fishery-wide revenues ($46.3 million from groundfish, Appendix IV, Table 2) relative to either the Status Quo ($42.6-$43.5 million) or the Alternative 2 area ($44.9-$45.3 million). Similarly, operating profit would be highest under the FY2019 area, followed by the Alternative 2 area, and lowest under the FY2020 area. Given these results, Alternative 2 could yield positive or negative impacts to the sector groundfish fishery relative to No Action. The two different methods for estimating revenue under the Alternative 2 area (as well as the

[43] The size of the redfish exemption area is not the only factor that might affect economic outcomes under the redfish exemption in FY2021, however the analysis assumes that these additional factors are held constant between past years and FY2021, such as prices, types of trips, and underlying participation—this assumption is always flawed because effort, participation, demand, and supply in other fisheries are continuously subject to change between years but the COVID-19 pandemic may have more dramatic impacts on the fishery between FY2019 and FY2021.

FY2020 area) yielded similar results. Scenario 3b did result in slightly higher revenues and operating profits, indicating that fishermen may be able to alleviate impacts of a smaller exemption area by modifying their fishing behavior. In this case, the modification would be to shift the location of fishing with undersized mesh into a relatively more concentrated area. Since the Alternative 2 area is further offshore than some parts of the FY2019 area, it is possible that smaller vessels may not have the same level of flexibility in their operations. QCM results by stock, port, and vessel length category under the various redfish exemption area scenarios are included in Appendix IV.

If the annual exemption area specified under Alternative 1/No Action is more similar to the exemption area in place through FY 2015 and 2019 area, however, economic impacts of Alternative 2 may be low negative to neutral, since it would be a relatively small contraction in the western edge of the exemption, a substantial reduction in the northern area, and several changes to the south eastern boundary, including the removal of statistical area 561 and conversion of statistical area 464 into a seasonal area, which encompasses the majority of average revenues from the FY2019 area (Table 99).

Economic impacts in future fishing years from an area change under Alternative 2 will depend on if and how fishing effort may shift. So far in FY2020, it is unclear how operations have changed as a result of the area change. Redfish landings on redfish exemption subtrips in the first seven months of the fishing year are trending lower than most previous years (Figure 6), despite total redfish landings trending higher, (8.1 million pounds as of November 30, 2020, 12.3 million pounds as of March 9, 2021; GARFO catch monitoring reports). It is difficult to draw conclusions about the impact of the exemption area change due to extreme market perturbations as a result of the COVID-19 pandemic.

Table 99- Total landed pounds (allocated groundfish and non-groundfish, in millions) and revenue from redfish exemption trips that occurred between FYs 2015-2019, by area, and of trips that occurred in each area, what proportion of total groundfish pounds and revenue were redfish (Millions of $2020). Source: DMIS and VTR data.

						Redfish				
FY	Trips	Sectors	Vessels	Total Pounds	Total Revenue	Pounds	Revenue	Area	% lbs	% revenue
2015	221	4	29	9.13	6.79	7.27	4.52	FY2019	79.6	62.2
2016	215	4	27	8.06	6.30	5.86	3.66	FY2019	72.7	62.5
2017	218	3	18	11.30	7.59	7.69	4.27	FY2019	68.0	55.5
2018	250	3	18	13.63	8.36	9.28	4.72	FY2019	68.1	50.9
2019	224	3	19	11.64	7.57	8.18	4.37	FY2019	70.3	53.4
Average	226	3.4	22.2	10.75	7.32	7.66	4.31	FY2019	71.7	56.9
2015	170	4	26	7.17	5.04	6.07	3.76	FY2020	84.7	61.9
2016	134	4	24	4.30	3.12	3.50	2.18	FY2020	81.5	62.3
2017	171	3	17	8.17	5.22	6.18	3.46	FY2020	75.7	56.0
2018	176	3	16	8.40	5.06	5.97	3.14	FY2020	71.1	52.6
2019	170	3	17	7.86	5.00	6.00	3.29	FY2020	76.3	54.8
Average	164	3.4	20	7.18	4.69	5.54	3.17	FY2020	77.9	57.5
2015	210	4	27	8.69	6.37	7.06	4.38	Alt 2	81.2	62.1
2016	202	4	26	6.79	5.13	5.24	3.28	Alt 2	77.2	62.7
2017	211	3	18	10.07	6.71	7.07	3.95	Alt 2	70.2	55.8
2018	221	3	18	11.28	6.90	7.79	4.02	Alt 2	69.1	51.6
2019	207	3	18	9.98	6.41	7.27	3.93	Alt 2	72.9	54.0
Average	210	3.4	21	9.36	6.30	6.88	3.91	Alt 2	74.1	57.2

6.5.4.2.1 Performance Standards/Administrative Measures

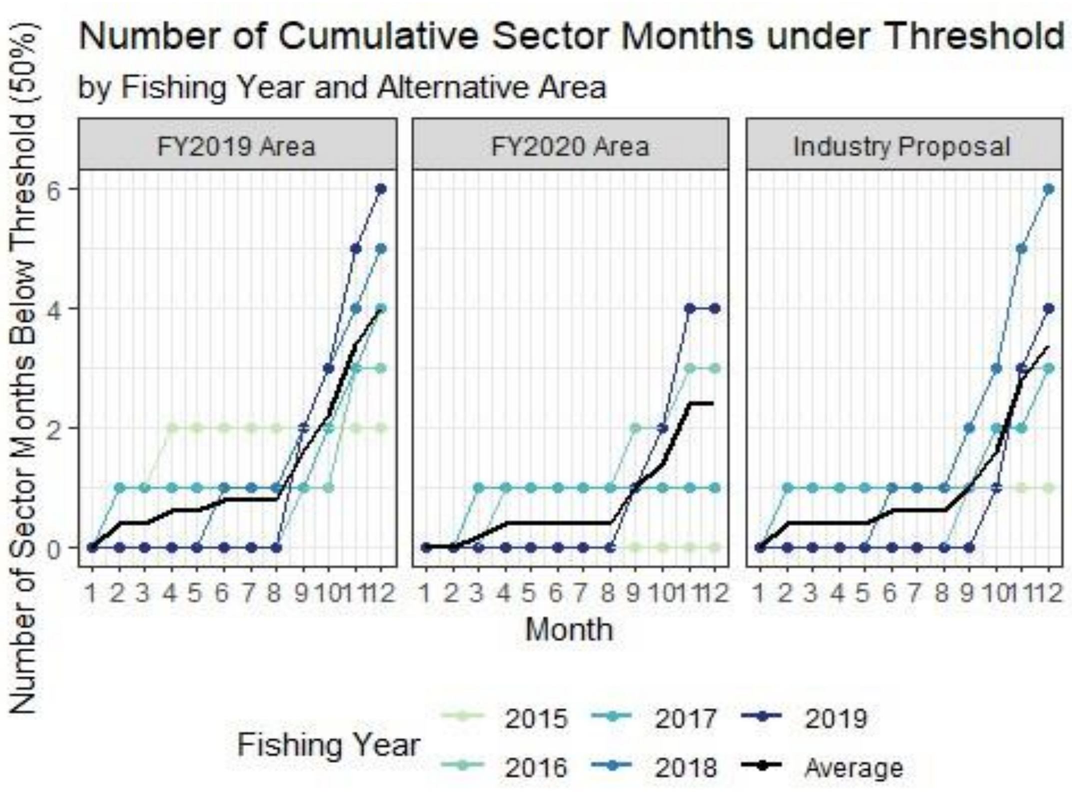
The Council selected both Option A and Option B.

6.5.4.2.1.1 Option A - Performance Standards for Monthly Redfish Landings Threshold and Groundfish Discards (*Preferred Alternative*)

Monthly threshold requirements under Alternative 2 may be stronger than under No Action and have negative economic impacts. Under Alternative 1/No Action, the Agency may withdraw authorization of the exemption to the Sector upon notification that landings or discard thresholds were not met in any given month and did not get into compliance within 30 days (Sector EA, 2015). However, to date, the Agency has not withdrawn its authorization to any sector, despite occurrences of multiple months in a fishing year where sectors did not meet landings threshold requirements (Figure 15). Under Alternative 2, at least one sector would have been placed on probation for one fishing year for failure to achieve thresholds for any three consecutive months or four total months in a year. Probation of any participating sector is likely to have negative economic impacts since, on average total ex-vessel revenue from exemption trips per sector is around $2 million dollars per year (Table 99). Analysis shows that based on the last five fishing years of data, at least two sectors would have been put on probation for the following fishing year based on effort within the FY 2019 area (individual sector performance cannot be shown due to confidentiality restrictions, instead the cumulative number of months not meeting the monthly threshold is shown, Figure 15). In future years, sectors with two or three months under the threshold may encourage members to stop fishing under the exemption for the remainder of the fishing year, or for certain months, to avoid being placed on probation for the following fishing year which would also result in negative economic impacts to participating vessels as well as potentially create instability in redfish supply—in recent years, 70%-75% of all redfish was landed on exemption trips by three sectors (See Appendix Figure 5, Figure 4).

The proposed monthly discard threshold of no more than 5% is expected to have neutral economic impacts relative to No Action since no sector has exceeded this threshold in the last five years (data not shown due to confidentiality restrictions).

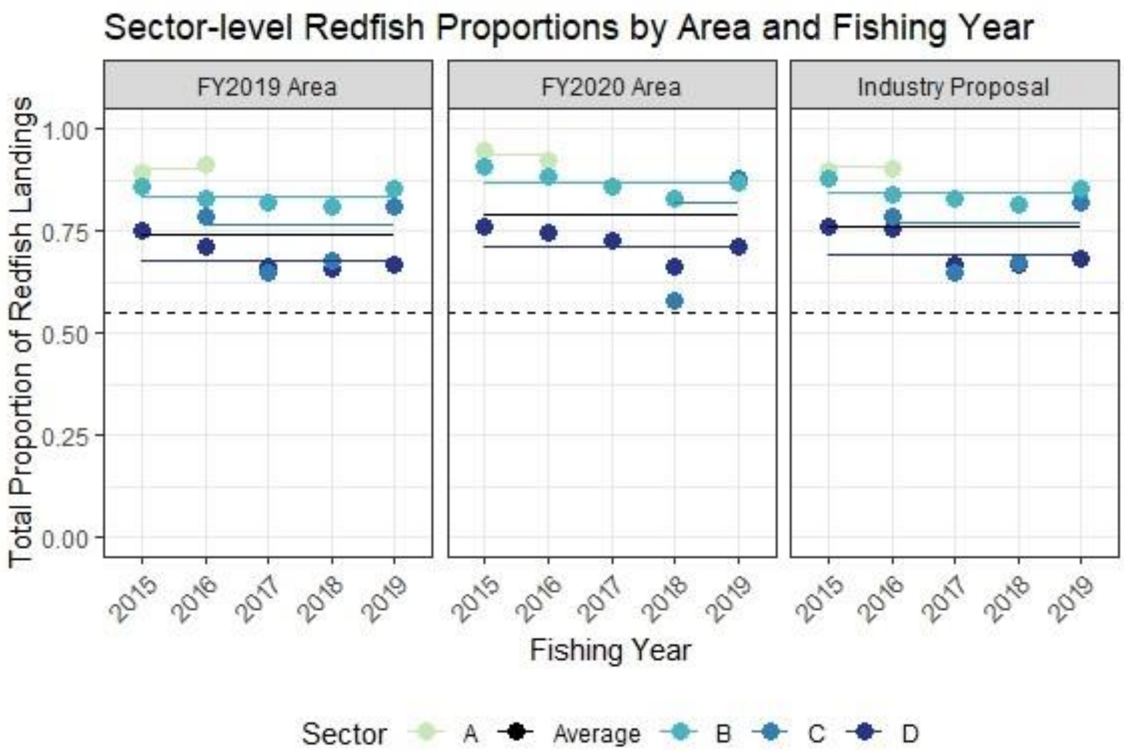
Figure 15- Cumulative sector months where the monthly redfish landings threshold (50%) was not met by fishing year and area. The average across all years is shown in bold. Each area represents the number of months that would have not met the threshold for any given sector based on fishing trips only within each area.' Industry Proposal' Area represents the Alternative 2 proposed exemption area. Source: DMIS and VTR data*.***



6.5.4.2.1.2 Option B - Annual Redfish Landings Threshold and Performance Standards (*Preferred Alternative*)

There is no annual threshold under No Action like the one proposed under Alternative 2 (55%), however no sector has attained less than 62% redfish over the last five fishing years (Figure 16), so the economic impact of this is expected to be low negative to neutral unless catch proportions change significantly, which in case there would be negative economic impacts under Alternative 2 relative to Alternative 1/No Action.

Figure 16- Total proportion of landed redfish pounds to total allocated groundfish pounds on exemption trips by sector, fishing year, and area. Dashed line indicated proposed annual threshold of 55% redfish under Alternative 2. Years where <3 vessels participated in a sector are not shown for confidentiality reasons, and the names of individual sectors are not shown. The average for each sector represents the total landings based on fishing trips only within each area. 'Industry Proposal' Area represents the Alternative 2 proposed exemption area. Source: DMIS and VTR data.



6.6 IMPACTS ON HUMAN COMMUNITIES- SOCIAL

Introduction

National Standard 8 (NS8) requires the Council to consider the importance of fishery resources to affected communities and provide those communities with continuing access to fishery resources, but it does not allow the Council to compromise the conservation objectives of the management measures. FW59 provides an overview of type of social change.

Social Impact Factors. The social impact factors outlined below can be used to describe the Northeast multispecies (groundfish) fishery, its sociocultural and community context, and its participants. These factors or variables are considered relative to the management alternatives and used as a basis for comparison between alternatives. Use of these kinds of factors in social impact assessment is based on NMFS guidance (NMFS 2007a) and other texts (e.g., Burdge 1998). Longitudinal data describing these social factors region-wide and in comparable terms is limited. Qualitative discussion of the potential changes to the factors characterizes the likely direction and magnitude of the impacts.

The social impact factors fit into five categories:

1. *Size and Demographic Characteristics* of the fishery-related workforce residing in the area; these determine demographic, income, and employment effects in relation to the workforce as a whole, by community and region.
2. The *Attitudes, Beliefs, and Values* of fishermen, fishery-related workers, other stakeholders and their communities; these are central to understanding the behavior of fishermen on the fishing grounds and in their communities.
3. The *Social Structure and Organization;* that is, changes in the fishery's ability to provide necessary social support and services to families and communities, as well as effects on the community's social structure, politics, etc.
4. The *Non-Economic Social Aspects* of the fishery; these include lifestyle, health, and safety issues, and the non-consumptive and recreational uses of living marine resources and their habitats.
5. The *Historical Dependence on and Participation in* the fishery by fishermen and communities, reflected in the structure of fishing practices, income distribution, and rights (NMFS 2007a).

Data utilized to inform the social impact factors include the 2004-2018 Groundfish-Specific Commercial Engagement Indicators, the 2012-2016 Community Social Vulnerability Indicators (CSVI), and results from both the 2012-13 and 2018-19 Socio-Economic Surveys of Hired Captains and Crew in New England and Mid-Atlantic Commercial Fisheries (Crew Survey). More information about these data can be found at https://www.fisheries.noaa.gov/new-england-mid-atlantic/socioeconomics/northeast-socioeconomic-data-products.

6.6.1 **Action 1 – Status Determination Criteria**

6.6.1.1 Alternative 1 - No Action

Social Impacts

Under Alternative 1/No Action there would be no revisions to the SDCs for GB winter flounder and SNE/MA winter flounder. Numerical estimates for these stocks would be based on the current SDCs.

As noted in the Economic Impacts section, there would not be immediate economic impacts under Alternative 1 but basing biomass targets on outdated information could lead to overfishing and would have long-term negative economic impacts. Overfishing that leads to the erosion of fishery profits over time would also lead to negative social impacts in terms of the Size and Demographic Characteristics of the fishery through reduced opportunities for income and employment.

Alternative 1 is also expected to have negative impacts in terms of the Attitudes, Beliefs, and Values of fishery participants. Biomass targets would not be based the latest peer reviewed assessment under Alternative 1, thereby likely reducing trust and confidence among fishery participants in the science and management of the fishery.

6.6.1.2 Alternative 2 – Updated Status Determination Criteria (*Preferred Alternative*)

Social Impacts

As noted in the Economic Impacts, Alternative 2 would result in lower ACLs compared to the No Action/Alternative 1, which might reduce revenues for fishery participants in the short term. However, the expected benefits of Alternative 2 relative to the Alternative 1/No Action would be the prevention of overfishing and the stock becoming overfished and to provide long-term sustainability of the fishery resource and potential for maximizing fishery revenues over time. Therefore, Alternative 2 is anticipated to have positive social impacts relative to the No Action/Alternative 1.

6.6.2 **Action 2 – Formal Rebuilding Program**

6.6.2.1 Alternative 1 - No Action

Commercial Groundfish Fishery Social Impacts

Under No Action/Alternative 1, there would be no revised rebuilding strategy for white hake and would maintain target fishing mortality at 75%FMSY, the same as in Alternative 2 Option C. Alternative 1/No Action is anticipated to have neutral to positive social impacts relative to Options A and B under Alternative 2 over the 10-year rebuilding period, which would decrease the target fishing mortality to 50%FMSY or 70%FSMY, respectively. Relatively higher target fishing mortality under No Action compared to these options would have positive social impacts to the extent that quotas would be less likely to constrain fishing effort and per the economic impacts analysis, maximize total benefits over the 10-year rebuilding period. There would be no immediate impact for 2021, but quotas would be reduced for the 10-year timeline under Options A and B of Alternative 2. No Action alternative is anticipated to have neutral impacts relative to Option C due to the maintenance of quotas based on 75% $F_{MSY.}$

6.6.2.2 Alternative 2 – Revised Rebuilding Strategy for White Hake (*Option B - Preferred*)

Commercial Groundfish Fishery Social Impacts

As described in the Economic Impacts section, Options A and B under Alternative 2 would produce negative to neutral economic and social impacts relative to the Alternative 1/No Action and C under Alternative 2. Rebuilding under Option A would occur by setting the rebuilding mortality target at 50%F_{MSY} and might result in the highest potential negative social impacts given the substantial reduction in quotas. Option B, the Preferred Alternative, sets target fishing mortality at 70%F_{MSY} and would likely result in less negative social and economic impacts as compared to a more substantial reduction in quotas under Option A, and relatively neutral impacts relative to No Action or Option C. While Option C largely does not differ from the Alternative 1/No Action in regard to quotas changing, the probability of rebuilding the stock is much lower than Option A and moderately lower than Option B.

Option A may have the largest negative social impacts relative the Size and Demographic character of the fishery's participants given the substantial reduction in quotas and resultant decreases in fishing opportunities and income. According to the results of the Crew Survey (Table 101), most crew respondents have reported that the rules and regulations in their primary commercial fisheries have been too restrictive. Therefore, Options A and B may have negative to neutral social impacts with respect to the Attitudes, Beliefs, and Values of commercial fishery participants as well.

6.6.3 Action 3 – Specifications

6.6.3.1 Alternative 1 - No Action

Commercial Groundfish Fishery Social Impacts

Alternative 1/No Action is anticipated to have negative social impacts on the commercial groundfish fishery. According to results presented in the Economic Impacts section, groundfish revenue in FY 2021 is predicted to decrease by about $37.6 million from FY 2020 under Alternative 1/No Action. Such a precipitous drop in revenues for the commercial groundfish fishery would likely result in losses of income and employment opportunities as vessels may be forced to reduce labor costs or exit the fishery altogether. These negative impacts would be across both sector and common pool components of the commercial fishery. Both components under Alternative 1/No Action would have no quotas for several stocks in all broad stock areas after July 31, 2021 and would curtail sector fishing until new specification were in place. The absence of quotas for the common pool would trigger trimester TAC area closures in the inshore Gulf of Maine (GOM) to gillnet and trawl fishing as well as large portions of the GOM and Georges Bank to trawl fishing (see Figure 14). In addition, administrative measures may be triggered for SNE/MA winter flounder in the following fishing year if the sub-ACL is exceeded, having additional negative economic impacts. Impacts on the common pool may be reduced if through follow-on action NMFS changed trip limits to zero for stocks without allocations.

Recreational Groundfish Fishery

Recreational Fishery social impacts are expected to be neutral relative to Alternative 2. As the Economic Impacts section describes, recreational access to GOM haddock is already limited by incidental catch of GOM cod. Therefore, the impact of the decreases under the No Action alternative would likely be neutral.

Atlantic Sea Scallop Fishery

Relative to Alternative 2, Alternative 1/ No Action is anticipated to have a range of negative through neutral to low positive social impacts on the scallop fishery. The scallop sub-ACL for GB yellowtail flounder would be slightly higher, but the SNE/MA yellowtail flounder sub-ACL would remain the same. However, the sub-ACL for GOM/GB windowpane flounder would be substantially less under the No Action than Alternative 2, which could trigger AMs for the scallop fishery. Therefore, the stock-level changes could be neutral to low positive for the scallop fishery but triggering any AMs would have negative impacts due to the potential loss of fishing opportunities.

Midwater trawl directed Atlantic herring fishery

Alternative 1/ No Action alternative is anticipated to have neutral social impacts on the herring fishery. As described in the Economic Impacts section, catches of haddock stocks by herring fishery vessels have been low in recent years and are trending downward. Reductions in GOM/GB haddock sub-ACLs would therefore not make a substantial difference to the herring fishery, especially on Georges Bank.

Small-mesh fisheries

Under Alternative 1/ No Action, the social impacts to the small-mesh fisheries are anticipated to be neutral given relatively low catches of GB yellowtail flounder in recent years. Despite slight reductions in GB yellowtail flounder sub-ACLs, these fisheries are unlikely to be constrained.

Large-mesh non-groundfish fisheries

Alternative 1/No Action may lead to negative social impacts on the large-mesh non-groundfish trawl (i.e., summer flounder and scup) fisheries in a future fishing year due to the decrease in the sub-ACL for southern windowpane flounder and increased potential of triggering the AM. If the AM is triggered, there could be substantial reductions in fishing opportunities and income for these fisheries. Under Alternative 1/No Action, the other sub-component would remain at the FY2020 level of 196 mt in FY2021. In FY 2019, the sub-ACL of 218 mt was exceeded (total catch in the other subcomponent was 243.6 mt), but the total ACL was not exceeded (total utilization was 76.6%), so the AM was not triggered. While this recent catch history suggests the possibility of an AM being triggered from windowpane catch in FY2021, inseason catch for FY2020 is trending lower than in previous years as of January 2021, both for the other sub-component and compared to the total sub-ACL (Table 97 and Table 98, respectively). In addition, despite higher quotas for summer flounder in FY2020, projected catch for the remainder of the fishing year is unlikely to exceed either the other sub-component sub-ACL and would not exceed the No Action/Alternative 1 sub-ACL. Catches in other fisheries may be declining, potentially as a result of declining status of the resource, or total effort across fisheries may have continued to be impacted throughout FY2020 as a result of the COVID-19 pandemic. If the catch of southern windowpane flounder remains similarly low in FY2021, there would be neutral economic impacts compared to both status quo and of the sub-ACL decrease under No Action/Alternative 1 compared to Alternative 2. However, if catches are more similar to FY2019, impacts could be positive relative to Alternative 2 or status quo since a higher sub-ACL would reduce the risk of triggering the AM.

6.6.3.2 Alternative 2 – Revised Specifications (*Preferred Alternative*)

Commercial Groundfish Fishery Social Impacts

Under Alternative 2, the sub-ACLs would be revised for the commercial, recreational, and other fisheries for FY21. According to results presented in the Economic Impacts section, overall commercial groundfish revenues are predicted to be $46.3 million, which would be a $2.7 million decrease from the prior year's prediction and a $1.7 million decrease from the realized value in FY19. Despite the decrease from prior years' predicted and realized revenues, Alternative 2 is anticipated to have positive social impacts on the sector component of the fishery relative to Alternative 1/No Action because predicted revenues are expected to be nearly $35 million under Alternative 1/No Action.

Port-level results revealed that revenues are predicted to increase by about $1 million in New Bedford, MA, but revenues are expected to decrease across all other major ports for the groundfish fishery. Although decreases in revenues are predicted for most major groundfish fishing ports, only Maine communities, and Portland in particular, are predicted to decrease by more than $1 million. Despite Portland, ME, being among the most highly engaged ports in commercial groundfish activities (Figure 10), the port's engagement has decreased over time and this further reduction in port-level revenue could exacerbate negative social impacts for the port and the surrounding community. Portland also has moderately high social vulnerability related to poverty in the community (Table 100), which could increase the likelihood of negative social impacts should predicted reductions in revenues become realized in FY21. New Bedford, MA, has also seen decreased in engagement over time, despite being the most highly engaged port, but the predicted increase in revenues for this port could produce positive impacts by helping to reverse negative trends of recent years for the port and its community. New Bedford, like Portland, has high social vulnerabilities related to poverty, but also has other vulnerabilities along other dimensions of the Community Social Vulnerability Indicators (Table 100). The predicted increase in revenues in New Bedford could produce positive impacts for this community by providing increased income and employment opportunities.

Alternative 2 is anticipated to have high positive social impacts for the sector and common pool fisheries relative to Alternative 1/No Action alternative because Alternative 1/No Action would result in no quotas for several stocks after July 31, 2021 and would effectively curtail all sector and some common pool fishing (especially with trawl gear) until new specifications were in place.

Recreational Groundfish Fishery Social Impacts

Alternative 2 is expected to have neutral social impacts on the recreational fishery relative to Alternative 1/No Action. Access to GOM haddock for the recreational fishery is already limited by the incidental catch of GOM cod.

Atlantic Sea Scallop Fishery

Social impacts of Alternative 2 relative to Alternative 1/No Action alternative for the scallop fishery range from potentially negative to neutral and low positive, depending upon multiple possible outcomes from changing sub-ACLs for the flounder stocks encountered by the scallop fishery. The decrease in SNE/MA yellowtail flounder under Alternative 2 could result in negative impacts relative to Alternative 1No Action alternative if bycatch exceeds the sub-ACL and triggers the AM in a future fishing year. Similarly, the decrease in GB yellowtail flounder under Alternative 2 may have negative social impacts on the scallop fishery relative to the No Action alternative.

On the other hand, sub-ACL values for GOM/GB windowpane flounder will be 19 mt greater under Alternative 2 than Alternative 1/No Action. The AM may be more likely to be triggered under Alternative

1/No Action, which may limit fishing opportunities for the scallop fishery in a future fishing year. However, although GOM/GB windowpane sub-ACL increases slightly, the SNE/MA windowpane sub-ACL would be substantially lower than in the previous year and bycatch estimates indicate that it might be likely the AM will be triggered if fishing effort is more similar to FY2018. However, if effort is more similar to FY2019, impacts could be neutral since total catch would not exceed the Alternative 2 ACLs in this action. Therefore, the windowpane stocks will likely have a mix of impacts on the scallop fishery that could be positive, neutral or negative.

Midwater trawl directed Atlantic herring fishery
While GB and GOM haddock sub-ACLs will decrease in FY21, the social impacts of these changes are anticipated to be neutral to the herring fishery because the midwater trawl vessels in this fishery had very little-to-no catch of these stocks in FY17 through FY19 and the limits on the catch of herring under the revise specifications are not expected to be constrain the catch of haddock.

Small-mesh fisheries
Similar to the midwater trawl herring fishery, the small-mesh fisheries (e.g., squid and whiting) are unlikely to see substantial impacts, either positive or negative, from Alternative 2 versus Alternative 1/No Action. Under Alternative 1/No Action the sub-ACL for GB yellowtail flounder for the small mesh fisheries (e.g., whiting and squid) would remain the same as FY2020 levels at 2 mt in FY2020, but decrease for FY2021 to 1.5 mt under Alternative 2. Economic impacts on the small mesh fishery are expected to be neutral since catches in recent years have been low (less than 1 mt in FY2017 and FY2018, 0 mt in FY2019). According to the FY2019 SAFE report for the small-mesh multispecies fishery, effort has decreased in the fishery since 2012 and the number of vessels with landings in the fishery hit a historical low in 2019. The *Illex* squid fishery, by contrast, has seen a relative boom in landings over the 2017-2019 period, with landings and revenue hitting a 30 year high in 2019 (MAFMC, 2020[44]). If the low catches of GB yellowtail flounder continue into FY21 then the impacts of Alternative 2 relative to No Action would likely be neutral.

Large Mesh non-groundfish fisheries
Alternative 2 may have neutral to negative social impacts on the other large mesh non-groundfish fisheries, depending upon whether or not an AM is triggered due to the decrease in southern windowpane flounder sub-ACL. Under Alternative 2, the other sub-component would reduce from 196 mt in FY2020 to 177 mt in FY2021, a decrease of 10%. The Economic Impacts section describes the conditions for triggering the AM and shows that the proposed sub-ACL under Alternative 2 would have been exceeded in five prior fishing years (FY2015-FY2019)—if catches are similar in FY2021 there would be negative impacts relative to Alternative 1/No Action due to an increased risk of exceeding the sub-ACL. However, in-season catch for FY2020 is trending lower than in previous years as of January 2021, both for the other sub-component and compared to the total sub-ACL. In addition, despite higher quotas for summer flounder in FY2020, projected catch for the remainder of the fishing year is unlikely to exceed either the other sub-component sub-ACL and would not exceed the Alternative 2 sub-ACL. If catches of southern windowpane flounder remain similarly low in FY2021, there would be neutral economic impacts of the sub-ACL decreasing under Alternative 2 compared to No Action/Alternative 1. Therefore, the social impacts of Alternative 2 relative to Alternative 1/No Action could be neutral to negative for the large mesh non-groundfish fisheries because of the possibility of an AM being triggered and implemented in a future fishing year.

[44]https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/5ea6f4239aac8c314b30b8b6/1587999780353/c_2020_Illex_AP_Info_Doc.pdf

6.6.4 Action 4 – Commercial Fishery Measures for Sectors

6.6.4.1 Alternative 1 – No Action

Commercial Groundfish Fishery Social Impacts

Under Alternative 1/No Action, there would be no universal sector exemption for redfish. Sectors could continue to request exemptions through their operations plans to use smaller mesh to target redfish. Alternative 1/No Action is anticipated to have negative social impacts relative to Alternative 2 because the current system for requesting exemptions increases the administrative responsibility for sectors and vessels in the sector system that want to target redfish and creates greater uncertainty about access to the redfish resource in future FYs.

6.6.4.2 Alternative 2 – Universal sector exemption for redfish (*Preferred Alternative*)

Commercial Groundfish Fishery Social Impacts

Alternative 2 would add a universal sector exemption for sector vessels to be able to use 5.5-inch (or larger) mesh codend within a defined Redfish Exemption Area and with particular stipulations, all described in section 4.4.2. Relative to Alternative 1/No Action, Alternative 2 is anticipated to have positive social impacts for commercial vessels participating in the sector system. A universal sector exemption for redfish will reduce the administrative responsibility for sectors and vessels, improve flexibility for vessels to retain more redfish than the current minimum mesh size allows, and increase the stability of access to the redfish resource.

Port-level data on vessel and dealer location from the last five years of available data (FY15-FY19) reveal that Gloucester, MA, Boston, MA, New Bedford, MA, and Portland, ME, have the most redfish activity in terms of landed pounds, the highest value in dollars, the most vessels landing redfish, and the highest number of trips fishing under exemption (Table 102). Alternative 2 will have substantially greater positive social impacts on communities in these ports given their relative engagement in these exempted redfish fishing activities in the recent past. In particular, Boston and Gloucester, MA, may gain the most from the reduction in administrative burden and increase in flexibility from the implementation of a universal sector exemption for redfish given their community members' relatively high engagement in these redfish fishing activities.

Table 100- 2016 Groundfish-Specific Commercial Engagement, Reliance and Social Vulnerability Indicator Factor Scores for Communities Highly Engaged in the Commercial Groundfish Fishery.

	Population Size (2016)	Groundfish Commercial Engagement and Reliance		Social Vulnerability				
Community	*Pop. Size*	*Engagement*	*Reliance*	*Labor Force*	*Housing Characteristics*	*Poverty*	*Population Composition*	*Personal Disruption*
Gloucester, MA	29,546	14.901	**10.675**	-0.117	0.019	-0.352	-0.709	-0.313
New Bedford, MA	94,988	13.968	**3.282**	-0.177	**0.501**	**1.229**	**0.743**	**0.877**
Boston, MA	658,279	6.188	0.012	-0.888	-0.037	**0.933**	**0.781**	0.421
Narragansett/Point Judith, RI	15,672	4.790	**2.368**	0.093	-0.177	-0.860	-0.975	-0.458
Montauk, NY	3,510	3.984	**4.251**	0.221	-0.403	-0.034	-0.516	-0.617
Portland, ME	66,649	3.348	**3.251**	-0.990	0.351	**0.666**	-0.315	-0.088
Chatham, MA	1,429	2.621	**2.234**	**0.951**	0.067	0.216	-0.784	-0.367
Scituate, MA	18,390	2.380	**1.912**	-0.294	-0.879	-0.606	-0.803	-0.735
Hampton Bays/ NY	13,040	2.092	**1.554**	-0.016	-0.725	-0.614	-0.008	-0.539
Cape May, NJ	3,529	1.617	**1.379**	**1.192**	0.196	-0.164	-0.779	-0.699
Portsmouth, NH	21,458	1.435	**1.182**	-0.895	0.074	-0.729	-0.744	-0.677
New London, CT	27,218	1.198	-0.161	-0.549	**0.540**	**1.555**	**0.722**	**1.189**
Point Pleasant, NJ	18,464	1.180	**0.757**	-0.725	-0.662	-0.624	-0.763	-0.648

Table 101- Commercial Crew Survey Attitudes Toward Fisheries Management

	2012	2018
"The rules and regulations change so quickly it's hard to keep up."		
Strongly Agree	41 (26%)	98 (20%)
Agree	62 (39%)	199 (42%)
Neutral	12 (8%)	96 (20%)
Disagree	36 (23%)	79 (16%)
Strongly Disagree	2 (1%)	5 (1%)
Don't know/No answer	6 (4%)	2 (<1%)
"The fines that are associated with breaking the rules and regulations of my primary fishery are fair."		
Strongly Agree	2 (1%)	23 (5%)
Agree	35 (22%)	199 (42%)
Neutral	17 (11%)	144 (30%)
Disagree	34 (21%)	62 (13%)
Strongly Disagree	37 (23%)	49 (10%)
Don't know/No answer	34 (21%)	2 (<1%)
"I feel that the regulations in my primary fishery are too restrictive."		
Strongly Agree	48 (30%)	107 (22%)
Agree	56 (35%)	140 (29%)
Neutral	16 (10%)	116 (24%)
Disagree	33 (21%)	104 (22%)
Strongly Disagree	2 (1%)	10 (2%)
Don't know/No answer	4 (3%)	2 (<1%)
Total Sampled Crew	200 (100%)	479 (100%)

Table 102- Port-level commercial fisheries dealer information on exempted redfish fishing activity, FY 2015-2019 (millions of lbs and millions of dollars ($2020)).

Year	Port	Vessels	Trips	Landed lbs.	Value ($)
2015	Boston, MA	9	92	2.55	2.13
2015	Gloucester, MA	14	97	4.30	3.17
2015	New Bedford, MA	11	43	1.80	1.38
2015	Portland, ME	1	2	c	c
2016	Boston, MA	9	73	2.17	2.01
2016	Gloucester, MA	14	120	4.40	3.44
2016	New Bedford, MA	6	30	0.97	0.70
2016	Portland, ME	5	10	0.15	0.15
2017	Boston, MA	6	84	3.79	2.92
2017	Gloucester, MA	10	129	6.32	4.33
2017	New Bedford, MA	2	7	c	c
2017	Portland, ME	2	4	c	c
2018	Boston, MA	9	115	6.16	4.10
2018	Gloucester, MA	12	137	6.66	4.19
2018	New Bedford, MA	2	6	c	c
2018	Portland, ME	2	2	c	c
2019	Boston, MA	8	83	4.23	2.75
2019	Gloucester, MA	12	140	6.81	4.78
2019	Portland, ME	2	3	c	c

c – Retracted to preserve confidentiality.

6.6.4.2.1 Performance Standards/Administrative Measures

The Council selected both Option A and Option B.

6.6.4.2.1.1 Option A - Performance Standards for Monthly Redfish Landings Threshold and Groundfish Discards (*Preferred Alternative*)

Monthly threshold requirements under Option A may be stronger than under Alternative 1/No Action and have negative social impacts. The performance standards for the monthly thresholds under Option A are expected to have negative economic impacts, which may result in losses of income and employment opportunities. Additionally, the performance standards could have negative impacts on crew attitudes towards fisheries management. Under Alternative 1/No Action, the Agency may withdraw authorization of the exemption to the Sector upon notification that landings or discard thresholds were not met in any given month and did not get into compliance within 30 days (Sector EA, 2015). However, to date, the Agency has not withdrawn its authorization to any sector, despite occurrences of multiple months in a fishing year where sectors did not meet landings threshold requirements (see section 6.5.4.2.1.1, Figure 15). Under Option A, at least one sector would have been placed on probation for one fishing year for failure to achieve thresholds for any three consecutive months or four total months in a year. No sector has exceeded the 5% groundfish discards threshold in the last five years.

6.6.4.2.1.2 Option B - Annual Redfish Landings Threshold and Performance Standards (*Preferred Alternative*)

There is no annual threshold under Alterative 1/No Action like the one proposed under Option B, however no sector has attained less than 62% redfish landings over the last five fishing years (Figure 16), and so unless catch proportions change significantly, economic impacts of Option B are likely to be low negative to neutral. This additional annual threshold could have negative impacts on crew attitudes towards fisheries management. Social impacts of Option B, therefore, could be low negative to neutral.

6.7 CUMULATIVE EFFECTS

6.7.1 Introduction

A cumulative effects assessment (CEA) is a required part of an EIS or EA according to the Council on Environmental Quality (CEQ; 40 CFR part 1508.7) and NOAA's policy and procedures for NEPA, found in NOAA Administrative Order 216-6A (Companion Manual, January 13, 2017). 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 this action together with past, present, and reasonably foreseeable future actions that affect the human environment. The predictions of potential synergistic effects from multiple actions, past, present and/or future are generally qualitative.

A cumulative effects analysis (CEA) is required by the Council on Environmental Quality (CEQ; 40 CFR part 1508.7) and NOAA policy and procedures for NEPA, found in NOAA Administrative Order 216-6A (Companion Manual, January 13, 2017). The purpose of the CEA is to consider the combined effects of many actions on the human environment 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. Rather, the intent is to focus on those effects that are truly meaningful. The following remarks address the significance of the expected cumulative impacts as they relate to the federally managed Northeast multispecies (groundfish) fishery.

A cumulative effects assessment makes effect determinations based on a combination of: 1) impacts from past, present, and reasonably foreseeable future actions; 2) the baseline conditions of the VECs (the combined effects from past, present, and reasonably foreseeable future actions plus the present condition of the VEC); and 3) impacts of the alternatives under consideration for this action.

Valued Ecosystem Components (VEC)

The valued ecosystem components for the groundfish fishery are generally the "place" where the impacts of management actions occur, and are identified as noted in Section 5.0:

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 (including economic and social effects on the fishery and fishing communities).

The CEA identifies and characterizes the impact on the VECs by the alternatives under consideration when analyzed in the context of other past, present, and reasonably foreseeable future actions. To enhance clarity and maintain consistency, terms are as defined in Table 72.

Temporal Scope of the VECs

While the effects of historical fisheries are considered, the temporal scope of past and present actions for regulated groundfish stocks, non-groundfish species, habitat and the human environment is primarily focused on actions that have taken place since implementation of the initial NE Multispecies FMP in 1977. An assessment using this timeframe demonstrates the changes to resources and the human environment that have resulted through management under the Council process and through U.S. prosecution of the fishery, rather than foreign fleets. For ESA-listed and MMPA 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. For future actions, this analysis examines the period between the expected implementation of this action (May 2020) and 2025.

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 5.1). However, the analyses of impacts presented in this framework focuses primarily on actions related to the harvest of the managed resources. The result is a more limited geographic area used to define the core geographic scope within which the majority of harvest effort for the managed resources occurs. For ESA-listed and MMPA protected species, the geographic range is the total range of each species (Section 5.6).

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 5.6.4.2.5) from the U.S.-Canada border to, and including, North Carolina.

Analysis of Total Cumulative Effects

A cumulative effects assessment ideally makes effect determinations based on the combination of: 1) impacts from past, present and reasonably foreseeable future actions; 2) the baseline condition of the VECs (the combined effects from past, present and reasonably foreseeable future actions plus the present condition of the VEC; and 3) impacts of the alternatives under consideration for this action.

6.7.1.1 Consideration of the Valued Ecosystem Components (VECs)

The valued ecosystem components for the groundfish fishery are generally the "place" where the impacts of management actions occur, and are identified in section 5.0.

- *Regulated groundfish stocks (target and non-target);*
- *Non-groundfish species (incidental catch and bycatch);*
- *Endangered and other protected species;*
- *Habitat, including non-fishing effects; and*
- *Human Communities (including economic and social effects on the fishery and fishing communities).*

The CEA identifies and characterizes the impacts on the VECs by the alternatives under consideration when analyzed in the context of other past, present, and reasonably foreseeable future actions.

6.7.1.2 Geographic Boundaries

The analysis of impacts focuses on actions related to the commercial and recreational harvest of regulated groundfish. The Western Atlantic Ocean is the core geographic scope for each of the VECs. The core geographic scope for the managed species is the management unit (Section 5.5). For non-groundfish species, that range may be expanded and would depend on the range of each species in the Western Atlantic Ocean. For habitat, the core geographic scope is focused on EFH within the EEZ but includes all habitat utilized by regulated groundfish, and non-groundfish species in the Western Atlantic Ocean. The core geographic scope for protected species is their range in the Western Atlantic Ocean. For human communities, the core geographic boundaries are defined as those U.S. fishing communities from the U.S.-Canada border to, and including, North Carolina directly involved in the harvest or processing of regulated groundfish (section 5.7).

6.7.1.3 Temporal Boundaries

Overall, while the effects of the historical groundfish fishery are important and considered in the analysis, the temporal scope of past and present actions for regulated groundfish stocks, non-groundfish species and other fisheries, the physical environment and EFH, and human communities is primarily focused on actions that occurred after FMP implementation (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. For protected species, the scope of past and present actions is focused on the 1980s and 1990s (when NMFS began generating stock assessments for marine mammals and sea turtles that inhabit waters of the U.S. EEZ) through the present.

The temporal scope of future actions for all VECs extends about five years (2021-2026) into the future beyond the implementation of this action. The dynamic nature of resource management for these species and lack of information on projects that may occur in the future make it difficult to predict impacts beyond this timeframe with any certainty. The impacts discussed in Section 6.7.5 are focused on the cumulative effects of the proposed action (i.e, the suite of preferred alternatives) in combination with the relevant past, present, and reasonably foreseeable future actions over these time scales.

6.7.2 Relevant Actions Other Than Those Proposed in this Document

This section summarizes the past, present, and reasonably foreseeable future actions and effects that are relevant for this cumulative effects assessment. Some past actions are still relevant to the present and/or future actions.

6.7.2.1 Fishery Management Actions

6.7.2.1.1 Managed Resources (Regulated Groundfish)

Past, present, and reasonably foreseeable future actions for regulated groundfish management include the establishment of the original FMP, all subsequent amendments and frameworks, and the setting of annual specifications (annual catch limits and measures to constrain catch and harvest). Key actions are described below.

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

Amendment 16, which became effective on May 1, 2010, adopted a broad suite of management measures in order to achieve the fishing mortality targets necessary to rebuild overfished stocks and meet other requirements of the M-S Act. Amendment 16 made major changes to the FMP. It greatly expanded the sector management program and adopted a process for setting ACLs to be set in biennial specifications packages. The Amendment adopted a system of ACLs and AMs that are designed to ensure catches remain below desired targets for each stock in the management complex. There were a host of mortality reduction measures for “common pool” (i.e. non-sector) vessels and the recreational component of the fishery. In 2011, the Council also approved Amendment 17, which allowed for NOAA-sponsored state-operated permit banks to function within the structure of Amendment 16.

Fifteen framework adjustments have updated the measures in Amendment 16. A subset are described below.

Framework 45 (May 1, 2011) adopted further modifications to the sector program and fishery specifications. Framework 47 (May 1, 2012, set specifications for some groundfish stocks for FY 2012 – 2014, modified AMs for the groundfish fishery and the administration of the scallop fishery AMs, and revised common pool management measures; modification of the Ruhle trawl definition and clarification of regulations for charter/party and recreational groundfish vessels fishing in groundfish closed areas were proposed under the RA authority.

Framework 48 (May 1, 2013) revised status determination criteria for several stocks, modified the sub-ACL system, adjusted monitoring measures for the groundfish fishery, and changed several accountability measures (AMs). Framework 49 (May 20, 2013) is a joint Northeast Multispecies/Atlantic Sea Scallop action that modified the dates for scallop vessel access to the year-round groundfish closed areas.

Framework 51 (May 1, 2014) modified rebuilding programs for GOM cod and American plaice, set specifications for FY2014-2016 and modified management measures in order to ensure that overfishing does not occur including, additional management measures related to U.S./Canada shared stocks and yellowtail flounder in the groundfish and scallop fisheries. Framework 53 (May 1, 2015) updated changes to the status determination criteria, set specifications for FY2015-2017, adopted U.S./ Canada Total Allowable Catches (TACs), established management measures for GOM cod that revise rolling closures and possession limits to enable GOM cod protection while providing opportunity for the groundfish fishery to prosecute healthy stocks in other times and areas, implemented default specifications, and revised regulations governing Sector Annual Catch Entitlement (ACE) carryover. Monkfish FW 9 was a joint action with the groundfish plan (FW 54), and modified regulations for vessels in the DAS program.

Framework 55 incorporated stock status changes for groundfish stocks, set specifications for all groundfish stocks for FY 2017- FY 2019, adopted an additional sector and modified the sector approval process, modified the definition of a haddock separator trawl so that the separator panel is easily identifiable, made changes to the groundfish monitoring program, made changes to the management measures for U.S./Canada TACs in order to move GB cod quota from the eastern management area to the western management area and modified the Gulf of Maine Cod Protection Measures so that the recreational possession limit for GOM cod can once again be modified by the Regional Administrator.

Amendment 18, which became effective on May 1 and May 22, 2017, addressed fleet diversity and accumulation limits.

Framework 59 (July 20, 2020) revised the allocation between commercial and recreational fisheries for GOM cod and GOM haddock based on new data from the Marine Recreational Information Program

(MRIP), along with setting specifications for some groundfish stocks for 2020-2022, and several other minor changes to management measures.

Reasonably Foreseeable Future Actions: The Council took final action on Amendment 23 to the Northeast Multispecies FMP in September 2020. This action will adjust the groundfish monitoring program to improve reliability and accountability of catch reporting and to ensure a precise and accurate representation of catch (landings and discards).

6.7.2.1.2 Non-target Species (Non-groundfish)

There are Management Plans in place for non-target, non-groundfish species, including the Skate FMP, Herring FMP (jointly managed with ASMFC), Scallop FMP, Summer Flounder, Black Sea Bass, and Scup FMP (managed by the MAFMC), Monkfish FMP (jointly managed with the MAFMC), and Spiny Dogfish FMP (jointly managed with the MAFMC).

6.7.2.1.3 Physical Habitat/EFH

The EFH Omnibus Amendment 2 (April 2018) reviewed and updated EFH designations, identified Habitat Areas of Particular Concern, and updated the status of current knowledge of gear impacts. It also implemented new spatial management measures throughout New England for minimizing the adverse impact of fishing on EFH that affect all species managed by the NEFMC. The Council developed a related omnibus framework (Clam Dredge Framework, June 2020) that designated three exemption areas within the Great South Channel Habitat Management Area where clam and mussel dredges are allowed. The Council also recently developed a deep-sea coral amendment to protect deep-sea coral habitats throughout New England from the negative impacts of fishing gears. NMFS approved the amendment on November 20, 2019 and the final rule is pending. Once implemented, the amendment will designate the Georges Bank Deep-Sea Coral Protection Zone between the US/Canada EEZ boundary, the boundary between the NEFMC and MAFMC regions, and the seaward boundary of the US EEZ, with the landward boundary at the 600 m contour. The zone will be a closure to all bottom-tending gears, with an exemption for the red crab pot fishery. Two mobile bottom-tending gear closures will also be implemented in federal waters in eastern Maine.

6.7.2.1.4 Protected Resources

Protected species impacted by the groundfish fishery include large whales, small cetaceans, pinnipeds, sea turtles, Atlantic sturgeon, Atlantic salmon, and giant manta rays. There are several Take Reduction Plans (TRPs) in place to reduce serious injury to, or mortality, of protected species, including the Atlantic Large Whale Take Reduction Plan (ALWTRP) for gillnet and pot/trap fisheries, the Bottlenose Dolphin Take Reduction Plan (BDTRP) for gillnet fisheries, and the Harbor Porpoise Take Reduction Plan (HPTRP) for gillnet fisheries.

6.7.2.1.5 Human communities

All actions taken under the Northeast Multispecies FMP have had effects on human communities. Many actions have included specific measures designed to improve flexibility and increase efficiency. Amendment 18 addressed fleet diversity and accumulation limits. Amendment 23 proposes to adjust the groundfish monitoring program, including establishing target coverage levels up to 100 percent, and is expected to have distributional impacts on individuals and ports participating in the fishery.

6.7.2.1.6 Other Fishery Management Actions

In addition to the Northeast Multispecies FMP, there are many other FMPs and associated fishery management actions for other species that impacted these VECs over the temporal scale described in Section 6.7.1.3. These include FMPs managed by the Mid-Atlantic Fishery Management Council, New England Fishery Management Council, Atlantic States Marine Fisheries Commission, and to a lesser extent the South Atlantic Fishery Management Council. Omnibus amendments are also frequently developed to amend multiple FMPs at once. Actions associated with other FMPs and omnibus amendments have included measures to regulate fishing effort for other species, measures to protect habitat and forage species, and fishery monitoring and reporting requirements.

6.7.2.1.7 Fishery Management Action Summary

The Council has taken many actions to manage the associated commercial fisheries in its jurisdiction. Actions taken in other FMPs, and some Omnibus Actions are described in Section 6.7.2.1. The MSA is the statutory basis for federal fisheries management. The cumulative impacts on the VECs of past, present, and reasonably foreseeable future federal fishery management actions under the MSA should generally be associated with positive long-term outcomes because they constrain fishing effort and manage stocks at sustainable levels. Constraining fishing effort through regulatory actions can have negative short-term socioeconomic impacts. These impacts are sometimes necessary to bring about long-term sustainability of a resource, and as such should promote positive effects on human communities in the long-term. A summary of the cumulative impacts of past, present, and reasonably foreseeable future actions on each VEC is provided in Table 103.

Table 103- Summary effects of past, present, and reasonably foreseeable future actions on the VECs identified for Framework Adjustment 61.

VEC	Past Actions	Present Actions	Reasonably Foreseeable Future Actions	Combined Effects of Past, Present, Future Actions
Regulated Groundfish Stocks	**Mixed** Combined effects of past actions have decreased effort, improved habitat protection, and implemented rebuilding plans when necessary. However, some stocks remain overfished	**Positive** Current regulations continue to manage for sustainable stocks	**Positive** Future actions are anticipated to continue rebuilding and strive to maintain sustainable stocks	**Short-term Negative** Several stocks are currently overfished, have overfishing occurring, or both **Long-Term Positive** Stocks are being managed to attain rebuilt status
Non-Groundfish Species	**Positive** Combined effects of past actions have decreased effort and improved habitat protection	**Positive** Current regulations continue to manage for sustainable stocks, thus controlling effort on direct and discard/bycatch species	**Positive** Future actions are anticipated to continue rebuilding and target healthy stocks, thus limiting the take of discards/bycatch	**Positive** Continued management of directed stocks will also control incidental catch/bycatch
Endangered and Other Protected Species	**Slight Positive** Combined effects of past fishery actions have reduced effort and thus interactions with protected resources	**Slight 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	**Slight Positive** Continued catch and effort controls are likely to reduce gear encounters through effort reductions. Additional management actions taken under ESA/MMPA should also help mitigate the risk of gear interaction

Habitat	**Mixed** Combined effects of effort reductions and better control of non-fishing activities have been positive but fishing activities and non-fishing activities continue to reduce habitat quality	**Mixed** Effort reductions and better control of non-fishing activities have been positive but fishing activities and non-fishing activities continue to reduce habitat quality	**Mixed** Future regulations will likely control effort and thus habitat impacts but as stocks improve, effort will likely increase along with additional non-fishing activities	**Mixed** Continued fisheries management will likely control effort and thus fishery related habitat impacts but fishery and non-fishery related activities will continue to reduce habitat quality
Human Communities	**Mixed** Fishery resources have supported profitable industries and communities but increasing effort and catch limit controls have curtailed fishing opportunities	**Mixed** Fishery resources continue to support communities but increasing effort and catch limit controls combined with non-fishing impacts such as high fuel costs have had a negative economic impact	**Short-term Negative** As effort controls are maintained or strengthened, economic impacts will be negative **Long-term Positive** As stocks improve, effort will likely increase which would have a positive impact	**Short-term Negative** Revenues would likely decline dramatically in the short term and may remain low until stocks are fully rebuilt **Long-term Positive** Sustainable resources should support viable communities and economies
Impact Definitions: -Regulated Groundfish Stocks, Non-groundfish species, Endangered and Other Protected Species: positive=actions that increase stock size and negative=actions that decrease stock size -Habitat: positive=actions that improve or reduce disturbance of habitat and negative=actions that degrade or increase disturbance of habitat -Human Communities: positive=actions that increase revenue and well-being of fishermen and/or associated businesses and negative=actions that decrease revenue and well-being of fishermen and/or associated businesses				

6.7.2.2 Non-Fishing Impacts

6.7.2.2.1 Other Human Activities

Non-fishing activities that occur in the marine nearshore and offshore environments and connected watersheds can cause the loss or degradation of habitat and/or affect the fish and protected species that utilize those areas. The impacts of most nearshore, human-induced, non-fishing activities tend to be localized in the areas where they occur, although effects on species could be felt throughout their populations since many marine organisms are highly mobile. For offshore projects, some impacts may be localized while others may have regional influence, especially for larger projects. The following discussion of impacts is based on past assessments of activities and assumes these activities will continue as projects are proposed.

Examples of non-fishing activities include point source and non-point source pollution, shipping, dredging/deepening, wind energy development, oil and gas development, construction, and other activities. Specific examples include at-sea disposal areas, oil and mineral resource exploration, aquaculture, construction of offshore wind farms, and bulk transportation of petrochemicals. Episodic storm events and the restoration activities that follow can also cause impacts. The impacts from these activities primarily stem from habitat loss due to human interaction and alteration or natural disturbances. These activities are widespread and can have localized impacts on habitat related to accretion of sediments, pollutants, habitat conversion, and shifting currents and thermoclines. For protected species, primary concerns associated with non-fishing activities include vessel strikes, dredge interactions (especially for sea turtles and sturgeon), and underwater noise. These activities have both direct and indirect impacts on protected species. Wherever these activities co-occur, they are likely to work additively or synergistically to decrease habitat quality and as such may indirectly constrain the productivity of managed species, non-target species, and protected species. Decreased habitat suitability tends to reduce the tolerance of these VECs to the impacts of fishing effort. Non-fishing activities can cause target, non-target, and protected species to shift their distributions away from preferred areas, and may also lead to decreased reproductive ability and success (from current changes, spawning disruptions, and behavior changes), disrupted or modified food web interactions, and increased disease. While localized impacts may be more severe, the overall impact on the affected species and their habitats on a population level is unknown, but likely to have impacts that mostly range from no impact to slight negative, depending on the species and activity.

Non-fishing activities permitted by other Federal agencies (e.g. beach nourishment, offshore wind facilities) require examinations of potential impacts on the VECs. The MSA imposes an obligation on other Federal agencies to consult with the Secretary of Commerce on actions that may adversely affect EFH (50 CFR 600.930). NMFS and the eight regional fishery management councils engage in this review process by making comments and recommendations on federal or state actions that may affect habitat for their managed species. Agencies need to respond to, but do not necessarily need to adopt these recommendations. Habitat conservation measures serve to potentially minimize the extent and magnitude of indirect negative impacts federally-permitted activities could have on resources under NMFS' jurisdiction. In addition to guidelines mandated by the MSA, NMFS evaluates non-fishing effects during the review processes required by Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act for certain activities that are regulated by Federal, state, and local authorities. Non-fishing activities must also meet the mandates under the ESA, specifically Section 7(a)(2)[45], which ensures that agency actions do not jeopardize the continued existence of endangered species and their critical habitat.

In recent years, offshore wind energy and oil and gas exploration have become more relevant activities in the Greater Atlantic region. They are expected to impact all VECs, as described below.

Impacts of offshore wind energy development on Biological Resources (Target species, Non-target species, Protected Species) and the Physical Environment

Construction activities may have both direct and indirect impacts on marine resources, ranging from temporary changes in distribution to injury and mortality. Impacts could occur from changes to habitat in the areas of wind turbines and cable corridors and increased vessel traffic to and from these areas. Species that reside in affected wind farms year round may experience different impacts than species that seasonally reside in or migrate through these areas. Species that typically reside in areas where wind turbines are installed may return to the area and adapt to habitat changes after construction is complete. Inter-array and electricity export cables will generate electromagnetic fields, which can affect patterns of movement, spawning, and recruitment success for various species. Effects will depend on cable type, transmission capacity, burial depth, and proximity to other cables. Substantial structural changes in habitats associated with cables are not expected unless cables are left unburied (see below). However, the cable burial process may alter sediment composition along the corridor, thereby affecting infauna and emergent biota. Taormina et al. (2018) provide a recent review of various cable impacts, and Hutchinson et al. (2020) and Taormina et al. (2020) examine the effects of electromagnetic fields in particular.

45 "Each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency (hereinafter in this section referred to as an "agency action") is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of critical habitat."

The full build out of offshore wind farms will result in broad habitat alteration. The wind turbines will alter hydrodynamics of the area, which may affect primary productivity and physically change the distribution of prey and larvae. It is not clear how these changes will affect the reproductive success of marine resources. Scour and sedimentation could have negative effects on egg masses that attach to the bottom. Benthic habitat will be altered due to the placement of scour protection at wind turbine foundations, and over cables that are not buried to target depth in the sediment, converting soft substrates into hard substrates. This could alter species composition and predator/prey relationships by increasing favorable habitat for some species and decreasing habitat for others. The placement of wind turbines will also establish new vertical structure in the water column, which could serve as reefs for bottom species, fish aggregating devices for pelagic species, and substrate for the colonization of other species, e.g. mussels. Various authors have studied these types of effects (e.g. Bergström et al. 2013, Dannheim et al. 2019, Degraer et al. 2019, Langhamer 2012, Methratta and Dardick 2019, Stenberg et al. 2015).

Elevated levels of sound produced during site assessment activities, construction, and operation of offshore wind facilities will impact the soundscape[46]. Temporary, acute, noise impacts from construction activity could impact reproductive behavior and migration patterns; the long-term impact of operational noise from turbines may also affect behavior of fish and prey species, through both vibrations in the immediate area surrounding them in the water column, and through the foundation into the substrate. Depending on the sound frequency and source level, noise impacts to species may be direct or indirect (Finneran 2015; Finneran 2016; Nowacek et al. 2007; NRC 2000; NRC 2003; NRC 2005; Madsen et al. 2006; Piniak 2012; Popper et al. 2014; Richardson et al. 1995; Thomsen et al. 2006). Exposure to underwater noise can directly affect species via behavioral modification (avoidance, startle, spawning) or injury (sound exposure resulting in internal damage to hearing structures or internal organs) (Bailey et al. 2010; Bailey et al. 2014;Bergström et al. 2014; Ellison et al. 2011; Ellison et al. 2018; Forney et al. 2017; Madsen et al. 2006; Nowacek et al. 2007; NRC 2003; NRC 2005; Richardson et al. 1995; Romano et al. 2004; Slabbekoorn et al. 2010; Thomsen et al. 2006; Wright et al. 2007). Indirect effects are likely to result from changes to the acoustic environment of the species, which may affect the completion of essential life functions (e.g., migrating, breeding, communicating, resting, foraging)[47] (Forney et al. 2017; Richardson et al. 1995; Slabbekoorn et al. 2010; Thomsen et al. 2006).

Wind farm survey and construction activities and turbine/cable placement will substantially affect NMFS scientific research surveys, including stock assessment surveys for fisheries and protected species[48] and ecological monitoring surveys. Disruption of such scientific surveys could increase scientific uncertainty in survey results and may significantly affect NMFS' ability to monitor the health, status, and behavior of marine resources and protected species and their habitat use within this region. Based on existing regional Fishery Management Councils' acceptable biological catch control rule processes and risk policies (e.g., 50 CFR §§ 648.20 and 21), increased assessment uncertainty could result in lower commercial quotas and recreational harvest limits that may reduce the likelihood of overharvesting and mitigate associated biological impacts on fish stocks. However, this would also result in lower associated fishing revenue and reduced recreational fishing opportunities, which could result in indirect negative impacts on fishing communities.

46 See NMFS Ocean Noise Strategy Roadmap: https://cetsound.noaa.gov/Assets/cetsound/documents/Roadmap/ONS_Roadmap_Final_Complete.pdf

47 See NMFS Ocean Noise Strategy Roadmap (footnote #2)

48 Changes in required flight altitudes due to proposed turbine height would affect aerial survey design and protocols (BOEM 2020a).

Impacts of Offshore Wind Energy Development on Socioeconomic Resources

One offshore wind pilot project off Virginia installed two turbines in 2020**.** Several potential offshore wind energy sites have been leased or identified for future wind energy development in federal waters from Massachusetts to North Carolina (see leasing map Figure 17). According to BOEM, approximately 22 gigawatts (close to 2,000 wind turbines based on current technology) of Atlantic offshore wind development via 17 projects are reasonably foreseeable along the east coast (BOEM 2020a). BOEM has recently begun a planning process for the Gulf of Maine via a regional intergovernmental renewable energy task force (https://www.boem.gov/Gulf-of-Maine). It is not clear at this time where development might occur in the Gulf of Maine. Given the water depth in the region, floating turbines will likely be the primary type of wind turbine foundations to be deployed in the area. As the number of wind farms increases, so too would the level and scope of impacts to affected habitats, marine resources, and human communities.

Offshore wind energy development is being considered in parts of the outer continental shelf that overlap with a small portion of the groundfish resource, specifically with the active lease areas off of Rhode Island. The groundfish fishery has been active in the areas of the lease areas at present and is expected to be for the near future (Map 6). The social and economic impacts of offshore wind energy on fisheries could be generally negative due to the overlap of wind energy areas with productive groundfish fishing grounds. Impacts may vary by year based on species availability.

It is worth noting that this analysis represents only a rough approximation of potential effects from the lease areas; however, because this productive region of the resource would be expected to support groundfish fishing in the future in the absence of offshore wind energy development, any restriction of fishing access to this region as a result of offshore wind energy development would be perceived as a negative overall effect to the fishery. In some cases, effort could be displaced to another area, which could compensate for potential economic losses if vessel operators choose not to operate in the wind energy areas.

Turbine structures could increase the presence of and recreational fishing for structure affiliated species, including some groundfish species such as cod. This could potentially lead to socioeconomic benefits in terms of increased for-hire fishing revenues and angler satisfaction in certain wind development areas.

There could also be social and economic benefits in the form of jobs associated with construction and maintenance, and replacement of some electricity generated using fossil fuels with renewable sources (AWEA 2020).

It remains unclear how fishing or transiting to and from fishing grounds (whether or not those grounds are within a wind farm) might be affected by the presence of a wind farm. While no offshore wind developers have expressed an intent to exclude fishing vessels from wind turbine arrays once construction is complete, it could be difficult for operators to tow bottom-tending mobile gear or transit amongst the wind turbines, depending on the spacing and orientation of the array and weather conditions.[49] If vessel operators choose to avoid fishing or transiting within wind farms, effort displacement and additional steaming time could result in negative socioeconomic impacts to affected communities, including increased user conflicts, decreased catch and associated revenue, safety concerns, and increased fuel costs. If vessels elect to fish within wind farms, effects could be both positive due to potential increased recreational catch and negative

49 The United States Coast Guard has considered transit and safety issues related to the Massachusetts and Rhode Island lease areas in a recent port access route study, and has recommended uniform 1 mile spacing in east-west and north-south directions between turbines to facilitate access for fishing, transit, and search and rescue operations. Future studies in other regions could result in different spacing recommendations (UCSG 2020).

due to reduced commercial fishery catch and associated revenue, user conflicts, gear damage/loss, and increased risk of allision or collision.

Impacts of Oil and Gas Development on Biological and Socioeconomic Resources

For oil and gas, this timeframe could include leasing and possible surveys, depending on the direction of BOEM's 5-year planning process in the North and Mid-Atlantic regions. (Note that there are fewer oil and gas development activities in the region than offshore wind; therefore, the non-fishing impacts focus more heavily on offshore wind.) Seismic surveys to detect and quantify mineral resources in the seabed impact marine species and the acoustic environment within which marine species live. These surveys have uncertain impacts on fish behaviors that could cumulatively lead to negative population level impacts. For protected species (sea turtle, fish, small cetacean, pinniped, large whale), the severity of these behavioral or physiological impacts is based on the species' hearing threshold , the overlap of this threshold with the frequencies emitted by the survey, as well as the duration of time the surveys would operate, as these factors influence exposure rate (Ellison et al. 2011; Ellison et al. 2018; Finneran 2015; Finneran 2016; Madsen et al. 2006; Nelms et al. 2016;Nowacek et al. 2007; Nowacek et al. 2015; NRC 2000; NRC 2003; NRC 2005; Piniak 2012; Popper et al. 2014; Richardson et al. 1995; Thomsen et al. 2006; Weilgart 2013). If fishery resources are affected by seismic surveys, then so in turn the fishermen targeting these resources would be affected. However, such surveys could increase jobs, which may provide some positive effects on human communities (BOEM 2020b). It is important to understand that seismic surveys for mineral resources are different from surveys used to characterize submarine geology for offshore wind installations, and thus these two types of activities are expected to have different impacts on marine species.

Offshore Energy Summary

The overall impact of offshore wind energy and oil and gas exploration on the affected species and their habitats at a population level is unknown, but likely to range from no impact to moderate negative, depending on the number and locations of projects that occur. The individual project phases (site assessment, construction, operation, and decommissioning) as well as different aspects of the technology (foundations, cables/pipelines, turbines) will have varying impacts on resources. Mitigation efforts, such as habitat conservation measures, time of year construction restrictions, layout modifications, and fishery compensation funds could lessen the magnitude of negative impacts as well. The overall impact on socioeconomic resources is likely slight positive to moderate negative; potentially positive due to a potential increase in jobs and recreational fishing opportunities, but negative due to displacement and disruption of commercial fishing effort.

Map 6- Northeast Multispecies FMP revenues (2017) relative to wind energy active lease areas and planning areas.

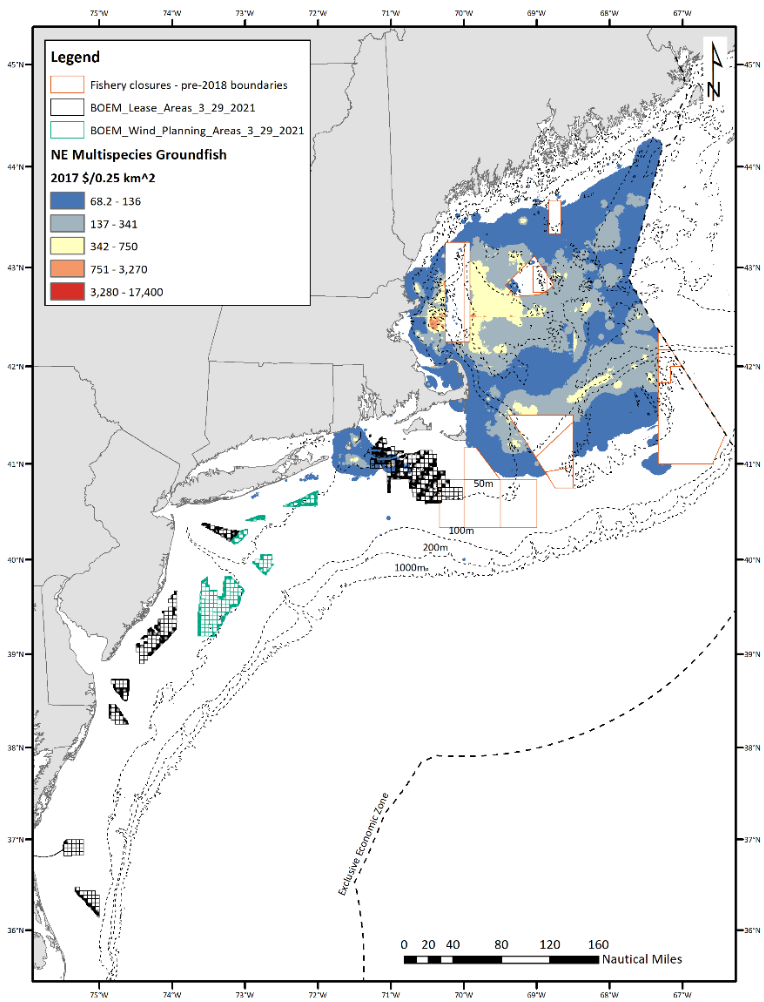
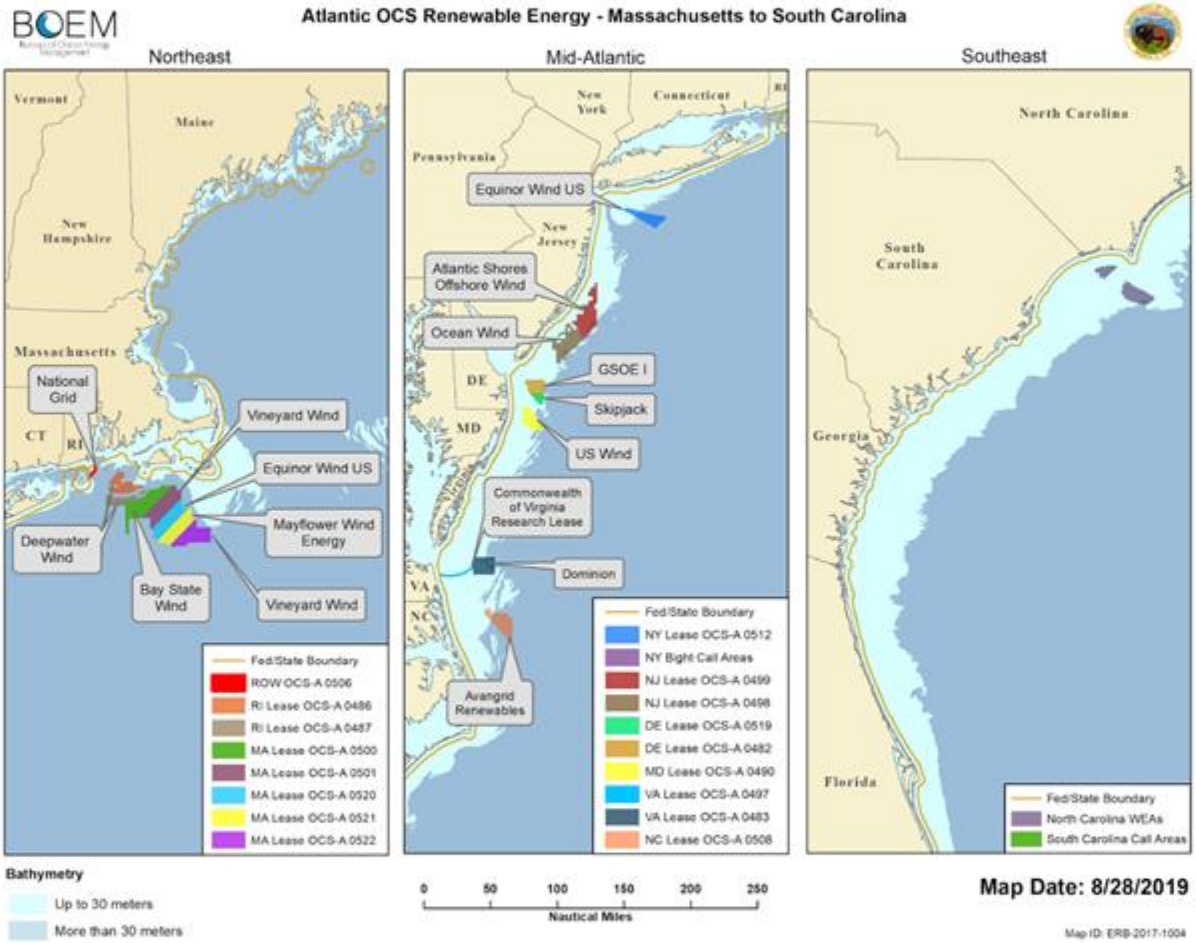


Figure 17- Map of BOEM Wind Planning areas, Wind Energy Areas, and Wind Leasing Areas on the Atlantic Outer Continental Shelf.



6.7.2.2.2 **Global Climate Change**

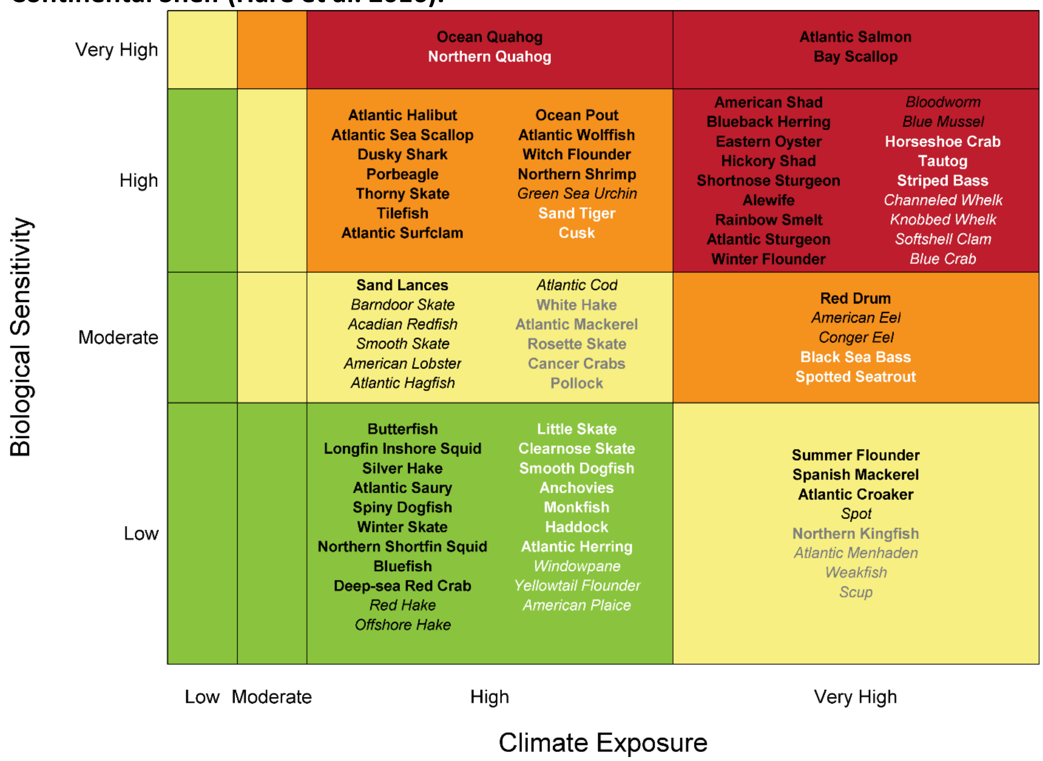
Global climate change affects all components of marine ecosystems, including human communities. Physical changes that are occurring and will continue to occur to these systems include sea-level rise, changes in sediment deposition; changes in ocean circulation; increased frequency, intensity and duration of extreme climate events; changing ocean chemistry; and warming ocean temperatures. The rates of physical and chemical changes in marine ecosystems have been most rapid in recent decades (Johnson et al. 2019). Emerging evidence demonstrates that these physical changes are resulting in direct and indirect ecological responses within marine ecosystems, which may alter the fundamental production characteristics of marine systems (Stenseth et al. 2002). The general trend of changes can be explained by warming causing increased ocean stratification, which reduces primary production, lowering energy supply for higher trophic levels and changing metabolic rates. Different responses to warming can lead to altered food-web structures and ecosystem-level changes. Shifts in spatial distribution are generally to higher latitudes (i.e., poleward) and to deeper waters as species seek cooler waters within their normal temperature preferences. Climate change will also potentially exacerbate the stresses imposed by fishing and other non-fishing human activities and stressors. Survival of marine resources under a changing climate depends on their ability to adapt to change, but also how and to what degree those other human activities influence their natural adaptive capacity.

Results from the Northeast Fisheries Climate Vulnerability Assessment indicate that climate change could have impacts on Council-managed species that range from negative to positive, depending on the adaptability of each species to the changing environment (Hare et al. 2016).

Based on this assessment, groundfish species were scored as having a range of climate vulnerability. Winter flounder were scored as having very high climate vulnerability with very high certainty (Hare et al. 2016). Witch flounder, Atlantic halibut, ocean pout, and Atlantic wolfish were scored as having high climate vulnerability with very high certainty (Hare et al. 2016). Atlantic cod and Acadian redfish were scored as having moderate climate vulnerability with high certainty, while white hake and pollock were scored as having moderate climate vulnerability with moderate certainty (Hare et al. 2016). Haddock were scored as having low climate vulnerability with moderate certainty (Hare et al. 2016). And finally, witch flounder, American plaice, and windowpane flounder were scored as having low climate vulnerability with low certainty (Hare et al. 2016).

Overall vulnerability results for additional Greater Atlantic species, including most of the non-target species identified in this action, are shown in Figure 18 (Hare et al. 2016). While the effects of climate change may benefit some habitats and the populations of species through increased availability of food and nutrients, reduced energetic costs, or decreased competition and predation, a shift in environmental conditions outside the normal range can result in negative impacts for those habitats and species unable to adapt. This, in turn, may lead to higher mortality, reduced growth, smaller size, and reduced reproduction or populations. Thus, already stressed populations are expected to be less resilient and more vulnerable to climate impacts. Climate change is expected to have impacts that range from positive to negative depending on the species. However, future mitigation and adaptation strategies to climate change may mitigate some of these impacts. The science of predicting, evaluating, monitoring and categorizing these changes continues to evolve. The social and economic impacts of climate change will depend on stakeholder and community dependence on fisheries, and their capacity to adapt to change. Commercial and recreational fisheries may adapt in different ways, and methods of adaptation will differ among regions. In addition to added scientific uncertainty, climate change will introduce implementation uncertainty and other challenges to effective conservation and management.

Figure 18- Overall climate vulnerability score for fish and invertebrates on the Northeast U.S. Continental Shelf (Hare et al. 2016).



Overall climate vulnerability is denoted by color: low (green), moderate (yellow), high (orange), and very high (red). Certainty in score is denoted by text font and text color: very high certainty (>95%, black, bold font), high certainty (90–95%, black, italic font), moderate certainty (66–90%, white or gray, bold font), low certainty (<66%, white or gray, italic font). Figure source: Hare et al. 2016.

6.7.3 Baseline Condition for the Resources, Ecosystems, and Human Communities

For the purposes of this CEA, the baseline condition is considered as the present condition of the VECs plus the combined effects of the past, present, and reasonably foreseeable future actions.

Table 104 and Table 105 summarize the added effects of the condition of the VECs (i.e., status/trends/stresses from Affected environment and impacts) and the sum effect of the past, present, and reasonably foreseeable future actions (from previous summary table or Past, present, reasonably foreseeable future action section above). The resulting CEA baseline for each VEC is exhibited in the last column of

Table 104 and Table 105. As mentioned above, the CEA Baseline is then used to assess cumulative effects of the proposed management actions.

Table 104- Cumulative effects assessment baseline conditions of regulated groundfish stocks.

VEC		Status/Trends, Overfishing	Status/Trends, Overfished	Combined Effects of Past, Present Reasonably Foreseeable Future Actions	Combined CEA Baseline Conditions
Regulated Groundfish Stocks	GB Cod	***Yes***	***Yes***	**Negative** – short term: Several stocks are currently overfished, have overfishing occurring, or both; **Positive** – long term: Stocks are being managed to attain rebuilt status	**Negative** – short term: Overharvesting in the past contributed to several stocks being overfished or where overfishing is occurring; **Positive – long** term: Regulatory actions taken over time have reduced fishing effort and with the addition of Amendment 16, stocks are expected to rebuild in the future
	GOM Cod	***Yes***	***Yes***		
	GB Haddock	No	No, Rebuilt		
	GOM Haddock	No	No, Rebuilt		
	GB Yellowtail Flounder	***Yes***	***Yes***		
	SNE/MA Yellowtail Flounder	No	***Yes***		
	CC/GOM Yellowtail Flounder	No	No		
	American Plaice	No	No, Rebuilt		
	Witch Flounder	Unknown	***Yes***		
	GB Winter Flounder	No	***Yes***		
	GOM Winter Flounder	No	Unknown		
	SNE/MA Winter Flounder	No	***Yes***		
	Acadian Redfish	No	No, Rebuilt		
	White Hake	No	***Yes***		
	Pollock	No	No, Rebuilt		
	Northern (GOM-GB) Windowpane Flounder	No	***Yes***		
	Southern (SNE-MA) Windowpane Flounder	No	No		
	Ocean Pout	No	***Yes***		
	Atlantic Halibut	No	***Yes***		
	Atlantic Wolffish	No	***Yes***		

Table 105– Cumulative effects assessment baseline conditions of non-groundfish species, habitat, protected resources, and human communities.

VEC		Status/Trends	Combined Effects of Past, Present Reasonably Foreseeable Future Actions	Combined CEA Baseline Conditions
Non-groundfish Species (principal species)	**Monkfish**	Not overfished and overfishing is not occurring.	**Positive** – Continued management of directed stocks will also control incidental catch/bycatch.	**Positive** – Although prior groundfish management measures likely contributed to redirecting effort onto non-groundfish species, as groundfish rebuild this pressure should lessen and all of these species are also managed through their own FMP.
	Dogfish	Not overfished and overfishing is not occurring.		
	Skates	Thorny skate is overfished and overfishing is not occurring. All other skate species are not overfished and overfishing is not occurring.		
Habitat		Fishing impacts are complex and variable and typically adverse. (Non-fishing activities had historically negative but site-specific effects on habitat quality.	**Mixed** – Future regulations will likely control effort and thus habitat impacts but as stocks improve, effort will likely increase along with additional non-fishing activities. An omnibus amendment to the FMP with mitigating habitat measures is under development.	**Mixed** – reduced habitat disturbance by fishing gear but impacts from non-fishing actions, such as climate change, could increase and have a negative impact.
Protected Resources	**Sea Turtles**	Leatherback and Kemp's ridley sea turtles are classified as endangered under the ESA; loggerhead (NW Atlantic DPS) and green (North Atlantic DPS) sea turtles are classified as threatened.	**Slight Positive** – reduced gear encounters through effort reductions and management actions taken under the ESA/MMPA should also help mitigate the risk of gear interactions	**Slight Positive** – Continued catch and effort controls, is likely to reduce gear encounters through effort reductions. Additional management actions taken under ESA/MMPA should also help mitigate the risk of gear interactions .
	Fish	Atlantic salmon (Gulf of Maine DPS): threatened under ESA Atlantic sturgeon: New York Bight, Chesapeake, Carolina, and South Atlantic DPSs are endangered under ESA; Gulf of Maine DPS is listed as threatened under the ESA Giant manta ray: threatened under ESA		
	Large Cetaceans	All large whales in the Northwest Atlantic are protected under the MMPA. Of these large whales, North Atlantic right, fin, blue, sei, and sperm whales are also listed as endangered under the ESA.		

Table 105, continued

VEC		Status/Trends	Combined Effects of Past, Present Reasonably Foreseeable Future Actions	Combined CEA Baseline Conditions
Protected Resources	**Small Cetaceans**	All are protected under the MMPA	**Slight Positive** – reduced gear encounters through effort reductions and management actions taken under the ESA and MMPA have had a positive impact	**Slight Positive** – reduced gear encounters through effort reductions and additional management actions taken under the ESA and MMPA.
	Pinnipeds	All are protected under the MMPA		
Human Communities		Complex and variable. 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

6.7.4 Summary of Effects of the Proposed Actions

Framework 61 would set specifications and adjust management measures for the groundfish fishery to achieve the objectives of the fishery management plan (FMP). The preferred alternatives in this action are described in Section 1.0 The impacts of the proposed actions are described in Section 6.0 and summarized in Table 106 below.

Table 106- Summary of Impacts for Valued Ecosystem Components (VECs) in Framework 61 (preferred in gray).

Actions and Alternatives		Direct and indirect impacts				
		Managed Resources	**Non-target species**	**Habitat/EFH**	**Protected Resources**	**Human communities (economic and social impacts)**
Action 1: Status Determination Criteria	**Alt. 1 – No Action**	No impacts (short-term), - (long-term)	No direct or indirect impacts	Negligible to slight -	No direct or indirect impacts	Economic: - Social: -
	Alt. 2 – Updated Status Determination Criteria	No impacts (short-term), + (long-term)	No direct or indirect impacts	Negligible to slight +	No direct or indirect impacts	Economic: slight – Social: +
Action 2: Formal Rebuilding Program	**Alt. 1 – No Action**	Slight +	Slight +	Negligible	Slight + to slight -	Economic: Negl. to + Social: Negl. to +
	Alt. 2 – Revised Rebuilding Strategy for White Hake (Option B preferred)	+	Slight +	Negligible to slight +	Slight + to slight -	Economic: Negl. to - Social: Negl. to -
Action 3: Specifications	**Alt. 1 – No Action**	Slight +	Slight +	Slight -	Slight – to slight +	Economic - Social: -
	Alt. 2 – Revised Specifications	Slight +	Slight +	Slight -	Slight – to slight +	Economic: + Social: +
Action 4: Commercial Fishery Measures for Sectors	**Alt. 1 – No Action**	Slight -	Slight -	Negligible	Slight – to slight +	Economic - Social: -
	Alt. 2 – Universal sector exemption for redfish	Slight -	Slight -	-	Slight – to slight +	Economic + Social: +
	Options A and B - Performance Standards	Slight +	Slight +	Slight +	Slight to moderately +	Economic Negl. to - Social: Negl. to -

6.7.5 Magnitude and Significance of Cumulative Effects

In determining the magnitude and significance of the cumulative impacts of the preferred alternatives, the incremental impacts of the direct and indirect impacts should be considered, on a VEC-by-VEC basis, in addition to the effects of all actions (those identified and discussed relative to the past, present, and reasonably foreseeable future actions of both fishing and non-fishing actions). Table 106 provides a summary of likely impacts found in the various groups of management alternatives contained in this action. The CEA baseline that, as described above in

Table 104 and Table 105 represents the sum of past, present, and reasonably foreseeable future actions and conditions of each VEC. When an alternative has a positive impact on the VEC, for example, reduced fishing mortality on a managed species, it has a positive cumulative effect on the stock size of the species when combined with "other" actions that were also designed to increase stock size. In contrast, when an alternative has negative effects on a VEC, such as increased mortality, the cumulative effect on the VEC would be negative and tend to reduce the positive effects of the other actions. The resultant positive and negative cumulative effects are described below for each VEC. As seen above in section 6.7.2.2, non-fishing impacts on the VECs generally range from no impact to slight negative.

6.7.5.1 Magnitude and Significance of Cumulative Effects on Managed Resources

Past fishery management actions taken through the Northeast Multispecies FMP and the annual specifications process such as catch limits and allocations ensure that stocks are managed sustainably and that measures are consistent with the objectives of the FMP under the guidance of the MSA. The impacts of annual specification of management measures are largely dependent on how effective those measures are in meeting the objectives of preventing overfishing and achieving optimum yield, and on the extent to which mitigating measures, such as accountability measures, are effective; however, these actions have generally had a positive cumulative effect on groundfish. It is anticipated that the future management actions described in Section 6.7.2.1 will have additional indirect positive effects on the target species through actions which reduce and monitor bycatch, protect habitat, and protect the ecosystem services on which the productivity of the target species depends.

As noted previously Section 6.2, none of the preferred alternatives are expected to result in significantly increased levels of fishing effort or changes to the character of that effort relative to current conditions. Therefore, impacts of the fisheries on target species are not expected to change relative to current conditions under the preferred alternatives (i.e., generally positive for target species). The proposed actions described in this document would positively reinforce the past and anticipated positive cumulative effects on target species by achieving the objectives specified in the FMP.

When the direct and indirect effects of the FW61 alternatives are considered in combination with all other actions (i.e., past, present, and reasonably foreseeable future actions), *the cumulative effects are expected to yield non-significant positive impacts on regulated groundfish resource.*

6.7.5.2 Magnitude and Significance of Cumulative Effects on Non-target Species

The combined impacts of past federal fishery management actions on non-target species have been mixed, as decreased effort and reduced catch of non-target species continue, though some stocks are in poor status. Current regulations continue to manage for sustainable stocks, thus controlling effort on direct and discard/bycatch species. As noted in section 6.7.2.1, the actions proposed by Framework 61 would likely continue this trend. Future actions are anticipated to continue rebuilding non-target species stocks and limit the take of incidental/bycatch in the groundfish fishery, particularly through mitigation measures like sub-ACLs and AMs. The other measures proposed in this action would likely have some impacts on non-target species, since fishing activity is expected to overlap with non-target species of interest. Continued management of directed stocks will also control catch of non-target species.

As noted previously in Section 6.2, none of the preferred alternatives are expected to result in significantly increased levels of fishing effort or changes to the character of that effort relative to current conditions. Therefore, impacts of the fishery on non-target species are not expected to change relative to the current condition under the preferred alternatives (i.e., slight positive for non-target species). The proposed actions in this document would positively reinforce past and anticipated cumulative effects on non-target species by achieving the objectives in the FMP.

When the direct and indirect effects of Framework 61 alternatives are considered in combination with all other actions (i.e., past, present, and reasonably foreseeable future actions), *the cumulative effects are expected to yield non-significant positive on non-target species.*

6.7.5.3 Magnitude and Significance of Cumulative Effects on Physical Environment

Past fishery management actions taken through the Habitat amendments, the Northeast Multispecies FMP and annual specifications process have had negligible to slightly positive cumulative effects on habitat. The actions have constrained fishing effort both at a large scale and locally and have implemented gear requirements which may reduce impacts on habitat. As required under Omnibus Habitat Amendment 2, EFH and Habitat Areas of Particular Concern were designated for the managed resources. It is anticipated that the future management actions described in Section 6.7.2.1 will result in additional direct or indirect positive effects on habitat through actions which protect EFH and protect ecosystem services on which these species' productivity depends.

Many additional non-fishing activities, as described above 6.7.2.2are concentrated near-shore and likely work either additively or synergistically to decrease habitat quality. The effects of these actions, combined with impacts resulting from years of commercial fishing activity, have negatively affected habitat. These impacts could be broad in scope. All the VECs are interrelated; therefore, the linkages among habitat quality, managed resources and non-target species productivity, and associated fishery yields should be considered. Some actions, such as coastal population growth and climate change may indirectly impact habitat and ecosystem productivity; however, these actions are beyond the scope of NMFS and Council management. Reductions in overall fishing effort and protection of sensitive habitats have mitigated some negative effects.

As noted previously in Section 6.3, none of the preferred alternatives are expected to result in significantly increased levels of fishing effort or changes to the character of that effort relative to current conditions. Although the impacted areas have been fished for many years with many different gear types and therefore will not likely be further impacted by these measures, continued fishing effort will continue to impact habitats. Therefore, the impacts of the fishery on the physical environment are not expected to change relative to the current condition under the preferred alternatives (i.e., slight negative for physical environment).

When the direct and indirect effects of the Framework 61 alternatives are considered in combination with all other actions (i.e., past, present, and reasonably foreseeable future actions), *the cumulative effects are expected to yield non-significant slight negative impacts on the physical environment and EFH.*

6.7.5.4 Magnitude and Significance of Cumulative Effects on Protected Species

Given their life history dynamics, large changes in protected species abundance over long time periods, and the multiple and wide-ranging fisheries management actions that have occurred, the cumulative impacts on protected species were evaluated over a long-time frame (i.e., from the early 1970s when the Marine Mammal Protection Act and Endangered Species Act were implemented through the present).

Numerous protected species (ESA listed and/or MMPA protected) occur in the Northwest Atlantic. The distribution and status of those species in the region are described in Section 5.6. Depending on species and status, the population trends for these protected resources are variable, and as follows:

Sea Turtles

Nest counts inform population trends for sea turtle species. In the affected environment (see Section 5.6), four sea turtle species were identified in the region: Northwest Atlantic Ocean DPS of loggerhead, Kemp's ridley, North Atlantic DPS of green, and leatherback sea turtles. For the Northwest Atlantic Ocean DPS of loggerhead sea turtles, there are five unique recovery units that comprise the DPS. Nesting trends for each of these recovery units are variable; however, recent data from Florida index nesting beaches, which comprise most of the nesting in the DPS, indicate a 19% increase in nesting from 1989 to 2018 (https://myfwc.com/research/wildlife/sea-turtles/nesting/loggerhead-trends/). For Kemp's ridley sea turtles, from 1980 through 2003, the number of nests at three primary nesting beaches (Rancho Nuevo, Tepehuajes, and Playa Dos) increased 15 percent annually (Heppell et al. 2005); however, due to recent declines in nest counts, decreased survival of immature and adult sea turtles, and updated population modeling, this rate is not expected to continue and the overall trend is unclear (NMFS and USFWS 2015; Caillouett et al. 2018). The North Atlantic DPS of green sea turtle is showing a positive trend in nesting (Seminoff et al. 2015). Leatherback turtle nesting in the Northwest Atlantic is showing an overall negative trend, with the most notable decrease occurring during the most recent time frame of 2008 to 2017 (NW Atlantic Leatherback Working Group 2018).

Large Whales

Large whale assessments indicate that for some species there is decreasing (i.e., North Atlantic right whales) trend in the population, while for other species, as a trend analysis has not been conducted, it is unknown what the population trajectory is.[50]

Small Cetaceans and Pinnipeds

For most small cetaceans and pinniped populations, it is unknown what the population trajectory is as a trend analysis has not been conducted for these populations.[51] However, in the most recent stock assessment reports, population trends were provided for common bottlenose dolphin stocks and gray seals; the analysis indicated a declining trend in population size for all common bottlenose dolphin stocks and an increasing trend for the gray seal population (Hayes et al. 2018; Hayes et al. 2019).

Atlantic Sturgeon

Population trends for Atlantic sturgeon are difficult to discern; however, the most recent stock assessment report concludes that Atlantic sturgeon, at both coastwide and DPS level, are depleted relative to historical levels (ASSRT 2007; ASMFC 2017).

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50 https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region

51 https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region

Atlantic Salmon

There is no population growth rate available for Gulf of Maine DPS Atlantic salmon; however, the consensus is that the DPS exhibits a continuing declining trend (NOAA 2016; USFWS and NMFS 2018).

Taking into consideration the above information, past fishery management actions taken through the respective FMPs and annual specifications process have had slight indirect positive cumulative effects on protected species. The actions have constrained fishing effort both at a large scale and locally, and have implemented, pursuant to the ESA, MMPA, or MSA, gear modifications, requirements, and management areas. These measures and/or actions have served to reduce interactions between protected species and fishing gear. It is anticipated that future management actions, described in Section 6.7.2.1 will result in additional indirect positive effects on protected species. These impacts could be broad in scope.

The preferred alternatives would not substantially modify current levels of fishing effort in terms of the overall amount of effort, timing, and location. They would allow existing fishing effort to continue. As described in Section 6.4, the proposed action is expected to have impacts on protected species that range from slight negative to slight positive, depending on the species.

When the direct and indirect effects of the Framework 61 alternatives are considered in combination with all other actions (i.e., past, present, and reasonably foreseeable future actions), *the cumulative effects are expected to yield non-significant slight negative impacts to slight positive impacts.*

6.7.5.5 Magnitude and Significance of Cumulative Effects on Human Communities

Past fishery management actions taken through the respective FMPs and annual specifications process such as catch limits and allocations have had both positive and negative cumulative effects on human communities. They have benefitted domestic fisheries through sustainable fishery management, but can also reduce participation in fisheries. The impacts from annual specification of management measures are largely dependent on how effective those measures are in meeting their intended objectives and the extent to which mitigating measures like AMs are effective. Quota overages may alter the timing of commercial fishery revenues such that revenues can be realized a year earlier. Fishermen may be impacted by reduced revenues in years which the overages are deducted. Similarly, recreational fisheries may have decreased harvest opportunities due to reduced harvest limits as a result of overages and more restrictive management measures (e.g. minimum fish size, possession limits, fishing seasons) implemented to address overages.

It is anticipated that the future management actions described in Section 6.7.2.1will result in positive effects for human communities due to sustainable management practices, although additional indirect negative effects on some human communities could occur if management actions result in reduced revenues. Overall, the past, present, and reasonably foreseeable future actions that are truly meaningful to human communities have had overall positive cumulative effects. Despite the potential for negative short-term effects on human communities due to reduced revenue, positive long-term effects are expected due to the long-term sustainability of the managed stocks.

By providing revenues and contributing to the overall functioning of and employment in coastal communities, the groundfish fishery has both direct and indirect positive social impacts. As previously described in Section 6.5 and Section 6.6, the preferred alternatives are unlikely to result in substantial changes to levels of fishing effort or the character of that effort relative to current conditions. Through implementation of this action, the Council seeks to achieve the primary objective of the MSA, which is to achieve OY from the managed fisheries.

When the direct and indirect effects of the Framework 61 alternatives are considered in combination with all other actions (i.e., past, present, and reasonably foreseeable future actions), *the cumulative effects are expected to yield non-significant positive impacts.* However, the overall combination of impacts thus far has been consistently negative for human communities.

6.7.6 Proposed Action on all the VECs

The Council's preferred alternatives (i.e. the proposed action) are described in Section 4.0. The direct and indirect impacts of the proposed action on the VECs are described in Section 6.0 and are summarized in the Executive Summary in Section 1.0. The magnitude and significance of the cumulative effects, including additive and synergistic effects of the proposed actions, as well as past, present, and future actions, have been taken into account (Section 6.7.5).

When considered in conjunction with all other pressures placed on the fisheries by past, present, and reasonably foreseeable future actions, the preferred alternatives are not expected to result in any significant impacts, positive or negative. The preferred action for revising SDCs is not expected to have direct or indirect impacts on the managed resource in the short-term, and positive impacts in the long-term, no direct or indirect impacts on non-target species, negligible to slight positive impacts on the physical environment, no direct or indirect impacts on protected resources, and slight negative impacts on human communities. The preferred alternative for establishing a rebuilding plan for white hake is expected to have slight positive impacts on the managed resource, slight positive impacts on non-target species, slight positive impacts on the physical environment, negligible to slight negative impacts on protected resources, and slightly negative impacts on human communities. For the 2021-2023 specifications, the preferred alternative is expected to have slightly positive impacts on the managed resource, slight positive impacts on non-target species, slight negative impacts on the physical environment, slight negative to slight positive impacts on protected resources, and positive economic and social impacts on human communities. The preferred action for establishing a universal sector exemption for redfish is expected to have slightly negative impacts on the managed resource, slightly negative impacts on non-target species, negative impacts on the physical environment, slight negative to slight positive impacts on protected resources, and positive economic and social impacts on human communities.

The preferred alternatives are consistent with other management measures that have been implemented in the past for the fishery. These measures are part of a broader management scheme for the groundfish fishery. This management scheme has helped to rebuild stocks and ensure long-term sustainability, while minimizing environmental impacts.

The regulatory atmosphere within which federal fishery management operates requires that management actions be taken in a manner that will optimize the conditions of managed species, habitat, and human communities. Consistent with NEPA, the MSA requires that management actions be taken only after consideration of impacts to the biological, physical, economic, and social dimensions of the human environment. Given this regulatory environment, and because fishery management actions must strive to create and maintain sustainable resources, impacts on all VECs from past, present and reasonably foreseeable future actions have generally been positive and are expected to continue in that manner for the foreseeable future. This is not to say that some aspects of the VECs are not experiencing negative impacts, but rather that when considered as a whole and as a result of the management measure implemented in these fisheries, the overall long-term trend is positive.

There are no significant cumulative effects associated with the preferred alternatives based on the information and analyses presented in this document and in past FMP documents (Table 107).

Cumulatively, through 2026 it is anticipated that the preferred alternatives will result in non-significant impacts on all VECs, ranging from slight negative to positive.

Table 107- Summary of Cumulative Effects of the Preferred Alternatives.

	Managed Resource	***Non-Target Species***	***Habitat***	***Protected Resources***	***Human Communities***
Direct/Indirect Impacts of Preferred Alternative	*Mixed (positive, negligible, and slight negative)*	*Mixed (positive, negligible, and slight negative)*	*Slight negative to slight positive*	*Slight negative to slight positive*	*Slight negative to positive*
Combined Cumulative Effects Assessment Baseline Conditions	*Negative (short-term), positive (long-term)*	*Positive*	*Mixed*	*Slight positive*	*Negative*
Cumulative Effects	*Slight positive*	*Slight positive*	*Slight positive*	*Slight positive*	*Negative (short-term), positive (long-term)*

7.0 APPLICABLE LAWS/EXECUTIVE ORDERS

7.1 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT – NATIONAL STANDARDS

7.1.1 National Standards

Section 301 of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires that regulations implementing any fishery management plan or amendment be consistent with ten national standards. Below is a summary of how this action is consistent with the National Standards and other required provisions of the MSA.

1. *Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.*

The Northeast Multispecies FMP includes measures to end overfishing on the groundfish stocks. This action adjusts those measures to maximize optimum yield while preventing overfishing and continuing rebuilding plans. For overfished fisheries, the MSA defines optimum yield as the amount of fish which provides for rebuilding to a level consistent with producing the maximum sustainable yield from the fishery. The measures are designed to achieve the fishing mortality rates, and yields, necessary to rebuild the overfished stocks as well as to keep fishing mortality below overfishing levels for stocks that are not in a rebuilding program. The measures in Section 1.0 change the status determination criteria for GB and GOM winter flounder stocks, modify the rebuilding plan for white hake, adjust OFLs, ABCs, and ACLs for several stocks to set controls on catch to ensure that the appropriate fishing mortality rates are implemented, and allow for increased commercial fishery access to a healthy stock, redfish.

2. *Conservation and management measures shall be based on the best scientific information available.*

The Preferred Alternatives are based on the most recent information on stock status available for all stocks in the Northeast multispecies complex, which is provided by the Northeast Fisheries Science Center in the 2020 TRAC and Integrated Peer Review and the 2019 and 2020 Groundfish Management Track Assessments. Additionally, the mortality limits were determined based on the scientific advice of the SSC, which recommends ABCs to the Council.

With respect to bycatch information, the action uses bycatch information from the most recent assessments. While additional observer data has been collected since the most recent assessments were completed, it has not been analyzed or reviewed through the stock assessment process and thus cannot be used.

The economic analyses in this document are based primarily on landings, revenue, and effort information collected through the NMFS data collection systems used for this fishery.

3. *To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.*

The Preferred Alternatives manage each individual groundfish stock as a unit throughout its range. Management measures specifically designed for one stock are applied to the entire range of the stock. In addition, the groundfish complex management measures are designed and evaluated for their impact on the fishery as a whole.

4. *Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such a manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.*

The Preferred Alternatives do not discriminate between residents of different states. They apply equally to all permit holders, regardless of homeport or location. While the measures do not discriminate between permit holders, they have different impacts on different participants because of the differences in the distribution of fish and the varying stock levels in the complex. Some of these impacts may be localized, as often communities near a fish stock may have developed small boat fisheries that target it and these distributive impacts are difficult to avoid given the requirement to rebuild overfished stocks. These distributive impacts are difficult to avoid given the requirement to rebuild overfished stocks. Even if management measures are designed to treat all permit holders the same, the uneven geographical distribution of fish stocks and the targeting of different stocks by individual vessels makes distributive impacts unavoidable.

5. *Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.*

The Preferred Alternatives are not expected to significantly reduce the efficiency of fishing vessels. These measures are considered practicable since they allow rebuilding of depleted groundfish stocks and have considered efficiency to the greatest extent possible. None of the measures in this action have economic allocation as their sole purpose; all are designed to contribute to the control of fishing mortality.

6. *Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.*

The primary controls used in this management plan - effort controls and sectors - allow each vessel operator to fish when and how it best suits his or her business. Vessels can make short or long trips, and can fish in any open area at any time of the year. The measures allow for the use of different gear, vessel size, and fishing practices. The specific measures adopted in this action do not reduce this flexibility.

7. *Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.*

While some of the measures used in the management plan, tend to increase costs, those measures are necessary for achieving the plan's objectives. As an example, measures that reduce the efficiency of fishing vessels, including time area closures, tend to increase the costs of fishing vessels since fishing catches are reduced. These measures accomplish other goals, however, by allowing groundfish stocks to rebuild. The measures do not duplicate other regulatory efforts. Management of multispecies stocks in federal waters is not subject to coordinated regulation by any other management body. Absent Council action, a coordinated rebuilding effort to restore the health of the overfished stocks would not occur.

The Council considered the costs and benefits of a range of alternatives to achieve the goals and objectives of this FMP. It considered the costs to the industry of taking no action relative to adopting the measures herein. The expected benefits are greater in the long-term if stocks are rebuilt. Under these proposed measure short-term gains in revenue and possible declines in costs can be expected as several stock ACLs would increase.

8. *Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the*

sustained participation of such communities, and (B) to the extent practicable, minimize adverse impacts on such communities.

Consistent with the requirements of the MSA to prevent overfishing and rebuild overfished stocks, the Preferred Alternatives may restrict fishing activity through the implementation of low ACLs for several groundfish stocks in order to achieve rebuilding targets. Analyses of the impacts of these measures show that landings and revenues are likely to decline for many participants in upcoming years due to the rebuilding programs in place for many stocks. In the short-term, these declines will probably have negative impacts on fishing communities throughout the region, but particularly on those ports that rely heavily on groundfish; however, they are needed for the long-term sustainability and benefit of these communities.

9. *Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.*

Many measures limit the discards of both groundfish and some other species, including the sector management program, and this action is expected to continue those benefits with no substantial changes. The proposed action is necessary to minimize bycatch. Changes that permit annual catch limits to adjust to changing fish stock abundance levels are needed to prevent wasteful bycatch compared to taking no action.

10. *Conservation and management measures shall, to the extent practicable, promote safety of human life at sea.*

The flexibility in sector management and the ability to use common pool DAS at any time promote safety by not incentivizing vessels to fish in dangerous conditions. The Preferred Alternative, in conjunction with Amendment 16 measures, is the best option for achieving the necessary mortality reductions while having the least impact on vessel safety.

7.1.2 **Other MSA Requirements**

This action is also consistent with the fourteen additional required provisions for FMPs. Section 303 (a) of MSA contains required provisions for FMPs.

1. *Contain the conservation and management measures, applicable to foreign fishing …*

   Foreign fishing is not allowed under this management plan or this action and so specific measures are not included to specify and control allowable foreign catch.

2. *Contain a description of the fishery …*

   Amendment 16 included a thorough description of the multispecies fishery from 2001 through 2008, including the gears used, number of vessels, landings and revenues, and effort used in the fishery. This information was updated for Amendment 18. This action provides a summary of that information and additional relevant information about the fishery in Section 5.6.4.2.5.

3. *Assess and specify the present and probable future condition of, and the maximum sustainable yield and optimum yield from the fishery …*

   The present biological status of the fishery is described in Section 5.2.21. Likely future conditions of the resource are described in Section 6.7.1.1. Impacts resulting from other measures in the management plan other than the measures included here can be found in Amendment 16. The maximum sustainable yield for each stock in the fishery is defined in Amendment 16 and optimum yield for the fishery is defined in Amendment 9.

4. *Assess and specify-- (A) the capacity and the extent to which fishing vessels of the United States, on an annual basis, will harvest the optimum yield specified under paragraph (3); etc.*

   U.S. fishing vessels are capable of, and expected to, harvest the optimum yield from this fishery as specified in Amendment 16 and Frameworks 44, 45, 47, 49, 50, 51, 53, 55, 56, 57, 58, 59 and this action FW61. U.S. processors are also expected to process the harvest of U.S. fishing vessels. None of the optimum yield from this fishery is available to foreign fishing.

5. *Specify the pertinent data which shall be submitted to the Secretary with respect to commercial, recreational, and charter fishing in the fishery …*

   Current reporting requirements for this fishery have been in effect since 1994 and were originally specified in Amendment 5. They were slightly modified in Amendments 13 and 16, and VMS requirements were adopted in FW42. The requirements include Vessel Trip Reports (VTRs) that are submitted by each fishing vessel. Dealers are also required to submit reports on the purchases of regulated groundfish from permitted vessels. Current reporting requirements are detailed in 50 CFR 648.7.

6. *Consider and provide for temporary adjustments, after consultation with the Coast Guard and persons utilizing the fishery, regarding access to the fishery for vessels otherwise prevented from harvesting because of weather or other ocean conditions …*

   Provisions in accordance with this requirement were implemented in earlier actions, and continue with this action. For common pool vessels, the carry-over of a small number of DAS is allowed from one fishing year to the next. If a fisherman is unable to use all of his DAS because of weather or other conditions, this measure allows his available fishing time to be used in the subsequent fishing year. Sectors will also be allowed to carry forward a small amount of ACE into the next fishing year. This will help sectors react should adverse weather interfere with harvesting the entire ACE before the end of the year. Neither of these practices requires consultation with the Coast Guard.

7. *Describe and identify essential fish habitat for the fishery …*

   A summary of the EFH can be found in Section 5.5.

8. *In the case of a fishery management plan that, after January 1, 1991, is submitted to the Secretary for review under section 304(a) assess and specify the nature and extent of scientific data which is needed for effective implementation of the plan;*

   Scientific and research needs are not required for a framework adjustment action.

9. *Include a fishery impact statement for the plan or amendment*

   Impacts of this framework on fishing communities directly affected by this action and adjacent areas can be found in Sections 6.4.4.2.1 and 0.

10. *Specify objective and measurable criteria for identifying when the fishery to which the plan applies is overfished …*

    Objective and measurable status determination criteria for all stocks in the management plan have been updated in framework actions, including FW48, FW51, FW53, FW55, and FW56.

11. *Establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery …*

    None of the measures in this framework are expected to increase bycatch beyond what was considered in Amendment 16.

12. *Assess the type and amount of fish caught and released alive during recreational fishing under catch and release fishery management programs and the mortality of such fish …*

    This management plan does not include a catch and release recreational fishery management program and thus does not address this requirement.

13. *Include a description of the commercial, recreational, and charter fishing sectors which participate in the fishery …*

    As noted above, the description of the commercial, recreational, and charter fishing sectors is updated and summarized in this document (Section 5.6.4.2.5).

14. *To the extent that rebuilding plans or other conservation and management measures which reduce the overall harvest in a fishery are necessary, allocate any harvest restrictions or recovery benefits fairly and equitably among the commercial, recreational, and charter fishing sectors in the fishery.*

    This preferred alternative does not allocate harvest restrictions or stock benefits to the fishery. Such allocations were adopted in Amendment 16, while this action adjusts management measures for some stocks within the existing allocation structure.

15. *Establish a mechanism for specifying annual catch limits in the plan (including a multiyear plan), implementing regulations, or annual specifications, at a level such that overfishing does not occur in the fishery, including measures to ensure accountability.*

    The FMP already contains a mechanism for establishing annual catch limits and this action uses that mechanism to specify ACLs for future fishing years.

7.2 National Environmental Policy Act

The National Environmental Policy Act (NEPA) provides a mechanism for identifying and evaluating the full spectrum of environmental issues associated with federal actions and for considering a reasonable range of alternatives to avoid or minimize adverse environmental impacts. The Council on Environmental Quality has issued regulations specifying the requirements for NEPA documents (40 CFR 1500 – 1508), as has NOAA in its policy and procedures for NEPA (NAO 216-6A §5.04b.1). This document is designed to meet the requirements of the MSA and NEPA and has been prepared using the 1978 CEQ NEPA Regulations. NEPA reviews initiated prior to the effective date of the revised CEQ regulations may be conducted using the 1978 version of the regulations. The effective date of the 2020 CEQ NEPA Regulations was September 14, 2020. This review began on June 25, 2020 and the agency has decided to proceed under the 1978 regulations. All those requirements are addressed, as described below.

7.2.1 Finding of No Significant Impact (FONSI)

The Council on Environmental Quality (CEQ) Regulations state that the determination of significance using an analysis of effects requires examination of both context and intensity and lists ten criteria for intensity (40 CFR 1508.27). In addition, the Companion Manual for National Oceanic and Atmospheric Administration Administrative Order 216-6A provides sixteen criteria, the same ten as the CEQ Regulations and six additional, for determining whether the impacts of a proposed action are significant. Each criterion is discussed below with respect to the proposed action and considered individually as well as in combination with the others.

1. Can the proposed action reasonably be expected to cause both beneficial and adverse impacts that overall may result in a significant effect, even if the effect will be beneficial?

Response: The Preferred Alternatives are designed to continue the groundfish rebuilding programs that were first adopted in Amendment 13 to the Northeast Multispecies Fishery Management Plan and modified in subsequent actions, including Amendment 16. The environmental assessment documents that no significant natural or physical effects will result from the implementation of the Preferred Alternative. As described in Section 6.2, the measures in this action are designed to continue rebuilding/ promote target catch levels. The action cannot be reasonably expected to have significant impacts on habitat or protected species, as the impacts are expected to fall within the range of those resulting from Amendments 13 and 16. The action's potential economic and social impacts are also addressed in the environmental assessment (Sections 6.4.4.2.1 and 0), as well as in the Executive Order 12866 review (Section 7.12.2) and the Regulatory Flexibility Act review (Section 7.12.1).

NMFS has determined that despite the potential socio-economic impacts resulting from this action, there is no need to prepare an EIS. The purpose of NEPA is to protect the environment by requiring Federal agencies to consider the impacts of their proposed actions on the human environment, defined as "the natural and physical environment and the relationship of the people with that environment." The EA for FW61 describes and analyzes the preferred alternatives and concludes that there will be no significant impacts to the natural and physical environment. While some fishermen, shore-side businesses, and others may experience impacts to their livelihood, these impacts, in and of themselves, do not require the preparation of an EIS, as supported by NEPA's implementing regulations at 40 C.F.R. 1508.14.

Consequently, because the EA demonstrates that the action's potential natural and physical impacts are not significant, a FONSI remains appropriate under these criteria.

2. Can the proposed action reasonably be expected to significantly affect public health or safety?

Response: Nothing in the Proposed Action can be reasonably expected to substantially impact public health or safety. Measures adopted in Amendment 16 were designed to improve safety in spite of low ACLs anticipated by subsequent actions in the near-term future. The flexibility inherent in sector management and the ability to use common pool DAS at any time are key elements of the measures that promoted safety. The Preferred Alternatives are the best options for achieving the necessary mortality reductions while having the least impact on vessel safety.

3. Can the proposed action reasonably be expected to result in significant impacts to unique characteristics of the geographic area, such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas?

Response: No, the Preferred Alternatives cannot be reasonably expected to result in substantial impacts to unique areas or ecological critical areas. The only designated Habitat Area of Particular Concern (HAPC) in the areas affected by this action is protected by an existing closed area that would not be affected by this action. In addition, vessel operations around the unique historical and cultural resources encompassed by the Stellwagen Bank National Marine Sanctuary would not likely be altered by this action. As a result, no substantial impacts are expected from this action.

4. Are the proposed action's effects on the quality of the human environment likely to be highly controversial?

Response: Some aspects concerning the science used to formulate the preferred alternatives on the quality of human environment are expected to be controversial. There is public controversy over the scientific evaluation of current stock status that is used to determine future catches. However, the scientific assessment process used in making determinations concerning stock harvest levels is not considered to be highly controversial. There is no competing scientific analysis that NMFS would consider. Further, the impacts to the VECs assessed in this environmental assessment are not considered highly controversial.

5. Are the proposed action's effects on the human environment likely to be highly uncertain or involve unique or unknown risks?

Response: The Preferred Alternatives are not expected to result in highly uncertain effects on the human environment or involve unique or unknown risks. The measures used in this action are similar to those adopted in past management actions, and these prior actions have reduced fishing mortality on many stocks. While there is a degree of uncertainty over how fishermen will react to the proposed measures, the analytic tools used to evaluate the measures attempt to take that uncertainty into account and reflect the likely results as a range of possible outcomes. For example, the economic analysis in Section 6.4.4.2.1 illustrates the distribution of results that are expected rather than provide only a point estimate. Overall, the impacts of the Preferred Alternatives are described with a relative amount of certainty. Overall, the short-term economic impacts of the proposed action are predicted to be positive and the long-term impacts are expected to be positive.

6. Can the proposed action reasonably be expected to establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration?

Response: No, the Preferred Alternatives are not likely to establish precedent for future actions with significant effects. These measures will address specific problems and are not intended to represent a decision about future management actions that may adopt different measures.

7. Is the proposed action related to other actions that when considered together will have individually insignificant but cumulatively significant impacts?

Response: The cumulative effects analysis presented in Section 0 of this document considers the impacts of the proposed action in combination with relevant past, present, and reasonably foreseeable future actions and concludes that no additional significant cumulative impacts are expected from the Proposed Action.

8. Can the proposed action reasonably be expected to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources?

Response: The Preferred Alternatives are not likely to affect objects listed in the National Register of Historic Places or cause significant impact to scientific, cultural, or historical resources. The only objects in the fishery area that are listed in the National Register of Historic Places are ship wrecks, including several in the Stellwagen Bank National Marine Sanctuary. The current regulations allow fishing within the Stellwagen Bank National Marine Sanctuary. The Preferred Alternative would not regulate current fishing practices within the sanctuary. However, vessels typically avoid fishing near wrecks to avoid tangling gear. Therefore, this action would not result in any adverse effects to wrecks.

9. Can the proposed action reasonably be expected to have a significant impact on endangered or threatened species, or their critical habitat as defined under the Endangered Species Act of 1973?

Response: The proposed action is not expected to alter overall fishing operations, lead to a substantial increase of fishing effort, or alter the spatial and/or temporal distribution of current fishing effort in a manner that would increase interaction risks with ESA-listed species.

This action falls within the range of impacts considered in the Batched Fisheries Biological Opinion for the Multispecies Fishery (December 16, 2013). However, in a memorandum dated October 17, 2017, GARFO's Protected Resources Division reinitiated consultation on the Batched Biological Opinion. As part of the reinitiation, the 2017 memorandum determined that allowing this fishery to continue during the reinitiation period will not violate ESA sections 7(a)(2) and 7(d) because it will not "….increase the likelihood of interactions with listed species above the amount that would otherwise occur if consultation had not been reinitiated, because allowing these fisheries to continue does not entail making any changes to any fishery during the reinitiation period that would cause an increase in interactions with whales, sea turtles, sturgeon, or Atlantic salmon. Because of this, the continuation of the Multispecies fishery during the reinitiation period would not be likely to jeopardize the continued existence of any whale, sea turtle, Atlantic salmon, or sturgeon species." Until replaced, the Multispecies fishery FMP is currently covered by the October 17, 2017, memorandum.

As described in Section 6.5, the proposed action is not likely to adversely affect any designated critical habitat. Specifically, the multispecies fishery will not affect the essential physical and biological features of North Atlantic right whale or loggerhead (Northwest Atlantic Ocean DPS) sea turtle critical habitat and therefore, will not result in the destruction or adverse modification of critical habitat (NMFS 2014a;NMFS2015a,b).

10. Can the proposed action reasonably be expected to threaten a violation of Federal, state, or local law or requirements imposed for environmental protection?

Response: The Preferred Alternatives implement measures that would offer further protection of marine resources and would not threaten a violation of Federal, state, or local law or requirements to protect the environment.

11. Can the proposed action reasonably be expected to adversely affect stocks of marine mammals as defined in the Marine Mammal Protection Act?

Response: The proposed action is not expected to lead to a substantial increase of fishing effort, or alter the spatial and/or temporal distribution of current fishing effort in a manner that would increase interaction rates with marine mammals. Based on this, and the information provided in Section 6.4, this action is not expected to adversely affect stocks of marine mammals as defined in the Marine Mammal Protection Act.

12. Can the proposed action reasonably be expected to adversely affect managed fish species?

The Preferred Alternatives cannot reasonably be expected to jeopardize the sustainability of any target species that may be affected by the action. With respect to the target species in the Northeast Multispecies fishery, the Preferred Alternatives adopts management measures that are consistent with target fishing mortality rates that promote rebuilding and/or sustaining stock sizes. For fishery resources that are caught incidental to groundfish fishing activity, there is no indication in the analyses that the alternatives will threaten sustainability. The fishery does not currently jeopardize non-target species, and it is not likely that these alternatives will change that status.

13. Can the proposed action reasonably be expected to adversely affect essential fish habitat as defined under the Magnuson-Stevens Fishery Conservation and Management Act?

Response: The Preferred Alternatives cannot reasonably be expected to cause substantial damage to the oceans and coastal habitats and/or essential fish habitat. Analyses described in Section 6.2.4.2.1 indicate that only minor impacts are expected.

14. Can the proposed action reasonably be expected to adversely affect vulnerable marine or coastal ecosystems, including but not limited to, deep coral ecosystems?

Response: The Proposed Action is not expected to allow substantial damage to vulnerable marine or coastal ecosystems.

15. Can the proposed action reasonably be expected to adversely affect biodiversity or ecosystem functioning (e.g., benthic productivity, predator-prey relationships, etc.)?

Response: The Preferred Alternatives are not expected to have a substantial impact on biodiversity and/or ecosystem function with the affected area. The use of ACLs and AMs will control catches of target and incidental regulated groundfish stocks. Catches of target and incidental catch species under this program will be consistent with the mortality targets of Amendment 16, and thus will not have a substantial impact on predator-prey relationships or biodiversity. Particular measures within this action will have no more than minimal adverse impacts to EFH. It is therefore reasonable to expect that it will not substantially impact biodiversity or ecosystem function.

16. Can the proposed action reasonably be expected to result in the introduction or spread of a nonindigenous species?

Response: This action would not result in the introduction or spread of any non-indigenous species, as it would not result in any vessel activity outside of the Northeast region.

DETERMINATION

In view of the information presented in this document and the analysis contained in the supporting Environmental Assessment prepared for Framework Adjustment 61 of the Northeast Multispecies Fishery Management Plan, it is hereby determined that the proposed actions will not significantly impact the quality of the human environment as described above and in the supporting Environmental Assessment. In addition, all beneficial and adverse impacts of the proposed action have been addressed to reach the conclusion of no significant impacts. Accordingly, preparation of an environmental impact statement for this action is not necessary.

____________________________________ ____________________

Regional Administrator, Greater Atlantic Region, NMFS Date

7.2.2 Environmental Assessment

The required elements of an Environmental Assessment (EA) are specified in 40 CFR 1508.9(b). They are included in this document as follows:

- The need for this action is in Section 3.2;
- The alternatives that were considered are in Section 1.0;
- The environmental impacts of the proposed action are in Section 6.0;
- A determination of significance is in Section 7.2.1; and,
- The agencies and persons consulted on this action are in Sections 7.2.4 and 7.2.5.

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 is in Section 1.0;
- A table of contents is in Section 2.0;
- Background and purpose are in Section 3.0;
- A summary of the document is in the executive summary, Section 1.0;
- A description of the affected environment is in Section 5.0;
- Cumulative effects of the proposed action are in Section 0;
- A list of preparers is in Section 7.2.5.

7.2.3 **Point of Contact**

Questions concerning this document may be addressed to:

Mr. Thomas A. Nies, Executive Director
New England Fishery Management Council
50 Water Street, Mill 2
Newburyport, MA 01950 (978) 465-0492

7.2.4 **Agencies Consulted**

The following agencies were consulted in preparing this document:

- New England Fishery Management Council, including representatives from:
    - Maine Department of Marine Resources
    - New Hampshire Fish and Game
    - Massachusetts Division of Marine Fisheries
    - Rhode Island Department of Environmental Management
    - Connecticut Department of Environmental Protection
- Mid-Atlantic Fishery Management Council
- National Marine Fisheries Service, NOAA, Department of Commerce
- United States Coast Guard, Department of Homeland Security

7.2.5 **List of Preparers**

The following personnel participated in preparing this document:

- ***New England Fishery Management Council***. Dr. Jamie Cournane (Groundfish Plan Coordinator), Robin Frede, Melissa Errend, Michelle Bachman, Sam Asci, Jonathon Peros, Chris Kellogg, Thomas Nies, and Woneta Cloutier
- ***National Marine Fisheries Service.*** Liz Sullivan, Mark Grant, Daniel Caless, Timothy Cardiasmenos, Danielle Palmer, Katherine McArdle, Paul Nitschke, Chad Demarest, Dr. Matt Cutler, Greg Ardini, Spencer Talmage, and Kyle Molton.
- ***State Agencies.*** Rebecca Peters (Maine DMR), Renee Zobel (NHF&G), Rich Balouskus (RIDMR)
- ***Mid-Atlantic Fishery Management Council***. Jason Didden

7.2.6 Opportunity for Public Comment

This action was developed from June 2020 through January 2021, and there were several public meetings related to this action (Table 108). Opportunities for public comment occurred at Advisory Panel, Committee, and Council meetings. There were more limited opportunities to comment at PDT meetings. Meeting discussion documents and summaries are available at www.nefmc.org.

Table 108- Public meetings related to Framework Adjustment 61.

Date	Meeting Type	Location
	2020	
6/9/2020	Advisory Panel	Webinar
6/10/2020	Committee	Webinar
6/15/2020	Recreational Advisory Panel	Webinar
6/15/2020	Committee	Webinar
6/23-25/2020	Council Meeting	Webinar
8/13/2020	PDT	Webinar
8/17/2020	Recreational Advisory Panel	Webinar
8/18/2020	Advisory Panel	Webinar
8/19/2020	Committee	Webinar
8/20/2020	PDT	Webinar
9/21/2020	Advisory Panel	Webinar
9/22/2020	Committee	Webinar
9/28/2020	PDT	Webinar
10/7/2020	PDT	Webinar
10/9/2020	PDT	Webinar
10/27/2020	Council Meeting	Webinar
11/4/2020	Advisory Panel	Webinar
11/4/2020	Committee	Webinar
11/12/2020	PDT	Webinar
11/16/2020	PDT	Webinar
11/30/2020	Advisory Panel	Webinar
11/30/2020	Committee	Webinar
12/1-3/2020	Council Meeting	Webinar
	2021	
1/7/2021	PDT	Webinar
1/20/2021	Committee	Webinar
1/26/2021	Committee	Webinar
1/26-28/2021	Council Meeting	Webinar

7.3 Marine Mammal Protection Act (MMPA)

The proposed action is not expected to alter fishing methods or activities. Therefore, this action is not expected to impact marine mammals in any manner not considered in previous consultations on the fisheries. Section 5.6 of this action describes the marine mammals potentially impacted by the groundfish fishery and Section 6.4 summarizes the impacts of the proposed action. A final determination of consistency with the MMPA will be made by the agency when this action is approved.

7.4 Endangered Species Act (ESA)

The Multispecies FMP, along with several other FMPs, was considered in the batched fisheries Opinion (Opinion) issued by NMFS on December 16, 2013. The Opinion concluded that the actions considered would not jeopardize the continued existence of any ESA-listed species. On October 17, 2017, NMFS reinitiated consultation on the batched Biological Opinion due to updated information on the decline of Atlantic right whale abundance.

Section 7(d) of the ESA prohibits federal agencies from making any irreversible or irretrievable commitment of resources with respect to the agency action that would have the effect of foreclosing the formulation or implementation of any reasonable and prudent alternatives during the consultation period. This prohibition is in force until the requirements of section 7(a)(2) have been satisfied. Section 7(d) does not prohibit all aspects of an agency action from proceeding during consultation; non-jeopardizing activities may proceed as long as their implementation would not violate section 7(d). Per the October 17, 2017 memo, it was concluded that allowing those fisheries specified in the batched Biological Opinion to continue during the reinitiation period will not increase the likelihood of interactions with ESA listed species above the amount that would otherwise occur if consultation had not been reinitiated. Based on this, the memo concluded that the continuation of these fisheries during the reinitiation period would not be likely to jeopardize the continued existence of any ESA listed species. Taking this, as well as the analysis of the proposed action into consideration, the proposed action, in conjunction with other activities, is not expected to result in jeopardy for any ESA listed species.

This action does not represent any irreversible or irretrievable commitment of resources with respect to the FMP that would affect the development or implementation of reasonable and prudent measures during the consultation period. NMFS has discretion to amend its MSA and ESA regulations and may do so at any time subject to the Administrative Procedure Act and other applicable laws. As a result, the Council has preliminarily determined that fishing activities conducted pursuant to this action will not impact endangered and threatened species or critical habitat in any manner beyond what has been considered in the 2013 Opinion of the 2017 memorandum.

7.5 Administrative Procedure Act (APA)

Sections 551-553 of the Administrative Procedure Act established procedural requirements applicable to informal rulemaking by federal agencies. The purpose is to ensure public access to the federal rulemaking process, and to give public notice and opportunity for comment. The Council did not request relief from notice and comment rule making for this action and expects that NOAA Fisheries will publish proposed and final rule making for this action.

7.6 Paperwork Reduction Act

The purpose of the Paperwork Reduction Act is to minimize paperwork burden for individuals, small businesses, nonprofit institutions, and other persons resulting from the collection of information by or for the Federal Government. It also ensures that the Government is not overly burdening the public with information requests. This action does not include any revisions to the current PRA collection requirements; therefore, no review under the Paperwork Reduction Act is necessary.

7.7 Coastal Zone Management Act (CZMA)

Section 307(c)(1) of the Coastal Zone Management Act (CZMA) of 1972, as amended, 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. The CZMA includes measures for ensuring stability of productive fishery habitat while striving to balance development pressures with social, economic, cultural, and other impacts on the coastal zone. It is recognized that responsible management of both coastal zones and fish stocks must involve mutually supportive goals. The Council has developed this action and will submit it to NMFS; NMFS must determine whether this action is consistent, to the maximum extent practicable, with the CZM programs for each state (Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina). Letters documenting NMFS' determination will be sent to the coastal zone management program offices of each state.

7.8 Information Quality Act (IQA)

Section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Public Law 106-554, also known as the Data Quality Act or Information Quality Act) directed the Office of Management and Budget (OMB) to issue government-wide guidelines that “provide policy and procedural guidance to federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by federal agencies.” OMB directed each federal agency to issue its own guidelines, establish administrative mechanisms allowing affected persons to seek and obtain correction of information that does not comply with the OMB guidelines, and report periodically to OMB on the number and nature of complaints. The NOAA Section 515 Information Quality Guidelines require a series of actions for each new information product subject to the Data Quality Act. Information must meet standards of utility, integrity and objectivity. This section provides information required to address these requirements.

Utility of Information Product

Framework Adjustment 61 and the proposed 2021-2023 fishery specifications include: a description of the management issues to be addressed, statement of goals and objectives, a description of the proposed action and other alternatives/options considered, analyses of the impacts of the proposed specifications and other alternatives/options on the affected environment, and the reasons for selecting the preferred specifications. These proposed modifications implement the FMP’s conservation and management goals consistent with the Magnuson-Stevens Fishery Conservation and Management Act as well as all other existing applicable laws.

Utility means that disseminated information is useful to its intended users. “Useful” means that the content of the information is helpful, beneficial, or serviceable to its intended users, or that the information supports the usefulness of other disseminated information by making it more accessible or easier to read, see, understand, obtain or use. 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. The intended users of the information contained in this document are participants in the groundfish fishery and other interested parties and members of the general public. The information contained in this document may be useful to owners of vessels holding a groundfish permit as well as groundfish dealers and processors since it serves to notify these individuals of any potential changes to management measures for the fishery. This information will enable these individuals to adjust their fishing practices and make appropriate business decisions based on the new management measures and corresponding regulations.

The information being provided in the 2021-2023 specifications concerning the status of the groundfish fishery is updated based on landings and effort information through the 2019 and 2020 fishing years when possible. Information presented in this document is intended to support Framework Adjustment 61 and the proposed specifications for the 2021-2023 fishing years, which have been developed through a multi-stage process involving all interested members of the public. Consequently, the information pertaining to management measures contained in this document has been improved based on comments from the public, fishing industry, members of the Council, and NOAA Fisheries.

Until a proposed rule is prepared and published, this document is the principal means by which the information herein is publicly available. The information provided in this document is based on the most recent available information from the relevant data sources, including detailed and relatively recent information on the herring resource and, therefore, represents an improvement over previously available information. This document will be subject to public comment through proposed rulemaking, as required under the Administrative Procedure Act and, therefore, may be improved based on comments received.

This document is available in several formats, including printed publication, and online through the NEFMC's web page (www.nefmc.org). 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 Greater Atlantic Regional Fisheries Office (www.greateratlantic.fisheries.noaa.gov), and through the Regulations.gov website. The *Federal Register* documents will provide metric conversions for all measurements.

Integrity of Information Product

Integrity refers to security – the protection of information from unauthorized access or revision, to ensure that the information is not compromised through corruption or falsification. 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 NMFS 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.

Objectivity of Information Product

Objective information is presented in an accurate, clear, complete, and unbiased manner, and in proper context. The substance of the information is accurate, reliable, and unbiased; in the scientific, financial, or statistical context, original and supporting data are generated and the analytical results are developed using sound, commonly accepted scientific and research methods. "Accurate" means that information is within an acceptable degree of imprecision or error appropriate to the *kind* of information at issue and otherwise meets commonly accepted scientific, financial, and statistical standards.

For purposes of the Pre-Dissemination Review, this document is a "Natural Resource Plan." Accordingly, the document adheres to the published standards of the MSA; 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 NEPA.

This information product uses information of known quality from sources acceptable to the relevant scientific and technical communities. Stock status (including estimates of biomass and fishing mortality) reported in this product are based on either assessments subject to peer-review through the Stock Assessment Review Committee or on updates of those assessments prepared by scientists of the Northeast Fisheries Science Center. These update assessments were reviewed for TRAC by the Integrated Peer Review which included participation by independent stock assessment scientists. Landing and revenue information is based on information collected through the Vessel Trip Report and Commercial Dealer databases. Information on catch composition, by tow, is based on reports collected by the NOAA Fisheries Service observer program and incorporated into the sea sampling or observer database systems. These reports are developed using an approved, scientifically valid sampling process. In addition to these sources, additional information is presented that has been accepted and published in peer-reviewed journals or by scientific organizations. Original analyses in this document were prepared using data from accepted sources, and the analyses have been reviewed by members of the Groundfish Plan Development Team.

Despite current data limitations, the conservation and management measures proposed for this action were selected based upon the best scientific information available. The analyses conducted in support of the Preferred Alternative were conducted using information from the most recent complete calendar years, through 2019, and in some cases includes information that was collected during the first eight months of calendar year 2020. Complete data were not available for calendar year 2020. 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 1.0 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 Council review process involves public meetings at which affected stakeholders have opportunity to comment on the document. Review by staff at GARFO is conducted by those with expertise in fisheries management and policy, habitat conservation, protected species, and compliance with the applicable law. The Council also uses its SSC to review the background science and assessment to approve the Overfishing Limits (OFLs) and Allocable Biological Catch (ABCs), including the effects those limits would have on other specifications in this document. The SSC is the primary scientific and technical advisory body to the Council and is made up of scientists that are independent of the Council. A list of current committee members can be found at https://www.nefmc.org/committees/scientific-and-statistical-committee.

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. In preparing this action for the Herring FMP, NMFS, the Administrative Procedure Act, the Paperwork Reduction Act, the Coastal Zone Management Act, the Endangered Species Act, the Marine Mammal Protection Act, the Information Quality Act, and Executive Orders 12630 (Property Rights), 12866 (Regulatory Planning), 13132 (Federalism), and 13158 (Marine Protected Areas). The Council has determined that the proposed action is consistent with the National Standards of the MSA and all other applicable laws.

7.9 Executive Order 13158 (Marine Protected Areas)

Executive Order (EO) 13158 on Marine Protected Areas (MPAs) 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 EO 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 EO. The EO requires that the Departments of Commerce and the Interior jointly publish and maintain such a list of MPAs. A list of MPA sites has been developed and is available at: http://marineprotectedareas.noaa.gov/nationalsystem/nationalsystemlist/. No further guidance related to this EO is available at this time.

In the Northeast U.S., the only MPAs are the Stellwagen Bank National Marine Sanctuary (SBNMS), the Tilefish Gear Restricted Areas in the canyons of Georges Bank, and the National Estuarine Research Reserves and other coastal sites. The only MPA that overlaps the groundfish fishery footprint is the SBNMS.

This action is not expected to more than minimally affect the biological/habitat resources of the SBNMS MPA, which was comprehensively analyzed in the Omnibus Habitat Amendment 2 (NEFMC 2016). Fishing gears regulated by the Northeast Multispecies FMP are unlikely to damage shipwrecks and other cultural artifacts because fishing vessel operators avoid contact with cultural resources on the seafloor to minimize costly gear losses and interruptions to fishing.

7.10 Executive Order 13132 (Federalism)

Executive Order 131321 on federalism established nine fundamental federalism principles for Federal agencies to follow when developing and implementing actions with federalism implications. However, no federalism issues or implications have been identified relative to the measures proposed in this action, thus preparation of an assessment under EO 13132 is unwarranted. The affected states have been closely involved in the development of the proposed action 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.

7.11 EXECUTIVE ORDER 12898 (ENVIRONMENTAL JUSTICE)

Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations provides guidelines to ensure that potential impacts on these populations are identified and mitigated, and that these populations can participate effectively in the NEPA process (EO 12898 1994). The NOAA NAO 216-6, at Section 7.02, states that "consideration of E.O. 12898 should be specifically included in the NEPA documents for decision-making purposes." Agencies should also encourage public participation, especially by affected communities, during scoping, as part of a broader strategy to address environmental justice issues. Minority and low-income individuals or populations must not be excluded from participation in, denied the benefits of, or subjected to discrimination because of their race, color, or national origin.

Although the impacts of this action may affect communities with environmental justice concerns, the proposed actions should not have disproportionately high effects on low income or minority populations. The proposed actions would apply to all participants in the affected area, regardless of minority status or income level.

7.12 REGULATORY IMPACT REVIEW

This Regulatory Impact Review (RIR) is framed around the preferred alternatives for this action.

7.12.1 Regulatory Flexibility Act – Initial Regulatory Flexibility Analysis

The purpose of the Regulatory Flexibility Analysis (RFA) is to reduce the impacts of burdensome regulations and record-keeping requirements on small businesses. To achieve this goal, the RFA requires government agencies to describe and analyze the effects of regulations and possible alternatives on small business entities. Based on this information, the Regulatory Flexibility Analysis determines whether the preferred alternative would have a "significant economic impact on a substantial number of small entities."

The Chief Counsel for Regulation of the Department of Commerce certified to the Chief Counsel for Advocacy of the Small Business Administration (SBA) that this proposed rule, if adopted, would not have a significant economic impact on a substantial number of small entities.

Description and estimate of the number of small entities to which the rule applies

As of June 1, 2020, NMFS had issued 762 commercial limited-access groundfish permits associated with vessels (including those in confirmation of permit history, CPH), 584 party/charter groundfish permits, 706 limited access and general category Atlantic sea scallop permits, 693 small-mesh multispecies permits, 81 Atlantic herring permits, and 810 large-mesh non-groundfish permits (limited access summer flounder and scup permits). Therefore, 3,636 permits are potentially regulated by this action. When accounting for overlaps between fisheries, this number falls to 2,102 permitted vessels. Each vessel may be individually owned or part of a larger corporate ownership structure, and for RFA purposes, it is the ownership entity that is ultimately regulated by the proposed action. Ownership entities are identified on June 1st of each year based on the list of all permit numbers, for the most recent complete calendar year, that have applied for any type of Northeast Federal fishing permit. The current ownership data set is based on calendar year 2019 permits and contains gross sales associated with those permits for calendar years 2017 through 2019.

For RFA purposes only, NMFS has established a small business size standard for businesses, including their affiliates, whose primary industry is commercial fishing (see 50 CFR § 200.2). A business primarily engaged in commercial fishing (NAICS code 11411) is classified as a small business if it is independently owned and operated, is not dominant in its field of operation (including its affiliates), and has combined annual receipts not in excess of $11 million for all its affiliated operations worldwide. The determination as to whether the entity is large or small is based on the average annual revenue for the three years from 2017 through 2019. The Small Business Administration (SBA) has established size standards for all other major industry sectors in the U.S., including for-hire fishing (NAICS code 487210). These entities are classified as small businesses if combined annual receipts are not in excess of $8.0 million for all its affiliated operations. As with commercial fishing businesses, the annual average of the three most recent years (2017-2019) is utilized in determining annual receipts for businesses primarily engaged in for-hire fishing.

Ownership data collected from permit holders indicates that there are 1,637 distinct business entities that hold at least one permit regulated by the proposed action. All 1,637 business entities identified could be directly regulated by this proposed action. Of these 1,637 entities, 1,000 are commercial fishing entities, 293 are for-hire entities, and 344 did not have revenues (were inactive in 2019). Of the 1,000 commercial fishing entities, 990 are categorized as small entities and 10 are categorized as large entities, per the NMFS guidelines. All 293 for-hire entities are categorized as small businesses.

Summary of the Proposed Action and significant alternatives

As outlined in Section 3.0, the purpose of this action is to implement FW 61 to the Northeast Multispecies FMP. Framework 61 would revise groundfish fishery specifications for fishing years 2021-2023 (May 1, 2021, through April 30, 2024) for nine groundfish stocks. Specifications for shared U.S./Canada groundfish stocks would also be updated for the 2021 fishing year (FY2021). The recreational groundfish, Atlantic sea scallop, small-mesh multispecies, Atlantic herring, and large-mesh non-groundfish fisheries would be impacted by the setting of specifications and sub-allocations of various groundfish stocks including: GOM cod and GOM haddock for the recreational groundfish fishery, four flatfish stocks (GB yellowtail flounder, SNE/MA yellowtail flounder, northern windowpane flounder, and southern windowpane founder) for the Atlantic sea scallop fishery, GB yellowtail flounder for the small-mesh groundfish fishery, and GOM and GB haddock for the Atlantic herring midwater trawl fishery. FW 61 would also revise status determination criteria (SDCs) for GB winter flounder and SNE/MA winter flounder as well as revise the stock rebuilding strategy for white hake. Lastly, FW 61 would implement a universal sector exemption to allow sectors to target redfish with 5.5 inch mesh codend in a specified exemption area.

Description and estimate of economic impacts on small entities, by entity size and industry

The proposed action, under all the preferred alternatives in Section 1.0, is estimated to generate $44.9-$45.3 million in sector revenue from the catch of Multispecies groundfish, $62.7-$63.5 million in total revenue from all fish caught on sector groundfish trips, and $46.4-$47.1 million in operating profit from sector groundfish trips during FY2021. Under No Action, the absence of quotas for several stocks after July 31, 2021, would result in sector groundfish fishing effectively stopping and would reduce total fishery revenue as a result. Under No Action, estimated sector revenue from the catch of Multispecies groundfish is $11.4 million, revenue from all fish caught on sector groundfish trips is $16.0 million, and operating profit from sector groundfish trips is $11.8 million. Small entities engaged in the commercial sector groundfish fishery will therefore be positively impacted by the proposed action, relative to No Action. Sectors comprised 99% of commercial groundfish landings and revenue in the most recently completed fishing year, 2019. Small entities compromise the vast majority of the common pool component of the commercial groundfish fishery and also would be positively impacted by the proposed action. Under No Action, closures for common pool fishing in parts of the Gulf of Maine and Georges Bank would be in place for trawl and gillnet gear after July 31, 2021.

Under the No Action alternative, if the universal sector exemption for redfish were not approved, the redfish exemption area would remain the same as the FY2020 redfish exemption area. Small entities are expected to be positively impacted by the proposed universal sector exemption relative to the smaller, current (FY2020) area. Analysis of landings and revenue from FY2015-FY2019 shows that 91% of redfish revenue and 86% of total revenue from exemption trips was generated in the proposed universal sector exemption area. In comparison, 73% of redfish revenue and 64% of total revenue from exemption trips was generated within the FY2020 exemption area. In addition, western boundaries of the proposed exemption area would be closer to shore than the FY2020 area, potentially creating more opportunities for smaller, inshore vessels.

Small entities engaged in the groundfish party/charter fishery will not be impacted by the proposed action relative to No Action. The FY2021 recreational sub-ACL for GOM cod (193mt) and GOM haddock (5,295mt) would be the same under the proposed action as under no action. Recreational measures for GOM cod and GOM haddock during FY2021 are set outside of FW 61.

For other fisheries (Atlantic herring, Atlantic sea scallop, small-mesh multispecies, and large-mesh non-groundfish), the proposed measures when compared to No Action have a range of generally neutral to positive impacts (see Section 7.12.2 for a summary of the economic impacts). The proposed action results in smaller allocations to the sea scallop fishery for GB yellowtail flounder and southern windowpane flounder, the same allocation for SNE/MA yellowtail flounder, and an increase in the allocation for northern windowpane flounder relative to No Action. Small entities engaged in the sea scallop fishery could potentially be negatively impacted by these changes in sub-allocations if Accountability Measures (AMs) are triggered or behavioral modifications are necessary to avoid exceeding the allocation. The proposed action, however, is not expected to increase the likelihood of AMs being triggered. Projected catch of southern windowpane flounder in the sea scallop fishery (72.2mt) falls well below the sub-ACL of 129mt. Projected catch of GB yellowtail flounder in the sea scallop fishery (16.4mt) exceeds the sub-ACL of 12mt, though per the AM policy adopted in groundfish FW47, AMs are only implemented if the scallop fishery exceeds its sub-ACL by 50 percent or more, or if the scallop fishery exceeds its sub-ACL and the overall ACL is also exceeded. Since utilization of GB yellowtail in the groundfish fishery has been low in recent years, neither of these conditions is expected for FY2021. The proposed action would maintain the allocation of GOM haddock to the midwater trawl fishery and increase the allocation of GB haddock to the midwater trawl fishery, relative to No Action. Utilization rates of both haddock stocks by the midwater trawl fishery has been low in recent years, and small entities participating in the midwater trawl fishery are not expected to be impacted by the proposed action. Likewise, the allocation of GB yellowtail flounder to the small-mesh multispecies fishery will be slightly decreased under the proposed action (by half a metric ton), though small entities participating in the fishery are not expected to be adversely impacted, given recent catches. The allocation of southern windowpane flounder the large-mesh non-groundfish trawl fisheries would decrease under the proposed action. In FY2020, in-season windowpane catches are much lower than previous years, and lower than the sub-ACL in the proposed action. If total catch remains similar in FY2021, the economic impacts of the proposed action would be neutral for small entities engaged in these fisheries since AMs would not be triggered. If effort or bycatch rates should increase to be more similar to previous years, there could be an increased likelihood of AMs being triggered.

Summary and Conclusions

The purpose of this action is to implement Framework 61 to the Northeast Multispecies FMP. Framework 61 would revise groundfish fishery specifications for fishing years 2021-2023 (May 1, 2021, through April 30, 2024) for nine groundfish stocks, and specifications for shared U.S./Canada groundfish stocks would also be updated for the 2021 fishing year (FY2021). The setting of specifications can potentially impact other fisheries in the region that have sub-ACLs for groundfish stocks. FW 61 would also implement a universal sector exemption to allow groundfish sectors to target redfish with 5.5 inch mesh codend in a specified exemption area. Additionally, this action would revise the status determination criteria for certain groundfish stocks and update the rebuilding plan for white hake.

The proposed action is estimated to generate $44.9-$45.3 million in sector revenue from the catch of Multispecies groundfish, $62.7-$63.5 million in total revenue from all fish caught on sector groundfish trips, and $46.4-$47.1 million in operating profit from sector groundfish trips during FY2021. Under No Action, estimated sector revenue from the catch of Multispecies groundfish is $11.4 million, revenue from all fish caught on sector groundfish trips is $16.0 million, and operating profit from sector groundfish trips is $11.8 million. Small entities engaged in the commercial sector groundfish fishery will therefore be positively impacted by the proposed action, relative to No Action. Small entities engaged in common pool groundfish fishing are also expected to be positively impacted by the proposed action. Other commercial fisheries which have sub-ACLs for groundfish stocks (Atlantic sea scallop, Atlantic herring, small-mesh multispecies, large-mesh non-groundfish), are not expected to be negatively impacted by the proposed action, if catch follows recent performance in these fisheries.

7.12.2 E.O. 12866 (Regulatory Planning and Review)

Determination of significance under E.O. 12866

The purpose of E.O. 12866 is to enhance planning and coordination with respect to new and existing regulations. This E.O. requires the Office of Management and Budget (OMB) to review regulatory programs that are considered to be "significant." Section 7.12 of this document represents the RIR, which includes an assessment of the costs and benefits of the Proposed Action in accordance with the guidelines established by E.O. 12866. NMFS guidelines provide criteria to be used to evaluate whether a proposed action is significant.

E.O. 12866 requires a review of proposed regulations to determine whether or not the expected effects would be significant, where a "significant regulatory action" means any regulatory action that is likely to result in a rule that may:

(1) Have an annual effect on the economy of $100 million or more[52]*, or adversely effect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local or tribal governments or communities;*

(2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

[52] All monetary values are reported in 2019 dollars using the GDP deflator per E.O. 13771.

(3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

Section 6.5 presents detailed economic analyses for the proposed action alternatives. These analyses are summarized below, with references to relevant tables in Section 6.5. Together, the economic analysis included in Section 6.5 and this RIR demonstrate that the proposed action is not significant under E.O. 12866, as it will not have an annual effect on the economy of $100 million or more, or adversely affect in a material way the economy or a sector of the economy, productivity, jobs, the environment, public health, or safety, or State, local, or tribal governments or communities.

Objectives

The goals and objectives of Framework 61 to the Northeast Multispecies FMP are consistent with the goals of the original FMP, which are as follows:

Goal 1: *Consistent with the National Standards and other required provisions of the Magnuson-Stevens Fishery Conservation and Management Act and other applicable law, manage the northeast multispecies complex at sustainable levels.*

Goal 2: *Create a management system so that fleet capacity will be commensurate with resource status so as to achieve goals of economic efficiency and biological conservation and that encourages diversity within the fishery.*

Goal 3: *Maintain a directed commercial and recreational fishery for northeast multispecies.*

Goal 4: *Minimize, to the extent practicable, adverse impacts on fishing communities and shore-side infrastructure.*

Goal 5: *Provide reasonable and regulated access to the groundfish species covered in this plan to all members of the public of the United States for seafood consumption and recreational purposes during the stock rebuilding period without compromising the Amendment 13 objectives or timetable. If necessary, management measures could be modified in the future to insure that the overall plan objectives are met.*

Goal 6: *To promote stewardship within the fishery.*

Objective 1: *Achieve, on a continuing basis, optimum yield (OY) for the U.S. fishing industry.*

Objective 2: *Clarify the status determination criteria (biological reference points and control rules) for groundfish stocks so they are consistent with the National Standard guidelines and applicable law.*

Objective 3: *Adopt fishery management measures that constrain fishing mortality to levels that are compliant with the Sustainable Fisheries Act.*

Objective 4: *Implement rebuilding schedules for overfished stocks, and prevent overfishing.*

Objective 5: *Adopt measures as appropriate to support international trans-boundary management of resources.*

Objective 6: *Promote research and improve the collection of information to better understand groundfish population dynamics, biology and ecology, and to improve assessment procedures in cooperation with the industry.*

Objective 7: *To the extent possible, maintain a diverse groundfish fishery, including different gear types, vessel sizes, geographic locations, and levels of participation.*

Objective 8: *Develop biological, economic and social measures of success for the groundfish fishery and resource that insure accountability in achieving fishery management objectives.*

Objective 9: *Adopt measures consistent with the habitat provisions of the M-S Act, including identification of EFH and minimizing impacts on habitat to the extent practicable.*

Objective 10: *Identify and minimize bycatch, which include regulatory discards, to the extent practicable, and to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.*

Description

This Framework Adjustment will affect entities engaged in the following fisheries: commercial groundfish (sector and common pool), recreational groundfish, Atlantic sea scallop, small-mesh multispecies, Atlantic herring, and large-mesh non-groundfish (summer flounder and scup). Entities affected are defined here as individual permits engaged in these fisheries.

Problem Statement

The need and purpose of the actions proposed in this Framework Adjustment are explained in Section 3.2 of this document and are incorporated herein by reference.

Analysis of Alternatives

This section provides an analysis of each proposed alternative of FW61 as mandated by E.O. 12866. The focus will be on the expected changes 1) in net benefits and costs to entities engaged in the groundfish fishery, 2) changes to the distribution of benefits and costs within the industry, 3) changes in income and employment, 4) cumulative impacts of the regulation, and 5) changes in other social concerns. Much of this information is captured already in the detailed economic impacts and social impacts analyses of Section 6.5 and Section 6.6 of this document.

This RIR will summarize and highlight the major findings of the economic impacts analysis provided in Section 6.5 of this document, as mandated by E.O. 12866. When assessing net benefits and costs of the proposed FY2021 specifications, it is important to note that the analysis will focus on impacts to producers and fishing businesses. Consumer surplus is not expected to be substantially affected by any of the regulatory changes proposed in FW61.

Impacts on entities engaged in the sector and common pool components of the commercial groundfish fishery, the recreational groundfish fishery, the Atlantic sea scallop fishery, the Atlantic herring fishery, the small-mesh multispecies fishery and the large-mesh non-groundfish fisheries are analyzed separately where appropriate.

A detailed description of the alternatives under consideration can be found in Section 1.0 of this document.

Action #1: Status Determination Criteria

The Preferred Alternative is Alternative 2: Revised Status Determination Criteria.

Under Alternative 2, SDCs for GB winter flounder and SNE/MA winter flounder would be changed following the outcome of the 2020 management track assessments. This would result in a lower MSY for each stock, and consequently, lower ACLs, compared to Alternative 1/No Action. In the short run, the lower ACLs for these species may result in fishermen experiencing lower net revenues as a result of anticipated catch reductions.

Alternative 2 is expected to have positive long run economic impacts relative to Alternative 1/No Action, since updating SDCs for both stocks according to the most recent scientific assessments decreases the likelihood of overfishing or the stock becoming overfished over the long run, which allows for maximized fishery revenues.

Alternative 2, relative to Alternative 1/No Action, is expected to yield negative economic impacts in the short run and positive economic impacts in the long run.

Action #2: Formal Rebuilding Program

The Preferred Alternative is Alternative 2, Option B: Revised Rebuilding Strategy for White Hake.

During FY2021, the preferred alternative would not yield any difference in economic impacts for the commercial groundfish fishery relative to No Action. Beyond FY2021, there are differences in impacts along the rest of the 10-year rebuilding time horizon.

Assuming quotas as projected in each rebuilding scenario remain in place for the duration of the rebuilding time frame and also that the fishing industry is able to capture 100% of the allocated quota (Table 85) it is possible to compare the net-present value (NPV) of the different rebuilding scenarios in 2020 dollars. To compare alternative benefit streams over time, discount rates of 0%, 3%, and 7% were selected to convert all benefit streams to a present value. For this purpose, a discount rate of 3% was selected as recommended by NOAA to reflect the Social Rate of Time Preference (SRTP) (NOAA 2003). In addition, the Office of Management and Budget recommends a discount rate of 7% to estimate the rate of return on average investments. Both discount rates (3% and 7%) are included here for the purpose of comparison with a 0% discount rate as a baseline. NPVs are calculated through 2031, the selected Ttarget and Tmax timeframe for rebuilding this stock.

This analysis assumes all allocated fish of a particular stock are caught in each year, varying by fishing mortality target in each Option and reduced by a discount rate. Here, Alternative 1 (the No Action alternative) is the same as Alternative 2/Option C. Total value is calculated in each year by applying an average price for white hake over the 2006-2020 fishing years. Average price was applied since there was not a significant relationship between price and quantity over this time period. This analysis does not account for the potential revenue changes associated with other stocks, or other potential drivers of demand (e.g., global markets). Therefore, because of all assumptions, estimates should be compared in relative terms and not by absolute values.

Results illustrate that if mortality targets specified in each Option are maintained through the entire rebuilding period (Tmax, or 10 years), that NPV is directly related to the proportion of allowable catch permitted in any Option (Table 86). Regardless of discount rate (0%, 3%, 7%), the preferred Alternative (Option 2B) results in a higher NPV than Option 2A, but a lower value than Option 2C. The preferred Alternative yields a 4% lower NPV than Option 2C, regardless of the choice of discount rate.

All the Options under Alternative 2 have the same Ttarget, but have different probabilities of attaining the target. This analysis does not consider the likelihood and timeline of rebuilding schedules. If the white hake stock rebuilds sooner than the target rebuilding date of 10 years, mortality rates could be increased in subsequent years for Option A and B, decreasing the differences in NPV between the three Options. Furthermore, while Option 2C yields the highest NPV, if the Option fails to rebuild the white hake stock within the rebuilding period, long-term economic benefits may be instead be optimized under the preferred alternative, or under Option 2A. If quantity landed were to have a (stronger) negative influence on price in the future, differences in NPV under the three Alternative 2 Options would decrease, assuming full quota utilization.

Action #3: Specifications

The Preferred Alternative is Alternative 2: Revised Specifications.

Entities engaged in the sector component of the commercial groundfish fishery

To compare predicted FY2021 fishery revenues under Alternative 2 and under Alternative 1/No Action, a constant approach was necessary regarding the redfish exemption area, and how it is incorporated into the Quota Change Model (QCM). The analysis here assumes the FY2019 exemption area under both Alternatives. QCM results under the proposed universal exemption for redfish are summarized under Action #4.

Alternative 2 would result in positive impacts to the sector component of the commercial groundfish fishery for FY2021, relative to No Action. Predicted groundfish revenue is $34.9M higher under Alternative 2 ($46.3M) relative to No Action ($11.4M), and total revenue from groundfish trips is $48.1M higher under Alternative 2 ($16.0M under No Action; $64.1M under Alternative 2). Operating profit is $35.9M higher under Alternative 2 ($47.7M) than under No Action ($11.8M). Under No Action, revenues would be strongly negatively impacted by the absence of quotas for several stocks after July 31, 2021, since this would curtail sector fishing.

The prediction of groundfish revenue for FY2021 under Alternative 2 is $46.3M, representing a $1.7M decrease from the FY2019 realized value of $48.0M (Table 91). Total gross revenues from groundfish trips for FY2021 is $64.1M, representing a $2.0M decrease from the FY2019 realized value of $66.1M. Operating profit is predicted to be $2.4M lower during FY2021 ($47.7M) than FY2019 ($50.1M).

At the stock-level, GB haddock and GOM haddock are predicted to be the two highest revenue generating stocks in FY2021 (Table 93). White hake is predicted to be a constraining stock, with full (100%) utilization of the sector sub-ACL of 1,995mt. Since white hake is a unit stock, the QCM does not allow any more groundfish fishing to occur once the sector sub-ACL is reached. A constraining unit stock generally increases the variability in the QCM estimates relative to a situation in which there are constraining stocks in each broad stock area. FY2021 revenue predictions from GB cod and GB winter flounder are lower than in previous years, though realized revenues may exceed these predictions if white hake is not as constraining as the model predicts. The other stock with a high predicted utilization rate is GOM cod (98.4%). Predicted utilization rates for all other stocks are below 70%. The predicted top four revenue-generating stocks (GB haddock, GOM haddock, pollock, and redfish) all have predicted utilization rates below 50%. Combined ex-vessel revenue from these four stocks is predicted to be $27.7M, which amounts to roughly 60% of total groundfish fishery revenue.

At the port-level (Table 94), many of the major groundfish ports have lower predicted values for FY2021 than were predicted for FY2019 or FY2020. Gloucester is predicted to continue to be the top groundfish port ($11.9M), accounting for ~25% of ex-vessel value in the sector groundfish fishery. Boston is predicted to be the second highest grossing port ($11.0M), followed by New Bedford ($9.1M), and Portland ($3.8M).

By vessel length (Table 95), vessels >75' are predicted to generate $27.7M in FY2021, accounting for over 50% of sector groundfish revenue. Vessels in the 50 to <75' category are predicted to generate ~30% of sector groundfish revenue ($14.7M), and vessels in the 30' to <50' category are predicted to generate ~12% of sector groundfish revenue ($5.8M).

Continued low ex-vessel prices are a contributor to predicted revenues for FY2021 (Table 96). For example, prices for American plaice hit a 5 year low in FY2019, resulting in a decline in predicted revenue generated from that stock (Table 93). Low prices across groundfish species may be the product of a multitude of factors, such as changes in landings, changes in the size of fish being landed, and a shift in consumer demand. The COVID-19 pandemic may also continue to affect demand and regional supply chains in hard to predict ways into FY2021. Among COVID-19 factors is a USDA purchasing program which purchased over $18 million worth of Atlantic pollock, haddock, and redfish products in the third quarter of fiscal year 2020. If such a program continues into FY2021, the QCM may underestimate attainment of these stocks.

Entities engaged in the common pool component of the commercial groundfish fishery

Alternative 2 would have a range of low negative, neutral, to low positive impacts on the common pool fishery relative to FY 2020 and positive impacts relative to Alternative 1/No Action.

The following changes from the non-sector FY2020 sub-ACL would go into place for FY2021 under Alternative 2: GB cod sub-ACL would decrease by 5 mt, GOM cod would increase by 0.6 mt, GB haddock would decrease by 388 mt, GOM haddock would increase by 119 mt, GB yellowtail flounder would decrease by 0.7 mt, SNE/MA yellowtail flounder would decrease by 0.1 mt, CC/GOM yellowtail flounder would decrease by 5 mt, American plaice would increase by 8 mt, witch flounder would increase by 1 mt, GB winter flounder would increase by 1 mt, GOM winter flounder would decrease by 1 mt, SNE/MA winter flounder would decrease by 43 mt, redfish would increase by 67 mt, white hake would increase by 8 mt, pollock would increase by 31 mt. All other stocks would remain the same as FY 2020. Under No Action/Alternative 1, for Eastern GB cod, Eastern GB haddock, GOM winter, SNE/MA winter flounder, redfish, ocean pout, and wolffish, default specifications would be in effect from May 1, 2021, to July 31, 2021, and would equal 35% of the FY2020 catch limits. After July 31st, quotas would go to 0.

The presence of allocations after July 31st for several stocks would have strong positive economic impacts on the common pool fishery relative to Alternative 1, since 0 quotas for redfish and GOM winter flounder would close each trimester TAC areas, encompassing large parts of the Gulf of Maine and Georges Bank to trawl and gillnet fishing. In recent years, this would have affected between 4 and 6 vessels and between $40,000 and $100,000 in ex-vessel revenue (Table 4 in econ impacts: Total common pool landings. In addition, the absence of quotas for SNE/MA winter flounder could also trigger AMs for the fishery in FY2022.

Entities engaged in the recreational groundfish fishery

Impacts on the recreational groundfish fishery of Alternative 2 would be neutral relative to FY2020 and Alternative 1/No Action (no change from the 193 mt. GOM cod sub-ACL). The recreational sub-ACL for GOM haddock would decrease under No Action and Alternative 2 (from 6,210 mt in FY2020 to 5,295 in FY2021 and 3,634 in FY2022) but access to this stock is limited by incidental catch of GOM cod so the impact of this decrease is expected to be neutral.

Entities engaged in the Atlantic sea scallop fishery

Under Alternative 2, the following sub-ACLs would be allocated to the scallop fishery during FY2021: 12 mt of GB yellowtail flounder, 2 mt of SNE/MA yellowtail flounder, 129 mt of southern windowpane flounder, and 31 mt of northern windowpane flounder.

Under Alternative 2, the FY2021 sub-ACL for SNE/MA yellowtail would be unchanged from FY2020 levels conferring neutral economic impacts for the scallop fishery relative to No Action, but potentially negative impacts overall since projected bycatch is 50% greater than the sub-ACL, potentially triggering the AM.

The sub-ACL for GB yellowtail flounder under Alternative 2 would decrease by 35% relative to FY 2020 levels and compared to Alternative 1/No Action (decreasing from 19 mt to 12 mt), having negative impacts relative to Alternative 1/No Action. A decrease in the sub-ACL will have relatively neutral impacts to the scallop fishery since the sub-ACL for GB yellowtail would be smaller than the projected catch for FY2021 year (16.4 mt) but by less than the amount needed to trigger the AM (greater than 50% over the sub-ACL).

Under Alternative 2 the sub-ACL for northern windowpane flounder would be 31 mt, 19 mt greater than under Alternative 1/No Action As a result, Alternative 2 results in potentially positive economic relative to Alternative 1/No Action, since FY2021 projected catch by the scallop fishery is estimated to be around 29.2 mt, and AMs for the scallop fishery could be more likely to be triggered if No Action/Alternative 1 is selected. Economic impacts under Alternative 2 for southern windowpane flounder are expected to be neutral to relative to No Action/Alternative 1. The sub-ACL would be 129 (14 mt less than No Action/Alternative 1) and FY2021 bycatch projections are estimated to be 72.2 mt, far below either sub-ACL, which would be unlikely to trigger AMs. If bycatch of southern windowpane flounder greatly exceeds projections, negative impacts to the sea scallop fishery are possible. Overall economic impacts for the scallop fishery are likely positive for northern windowpane flounder and neutral for southern windowpane flounder.

Entities engaged in the midwater trawl directed Atlantic herring fishery

The midwater trawl herring fishery will have negative changes in sub-ACL values. Under Alternative 2, the GB haddock sub-ACL is proposed to decrease by 37% between FY2020 and FY2021 (from 2,447 mt to 1,539 mt), and GOM haddock would decrease by 15% (from 183 mt to 156 mt). Impacts are expected to be neutral both in respect to Alternative 1 (where quotas would remain higher) and status quo given recent low catches of both haddock stocks, relative to the sub-ACLs. In FY2017 and FY2018 there were no recorded catch or discards of GOM haddock by the midwater trawl herring fishery, and approximately 0.1 mt of catch in FY 2019, so unless effort shifts considerably, neutral economic impacts would be expected. Atlantic herring quotas for 2020 and 2021 were lower than for 2019, and substantially lower than in prior years (NEFMC, Atlantic Herring FW6).

Entities engaged in the small-mesh multispecies fishery

Under Alternative 2 the sub-ACL for GB yellowtail flounder for the small mesh fisheries (e.g., whiting and squid) would decrease from FY 2020 levels from 2 mt to 1.5 mt in FY 2021. This is expected to have neutral economic impacts on the small mesh fishery since catches in recent years have been low (less than 1 mt in FY2017 and FY2018, 0 mt in FY2019). If effort remains similar to recent fishing years, it is unlikely that this change in the sub-ACL will be constraining for the fishery. According to the FY2019 SAFE report for the small-mesh multispecies fishery, effort has decreased in the fishery since 2012 and the number of vessels with landings in the fishery hit a historical low in 2019. Overall economic impacts are expected to be neutral both in respect to status quo and with respect to Alternative 1/No Action, since neither the Alternative 2 sub-ACL of 1.5 mt or the Alternative 1/No Action sub-ACL of 2 mt are expected to be constraining.

Entities engaged in the large-mesh non-groundfish trawl fisheries (included within the 'other' sub-component)

The southern windowpane flounder "other fisheries" sub-component is used to evaluate when an AM could be triggered for large-mesh non-groundfish fisheries (e.g., summer flounder and scup trawl fisheries). Under Alternative 2, the other sub-component would reduce from 196 mt in FY2020 to 177 mt in FY2021, a decrease of 10%. The triggering of an AM implements gear-restricted areas (GRAs) to reduce incidental catch of windowpane flounder. The conditions for triggering an AM in the large-mesh non-groundfish fisheries are as described below: The AM for southern windowpane for large-mesh non-groundfish fisheries is implemented if the total ACL is exceeded by more than the management uncertainty buffer (currently set at approximately 5%), and if the large-mesh non-groundfish fishery also exceeds its sub-ACL (evaluated using the "other sub-component"). Table 97 and Table 98 show "other" sub-component and total catch and utilization rates for southern windowpane flounder in recent years as well as projected total catch for FY2020. The "other" sub-component ACL exceeded the Alternative 2 FY2021 sub-ACL in all five of the previous FYs for which complete data are available. Likewise, the total ACL for southern windowpane would have been exceeded by >5% in at least three FYs. This recent catch history suggests the possibility of an AM being triggered from windowpane catch in FY2021 if catch rates remain similar. However, in-season catch and projected landings in FY2020 are much lower than previous years, and much lower than the sub-ACL in the proposed action. If total catch remains similar in FY2021, the economic impacts of the proposed action may be neutral since there would be a low risk of triggering the AM.

FW57 made a few adjustments to the size and timing of the AM areas to limit potential impacts to large mesh non-groundfish fisheries. The impacts of these smaller AM areas have not been quantified, but revenue generated from these areas in recent years should be lower than those previously estimated for summer flounder and scup. Furthermore, the impacts of AMs may be more cost-driven than revenue driven if fishermen elect to continue fishing for these species outside of the AM areas, potentially increasing operating costs. A more detailed analysis of the economic impacts of AMs on the large-mesh non-groundfish fisheries can be found in FW57 (NEFMC, 2018).

The expected impacts of Alternative 2 relative to Alternative 1/No Action for the large-mesh non-groundfish fisheries are neutral to negative, depending on whether or not an AM is triggered in future FYs.

Action #4: Commercial Fishery Measures for Sectors

The Preferred Alternative is Alternative 2: Universal Sector Exemption for Redfish.

Entities engaged in the commercial groundfish fishery

The economic impacts of Alternative 2 compared to Alternative 1/No Action depend on the specifics of the annual exemption in any given year, since under Alternative 1/No Action, GARFO would retain the authority to change the exemption area and requirements, or authorize any given sector to participate in the exemption, for any given fishing year. Therefore, the exemption area could be larger or smaller than the preferred alternative area. If the area were to remain similar to the FY2020 area (Map 1) the economic impacts of the preferred alternative are expected to be positive since 91% of redfish revenue and 86% of total revenue on exemption trips came from the Alternative 2 area over the FY2015-FY2019 period. In comparison, 73% of redfish revenue and 64% of total revenue came from the FY2020 area (Table 99).

QCM model results estimate that the FY2019 area would maximize fishery-wide revenues ($46.3 million from groundfish, Table 92) relative to either the Status Quo ($42.6-$43.5 million) or the Alternative 2 area ($44.9-$45.3 million). The difference in total groundfish revenues between the areas is largely attributed to redfish and pollock (Table 93). These estimates incorporate the preferred specifications under Action #3.

If the annual exemption area specified under Alternative 1/No Action is more similar to the exemption area in place through FY 2015 and 2019 area, however, the economic impacts of Alternative 2 may be neutral, or negative, since it would be a relatively small contraction in the western edge of the exemption, a substantial reduction in the northern area, and several changes to the south eastern boundary, including the removal of statistical area 561 and conversion of statistical area 464 into a seasonal area, which encompasses the majority of average revenues from the FY2019 area (Table 92).

Economic impacts in future fishing years from an area change under Alternative 2 will depend on if and how fishing effort may shift. So far in FY2020, it is unclear how operations have changed as a result of the area change. Redfish landings on redfish exemption sub-trips in the first seven months of the fishing year are trending lower than most previous years (Figure 6), despite total redfish landings trending higher (8.1 million pounds as of November 30th, 2020; GARFO catch monitoring reports), possibly as a result of a 2020 USDA purchasing program for haddock, pollock, and redfish. It is difficult to draw conclusions about the impact of the exemption area change due to extreme market perturbations as a result of the COVID-19 pandemic.

<u>Summary of expected economic impacts from implementation of FW61 proposed action</u>

The Proposed Action for Framework 61 includes: 1) Updated Status Determination Criteria for two groundfish stocks; 2) Revised Rebuilding Strategy for White Hake; 3) Revised Specifications for nine groundfish stocks for fishing years 2021-2023 and revised specifications for shared U.S./Canada stocks for fishing year 2021; 4) Universal Sector Exemption for Redfish.

The regulations proposed in FW61 are expected to have a positive impact on gross revenues and operating profits for entities engaged in the commercial sector groundfish fishery relative to No Action. The combination of revised specifications and a universal sector redfish exemption for redfish is predicted to yield $44.9-$45.3 million in sector groundfish revenue during FY2021. Under No Action for all FW61 alternatives, predicted fishery revenue for FY2021 is $11.4 million. Compared to the 2019 fishing year, gross revenues and operating profits in FY2021 are expected to be slightly negatively impacted; realized sector groundfish revenue was $48.0 million in FY2019. For common pool vessels, which comprise a very small portion of groundfish revenue, the proposed action is also expected to yield positive impacts relative to No Action.

Economic impacts on entities engaged in the recreational groundfish, Atlantic sea scallop, Atlantic herring, small-mesh multispecies, large-mesh non-groundfish fisheries, are expected to have a mix of impacts from neutral to positive, driven by the directionality of changes in sub-ACLs for incidentally caught groundfish stocks. The GOM cod sub-ACL for the recreational groundfish fishery would remain unchanged relative to FY2020 or No Action, meaning the recreational fishery will not be adversely impacted. The proposed action results in smaller sub-allocations for two groundfish stocks for the sea scallop fishery; entities engaged in the sea scallop fishery could be negatively impacted if Accountability Measures are triggered, or if behavioral modifications are necessary to avoid exceeding allocations, but based on recent years effort and catch projections this is unlikely. The Atlantic herring and small-mesh multispecies fisheries are not expected to be adversely impacted by the FW61 proposed alternatives. Lastly, the large-mesh non-groundfish fisheries would have a reduced allocation of southern windowpane flounder, relative to both FY2020 and No Action, potentially causing negative impacts.

If implemented, the proposed action is predicted to generate $62.7-$63.5 million in gross revenues for the sector portion of the commercial groundfish trips, compared to $16 million under No Action. Fishery-wide operating profits are predicted to be ~$35 million higher under the proposed action relative to No Action.

Determination of Significance

The proposed action does not constitute a significant regulatory action under EO 12866 for the following reasons: the proposed action will not have an annual effect on the economy of more than $100 million and is not predicted to have any adverse impact on fisherman and fishing businesses, ports, recreational anglers, and operators of party/charter businesses.

In addition, there should be no interactions with activities of other agencies and no impacts on entitlements, grants, user fees, or loan programs. The proposed action does not raise novel legal or policy issues. As such, the Proposed Action is not considered significant as defined by EO 12866.

8.0 GLOSSARY

Adult stage: One of several marked phases or periods in the development and growth of many animals. In vertebrates, the life history stage where the animal is capable of reproducing, as opposed to the juvenile stage.

Adverse effect: Any impact that reduces quality and/or quantity of EFH. May include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include sites-specific of habitat wide impacts, including individual, cumulative, or synergistic consequences of actions.

Aggregation: A group of animals or plants occurring together in a particular location or region.

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

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

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

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

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

Annual total mortality: Rate of death expressed as the fraction of a cohort dying over a period compared to the number alive at the beginning of the period (# total deaths during year / numbers alive at the beginning of the year). Optimists convert death rates into annual survival rate using the relationship S=1-A.

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

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

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

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

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

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

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

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

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

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

Btarget: A desirable biomass to maintain fishery stocks. This is usually synonymous with BMSY or its proxy.

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

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

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

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

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

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

Boulder reef: An elongated feature (a chain) of rocks (generally piled boulders) on the seabed.

Bryozoans: Phylum aquatic organisms, living for the most part in colonies of interconnected individuals. A few to many millions of these individuals may form one colony. Some bryozoans encrust rocky surfaces, shells, or algae others form lacy or fan-like colonies that in some regions may form an abundant component of limestones. Bryozoan colonies range from millimeters to meters in size, but the individuals that make up the colonies are rarely larger than a millimeter. Colonies may be mistaken for hydroids, corals or seaweed.

Burrow: A hole or excavation in the sea floor made by an animal (as a crab, lobster, fish, burrowing anemone) for shelter and habitation.

Bycatch: (v.) the capture of nontarget species in directed fisheries which occurs because fishing gear and methods are not selective enough to catch only target species; (n.) fish which are harvested in a fishery but are not sold or kept for personal use, including economic discards and regulatory discards but not fish released alive under a recreational catch and release fishery management program.

Capacity: the level of output a fishing fleet is able to produce given specified conditions and constraints. Maximum fishing capacity results when all fishing capital is applied over the maximum amount of available (or permitted) fishing time, assuming that all variable inputs are utilized efficiently.

Catch: The sum total of fish killed in a fishery in a given period. Catch is given in either weight or number of fish and may include landings, unreported landings, discards, and incidental deaths.

Closed Area Model: A General Algebraic Modeling System (GAMS) model used to evaluate the effectiveness of effort controls used in the Northeast Multispecies Fishery. Using catch data from vessels in the fishery, the model estimates changes in exploitation that may result from changes in DAS, closed areas, and possession limits. These changes in exploitation are then converted to changes in fishing mortality to evaluate proposed measures.

Coarse sediment: Sediment generally of the sand and gravel classes; not sediment composed primarily of mud; but the meaning depends on the context, e.g. within the mud class, silt is coarser than clay.

Commensalism: See Mutualism. An interactive association of two species where one benefits in some way, while the other species is in no way affected by the association.

Continental shelf waters: The waters overlying the continental shelf, which extends seaward from the shoreline and deepens gradually to the point where the sea floor begins a slightly steeper descent to the deep ocean floor; the depth of the shelf edge varies, but is approximately 200 meters in many regions.

Control rule: A pre-determined method for determining fishing mortality rates based on the relationship of current stock biomass to a biomass target. Amendment 9 overfishing control rules define a target biomass (BMSY or proxy) as a management objective. The biomass threshold (Bthreshold or Bmin) defines a minimum biomass below which a stock is considered overfished.

Cohort: see yearclass.

Crustaceans: Invertebrates characterized by a hard outer shell and jointed appendages and bodies. They usually live in water and breathe through gills. Higher forms of this class include lobsters, shrimp and crawfish; lower forms include barnacles.

Days absent: an estimate by port agents of trip length. This data was collected as part of the NMFS weighout system prior to May 1, 1994.

Days-at-sea (DAS): the total days, including steaming time that a boat spends at sea to fish. Amendment 13 categorized DAS for the multispecies fishery into three categories, based on each individual vessel's fishing history during the period fishing year 1996 through 2001. The three categories are: Category A: can be used to target any groundfish stock; Category B: can only be used to target healthy stocks; Category C: cannot be used until some point in the future. Category B DAS are further divided equally into Category B (regular) and Category B (reserve).

DAS "flip": A practice in the Multispecies FMP that occurs when a vessel fishing on a Category B (regular) DAS must change ("flip") its DAS to a Category A DAS because it has exceeded a catch limit for a stock of concern.

Demersal species: Most often refers to fish that live on or near the ocean bottom. They are often called benthic fish, groundfish, or bottom fish.

Diatoms: Small mobile plants (algæ) with silicified (silica, sand, quartz) skeletons. They are among the most abundant phytoplankton in cold waters, and an important part of the food chain.

Discards: animals returned to sea after being caught; see Bycatch (n.)

Dissolved nutrients: Non-solid nutrients found in a liquid.

Echinoderms: A member of the Phylum Echinodermata. Marine animals usually characterized by a five-fold symmetry, and possessing an internal skeleton of calcite plates, and a complex water vascular system. Includes echinoids (sea urchins), crinoids (sea lillies) and asteroids (starfish).

Ecosystem-based management: a management approach that takes major ecosystem components and services—both structural and functional—into account, often with a multispecies or habitat perspective

Egg stage: One of several marked phases or periods in the development and growth of many animals. The life history stage of an animal that occurs after reproduction and refers to the developing embryo, its food store, and sometimes jelly or albumen, all surrounded by an outer shell or membrane. Occurs before the larval or juvenile stage.

Elasmobranch: Any of numerous fishes of the class Chondrichthyes characterized by a cartilaginous skeleton and placoid scales: sharks; rays; skates.

Embayment: A bay or an indentation in a coastline resembling a bay.

Emergent epifauna: See Epifauna. Animals living upon the bottom that extend a certain distance above the surface.

Epifauna: See Benthic infauna. Epifauna are animals that live on the surface of the substrate, and are often associated with surface structures such as rocks, shells, vegetation, or colonies of other animals.

Essential Fish Habitat (EFH): Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. The EFH designation for most managed species in this region is based on a legal text definition and geographical area that are described in the Habitat Omnibus Amendment (1998).

Estuarine area: The area of an estuary and its margins; an area characterized by environments resulting from the mixing of river and sea water.

Estuary: A water passage where the tide meets a river current; especially an arm of the sea at the lower end of a river; characterized by an environment where the mixing of river and seawater causes marked variations in salinity and temperature in a relatively small area.

Eutrophication: A set of physical, chemical, and biological changes brought about when excessive nutrients are released into the water.

Euphotic zone: The zone in the water column where at least 1% of the incident light at the surface penetrates.

Exclusive Economic Zone (EEZ): a zone in which the inner boundary is a line coterminous with the seaward boundary of each of the coastal States and the outer boundary is line 200 miles away and parallel to the inner boundary

Exempt fisheries: Any fishery determined by the Regional Director to have less than 5 percent regulated species as a bycatch (by weight) of total catch according to 50 CFR 648.80(a)(7).

Exploitable biomass: The biomass of fish in the portion of the population that is vulnerable to fishing.

Exploitation pattern: Describes the fishing mortality at age as a proportion of fully recruited F (full vulnerability to the fishery). Ages that are fully vulnerable experience 100% of the fully recruited F and are termed fully recruited. Ages that are only partially vulnerable experience a fraction of the fully recruited F and are termed partially recruited. Ages that are not vulnerable to the fishery (including discards) experience no mortality and are considered pre-recruits. Also known as the partial recruitment pattern, partial recruitment vector or fishery selectivity.

Exploitation rate (u): The fraction of fish in the exploitable population killed during the year by fishing. This is an annual rate compared to F, which is an instantaneous rate. For example, if a population has 1,000,000 fish large enough to be caught and 550,000 are caught (landed and discarded) then the exploitation rate is 55%.

Fathom: A measure of length, containing six feet; the space to which a man can extend his arms; used chiefly in measuring cables, cordage, and the depth of navigable water by soundings.

Fishing mortality (F): A measurement of the rate of removal of fish from a population caused by fishing. This is usually expressed as an instantaneous rate (F) and is the rate at which fish are harvested at any given point in a year. Instantaneous fishing mortality rates can be either fully recruited or biomass weighted. Fishing mortality can also be expressed as an exploitation rate (see exploitation rate) or less commonly, as a conditional rate of fishing mortality (m, fraction of fish removed during the year if no other competing sources of mortality occurred. Lower case m should not be confused with upper case M, the instantaneous rate of natural mortality).

F0.1: a conservative fishing mortality rate calculated as the F associated with 10 percent of the slope at origin of the yield-per-recruit curve.

FMAX: a fishing mortality rate that maximizes yield per recruit. FMAX is less conservative than F0.1.

FMSY: a fishing mortality rate that would produce MSY when the stock biomass is sufficient for producing MSY on a continuing basis.

Fthreshold: 1) The maximum fishing mortality rate allowed on a stock and used to define overfishing for status determination. Amendment 9 frequently uses FMSY or FMSY proxy for Fthreshold. 2) The maximum fishing mortality rate allowed for a given biomass as defined by a control rule.

Fishing effort: the amount of time and fishing power used to harvest fish. Fishing power is a function of gear size, boat size and horsepower.

Framework adjustments: adjustments within a range of measures previously specified in a fishery management plan (FMP). A change usually can be made more quickly and easily by a framework adjustment than through an amendment. For plans developed by the New England Council, the procedure requires at least two Council meetings including at least one public hearing and an evaluation of environmental impacts not already analyzed as part of the FMP.

Furrow: A trench in the earth made by a plow; something that resembles the track of a plow, as a marked narrow depression; a groove with raised edges.

Glacial moraine: A sedimentary feature deposited from glacial ice; characteristically composed of unsorted clay, sand, and gravel. Moraines typically are hummocky or ridge-shaped and are located along the sides and at the fronts of glaciers.

Glacial till: Unsorted sediment (clay, sand, and gravel mixtures) deposited from glacial ice.

Grain size: the size of individual sediment particles that form a sediment deposit; particles are separated into size classes (e.g. very fine sand, fine sand, medium sand, among others); the classes are combined into broader categories of mud, sand, and gravel; a sediment deposit can be composed of few to many different grain sizes.

Growth overfishing: Fishing at an exploitation rate or at an age at entry that reduces potential yields from a cohort but does not reduce reproductive output (see recruitment overfishing).

Halocline: The zone of the ocean in which salinity increases rapidly with depth.

Habitat complexity: Describes or measures a habitat in terms of the variability of its characteristics and its functions, which can be biological, geological, or physical in nature. Refers to how complex the physical structure of the habitat is. A bottom habitat with structure-forming organisms, along with other three dimensional objects such as boulders, is more complex than a flat, featureless, bottom.

Highly migratory species: tuna species, marlin, oceanic sharks, sailfishes, and swordfish

Hydroids: Generally, animals of the Phylum Cnidaria, Class Hydrozoa; most hydroids are bush- like polyps growing on the bottom and feed on plankton, they reproduce asexually and sexually.

Immobile epifaunal species: See epifauna. Animals living on the surface of the bottom substrate that, for the most part, remain in one place.

Individual Fishing Quota (IFQ): federal permit under a limited access system to harvest a quantity of fish, expressed by a unit or units representing a percentage of the total allowable catch of a fishery that may be received or held for exclusive use by an individual person or entity

Juvenile stage: One of several marked phases or periods in the development and growth of many animals. The life history stage of an animal that comes between the egg or larval stage and the adult stage; juveniles are considered immature in the sense that they are not yet capable of reproducing, yet they differ from the larval stage because they look like smaller versions of the adults.

Landings: The portion of the catch that is harvested for personal use or sold.

Land runoff: The part of precipitation, snowmelt, or irrigation water that reaches streams (and thence the sea) by flowing over the ground, or the portion of rain or snow that does not percolate into the ground and is discharged into streams instead.

Larvae stage: One of several marked phases or periods in the development and growth of many animals. The first stage of development after hatching from the egg for many fish and invertebrates. This life stage looks fundamentally different than the juvenile and adult stages, and is incapable of reproduction; it must undergo metamorphosis into the juvenile or adult shape or form.

Lethrinids: Fish of the genus Lethrinus, commonly called emperors or nor'west snapper, are found mainly in Australia's northern tropical waters. Distinctive features of Lethrinids include thick lips, robust canine teeth at the front of the jaws, molar-like teeth at the side of the jaws and cheeks without scales. Lethrinids are carnivorous bottom-feeding fish with large, strong jaws.

Limited-access permits: permits issued to vessels that met certain qualification criteria by a specified date (the "control date").

Lutjanids: Fish of the genus of the Lutjanidae: snappers. Marine; rarely estuarine. Some species do enter freshwater for feeding. Tropical and subtropical: Atlantic, Indian and Pacific Oceans.

Macrobenthos: See Benthic community and Benthic infauna. Benthic organisms whose shortest dimension is greater than or equal to 0.5 mm.

Maturity ogive: A mathematical model used to describe the proportion mature at age for the entire population. A50 is the age where 50% of the fish are mature.

Mean biomass: The average number of fish within an age group alive during a year multiplied by average weight at age of that age group. The average number of fish during the year is a function of starting stock size and mortality rate occurring during the year. Mean biomass can be aggregated over several ages to describe mean biomass for the stock. For example the mean biomass summed for ages 1 and over is the 1+ mean biomass; mean biomass summed across ages 3 and over is 3+ mean biomass.

Megafaunal species: The component of the fauna of a region that comprises the larger animals, sometimes defined as those weighing more than 100 pounds.

Mesh selectivity ogive: A mathematical model used to describe the selectivity of a mesh size (proportion of fish at a specific length retained by mesh) for the entire population. L25 is the length where 25% of the fish encountered are retained by the mesh. L50 is the length where 50% of the fish encountered are retained by the mesh.

Meter: A measure of length, equal to 39.37 English inches, the standard of linear measure in the metric system of weights and measures. It was intended to be, and is very nearly, the ten millionth part of the distance from the equator to the north pole, as ascertained by actual measurement of an arc of a meridian.

Metric ton: A unit of weight equal to a thousand kilograms (1kgs = 2.2 lbs.). A metric ton is equivalent to 2,205 lbs. A thousand metric tons is equivalent to 2.2 million lbs.

Microalgal: Small microscopic types of algae such as the green algae.

Microbial: Microbial means of or relating to microorganisms.

Minimum spawning stock threshold: the minimum spawning stock size (or biomass) below which there is a significantly lower chance that the stock will produce enough new fish to sustain itself over the long term.

Mobile organisms: organisms that are not confined or attached to one area or place, that can move on their own, are capable of movement, or are moved (often passively) by the action of the physical environment (waves, currents, etc.).

Molluscs: Common term for animals of the phylum Mollusca. Includes groups such as the bivalves (mussels, oysters etc.), cephalopods (squid, octopus etc.) and gastropods (abalone, snails). Over 80,000 species in total with fossils back to the Cambrian period.

Mortality: see Annual total mortality (A), Exploitation rate (u), Fishing mortality (F), Natural mortality (M), and instantaneous total mortality (Z).

Motile: Capable of self-propelled movement. A term that is sometimes used to distinguish between certain types of organisms found in water.

Multispecies: the group of species managed under the Northeast Multispecies Fishery Management Plan. This group includes whiting, red hake and ocean pout plus the regulated species (cod, haddock, pollock, yellowtail flounder, winter flounder, witch flounder, American plaice, windowpane flounder, white hake and redfish).

Mutualism: See Commensalism. A symbiotic interaction between two species in which both derive some benefit.

Natural disturbance: A change caused by natural processes; e.g. in the case of the seabed, changes can be caused by the removal or deposition of sediment by currents; such natural processes can be common or rare at a particular site.

Natural mortality: A measurement of the rate of death from all causes other than fishing such as predation, disease, starvation, and pollution. Commonly expressed as an instantaneous rate (M). The rate of natural mortality varies from species to species, but is assumed to be M=0.2 for the five critical stocks. The natural mortality rate can also be expressed as a conditional rate (termed n and not additive with competing sources of mortality such as fishing) or as annual expectation of natural death (termed v and additive with other annual expectations of death).

Nearshore area: The area extending outward an indefinite but usually short distance from shore; an area commonly affected by tides and tidal and storm currents, and shoreline processes.

Nematodes: a group of elongated, cylindrical worms belonging to the phylum Nematoidea, also called thread-worms or eel-worms. Some non-marine species attack roots or leaves of plants, others are parasites on animals or insects.

Nemerteans: Proboscis worms belonging to the phylum Nemertea, and are soft unsegmented marine worms that have a threadlike proboscis and the ability to stretch and contract.

Nemipterids: Fishes of the Family Nemipteridae, the threadfin breams or whiptail breams. Distribution: Tropical and sub-tropical Indo-West Pacific.

Northeast Shelf Ecosystem: The Northeast U.S. Shelf Ecosystem has been described as including the area from the Gulf of Maine south to Cape Hatteras, extending from the coast seaward to the edge of the continental shelf, including the slope sea offshore to the Gulf Stream.

Northwest Atlantic Analysis Area (NAAA): A spatial area developed for analysis purposes only. The boundaries of this the area are within the 500 fathom line to the east, the coastline to the west, the Hague line to the north, and the North Carolina/ South Carolina border to the south. The area is approximately 83,550 square nautical miles, and is used as the denominator in the EFH analysis to determine the percent of sediment, EFH, and biomass contained in an area, as compared to the total NAAA.

Nutrient budgets: An accounting of nutrient inputs to and production by a defined ecosystem (e.g., salt marsh, estuary) versus utilization within and export from the ecosystem.

Observer: any person required or authorized to be carried on a vessel for conservation and management purposes by regulations or permits under this Act

Oligochaetes: See Polychaetes. Oligochaetes are worms in the phylum Annelida having bristles borne singly along the length of the body.

Open access: describes a fishery or permit for which there is no qualification criteria to participate. Open-access permits may be issued with restrictions on fishing (for example, the type of gear that may be used or the amount of fish that may be caught).

Opportunistic species: Species that colonize disturbed or polluted sediments. These species are often small, grow rapidly, have short life spans, and produce many offspring.

Optimum Yield (OY): the amount of fish which A) will provide the greatest overall benefit to the nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems; B) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and C) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery

Organic matter: Material of, relating to, or derived from living organisms.

Overfished: A conditioned defined when stock biomass is below minimum biomass threshold and the probability of successful spawning production is low.

Overfishing: A level or rate of fishing mortality that jeopardizes the long-term capacity of a stock or stock complex to produce MSY on a continuing basis.

Peat bank: A bank feature composed of partially carbonized, decomposed vegetable tissue formed by partial decomposition of various plants in water; may occur along shorelines.

Pelagic gear: Mobile or static fishing gear that is not fixed, and is used within the water column, not on the ocean bottom. Some examples are mid-water trawls and pelagic longlines.

Phytoplankton: Microscopic marine plants (mostly algae and diatoms) which are responsible for most of the photosynthetic activity in the oceans.

Piscivore: A species feeding preferably on fish.

Planktivore: An animal that feeds on plankton.

Polychaetes: Polychaetes are segmented worms in the phylum Annelida. Polychaetes (poly-chaetae = many-setae) differ from other annelids in having many setae (small bristles held in tight bundles) on each segment.

Porosity: The amount of free space in a volume of a material; e.g. the space that is filled by water between sediment particles in a cubic centimeter of seabed sediment.

Possession-limit-only permit: an open-access permit (see above) that restricts the amount of multispecies a vessel may retain (currently 500 pounds of "regulated species").

Potential Sector Contribution (PSC): The percentage of the available catch a limited access permit is entitled to after joining a sector. Based on landings history as defined in Amendment 16. The sum of the PSC's in a sector is multiplied by the groundfish sub-ACL to get the ACE for the sector.

Pre-recruits: Fish in size or age groups that are not vulnerable to the fishery (including discards).

Prey availability: The availability or accessibility of prey (food) to a predator. Important for growth and survival.

Primary production: The synthesis of organic materials from inorganic substances by photosynthesis.

Recovery time: The period of time required for something (e.g. a habitat) to achieve its former state after being disturbed.

Recruitment: the amount of fish added to the fishery each year due to growth and/or migration into the fishing area. For example, the number of fish that grow to become vulnerable to fishing gear in one year would be the recruitment to the fishery. "Recruitment" also refers to new year classes entering the population (prior to recruiting to the fishery).

Recruitment overfishing: fishing at an exploitation rate that reduces the population biomass to a point where recruitment is substantially reduced.

Regulated groundfish species: cod, haddock, yellowtail flounder, winter flounder, witch flounder, American plaice, white hake, pollock, redfish, Atlantic halibut, windowpane flounder, ocean pout, and wolffish. These species are usually targeted with large-mesh net gear.

Relative exploitation: an index of exploitation derived by dividing landings by trawl survey biomass. This measure does not provide an absolute magnitude of exploitation but allows for general statements about trends in exploitation.

Retrospective pattern: A pattern of systematic over-estimation or underestimation of terminal year estimates of stock size, biomass or fishing mortality compared to that estimate for that same year when it occurs in pre-terminal years.

Riverine area: The area of a river and its banks.

Saurids: Fish of the family Scomberesocidae, the sauries or needlefishes. Distribution: tropical and temperate waters.

Scavenging species: An animal that consumes dead organic material.

Sea whips: A coral that forms long flexible structures with few or no branches and is common on Atlantic reefs.

Sea pens: An animal related to corals and sea anemones with a featherlike form.

Sediment: Material deposited by water, wind, or glaciers.

Sediment suspension: The process by which sediments are suspended in water as a result of disturbance.

Sedentary: See Motile and Mobile organisms. Not moving. Organisms that spend the majority of their lives in one place.

Sedimentary bedforms: Wave-like structures of sediment characterized by crests and troughs that are formed on the seabed or land surface by the erosion, transport, and deposition of particles by water and wind currents; e.g. ripples, dunes.

Sedimentary structures: Structures of sediment formed on the seabed or land surface by the erosion, transport, and deposition of particles by water and wind currents; e.g. ripples, dunes, buildups around boulders, among others.

Sediment types: Major combinations of sediment grain sizes that form a sediment deposit, e.g. mud, sand, gravel, sandy gravel, muddy sand, among others.

Spawning adult stage: See adult stage. Adults that are currently producing or depositing eggs.

Spawning stock biomass (SSB): the total weight of fish in a stock that sexually mature, i.e., are old enough to reproduce.

Species assemblage: Several species occurring together in a particular location or region

Species composition: A term relating the relative abundance of one species to another using a common measurement; the proportion (percentage) of various species in relation to the total on a given area.

Species diversity: The number of different species in an area and their relative abundance

Species richness: See Species diversity. A measurement or expression of the number of species present in an area; the more species present, the higher the degree of species richness.

Species with vulnerable EFH: If a species was determined to be "highly" or "moderately" vulnerable to bottom tending gears (otter trawls, scallop dredges, or clam dredges) then it was included in the list of species with vulnerable EFH. Currently there are 23 species and life stages that are considered to have vulnerable EFH for this analysis.

Status Determination: A determination of stock status relative to Bthreshold (defines overfished) and Fthreshold (defines overfishing). A determination of either overfished or overfishing triggers a SFA requirement for rebuilding plan (overfished), ending overfishing (overfishing) or both.

Stock: A grouping of fish usually based on genetic relationship, geographic distribution and movement patterns. A region may have more than one stock of a species (for example, Gulf of Maine cod and Georges Bank cod). A species, subspecies, geographical grouping, or other category of fish capable of management as a unit.

Stock assessment: determining the number (abundance/biomass) and status (life-history characteristics, including age distribution, natural mortality rate, age at maturity, fecundity as a function of age) of individuals in a stock

Stock of concern: a regulated groundfish stock that is overfished, or subject to overfishing.

Structure-forming organisms: Organisms, such as corals, colonial bryozoans, hydroids, sponges, mussel beds, oyster beds, and seagrass that by their presence create a three-dimensional physical structure on the bottom. See biogenic habitats.

Submerged aquatic vegetation: Rooted aquatic vegetation, such as seagrasses, that cannot withstand excessive drying and therefore live with their leaves at or below the water surface in shallow areas of estuaries where light can penetrate to the bottom sediments. SAV provides an important habitat for young fish and other aquatic organisms.

Surficial sediment: Sediment forming the sea floor or land surface; thickness of the surficial layer may vary.

Surplus production: Production of new stock biomass defined by recruitment plus somatic growth minus biomass loss due to natural deaths. The rate of surplus production is directly proportional to stock biomass and its relative distance from the maximum stock size at carrying capacity (K). BMSY is often defined as the biomass that maximizes surplus production rate.

Surplus production models: A family of analytical models used to describe stock dynamics based on catch in weight and CPUE time series (fishery dependent or survey) to construct stock biomass history. These models do not require catch at age information. Model outputs may include stock biomass history, biomass weighted fishing mortality rates, MSY, FMSY, BMSY, K, (maximum population biomass where stock growth and natural deaths are balanced) and r (intrinsic rate of increase).

Survival rate (S): Rate of survival expressed as the fraction of a cohort surviving the a period compared to number alive at the beginning of the period (# survivors at the end of the year / numbers alive at the beginning of the year). Pessimists convert survival rates into annual total mortality rate using the relationship A=1-S.

Survival ratio (R/SSB): an index of the survivability from egg to age-of-recruitment. Declining ratios suggest that the survival rate from egg to age-of-recruitment is declining.

TAC: Total allowable catch. This value is calculated by applying a target fishing mortality rate to exploitable biomass.

Taxa: The plural of taxon. Taxon is a named group or organisms of any rank, such as a particular species, family, or class.

Ten-minute- "squares" of latitude and longitude (TMS): Are a measure of geographic space. The actual size of a ten-minute-square varies depending on where it is on the surface of the earth, but in general each square is approximately 70-80 square nautical miles in this region. This is the spatial area that EFH designations, biomass data, and some of the effort data have been binned into for analysis purposes in various sections of this document.

Topography: The depiction of the shape and elevation of land and sea floor surfaces.

Total Allowable Catch (TAC): The amount (in metric tons) of a stock that is permitted to be caught during a fishing year. In the Multispecies FMP, TACs can either be "hard" (fishing ceases when the TAC is caught) or a "target" (the TAC is merely used as an indicator to monitor effectiveness of management measures, but does not trigger a closure of the fishery).

Total mortality: The rate of mortality from all sources (fishing, natural, pollution) Total mortality can be expressed as an instantaneous rate (called Z and equal to F + M) or Annual rate (called A and calculated as the ratio of total deaths in a year divided by number alive at the beginning of the year)

Trophic guild: Trophic is defined as the feeding level within a system that an organism occupies; e.g., predator, herbivore. A guild is defined as a group of species that exploit the same class of environmental resources in a similar way. The trophic guild is a utilitarian concept covering both structure and organization that exists between the structural categories of trophic groups and species.

Turbidity: Relative water clarity; a measurement of the extent to which light passing through water is reduced due to suspended materials.

Two-bin (displacement) model: a model used to estimate the effects of area closures. This model assumes that effort from the closed areas (first bin) is displaced to the open areas (second bin). The total effort in the system is then applied to the landings-per-unit-effort (LPUE) in open areas to obtain a projected catch. The percent reduction in catch is calculated as a net result.

Vulnerability: In order to evaluate the potential adverse effects of fishing on EFH, the vulnerability of each species EFH was determined. This analysis defines vulnerability as the likelihood that the functional value of EFH would be adversely affected as a result of fishing with different gear types. A number of criteria were considered in the evaluation of the vulnerability of EFH for each life stage including factors like the function of habitat for shelter, food and/or reproduction.

Yield-per-recruit (YPR): the expected yield (weight) of individual fish calculated for a given fishing mortality rate and exploitation pattern and incorporating the growth characteristics and natural mortality.

Yearclass: also called cohort. Fish that were spawned in the same year. By convention, the "birth date" is set to January 1st and a fish must experience a summer before turning 1. For example, winter flounder that were spawned in February-April 1997 are all part of the 1997 cohort (or year-class). They would be considered age 0 in 1997, age 1 in 1998, etc. A summer flounder spawned in October 1997 would have its birth date set to the following January 1 and would be considered age 0 in 1998, age 1 in 1999, etc.

Z: instantaneous rate of total mortality. The components of Z are additive (i.e., Z = F+M)

Zooplankton: See Phytoplankton. Small, often microscopic animals that drift in currents. They feed on detritus, phytoplankton, and other zooplankton. They are preyed upon by fish, shellfish, whales, and other zooplankton.

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