Specifications and Related Management Measures for:
Atlantic Mackerel (2021-2022)
Illex squid (2021),
Longfin Squid (2021-2023), and
Butterfish (2021-2022),

Includes Draft Environmental Assessment and
Initial Regulatory Flexibility Analysis

Prepared by the

Mid-Atlantic Fishery Management Council (Council) in collaboration with the

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1.0 EXECUTIVE SUMMARY AND TABLE OF CONTENTS

The Mid-Atlantic Fishery Management Council (Council) adopted specifications for the Mackerel[1], Squid, and Butterfish (collectively "MSB") Fishery Management Plan (FMP) at its June 2020 and August 2020 meetings and herein submits them to the National Marine Fisheries Service (NMFS).

This document[2] examines the potential actions and their expected impacts. The specification recommendations are consistent with the recommendations of the Council's Scientific and Statistical Committee (SSC), which may be accessed at https://www.mafmc.org/ssc. The SSC's acceptable biological catch (ABC) recommendations account for scientific uncertainty such that overfishing of managed stocks should be unlikely. The preferred specifications also address management uncertainties and optimum yield considerations raised by the MSB Monitoring Committee (NMFS and Council staff) or otherwise brought to the Council's attention.

The proposed alternatives are expected to maintain positive benefits to the nation by maintaining the sustainability of the resources and achieving optimum yield (i.e., fully harvesting available quotas). However, from a National Environmental Policy Act (NEPA) perspective, this action should have no significant impacts on valued ecological components compared to the fishery as it was prosecuted in the previous year or cumulatively. Because none of the preferred alternatives are associated with significant impacts to the biological, social, economic, or physical environment, a "Finding of No Significant Impact" (FONSI) is proposed and this document constitutes an Environmental Assessment (EA) to satisfy the impact analysis requirements of NEPA.

A summary of the preferred alternatives follows; details of all alternatives are in Section 5. A qualitative summary of the expected impacts related to the preferred alternatives is provided below in Table 1.

<u>Mackerel A: Set 2021-2022 Mackerel specifications/quotas same as current.</u>

Mackerel A is the preferred Mackerel alternative and is the same as current. Currently the total Mackerel ABC is 29,184 mt[3] and other measures are based on that ABC, including the U.S. ABC of 19,184 mt after 10,000 mt is deducted for expected Canadian landings. The SSC recommended both 2021-2022 ABCs remain the same as current. This alternative would implement the SSC-recommended ABCs and associated measures. The commercial quota (domestic annual harvest or DAH) would be 17,312 mt both years, also the same as current. No other changes are proposed, including the river herring and shad (RH/S) cap for the mackerel

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1 Chub mackerel has recently been added to this FMP. "Mackerel" by itself is used for Atlantic mackerel exclusively and never chub mackerel.
2 In this document, catch quantities are the "***specifications,***" commonly referred to as quotas. The longfin squid specifications are also divided up into trimesters, referred to as "***trimester quotas***." "***Management measures***" refer to other potential fishery controls such as closure thresholds, trips limits, and gear restrictions. Management measures support the specifications and ensure that catch limits are not exceeded. ***"Current"*** refers to 2020.
3 One metric ton equals approximately 2,204.6 pounds.

fishery (129 mt). (River herring include alewife and blueback herring; shad include American and hickory shad)

Illex B – Set 2021 *Illex* specifications/quotas same as current, also with two monitoring changes.

Illex B is the preferred *Illex* alternative. Currently the *Illex* ABC is 30,000 metric tons (mt) and other measures are based on that ABC. The SSC recommended this ABC for 2020 and 2021 and this alternative would implement the 30,000 mt ABC and associated measures for 2021. NMFS implemented the 30,000 mt ABC in 2020 via the in-season adjustment measures contained in the FMP. After accounting for discards, the commercial quota (domestic annual harvest or DAH) would be 28,644 mt, also the same as 2020. This alternative is different from no action in that it would also implement 48-hour *Illex* trip reporting after July 15 for commercial dealers and change the closure threshold to 94% - both measures are designed to help avoid quota overages, which occurred in 2018 and 2019.

Longfin A – Set 2021-2023 longfin squid specifications/quotas same as current.

Longfin A is the preferred longfin squid alternative and is the same as current. Currently the longfin squid ABC is 23,400 mt and other measures are based on that ABC. The SSC recommended maintaining this ABC and this alternative would implement the same 23,400 mt ABC and associated measures. After accounting for discards, the commercial quota (domestic annual harvest or DAH) would be 22,932 mt, also the same as current. No other changes are proposed.

Butterfish B: Set 2021-2022 butterfish specifications with new ABCs as recommended by the SSC.

Butterfish B is the preferred butterfish alternative. Currently the butterfish ABC is 32,063 mt and other measures are based on that ABC. The SSC recommended 2021 and 2022 ABCs (11,993 mt and 17,854 mt) that are lower than current due to an assessment update that incorporates new data including lower recruitment. This alternative would implement the new SSC-recommended ABCs and associated measures. The commercial quota (domestic annual harvest or DAH) would be 6,350 mt in 2021 and 11,495 mt in 2022. While lower than current, even the 6,350 mt quota in 2021 would allow an increase in landings compared to recent years. No other changes are proposed.

Table 1. Expected impacts of the preferred specifications

Status Quo and Preferred Alternatives	Valued Ecosystem Components/Environmental Dimensions				
	Managed Resource	Non-target Species	Human Communi-ties	Protected Resources	Essential Fish Habitat
Mackerel A (Preferred): 2021-2022; ABC = 29,184mt; DAH = 17,312mt	moderate +	slight -	moderate +	slight - to slight +	slight -
Illex B (Preferred): 2021; ABC = 30,000mt; DAH = 28,644mt; 48-hour dealer reporting, and 94% closure threshold.	moderate +	slight -	moderate +	slight - to slight +	slight -
Longfin A (Preferred): 2021-2022; ABC = 23,400mt; DAH = 22,932mt	moderate +	slight -	moderate +	slight - to slight +	slight -
Butterfish B (Preferred): 2021-2022; ABC (2021/2022) = 11,993mt/17,854mt; DAH = 6,350mt/11,495mt; Butterfish Cap = 3,884mt	moderate +	slight -	moderate +	slight - to slight +	slight -

("+" signifies a positive impact, "-" a negative impact – see section 7 for details on impact intensities such as "slight."

The essence of the impacts is that given not much is changing, the proposed conservation of these stocks should keep the managed resources sustainable, which provides benefits to human communities. Negative impacts to non-targets, protected resources, and habitat occur from fishing but are slight negative because of previous actions designed to mitigate negative impacts.

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2.0 LIST OF ACRONYMS, ABBREVIATIONS, ETC.

ABC	Acceptable Biological Catch
ACL	Annual Catch Limit
ACT	Annual Catch Target
ASMFC	Atlantic States Marine Fisheries Commission or Commission
ATGTRT	Atlantic Trawl Gear Take Reduction Team
B	Biomass
CFR	Code of Federal Regulations
CV	coefficient of variation
DAH	Domestic Annual Harvest
DAP	Domestic Annual Processing
DPS	Distinct Population Segment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ESA	Endangered Species Act of 1973
F	Fishing Mortality Rate
FMP	Fishery Management Plan
FR	Federal Register
GB	Georges Bank
GOM	Gulf of Maine
IOY	Initial Optimum Yield
M	Natural Mortality Rate
MAFMC	Mid-Atlantic Fishery Management Council
MMPA	Marine Mammal Protection Act
MSA	Magnuson-Stevens Fishery Conservation and Management Act (as currently amended)
MSB	Mackerel, Squid, Butterfish
MSY	Maximum Sustainable Yield
MT (or mt)	Metric Tons (1 mt equals about 2,204.62 pounds)
NE	Northeast
NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service (NOAA Fisheries)
NOAA	National Oceanic and Atmospheric Administration
OFL	Overfishing Level
PBR	Potential Biological Removal
PTNS	Pre-Trip Notification System
RH/S	River Herring and Shad
RSA	Research Set-Aside
SARC	Stock Assessment Review Committee
SAW	Stock Assessment Workshop
SNE	Southern New England
SSC	Scientific and Statistical Committee
TALFF	Total allowable level of foreign fishing
TRAC	Transboundary Resource Assessment Committee
US	United States
VTR	Vessel Trip Report

Note: "Mackerel" refers to "Atlantic mackerel" unless otherwise noted.

3.0 LISTS OF TABLES AND FIGURES

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4.0 THE ANNUAL SPECIFICATIONS PROCESS

4.1 Introduction

The Council manages the **M**ackerel (Atlantic and chub[4]), **S**quid (longfin and *Illex*), and **B**utterfish (MSB) fisheries with the Mackerel, Squid, and Butterfish Fishery Management Plan (MSB FMP), pursuant to the Magnuson-Stevens Fishery Conservation and Management Act of 1976 (MSA or Magnuson-Stevens Act) as currently amended. Chub mackerel are part of the FMP, but are not directly addressed with this EA as they are in the middle of previously-adopted multi-year specifications and no changes are proposed. The MSB FMP requires the Council to set annual or multi-year specifications[5] according to national standards specified in the MSA and the plan's goals/objectives. The Council recently endorsed modified goals/objectives for this FMP:

Goal 1: Maintain sustainable MSB stocks.

- Objective 1.1: Prevent overfishing and maintain sustainable biomass levels that achieve optimum yield in the MSB fisheries.
- Objective 1.2: Consider and, to the extent practicable, account for the roles of MSB species/fisheries in the ecosystem.

Goal 2: Acknowledging the difficulty in quantifying all costs and benefits, achieve the greatest overall net benefit to the Nation, balancing the needs and priorities of different user groups and effects of management on fishing communities.

- Objective 2.1: Provide the greatest degree of freedom and flexibility to harvesters and processors (including shoreside infrastructure) of MSB resources consistent with attainment of the other objectives of this FMP, including minimizing additional restrictions.
- Objective 2.2: Allow opportunities for commercial and recreational MSB fishing, considering the opportunistic nature of the fisheries, changes in availability that may result from changes in climate and other factors, and the need for operational flexibility.
- Objective 2.3: Consider and strive to balance the social and economic needs of various sectors of the MSB fisheries (commercial including shoreside infrastructure and recreational) as well as other fisheries or concerns that may be ecologically linked to MSB fisheries.
- Objective 2.4: Investigate opportunities to access international/shared resources of MSB species.

Goal 3: Support science, monitoring, and data collection to enhance effective management of MSB fisheries.

- Objective 3.1: Improve data collection to better understand the status of MSB stocks, the role of MSB species in the ecosystem, and the biological, ecological, and socio-economic impacts of management measures, including impacts to other fisheries.

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4 Chub mackerel has recently been added to this FMP. "Mackerel" by itself is used for Atlantic mackerel exclusively and never chub mackerel.
5 The Council has instituted a variety of management changes over the years in addition to annual specifications, which are summarized at http://www.mafmc.org/msb/.

Objective 3.2: Promote opportunities for industry collaboration on research.
Objective 3.3: Encourage research that may lead to practicable opportunities to further reduce bycatch in the MSB fisheries.

The specifications process begins with recommendations from the Council's Scientific and Statistical Committee (SSC) for acceptable biological catches (ABC) that account for scientific uncertainty regarding stock status and productivity such that overfishing is unlikely. Annual catch limits (ACLs) are set equal to the ABCs, and if ACLs are exceeded paybacks will be required (the squids are exempted from paybacks due to their short lifecycle, but existing management measures are still designed to avoid overages). Proactive accountability measures (like in-season closures and closure buffers) help ensure that catch targets and/or ABCs are not substantially exceeded. Based on the recommendations of the SSC, the MSB Monitoring Committee, the MSB Advisory Panel, and public input, the Council adopted the preferred alternatives presented in this document.

This document serves as the submission to NMFS of the Council's recommendations for MSB specifications and management measures, and contains related analyses supporting the recommendations. The analysis of the proposed measures' environmental impacts (and their significance) is discussed in accordance with the National Environmental Policy Act (NEPA) and National Oceanic and Atmospheric Administration Order 216-6 formatting requirements for an Environmental Assessment. The proposed alternatives are expected to maintain positive benefits to the nation by maintaining the sustainability of the resources but should have no significant impacts from a NEPA perspective on valued ecological components compared to the fishery as it was prosecuted under the previous year's specifications. Because none of the preferred alternatives are associated with significant impacts to the biological, social, economic, or physical environment, a "Finding of No Significant Impact" (FONSI) has been made (see Section 8.2) and this document constitutes an Environmental Assessment (EA) to satisfy the remaining impact analysis requirements of NEPA.

This EA is being prepared using the 1978 CEQ NEPA Regulations. NEPA reviews initiated prior to the effective date of the 2020 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 in June and August 2020 with Council actions, and the agency has decided to proceed under the 1978 regulations.

4.2 Purpose and Need of the Action

The purpose of this action is to set specifications for Atlantic mackerel, *Illex* squid, longfin squid, and butterfish fisheries. This action is needed to prevent overfishing and achieve optimum yield in the MSB fisheries. Per the MSA, optimum yield is defined as the amount of fish that will provide the greatest overall benefit to the nation based on the stock's maximum sustainable yield as reduced by relevant economic, social, and/or ecological factors.

5.0 WHAT ALTERNATIVES ARE CONSIDERED IN THIS DOCUMENT?

Introduction

No action or *the no action alternative* is equivalent to the current ("status quo") specifications[6] because the current regulations contain a "roll-over" provision: if NMFS fails to publish annual specifications before the start of the new fishing year, then the previous year's specifications remain in effect. The preferred alternatives were recommended by the Council after considering the recommendations of its SSC, the MSB Monitoring Committee (Council and NMFS technical staff), the MSB Advisory Panel, and public comment given the requirements of the MSA and the MSB FMP. Several alternatives are analyzed to facilitate consideration of a reasonable range of alternatives (per NEPA) and their impacts on the stocks and other valued ecosystem components, including socio-economic impacts on fishing communities.

The overall goal of the specifications is to manage catch such that the ABCs provided by the SSC are not exceeded and optimum yield is achieved. Council ABC recommendations may not exceed SSC ABC recommendations. In cases where multi-year specifications are recommended, the SSC and Council will review the fishery annually and if the SSC recommends a new ABC the Council will revisit these specifications. No foreign fishing is specified since the U.S. fleet can fully harvest the available quotas.

ABCs are set by SSC according to the Council's risk policy, which is designed to incorporate scientific uncertainty in the setting of catch limits to ensure that overfishing is avoided. Details on the Council's risk policy may be found at CFR Title 50, Chapter VI, Part 648, Subpart B, §648.20-21. The Council recently modified its risk policy, tolerating a slightly higher chance of overfishing for stocks with quantitative projections to allow slightly more landings – see https://www.mafmc.org/actions/risk-policy-framework for details. In this action, the only species affected by the risk policy change is butterfish, because butterfish is the only MSB species that currently has quantitative catch projections directly calculated via the risk policy. There are no projections involved for mackerel, *Illex*, and longfin, so there is no quantitative assessment of overfishing (the preferred butterfish alternative uses the new risk policy). Instead the SSC uses a variety of observations about the stocks to determine that the recommended ABCs should likely avoid overfishing. See https://www.mafmc.org/ssc for more details on the SSCs rationale for particular recommendations.

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6 Note on research set-asides (RSA): The RSA program has been suspended by the Council pending further review of its overall utility, so it is unlikely that any RSA quota will be utilized.

5.1 Atlantic Mackerel Specifications Alternatives

The following three alternatives are considered for Mackerel. No changes to measures other that the specifications are being considered.

"Mackerel A" – 2021-2022 Specifications Same as 2020/Current (No action and Preferred)

Table 2. Mackerel A Specifications

Specification	Mackerel 2021-2022 (MT)	Rationale Summary
(a) Overfishing Limit (OFL)	Not available	Assessment Delayed
(b) Acceptable Biological Catch (ABC)	29,184	from SSC
(c) Canadian Deduction (10,000 MT)	10,000	from recent observations
(d) U.S. ABC = ACL (Canadian catch deducted)	19,184	b-c
(e) Recreational Allocation	1,270	from recent observations
(f) Commercial Allocation (rest of ACL)	17,914	d-e
(g) Management Uncertainty Buffer = 3%	537	Closure system untested
(h) Commercial ACT (97% of allocation)	17,377	f-g
(i) DAH (0.37% set aside for discards)	17,312	from recent observations
(j) River Herring and Shad (RH/S) Cap	129	Incentive to avoid RH/S

Mackerel A Specification Rationale

(a) Overfishing Limit (OFL) – Due to data delays from COVID-19, a management track assessment was delayed until 2021.
(b) Acceptable Biological Catch (ABC) – The SSC maintained the previous ABC, which should generally facilitate rebuilding, though an assessment update is not available to quantitatively assess rebuilding progress. This ABC was in a series or rising rebuilding ABCs previously specified but then frozen to account for possibly lower-than-expected recruitment.
(c) Canadian Deduction (10,000 mt) – The Canadian quota was 8,000 mt in 2020, but they have gone over their quota in some recent years, and we cannot be sure what they will set their 2021 quota at, so the Council set the Canadian deduction at 10,000 mt.
(d) U.S. ABC = ACL (Canadian catch deducted)
(e) Recreational Allocation – Uses updated information on recent catch. The expected recreational catch is deducted in the current FMP.
(f) Commercial Allocation – remainder of ACL
(g) Management Uncertainty Buffer = 3% - While we have not had quota overages, the closure system has not yet been utilized so some uncertainty about performance remains.
(h) Commercial ACT (97% of Commercial Allocation) – The 3% buffer is subtracted.
(i) DAH – 0.37% set aside for discards based on recent observer data.
(j) River Herring and Shad (RH/S) Cap – This is designed to encourage RH/S avoidance. If the fishery has a lower RH/S encounter rate versus the median in historical (2005-2012) years, the fishery will not close due to the cap before catching the mackerel quota. Higher encounter rates

will cause closures to the degree that the RH/S encounter ratio is higher than the median encounter rate from the base years.

"Mackerel B" – 2021-2022 Specifications with ABC 1/3 higher than 2020/Current

Table 3. Mackerel B Specifications

Specification	Mackerel 2021-2022 (MT)	Rationale Summary
(a) Overfishing Limit (OFL)	Not available	Assessment Delayed
(b) Acceptable Biological Catch (ABC)	38,912	Higher Range
(c) Canadian Deduction (10,000 MT)	10,000	from recent observations
(d) U.S. ABC = ACL (Canadian catch deducted)	28,912	b-c
(e) Recreational Allocation	1,270	from recent observations
(f) Commercial Allocation (rest of ACL)	27,642	d-e
(g) Management Uncertainty Buffer = 3%	829	Closure system untested
(h) Commercial ACT (97% of allocation)	26,813	f-g
(i) DAH (0.37% set aside for discards)	26,714	from recent observations
(j) River Herring and Shad (RH/S) Cap	199	Incentive to avoid RH/S

Mackerel B Specification Rationale

(a) Overfishing Limit (OFL) – Due to data delays from COVID-19, a management track assessment was delayed until 2021.
(b) Acceptable Biological Catch (ABC) – This is 1/3 higher than the SSC-recommended ABC to provide a range for analysis.
(c) Canadian Deduction (10,000 mt) – The Canadian quota was 8,000 mt in 2020, but they have gone over their quota in some recent years, and we cannot be sure what they will set their 2021 quota at, so the Council set the Canadian deduction at 10,000 mt.
(d) U.S. ABC = ACL (Canadian catch deducted)
(e) Recreational Allocation – Uses updated information on recent catch. The expected recreational catch is deducted in the current FMP.
(f) Commercial Allocation – remainder of ACL
(g) Management Uncertainty Buffer = 3% - While we have not had quota overages, the closure system has not yet been utilized so some uncertainty about performance remains.
(h) Commercial ACT (97% of Commercial Allocation) – The 3% buffer is subtracted.
(i) DAH – 0.37% set aside for discards based on recent observer data.
(j) River Herring and Shad (RH/S) Cap – This is designed to encourage RH/S avoidance. If the fishery has a lower RH/S encounter rate versus the median in historical (2005-2012) years, the fishery will not close due to the cap before catching the mackerel quota. Higher encounter rates will cause closures to the degree that the RH/S encounter ratio is higher than the median encounter rate from the base years. Compared to Mackerel A, it is scaled up along with the mackerel quota.

“Mackerel C” – 2021-2022 Specifications with ABC 1/3 lower than 2020/Current

Table 4. Mackerel C Specifications

Specification	Mackerel 2021-2022 (MT)	Rationale Summary
(a) Overfishing Limit (OFL)	Not available	Assessment Delayed
(b) Acceptable Biological Catch (ABC)	19,456	Lower Range
(c) Canadian Deduction (10,000 MT)	10,000	from recent observations
(d) U.S. ABC = ACL (Canadian catch deducted)	9,456	b-c
(e) Recreational Allocation	1,270	from recent observations
(f) Commercial Allocation (rest of ACL)	8,186	d-e
(g) Management Uncertainty Buffer = 3%	246	Closure system untested
(h) Commercial ACT (97% of allocation)	7,940	f-g
(i) DAH (0.37% set aside for discards)	7,911	from recent observations
(j) River Herring and Shad (RH/S) Cap	133	Incentive to avoid RH/S

Mackerel C Specification Rationale

(a) Overfishing Limit (OFL) – Due to data delays from COVID-19, a management track assessment was delayed until 2021.
(b) Acceptable Biological Catch (ABC) – This is 1/3 lower than the SSC-recommended ABC to provide a range for analysis.
(c) Canadian Deduction (10,000 mt) – The Canadian quota was 8,000 mt in 2020, but they have gone over their quota in some recent years, and we cannot be sure what they will set their 2021 quota at, so the Council set the Canadian deduction at 10,000 mt.
(d) U.S. ABC = ACL (Canadian catch deducted)
(e) Recreational Allocation – Uses updated information on recent catch. The expected recreational catch is deducted in the current FMP.
(f) Commercial Allocation – remainder of ACL
(g) Management Uncertainty Buffer = 3% - While we have not had quota overages, the closure system has not yet been utilized so some uncertainty about performance remains.
(h) Commercial ACT (97% of Commercial Allocation) – The 3% buffer is subtracted.
(i) DAH – 0.37% set aside for discards based on recent observer data.
(j) River Herring and Shad (RH/S) Cap – This is designed to encourage RH/S avoidance. If the fishery has a lower RH/S encounter rate versus the median in historical (2005-2012) years, the fishery will not close due to the cap before catching the mackerel quota. Higher encounter rates will cause closures to the degree that the RH/S encounter ratio is higher than the median encounter rate from the base years. Compared to Mackerel A, it is scaled down along with the quota.

5.2 Illex Specifications Alternatives

The following four alternatives are considered for *Illex*.

"Illex **A" – 2021 Specifications Same as 2020/Current (no action)**

Table 5. *Illex* A Specifications

Specification	Illex 2021 (MT)	Rationale
(a) Overfishing Limit (OFL)	Not available	unknown
(b) Acceptable Biological Catch (ABC)	30,000	from SSC
(c) Commercial Discard Set-Aside	4.52%	from recent observations
(d) Initial Optimum Yield (IOY)/DAH/DAP	28,644	ABC - discard set-aside

Illex A Specification Rationale

(a) Overfishing Limit (OFL) – No assessments are available for *Illex*.
(b) Acceptable Biological Catch (ABC) – The SSC's ABC recommendation, which should avoid overfishing given the available information.
(c) Discard Set-Aside – Based on recent available observer data and discard estimates.
(d) IOY/DAH/DAP – The Initial Optimum Yield is the ABC less discards, and since domestic vessels/processors can harvest/process all of the quota, IOY equals the domestic annual harvest (DAH) as well as the domestic annual processing (DAP) amounts.

With this alternative, no other management or monitoring provisions would change. Most relevant for this action, dealers must report landings at least weekly, and the closure threshold is set at 95% of the DAH.

"Illex **B" – 2021 Specifications Same as 2020/Current with monitoring change (Preferred)**

Table 6. *Illex* B Specifications

Specification	Illex 2021 (MT)	Rationale
(a) Overfishing Limit (OFL)	Not available	unknown
(b) Acceptable Biological Catch (ABC)	30,000	from SSC
(c) Commercial Discard Set-Aside	4.52%	from recent observations
(d) Initial Optimum Yield (IOY)/DAH/DAP	28,644	ABC - discard set-aside

Illex B Specification Rationale

(a) Overfishing Limit (OFL) – No assessments are available for *Illex*.
(b) Acceptable Biological Catch (ABC) – The SSC's ABC recommendation, which should avoid overfishing given the available information. The SSC's recommendation is based on a holistic evaluation of available information and historical fishery performance.
(c) Discard Set-Aside – Based on recent available observer data and discard estimates.

(d) IOY/DAH/DAP – The Initial Optimum Yield is the ABC less discards, and since domestic vessels/processors can harvest/process all of the quota, IOY equals the domestic annual harvest (DAH) as well as the domestic annual processing (DAP) amounts.

This alternative is different from no action in that it would also implement 48-hour reporting after July 15 for commercial dealers and change the closure threshold from 95% of the DAH to 94% - both measures are designed to help avoid quota overages, which occurred in 2018 and 2019.

"Illex **C" – 2021 Specifications with ABC 1/3 higher than 2020/Current with monitoring change**

Table 7. *Illex* C Specifications

Specification	Illex 2021 (MT)	Rationale
(a) Overfishing Limit (OFL)	Not available	unknown
(b) Acceptable Biological Catch (ABC)	40,000	Higher Range
(c) Commercial Discard Set-Aside	4.52%	from recent observations
(d) Initial Optimum Yield (IOY)/DAH/DAP	38,192	ABC - discard set-aside

Illex C Specification Rationale

(a) Overfishing Limit (OFL) – No assessments are available for *Illex*.
(b) Acceptable Biological Catch (ABC) – This is 1/3 higher than the SSC-recommended ABC to provide a range for analysis.
(c) Discard Set-Aside – Based on recent available observer data and discard estimates.
(d) IOY/DAH/DAP – The Initial Optimum Yield is the ABC less discards, and since domestic vessels/processors can harvest/process all of the quota, IOY equals the domestic annual harvest (DAH) as well as the domestic annual processing (DAP) amounts.

This alternative is also different from no action in that it would also implement 48-hour reporting after July 15 for commercial dealers and change the closure threshold from 95% of the DAH to 94% - both measures are designed to help avoid quota overages, which occurred in 2018 and 2019.

"Illex **D" – 2021 Specifications with ABC 1/3 lower than 2020/Current with monitoring change**

Table 8. *Illex* D Specifications

Specification	Illex 2021 (MT)	Rationale
(a) Overfishing Limit (OFL)	Not available	unknown
(b) Acceptable Biological Catch (ABC)	20,000	Lower Range
(c) Commercial Discard Set-Aside	4.52%	from recent observations
(d) Initial Optimum Yield (IOY)/DAH/DAP	19,096	ABC - discard set-aside

Illex D Specification Rationale

(a) Overfishing Limit (OFL) – No assessments are available for *Illex*.
(b) Acceptable Biological Catch (ABC) – This is 1/3 lower than the SSC-recommended ABC to provide a range for analysis.
(c) Discard Set-Aside – Based on recent available observer data and discard estimates.
(d) IOY/DAH/DAP – The Initial Optimum Yield is the ABC less discards, and since domestic vessels/processors can harvest/process all of the quota, IOY equals the domestic annual harvest (DAH) as well as the domestic annual processing (DAP) amounts.

This alternative is also different from no action in that it would also implement 48-hour reporting after July 15 for commercial dealers and change the closure threshold from 95% of the DAH to 94% - both measures are designed to help avoid quota overages, which occurred in 2018 and 2019.

5.3 Longfin Squid Specifications Alternatives

The following three alternatives are considered for Longfin squid (simply "longfin" hereafter).

"Longfin **A" – 2021 Specifications Same as 2020/Current (No action and Preferred)**

Table 9. Longfin A Specifications

Specification	Longfin 2021-2023 (MT)	Rationale
(a) Overfishing Limit (OFL)	Not available	unknown
(b) Acceptable Biological Catch (ABC)	23,400	from SSC
(c) Commercial Discard Set-Aside	2.00%	from recent observations
(d) Initial Optimum Yield (IOY)/DAH/DAP	22,932	ABC - discard set-aside

Longfin A Specification Rationale

(a) Overfishing Limit (OFL) – No OFL is available for Longfin.
(b) Acceptable Biological Catch (ABC) – The SSC's ABC recommendation, which should avoid overfishing given the available information. The SSC's recommendation is based on a holistic evaluation of available information and historical fishery performance, along with an assessment that can not provide overfishing reference points but does suggest that stock is not overfished.
(c) Discard Set-Aside – Based on recent available observer data and discard estimates.
(d) IOY/DAH/DAP – The Initial Optimum Yield is the ABC less discards, and since domestic vessels/processors can harvest/process all of the quota, IOY equals the domestic annual harvest (DAH) as well as the domestic annual processing (DAP) amounts.

With this alternative, no other management or monitoring provisions would change.

"Longfin B" – 2021 Specifications with ABC 1/3 higher than 2020/Current

Table 10. Longfin B Specifications

Specification	Longfin 2021-2023 (MT)	Rationale
(a) Overfishing Limit (OFL)	Not available	unknown
(b) Acceptable Biological Catch (ABC)	31,200	Higher Range
(c) Commercial Discard Set-Aside	2.00%	from recent observations
(d) Initial Optimum Yield (IOY)/DAH/DAP	30,576	ABC - discard set-aside

Longfin B Specification Rationale

(a) Overfishing Limit (OFL) – No OFL is available for Longfin.
(b) Acceptable Biological Catch (ABC) – This is 1/3 higher than the SSC-recommended ABC to provide a range for analysis.
(c) Discard Set-Aside – Based on recent available observer data and discard estimates.
(d) IOY/DAH/DAP – The Initial Optimum Yield is the ABC less discards, and since domestic vessels/processors can harvest/process all of the quota, IOY equals the domestic annual harvest (DAH) as well as the domestic annual processing (DAP) amounts.

"Longfin C" – 2021 Specifications with ABC 1/3 lower than 2020/Current

Table 11. Longfin C Specifications

Specification	Longfin 2021-2023 (MT)	Rationale
(a) Overfishing Limit (OFL)	Not available	unknown
(b) Acceptable Biological Catch (ABC)	15,600	Lower Range
(c) Commercial Discard Set-Aside	2.00%	from recent observations
(d) Initial Optimum Yield (IOY)/DAH/DAP	15,288	ABC - discard set-aside

Longfin C Specification Rationale

(a) Overfishing Limit (OFL) – No OFL is available for Longfin.
(b) Acceptable Biological Catch (ABC) – This is 1/3 lower than the SSC-recommended ABC to provide a range for analysis.
(c) Discard Set-Aside – Based on recent available observer data and discard estimates.
(d) IOY/DAH/DAP – The Initial Optimum Yield is the ABC less discards, and since domestic vessels/processors can harvest/process all of the quota, IOY equals the domestic annual harvest (DAH) as well as the domestic annual processing (DAP) amounts.

5.4 Butterfish Specifications Alternatives

The following three alternatives are considered for butterfish.

***"Butterfish* A" – 2021-2022 Specifications Same as 2020/Current (No action)**

Table 12. Butterfish A Specifications

	Specification	2021	2022	Rationale Summary
	OFL	22,053	na	From projection for 2020
a	ABC	32,063	32,063	From SSC, scientific uncertainty
b	ACT Buffer %	10%	10%	for management uncertianty
c	ACT Buffer	3,206	3,206	a times b
d	ACT (a-c)	28,857	28,857	a-c
e	Assumed discards in directed fishing (2.4%)	584	584	from older observer data
f	Assumed other discards	637	637	from cap performance
g	Non-longfin discards	1,221	1,221	e+f
h	Butterfish Cap (longfin discards)	3,884	3,884	set by Council
i	Total discard set-aside	5,105	5,105	g+h
j	Landings or "Domestic Annual Harvest" (DAH)	23,752	23,752	d-i
k	Close primary directed at this amount, i.e. with 1,000 mt left; go to 5,000 pound trip limit	22,752	22,752	j-1000

Butterfish A Specification Rationale

Overfishing Limit (OFL) – The OFL is calculated/projected from the assessment.
(a) Acceptable Biological Catch (ABC) – Last year of previous ABC recommendations from SSC to account for scientific uncertainty based on earlier projections.
(b) Annual Catch Target (ACT) Buffer Percent – this accounts for management uncertainty as the closure system is relatively untested.
(c) ACT Buffer – This is calculated from the buffer percent.
(d) Annual Catch Target (ACT) – This is the ABC minus the ACT buffer.
(e) Assumed discards – This was estimated from older observer data for directed trips.
(f) Assumed other discards – this is based on fishery performance in the early butterfish cap years.
(g) Non-longfin discards – This adds (e) and (f).
(h) Butterfish cap – This controls butterfish discards in the longfin squid fishery and is set by the Council such that the longfin squid fishery should be able to operate if it avoids excessive butterfish discards.
(i) Total discard set-aside – This combines all discards (g+h)
(j) Domestic Annual Harvest (DAH) – This is the catch target (ACT) minus all discard set-asides.
(k) Primary closure – This slows the directed fishery to avoid overages and allows for retention of incidental catch as the DAH is approached.

With this alternative, no other management or monitoring provisions would change.

“Butterfish **B” – 2021-2022 Specifications Based on updated assessment/variable projections. (Preferred)**

Table 13. Butterfish B Specifications

	Specification	2021	2022	Rationale Summary
	OFL	22,053	24,341	From projections
a	ABC	11,993	17,854	From SSC, scientific uncertainty
b	ACT Buffer %	5%	5%	for management uncertianty
c	ACT Buffer	600	893	a times b
d	ACT (a-c)	11,393	16,961	a-c
e	Assumed discards in directed fishing (7.6%)	522	945	from observer data
f	Assumed other discards	637	637	from cap performance
g	Non-longfin discards	1,159	1,582	e+f
h	Butterfish Cap (longfin discards)	3,884	3,884	set by Council
i	Total discard set-aside	5,043	5,466	g+h
j	Landings or "Domestic Annual Harvest" (DAH)	6,350	11,495	d-i
k	Close primary directed at this amount, i.e. with 1,000 mt left; go to 5,000 pound trip limit	5,350	10,495	j-1000

Butterfish B Specification Rationale

Overfishing Limit (OFL) – The OFL is calculated/projected from the assessment.
(a) Acceptable Biological Catch (ABC) –ABC recommendations from SSC to account for scientific uncertainty. With this option the ABC increases from 2021 to 2022 as stock size is predicted to increase. These are based on the recent (2020) assessment and the Council’s risk policy to avoid overfishing.
(b) Annual Catch Target (ACT) Buffer Percent – this accounts for management uncertainty as the closure system is relatively untested.
(c) ACT Buffer – This is calculated from the buffer percent.
(d) Annual Catch Target (ACT) – This is the ABC minus the ACT buffer.
(e) Assumed discards – This was estimated from newer observer data for directed trips.
(f) Assumed other discards – this is based on fishery performance in the early butterfish cap years.
(g) Non-longfin discards – This adds (e) and (f).
(h) Butterfish cap – This controls butterfish discards in the longfin squid fishery and is set by the Council such that the longfin squid fishery should be able to operate if it avoids excessive butterfish discards.
(i) Total discard set-aside – This combines all discards (g+h)
(j) Domestic Annual Harvest (DAH) – This is the catch target (ACT) minus all discard set-asides.
(k) Primary closure – This slows the directed fishery to avoid overages and allows for retention of incidental catch as the DAH is approached.

With this alternative, no other management or monitoring provisions would change.

"Butterfish **C" – 2021-2022 Specifications Based on updated assessment/constant projections.**

Table 14. Butterfish C Specifications

	Specification	2021	2022	Rationale Summary
	OFL	22,053	23,674	From projections
a	ABC	14,924	14,924	From SSC, scientific uncertainty
b	ACT Buffer %	5%	5%	for management uncertianty
c	ACT Buffer	746	746	a times b
d	ACT (a-c)	14,178	14,178	a-c
e	Assumed discards in directed fishing (7.6%)	734	734	from observer data
f	Assumed other discards	637	637	from cap performance
g	Non-longfin discards	1,371	1,371	e+f
h	Butterfish Cap (longfin discards)	3,884	3,884	set by Council
i	Total discard set-aside	5,255	5,255	g+h
j	Landings or "Domestic Annual Harvest" (DAH)	8,923	8,923	d-i
k	Close primary directed at this amount, i.e. with 1,000 mt left; go to 5,000 pound trip limit	7,923	7,923	j-1000

Butterfish C Specification Rationale

Overfishing Limit (OFL) – The OFL is calculated/projected from the assessment.
(a) Acceptable Biological Catch (ABC) –ABC recommendations from SSC to account for scientific uncertainty. With this option the ABC stays steady in between the two years of the "Butterfish B" specifications to increase stability (this ABC level still avoids overfishing).
(b) Annual Catch Target (ACT) Buffer Percent – this accounts for management uncertainty as the closure system is relatively untested.
(c) ACT Buffer – This is calculated from the buffer percent.
(d) Annual Catch Target (ACT) – This is the ABC minus the ACT buffer.
(e) Assumed discards – This was estimated from newer observer data for directed trips.
(f) Assumed other discards – this is based on fishery performance in the early butterfish cap years.
(g) Non-longfin discards – This adds (e) and (f).
(h) Butterfish cap – This controls butterfish discards in the longfin squid fishery and is set by the Council such that the longfin squid fishery should be able to operate if it avoids excessive butterfish discards.
(i) Total discard set-aside – This combines all discards (g+h)
(j) Domestic Annual Harvest (DAH) – This is the catch target (ACT) minus all discard set-asides.
(k) Primary closure – This slows the directed fishery to avoid overages and allows for retention of incidental catch as the DAH is approached.

With this alternative, no other management or monitoring provisions would change.

6.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT AND FISHERIES

This section identifies and describes the *valued ecosystem components* (Beanlands and Duinker 1984) that comprise the affected environment and may be affected by the alternatives proposed in this document. The valued ecosystem components are identified and described here as a means of establishing the context for the impact analysis that will be presented in Section 7's "Analysis of Impacts." The significance of the various impacts of the proposed alternatives on the valued ecosystem components are also assessed from a cumulative effects perspective at the end of Section 7. The valued ecosystem components are:

1. Managed resources (Atlantic mackerel, Chub Mackerel, *Illex* squid, longfin squid, and butterfish)
2. Habitat including EFH for the managed resources and non-target species
3. Endangered and other protected resources
4. Other non-target species
5. Human communities

Overviews of the managed species and of the physical environment are described first, to establish the context for the valued ecosystem components. Impacts of the alternatives on the physical environment are addressed through analysis of impacts on habitat, as most of the impacted physical environment comprises EFH for various species.

6.1 Description of the Managed Resources

Mackerel

Unless otherwise indicated, the information in this section is taken from the EFH source document at http://www.nefsc.noaa.gov/nefsc/habitat/efh/ and the recent assessment at https://apps-nefsc.fisheries.noaa.gov/saw/sasi/sasi_report_options.php.

Atlantic mackerel is a semi-pelagic/semi-demersal (may be found near the bottom or higher in the water column) schooling fish species primarily distributed between Labrador (Newfoundland, Canada) and North Carolina. Based on the work of Sette (1943, 1950) and confirmed in the recent assessment, the stock is considered to comprise two spawning contingents: a northern contingent spawning primarily in the southern Gulf of St. Lawrence and a southern contingent spawning in the Mid-Atlantic Bight, Southern New England and the western Gulf of Maine. The two contingents mix during winter months on the Northeast U.S. shelf; however, the degree of mixing and natal homing is unknown. Mackerel in the northwest Atlantic were modeled as one stock for the recent assessment. The Canadian fishery likely primarily catches the northern contingent while the U.S. fishery likely catches both contingents. Mackerel spawning occurs during spring and summer and progresses from south to north as the surface waters warm. Mackerel are serial, or batch spawners. Eggs are pelagic. Post-larvae gradually transform from planktonic to swimming and schooling behavior at about 30-50 mm. Approximately 50% of fish are mature at age 2 and about 99% were mature at age 3 from 2007-2016 according to the recent benchmark assessment.

Based on the most recent assessment model (statistical catch-at-age model incorporating both fishery dependent and fishery independent data through 2016), the status of Mackerel is overfished with overfishing occurring (NEFSC 2018), and a rebuilding program is underway, though catches have been frozen to take account of potentially lower-than-expected recruitment. Rebuilding projections indicated there will likely be no overfishing in 2018 and that the stock should have climbed above the overfished threshold in 2018. These rebuilding projections, however, are critically dependent on the estimate of the 2015 year class, which was the most uncertain parameter from the assessment model (as is typical of all such assessments). The biomass target is the SSB associated with the FMSY proxy or "SSBmsyproxy," and is estimated to be 196,894 mt. This is also the rebuilding biomass target. Once rebuilt, the MSYproxy (i.e. the proxy for maximum sustainable yield) is estimated to be 41,334 mt (total catch, U.S. plus Canada). Optimum yield is the landings that result from the Council's risk policy to rebuild the stock and avoid overfishing. A planned 2020 update of the assessment has been postponed due to data delays but is underway in 2021.

Illex Squid

Unless otherwise indicated, the information in this section is taken from the EFH source document at http://www.nefsc.noaa.gov/nefsc/habitat/efh/ and a collection of working papers developed and/or organized by the Council's *Illex* Working Group and posted to https://www.mafmc.org/ssc-meetings/2020/may-12-13.

Illex squid is a semi-pelagic/semi-demersal schooling cephalopod species distributed between Newfoundland and the Florida Straits. Their lifespan is less than one year with complex stock dynamics that are likely highly sensitive to environmental parameters and not well understood. There is a northern NAFO and southern U.S. management component, but assessments for both have been highly uncertain and without good predictive abilities. Accordingly, the status of *Illex* is unknown with respect to being overfished or not, and unknown with respect to experiencing overfishing or not. A working group created by the Council developed a series of working papers, and after a holistic review the SSC determined that catches up to 30,000 mt are currently unlikely to cause overfishing.

Longfin Squid

Unless otherwise indicated, the information in this section is taken from the EFH source document at http://www.nefsc.noaa.gov/nefsc/habitat/efh/ and the recent assessment at https://apps-nefsc.fisheries.noaa.gov/saw/sasi/sasi_report_options.php.

Longfin squid is a semi-pelagic/semi-demersal schooling cephalopod species primarily distributed between Georges Bank and Cape Hatteras, NC. Their lifespan is less than one year with complex overlapping cohort stock dynamics that are likely highly sensitive to environmental parameters. They winter near the edge of the continental shelf and migrate inshore in the spring into primarily northern Mid-Atlantic and southern New England waters.

There are no fishing mortality reference points for longfin squid, but the recent longfin squid management track assessment found that the annualized 2-year moving average of biomass was above the target in 2019. The annualized 2-year moving average exploitation rate was near the long term median. The 2-year moving averages for non-annualized (examining the spring and fall surveys separately) were also near or above potential proxy biomass targets, and the 2-year moving averages for non-annualized exploitation indices were near or below their long term medians in 2019 (NEFSC 2020b). The median fall swept-area biomass estimate is about five times bigger than the median spring biomass, though uncertainties about potential differences in catchability between the fall and spring surveys make that scale difference somewhat difficult to interpret.

Butterfish

Unless otherwise indicated, the information in this section is taken from the EFH source document at http://www.nefsc.noaa.gov/nefsc/habitat/efh/ and the recent assessment at https://apps-nefsc.fisheries.noaa.gov/saw/sasi/sasi_report_options.php.

Atlantic butterfish is a semi-pelagic/semi-demersal schooling fish species primarily distributed between Nova Scotia, Canada and Florida. They are most abundant from the Gulf of Maine to Cape Hatteras and are fast-growing, short-lived, and form loose schools. They winter near the edge of the continental shelf and migrate inshore in the spring into Mid-Atlantic, southern New England, and Gulf of Maine waters. Butterfish are short-lived and grow rapidly; few individuals live beyond 3 years and most are sexually mature at 1-2 years of age. The maximum age reported is 6 years. Juvenile butterfish range from 16 mm to about 120 mm. During their first year, they grow to 76-127 mm, or about half their adult size. Early-spawned individuals are 76-102 mm in the fall; late-spawned individuals are 51-76 mm in the fall and 76-127 mm the following spring. Adult butterfish range from about 120 mm to 305mm with an average length of 150-230 mm. Approximately half of 120 mm fish are mature for butterfish collected on the northeast shelf (1986-1989), which corresponds to an age of about 1 year.

The status of butterfish with 2019 data is not overfished with no overfishing occurring according to a recent management track assessment (NEFSC 2020a). The assessment update found that butterfish was at 69% of the target biomass in 2019. Given butterfish's short life history and variable recruitment substantial fluctuations are not unexpected. Fishing mortality appears to have been low in recent years, so recent declines are not a result of overfishing but rather poor recruitment. If recruitment returns to average levels, then the stock is predicted to build above the SSBmsy target quickly. The MSY biomass is 42,247 mt, and the MSY is 31,136 mt.

Chub Mackerel

While not directly addressed in this action, Chub Mackerel are now managed by this FMP. There is no chub mackerel assessment, and sparse catches occur in the NEFSC fall survey (none in the spring survey). Abundance/availability fluctuations are likely driven by environment drivers that are not well understood. Based loosely on the historic high for landings and assumptions about discards, current ABCs are based on the expert judgement of the SSC to likely avoid overfishing given the general productivity of the species worldwide combined with low fishery capacity in this region. Additional information on chub mackerel is available in Amendment 21 to the MSB FMP (https://www.mafmc.org/msb), which became effective in 2020.

6.2 Physical Environment

Climate, physiographic, and hydrographic differences separate the Atlantic Ocean from Maine to Florida into the New England-Middle Atlantic Area and the South Atlantic Area (division/mixing at Cape Hatteras, NC). The MSB fisheries are prosecuted in the New England-Middle Atlantic Area. The inshore New England-Middle Atlantic area is relatively uniform physically, and is influenced by many large coastal rivers and estuarine areas. The continental shelf (characterized by water less than 650 ft. in depth) extends seaward approximately 120 miles off Cape Cod, narrows gradually to 70 miles off New Jersey, and is 20 miles wide at Cape Hatteras. Surface circulation is generally southwesterly on the continental shelf during all seasons of the year, although this may be interrupted by coastal indrafting and some reversal of flow at the northern and southern extremities of the area. Water temperatures range from less than 33 ^{o}F from the New York Bight north in the winter to over 80 ^{o}F off Cape Hatteras in summer.

Within the New England-Middle Atlantic Area, the principal area within which the MSB fisheries are prosecuted, is the Northeast Shelf Ecosystem which includes the area from the Gulf of Maine to Cape Hatteras, extending from the coast seaward to the edge of the continental shelf, including the slope sea offshore to the Gulf Stream. A number of distinct subsystems comprise the region. The Gulf of Maine is an enclosed coastal sea, characterized by relatively cold waters and deep basins, with various sediment types. Georges Bank is a relatively shallow coastal plateau that slopes gently from north to south and has steep submarine canyons on its eastern and southeastern edge. It is characterized by highly productive, well-mixed waters and fast-moving currents. The Mid-Atlantic Bight is comprised of the sandy, relatively flat, gently sloping continental shelf from southern New England to Cape Hatteras, NC. Detailed information on the affected physical and biological environments inhabited by the managed resources is available in Stevenson et al. (2006).

Ecosystem Considerations

The Council recently adopted an Ecosystem Approach to Fisheries Management (EAFM) Guidance Document, available at http://www.mafmc.org/eafm/. It is anticipated that the EAFM Guidance Document will serve through a transitional period where ecosystem considerations are introduced into Council management in an evolutionary fashion. Some highlights from the EAFM Guidance Document that could apply to MSB management include:

-It is the policy of the Council to support the maintenance of an adequate forage base in the Mid-Atlantic to ensure ecosystem productivity, structure and function and to support sustainable fishing communities.

-The Council could adopt biological reference points (overfishing levels or OFL) for forage stocks that are more conservative than the required MSA standard of F_{MSY}.

-The Council could modify the existing risk policy to accommodate ecosystem level concerns for forage species by reducing the maximum tolerance for risk of overfishing.

-The Council will promote the timely collection of data and development of analyses to support the biological, economic and social evaluation of ecosystem-level connections, tradeoffs, and risks, including those required to establish an optimal forage fish harvest policy.

-Habitat and climate change considerations will be more fully integrated into fishery management decisions.

The NEFSC also produces regular updates on conditions of the Northeast Shelf Ecosystem, which may be accessed via https://www.nefsc.noaa.gov/ecosys/. Highlights from the 2020 Mid-Atlantic Update (NEFSC 2020c) include:

- Total commercial fishery landings were scaled to ecosystem productivity. Primary production required to support Mid-Atlantic commercial landings has been declining since 2000.

- Engagement in commercial fishing has declined since 2004 for medium to highly engaged Mid-Atlantic fishing communities. This may be related to the overall downward trend in commercial landings since 1986 and the decline in total revenue since 2004.

- 2018 retained recreational catch in the Mid-Atlantic was the lowest observed since 1982. There is also a similar, although less steep decline in recreational fishing effort. The party/charter sector is expected to continue to shrink. Recreational species catch diversity has been maintained by increased catch of South Atlantic and state managed species.

- Habitat modeling indicates that summer flounder, butterfish, longfin squid, and spiny dogfish are among fish species highly likely to occupy wind energy lease areas. Habitat conditions for many of these species have become more favorable over time within wind lease areas.

- There are no apparent trends in aggregate biomass of predators, forage fish, bottom feeders, and shellfish sampled by trawl surveys, implying a stable food web. However, we continue to see a northward shift in aggregate fish distribution along the Northeast US shelf and a tendency towards distribution in deeper waters.

- Forage fish energy content is now being measured regularly, revealing both seasonal and annual variation in energy of these important prey species due to changing ecosystem conditions. Notably, Atlantic herring energy content is half what it was in the 1980-90s.

- Nearshore habitats are under stress. Heavy rains in 2018-2019 resulted in unprecedented fresh water and high nutrient flow into the Chesapeake Bay, driving low oxygen, increased oyster mortality, and spread of invasive catfish in this critical Mid-Atlantic nursery habitat. Sea level rise is altering coastal habitats in the Mid-Atlantic, driving declines in nesting seabirds on Virginia islands.

- The Northeast US shelf ecosystem continued to experience warm conditions in 2019, with changes in ocean circulation affecting the shelf. The Gulf Stream is increasingly unstable, with more warm core rings resulting in higher likelihood of warm salty water and associated oceanic species such as shortfin squid coming onto the shelf.

- The intensity and duration of marine surface heatwaves are increasing, and bottom temperatures both in the seasonal Mid-Atlantic cold pool and shelfwide are increasing. Warmer temperatures increase nutrient recycling and summer phytoplankton productivity.

6.3 Habitat, Including Essential Fish Habitat (EFH)

Pursuant to the MSA / EFH Provisions (50 CFR Part 600.815 (a)(1)), an FMP must describe EFH by life history stage for each of the managed species in the plan. This information was updated via Amendment 11 to the MSB FMP. EFH for the four species managed under this FMP is described using fundamental information on habitat requirements by life history stage that is summarized in a series of EFH source documents produced by NMFS and available at: http://www.nefsc.noaa.gov/nefsc/habitat/efh/. The updated EFH designations (text and maps) are available at http://www.habitat.noaa.gov/protection/efh/efhmapper/. In general, EFH for the MSB species is the water column itself, and the species have temperature and prey preferences/needs that determine the habitat suitability of any particular area/depth, thus fishing activity has minimal impacts. Longfin squid also use hard bottom, submerged vegetation, other natural or artificial structure, and sand or mud to attach/anchor eggs, but there are no known preferences for different types of substrates or indications that fishing activity may negatively impact longfin squid egg EFH (which is separate from impacting the eggs themselves).

There are other lifestages of federally-managed species that have designated EFH that may be susceptible to adverse impacts from the bottom trawls predominantly used in MSB fisheries, depending on the geographic distribution of their essential habitats in relation to the footprint of MSB bottom trawl fishing activity, described in the following table (see Stevenson et al 2004):

Table 15. EFH descriptions for species vulnerable to trawl gear

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
Acadian redfish	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
American plaice	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
Atlantic cod	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 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)
Atlantic sea scallop	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

Species	Life Stage	Geographic Area	Depth (meters)	Habitat Type and Description
Atlantic sea scallop	Juveniles	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 initially attached to shells, gravel, and small rocks (pebble, cobble), later free-swimming juveniles found in same habitats as adults
Atlantic sea scallop	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
Atlantic surfclams	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
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
Atlantic wolffish	Juveniles	U.S. waters north of 41˚N latitude and east of 71˚W longitude	70-184	Sub-tidal benthic habitats
Atlantic wolffish	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
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
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
Chub Mackerel	Eggs	Pelagic waters throughout the exclusive economic zone (EEZ) from North Carolina to Texas, including intertidal and subtidal areas, at temperatures of 15-25 °C		
	Larvae	Pelagic waters throughout the EEZ from North Carolina to Texas, including intertidal and subtidal areas, at temperatures of 15-30 °C		
	Juveniles and Adults	Pelagic waters throughout the EEZ from Maine to Texas, including intertidal and subtidal areas, at temperatures of 15-30 °C		
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
Clearnose skate	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

Species	Life Stage	Geographic Area	Depth (meters)	Habitat Type and Description
Deep-sea red crab	Eggs	Outer continental shelf and slope throughout the region, including two seamounts	320-640	Benthic habitats attached to female crabs
Deep-sea red crab	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
Deep-sea red crab	Adults	Outer continental shelf and slope throughout the region, including two seamounts	320-900 on slope and up to 2000 on seamounts	Benthic habitats with unconsolidated and consolidated silt-clay sediments
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
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
Haddock	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
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
Little skate	Adults	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-100	Intertidal and sub-tidal benthic habitats on sand and gravel, also found on mud
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
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
Monkfish	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
Ocean pout	Eggs	Georges Bank, Gulf of Maine, and the Mid-Atlantic, including	<100	Sub-tidal hard bottom habitats in sheltered nests, holes, or rocky crevices

Species	Life Stage	Geographic Area	Depth (meters)	Habitat Type and Description
		certain bays and estuaries in the Gulf of Maine		
Ocean pout	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
Ocean pout	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
Ocean quahogs	Juveniles and adults	Continental shelf from southern New England and Georges Bank to Virginia	9-244	In substrate to depth of 3 ft
Offshore hake	Juveniles	Outer continental shelf and slope from Georges Bank to 34° 40'N	160-750	Pelagic and benthic habitats
Offshore hake	Adults	Outer continental shelf and slope from Georges Bank to 34° 40'N	200-750	Pelagic and benthic habitats
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
Pollock	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
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, esp 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)
Red hake	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
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
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

Species	Life Stage	Geographic Area	Depth (meters)	Habitat Type and Description
Scup	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
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
Silver hake	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
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
Smooth skate	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
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
Summer flounder	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
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
Spiny dogfish	Female sub-adults	Throughout the region	Wide depth range	Pelagic and epibenthic habitats
Spiny dogfish	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
Spiny dogfish	Female adults	Throughout the region	Wide depth range	Pelagic and epibenthic habitats
Spiny dogfish	Male adults	Throughout the region	Wide depth range	Pelagic and epibenthic habitats
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 om slope	Benthic habitats on a wide variety of bottom types, including sand, gravel, broken shells, pebbles, and soft mud
Thorny skate	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	Benthic habitats on a wide variety of bottom types, including sand, gravel, broken shells, pebbles, and soft mud

Species	Life Stage	Geographic Area	Depth (meters)	Habitat Type and Description
			Maine, to 900 om slope	
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
White hake	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 northern Florida, including bays and estuaries from Maine to Maryland	Mean high water - 60	Intertidal and sub-tidal benthic habitats on mud and sand substrates
Windowpane flounder	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
Winter flounder	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
Winter flounder	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
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
Winter skate	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

Species	Life Stage	Geographic Area	Depth (meters)	Habitat Type and Description
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
Witch flounder	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
Yellowtail flounder	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

Fishery Impact Considerations

Actions implemented that affect species with overlapping EFH were assessed in Amendment 9 to the MSB FMP in 2008 (http://www.mafmc.org/fmp/history/smb-hist.htm). Amendment 9 summarized Stevenson et al. 2004's findings on bottom-trawling's habitat impacts as:

> "In studies examining the effect of bottom otter trawling on a variety of substrate types, it was demonstrated that the physical effects of trawl doors contacting the bottom produced furrows and some shifts in surface sediment composition, although there is a large variation in the duration of these impacts. Typically the more dynamic environment and less structured bottom composition, the shorter the duration of impact. This type of fishing was demonstrated to have some effects on composition and biomass of benthic species in the effected areas, but the directionality and duration of these effects varied by study and substrate types."

Mackerel, longfin squid, *Illex* squid, and butterfish are all caught with mobile bottom-tending gear that does contact the bottom, though in some years most mackerel catch is made with mid-water gear which should not impact the bottom. Industry contacts report that MSB effort is generally over sand/mud bottoms that will not damage nets and that "hangs" or areas with structure have been mapped over the years and are avoided. Amendment 9 included an analysis of the adverse impacts of the MSB fisheries on EFH (per section 303(a)(7) of the MSA). In Amendment 9 the Council determined that bottom trawls used in MSB fisheries do have the potential to adversely affect EFH for some federally-managed fisheries in the region and closed portions of two offshore canyons (Lydonia and Oceanographer) to squid trawling. Subsequent closures were implemented in these and two other canyons (Veatch and Norfolk) to protect tilefish EFH by prohibiting all bottom trawling activity. The Council has also taken action for protections for deep-sea corals on the outer continental shelf and slope via Amendment 16 to the MSB FMP.

Because there have been no significant changes to the manner in which the MSB fisheries are prosecuted, and because none of the alternatives being considered in this document should adversely affect EFH (see section 7.0), no additional alternatives to minimize adverse effects on EFH are considered as part of this management action.

6.4 ESA Listed Species and MMPA Protected Species

Protected species are those afforded protections under the Endangered Species Act (ESA; species listed as threatened or endangered under the ESA) and/or the Marine Mammal Protection Act (MMPA). Table 16 provides a list of protected species that occur in the affected environment of the MSB fisheries and the potential for the fishery to impact the species, specifically via interactions with MSB fishing gear (i.e., mid-water trawl and bottom trawl gear).

Table 16. Species Protected Under the ESA and/or MMPA that May Occur in the Affected Environment of the MSB FMP

Species	**Status**[2]	***Potential to interact with MSB fishing gear?***
Cetaceans		
North Atlantic right whale (Eubalaena glacialis)	***Endangered***	***No***
Humpback whale, West Indies DPS, (*Megaptera novaeangliae*)	Protected (MMPA)	No
Fin whale (Balaenoptera physalus)	***Endangered***	***No***
Sei whale (Balaenoptera borealis)	***Endangered***	***No***
Blue whale (Balaenoptera musculus)	***Endangered***	***No***
Sperm whale (Physeter macrocephalus	***Endangered***	***No***
Minke whale (*Balaenoptera acutorostrata*)	Protected (MMPA)	Yes
Pilot whale (Globicephala spp.)[3]	Protected (MMPA)	Yes
Pygmy sperm whale (*Kogia breviceps*)	Protected (MMPA)	No
Dwarf sperm whale (*Kogia sima*)	Protected (MMPA)	No
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
Atlantic Spotted dolphin (*Stenella frontalis*)	Protected (MMPA)	No
Striped dolphin (*Stenella coeruleoalba*)	Protected (MMPA)	No
Beaked whales (*Ziphius and Mesoplodon spp*)[4]	Protected (MMPA)	No
Bottlenose dolphin (Tursiops truncatus)[5]	***Protected (MMPA)***	***Yes***

Species	**Status[2]**	***Potential to interact with MSB fishing gear?***
Harbor porpoise (*Phocoena phocoena*)	Protected (MMPA)	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)	No
Sea Turtles		
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered	Yes
Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered	Yes
Green sea turtle, North Atlantic DPS (*Chelonia mydas*)	Threatened	Yes
Loggerhead sea turtle (*Caretta caretta*), Northwest Atlantic Ocean DPS	Threatened	Yes
Hawksbill sea turtle (*Eretmochelys imbricate*)	Endangered	No
Fish		
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
Giant manta ray (*Manta birostris*)	Threatened	Yes
Critical Habitat		
Northwest Atlantic DPS of Loggerhead Sea Turtle	ESA (Protected)	No
North Atlantic Right Whale Critical Habitat	ESA (Protected)	No

Species	Status[2]	***Potential to interact with MSB fishing gear?***
Notes: Marine mammal species (cetaceans and pinnipeds) italicized and in bold are considered MMPA strategic stocks. Shaded rows indicate species who prefer continental shelf edge/slope waters (i.e., >200 meters). [1] A strategic stock is defined under the MMPA as a marine mammal stock for which: (1) the level of direct human-caused mortality exceeds the potential biological removal level; (2) based on the best available scientific information, is declining and is likely to be listed as a threatened species under the ESA within the foreseeable future; and/or (3) is listed as a threatened or endangered species under the ESA, or is designated as depleted under the MMPA (Section 3 of the MMPA of 1972). [2] Status is defined by whether the species is listed under the ESA as endangered (i.e. at risk of extinction) or threatened (i.e. at risk of endangerment), or protected under the MMPA. Marine mammals listed under the ESA are also protected under the MMPA. Candidate species are those species for which ESA listing may be warranted. [3] There are 2 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 referred to as *Globicephala spp*. [4] There are multiple species of beaked whales in the Northwest Atlantic. They include the cuvier's (*Ziphius cavirostris*), blainville's (*Mesoplodon densirostris*), gervais' (*Mesoplodon europaeus*), sowerbys' (*Mesoplodon bidens*), and trues' (*Mesoplodon mirus*) beaked whales. Species of *Mesoplodon* are difficult to identify at sea, therefore, much of the available characterization for beaked whales is to the genus level only. [5] This includes the Western North Atlantic Offshore, Northern Migratory Coastal, and Southern Migratory Coastal Stocks of Bottlenose Dolphins.		

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

6.4.1. Protected Species and Critical Habitat Not Likely to be Impacted (via interactions with gear or destruction of essential features of critical habitat) by the MSB fisheries

Based on available information, it has been determined that this action is not likely to affect (via interactions with gear or destruction of essential features of critical habitat) multiple ESA listed and/or marine mammal protected species or any designated critical habitat (see Table 16). 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 been no observed or documented interactions between the species and the primary gear type (i.e., bottom otter and mid-water trawls) used to prosecute the MSB fisheries (Greater Atlantic Region Marine Animal Incident Database, unpublished data; Marine Mammal Stock Assessment Reports (SARS) for the Atlantic Region: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; MMPA List of Fisheries (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[7]. In the case of critical habitat, this determination has been made because operation of the MSB fisheries will not affect the essential physical and biological features of North Atlantic right whale or loggerhead (NWA DPS) critical habitat and therefore, will not result in the destruction or adverse modification of any species critical habitat (NMFS 2014; NMFS 2015a,b).

6.4.2. Protected Species Potentially Impacted by the Proposed Action

Table 16 provides a list of protected species of sea turtle, marine mammal, and fish species present in the affected environment of the MSB fishery, and that may also be affected 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 affected by the action, the MMPA LOF, and marine mammal stock assessment 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 aid in identifying ESA listed species potentially affected by the action, the most recent 10 years of marine animal incidence (e.g., entanglement) and NEFSC observer data (i.e., 2010-2019; NEFSC observer/sea sampling database, unpublished data, Greater Atlantic Region Marine Animal Incident Database, unpublished data),, as well as the 2013 Biological Opinion issued by NMFS on the operation of seven commercial fisheries, including the MSB FMP, 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

7 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 2007-2016; however, entanglement data is available through 2019. For ESA listed species, information on observer or documented interactions with fishing gear is from 2010-2019.

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. Reasonable and prudent measures and terms and conditions were also issued with the ITS to minimize impacts of any incidental take.

New information on North Atlantic right whale abundance has been in decline since 2010 (Pace et al. 2017). This new information is different from that considered and has been made available that may reveal effects of the fisheries analyzed in the 2013 Opinion that may not have been previously considered. As a result, per an October 17, 2017, ESA 7(a)(2)/7(d) memorandum issued by NMFS, the 2013 Opinion has been reinitiated. However, the October 17, 2017, memorandum concludes that allowing these fisheries 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, and therefore, the continuation of these fisheries during the reinitiation period would not be likely to jeopardize the continued existence of any ESA listed species. Until replaced, the MSB fishery is currently covered by the incidental take statement authorized in NMFS 2013 Opinion.

The following provides the status/trend of MMPA and/or ESA listed species that have the potential to be impacted by the MSB fishery:

Sea Turtles (loggerhead (Northwest Atlantic Ocean DPS), Kemp's ridley, green (North Atlantic DPS), and leatherback)

Four sea turtle species have 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 (Table 16). 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).

Large Whales
As provided in Table 16, minke whales have the potential to be impacted by the proposed action. Review of the most recent NMFS Marine Mammal Stock Assessments (Hayes et al. 2020) indicates that, as a trend analysis has not been conducted, the population trajectory for minke whales is unknown.

Small Cetaceans
Risso's, Atlantic 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 16). Review of the most recent stock assessment (Hayes et al. 2020) indicates that as a trend analysis has not been conducted for Risso's, Atlantic 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 the Western North Atlantic Offshore stock of bottlenose dolphins, 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 of bottlenose dolphins (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).

Pinnipeds
Harbor, gray, and harp seals are identified as having the potential to be impacted by the proposed action (Table 16). 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 and harp seal population relative to optimum sustainable population (OSP) in U.S. Atlantic EEZ waters is unknown; however, gray seal stock's abundance appears to be increasing in Canadian and U.S. waters and harp seal stock abundance appears to have stabilized (Hayes et al. 2019; Hayes et al. 2020).

Atlantic Sturgeon
Atlantic sturgeon, from any DPS, are identified as having the potential to be impacted by the proposed action (Table 16). 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).

Atlantic Salmon (GOM DPS)
Atlantic salmon (GOM DPS) are identified as having the potential to be impacted by the proposed action (Table 16). 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).

Giant Manta Rays
Giant Manta Rays may be impacted by the proposed action (Table 16). 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). While it's 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).

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, in order to understand the potential risk of an interaction. Information on species occurrence in the affected environment of the MSB FMP is provided below, while information on protected species interactions with specific fishery gear is provided in section 6.4.3.

6.4.2.1. Sea Turtles
This section contains a brief summary of the occurrence and distribution of sea turtles in the affected environment of the MSB fisheries. Additional background information on the range-wide status of affected sea turtles species, as well as a description and life history of each of these species, can be found in a number of published documents, including sea turtle status reviews and biological reports (NMFS and USFWS 1995; Hirth 1997; TEWG 1998, 2000, 2007, 2009; NMFS and USFWS 2007a, 2007b; Conant et al. 2009; NMFS and USFWS 2013, Seminoff et al. 2015), and recovery plans for the loggerhead sea turtle (Northwest Atlantic DPS; Bolten et al. 2019, NMFS and USFWS 2008), leatherback sea turtle (NMFS and USFWS 1992, 1998a, 2013), Kemp's ridley sea turtle (NMFS et al. 2011, NMFS and USFWS 2015), and green sea turtle (NMFS and USFWS 1991, 1998b).

Hard-shelled sea turtles: In U.S. Northwest Atlantic waters, hard-shelled turtles commonly occur throughout the continental shelf from Florida to Cape Cod, MA, although their presence varies with the seasons due to changes in water temperature (Braun-McNeill et al. 2008; Braun & Epperly 1996; Epperly et al. 1995a,b; Mitchell et al. 2003; Shoop & Kenney 1992; TEWG 2009; Blumenthal et al. 2006; Braun-McNeill & Epperly 2004; Griffin et al. 2013; Hawkes et al. 2006; Hawkes et al. 2011; Mansfield et al. 2009; McClellan & Read 2007; Mitchell et al. 2003; Morreale & Standora 2005). 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 (Braun-McNeill & Epperly 2004; Epperly et al. 1995a,b,c; Griffin et al. 2013; Morreale & Standora 2005), occurring in Virginia foraging areas as early as late April and on the most northern foraging grounds in the Gulf of Maine (GOM) in June (Shoop & Kenney 1992). The trend is reversed in the fall as water temperatures cool. The majority leave the Gulf of Maine by September, but some remain in Mid-Atlantic and Northeast areas until November. By December, sea turtles have migrated south to waters offshore of North Carolina, particularly south of Cape Hatteras, and further south, although hard-shelled sea turtles can occur year-round in waters off Cape Hatteras and south (Epperly et al. 1995b; Griffin et al. 2013; Hawkes et al 2011; Shoop & Kenney 1992).

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 2013; 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).

6.4.2.2. Large Whales

Multiple species of whales occur in the Northwest Atlantic, with the minke whale being the only whale species potentially impacted by the proposed action (Table 13). Minke whales are widely distributed throughout the U.S. EEZ. From spring to the fall, minke whales are most abundant in New England continental shelf waters; however, from late fall through the winter, there is high occurrence in deep-ocean waters throughout most of the western North Atlantic (Hayes et al. 2020). In addition, like many other species of large whales in the Northwest Atlantic, minke whales can undertake seasonal migrations. Generally speaking, large whales 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 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, some portion of the population remains in higher latitudes throughout the winter (Hayes et al. 2020; Davis et al. 2017; Davis et al. 2020; Clapham *et al*. 1993; Swingle *et al*. 1993; Vu *et al*. 2012). Although further research is needed to provide a clearer understanding of large whale movements and distribution in the winter, the distribution and movements of large whales to foraging grounds in the spring/summer is well understood. Movements of whales into higher latitudes coincide with peak productivity in these waters. As a result, the distribution of large whales in higher latitudes is strongly governed by prey availability and distribution, with large numbers of whales coinciding with dense patches of preferred forage (Payne *et al*.1986, 1990; Schilling *et al.* 1992; Hayes et al. 2020, Davis et al. 2017; Davis et al. 2020). For additional information on the biology, status, and range wide distribution of minke whales, refer to the marine mammal SARs provided at: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments).

6.4.2.3. Small Cetaceans and Pinnipeds

Table 16 lists the small cetaceans and pinnipeds that may occur in the affected environment of the MSB fisheries. Small cetaceans can be found throughout the year in the Northwest Atlantic Ocean; however, within this range, there are seasonal shifts in species distribution and abundance. Pinnipeds are primarily found throughout the year or seasonally from New Jersey to Maine; however, increasing evidence indicates that some species (e.g., harbor seals) may be extending their range seasonally into waters as far south as Cape Hatteras, North Carolina (35oN). For additional information on the biology and range wide distribution of each species of small cetacean and pinniped provided in Table 16, refer to the marine mammal SARs provided at:
https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments

6.4.2.4. Atlantic Sturgeon

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 (ASMFC 2017; 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, 2015; Erickson et al. 2011; Wirgin et al. 2012; Waldman et al. 2013; O'Leary et al. 2014; Wirgin et al. 2015a,b). 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 Atlantic sturgeon may undertake seasonal movements along the coast (Dunton et al. 2010; Erickson et al. 2011; 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. For additional information on the biology, status, 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).

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6.4.2.5 Atlantic Salmon

The wild populations of Atlantic salmon are listed as endangered under the ESA. Their freshwater range occurs in the watersheds from the Androscoggin River northward along the Maine coast to the Dennys River, while the marine range of the Gulf of Maine DPS extends from the Gulf of Maine (primarily northern portion of the Gulf of Maine) to the coast of Greenland

(NMFS and USFWS 2005, 2016; Fay *et al*. 2006). In general, smolts, post-smolts, and adult Atlantic salmon may be present in the Gulf of Maine 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; USASAC 2004; Hyvarinen *et al.* 2006; Lacroix and McCurdy 1996; Lacroix *et al.* 2004, 2005; Reddin 1985; Reddin and Short 1991; Reddin and Friedland 1993, Sheehan *et al.* 2012; NMFS and USFWS 2005, 2016; Fay *et al*. 2006). For additional information on the on the biology, status, and range-wide distribution of the Gulf of Maine DPS of Atlantic salmon, refer to NMFS and USFWS (2005, 2016); and Fay *et al*. (2006).

6.4.2.6 Giant Manta Ray

Based on the giant manta ray's distribution, the species 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).

6.4.3. Gear Interactions with 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 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[8;] however, the Greater Atlantic Region (GAR) Marine Animal Incident Database (unpublished data) contains large whale entanglement reports through 2019. For ESA listed species, the most recent 10 years of data on observed or documented interactions is available from 2010-2019[9]. 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

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[8] 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/.

[9] ASMFC 2017; GAR Marine Animal Incident Database, unpublished data; Kocik et al. 2014; Marine Mammal SARs: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; Miller and Shepard 2011; Murray 2015; 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.

types used to prosecute MSB fishery (i.e., mid-water trawl and bottom trawl gear).

6.4.3.1. Gear Interactions with Sea Turtles

Bottom Otter Trawl

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 2015; Murray 2020; 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 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.

Most recently, Murray (2020) provided information on sea turtle interaction rates from 2014-2018.[10] 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, due to a greater amount of commercial effort in this stratum compared to those farther south. Within each stratum, interaction rates for non-loggerhead species were lower than rates for loggerheads.

Based on Murray (2020), from 2014-2018 (the most recent five-year period that has been statistically analyzed for trawls), 571 loggerheads (CV=0.29, 95% CI=318-997) were estimated to have interacted with bottom trawl gear in the U.S. Mid-Atlantic, while 12 loggerheads (CV=0.70, 95% CI=0-31) were estimated to have interacted with bottom trawls on Georges Bank. Of these interactions, Murray (2020) estimated 272 loggerhead sea turtles died from these interactions. In the Mid-Atlantic, 38 loggerheads were estimated to have been excluded by Turtle Excluder Devices (TEDs). In regards to non-loggerhead species, from 2014-2018, Murray (2020) estimated that a total of 46 Kemp's ridley (CV=0.45, 95% CI=10-88) and 16 green (CV=0.73, 95% CI=0-44) sea turtles interacted with bottom trawl gear in the Mid-Atlantic, of which 23 and eight resulted in mortality, respectively. Murray (2020) also estimated that 20 (CV=0.72, 95% CI = 0-50) and six (CV=1.0, 95% CI=0-20) leatherback interactions with bottom trawl gear occurred in the Mid-Atlantic and on Georges Bank, respectively; these interactions resulted in 13 total leatherback mortalities. No Kemp's ridley, green, and leatherback sea turtles were estimated to have been excluded by TEDs.

[10] For sea turtle bycatch estimates prior to 2014, see Murray (2008); Murray (2015); Warden 2011 a,b.

Mid-Water Trawl
NEFOP and ASM observer data from 1989 to 2015 show five leatherback sea turtle interactions with mid-water trawl gear; the primary species landed during these interactions was tuna (NEFSC observer/sea sampling database, unpublished data). These takes were in the early 1990s in an experimental HMS fishery that no longer operates. Review of observer data over the last 30 years (i.e., between 1989 and 2019) shows that there have been no observed takes in other mid-water trawl fisheries (e.g., MSB fishery) operating in the Greater Atlantic Region (NEFSC observer/sea sampling database, unpublished data). Based on this and the best available information, sea turtle interactions in mid-water trawl gear in the Greater Atlantic Region are expected to be rare.

6.4.3.2. Gear Interactions with Atlantic Sturgeon

Bottom Otter Trawl

Since 1989, Atlantic sturgeon interactions (i.e., bycatch) with bottom trawl gear have frequently been observed in the Greater Atlantic Region (ASMFC 2007; ASMFC 2017; Miller and Shepard 2011; NEFSC observer/sea sampling database, unpublished data; Stein et al. 2004). For bottom 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., bottom otter trawl). 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. Focusing on the most recent five-year period of data provided in the stock assessment report[11], the estimated average annual bycatch during 2011-2015 of Atlantic sturgeon in bottom otter trawl gear is 777.4 individuals.

Mid-Water Trawl

To date, there have been no observed/documented interactions with Atlantic sturgeon in mid-water trawl gear (NEFSC observer/sea sampling database, unpublished data). Based on this information, mid-water trawl gear is not expected to pose an interaction risk to any Atlantic sturgeon and therefore, is not expected to be source of injury or mortality to this species.

[11] 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.

6.4.3.3. Gear Interaction with Atlantic Salmon

Bottom Otter Trawl

Atlantic salmon are at risk of interacting with bottom trawl gear (NEFSC observer/sea sampling database, unpublished data; Kocik *et al*. 2014). NEFOP data from 1989 to 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).[12] 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). 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.

Mid-Water Trawl

To date, there have been no observed/documented interactions with Atlantic salmon and mid-water trawl gear (NEFSC observer/sea sampling database, unpublished data). Based on this information, mid-water trawl 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.

6.4.3.4. Gear Interactions with Marine Mammals

Depending on species, marine mammals have been observed seriously injured or killed in bottom trawl 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 bottom trawl fisheries (Northeast or Mid-Atlantic) as Category II fisheries.

Large Whales

Bottom Otter and Mid-Water Trawls

Review of the most recent 10 years of observer, stranding, and/or marine mammal serious injury and mortality or entanglement reports (i.e., 2008-2017), as well as marine mammal incident reports (i.e., data through 2019), minke whales are the only large whale species in which an

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[12] There is no information available on the genetics of these bycaught Atlantic salmon, so it is not know 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.

interaction with midwater trawl gear has been observed or documented.[13] There has been only one observed minke whale incidentally taken in MWT gear. The incident occurred in 2009 and was a result of a minke whale becoming entangled in NOAA research MWT gear (whale was released alive, but seriously injured; Henry *et al.* 2015). Since this incident, there have been no observed or reported interactions between minke whales and MWT gear (Cole, et al. 2013; Henry et al. 2017; Henry et al. 2015; 2016; Henry et al. 2019; Henry et al. 2020; GAR Marine Animal Incident Database, unpublished data; Marine Mammal SARs: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region). In fact, the most recent marine mammal stock assessment report estimates the annual average minke whale mortality and serious injury from the Northeast MWT fishery to be zero (Hayes, et al. 2020). Thus, although interactions between MWT gear and minke whales are possible, the interaction risk is low.
With the exception of minke whales, there have been no observed interactions with large whales and bottom trawl gear.[14] 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.[15] Based on this information, large whale interactions with bottom trawl gear are expected to be rare to nonexistent.

Small Cetaceans and Pinnipeds

Bottom and Mid-Water Trawl Gear

Small cetaceans and pinnipeds are at risk of interacting with midwater trawl or bottom trawl gear (Marine Mammal SARs: 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

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[13] Refer to Greater Atlantic Region Marine Animal Incident Database (unpublished data); Marine Mammal 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 Greater Atlantic Region Marine Animal Incident Database (unpublished data); Marine Mammal 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

[15] Refer to: Greater Atlantic Region 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.

reference documents (marine mammal serious injury and mortality reports): https://apps-nefsc.fisheries.noaa.gov/rcb/publications/center-reference-documents.html). For marine mammals protected under the MMPA, the most recent 10 years (i.e., 2008-2017) of observer, stranding, and/or marine mammal serious injury and mortality, as well as the MMPA LOF's covering this timeframe (i.e., issued between 2016 and 2021), were reviewed to provide a list of species that have been observed (incidentally) seriously injured and/or killed between 2008 and 2017 by List of Fisheries Category II Bottom Trawl and Mid-Water Trawl fisheries that operate in the affected environment of the MSB fishery.

Table 17. Small cetacean and pinniped species observed seriously injured and/or killed by Category II Mid-Water and Bottom Trawl fisheries in the affected environment of the MSB fisheries.

Fishery	Category	Species Observed or reported Injured/Killed
Mid-Atlantic Mid-Water Trawl-Including Pair Trawl	II	Bottlenose dolphin (offshore)
		White-sided dolphin
		Risso's dolphin
		Gray seal
		Harbor seal
Northeast Mid-Water Trawl-Including Pair Trawl	II	Short-beaked common dolphin
		Long-finned pilot whales
		Gray seal
		Harbor seal
Northeast Bottom Trawl	II	Harp seal
		Harbor seal
		Gray seal
		Long-finned pilot whales
		Short-beaked common dolphin
		White-sided dolphin
		Harbor porpoise
		Bottlenose dolphin (offshore)
		Risso's dolphin
Mid-Atlantic Bottom Trawl	II	White-sided dolphin
		Short-beaked common dolphin
		Risso's dolphin

		Bottlenose dolphin (offshore)
		Gray seal
		Harbor seal
Sources: MMPA 2016-2021 LOFs at: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries		

In 2006, based on observed mid-water trawl interactions with long-finned pilot whales, short - finned pilot whales, common dolphins, and white sided dolphins, the Atlantic Trawl Gear Take Reduction Team (ATGTRT) was convened to address the incidental mortality and serious injury of these species incidental to bottom and mid-water trawl fisheries operating in both the New England and Mid-Atlantic regions. Because none of the marine mammal stocks of concern to the ATGTRT are classified as a "strategic stock", nor do they currently interact with a Category I fishery,[16] it was determined that development of a take reduction plan was not necessary. In lieu of a take reduction plan, the ATGTRT agreed to develop an Atlantic Trawl Gear Take Reduction Strategy (ATGTRS). The ATGTRS identifies informational and research tasks, as well as education and outreach needs the ATGTRT believes are necessary to provide the basis for decreasing mortalities and serious injuries of marine mammals to insignificant levels approaching zero. The ATGTRS also identifies several voluntary measures that can be adopted by certain trawl fishing sectors to potentially reduce the incidental capture of marine mammals.[17]

6.4.3.5 Giant Manta Ray

Bottom Trawl

Giant manta rays are potentially susceptible to capture by bottom trawl gear based on records of their capture in fisheries using this 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. Additionally, all of the giant manta ray interactions in trawl gear recorded in the NEFOP database 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.

Mid-Water Trawl

NEFOP and ASM observer data since 1989 shows eight observed interactions between giant manta rays and mid-water trawl gear in the early 1990s; the interactions were likely associated with an experimental HMS fishery that no longer operates (NEFSC observer/sea sampling database, unpublished data). Review of observer data over the last 30 years (i.e., between 1989 and 2019) shows that there have been no observed takes in other mid-water trawl fisheries (e.g., MSB fishery) operating in the Greater Atlantic Region (NEFSC observer/sea sampling database, unpublished data). Based on this and the best available information, giant manta ray interactions in mid-water trawl gear in the Greater Atlantic Region are expected to be rare.

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[16] Category I fisheries have frequent incidental mortality and serious injury of marine mammals.

[17] For additional details on the ATGTRS, visit: http://www.greateratlantic.fisheries.noaa.gov/Protected/mmp/atgtrp/

6.5 Other Non-Target Species in MSB Fisheries Affected by this Action

Various species are caught incidentally by the MSB fisheries. For non-target species that are managed under their own FMP, incidental catch/discards are also considered as part of the management of that fishery. Observers are deployed based on gear/area-based fleets via the standardized bycatch reporting methodology (SBRM), and for FMP species the NEFSC estimates discards of FMP species by those fleets - estimates may be found at https://www.fisheries.noaa.gov/new-england-mid-atlantic/fisheries-observers/fisheries-sampling-northeast. However, those analyses are not fishery-specific and of limited value for informing fishery management decisions, so this document includes a fishery-specific analysis. The primary database used to assess discarding is the NMFS Observer Program database, which includes data from trips that had trained observers onboard to document discards. Since fisheries evolve over time, a relatively recent, three-year time period was examined, 2017-2019. The MSB species are predominantly targeted with trawl gear so the analysis was restricted to data from trawl fishing trips. One critical aspect of using this database to describe discards is to correctly define the trips that constitute a given directed fishery. A flexible criteria of what captains initially intend to target, how they may adjust targeting over the course of a trip, and what they actually catch would be ideal but is impracticable. Over time directed trip definitions based on proportions of retained catch have been developed to reflect the operation of the fisheries, but these definitions will only approximately identify targeted trips, and therefore only approximately identify other non-target species caught in the MSB fisheries.

Atlantic Mackerel

There have been very few recent observed directed mackerel trips due to the low directed effort toward mackerel in recent years. Various species will be caught incidentally to any mackerel fishing and will be impacted to some degree by the prosecution of the fishery. On the mackerel trips identified in this analysis, the 2017-2019 overall discard rate was 1%. For non-target species that are managed under their own FMP, incidental catch/discards are also considered as part of the management of that fishery.

The primary database used to assess discarding is the NMFS Observer Program database, which includes data from trips that had trained observers onboard to document discards. One critical aspect of using this database to describe discards is to correctly define the trips that constitute a given directed fishery. A flexible criteria of what captains initially intend to target, how they may adjust targeting over the course of a trip, and what they actually catch would be ideal but is impracticable. The case with mackerel is further complicated by the small size of the fishery recently and the few observed trips. However from 2017-2019 there were on average 7 observed trips annually where mackerel accounted for at least 50% of retained catch, and those trips form the basis of the following analysis. These trips made 65 hauls of which 89% were observed. Hauls may be unobserved for a variety of reasons, for example transfer to another vessel without an observer, observer not on station, haul slipped (dumped) in the water before observing, etc.

The observed mackerel kept on these trips accounted for approximately 7% of the total mackerel landed (this is the overall coverage rate based on weight). While a very rough estimate, especially given non-accounting for spatial and temporal trends, one can use the information in the table immediately following and the fact that about 6,920 mt of mackerel were caught annually 2017-2019 to roughly estimate annual incidental catch and discards for the species in the table. Readers are strongly cautioned that while this is a reasonable approach for a quick, rough, and relative estimate given the available data, it is highly imprecise and does not follow the protocol used for official discard estimates. As a minimum threshold, only species estimated to be caught at a level more than 10,000 pounds per year are included (captures 95% of all discards). Species with a "*" are overfished, subject to overfishing, or otherwise considered depleted.

Table 18. Incidental Catch and Discards in the Mackerel Fishery

NE Fisheries Science Center Common Name	Pounds Observed Caught	Pounds Observed Discarded	Of all discards observed, percent that comes from given species	Percent of given species that was discarded	Pounds of given species caught per mt mackerel Kept	Pounds of given species discarded per mt mackerel Kept	Rough Annual Catch (pounds) based on 3-year (2017-2019) average of mackerel landings (6,920 mt)	Rough Annual Discards (pounds) based on 3-year (2017-2019) average of mackerel landings (6,920 mt)
MACKEREL, ATLANTIC *	3,207,485	585	1%	0%	2,205	0	15,258,755	2,785
HERRING, ATLANTIC *	626,320	4,639	9%	1%	431	3	2,979,549	22,068
HERRING, BLUEBACK *	28,805	9,570	19%	33%	20	7	137,031	45,529
FISH, NK	22,101	22,101	43%	100%	15	15	105,137	105,137
DOGFISH, SPINY	13,912	10,048	20%	72%	10	7	66,181	47,799
ALEWIFE *	7,580	1,793	3%	24%	5	1	36,061	8,531
HAKE, SILVER (WHITING	2,187	23	0%	1%	2	0	10,402	108

The observer program creates individual animal records for some fish species of interest, mostly larger pelagics and/or elasmobranchs, as well as tagged fish. There was only one such record for these trips, an unknown shark species.

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***Illex* Squid**

Coverage of bottom trawl trips has improved in recent years. Various species will be caught incidentally to any *Illex* fishing and will be impacted to some degree by the prosecution of the fishery. On the *Illex* trips identified in this analysis, the 2017-2019 overall discard rate was 2%. For non-target species that are managed under their own FMP, incidental catch/discards are also considered as part of the management of that fishery.

The primary database used to assess discarding is the NMFS Observer Program database, which includes data from trips that had trained observers onboard to document discards. One critical aspect of using this database to describe discards is to correctly define the trips that constitute a given directed fishery. A flexible criteria of what captains initially intend to target, how they may adjust targeting over the course of a trip, and what they actually catch would be ideal but is impracticable. From 2017-2019 there were on average 61 observed trips annually where *Illex* accounted for at least 50% of retained catch, and those trips form the basis of the following analysis. These trips made 1,298 hauls of which 93% were observed. Hauls may be unobserved for a variety of reasons, for example transfer to another vessel without an observer, observer not on station, haul slipped (dumped) in the water before observing, etc.

The observed *Illex* kept on these trips accounted for approximately 15% of the total *Illex* landed (this is the overall coverage rate based on weight). While a very rough estimate, especially given non-accounting for spatial and temporal trends, one can use the information in the table immediately following and the fact that about 24,597 mt of *Illex* were caught annually 2017-2019 to roughly estimate annual incidental catch and discards for the species in the table. Readers are strongly cautioned that while this is a reasonable approach for a quick, rough, and relative estimate given the available data, it is highly imprecise and does not follow the protocol used for official discard estimates. As a minimum threshold, only species estimated to be caught at a level more than 10,000 pounds per year are included (captures 92% of all discards). Species with a "*" are overfished, subject to overfishing, or otherwise considered depleted.

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Table 19. Incidental Catch and Discards in the *Illex* Squid Fishery.

NE Fisheries Science Center Common Name	Pounds Observed Caught	Pounds Observed Discarded	Of all discards observed, percent that comes from given species	Percent of given species that was discarded	Pounds of given species caught per mt Illex Kept	Pounds of given species discarded per mt Illex Kept	Rough Annual Catch (pounds) based on 3-year (2017-2019) average of Illex landings (24,597 mt)	Rough Annual Discards (pounds) based on 3-year (2017-2019) average of Illex landings (24,597 mt)
SQUID, SHORT-FIN	24,472,176	236,856	52%	1%	2,226	22	54,757,008	529,970
SQUID, ATL LONG-FIN	137,434	1,266	0%	1%	13	0	307,510	2,833
DORY, BUCKLER (JOHN)	59,564	15,045	3%	25%	5	1	133,275	33,663
MACKEREL, CHUB	50,659	18,909	4%	37%	5	2	113,349	42,310
BUTTERFISH	41,301	37,276	8%	90%	4	3	92,411	83,406
HAKE, SPOTTED	35,344	32,203	7%	91%	3	3	79,082	72,054
DOGFISH, SMOOTH	19,930	19,892	4%	100%	2	2	44,595	44,508
BEARDFISH	14,033	5,541	1%	39%	1	1	31,398	12,398
HAKE, SILVER (WHITING	9,919	8,168	2%	82%	1	1	22,194	18,275
FISH, NK	8,332	8,310	2%	100%	1	1	18,642	18,595
SEA ROBIN, NORTHERN	8,078	8,078	2%	100%	1	1	18,075	18,075
MACKEREL, ATLANTIC *	7,902	5,374	1%	68%	1	0	17,682	12,024
SCUP	7,774	5,561	1%	72%	1	1	17,395	12,443
SQUID, NK	6,020	6,020	1%	100%	1	1	13,470	13,470
BLUEFISH *	5,052	1,836	0%	36%	0	0	11,303	4,108
MONKFISH (GOOSEFISH)	4,742	2,211	0%	47%	0	0	10,609	4,947
HAKE, RED (LING) *	4,637	4,280	1%	92%	0	0	10,376	9,576

The observer program creates individual animal records for some fish species of interest, mostly larger pelagics and/or elasmobranchs, as well as tagged fish. Counts of these individual fish records from the same trips are provided in the table below.

Table 20. Total Counts of fish in Individual Animal Records on observed Illex trips from 2017-2019

COMNAME	count
DOLPHINFISH (MAHI MAH	4
GROUPER, SNOWY	3
MARLIN, WHITE	1
MOLA, NK	4
MOLA, OCEAN SUNFISH	31
MOLA, SHARPTAIL	1
RAY, TORPEDO	37
SHARK, ATL ANGEL	1
SHARK, BASKING	14
SHARK, BLUE (BLUE DOG	1
SHARK, CARCHARHINID,N	4
SHARK, GREENLAND	2
SHARK, HAMMERHEAD, SC	14
SHARK, HAMMERHEAD,NK	7
SHARK, NIGHT	3
SHARK, NK	3
SHARK, SANDBAR (BROWN	48
SHARK, SPINNER	1
SHARK, THRESHER, BIGE	1
SHARK, TIGER	17
STINGRAY, ROUGHTAIL	19
SWORDFISH	108
TUNA, BLUEFIN	1
TUNA, LITTLE (FALSE A	9
TUNA, YELLOWFIN	3
WRECKFISH	1

Longfin Squid

Coverage of bottom trawl trips has improved in recent years. Various species will be caught incidentally to any longfin fishing and will be impacted to some degree by the prosecution of the fishery. On the longfin trips identified in this analysis, the 2017-2019 overall discard rate was 44%. For non-target species that are managed under their own FMP, incidental catch/discards are also considered as part of the management of that fishery.

The primary database used to assess discarding is the NMFS Observer Program database, which includes data from trips that had trained observers onboard to document discards. One critical aspect of using this database to describe discards is to correctly define the trips that constitute a given directed fishery. A flexible criteria of what captains initially intend to target, how they may adjust targeting over the course of a trip, and what they actually catch would be ideal but is impracticable. From 2017-2019 there were on average 394 observed trips annually where longfin accounted for at least 40% of retained catch, and those trips form the basis of the following analysis. These trips made 10,293 hauls of which 88% were observed. Hauls may be unobserved for a variety of reasons, for example transfer to another vessel without an observer, observer not on station, haul slipped (dumped) in the water before observing, etc.

The observed longfin kept on these trips accounted for approximately 10% of the total longfin landed (this is the overall coverage rate based on weight). While a very rough estimate, especially given non-accounting for spatial and temporal trends, one can use the information in the table immediately following and the fact that about 10,645 mt of longfin were caught annually 2017-2019 to roughly estimate annual incidental catch and discards for the species in the table. Readers are strongly cautioned that while this is a reasonable approach for a quick, rough, and relative estimate given the available data, it is highly imprecise and does not follow the protocol used for official discard estimates. There is also likely to be overlap with butterfish trips, so estimates are not additive across fisheries in this document. As a minimum threshold, only species estimated to be caught at a level more than 25,000 pounds per year are included (captures 98% of all discards). Species with a "*" are overfished, subject to overfishing, or otherwise considered depleted.

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Table 21. Incidental Catch and Discards in the Longfin Fishery.

NE Fisheries Science Center Common Name	Pounds Observed Caught	Pounds Observed Discarded	Of all discards observed, percent that comes from given species	Percent of given species that was discarded	Pounds of given species caught per mt longfin Kept	Pounds of given species discarded per mt longfin Kept	Rough Annual Catch (pounds) based on 3-year (2017-2019) average of longfin landings (10,645 mt)	Rough Annual Discards (pounds) based on 3-year (2017-2019) average of longfin landings (10,645 mt)
SQUID, ATL LONG-FIN	7,472,015	169,263	3%	2%	2,256	51	24,012,124	543,944
HAKE, SPOTTED	1,051,516	1,040,776	16%	99%	317	314	3,379,159	3,344,647
SCUP	887,234	664,185	10%	75%	268	201	2,851,222	2,134,430
SQUID, SHORT-FIN	810,302	661,247	10%	82%	245	200	2,603,992	2,124,989
BUTTERFISH	715,061	590,756	9%	83%	216	178	2,297,926	1,898,458
HAKE, SILVER (WHITING	437,313	256,901	4%	59%	132	78	1,405,353	825,579
SEA ROBIN, NORTHERN	415,951	415,937	6%	100%	126	126	1,336,702	1,336,658
DOGFISH, SPINY	401,946	400,669	6%	100%	121	121	1,291,698	1,287,592
SKATE, LITTLE	338,736	337,527	5%	100%	102	102	1,088,563	1,084,678
FLOUNDER, SUMMER (FLU	287,376	178,226	3%	62%	87	54	923,512	572,749
SEA BASS, BLACK	257,455	214,199	3%	83%	78	65	827,359	688,351
DOGFISH, SMOOTH	233,253	204,663	3%	88%	70	62	749,582	657,708
SKATE, WINTER (BIG)	206,933	160,002	2%	77%	62	48	665,001	514,184
HAKE, RED (LING) *	161,671	150,843	2%	93%	49	46	519,547	484,751
MACKEREL, ATLANTIC *	124,479	80,098	1%	64%	38	24	400,026	257,405
CRAB, LADY	110,150	110,150	2%	100%	33	33	353,979	353,979
BASS, STRIPED	99,613	90,307	1%	91%	30	27	320,118	290,211
MONKFISH (GOOSEFISH)	85,330	58,991	1%	69%	26	18	274,217	189,575
SEA ROBIN, STRIPED	84,334	82,462	1%	98%	25	25	271,017	265,001
HAKE, NK	73,111	65,667	1%	90%	22	20	234,950	211,028
FLOUNDER, FOURSPOT	62,057	61,673	1%	99%	19	19	199,427	198,194
SEAWEED, NK	43,243	43,243	1%	100%	13	13	138,964	138,964
SKATE, CLEARNOSE	41,931	41,877	1%	100%	13	13	134,749	134,575
FLOUNDER, SAND DAB *	39,443	38,811	1%	98%	12	12	126,755	124,723
BLUEFISH *	32,985	6,894	0%	21%	10	2	105,999	22,156
SCALLOP, SEA	30,483	23,897	0%	78%	9	7	97,961	76,797
MENHADEN, ATLANTIC	30,143	28,176	0%	93%	9	9	96,868	90,546
FLOUNDER, WINTER *	28,525	27,777	0%	97%	9	8	91,669	89,264
DORY, BUCKLER (JOHN)	24,897	3,845	0%	15%	8	1	80,008	12,356
SKATE, NK	22,796	19,318	0%	85%	7	6	73,258	62,079
ALEWIFE *	21,678	21,660	0%	100%	7	7	69,664	69,606
SKATE, BARNDOOR	19,841	19,841	0%	100%	6	6	63,760	63,760
DOGFISH, CHAIN	19,283	19,283	0%	100%	6	6	61,968	61,968
SKATE, LITTLE/WINTER,	18,390	18,347	0%	100%	6	6	59,098	58,960
CRAB, ROCK	17,069	16,979	0%	99%	5	5	54,853	54,564
SHAD, AMERICAN *	14,490	14,449	0%	100%	4	4	46,565	46,435
DOGFISH, NK	14,218	10,356	0%	73%	4	3	45,691	33,280
TAUTOG (BLACKFISH) *	13,734	12,911	0%	94%	4	4	44,137	41,489
SQUID EGGS, ATL LONG-	12,916	12,916	0%	100%	4	4	41,506	41,506
CRAB, JONAH	12,429	12,139	0%	98%	4	4	39,941	39,011
ROSEFISH,BLACK BELLY	12,354	11,604	0%	94%	4	4	39,702	37,292
HADDOCK	11,959	11,590	0%	97%	4	3	38,431	37,245
SKATE, ROSETTE	10,590	10,590	0%	100%	3	3	34,031	34,031
CRAB, HORSESHOE	10,438	9,488	0%	91%	3	3	33,544	30,490
FISH, NK	9,267	8,797	0%	95%	3	3	29,781	28,271
BOARFISH, DEEPBODY	9,243	9,229	0%	100%	3	3	29,702	29,658
MACKEREL, CHUB	9,065	5,617	0%	62%	3	2	29,131	18,051

The observer program creates individual animal records for some fish species of interest, mostly larger pelagics and/or elasmobranchs, as well as tagged fish. Counts of these individual fish records from the same trips are provided in the table below.

Table 22. Total Counts of fish in Individual Animal Records on all observed longfin trips, 2017-2019

COMNAME	count
AMBERJACK, NK	37
BARRACUDA, NK	25
BASS, STRIPED	4
BONITO, ATLANTIC	31
COBIA	1
CRAB, HORSESHOE	3
CUTLASSFISH, ATL	2
FLOUNDER, SUMMER (FLU	3
GROUPER, NK	1
MACKEREL, FRIGATE	1
MACKEREL, KING	3
MOLA, NK	33
MOLA, OCEAN SUNFISH	23
NEEDLEFISH, ATLANTIC	1
RAY, BUTTERFLY, NK	3
RAY, BUTTERFLY, SMOOT	1
RAY, BUTTERFLY, SPINY	6
RAY, NK	4
RAY, TORPEDO	366
SHARK, ATL ANGEL	58
SHARK, BASKING	11
SHARK, BLUE (BLUE DOG	9
SHARK, CARCHARHINID,N	50
SHARK, DUSKY	6
SHARK, HAMMERHEAD, GR	1
SHARK, HAMMERHEAD, SC	8
SHARK, HAMMERHEAD,NK	18
SHARK, NIGHT	1
SHARK, NK	45
SHARK, PELAGIC	1
SHARK, PORBEAGLE (MAC	13
SHARK, SAND TIGER	35
SHARK, SANDBAR (BROWN	254
SHARK, SEVENGILL SHAR	1
SHARK, SPINNER	5
SHARK, THRESHER	52
SHARK, TIGER	22
SHARK, WHITE	16
STINGRAY, BLUNTNOSE	1
STINGRAY, NK	31
STINGRAY, PELAGIC	2
STINGRAY, ROUGHTAIL	211
STINGRAY, SOUTHERN	1
STURGEON, ATLANTIC	139
STURGEON, NK	72
SWORDFISH	80
TUNA, LITTLE (FALSE A	8
TUNA, NK	7
WRECKFISH	1

Butterfish

Until recently there were very few observed directed butterfish trips due to the low directed effort toward butterfish in recent years. Various species will be caught incidentally to any butterfish fishing and will be impacted to some degree by the prosecution of the fishery. On the butterfish trips identified in this analysis, the 2017-2019 overall discard rate was 17%. For non-target species that are managed under their own FMP, incidental catch/discards are also considered as part of the management of that fishery.

The primary database used to assess discarding is the NMFS Observer Program database, which includes data from trips that had trained observers onboard to document discards. One critical aspect of using this database to describe discards is to correctly define the trips that constitute a given directed fishery. A flexible criteria of what captains initially intend to target, how they may adjust targeting over the course of a trip, and what they actually catch would be ideal but is impracticable. The case with butterfish is further complicated by the small size of the fishery and few observed trips. However from 2017-2019 there were on average 22 observed trips where butterfish accounted for at least 50% of retained catch, and those trips form the basis of the following analysis. These trips made 267 hauls of which 93% were observed. Hauls may be unobserved for a variety of reasons, for example transfer to another vessel without an observer, observer not on station, haul slipped (dumped) in the water before observing, etc.

The observed butterfish kept on these trips accounted for approximately 5% of the total butterfish landed (this is the overall coverage rate based on weight). This low percentage is not surprising given the limited directed fishery and incidental nature of much butterfish catch. While a very rough estimate, especially given non-accounting for spatial and temporal trends, one can use the information in the table immediately following and the fact that about 2,933 mt of butterfish were caught annually 2017-2019 to roughly estimate annual incidental catch and discards for the species in the table. Readers are strongly cautioned that while this is a reasonable approach for a quick, rough, and relative estimate given the available data, it is highly imprecise and does not follow the protocol used for official discard estimates. There is also likely to be substantial overlap with longfin squid trips, so estimates are not additive across fisheries in this document. As a minimum threshold, only species estimated to be caught at a level more than 10,000 pounds per year are included (captures 93% of all discards). Species with a "*" are overfished, subject to overfishing, or otherwise considered depleted.

Table 23. Incidental Catch and Discards in the butterfish Fishery.

NE Fisheries Science Center Common Name	Pounds Observed Caught	Pounds Observed Discarded	Of all discards observed, percent that comes from given species	Percent of given species that was discarded	Pounds of given species caught per mt Butterfish Kept	Pounds of given species discarded per mt butterfish Kept	Rough Annual Catch (pounds) based on 3-year (2017-2019) average of butterfish landings (2,933 mt)	Rough Annual Discards (pounds) based on 3-year (2017-2019) average of butterfish landings (2,933 mt)
BUTTERFISH	1,153,015	101,677	37%	9%	2,418	213	7,091,225	625,330
SQUID, ATL LONG-FIN	167,780	1,836	1%	1%	352	4	1,031,876	11,290
SQUID, SHORT-FIN	52,988	6,638	2%	13%	111	14	325,885	40,825
DOGFISH, SPINY	37,318	37,314	14%	100%	78	78	229,511	229,485
SCUP	37,271	28,763	11%	77%	78	60	229,222	176,898
HAKE, SILVER (WHITING	23,422	10,728	4%	46%	49	22	144,051	65,981
SKATE, LITTLE	15,201	15,125	6%	99%	32	32	93,490	93,021
SKATE, WINTER (BIG)	13,098	10,466	4%	80%	27	22	80,552	64,367
HAKE, SPOTTED	8,871	6,746	2%	76%	19	14	54,560	41,490
FLOUNDER, SUMMER (FLU	7,194	3,530	1%	49%	15	7	44,246	21,709
SEA ROBIN, NORTHERN	6,922	6,922	3%	100%	15	15	42,571	42,571
DOGFISH, SMOOTH	5,155	4,380	2%	85%	11	9	31,703	26,938
SEA BASS, BLACK	4,617	3,270	1%	71%	10	7	28,397	20,111
SEA ROBIN, STRIPED	3,922	3,891	1%	99%	8	8	24,118	23,933
HAKE, RED (LING) *	3,690	2,434	1%	66%	8	5	22,694	14,969
SKATE, CLEARNOSE	3,071	3,071	1%	100%	6	6	18,885	18,885
MENHADEN, ATLANTIC	2,329	2,040	1%	88%	5	4	14,324	12,545
WEAKFISH *	2,250	2,006	1%	89%	5	4	13,835	12,337
FLOUNDER, WINTER *	2,028	2,015	1%	99%	4	4	12,472	12,390
BLUEFISH *	1,898	1,395	1%	74%	4	3	11,674	8,581
SKATE, BARNDOOR	1,774	1,774	1%	100%	4	4	10,910	10,910
FLOUNDER, SAND DAB *	1,765	1,765	1%	100%	4	4	10,856	10,856
FLOUNDER, FOURSPOT	1,724	1,724	1%	100%	4	4	10,602	10,602
ALEWIFE *	1,684	1,682	1%	100%	4	4	10,359	10,347

The observer program creates individual animal records for some fish species of interest, mostly larger pelagics and/or elasmobranchs, as well as tagged fish. Counts of these individual fish records from the same trips are provided in the table below.

Table 24. Total Counts of fish in Individual Animal Records on all observed butterfish trips, 2017-2019

COMNAME	count
BONITO, ATLANTIC	1
MOLA, OCEAN SUNFISH	2
RAY, TORPEDO	4
SHARK, BASKING	1
SHARK, BLUE (BLUE DOG	1
SHARK, PORBEAGLE (MAC	7
STINGRAY, BLUNTNOSE	2
STURGEON, ATLANTIC	3
TUNA, LITTLE (FALSE A	4

6.6 Human Communities and Economic Environment

6.6.1 Fishery Descriptions

This section describes the historic and recent socio-economic importance of the MSB fisheries so that impacts may be contextualized. Additional community information can be obtained at https://fish.nefsc.noaa.gov/read/socialsci/communitySnapshots.php, where one can search for various ports in the region. Information on community vulnerability may be found at https://www.fisheries.noaa.gov/national/socio-economics/social-indicators-fishing-communities-0. Communities that have high fishing engagement or high fishing reliance, and also have high levels of social vulnerability and/or gentrification pressure vulnerability will be less able to successfully cope with any potentially negative impacts.

For each species with alternatives in this document (Atlantic mackerel, *Illex* squid, longfin squid, and butterfish), this section provides background fishery performance information. If fewer than either 3 vessels or 3 dealers were active for a given species in a given port, or if there is other concern about data confidentiality, some information may be withheld or limited in order to maintain the confidentiality of fishery participants' proprietary business data.

The Council employed a new procedure for gathering information from its Squid-Mackerel-Butterfish Advisory Panel during the 2012 specifications setting process, which it continued for these specifications. The MSB Advisory Panel created a "Fishery Performance Report" for each species based on the advisors' personal and professional experiences as well as reactions to an "informational document" for each species created by Council staff. The Informational Documents and Fishery Performance Reports may be found here https://www.mafmc.org/ssc (see meetings with MSB topics). The information in those documents, while preliminary and not NMFS or peer-reviewed, were constructed using the same basic analytical techniques as this document and may be of interest to readers looking for additional descriptive fishery information.

The data in this document was downloaded in mid-2020 and edits to the database may lead to different values being produced from data downloaded before or later, but substantial changes would not be expected.

6.6.2 Atlantic Mackerel

Foreign catches dominated the fishery during the 1960s and 1970s, with total catch peaking at over 430,000 mt in 1973. Foreign catches declined and then were eliminated by the MSA, though there was also some joint venture activity from the mid-1980s through 1991. US and Canadian domestic landings peaked in the mid-2000s, fishing on one main year class, and landings have been low in recent years with both the U.S. and Canada concluding that the stock has been overfished.

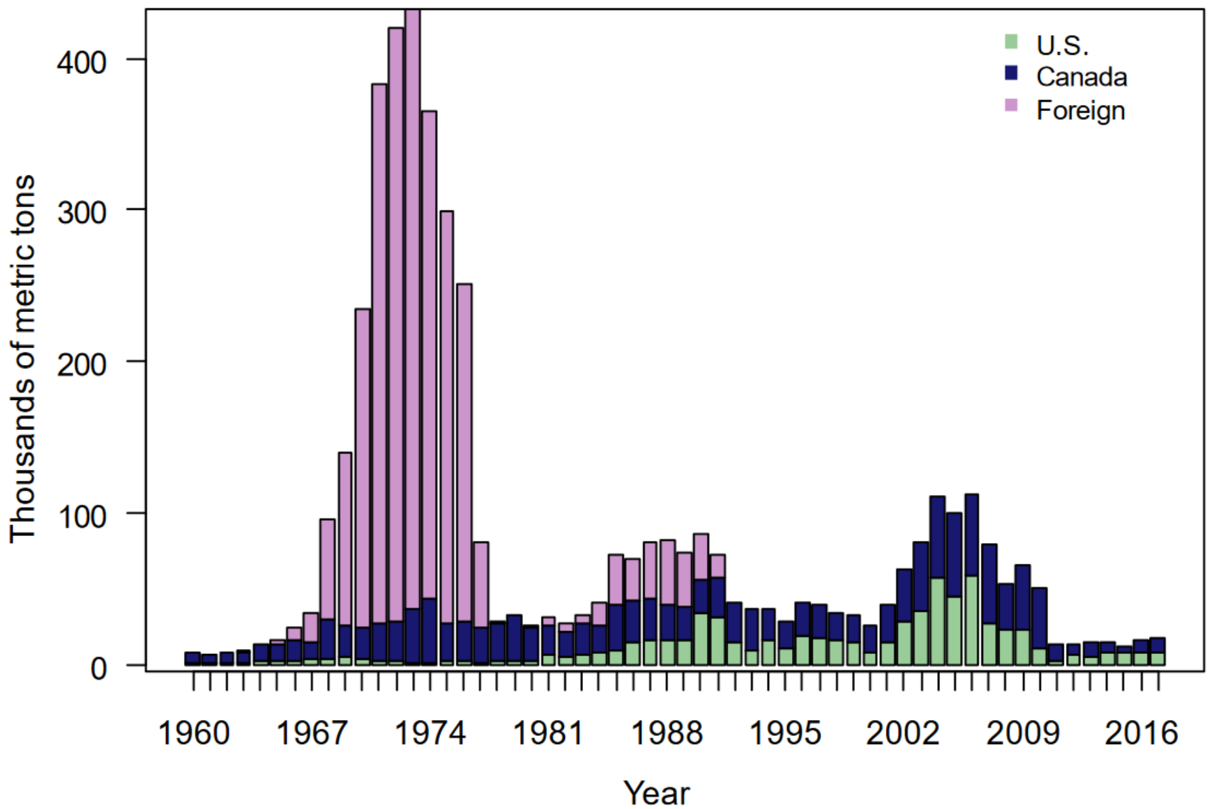

Figure 1. Total annual mackerel catch (mt) by the U.S., Canada and other countries for 1960-2017.

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Price has trended up in recent years (Figure 2). Revenues are more variable due to the variability of landings, which is not unexpected given mackerel's range (Figure 3).

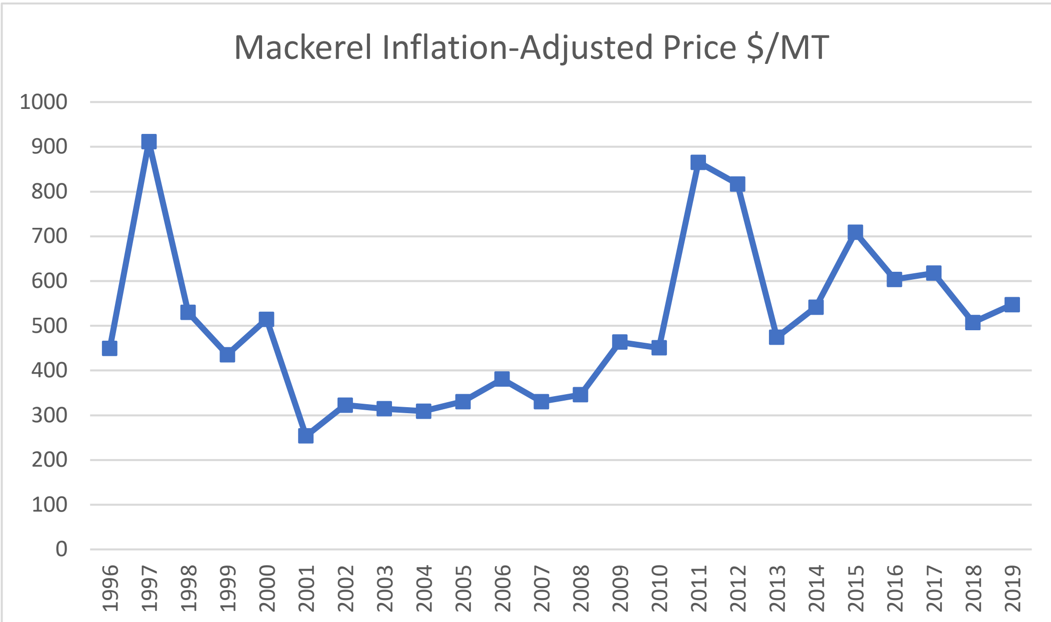

Figure 2. Inflation-adjusted ex-vessel Prices for Mackerel landings during 1982-2019.

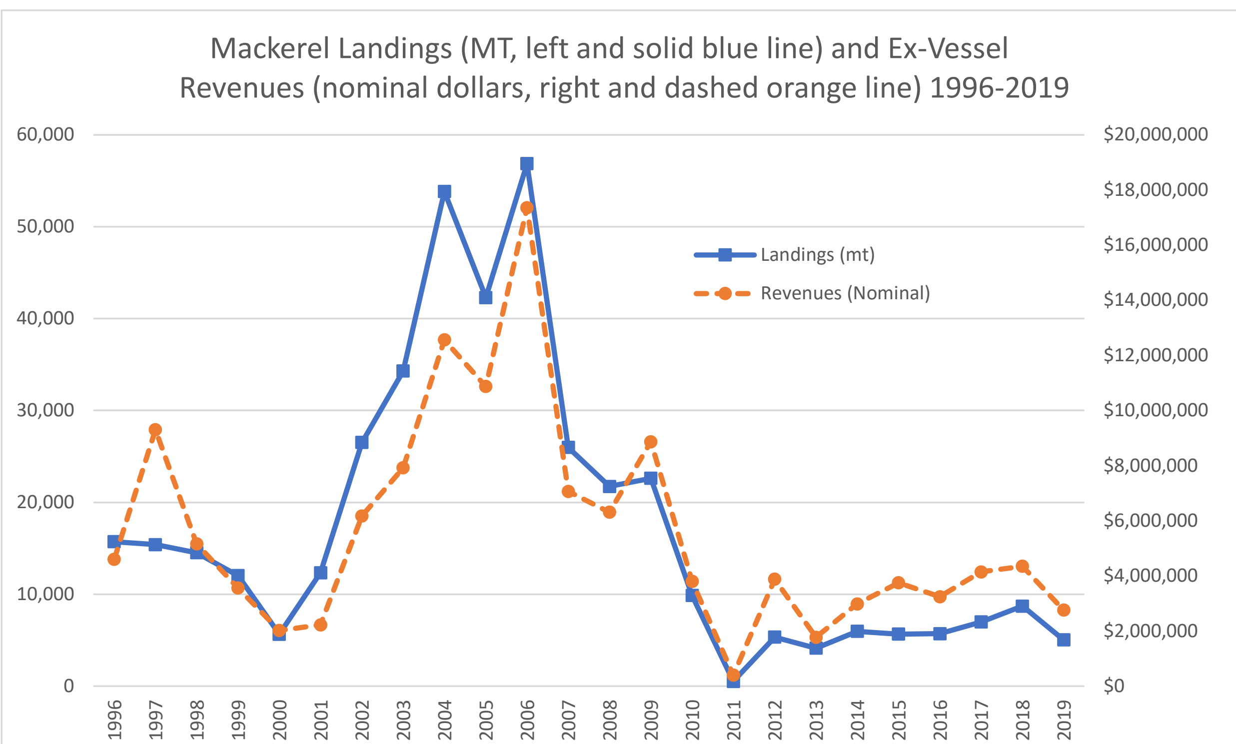

Figure 3. Landings and Nominal Ex-Vessel Revenues for Mackerel landings during 1982-2019.

The spatial distribution of mackerel landings matches the distribution of the fish in any given year. The shelf break, heads of canyons, and near and north of cape cod have been producing mackerel in recent years (Figure 4 from Curti 2020). Mackerel are caught in smaller quantities inshore in the summer and fall in New England. Mid-water and bottom trawl land most of the mackerel.

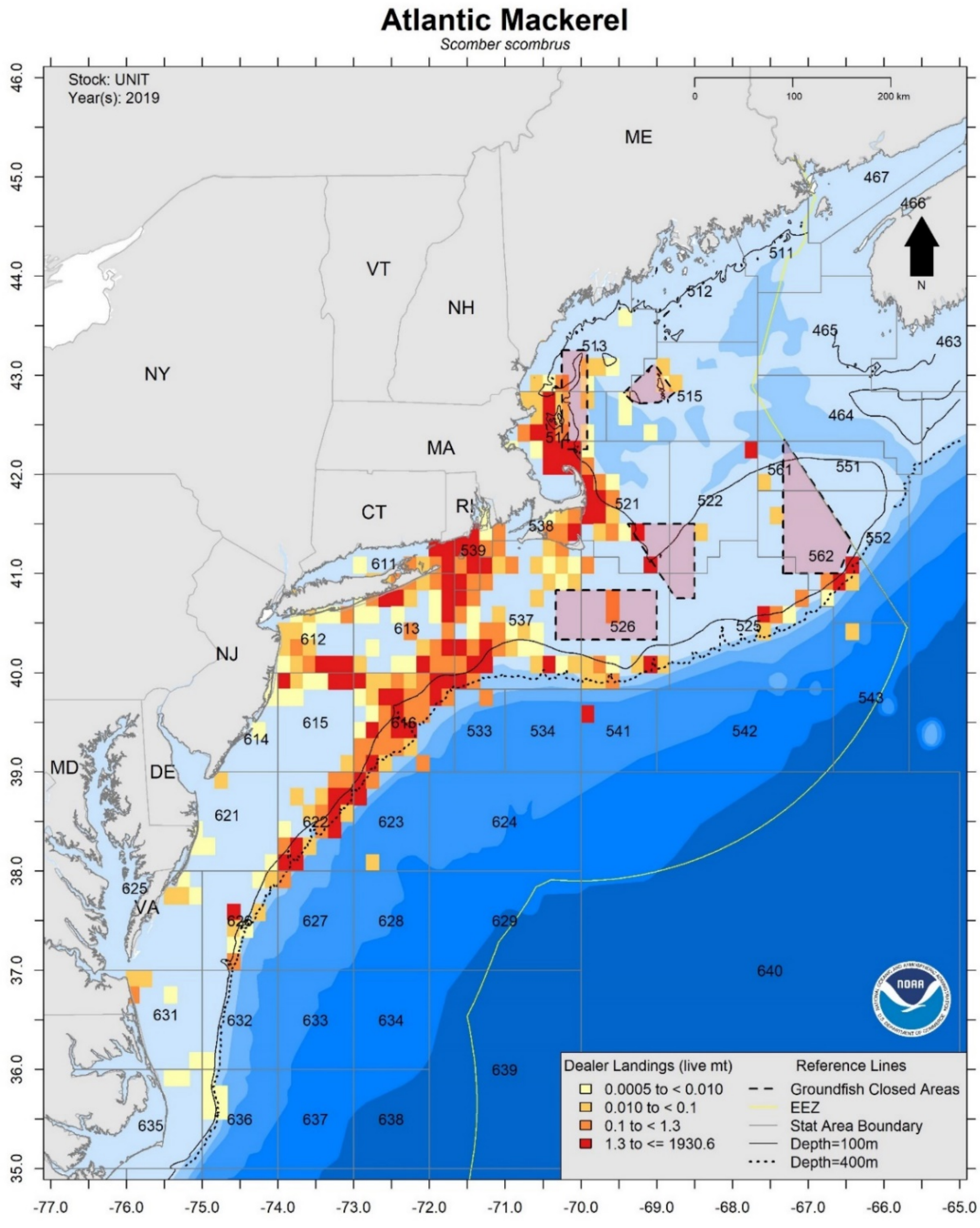

Figure 4. Approximate Primary 2019 Mackerel Catch Locations (from dealer and VTR data) (Curti 2019)

In recent years the preponderance of Mackerel landings have occurred in Massachusetts, New Jersey, and Rhode Island (see table below). Further breakdowns of landings by port may violate data confidentiality rules.

Table 25. Recent Mackerel **Landings by State**

YEAR	MA	NJ	ME	RI	Other	Total
2017	4,726	1,260	655	315	36	6,992
2018	3,418	3,224	175	1,812	91	8,720
2019	1,622	2,501	254	587	83	5,047

Table 26 describes the dependence on the Mackerel fishery for federally-permitted vessels in terms of the proportion of ex-vessel revenues from Mackerel in 2019. Table 27 provides information on vessel participation over time.

Table 26. Numbers of Federally-Permitted Vessels by percent dependence on Mackerel **landings during 2019**

Dependence on Mackerel	Number of Vessels in Each Dependency Category
1%-5%	45
5%-25%	25
25%-50%	6
More than 50%	8

Atlantic mackerel also support recreational fishing, with recent harvest ranging from 1,760 mt - 3,602 mt over 2017-2019. This range is in current MRIP values – the current recreational deduction is based on an earlier version on MRIP, and the current MRIP values will be used during the upcoming management track assessment and subsequent specifications. There are no federal recreational measures, and none are proposed – the expected catch is accounted for with a deduction. Most harvest occurs in Massachusetts, New Hampshire, and Maine during May-August, with harvest tapering off September-December.

Table 27. Numbers of vessels that landed mackerel, by landings (lbs) category, during 1982-2019.

YEAR	Vessels 1 mil +	Vessels 100,000 - 1mil	Vessels 50,000 - 100,000	Vessels 10,000 - 50,000	Total
1982	0	10	10	43	63
1983	0	10	5	26	41
1984	0	11	14	29	54
1985	0	12	10	28	50
1986	1	10	5	37	53
1987	1	15	8	31	55
1988	2	20	8	40	70
1989	6	17	8	27	58
1990	6	16	7	39	68
1991	13	18	1	38	70
1992	9	17	13	48	87
1993	0	16	11	55	82
1994	2	27	14	44	87
1995	4	24	11	50	89
1996	7	45	15	53	120
1997	6	30	20	46	102
1998	9	16	6	39	70
1999	6	15	9	37	67
2000	5	3	0	26	34
2001	5	3	2	20	30
2002	12	3	1	22	38
2003	14	6	5	23	48
2004	18	6	1	14	39
2005	15	11	4	17	47
2006	20	12	5	10	47
2007	16	12	2	20	50
2008	15	5	1	17	38
2009	15	6	6	18	45
2010	10	9	2	14	35
2011	0	3	3	17	23
2012	3	9	1	9	22
2013	4	3	3	13	23
2014	6	5	1	13	25
2015	5	9	10	12	36
2016	3	16	7	26	52
2017	6	7	14	27	54
2018	8	6	3	24	41
2019	3	11	4	38	56

6.6.3 *Illex* Squid

International fleets fished *Illex* in U.S. waters prior to elimination of foreign fishing. Development of the domestic *Illex* squid bottom trawl fishery began in 1982, as the U.S. industry developed the appropriate technology to catch and process squid in large quantities, and became solely domestic in 1987. The figure below illustrates the foreign fishery and the development of the domestic fishery relative to the current and recent quotas. The 2016 landings data are preliminary and may be incomplete.

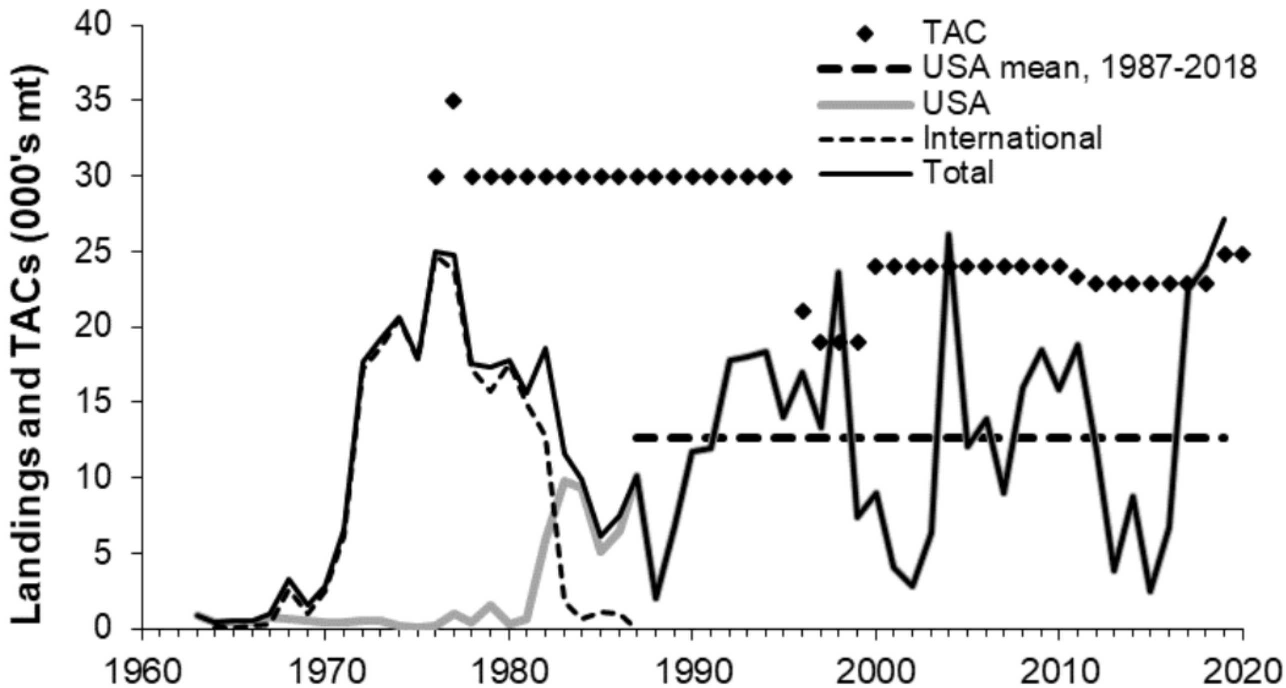

Figure 5. Landings (000's mt) of *Illex* illecebrosus from NAFO Subareas 5+6, by fleet during 1963-2019, and TACs (000's mt) for the same region during 1975-2019. The 2019 landings are preliminary. Fishery closures occurred during 1998, 2004 and 2017-2019

Price has trended up in recent years (Figure 6). Revenues are more variable due to the variability of landings, which is not unexpected for a sub-annual species (Figure 7).

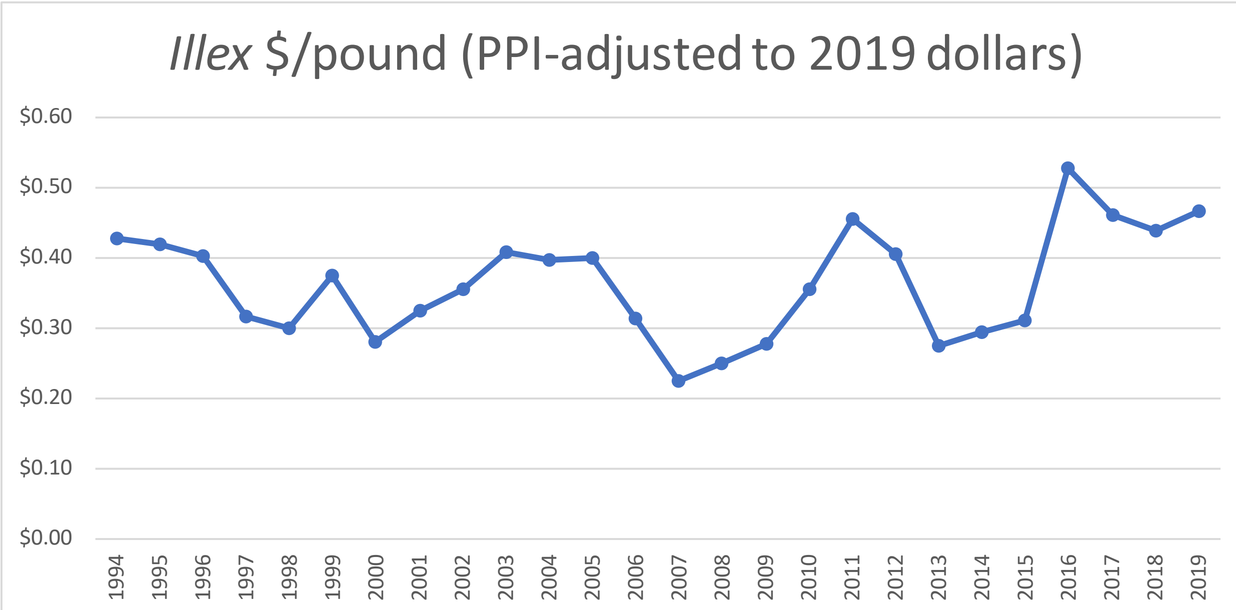

Figure 6. Inflation-adjusted ex-vessel Prices for *Illex* landings during 1982-2019.

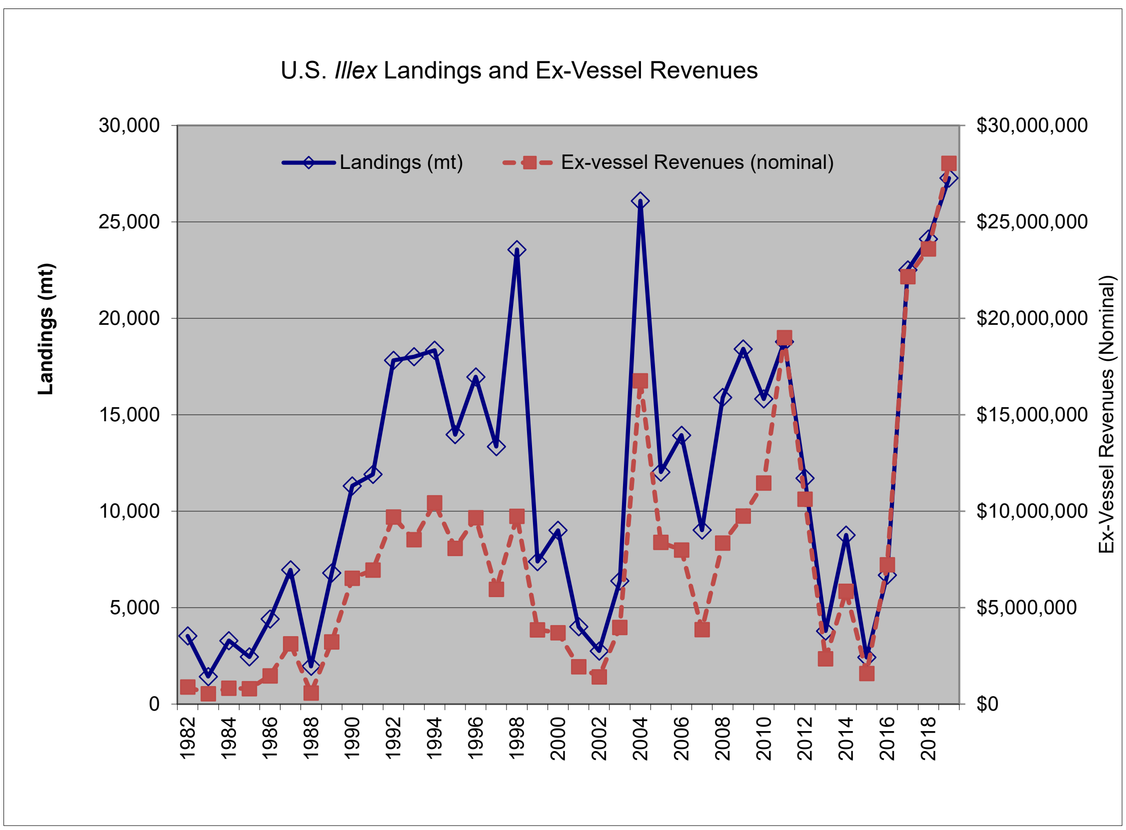

Figure 7. Landings and Nominal Ex-Vessel Revenues for *Illex* landings during 1982-2019.

The *Illex* fishery takes place near the shelf break (Figure from Hendrickson 2020) during June-September/October, when the species is available to the U.S. bottom trawl fishery.

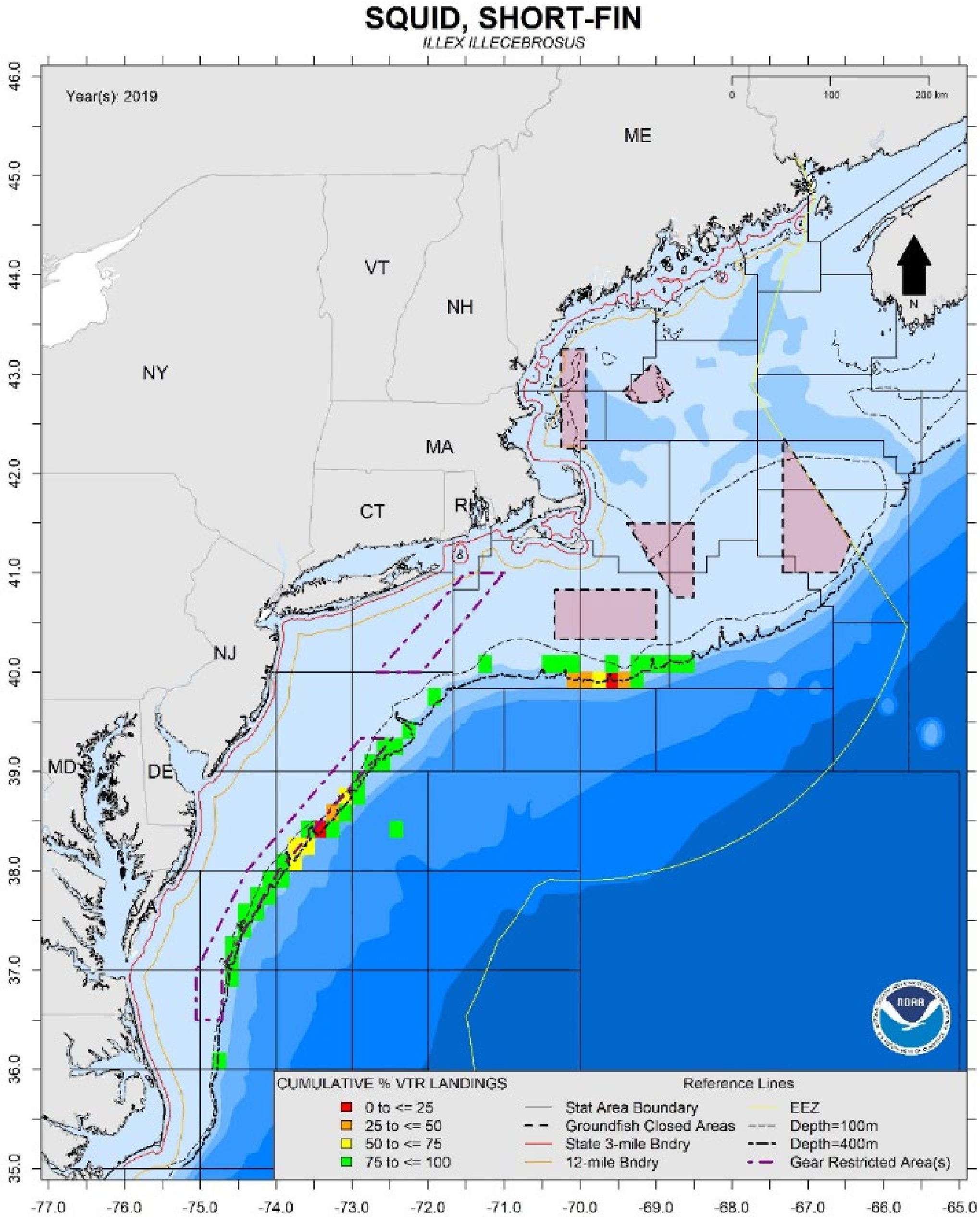

Figure 8. Distribution of landings (mt) from bottom trawl trips with *Illex* landings > 4.536 mt (10,000 lbs), by ten-minute square, during 2019 (VTR data)

In most years the preponderance of Illex landings have occurred in Rhode Island and New Jersey ports. Recent years have seen more landings in Massachusetts, and Virginia has a lower level of landings than usual. Further breakdowns of landings may violate data confidentiality rules.

Table 28. Recent *Illex* Landings by State

Most *Illex* landings occurred in NJ, RI, and MA, but further breakdown may violate data confidentiality rules (in spirit if not to the letter).

Table 29 describes the dependence on the *Illex* squid fishery for federally-permitted vessels in terms of the proportion of ex-vessel revenues from *Illex* squid in 2019. Table 30 provides information on vessel participation over time.

Table 29. Numbers of Federally-Permitted Vessels by percent dependence on *Illex* landings during 2019

Dependence on Illex	Number of Vessels in Each Dependency Category
1%-5%	5
5%-25%	8
25%-50%	14
More than 50%	11

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Table 30. Numbers of vessels that landed *Illex*, by landings (lbs) category, during 1982-2019.

YEAR	Vessels 500,000+	Vessels 100,000 - 500,000	Vessels 50,000 - 100,000	Vessels 10,000 - 50,000	Total
1982	7	7	0	10	24
1983	1	8	7	11	27
1984	4	15	4	6	29
1985	2	6	4	3	15
1986	8	6	4	3	21
1987	7	10	2	1	20
1988	3	3	1	2	9
1989	8	5	1	3	17
1990	12	3	0	1	16
1991	12	1	1	0	14
1992	16	1	0	1	18
1993	19	3	1	3	26
1994	21	7	5	8	41
1995	24	5	2	7	38
1996	24	5	6	4	39
1997	13	9	2	0	24
1998	25	4	1	3	33
1999	6	9	2	10	27
2000	7	7	0	2	16
2001	3	4	1	2	10
2002	2	3	1	1	7
2003	5	6	1	2	14
2004	23	5	2	0	30
2005	10	10	2	2	24
2006	9	8	1	2	20
2007	8	2	1	0	11
2008	12	5	0	0	17
2009	10	3	1	1	15
2010	13	5	0	4	22
2011	17	4	2	0	23
2012	8	3	2	2	15
2013	5	4	3	5	17
2014	5	3	2	2	12
2015	3	0	1	1	5
2016	4	3	3	2	12
2017	14	6	0	0	20
2018	19	7	0	5	31
2019	26	6	0	3	35

6.6.4 Longfin Squid

US fishermen have been landing squid along east coast of the US since the 1880's (Kolator and Long 1978), but early fisheries were minor in scope. Focused effort began in 1968 by the Union of Soviet Socialist Republics (USSR) and Japanese vessels. Reported foreign landings of longfin squid increased from 2,000 mt in 1964 to a peak of 36,500 mt in 1973. Foreign longfin squid landings averaged 29,000 mt for the period 1972-1975. Foreign fishing for longfin squid began to be regulated with the advent of extended fishery jurisdiction in the US in 1977. Initially, US regulations restricted foreign vessels fishing for squid (and other species) to certain areas and times (the so-called foreign fishing "windows"), primarily to reduce spatial conflicts with domestic fixed gear fishermen and minimize bycatch of non-target species. Later, foreign allocations were reduced and then eliminated as the domestic fishery became established. The development and expansion of the US squid fishery occurred relatively slowly as the US industry did not develop the appropriate technology to catch and process squid in offshore waters until the 1980's.

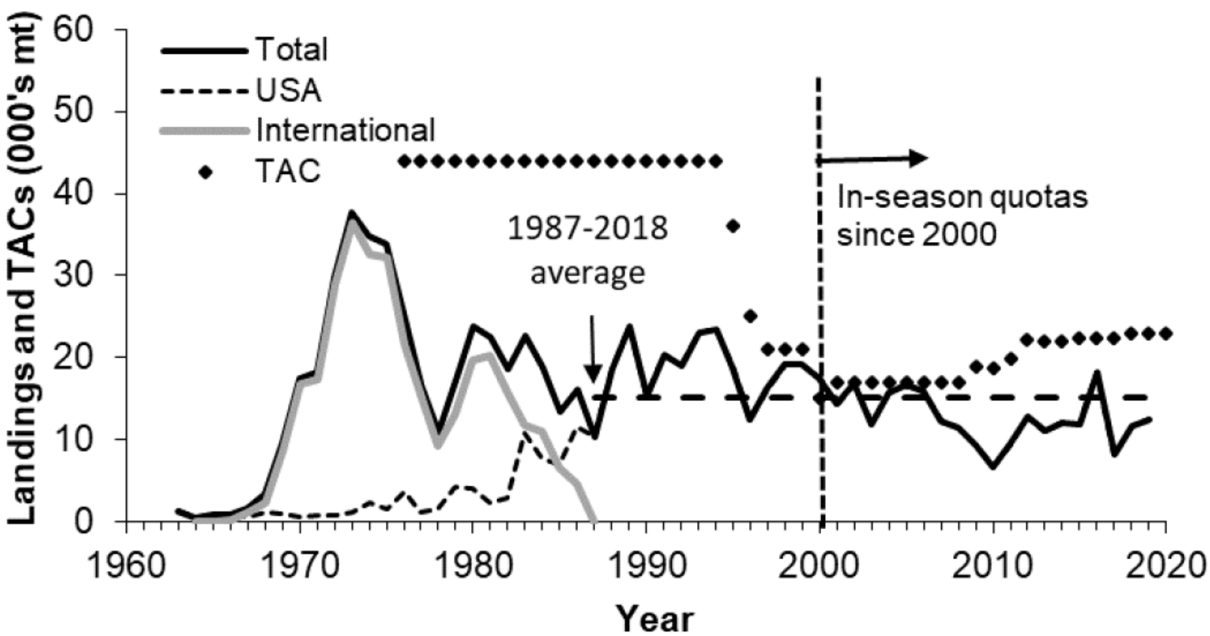

Figure 9. Historical Longfin Squid Landings in the U.S. EEZ.

Price has trended up in recent years (Figure 10). Revenues are more variable due to the variability of landings, which is not unexpected for a sub-annual species (Figure 11).

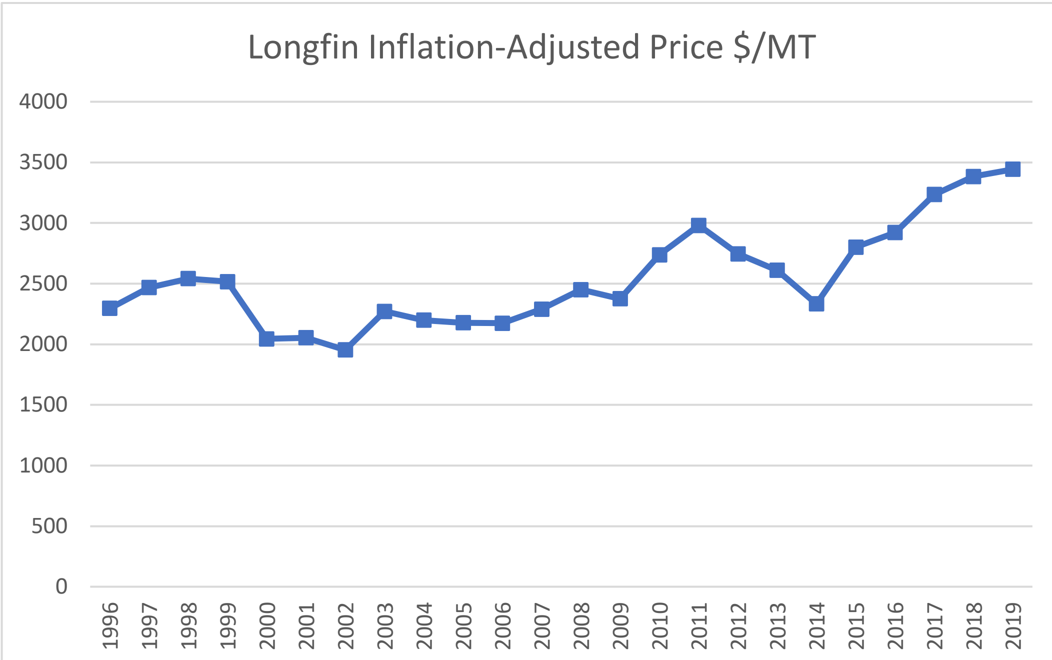

Figure 10. Ex-Vessel Longfin Prices 1996-2019 Adjusted to 2019 Dollars

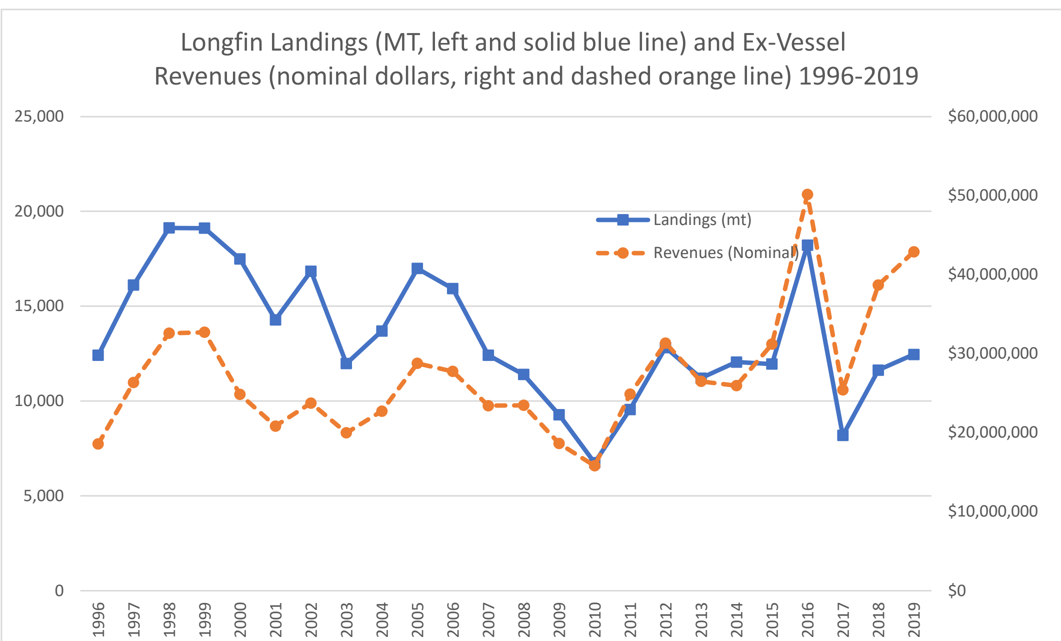

Figure 11. U.S. Longfin Landings and Nominal Longfin Ex-Vessel Values 1996-2019. Source: NMFS unpublished dealer data.

There is a strong seasonal aspect to longfin squid landings due to squid availability in the inshore and offshore habitats for bottom trawling (predominant gear type), and due to trimester-based quota allocations. Quotas for Trimesters 1-3 (T1, T2, and T3 hereafter) are 43%, 17% and 40% of the annual quota, respectively. Since implementation of trimester-based quota management, in 2007, the fishery has been frequently closed due in-season quota attainment but has not caught its annual quota. As seen in Figure 12 below, landings are generally offshore during T1 (left panel) and T3 (right panel) and inshore during T2 (center panel (Fig. 4 from Hendrickson 2019)).

The T1 and T2 quotas have been allowed to roll-over within a year with certain constraints. Since 2010, underages for T1 that are greater than 25% are reallocated to Trimesters 2 and 3 (split equally between both trimesters) of the same year. However, since 2011 the T2 quota may only be increased by 50% from rollover and the remaining portion of the underage is reallocated to T3. Any underages for T1 that are less than 25% of the T1 quota are applied only to T3 of the same year. Any overages for T1 and T2 are subtracted from T3 (or the annual quota) of the same year.

While the Trimester allocations are based on historical catch and were primarily developed to optimize fishery operation, they do serve a biological purpose of spreading catch throughout the year, which is an important consideration given the short lifecycle of longfin squid (NEFSC 2011). The squid population is composed of overlapping micro-cohorts and avoiding excessive mortality on any one cohort reduces the chances of recruitment overfishing.

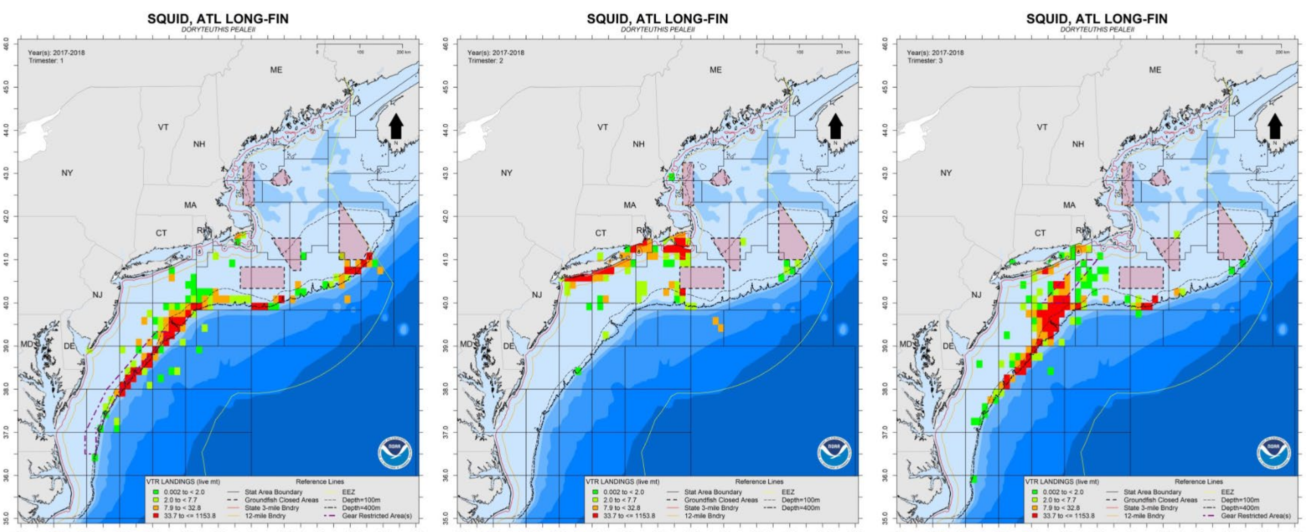

Figure 12. Distribution of directed longfin landings during 2017-2018. [18]

18 Figure 4 details: Distribution of landings (mt) from bottom trawl trips with Doryteuthis pealeii landings greater than 1,134 mt (2,500 lbs), summed by ten-minute square and trimester, for 2017 and 2018 combined. The Southern Gear Restricted Area (GRA) is in effect from January 1 to March 15 (Trimester 1) and the Northern GRA is in effect from November 1 to December 31. Squid fishing is not permitted in the GRAs during these time

In recent years most longfin squid landings have occurred in Rhode Island ports, with New York, New Jersey, Massachusetts, and Connecticut also contributing substantially (Table 31). The top ports are listed in Table 32. The preponderance of landings occur with bottom trawl gear.

Table 31. Longfin Squid Landings (mt), by State, during 2017-2019.

YEAR	CT	MA	NJ	NY	RI	Other	Total
2017	295	642	841	1,510	4,863	37	8,151
2018	611	735	1,586	2,223	6,389	89	11,543
2019	980	1,188	2,203	1,828	6,040	213	12,241

Table 32. Top longfin squid ports in rank of descending ex-vessel value, for ports that averaged at least $25,000 in landed longfin squid during 2017-2019.

POINT_JUDITH, RI
MONTAUK, NY
CAPE_MAY, NJ
NORTH_KINGSTOWN, RI
HAMPTON_BAYS, NY
NEW_BEDFORD, MA
NEW_LONDON, CT
BARNSTABLE, MA
POINT__PLEASANT, NJ
STONINGTON, CT
SHINNECOCK, NY
HAMPTON, NY
HYANNIS, MA
FALMOUTH, MA
BELFORD, NJ
BOSTON, MA
EAST_HAVEN, CT
WOODS_HOLE, MA
NEWPORT, RI
MYSTIC, CT
CHATHAM, MA

periods because bottom trawls with a codend mesh size less than 127 mm diamond mesh (5.0 in., inside stretched mesh) are prohibited. East of 72º 30' N, squid fishing is only permitted in small-mesh exemption areas which are not shown here. The 100 m and 400 m isobaths are shown. Landings in ten-minute squares shown at depths greater than 400 m are incorrect fishing locations that were reported in the Vessel Trip Reports.

Table 33 describes the dependence on the longfin squid fishery for federally-permitted vessels in terms of the proportion of ex-vessel revenues from longfin squid in 2019. Table 34 provides information on vessel participation over time.

Table 33. Dependence on Longfin Squid by Federally-Permitted Vessels – 2019

Dependence on Longfin	Number of Vessels in Each Dependency Category
1%-5%	44
5%-25%	60
25%-50%	54
More than 50%	42

While data are not available on recreational fishing (MRIP does not collect information on invertebrates), recreational fishing does occur for longfin squid, but it is believed to be a minor component of total catch.

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Table 34. Numbers of vessels that landed Longfin, by landings (lbs) category, during 1982-2019.

YEAR	Vessels 500,000+	Vessels 100,000 - 500,000	Vessels 50,000 - 100,000	Vessels 10,000 - 50,000	Total
1982	0	14	16	88	118
1983	1	64	36	108	209
1984	1	41	48	111	201
1985	2	44	34	89	169
1986	1	56	44	98	199
1987	3	39	44	103	189
1988	11	65	35	95	206
1989	15	68	51	83	217
1990	11	52	47	108	218
1991	17	54	34	107	212
1992	17	48	31	67	163
1993	21	73	32	92	218
1994	24	74	26	77	201
1995	15	79	40	96	230
1996	8	68	37	93	206
1997	13	87	55	65	220
1998	18	86	46	91	241
1999	18	85	36	120	259
2000	13	96	47	96	252
2001	12	66	44	84	206
2002	13	90	32	69	204
2003	8	65	24	59	156
2004	13	64	27	51	155
2005	19	64	19	46	148
2006	16	76	26	50	168
2007	16	46	31	69	162
2008	10	58	18	78	164
2009	8	52	26	65	151
2010	3	45	23	69	140
2011	7	55	32	46	140
2012	8	75	38	41	162
2013	10	58	18	37	123
2014	12	60	29	56	157
2015	13	49	21	50	133
2016	19	74	35	46	174
2017	3	50	38	57	148
2018	14	47	29	62	152
2019	16	52	27	48	143

Butterfish Discard Cap

The longfin squid fishery is subject to closure if it discards too much butterfish. Framework 7 modified the cap to be a discard cap versus catch cap but the desired effect remained unchanged - butterfish mortality in the longfin squid fishery should be controlled. Because of the butterfish discard cap, butterfish discards in the squid fishery may limit production in the squid fishery, so butterfish takes on a "shadow value" in terms of the indirect impact on the longfin squid fishery. While the exact relationship between butterfish and longfin squid catches cannot be precisely determined ahead of time for any given year, the "shadow value" of butterfish could be quite large; that is, the longfin squid fishery may see large increases in landings/revenues/profits from relatively small increases in the butterfish specifications (and vice-versa with decreases).

The cap also is important for butterfish management. Since ACL overages of butterfish have to be paid back in following years, the cap serves to help limit annual butterfish mortality to a given amount established by the SSC. This should both protect the butterfish stock and avoid negative impacts related to large paybacks that would occur if discarding was not monitored and controlled each year in near real-time.

Since implementation of the cap in 2011, there has only been one closure from the butterfish cap. (In 2012 there was a closure from April 17-30, although had late-arriving data been on-time there would not have been a closure.) Previous reviews of the cap's operation by the SSC have found that the cap appears to be operating as designed, i.e., tracking and limiting butterfish mortality in the longfin squid fishery.

Longfin Squid Recreational Fishery

While there is a recreational fishery for longfin squid, catch amounts have not been estimated – MRIP does not collect information on invertebrates. Informal investigation by Council staff indicates that the recreational longfin squid fishing catch is probably a small component of total catch, but may warrant future investigation.

6.6.5 Atlantic butterfish

Atlantic butterfish were landed exclusively by US fishermen from the late 1800's (when formal record keeping began) until 1962 (Murawski and Waring 1979). Reported landings averaged about 3,000 mt from 1920-1962 (Waring 1975). Beginning in 1963, vessels from Japan, Poland and the Union of Soviet Socialist Republics (USSR) began to exploit butterfish along the edge of the continental shelf during the late-autumn through early spring (Murawski and Waring 1979). Reported foreign catches of butterfish increased from 750 mt in 1965 to 15,000 mt in 1969, and then to about 32,000 mt in 1973. With the advent of extended jurisdiction in US waters, reported foreign catches declined sharply from 14,000 mt in 1976 to 2,000 mt in 1978. Foreign landings were completely phased out by 1987 (NEFSC 2014).

During the period 1965-1976, US Atlantic butterfish landings averaged 1,840 mt. From 1977-1987, average US landings doubled to 5,137 mt, with a historical peak of slightly less than 12,000 mt landed in 1984 (NEFSC 2014). Low abundance and reductions in Japanese demand for butterfish probably were a factor in lowering butterfish landings in the 1990s-early 2000s, but regulations kept landings low from 2005-2012. Quotas were increased somewhat in each year 2012-2014 and more substantially in 2015 based on a new assessment. Current fishery participants report the highest demand for large butterfish with high fat content, though there is currently some demand for most sizes of butterfish (pers com Meghan Lapp, Seafreeze Ltd). Through 2019, the fishery had not fully redeveloped to take maximum advantage of the higher quotas.

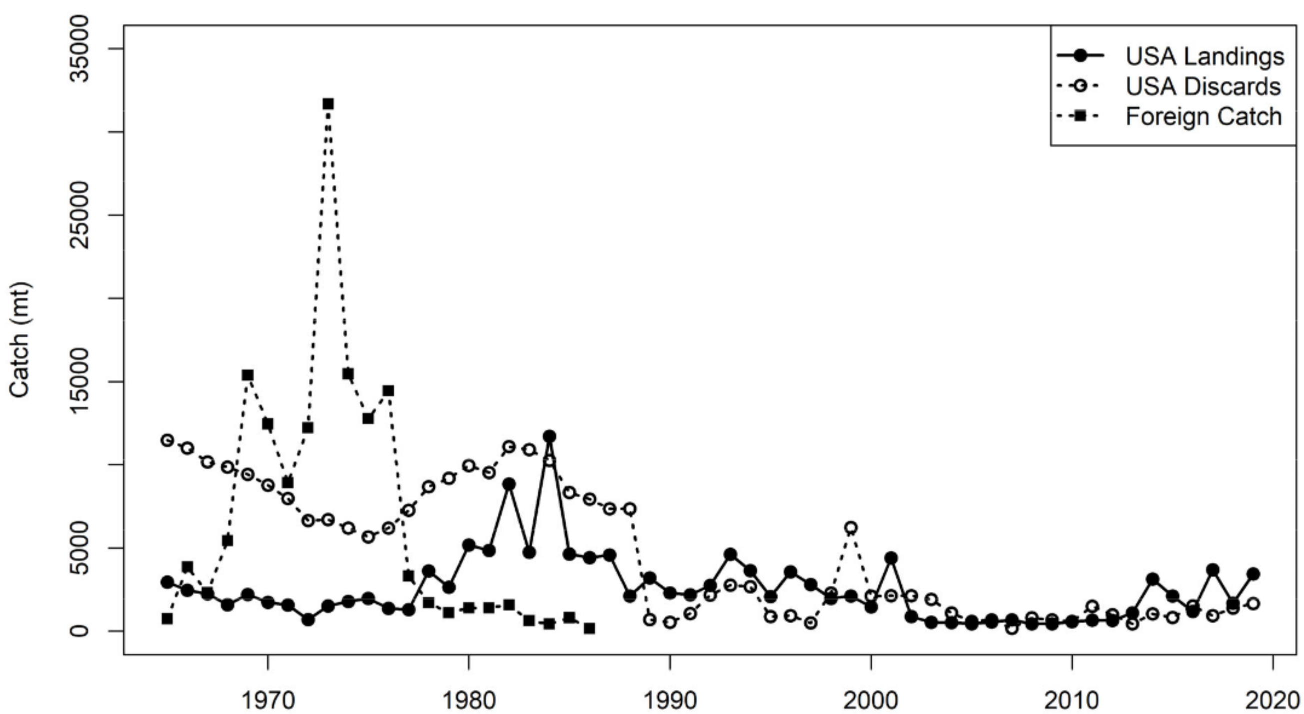

Figure 13. Butterfish Catch in U.S. Waters 1965-2019.

Butterfish price shows no clear trend (Figure 14) considering the time series since 1996. Revenues are more variable due to the variability of landings, which is not unexpected for a relatively short-lived species (Figure 15).

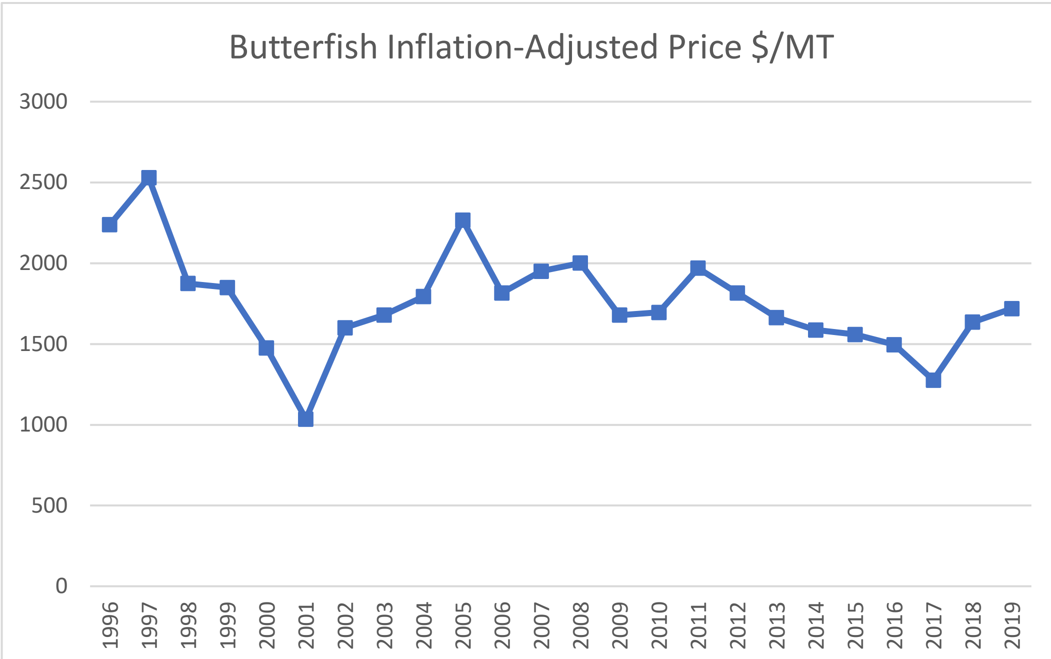

Figure 14. Ex-Vessel Butterfish Prices 1996-2019 Adjusted to 2019 Dollars

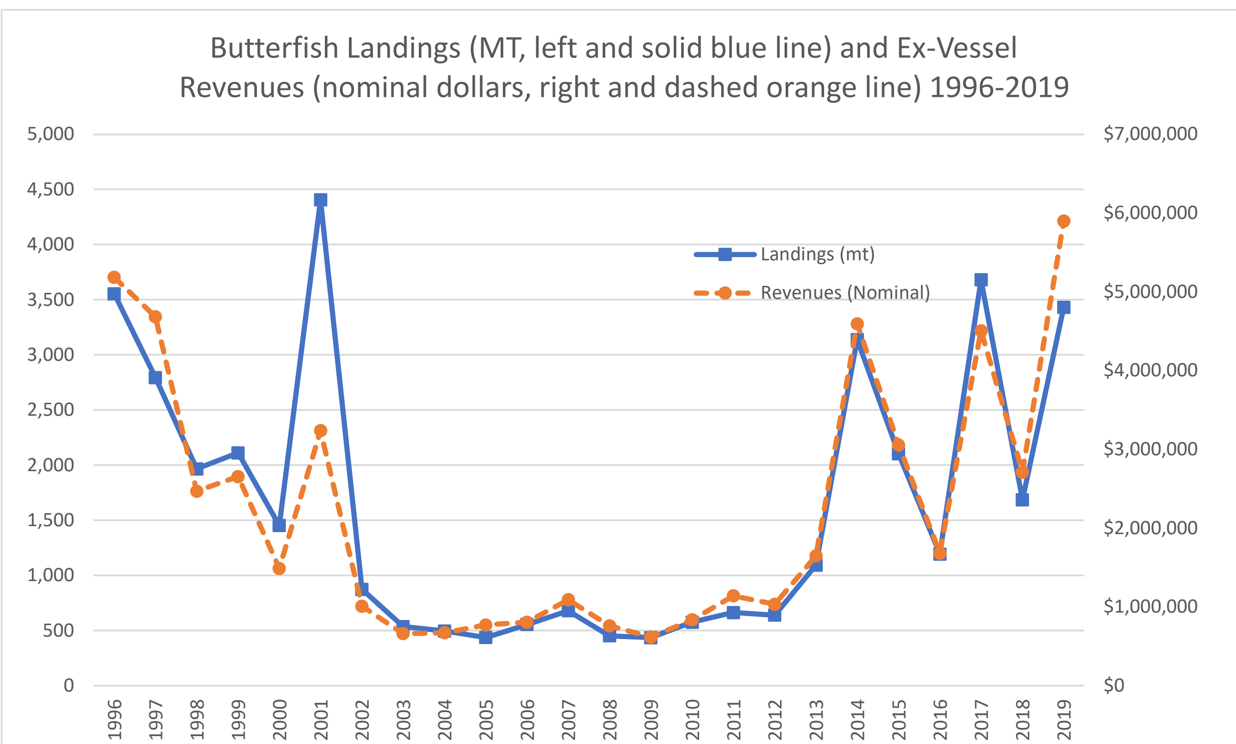

Figure 15. U.S. Butterfish Landings and Nominal Longfin Ex-Vessel Values 1996-2019. Source: NMFS unpublished dealer data.

Butterfish landings track the seasonal distribution of butterfish, with landings more from offshore areas in the winter and extending inshore during summer/fall (Figure 16). Most directed fishing occurs with bottom trawls.

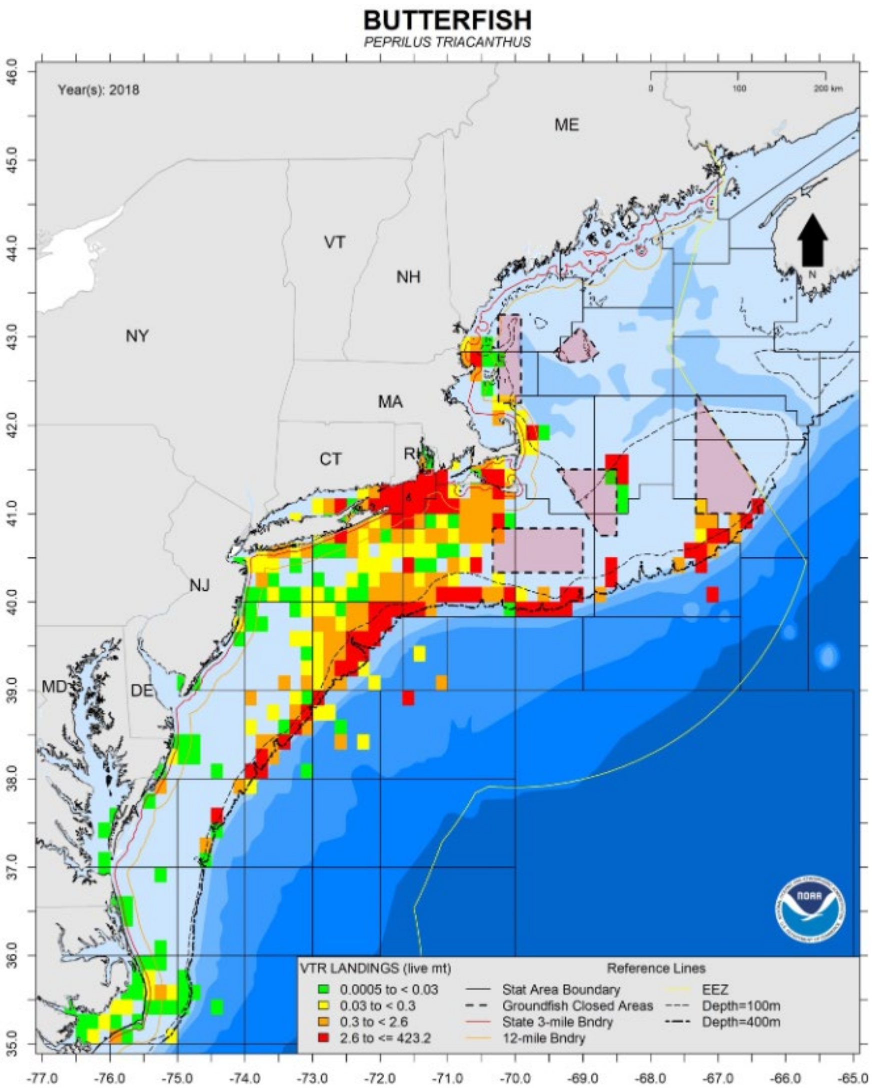

Figure 16. Distribution of butterfish landings (mt) from VTR data in 2018 (Adams 2019)

In recent years most butterfish landings have occurred in Rhode Island, New York, and Massachusetts (see table below). Further breakdowns of landings by port may violate data confidentiality rules.

Table 35. Recent Butterfish Landings by State

YEAR	RI	NY	MA	Other	Total
2017	3,120	314	111	136	3,681
2018	1,190	230	119	148	1,687
2019	2,969	223	85	153	3,431

Table 36 describes the dependence on butterfish for federally-permitted vessels in terms of the proportion of ex-vessel revenues from butterfish in 2019. Table 37 provides information on vessel participation over time.

Table 36. Numbers of Federally-Permitted Vessels by percent dependence on butterfish landings during 2019

Dependence on Butterfish	Number of Vessels in Each Dependency Category
1%-5%	88
5%-25%	25
25%-50%	3
More than 50%	0

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Table 37. Numbers of vessels that landed butterfish, by landings (lbs) category, during 1982-2019.

YEAR	Vessels 200,000+	Vessels 50,000 - 200,000	Vessels 10,000 - 50,000	Vessels 1,000 - 10,000	Total
1982	29	31	35	107	202
1983	9	33	67	111	220
1984	41	35	47	100	223
1985	11	36	52	122	221
1986	7	14	52	113	186
1987	8	38	40	86	172
1988	4	15	54	86	159
1989	7	29	40	99	175
1990	1	22	58	110	191
1991	5	15	45	96	161
1992	7	25	32	90	154
1993	12	30	36	108	186
1994	6	20	40	124	190
1995	3	11	63	141	218
1996	6	15	86	129	236
1997	6	12	77	169	264
1998	2	14	69	153	238
1999	2	10	72	146	230
2000	1	9	55	160	225
2001	4	6	73	129	212
2002	0	3	46	125	174
2003	0	0	20	115	135
2004	0	0	23	94	117
2005	0	1	11	93	105
2006	0	1	24	91	116
2007	0	3	37	98	138
2008	0	1	22	99	122
2009	0	2	17	83	102
2010	0	1	37	82	120
2011	0	2	36	91	129
2012	0	1	38	87	126
2013	1	1	46	82	130
2014	2	4	47	79	132
2015	3	6	36	83	128
2016	2	9	39	82	132
2017	3	7	51	67	128
2018	1	8	48	84	141
2019	3	9	47	72	131

7.0 WHAT ARE THE IMPACTS (Biological and Human Community) FROM THE ALTERNATIVES CONSIDERED IN THIS DOCUMENT?

The alternatives are described in Section 5. A descriptive label is included for each alternative below when considering impacts – see the labels in quotes in Section 5 at the start of each alternative.

Related to this action, the key determinant of biological impacts on the FMP's managed resource is how much fish are caught, and whether catch remains below the ABC. Keeping catch at or below the ABC should maintain or return any stock to a sustainable condition, with biomass above its target. By design, the Council's risk policy leads stocks toward a biomass point greater than that associated with MSY. Stocks may be driven below or further above their targets than intended by low or high recruitment events, which are in turn may be driven by large scale ecosystem processes beyond our control. Accordingly, the analysis of impacts on the managed resources in this document focuses on the relative upper limits or other constraints imposed (or removed) by the various alternatives considered in this action.

For habitat and non-target species impacts, the key determinant is not so much the catch itself but the amount and character of the related effort. A decrease in effort may result in positive impacts (+) as a result of fewer encounters and/or fewer habitat impacts from fishing gear, while an increase in effort may result in a negative impact (-). Similar effort likely results in negligible impacts (0), maintaining the status quo or baseline condition. The table immediately below illustrates that the availability of the target species can drive effort as much as any quota change, and as effort changes so would impacts on habitat, protected resources, and non-target species. Since limits on catch do cap effort however, measures that limit catch are a factor related to effort.

For protected resources that may be listed under the ESA or have catch above potential biological removal (PBR), the situation is slightly more complex. While lower effort will reduce impacts, any interactions on ESA-listed species or species above PBR is still a negative effect – see Table 39.

National Oceanic and Atmospheric Administration Administrative Order 216 6A and the Companion Manual contains criteria for determining the significance of the impacts of a proposed action and it includes the possibility of introducing or spreading a nonindigenous species. This potential impact does not fit into the sections below so it is addressed in this introduction. There is no evidence or indication that these fisheries have ever resulted or would ever result in the introduction or spread of nonindigenous species.

Table 38. Changes in effort as a result of adjustments to quota and/or fish availability.

Change in quota	Fish abundance/availability		
	Decrease in availability	**No change in availability**	**Increase in availability**
Decrease in quota	Fishing effort may decrease, increase, or stay the same depending on a combination of factors[19].	Effort likely to decrease or stay the same. If per trip catch stays the same, the fishery will be closed earlier with fewer trips taken (reducing effort). However managers may reduce trip limits or adjust regulations that extend the fishing season (keeping effort the same).	Effort likely to decrease or stay the same. A lower quota plus higher catch per unit of effort (CPUE) from higher availability should decrease effort. However, managers may reduce trip limits or adjust regulations that extend the fishing season which may keep effort relatively even.
No change in quota	Effort may increase or decrease. While the quota has not changed, fishermen may try to take more trips to catch the same amount of fish (increasing effort) or may stop targeting a stock of fish if availability is low enough to decrease profitability (decreasing effort).	Fishing effort may remain the same given the quota has not changed and availability is expected to be similar.	Effort should decrease. While the quota has not changed, fishermen should be able to take fewer trips to catch the same amount of fish (decreasing effort).
Increase in quota	Fishing effort likely to increase or stay the same. A higher quota plus lower catch per unit of effort from lower availability should increase effort. However, managers may increase trip limits or adjust regulations to allow more efficient fishing (keeping effort the same).	Effort likely to increase or stay the same. If per trip catch stays the same, the fishery will be closed later with more trips taken (increasing effort). However managers may increase trip limits or adjust regulations to allow more efficient fishing (keeping effort the same).	Fishing effort may decrease, increase, or stay the same depending on a combination of factors.

19 Factors affecting fishing effort include other species abundance, availability of other opportunities, weather, climate, fish movements/availability, variable productivity, and market forces/price changes.

Environmental impacts are described both in terms of their direction (negative, positive, or no impact) and their magnitude (slight, moderate, or high). The table below summarizes the guidelines used for each VEC to determine the magnitude and direction of the impacts described in this section.

Table 39. General definitions for impacts and qualifiers relative to resource condition (i.e., baselines)

General Definitions				
VEC	**Resource Condition**	**Impact of Action**		
		Positive (+)	Negative (-)	No Impact (0)
Target and non-target Species	Overfished status defined by the MSA	Alternatives that maintain or are projected to result in a stock status above an overfished condition*	Alternatives that 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 (i.e., no take)	Alternatives that result in interactions/take of listed species, 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 maintain takes below PBR and approaching the Zero Mortality Rate Goal	Alternatives that result in interactions with/take of marine mammals 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)	Alternatives that improve the quality or quantity of habitat or allow for recovery	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), as in slight positive or slight negative		To a lesser degree / minor	
	Moderate (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.				

The table below summarizes the baseline conditions of the VECs considered in this action, as described in Section 6.

Table 40. Summary Baseline conditions of VECs considered in this action

<table>
<tr><th colspan="2" rowspan="2">VEC</th><th colspan="2">Baseline Condition</th></tr>
<tr><th>Status/Trends, Overfishing?</th><th>Status/Trends, Overfished?</th></tr>
<tr><td rowspan="5">Target stocks (section 6.1)</td><td>Atl. mackerel</td><td>Yes through 2016, projected to have been below overfishing threshold in 2017 and beyond.</td><td>Yes in 2016. Projected to be above overfished threshold in 2017 and beyond. A rebuilding program is in place.</td></tr>
<tr><td>Butterfish</td><td>No</td><td>No</td></tr>
<tr><td>Longfin Squid</td><td>Unknown</td><td>No</td></tr>
<tr><td>Illex Squid</td><td>Unknown, but appears unlikely based on SSC holistic evaluation.</td><td>Unknown, but appears unlikely based on SSC holistic evaluation.</td></tr>
<tr><td>Chub Mackerel</td><td>Unknown</td><td>Unknown</td></tr>
<tr><td>Non-target species (principal species listed in section 6.1)</td><td>See Section 6.1</td><td colspan="2">There are a variety of species incidentally caught in the MSB fisheries. See Section 6.1 for relevant lists, which note species that are overfished, subject to overfishing, or otherwise depleted.</td></tr>
<tr><td colspan="2">Habitat (section 6.2)</td><td colspan="2">Commercial fishing impacts are complex, variable, and typically adverse; fishing activities had historically negative but site-specific effects on habitat quality. Actions to protect habitat (e.g. Tilefish EFH closures and deep water coral protection areas) have mitigated impacts from the MSB fisheries.</td></tr>
<tr><td rowspan="5">Protected resources (section 6.4)</td><td>Sea turtles</td><td colspan="2">Leatherback and Kemp's ridley sea turtles are endangered under the ESA; loggerhead (NW Atlantic DPS) and green (North Atlantic DPS) sea turtles are classified as threatened.</td></tr>
<tr><td>Fish</td><td colspan="2">Atlantic salmon, shortnose sturgeon, and the New York Bight, Chesapeake, Carolina, and South Atlantic DPSs of Atlantic sturgeon are classified as endangered under the ESA; the Atlantic sturgeon Gulf of Maine DPS is listed as threatened; cusk, alewife, and blueback herring are candidate species</td></tr>
<tr><td>Large whales</td><td colspan="2">All large whales in the Northwest Atlantic are protected under the MMPA. North Atlantic right, fin, blue, sei, and sperm whales are also listed as endangered under the ESA. Pursuant to section 118 of the MMPA, the Large Whale Take Reduction Plan was implemented to reduce humpback, North Atlantic right, and fin whale entanglement in vertical lines associated with fixed fishing gear (sink gillnet and trap/pot) and sinking groundlines.</td></tr>
<tr><td>Small cetaceans</td><td colspan="2">Pilot whales, dolphins, and harbor porpoise are protected under the MMPA. Pursuant to section 118 of the MMPA, the HPTRP and BDTRP was implemented to reduce bycatch of harbor porpoise and bottlenose dolphin stocks, respectively, in gillnets.</td></tr>
<tr><td>Pinnipeds</td><td colspan="2">Gray, harbor, hooded, and harp seals are protected by the MMPA</td></tr>
</table>

Human communities (section 6.3)	The MSB stocks, including *Illex*, support ongoing substantial fisheries and related support services, providing jobs which contribute positively to human communities.

7.1 Biological Impacts on Managed Species

The impacts from the alternatives are described separately for each of the managed species: Atlantic mackerel (7.1.1), *Illex* squid (7.1.2), longfin squid (7.1.3), butterfish (7.1.4), and chub mackerel (7.1.5) Any amount of fishing will lower the population of a fish stock to some degree, but in the context of fishery management, a functionally negative impact would be something that causes a population to undergo overfishing or become overfished.

7.1.1 Impacts on Atlantic Mackerel

Baseline condition: The most recent assessment found Mackerel to be overfished with overfishing occurring in 2016. An updated assessment is expected in 2021 to help evaluate rebuilding progress. The delay in that assessment from 2020 means that the impacts of catch levels cannot be currently quantified, but directional impacts can be identified given the original rebuilding projections. The implemented rebuilding plan estimated that with typical recruitment, the stock could rebuild within 5 years, i.e. by mid-2023.

The *Illex* squid, longfin squid, and butterfish specifications should not substantially affect Mackerel because there is minimal unmonitored mackerel catch in these fisheries. There is also already a set-aside for discards within the existing specifications as well as a management uncertainty buffer. The impacts of the mackerel specifications are described below.

Mackerel A (Preferred)

Mackerel A, which maintains the current catch levels and adheres to the SSC's recommendations, would restrict catch to slightly below levels that the most recent assessment indicated would rebuild mackerel within 5 years if A) typical recruitment occurs and B) if the recruitment estimated in the final years of the assessment approximately persists. Terminal year-class recruitment estimates are typically imprecise given there have not been many years to observe the year-class. Overall, Mackerel A should have a moderate positive impact on the mackerel stock by facilitating rebuilding within the targeted timeframe, but not as fast as if catch was even lower. Given the relative catch constraints, impacts would be more positive than Mackerel B, but less positive than Mackerel C.

Mackerel B

Mackerel B would allow more than the SSC-recommended catches, which are designed to avoid overfishing and allow the stock to rebuild. The higher catches possible with Mackerel B could have a moderate negative impact on the mackerel stock by hindering stock rebuilding within the targeted 5-year period and/or causing overfishing. Given the relative catch constraints, impacts would be more negative relative to all other alternatives.

Mackerel C

Mackerel C would restrict mackerel catch more than the SSC-recommended ABCs in Mackerel A (as well as compared to Mackerel B). Overall, Mackerel C should have a moderate positive impact on the mackerel stock by facilitating rebuilding within the targeted timeframe, but not as fast as if catch was even lower. Given the relative catch constraints, impacts would be more positive relative to all other alternatives.

7.1.2 Impacts on *Illex* Squid

Baseline condition: while there is no assessment for *Illex* squid, catches have been limited to an amount deemed sustainable by the SSC based on the best available scientific information. The lack of an assessment means that the impacts of catch levels cannot be currently quantified, but directional impacts can be identified based on the assumption that the SSC's ABCs are sustainable.

The Mackerel, longfin squid, and butterfish specifications should not substantially affect *Illex* because there is minimal unmonitored *Illex* catch in these fisheries, and there is already a set-aside for discards within the existing specifications. The impacts of the *Illex* specifications are described below.

Illex A

Illex A, which maintains the current catch levels and monitoring, should approximately restrict *Illex* squid catch at or below the SSC-recommended ABC, thus maintaining the baseline condition in an approximately similar fashion (SSC recommendations are designed by the Council's risk policy to avoid overfishing). As such, *Illex* A should have a moderately positive, if unquantifiable, impact on the *Illex* stock. Given the relative catch constraints, impacts from *Illex* A would be moderately more positive than *Illex* C but moderately less positive than *Illex* D (*Illex* C's and *Illex* D's different quotas would outweigh any effects from their proposed monitoring changes). Impacts with *Illex* A would be slightly less positive than *Illex* B given the identical specifications and reporting and monitoring modifications proposed in *Illex* B (48-hour reporting and 94% closure).

Illex B (Preferred)

Illex B, which maintains the current catch levels and also modifies monitoring to better avoid overages, should restrict *Illex* squid catch at or below the SSC-recommended ABC, thus maintaining the baseline condition in a similar fashion (SSC recommendations are designed by the Council's risk policy to avoid overfishing). As such, *Illex* B should have a moderately positive, if unquantifiable, impact on the *Illex* stock. The additional timeliness of dealer reporting and slight lowering of the closure threshold in *Illex* B should lead to slightly more positive impacts for the *Illex* stock than *Illex* A (by slightly lowering the probability of ABC overages and therefore overfishing). Given the relative catch constraints, impacts from *Illex* B would be more positive than *Illex* C but less positive than *Illex* D (*Illex* C's and *Illex* D's different quotas would outweigh any effects from their proposed monitoring changes).

Illex C

Illex C would allow more than the SSC-recommended catches. While it is not possible to quantify the impact given current information, the higher catches possible with *Illex* C could have a moderately negative impact on the *Illex* stock (by causing overfishing), and would be more negative compared to any of the other alternatives by potentially exceeding the SSC recommendation (which is designed to avoid overfishing), despite the included monitoring changes.

Illex D

Illex D would restrict *Illex* catch most, below the SSC's recommendation, so impacts should be moderately positive for the *Illex* stock. Given the relative catch constraints, impacts would be more positive relative to all other alternatives. The additional timeliness of dealer reporting and slight lowering of the closure threshold would also be protective of the *Illex* stock, but of limited impact compared to the ABC differences.

7.1.3 Impacts on Longfin Squid

Baseline condition: longfin squid are not overfished (above target biomass), but the overfishing status is unknown due to the complex stock dynamics. The lack of an overfishing reference point means that the impacts of catch levels cannot be currently quantified, but directional impacts can be identified based on the recent assessment's finding that the stock is above target biomass.

The Mackerel, *Illex* squid, and butterfish specifications should not substantially affect longfin because there is minimal unmonitored longfin catch in these fisheries, and there is already a set-aside for discards within the existing specifications. The impacts of the longfin specifications are described below.

Longfin A (Preferred)

Longfin A, which maintains the current catch levels and monitoring, should restrict longfin catch at or below the SSC-recommended ABC, thus maintaining the baseline condition in a similar fashion. As such, Longfin A should have a moderately positive impact on the longfin stock. Given the relative catch constraints, impacts would be moderately more positive than Longfin B but moderately less positive than Longfin C.

Longfin B

Longfin B would allow more than the SSC-recommended catches, which are designed to avoid overfishing. While it is not possible to quantify the impact given current information, the higher catches possible with Longfin B could have a moderately negative impact on the longfin stock (by causing overfishing), and would be moderately more negative compared to either Longfin A or Longfin C.

Longfin C

Longfin C would restrict longfin catch most, and would therefore potentially have a moderately positive impact on the longfin stock. Given the relative catch constraints, impacts would be more positive relative to all other alternatives.

7.1.4 Impacts on Butterfish

Baseline condition: butterfish are not overfished, overfishing is not occurring, and catches are limited to maintain a sustainable fishery. A recent assessment indicates a short-term decline (but not to an overfished condition). Butterfish recruitment is variable so substantial year to year populations changes are expected, and recruitment has been low recently.

The Mackerel, longfin squid, and *Illex* specifications should not substantially affect butterfish because there is minimal unmonitored butterfish catch in these fisheries. There are also already several set-asides for discards within the existing specifications as well as a management uncertainty buffer. While there can be substantial discarding of butterfish in the longfin fishery, the longfin specifications should not have a substantial impact on butterfish because all of the butterfish specifications include a cap on discarding of butterfish in the longfin squid fishery.

Butterfish A

Butterfish A, which maintains the current catch levels, might not restrict catch at or below the SSC-recommended ABCs, which are designed to avoid overfishing. As such, Butterfish A could have a moderately negative impact on the butterfish stock by leading to overfishing and/or an overfished condition. Given the relative catch constraints, impacts for Butterfish A would be more negative than any alternative.

Butterfish B (Preferred)

Butterfish B should restrict butterfish catch at or below the SSC-recommended ABCs, thus maintaining the baseline condition in a similar fashion. As such, Butterfish B should have a moderately positive impact on the butterfish stock (by avoiding overfishing). Given the relative catch constraints, impacts would be moderately more positive than Butterfish A and very similar to Butterfish C. (Butterfish C's catch is somewhat higher in 2021 and somewhat lower in 2022 compared to Butterfish B.)

Butterfish C

Butterfish C should restrict butterfish catch at or below the SSC-recommended ABCs, thus maintaining the baseline condition in a similar fashion. As such, Butterfish C should have a moderately positive impact on the butterfish stock (by avoiding overfishing). Given the relative catch constraints, impacts would be moderately more positive than Butterfish A and very similar to Butterfish B. (Butterfish C's catch is somewhat higher in 2021 and somewhat lower in 2022 compared to Butterfish B.)

7.1.5 Impacts on Chub Mackerel

Baseline condition: while there is no assessment for chub mackerel, catches are limited to an amount deemed sustainable by the SSC based on the best available scientific information so the stock should be harvested in a sustainable manner, leading to positive impacts for the chub mackerel stock. The MSB specifications considered in this document should not substantially affect chub mackerel because there is minimal unmonitored chub mackerel catch in these fisheries, and there are management uncertainty and discard set-asides within the existing chub mackerel specifications that can account for any incidental catch.

7.2 Habitat Impacts

As discussed in Table 38 at the start of Section 7, the availability of the targeted species may drive effort (and habitat impacts) as much as quotas and other regulations. Impacts on the habitat for the managed species (7.2.1) and other species (7.2.2) are addressed separately. The word "habitat" encompasses essential fish habitat (EFH) for the purposes of this analysis. The Council has already minimized to the extent practicable impacts to habitat from the MSB fisheries through closure of several canyon areas in MSB Amendment 9 (http://www.mafmc.org/fmp/history/smb-hist.htm) and Tilefish Amendment 1 (http://www.mafmc.org/fmp/history/tilefish.htm), and protections for Deep Sea Corals via Amendment 16 (http://www.mafmc.org/fmp/history/smb-hist.htm). As a baseline, many habitats in the area of operation of the MSB fisheries are degraded from historical fishing effort (both MSB and other) and from non-fishing activities (Stevenson et al. 2004). None of the preferred alternatives would increase quotas and/or effort, and there is nothing in this action that would change the character of MSB fishing effort, so there should not be any adverse habitat impacts. The changes in effort considered in this document are all relatively slight in the context of overall fishing effort in the management area – see section 7.3 for discussion of this concept.

7.2.1 Impacts on Managed Species Habitat

As described in Section 6.3, most MSB fishing takes place with bottom otter trawling with some mid-water trawling for Mackerel. Habitat for the managed species (MSB) generally consists of the water column, which is not significantly impacted by fishing activity. The exception to the habitat location being the water column is longfin squid eggs, which are attached to sand, mud, or bottom structure (manmade or natural). However, as determined in Amendment 9, there is no indication that squid eggs are preferentially attached to substrates that are vulnerable to disturbance from bottom trawling, so no impacts on habitat for longfin squid eggs are expected from any increase or decrease in fishing effort by bottom trawls. Trawling won't impact the water column itself and there is no information to suggest that MSB trawling impacts on substrate will degrade it for purposes of longfin squid egg laying or survival. This means that bottom trawl effort is unlikely to further impact MSB habitat regardless of intensity.

7.2.2 Impacts on Other Federally Managed Species Habitat (see Table 15)

As described in Section 6.3, most MSB fishing takes place with bottom otter trawling with some mid-water trawling for Mackerel. Mid-water trawling should not impact bottom habitat or negatively impact the water column. Potential impacts of the alternatives on other federally-managed species EFH are discussed below.

Habitat Impacts from Atlantic Mackerel Alternatives

Mackerel A (Preferred)

Mackerel A maintains the current catch levels (also is the no-action). These catch levels provide some constraint on effort. As described in section 6.3 above, the bottom trawling that is used for some of this fishery can adversely impact some habitat types. However, since the Council has considered habitat impacts in the past and has already restricted MSB fishing to protect sensitive habitats (e.g. Tilefish habitat canyon closures and coral protections), the impact of maintaining the current specifications via Mackerel A is best characterized as overall slight negative, similar to past years, because effort is not expected to change under this alternative. Given the relative catch constraints (and therefore effort constraints), impacts would be slightly less negative than Mackerel B and slightly more negative than Mackerel C (because of the relative controls on catch/effort).

Mackerel B

Mackerel B would allow higher catch levels than current (Mackerel A) or than Mackerel C. Compared to the no action alternative, a higher ABC and associated specifications should have a slight negative effect on habitat compared to the status quo by potentially increasing effort. Given the relatively small change in overall fishing effort that would be expected, especially since some effort may be re-directed from other ongoing trawl fisheries, the impact would be slightly negative. Given the slightly negative impact relative to the status quo, the overall impact on habitat is likely still slight negative, but slightly more so than current, and the most negative of any alternatives for this species (because of the relative controls on catch/effort).

Mackerel C

Mackerel C would allow lower catch levels than current (Mackerel A) or than Mackerel B. Compared to the no action alternative, a lower ABC and associated specifications should have a slight positive effect on habitat compared to the status quo by potentially decreasing effort. Given the relatively small change in overall fishing effort that would be expected, especially since some effort may be re-directed into other ongoing trawl fisheries, the impact would be slightly positive. Given the slightly positive impact relative to the status quo, the overall impact on habitat is likely still slight negative, but slightly less so than current, and the least negative of any alternatives for this species (because of the relative controls on catch/effort).

Habitat Impacts from *Illex* Alternatives

Illex A

Illex A maintains the current catch levels (also is the no-action), similar to *Illex* B, lower than *Illex* C, and higher than *Illex* D. These catch levels provide some constraint on effort. As described in section 6.3 above, the bottom trawling used in this fishery can adversely impact some habitat types. However, since the Council has considered habitat impacts in the past and has already restricted MSB fishing to protect sensitive habitats (e.g. Tilefish habitat canyon closures and coral protections), the impact of maintaining the current specifications via *Illex* A is best characterized as overall slight negative, similar to past years, because effort is not expected to change under this alternative. Given the relative catch constraints (and therefore effort constraints), impacts would be similar to *Illex* B, slightly less negative than *Illex* C and slightly more negative than *Illex* D (because of the relative controls on catch/effort).

Illex B (Preferred)

Illex B only slightly lowers the quota closure threshold, so would be very similar to the current catch levels, (*Illex* A), lower than *Illex* C, and higher than *Illex* D. These catch levels provide some constraint on effort. As described in section 6.3 above, the bottom trawling used in this fishery can adversely impact some habitat types. However, since the Council has considered habitat impacts in the past and has already restricted MSB fishing to protect sensitive habitats (e.g. Tilefish habitat canyon closures and coral protections), the impact of approximately maintaining the current specifications via *Illex* B is best characterized as overall slight negative, similar to past years, because effort is not expected to substantially change under this alternative. Given the relative catch constraints (and therefore effort constraints), impacts would be similar to *Illex* A (the monitoring/closure mechanisms are unlikely to cause substantial changes in effort), slightly less negative than *Illex* C and slightly more negative than *Illex* D (because of the relative controls on catch/effort).

Illex C

Illex C would allow higher catch levels than current or other alternatives. Compared to the no action alternative or *Illex* B, a higher ABC and associated specifications should have a negative effect on habitat by potentially increasing effort. Given the relatively small change in overall fishing effort that would be expected, especially since some effort may be re-directed from other trawl fisheries, the impact would be slightly more negative compared to status quo. Given the slightly negative impact relative to the status quo, the overall impact on habitat is likely still slight negative, but slightly more so than current, and the most negative of any alternatives for this species (because of the relative controls on catch/effort).

Illex D

Illex D would implement lower catch levels than current or other alternatives. A lower ABC and associated specifications should have a positive effect on habitat by reducing effort. Given the relatively small change in overall fishing effort that would be expected, especially since some effort may be re-directed into other fisheries, the impact would be slightly positive compared to the status quo. Given the slightly positive impact relative to the status quo, the overall impact on habitat is likely still slight negative, but less so than current and the least negative of any alternatives for this species (because of the relative controls on catch/effort).

Habitat Impacts from Longfin Alternatives

Longfin A (Preferred)

Longfin A maintains the current catch levels (also is the no-action). These catch levels provide some constraint on effort. As described in section 6.3 above, the bottom trawling that is used for most of this fishery can adversely impact some habitat types. However, since the Council has considered habitat impacts in the past and has already restricted MSB fishing to protect sensitive habitats (e.g. Tilefish habitat canyon closures and coral protections), the impact of maintaining the current specifications via Longfin A is best characterized as overall slight negative, similar to past years, because effort is not expected to change under this alternative. Given the relative catch constraints (and therefore effort constraints), impacts would be slightly less negative than Longfin B and slightly more negative than Longfin C (because of the relative controls on catch/effort).

Longfin B

Longfin B would allow higher catch levels than current (Longfin A) or than Longfin C. Compared to the no action alternative, a higher ABC and associated specifications should have a slight negative effect on habitat compared to the status quo by potentially increasing effort. Given the relatively small change in overall fishing effort that would be expected, especially since some effort may be re-directed from other ongoing trawl fisheries, the impact would be slightly negative. Given the slightly negative impact relative to the status quo, the overall impact on habitat is likely still slight negative, but slightly more so than current, and the most negative of any alternatives for this species (because of the relative controls on catch/effort).

Longfin C

Longfin C would allow lower catch levels than current (Longfin A) or than Longfin B. Compared to the no action alternative, a lower ABC and associated specifications should have a slight positive effect on habitat compared to the status quo by potentially decreasing effort. Given the relatively small change in overall fishing effort that would be expected, especially since some effort may be re-directed into other ongoing trawl fisheries, the impact would be slightly positive. Given the slightly positive impact relative to the status quo, the overall impact on habitat is likely still slight negative, but slightly less so than current, and the least negative of any alternatives for this species (because of the relative controls on catch/effort).

Habitat Impacts from Butterfish Alternatives

Butterfish A

Butterfish A maintains the current catch levels (also is the no-action), which would be higher than either Butterfish B or Butterfish C (which are themselves similar). As described in section 6.3 above, the bottom trawling used in this fishery can adversely impact some habitat types. However, since the Council has considered habitat impacts in the past and has already restricted MSB fishing to protect sensitive habitats (e.g. Tilefish habitat canyon closures and coral protections), the impact of maintaining the current specifications is best characterized as overall slight negative, similar to past years, because effort is not expected to increase under this alternative. Since effort could be highest with this alternative, the negative impacts are higher than any other alternative (because of the relative controls on catch/effort).

Butterfish B (Preferred)

Butterfish B would allow lower catch levels than current (Butterfish A), similar to Butterfish C. Compared to the no action alternative, a lower ABC and associated specifications should have a slight positive effect on habitat compared to the status quo by potentially decreasing effort. Given the relatively small change in overall fishing effort that would be expected, especially since some effort may be re-directed into other ongoing trawl fisheries, the impact would be slightly positive. Given the slightly positive impact relative to the status quo, the overall impact on habitat is likely still slight negative, but slightly less so than current (Butterfish A), and similar to Butterfish C (because of the relative controls on catch/effort).

Butterfish C

Butterfish C would allow lower catch levels than current (Butterfish A), similar to Butterfish B. Compared to the no action alternative, a lower ABC and associated specifications should have a slight positive effect on habitat compared to the status quo by potentially decreasing effort. Given the relatively small change in overall fishing effort that would be expected, especially since some effort may be re-directed into other ongoing trawl fisheries, the impact would be slightly positive. Given the slightly positive impact relative to the status quo, the overall impact on habitat is likely still slight negative, but slightly less so than current (Butterfish A), and similar to Butterfish B (because of the relative controls on catch/effort).

7.3 Impacts on Protected Resources

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 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, 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 may have positive impacts by maintaining takes below the PBR level and approaching the zero mortality rate goal (See Tables 39 and 40).

In addition to taking into account the resource condition of ESA-listed and/or MMPA protected species, factors associated with the risk of an interaction between gear and protected species are also considered in assessing impacts of the alternatives proposed. Specifically, 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., tow time), and the presence of listed species in the same area and time as the gear, with risk of an interaction increasing with increases in of any of these factors.

General No-action: MMPA (Non-ESA Listed) Species Impacts

Aside from several stocks of bottlenose dolphin, there has been no indication that takes of non-ESA listed marine mammals in commercial fisheries have gone beyond levels which would result in the inability of the populations to sustain themselves. Specifically, aside from several stocks of bottlenose dolphin, the PBR level has not been exceeded for any of the non-ESA listed marine mammal species in the affected environment (section 6.3). Although several stocks of bottlenose dolphin have experienced levels of take that resulted in the exceedance of their PBR level, take reduction strategies and/or plans have been implemented to reduce bycatch in the fisheries affecting these species.

Taking into consideration the above information, and the fact that there are non-listed marine mammal stocks/species whose populations may or may not be at optimum sustainable levels, impacts of the No Action Alternatives on non-ESA listed species of marine mammals are likely to range from slight negative to slight positive. As noted above, there are some bottlenose dolphin stocks 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 provided above, 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., 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 effort under any of the No Action scenarios is not expected to change from current operating conditions, the No Action Alternatives are 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, gear tow duration, and the overlap between protected species and fishing gear (i.e., bottom trawl or mid-water trawl), in space and time, is not expected to change relative to current conditions. Given this information, and the information provided in section 6.3.3, the No Action Alternatives are 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 slight 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 slight positive impacts would remain. As provided above, the No Action Alternatives are not expected to change fishing effort relative to the *status quo*. Given this, and the fact that the potential risk of interacting with gear types used in the fishery varies between non-ESA listed marine mammal species in good condition (e.g., minke whale interactions with bottom trawl gear are expected to be rare; see section 6.3.3), 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).

Based on this information, the No Action Alternatives are expected to have slight negative to slight positive impacts on non-ESA listed species of marine mammals.

General No-action: ESA Listed Species Impacts

The MSB fisheries are prosecuted with bottom and mid-water trawl gear. As provided in section 6.4, interactions between ESA-listed species of sea turtles, Atlantic sturgeon, and Atlantic salmon have not been observed or documented; however, these species are at risk of interacting with bottom trawl gear. Based on this, the MSB fishery is likely to result in some level some level of negative impacts to ESA listed species. Taking into consideration fishing behavior/effort under the No Action, as well the fact that interaction risks with protected species are strongly associated with amount, time, and location of gear in the water (with vulnerability of an interaction increasing with increases in of any or all of these factors), we determined the level of negative impacts to ESA listed species to be low. Below, we provide support for this determination.

Under the No Action, the amount of trawl gear, tow times, and area fished are not expected change significantly from current operating conditions. As interactions risks with protected species are strongly associated with amount, time, and location of gear in the water, continuation of “status quo” fishing behavior/effort is not expected to change any of these operating conditions. Based on this, and the fact that the potential risk of interacting with gear types used in fishery varies between ESA listed species (e.g., listed species of large whales have never been documented/observed in bottom trawl gear; no observed or documented interactions between listed species and mid-water trawl gear, see section 6.3.3) the impacts of the No Action Alternatives on ESA listed species is expected to be slight negative.

Protected resources Impacts from Atlantic Mackerel Alternatives

Mackerel A (Preferred and No-Action)

Mackerel A will maintain the current catch levels, and therefore, relative to current operating conditions, changes in fishing behavior (e.g., area fished) or effort (e.g., amount of gear in the water, tow duration) are not expected. Given this, and the information provided in the general impacts discussions above, impacts of Mackerel A on protected species (ESA-listed and MMPA protected) are expected to range from slight negative (for ESA-listed species and marine mammals above PBR) to slight positive (for marine mammals below PBR) (see above for rationale).

Relative to Mackerel B, the impacts of Mackerel A on protected species are expected to be slightly less negative because Mackerel B’s ABC is 1/3 higher, and in this fishery the ABC could affect the amount of effort expended. Impacts are slight given the relatively small number of trips affected.

Relative to Mackerel C, the impacts of Mackerel A on protected species are expected to be slightly more negative because Mackerel C’s ABC is 1/3 lower, and in this fishery the ABC could affect the amount of effort expended. Impacts are slight given the relatively small number of trips affected.

Mackerel B

Proposed catch levels under Mackerel B would be 1/3 higher than status quo, i.e. Mackerel A. As described above, interaction risks with protected species (ESA-listed and/or MMPA protected) are strongly associated with the amount of gear in the water, the time the gear is in the water (e.g., tow time), and the presence of listed species in the same area and time as the gear, with risk of an interaction increasing with increases in of any of these factors. It is not anticipated that increased mackerel quota would lead to effort that would be substantially different in character from the status quo, but if allowed catch is higher and mackerel are available, there could be a general scaling up of effort, likely in the same scale as the allowed catch changed. If mackerel are available, such effort could include some additional vessels participating in the fishery (which already varies substantially from year to year), and some vessels increasing the days they participate in the fishery. However, a 1/3 increase in the mackerel ABC would not entail a substantial amount of additional fishing effort overall. A 1/3 increase in the ABC amounts to approximately 9,400 mt of additional quota. Since vessels in this fishery routinely land more than 250 mt per trip when directing on this species, this additional quota could amount to around an extra 38 trips. Compared to the tens of thousands of trips occurring annually just in federally-permitted fisheries off New England and the mid-Atlantic that require VTRs (more than 80,000 from July 2018 through June 2019 – NEFSC 2020d), this extra potential effort would only have a slight extra negative impact compared to the status quo (Mackerel A). Overall protected resource effects from the fishery under Mackerel B would thus be expected to remain about the same as status quo. Given the minimal differences from the status quo, Mackerel B's impacts on protected species (ESA-listed and MMPA protected) are expected to range from slight negative (for ESA-listed species and marine mammals above PBR) to slight positive (for marine mammals below PBR) (see above for rationale).

Relative to Mackerel C, the impacts of Mackerel B on protected species are expected to be slightly more negative because Mackerel C's ABC is lower, and in this fishery the ABC could affect the amount of effort expended, and the difference is slight for the same rationale related to the limited number of trips affected.

Mackerel C

Proposed catch levels under Mackerel C would be 1/3 lower than status quo, i.e. Mackerel A. As described above, interaction risks with protected species (ESA-listed and/or MMPA protected) are strongly associated with the amount of gear in the water, the time the gear is in the water (e.g., tow time), and the presence of listed species in the same area and time as the gear, with risk of an interaction increasing with increases in of any of these factors. It is not anticipated that decreased mackerel quota would lead to effort that would be substantially different in character from the status quo, but if allowed catch is lower and mackerel are available, there could be a general scaling down of effort, likely in the same scale as the allowed catch changed. If mackerel are available, such effort could involve fewer vessels participating in the fishery (which already varies substantially from year to year), and some vessels decreasing the days they participate in the fishery. However, a 1/3 decrease in the mackerel ABC would not entail a substantial reduction of fishing effort overall. A 1/3 decrease in the ABC amounts to approximately 9,400 mt less quota. Since vessels in this fishery routinely land more than 250 mt per trip when directing on this species, this reduced quota could amount to around 38 fewer trips. Compared to the tens of thousands of trips occurring annually just in federally-permitted fisheries off New England and the mid-Atlantic that require VTRs (more than 80,000 from July 2018 through June 2019 – NEFSC 2020d), this potential reduced effort would only have a slight extra positive impact compared to the status quo (Mackerel A). Overall protected resource effects from the fishery under Mackerel C would thus be expected to remain about the same as status quo. Given the minimal differences from the status quo, Mackerel C's impacts on protected species (ESA-listed and MMPA protected) are expected to range from slight negative (for ESA-listed species and marine mammals above PBR) to slight positive (for marine mammals below PBR) (see above for rationale).

Relative to Mackerel B, the impacts of Mackerel C on protected species are expected to be slightly less negative because Mackerel C's ABC is lower, and in this fishery the ABC could affect the amount of effort expended, and the difference is slight for the same rationale related to the limited number of trips affected.

<u>Protected resources Impacts from *Illex* Alternatives</u>

Illex A (No-Action)

Illex A will maintain the current catch levels, and therefore, relative to current operating conditions, changes in fishing behavior (e.g., area fished) or effort (e.g., amount of gear in the water, tow duration) are not expected. Given this, and the information provided in the general impacts discussions above, impacts of *Illex* A on protected species (ESA-listed and MMPA protected) are expected to range from slight negative (for ESA-listed species and marine mammals above PBR) to slight positive (for marine mammals below PBR) (see above for rationale).

Relative to *Illex* B, the impacts of *Illex* A would be expected to ne negligibly different given the similar quota levels.

Relative to *Illex* C, the impacts of *Illex* A on protected species are expected to be slightly less negative because *Illex* C's ABC is 1/3 higher, and in this fishery the ABC could affect the amount of effort expended. Impacts are slight given the relatively small number of trips affected.

Relative to *Illex* D, the impacts of *Illex* A on protected species are expected to be slightly more negative because *Illex* D's ABC is 1/3 lower, and in this fishery the ABC could affect the amount of effort expended. Impacts are slight given the relatively small number of trips affected.

Illex B (Preferred)

Illex B will approximately maintain the current catch levels, and therefore, relative to current operating conditions, changes in fishing behavior (e.g., area fished) or effort (e.g., amount of gear in the water, tow duration) are not expected. Given this, and the information provided in the general impacts discussions above, impacts of *Illex* B on protected species (ESA-listed and MMPA protected) are expected to range from slight negative (for ESA-listed species and marine mammals above PBR) to slight positive (for marine mammals below PBR) (see above for rationale).

Relative to *Illex* A, the impacts of *Illex* B would be expected to ne negligibly different given the similar quota levels.

Relative to *Illex* C, the impacts of *Illex* B on protected species are expected to be slightly less negative because *Illex* C's ABC is 1/3 higher, and in this fishery the ABC could affect the amount of effort expended. Impacts are slight given the relatively small number of trips affected.

Relative to *Illex* D, the impacts of *Illex* B on protected species are expected to be slightly more negative because *Illex* D's ABC is 1/3 lower, and in this fishery the ABC could affect the amount of effort expended. Impacts are slight given the relatively small number of trips affected.

Illex C

Proposed catch levels under *Illex C* would be 1/3 higher than status quo, i.e. *Illex* A. As described above, interaction risks with protected species (ESA-listed and/or MMPA protected) are strongly associated with the amount of gear in the water, the time the gear is in the water (e.g., tow time), and the presence of listed species in the same area and time as the gear, with risk of an interaction increasing with increases in of any of these factors. It is not anticipated that increased *Illex* quota would lead to effort that would be substantially different in character from the status quo, but if allowed catch is higher and *Illex* are available, there could be a general scaling up of effort, likely in the same scale as the allowed catch changed. If *Illex* are available, such effort could include some additional vessels participating in the fishery (which already varies substantially from year to year), and some vessels increasing the days they participate in the fishery. However, a 1/3 increase in the *Illex* ABC would not entail a substantial amount of additional fishing effort overall. A 1/3 increase in the ABC amounts to approximately 9,548 mt of additional quota. Since vessels in this fishery routinely land more than 100 mt per trip when directing on this species, this additional quota could amount to around an extra 96 trips. Compared to the tens of thousands of trips occurring annually just in federally-permitted fisheries off New England and the mid-Atlantic that require VTRs (more than 80,000 from July 2018 through June 2019 – NEFSC 2020d), this extra potential effort would only have a slight extra negative impact compared to the status quo (*Illex* A). Overall protected resource effects from the fishery under *Illex C* would thus be expected to remain about the same as status quo. Given the minimal differences from the status quo, *Illex C*'s impacts on protected species (ESA-listed and MMPA protected) are expected to range from slight negative (for ESA-listed species and marine mammals above PBR) to slight positive (for marine mammals below PBR) (see above for rationale).

Relative to *Illex* A and B (which are themselves similar), the impacts of *Illex* C would be expected to be slightly more negative because *Illex* C's ABC is higher, and in this fishery the ABC could affect the amount of effort expended. Impacts are slight given the relatively small number of trips affected.

Relative to *Illex* D, the impacts of *Illex* C on protected species are expected to be slightly more negative because *Illex* D's ABC is lower, and in this fishery the ABC could affect the amount of effort expended. Impacts are slight given the relatively small number of trips affected.

Illex D

Proposed catch levels under *Illex* D would be 1/3 lower than status quo, i.e. *Illex* A. As described above, interaction risks with protected species (ESA-listed and/or MMPA protected) are strongly associated with the amount of gear in the water, the time the gear is in the water (e.g., tow time), and the presence of listed species in the same area and time as the gear, with risk of an interaction increasing with increases in of any of these factors. It is not anticipated that decreased *Illex* quota would lead to effort that would be substantially different in character from the status quo, but if allowed catch is lower and *Illex* are available, there could be a general scaling down of effort, likely in the same scale as the allowed catch changed. If *Illex* are available, such effort could involve fewer vessels participating in the fishery (which already varies substantially from year to year), and some vessels decreasing the days they participate in the fishery. However, a 1/3 decrease in the *Illex* ABC would not entail a substantial reduction of fishing effort overall. A 1/3 decrease in the ABC amounts to approximately 9,548 mt less quota. Since vessels in this fishery routinely land more than 100 mt per trip when directing on this species, this reduced quota could amount to around 96 fewer trips. Compared to the tens of thousands of trips occurring annually just in federally-permitted fisheries off New England and the mid-Atlantic that require VTRs (more than 80,000 from July 2018 through June 2019 – NEFSC 2020d), this potential reduced effort would only have a slight extra positive impact compared to the status quo (*Illex* A). Overall protected resource effects from the fishery under *Illex* D would thus be expected to remain about the same as status quo. Given the minimal differences from the status quo, *Illex* D's impacts on protected species (ESA-listed and MMPA protected) are expected to range from slight negative (for ESA-listed species and marine mammals above PBR) to slight positive (for marine mammals below PBR) (see above for rationale).

Relative to *Illex* A and B (which are themselves similar), the impacts of *Illex* D would be expected to be slightly less negative because *Illex* D's ABC is lower, and in this fishery the ABC could affect the amount of effort expended. Impacts are slight given the relatively small number of trips affected.

Relative to *Illex* C, the impacts of *Illex* D on protected species are expected to be slightly less negative because *Illex* D's ABC is lower, and in this fishery the ABC could affect the amount of effort expended. Impacts are slight given the relatively small number of trips affected.

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Protected resources Impacts from Longfin Alternatives

Longfin A (Preferred and No-Action)

Longfin A will maintain the current catch levels, and therefore, relative to current operating conditions, changes in fishing behavior (e.g., area fished) or effort (e.g., amount of gear in the water, tow duration) are not expected. Given this, and the information provided in the general impacts discussions above, impacts of Longfin A on protected species (ESA-listed and MMPA protected) are expected to range from slight negative (for ESA-listed species and marine mammals above PBR) to slight positive (for marine mammals below PBR) (see above for rationale).

Relative to Longfin B, the impacts of Longfin A on protected species are expected to be slightly less negative because Longfin B's ABC is 1/3 higher, and in this fishery the ABC could affect the amount of effort expended. Impacts are slight given the relatively small number of trips affected.

Relative to Longfin C, the impacts of Longfin A on protected species are expected to be slightly more negative because Longfin C's ABC is 1/3 lower, and in this fishery the ABC could affect the amount of effort expended. Impacts are slight given the relatively small number of trips affected.

Longfin B

Proposed catch levels under Longfin B would be 1/3 higher than status quo, i.e. Longfin A. As described above, interaction risks with protected species (ESA-listed and/or MMPA protected) are strongly associated with the amount of gear in the water, the time the gear is in the water (e.g., tow time), and the presence of listed species in the same area and time as the gear, with risk of an interaction increasing with increases in of any of these factors. It is not anticipated that increased Longfin quota would lead to effort that would be substantially different in character from the status quo, but if allowed catch is higher and Longfin are available, there could be a general scaling up of effort, likely in the same scale as the allowed catch changed. If Longfin are available, such effort could include some additional vessels participating in the fishery (which already varies substantially from year to year), and some vessels increasing the days they participate in the fishery. A 1/3 increase in the ABC amounts to approximately 7,644 mt of additional quota. Since vessels in this fishery routinely land more than 20 mt per trip when directing on this species, this additional quota could amount to around an extra 382 trips. The directed longfin squid fishery also has more interactions with protected resources (e.g. turtles and sturgeon) than mackerel or *Illex*. Compared to the tens of thousands of trips occurring annually just in federally-permitted fisheries off New England and the mid-Atlantic that require VTRs (more than 80,000 from July 2018 through June 2019 – NEFSC 2020d), this extra potential effort would only have a moderate extra negative impact compared to the status quo (Longfin A). Overall protected resource effects from the fishery under Longfin B would thus be expected to remain about the same as status quo. Given the moderate differences from the status quo, Longfin B's impacts on protected species (ESA-listed and MMPA protected) are expected to range from slight negative (for ESA-listed species and marine mammals above PBR) to slight positive (for marine mammals below PBR) (see above for rationale).

Relative to Longfin C, the impacts of Longfin B on protected species are expected to be moderately more negative because Longfin C's ABC is lower, and in this fishery the ABC could affect the amount of effort expended, and the difference is slight for the same rationale related to the limited number of trips affected.

Longfin C

Proposed catch levels under Longfin C would be 1/3 lower than status quo, i.e. Longfin A. As described above, interaction risks with protected species (ESA-listed and/or MMPA protected) are strongly associated with the amount of gear in the water, the time the gear is in the water (e.g., tow time), and the presence of listed species in the same area and time as the gear, with risk of an interaction increasing with increases in of any of these factors. It is not anticipated that decreased Longfin quota would lead to effort that would be substantially different in character from the status quo, but if allowed catch is lower and Longfin are available, there could be a general scaling down of effort, likely in the same scale as the allowed catch changed. If Longfin are available, such effort could involve fewer vessels participating in the fishery (which already varies substantially from year to year), and some vessels decreasing the days they participate in the fishery. A 1/3 decrease in the ABC amounts to approximately 7,644 mt less quota. Since vessels in this fishery routinely land more than 20 mt per trip when directing on this species, this reduced quota could amount to around 382 fewer trips. The directed longfin squid fishery also has more interactions with protected resources (e.g. turtles and sturgeon) than mackerel or *Illex*. Compared to the tens of thousands of trips occurring annually just in federally-permitted fisheries off New England and the mid-Atlantic that require VTRs (more than 80,000 from July 2018 through June 2019 – NEFSC 2020d), this potential reduced effort would only have a moderate extra positive impact compared to the status quo (Longfin A). Overall protected resource effects from the fishery under Longfin C would thus be expected to remain about the same as status quo. Given the moderate differences from the status quo, Longfin C's impacts on protected species (ESA-listed and MMPA protected) are expected to range from slight negative (for ESA-listed species and marine mammals above PBR) to slight positive (for marine mammals below PBR) (see above for rationale).

Relative to Longfin B, the impacts of Longfin C on protected species are expected to be moderately less negative because Longfin C's ABC is lower, and in this fishery the ABC could affect the amount of effort expended, and the difference is slight for the same rationale related to the limited number of trips affected.

Protected resources Impacts from Butterfish Alternatives

Butterfish A (No action)

Butterfish A will maintain the current catch levels, and therefore, relative to current operating conditions, changes in fishing behavior (e.g., area fished) or effort (e.g., amount of gear in the water, tow duration) are not expected. Given this, and the information provided in the general impacts discussions above, impacts of Butterfish A on protected species (ESA-listed and MMPA protected) are expected to range from slight negative (for ESA-listed species and marine mammals above PBR) to slight positive (for marine mammals below PBR) (see above for rationale).

Relative to Butterfish B, the impacts of Butterfish A on protected species are expected to be slightly more negative because Butterfish B's ABC is about a quarter of Butterfish A in 2021 and a half of Butterfish A in 2022. Impacts are slight given the relatively small number of trips affected.

Relative to Butterfish C, the impacts of Butterfish A on protected species are expected to be slightly more negative because Butterfish C's ABC is about a third of Butterfish A in 2021/2022. Impacts are slight given the relatively small number of trips affected.

Butterfish B (Preferred)

Proposed catch levels under Butterfish B would be about a quarter of Butterfish A in 2021 and a half of Butterfish A in 2022. As described above, interaction risks with protected species (ESA-listed and/or MMPA protected) are strongly associated with the amount of gear in the water, the time the gear is in the water (e.g., tow time), and the presence of listed species in the same area and time as the gear, with risk of an interaction increasing with increases in of any of these factors. It is not anticipated that decreased Butterfish quota would lead to effort that would be substantially different in character from the status quo, but if allowed catch is lower and Butterfish are available, there could be a general scaling down of effort, likely in the same scale as the allowed catch changed. If Butterfish are available, such effort could involve fewer vessels participating in the fishery (which already varies substantially from year to year), and some vessels decreasing the days they participate in the fishery. The decreases amount to about 17,400 mt less directed quota in 2021 and 11,300 mt less directed quota in 2022. Since vessels in this fishery routinely land more than 150 mt per trip when directing on this species, this reduced quota could amount to around 116-75 fewer trips. Compared to the tens of thousands of trips occurring annually just in federally-permitted fisheries off New England and the mid-Atlantic that require VTRs (more than 80,000 from July 2018 through June 2019 – NEFSC 2020d), this potential reduced effort would only have a slight extra positive impact compared to the status quo (Butterfish A). Overall protected resource effects from the fishery under Butterfish B would thus be expected to remain about the same as status quo. Given the slight differences from the status quo, Butterfish B's impacts on protected species (ESA-listed and MMPA protected) are expected to range from slight negative (for ESA-listed species and marine mammals above PBR) to slight positive (for marine mammals below PBR) (see above for rationale).

Relative to Butterfish C, the impacts of Butterfish B on protected species are expected to be similar given the scale of quota reduction averaged over the two years.

Butterfish C

Proposed catch levels under Butterfish C would be about a third of Butterfish A. As described above, interaction risks with protected species (ESA-listed and/or MMPA protected) are strongly associated with the amount of gear in about 1/the water, the time the gear is in the water (e.g., tow time), and the presence of listed species in the same area and time as the gear, with risk of an interaction increasing with increases in of any of these factors. It is not anticipated that decreased Butterfish quota would lead to effort that would be substantially different in character from the status quo, but if allowed catch is lower and Butterfish are available, there could be a general scaling down of effort, likely in the same scale as the allowed catch changed. If Butterfish are available, such effort could involve fewer vessels participating in the fishery (which already varies substantially from year to year), and some vessels decreasing the days they participate in the fishery. The decreases amount to about 14,800 mt less directed quota. Since vessels in this fishery routinely land more than 150 mt per trip when directing on this species, this reduced quota could amount to around 99 fewer trips. Compared to the tens of thousands of trips occurring annually just in federally-permitted fisheries off New England and the mid-Atlantic that require VTRs (more than 80,000 from July 2018 through June 2019 – NEFSC 2020d), this potential reduced effort would only have a slight extra positive impact compared to the status quo (Butterfish A). Overall protected resource effects from the fishery under Butterfish C would thus be expected to remain about the same as status quo. Given the slight differences from the status quo, Butterfish C's impacts on protected species (ESA-listed and MMPA protected) are expected to range from slight negative (for ESA-listed species and marine mammals above PBR) to slight positive (for marine mammals below PBR) (see above for rationale).

Relative to Butterfish B, the impacts of Butterfish C on protected species are expected to be similar given the scale of quota reduction averaged over the two years.

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7.4 Socio-economic Impacts

Note: As discussed in Table 38 and accompanying text, the availability of the targeted species may drive effort (and catch and revenues) as much as quotas and other regulations. As a baseline and as described in Section 6.6, the MSB fisheries utilize sustainable catches to support a number of vessels, which provide a variety of jobs related directly to fishing and also in associated support services. Social impacts are strongly aligned with changes to fishing opportunities and while difficult to measure can include impacts to families from income changes/volatility, safety-at-sea (related to changes in fishery operations due to regulation changes), job satisfaction and stability, and general frustration by individuals due to management's impacts especially if they perceive the management actions to be unreasonable or ill-informed. Social impacts are generally difficult to measure in real time, but for purposes of this analysis the key factor of concern is sustainable revenues, and higher sustainable revenues should result in more benefits for other interrelated social impacts.

Note: The only preferred alternative that involves reductions in quotas compared to current quotas is Butterfish B, but it would not reduce quotas so much that recent landings could not be achieved or exceeded.

Socio-economic Impacts from Atlantic Mackerel Alternatives

Mackerel A (Preferred and No-Action)

Mackerel A maintains the current catch levels, which are lower than Mackerel B and higher than Mackerel C. Due to the year to year variation in catch and effort in the fishery, it is difficult to quantify human community impacts. However, the current fishery supports a number of vessels, as described in Section 6.6, and provides a variety of jobs related directly to fishing and also in associated support services, as well as recreational opportunities, so status quo impacts are moderately positive. While mackerel is overfished, fishing under Mackerel A should rebuild the stock to an optimum condition. The overall socio-economic impacts from the status quo should maintain the baseline socio-economic condition of the fishery since the ABCs should lead to sustainable fishing at an optimum yield, which benefits fishery participants, associated support industries, and associated fishing communities. Mackerel A should provide more positive benefits than Mackerel B (which could lead to overfishing and reduced yield/revenues), or Mackerel C (which could lead to underfishing and also reduced yield/revenues).

Mackerel B

Mackerel B would allow higher catch levels than current (Mackerel A) or than Mackerel C. Compared to the no action alternative (Mackerel A), this ABC and associated specifications could cause moderately negative socio-economic impacts by hindering rebuilding, potentially causing overfishing, and reducing yield. It is difficult to precisely compare Mackerel B and Mackerel C with each other, since both would reduce yield compared to Mackerel A – they may be similar in the short run, but since Mackerel B could depress the mackerel stock it is likely more negative than Mackerel C due to longer-term negative impacts on yield/revenues from a sub-optimally low stock size.

Mackerel C

Mackerel C would allow lower catch levels than current (Mackerel A) or than Mackerel B. Compared to the no action alternative (Mackerel A), this ABC and associated specifications could cause moderately negative socio-economic impacts by unnecessarily restricting the fishery. It is difficult to precisely compare Mackerel C and Mackerel B with each other, since both would reduce yield compared to Mackerel A – they may be similar in the short run, but since Mackerel B could depress the mackerel stock it is likely more negative than Mackerel C due to longer-term negative impacts on yield/revenues from a sub-optimally low stock size.

Socio-economic Impacts from *Illex* Alternatives

Illex A (No Action)

Illex A maintains the current catch levels, similar to *Illex* B, lower than *Illex* C, and higher than *Illex* D. Due to the year to year variation in catch and effort in the fishery, it is difficult to quantify human community impacts. However, the current fishery supports a number of vessels, as described in Section 6.6, and provides a variety of jobs related directly to fishing and also in associated support services, so status quo impacts are moderately positive. Fishing under *Illex* A should maintain the stock near an optimum condition. The overall socio-economic impacts from the status quo should maintain the baseline socio-economic condition of the fishery since the ABCs should lead to sustainable fishing at an optimum yield, which benefits fishery participants, associated support industries, and associated fishing communities. *Illex* A should provide more positive benefits than *Illex* C (which could lead to overfishing and reduced yield/revenues), or *Illex* D (which could lead to underfishing and also reduced yield/revenues). Compared to *Illex* B, annual revenues might be slightly higher in any given year due to *Illex* A's slightly higher closure threshold, but the increased likelihood of quota overages with *Illex* A may lead to overfishing and slightly lower revenues in the longer term versus *Illex* B.

Illex B (Preferred)

Illex B maintains the current catch levels, similar to *Illex* A, lower than *Illex* C, and higher than *Illex* D. Due to the year to year variation in catch and effort in the fishery, it is difficult to quantify human community impacts. However, the current fishery supports a number of vessels, as described in Section 6.6, and provides a variety of jobs related directly to fishing and also in associated support services, so status quo impacts are moderately positive. Fishing under *Illex* B should maintain the stock at an optimum condition. The overall socio-economic impacts with *Illex* B should maintain the baseline socio-economic condition of the fishery since the ABCs should lead to sustainable fishing at an optimum yield, which benefits fishery participants, associated support industries, and associated fishing communities. *Illex* B should provide more positive benefits than *Illex* C (which could lead to overfishing and reduced yield/revenues), or *Illex* D (which could lead to underfishing and also reduced yield/revenues). Compared to *Illex* A, annual revenues might be slightly lower in any given year due to *Illex* B's slightly lower closure threshold, but the increased likelihood of quota overages with *Illex* A may lead to overfishing and slightly lower revenues in the longer term versus *Illex* B.

Fishery processor participants have reported that the 48-hour reporting requirement will not be a substantial burden. The landings that can occur up to the 94% closure threshold would still be higher than the 2017-2019 quotas. 2019-2020 landings were only slightly above the landings at the 94% threshold even with the 2019 overage, so direct impacts even in the short term are expected to be negligible.

Illex C

Illex C would allow higher catch levels than current (*Illex* A/B) or than *Illex* D. Compared to the no action alternative (*Illex* A) or *Illex* B, this ABC and associated specifications could cause moderately negative socio-economic impacts by potentially causing overfishing, and reducing yield. It is difficult to precisely compare *Illex* C and *Illex* D with each other, since both would reduce yield compared to Illex A/B – they may be similar in the short run, but since *Illex* C could depress the stock given current information, it is likely more negative than *Illex* D due to longer-term negative impacts on yield/revenues from a sub-optimally low stock size.

Illex D

Illex D would allow lower catch levels than current (*Illex* A/B) or than *Illex* C. Compared to the no action alternative (*Illex* A) or *Illex* B, this ABC and associated specifications could cause moderately negative socio-economic impacts by potentially unnecessarily restricting the fishery and reducing yield. It is difficult to precisely compare *Illex* C and *Illex* D with each other, since both would reduce yield compared to *Illex* A/B – they may be similar in the short run, but since *Illex* C could depress the stock given current information, it is likely more negative than *Illex* D due to longer-term negative impacts on yield/revenues from a sub-optimally low stock size.

Socio-economic Impacts from Longfin Alternatives

Longfin A (Preferred and No-Action)

Longfin A maintains the current catch levels, which are lower than Longfin B and higher than Longfin C. Due to the year to year variation in catch and effort in the fishery, it is difficult to quantify human community impacts. However, the current fishery supports a number of vessels, as described in Section 6.6, and provides a variety of jobs related directly to fishing and also in associated support services, as well as recreational opportunities, so status quo impacts are moderately positive. Fishing under Longfin A should maintain the stock at an optimum condition. The overall socio-economic impacts from the status quo should maintain the baseline socio-economic condition of the fishery since the ABCs should lead to sustainable fishing at an optimum yield, which benefits fishery participants, associated support industries, and associated fishing communities. Longfin A should provide more positive benefits than Longfin B (which could lead to overfishing and reduced yield/revenues), or Longfin C (which could lead to underfishing and also reduced yield/revenues).

Longfin B

Longfin B would allow higher catch levels than current (Longfin A) or than Longfin C. Compared to the no action alternative, this ABC and associated specifications could have moderate negative socio-economic impacts by potentially causing overfishing and reducing long-term yield. It is difficult to precisely compare Longfin B and Longfin C to each other, but both may reduce socio-economic benefits compared to Longfin A. Since Longfin B could depress the stock given current information, it is likely more negative than Longfin C due to longer-term negative impacts on yield/revenues from a sub-optimally low stock size.

Longfin C

Longfin C would implement lower catch levels than current (Longfin A) or than Longfin B. Compared to the no action alternative, this ABC and associated specifications could have moderate negative socio-economic impacts by unnecessarily restricting the fishery, reducing revenues. It is difficult to precisely compare Longfin C and Longfin B to each other, but both may reduce socio-economic benefits compared to Longfin A. Since Longfin B could depress the stock given current information, it is likely more negative than Longfin C due to longer-term negative impacts on yield/revenues from a sub-optimally low stock size.

Socio-economic Impacts from Butterfish Alternatives

Butterfish A (No action)

Butterfish A maintains the current catch levels, which are higher than the other alternatives (and higher than the SSC recommendations). While previous management has maintained the stock near an optimal range (see Butterfish B for discussion of the benefits of maintaining stock size at an optimal range), this ABC and associated specifications could have moderate negative socio-economic impacts by potentially causing overfishing and reducing sustainable yield and revenues.

Butterfish B (Preferred)

Butterfish B would implement lower catch levels than current, similar to Butterfish C. Due to the year to year variation in catch and effort in the fishery, it is difficult to quantify human community impacts. However, the current fishery supports a number of vessels, as described in Section 6.6, and provides a variety of jobs related directly to fishing and also in associated support services, so fishing under Butterfish B, which should maintain an optimal stock condition, should result in moderately positive impacts. The overall socio-economic impacts from Butterfish B should maintain the baseline socio-economic condition of the fishery since the ABCs should lead to sustainable fishing at an optimum yield, which benefits fishery participants, associated support industries, and associated fishing communities. Butterfish B should provide more positive benefits than Butterfish A (which could lead to overfishing and reduced yield/revenues). Impacts are negligibly different from Butterfish C - Impacts are likely very similar to Butterfish C as the quotas totaled over 2 years for Butterfish B and Butterfish C are very similar. Butterfish B and Butterfish C both involve reductions in quotas compared to the current quota, but neither would reduce quotas so much that recent landings could not be achieved or exceeded. There was some Council discussion whether the stability of Butterfish C may be a benefit in itself, but public input from industry preferred Butterfish B.

Butterfish C

Butterfish C would implement lower catch levels than current, similar to Butterfish B. Due to the year to year variation in catch and effort in the fishery, it is difficult to quantify human community impacts. However, the current fishery supports a number of vessels, as described in Section 6.6, and provides a variety of jobs related directly to fishing and also in associated support services, so fishing under Butterfish C, which should maintain an optimal stock condition, should result in moderately positive impacts. The overall socio-economic impacts from Butterfish C should maintain the baseline socio-economic condition of the fishery since the ABCs should lead to sustainable fishing at an optimum yield, which benefits fishery participants, associated support industries, and associated fishing communities. Butterfish C should provide more positive benefits than Butterfish A (which could lead to overfishing and reduced yield/revenues). Impacts are negligibly different from Butterfish B - Impacts are likely very similar to Butterfish B as the quotas totaled over 2 years for Butterfish B and Butterfish C are very similar. Butterfish C and Butterfish B both involve reductions in quotas compared to the current quota, but neither would reduce quotas so much that recent landings could not be achieved or exceeded. There was some Council discussion whether the stability of Butterfish C may be a benefit in itself, but public input from industry preferred Butterfish B.

7.5 Impacts on non-Target Fish Species

Baseline: As described in Section 6.5, the Atlantic mackerel and *Illex* fisheries have relatively low discarding while the longfin squid fishery has relatively high discarding. Butterfish appears to be in-between, but part of that may be to trip-type overlap with the longfin squid fishery. Regardless, the longfin squid fishery appears most likely to potentially cause harm to stocks of incidentally-caught species. Some of the species in the longfin non-target table in Section 6.5 are overfished, experiencing overfishing, or otherwise depleted in some portion of their range: red hake, winter flounder, alewife, American shad, witch flounder, and American lobster. For these species there is a negative baseline condition potentially partially associated with impacts from the longfin squid fishery. RH/S species are caught in the Mackerel and longfin squid fisheries, and while the impacts of incidental RH/S catch in these fisheries is unknown due to complex RH/S stock dynamics, RH/S species are generally depleted throughout their ranges and they also have a negative baseline condition potentially partially associated with impacts from the Mackerel and longfin squid fisheries. Previous actions (e.g. Amendments 10 and 14 to the MSB

FMP) have reduced discards and non-target catch to the extent practicable, but changes to quotas/effort may have non-target impacts and are described below. For non-target species that are managed under their own FMP, incidental catch/discards are also considered as part of the management of that fishery. Also, as discussed in Table 38, the availability of the targeted species may drive effort (and non-target fish species impacts) as much as quotas and other regulations. Negative stock effects are also mitigated by consideration of and accounting for discards when quotas for those other species are being developed. For the many non-target species that are not in some depleted condition (see tables in Section 6.1), it is unlikely that the MSB fisheries are a substantial contributor to their positive stock status (since some incidental catch and mortality is occurring), rather it is more likely that direct management of those stocks by whatever entity manages them has the predominant impact on those stocks.

Non-Target Species Impacts from Atlantic Mackerel Alternatives

Mackerel A (Preferred)

Mackerel A maintains the current catch levels (also is the no-action). These catch levels provide some constraint on effort. As described in section 6.1 above, this fishery can impact some Non-Target Species, especially those in an overfished or depleted condition. However, since the Council has considered Non-Target Species impacts in the past and has already restricted mackerel fishing to minimize Non-Target Species impacts to the extent practicable (e.g. RH/S caps), the impact of maintaining the current specifications via Mackerel A is best characterized as overall slight negative, similar to past years, because effort is not expected to change under this alternative. Also, incidental catch is relatively low in the mackerel fishery. Given the relative catch constraints (and therefore effort constraints), impacts would be slightly less negative than Mackerel B and slightly more negative than Mackerel C (because of the relative controls on catch/effort).

Mackerel B

Mackerel B would allow higher catch levels than current (Mackerel A) or than Mackerel C. Compared to the no action alternative, a higher ABC and associated specifications should have a slight negative effect on Non-Target Species compared to the status quo by potentially increasing effort, especially those in an overfished or depleted condition. Given the relatively small change in overall fishing effort that would be expected, especially since some effort may be re-directed from other ongoing fisheries, the impact would be slightly negative. Also, incidental catch is relatively low in the mackerel fishery. Given the slightly negative impact relative to the status quo, the overall impact on Non-Target Species is likely still slight negative, but slightly more so than current, and the most negative of any alternatives for this species (because of the relative controls on catch/effort).

Mackerel C

Mackerel C would allow lower catch levels than current (Mackerel A) or than Mackerel B. Compared to the no action alternative, a lower ABC and associated specifications should have a slight positive effect on Non-Target Species compared to the status quo by potentially decreasing effort, especially those in an overfished or depleted condition. Given the relatively small change in overall fishing effort that would be expected, especially since some effort may be re-directed into other ongoing fisheries, the impact would be slightly positive. Also, incidental catch is relatively low in the mackerel fishery. Given the slightly positive impact relative to the status quo, the overall impact on Non-Target Species is likely still slight negative, but slightly less so than current, and the least negative of any alternatives for this species (because of the relative controls on catch/effort).

Non-Target Species Impacts from *Illex* Alternatives

Given the very low incidental catch in the *Illex* fishery (see Section 6.1), the impacts of all *Illex* Alternatives on Non-Target Species are negligible, and are negligibly different from each other.

Non-Target Species Impacts from Longfin Alternatives

Longfin A (Preferred)

Longfin A maintains the current catch levels (also is the no-action). These catch levels provide some constraint on effort. As described in section 6.1 above, the longfin squid fishery can impact some Non-Target Species, especially those in an overfished or depleted condition. However, since the Council has considered Non-Target Species impacts in the past and has already restricted longfin squid fishing to minimize Non-Target Species impacts to the extent practicable (e.g. scup restricted areas and minimum mesh requirements), the impact of maintaining the current specifications via Longfin A is best characterized as overall slight negative, similar to past years, because effort is not expected to change under this alternative. Given the relative catch constraints (and therefore effort constraints), impacts would be slightly less negative than Longfin B and slightly more negative than Longfin C (because of the relative controls on catch/effort).

Longfin B

Longfin B would allow higher catch levels than current (Longfin A) or than Longfin C. Compared to the no action alternative, a higher ABC and associated specifications should have a slight negative effect on Non-Target Species compared to the status quo by potentially increasing effort, especially those in an overfished or depleted condition. Given the relatively small change in overall fishing effort that would be expected, especially since some effort may be re-directed from other ongoing fisheries, the impact would be slightly negative. Given the slightly negative impact relative to the status quo, the overall impact on Non-Target Species is likely still slight negative, but slightly more so than current, and the most negative of any alternatives for this species (because of the relative controls on catch/effort).

Longfin C

Longfin C would allow lower catch levels than current (Longfin A) or than Longfin B. Compared to the no action alternative, a lower ABC and associated specifications should have a slight positive effect on Non-Target Species compared to the status quo by potentially decreasing effort, especially those in an overfished or depleted condition. Given the relatively small change in overall fishing effort that would be expected, especially since some effort may be re-directed into other ongoing trawl fisheries, the impact would be slightly positive. Given the slightly positive impact relative to the status quo, the overall impact on Non-Target Species is likely still slight negative, but slightly less so than current, and the least negative of any alternatives for this species (because of the relative controls on catch/effort).

Non-Target Species Impacts from Butterfish Alternatives

Butterfish A

Butterfish A maintains the current catch levels (also is the no-action), which would be higher than either Butterfish B or Butterfish C (which are themselves similar). As described in section 6.1 above, this fishery can impact some Non-Target Species types, especially those in an overfished or depleted condition. However, since the Council has considered Non-Target Species impacts in the past and has already restricted MSB fishing to reduce Non-Target Species impacts to the extent practicable, the impact of maintaining the current specifications is best characterized as overall slight negative, similar to past years, because effort is not expected to increase under this alternative. Since effort could be highest with this alternative, the negative impacts are higher than any other alternative (because of the relative controls on catch/effort).

Butterfish B (Preferred)

Butterfish B would allow lower catch levels than current (Butterfish A), similar to Butterfish C. Compared to the no action alternative, a lower ABC and associated specifications should have a slight positive effect on Non-Target Species compared to the status quo by potentially decreasing effort, especially those in an overfished or depleted condition. Given the relatively small change in overall fishing effort that would be expected, especially since some effort may be re-directed into other ongoing trawl fisheries, the impact would be slightly positive. Given the slightly positive impact relative to the status quo, the overall impact on Non-Target Species is likely still slight negative, but slightly less so than current (Butterfish A), and similar to Butterfish C (because of the relative controls on catch/effort). Effort differences, and therefore non-target species impacts, between Butterfish B and C are expected to be negligible.

Butterfish C

Butterfish C would allow lower catch levels than current (Butterfish A), similar to Butterfish B. Compared to the no action alternative, a lower ABC and associated specifications should have a slight positive effect on Non-Target Species compared to the status quo by potentially decreasing effort, especially those in an overfished or depleted condition. Given the relatively small change in overall fishing effort that would be expected, especially since some effort may be re-directed into other ongoing trawl fisheries, the impact would be slightly positive. Given the slightly positive impact relative to the status quo, the overall impact on Non-Target Species is likely still slight negative, but slightly less so than current (Butterfish A), and similar to Butterfish B (because of the relative controls on catch/effort). Effort differences, and therefore non-target species impacts, between Butterfish B and C are expected to be negligible.

7.6 Cumulative Effects

7.6.1 Introduction

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.

A cumulative effects assessment ideally 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.

7.6.1.1 Consideration of Valued Ecosystem Components (VECs)

The valued ecosystem components for the Council-managed fisheries are generally the "place" where the impacts of management actions occur, and are identified in section 6.0.

- Managed resources
- Physical habitat
- Protected species
- Non-target species
- Human 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.

7.6.1.2 Geographic Boundaries

The geographic scope of the analysis of impacts to fish species and habitat for this action is the range of the fisheries in the Western Atlantic Ocean, as described in the Affected Environment section of the document. For endangered and protected species the geographic range is the total range of each species. The geographic range for socioeconomic impacts is defined as those fishing communities bordering the range of the fisheries for mackerel, longfin squid, Illex squid, and butterfish which occur primarily from the U.S.- Canada border to Cape Hatteras, NC, although the management unit includes all the coastal states from Maine to Florida.

7.6.1.3 Temporal Boundaries

The temporal scope of this analysis is focused on actions that have taken place since 1976, when these fisheries began to be managed under the MSA. For endangered and other protected species, the context is largely focused since the 1980s and 1990s, when NMFS began generating stock assessments for marine mammals and turtles that inhabit waters of the U.S. EEZ. In terms of future actions, the analysis considers a period five years beyond the expected effective date of this action if approved in early 2021 through December 31, 2025. The temporal scope of this analysis does not extend beyond 2025 because the FMP and the issues facing these fisheries may change in ways that can't be effectively predicted. 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. The impacts discussed herein are focused on the cumulative effects of the proposed action (i.e., the suite of preferred alternatives) in combination with the relevant other past, present, and reasonably foreseeable future actions over these time scales.

7.6.2 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.

7.6.2.1 Fishery Management Actions

The historical management practices of the Council have resulted in positive impacts on the health of the managed resources. Numerous actions have been taken to manage these commercial and recreational fisheries through FMP amendment and FMP framework adjustment actions. The annual (or multi-year) specifications process is intended to provide the opportunity for the Council and NMFS to regularly assess the status of the fisheries and to make necessary adjustments to ensure that there is a reasonable expectation of meeting the objectives of each FMP and the targets associated with any rebuilding programs under the FMP.

The earliest management actions implemented under the Council's FMPs involved the sequential phasing out of foreign fishing for these species in US waters and the development of domestic fisheries. All Council-managed species are considered to be fully utilized by the US domestic fishery to the extent that sufficient availability will result in a full harvest of the various quotas. More recent actions have focused on stock rebuilding, reducing non-target catch and discards, reducing habitat impacts, and reducing protected species impacts. Limited access and/or catch shares have been established in most directed Council-managed fisheries to control capacity. All Council-managed fisheries have a variety of reporting and monitoring requirements to document catch and facilitate regulatory compliance with a focus on timely and reliable electronic reporting methods. Based on the 2007 MSA reauthorization and the Council's ACL/AM Omnibus Amendment, the SSC now sets an upper limit (ABCs) on catches to avoid overfishing. There is also a Standardized Bycatch Reporting Methodology (SBRM) to evaluate discards and allocate observer coverage. A full list of Council FMPs and their amendments is available at http://www.mafmc.org/fishery-management-plans.

Specific actions from this FMP (http://www.mafmc.org/msb/) which had substantial impacts on the fishery included: the implementation of a limited access program in Amendment 5 to control capacity in the squid and butterfish fisheries; revision of overfishing definitions in Amendment 6; modification of vessel upgrade rules in Amendment 7; and implementation of overfishing and rebuilding control rules and other measures in Amendment 8. Amendment 9 allowed multi-year specifications, extended the moratorium on entry into the *Illex* fishery without a sunset provision; adopted biological reference points recommended by the SARC 34 (2002) for longfin squid; designated EFH for longfin squid eggs, and prohibited bottom trawling by MSB-permitted vessels in Lydonia and Oceanographer Canyons to protect Tilefish EFH. Amendment 1 to the Tilefish FMP created closures in these canyons as well as Veatches and Norfolk canyons for bottom trawling generally. MSB Amendment 10's measures included increasing the longfin squid minimum mesh to 2 1/8 inches in Trimesters 1 and 3 and implementing a butterfish mortality cap in the longfin squid fishery. Amendment 11 implemented mackerel limited access, a recreational-commercial mackerel allocation, and EFH updates. Amendment 12 implemented a Standardized Bycatch Reporting Methodology that was vacated by court order and has been revisited through Amendment 15. Amendment 13 to the MSB FMP implemented Annual Catch Limit and Accountability Measures. Amendment 14 increased and improved reporting and monitoring (vessel, dealer, and observer) of the mackerel and longfin squid fisheries and implemented a catch cap for river herrings and shads in the mackerel fishery since 2014. Monitoring improvements include minimization of unobserved catch, observer facilitation and assistance, weekly vessel trip reporting, additional trip notification, and electronic vessel monitoring systems and reporting. Amendment 16 implemented protections for deep-water corals. Framework 9 followed-up on Amendment 14's measures to specifically improve observer operations by minimizing slippage (unobserved discards) and NMFS has implemented a new Standardized Bycatch Reporting Methodology in Amendment 15 to address observer assignment deficiencies identified in a previous lawsuit. Amendment 18 restricted the expansion of commercial fisheries for certain forage species, some of which are encountered in the MSB fisheries. Amendment 20 reduced latent directed longfin permits, created limited access incidental permits, and lowered Trimester 2 post-closure trip limit to 250 pounds to discourage directed longfin fishing after closures. Amendment 21 added chub mackerel as a managed species. Framework 9 followed-up on Amendment 14's measures to specifically improve observer operations by minimizing slippage (unobserved discards). Framework 12 allowed the possession of 5,000 lb of Atlantic mackerel after 100 percent of the domestic annual harvest is caught instead of prohibiting the possession of Atlantic mackerel for the rest of the year to facilitate incidental catch in the Atlantic herring fishery. Framework 14 established a requirement for commercial vessels with federal permits for all species managed by the Mid-Atlantic and New England Councils to submit vessel trip reports electronically within 48 hours after entering port at the conclusion of a trip. Framework 15 revised the Council's risk policy to reduce the probability of overfishing as stock size falls below the target biomass while allowing for increased risk and greater economic benefit under higher stock biomass conditions. Past annual specifications have also limited catches to avoid overfishing. The Council is also planning on revising EFH for all species and considering the impacts of fishing on EFH before 2022.

Recent actions at the New England Fishery Management Council (NEFMC) extend deep-water coral protections in the New England area and protect deep-water corals there against any future expansion of the MSB fisheries in the rest of the continental slope. Amendment 8 to the Atlantic herring plan would cap overall Atlantic herring fishing mortality at 80% of sustainable levels. A portion of the available catch would be set aside to explicitly account for the role of Atlantic herring as forage within the ecosystem. The Amendment also banned mid-water trawling for herring-permitted vessels near the New England coast. Through an in-season action Atlantic herring quotas were lowered in 2018 but the mackerel fishery had already closed at that point so there were no impacts to mackerel fishing. The NEFMC's omnibus habitat amendment revised EFH and habitat area of particular concern designations for NEFMC-managed species; revised or created habitat management areas, including gear restrictions to protect vulnerable habitat from fishing gear impacts; and established dedicated habitat research areas. This action is expected to have overall positive impacts on habitat and EFH, with expected long-term positive implications for target and non-target species, while having mixed socioeconomic impacts on various user groups.

In addition to the managed resource FMPs, there are many other FMPs and associated fishery management actions for other species that impacted these VECs over the temporal scale described in Section 7.6.1.3. 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 generally included (but are not limited to) measures to regulate fishing effort for other species, measures to protect habitat and forage species, and fishery monitoring and reporting requirements.

The convening of take reduction teams for marine mammals over the temporal scope described in section 7.6.1.3 has had positive impacts for marine mammals via recommendations for management measures to reduce mortality and injury to marine mammals. These actions have had indirect positive impacts on target species, non-target species, and habitat as they have improved monitoring of fishing effort and reduced the amount of gear in the water. These measures have had indirect negative impacts on human communities through reduced fishery efficiency.

As with all the managed resource FMP actions described above, other FMP actions have had positive long-term cumulative impacts on managed and non-target species because they constrain fishing effort and manage stocks at sustainable levels. As previously stated, constraining fishing effort can have negative short-term socioeconomic impacts and long-term positive impacts. These actions have typically had slight negative impacts on habitat, due to continued fishing operations preventing impacted habitats from recovering; however, some actions had long-term positive impacts through designating or protecting important habitats. FMP actions have also had a range of impacts on protected species, including generally slight negative impacts on ESA-listed species, and slight negative to slight positive impacts on non ESA-listed marine mammals, depending on the species and interaction levels.

7.6.2.2 Non-Fishing Impacts

7.6.2.2.1 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)[20], 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.

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

[20] "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."

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 soundscape21. 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)22 (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[23] and ecological monitoring surveys. Disruption of such scientific surveys could increase scientific uncertainty in survey results and may 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

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21 See NMFS Ocean Noise Strategy Roadmap:
https://cetsound.noaa.gov/Assets/cetsound/documents/Roadmap/ONS_Roadmap_Final_Complete.pdf
22 See NMFS Ocean Noise Strategy Roadmap (footnote #2)
[23] Changes in required flight altitudes due to proposed turbine height would affect aerial survey design and protocols (BOEM 2020a).

fishing communities.

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 below). 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). 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 nearly all Council-managed resources. Recent habitat modeling work by the NEFSC and presented as part of the 2020 Mid-Atlantic State of the Ecosystem Report found that summer flounder, butterfish, longfin squid, and spiny dogfish are highly likely to occupy wind lease areas throughout the region (NEFSC 2020). Habitat conditions for those species are projected to become more favorable over time within the lease areas, potentially leading to increased interactions and impacts over time. Fisheries for the managed resources have been active in many of the lease areas at present and are expected to be for the near future (section 6.0). The social and economic impacts of offshore wind energy on fisheries could be generally negative due to the substantial overlap of wind energy areas with productive fishing grounds for many Council-managed fisheries. Impacts may vary by species and by year depending upon habitat overlap, species availability, and any area-based regulations that define the amount and type of fishing access with the lease area. 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.

BOEM recently released its Supplemental Draft Environmental Impact Statement (SEIS) for the Vineyard Wind project, an 800 megawatt wind farm southeast of Martha's Vineyard, Massachusetts (BOEM 2020). The SEIS evaluated the revenue exposure (defined as the dockside value of the fish caught within individual lease areas) of various Mid-Atlantic and New England commercial fisheries found within future wind energy lease areas. For most Council-managed fisheries, less than 3 percent of the total revenue would be exposed to future offshore wind development (see table 3.11.-3, section B-78). The analysis noted that the Atlantic surfclam and ocean quahog fisheries represented the largest combined percent exposure and dollar value (BOEM 2020). The SEIS concluded that the impacts associated with future offshore wind activities in the geographic analysis area would result in major adverse impacts on commercial fisheries and moderate adverse impacts on for-hire recreational fishing due to the presence of structures.

It's also worth noting, that turbine structures could increase the presence of and fishing for structure affiliated Council-managed species, such as black sea bass. Many recreational fishing trips in this region target a combination of species. For example, recreational trips which catch black sea bass often also catch tautog, scup, summer flounder, and Atlantic croaker (NEFSC 2017). For this reason, increased recreational fishing effort focusing on species such as black sea bass in wind farms could also lead to increased recreational catches of other species. This could 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.[24] 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 and negative for various managed resources. Fishing within wind farms could lead to increased catch rates, decreased steaming searching for concentrations of fish and different size availability (e.g., larger fish found within a wind farm) which would result in positive effects. However negative effects could occur due to the potential for reduced 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.

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[24] 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).

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.

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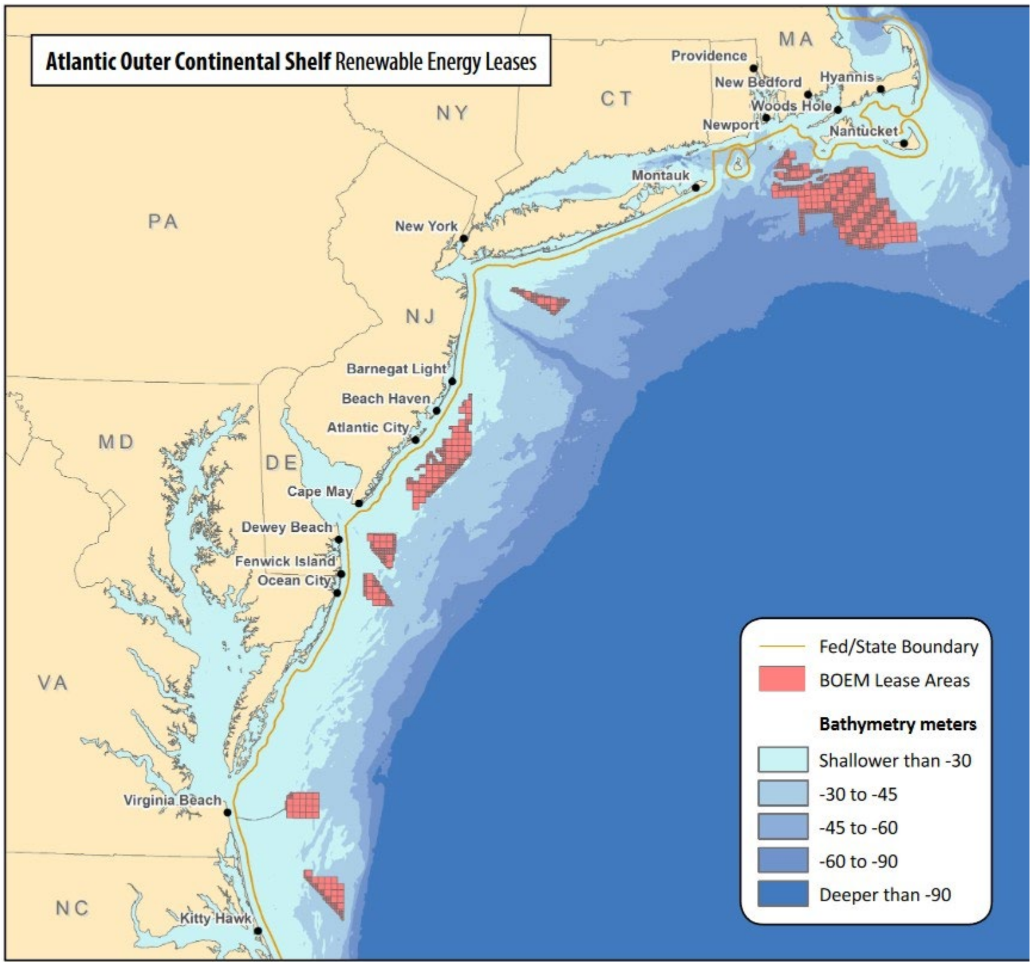

Figure 17: BOEM approved renewable energy lease areas in federal waters in the Atlantic Ocean off the Mid-Atlantic and New England
(source: BOEM Map Book of Outer Continental Shelf Renewable Energy Lease Areas, https://www.boem.gov/sites/default/files/renewable-energy-program/Mapping-and-Data/Renewable_Energy_Leases_Map_Book_March_2019.pdf)

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7.6.2.2.2 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 Council-managed species to the changing environment (Hare et al. 2016). It should be noted that at the time of this analysis, blueline tilefish and chub mackerel were not managed by the Council but have since been added as Council-managed species.

Based on this assessment, all Council-managed species have a high or very high exposure to climate change (Figure 29). For Council-managed species, ocean quahog was identified as being very highly sensitive to climate change, and three species (tilefish, Atlantic surfclam, and black sea bass) were highly sensitive to climate change. The remaining species had moderate or low sensitivity to a change in abundance and productivity due to climate change. A vast majority of Council-managed species had a high or very high potential for changes in distribution (12 of 13 species managed at time of analysis); only golden tilefish had a low potential for a change in distribution. Overall, the impacts of climate change are expected to be negative for three Council-managed species (Atlantic mackerel, Atlantic surfclam, and ocean quahog), whereas the impacts are expected to be positive for six species (black sea bass, scup, butterfish, longfin inshore squid, Northern shortfin squid (*Illex*), and bluefish; Figure 30). The effects of climate change are expected to be neutral for the remainder of Council-managed species Overall vulnerability results for additional Greater Atlantic species, including many non-target species identified in this action, are shown in Figure 29 (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.

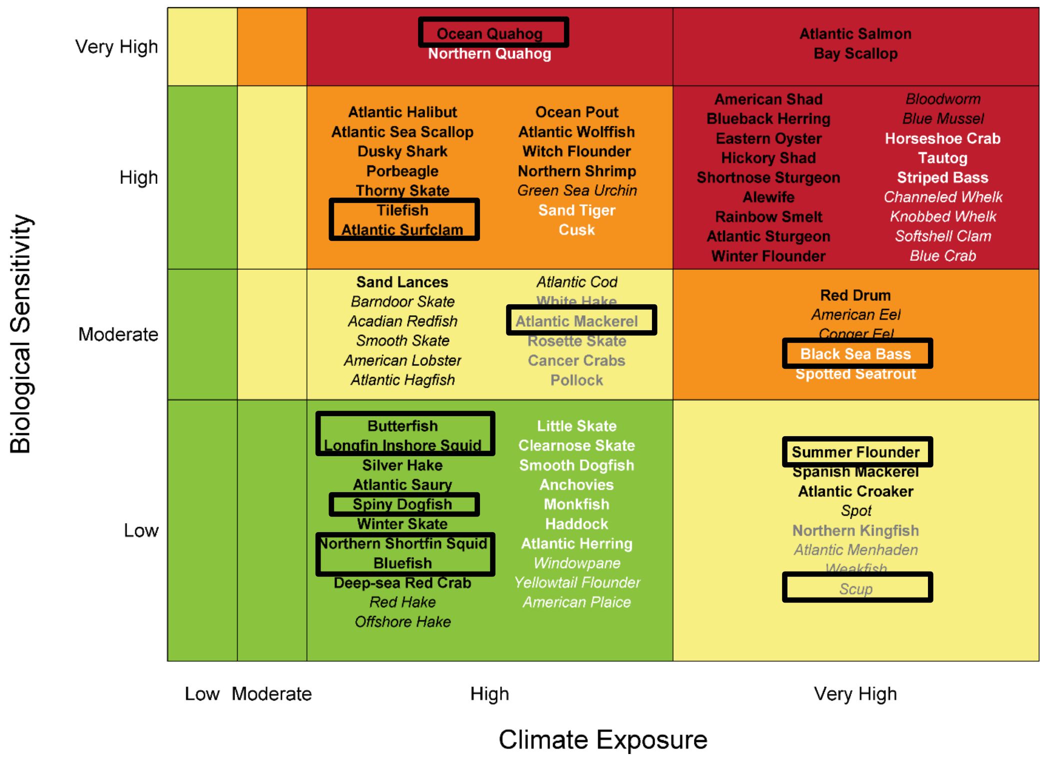

Figure 18: Overall climate vulnerability score for Greater Atlantic species, with Mid-Atlantic Council managed species highlighted with black boxes.

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.

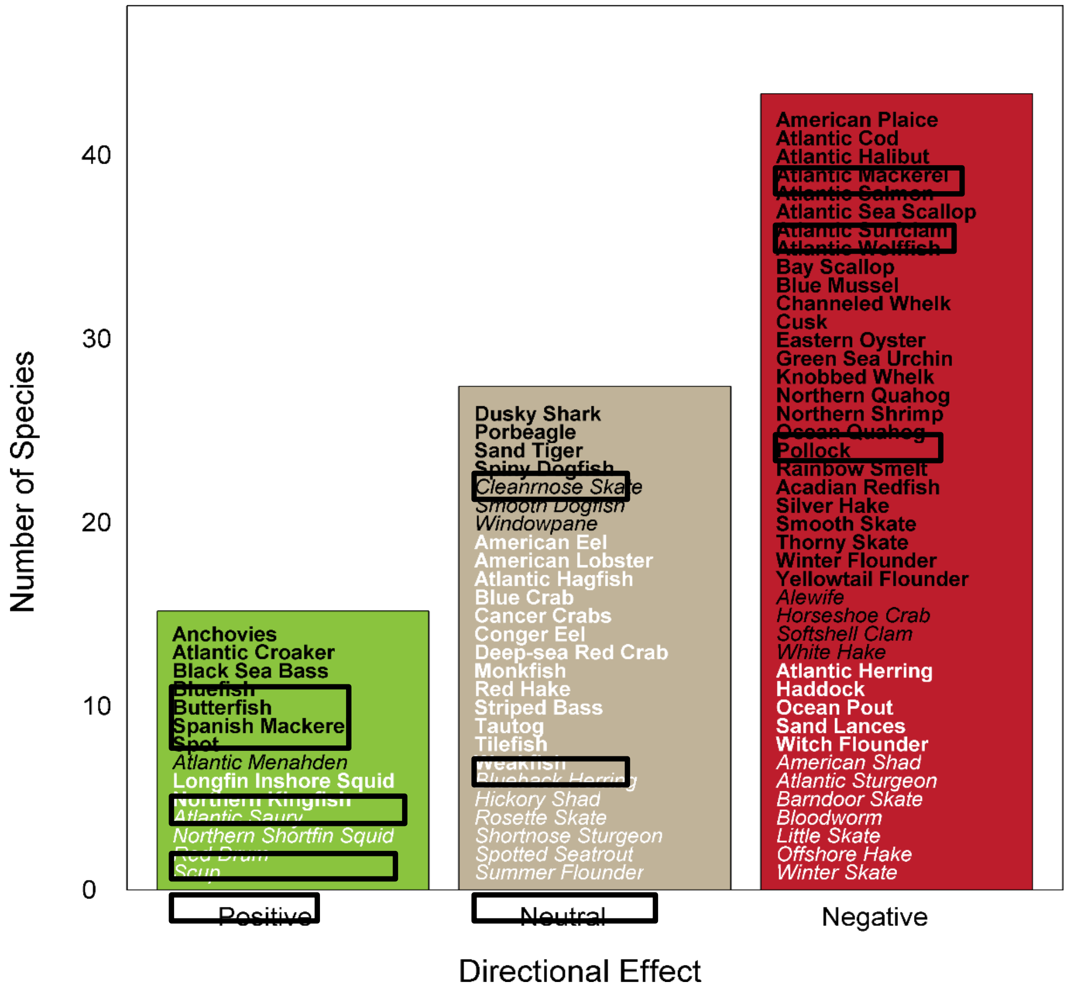

Figure 19: Directional effect of climate change for Council-managed species highlighted with black boxes. Colors represent expected negative (red), neutral (tan), and positive (green) effects. Certainty in score is denoted by text font and text color: very high certainty (>95%, black, bold font), high 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.

7.6.3 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. Those past, present, and reasonably foreseeable future actions which may impact the VECs, and the direction of those potential impacts, are summarized in section 7.6.2. 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 7.6.2, non-fishing impacts on the VECs generally range from slight positive to slight negative.

7.6.3.1 Magnitude and Significance of Cumulative Effects on Managed Resources

Past fishery management actions taken through all Council-managed resource FMPs and the annual specifications process such as catch limits and commercial quotas for the managed resource ensure that stocks are managed sustainably and that measures are consistent with the objectives of the FMP under the guidance of the MSA. While species have been designated as overfished, including mackerel recently in this FMP, rebuilding measures have been subsequently implemented. 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 (e.g., gear restricted areas, limited access, minimum mesh sizes etc.) are effective; however, these actions have generally had a positive cumulative effect on the managed resources. It is anticipated that future management actions 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 above, the preferred alternatives are not expected to result in substantially changed levels of fishing effort or substantial changes to the character of that effort relative to current conditions. Therefore, impacts of Council-managed fisheries on target species are not expected to change relative to current conditions under the preferred alternatives. The proposed actions described in this document would positively reinforce the past and anticipated positive cumulative effects on all managed resources by achieving the objectives specified in the FMP.

When the effects of the preferred 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 the Council-managed resources.*

7.6.3.2 Magnitude and Significance of Cumulative Effects on Physical Environment

Past fishery management actions taken through the federal fisheries management process have had positive cumulative effects on habitat but fishery activities still likely have slight negative habitat impacts. Actions have constrained fishing effort both at a large scale and locally which may reduce impacts on habitat. As required under these FMP actions, EFH was designated for the managed stocks. It is anticipated that future management actions 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 in section 7.6.2, are 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 and non-target species productivity, and associated fishery yields should be considered. For habitat, there are direct and indirect negative effects from actions which may be localized or broad in scope; however, positive actions that have broad implications have been, and will likely continue to be, taken to improve the condition of habitat. Some actions, such as coastal population growth and climate change may impact habitat and ecosystem productivity; however, these actions are beyond the scope of NMFS and Council management.

As noted above, the preferred alternative is not expected to result in substantially changed levels of fishing effort or changes to the character of that effort relative to current conditions. The preferred actions are thus expected to have no significant impact (direct or indirect) on habitat. 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.

Overall, the relevant past, present, and reasonably foreseeable future actions, including the proposed actions, *the cumulative effects are expected to yield non-significant impacts on habitat that are slight negative.*

7.6.3.3 Magnitude and Significance of Cumulative Effects on Protected Resources

Given their life history, 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 MMPA and ESA were implemented through the present).

Numerous protected species (ESA listed and/or MMPA protected) occur in the Northwest Atlantic (see section 6.4). The population trends for these species are variable, with some showing signs of stability, while others are decreasing, increasing, or remain unknown.[25] Taking into consideration this information, past fishery management actions have contributed to a long-term <u>trend toward positive</u> cumulative effects on protected species, though to date, effects for ESA species are slight negative given their status and slight negative for MMPA species below PBR (i.e., bottlenose dolphin stocks). The actions have constrained fishing effort, 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 will result in additional direct and/or indirect positive effects on protected species. These impacts could be broad in scope.

As noted above, the preferred alternative is not expected to result in significantly changed levels of fishing effort or changes to the character of that effort relative to current conditions. The modification of permitting and associated management measures in the preferred alternative would not change the existing commercial quotas, which have the most effects on effort in this fishery. Based on this, the proposed actions are expected to directionally have slight positive to negligible effects on protected species.

Overall, the relevant past, present, and reasonably foreseeable future actions, including the proposed actions, *the cumulative effects are expected to yield non-significant impacts on protected resources that range from slight negative (for ESA species and MMPA species above PBR) to slight positive for other MMPA species that are not above PBR.*

7.6.3.4 Magnitude and Significance of Cumulative Effects on Non-Target Species

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25 Information on the population trajectory of protected species of sea turtles, Marine Mammals (large whales, small cetaceans, and pinnipeds), and fish (Atlantic sturgeon and salmon) can be found in the following resources. **Sea Turtles**: https://myfwc.com/research/wildlife/sea-turtles/nesting/loggerhead-trends/; Heppell et al. 2005; NMFS and USFWS 2015; Caillouett et al. 2018; Seminoff et al. 2015; NW Atlantic Leatherback Working Group 2018; **Marine Mammals**: Marine Mammal Stock Assessment Report for the Atlantic Region , https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; **Fish**: ASMFC 2017, USASAC 2020.

The combined impacts of past federal fishery management actions on non-target species have been mixed. Decreased effort and reduced catch of non-target species continue, though some stocks are in poor status and to some degree that status is worsened by bycatch, which can vary among directed fisheries. Therefore the effect to date of federal fishery management actions is overall slight negative. Current regulations continue to manage for sustainable stocks, thus controlling effort on direct and discard/bycatch species and accounting for all catch. Future actions are anticipated to continue rebuilding non-target species stocks if needed and limit the take of incidental/bycatch in Council-managed fisheries, particularly through mitigation measures like sub-ACLs, AMs, spatial-temporal measures, and bycatch caps. Continued management of directed stocks will also control catch of non-target species. Therefore, impacts on non-target species (slight negative) are not expected to change relative to the current condition under the preferred alternatives. The proposed actions in this document would positively reinforce past and anticipated cumulative effects on non-target species by achieving the objectives specified in the FMP.

When the effects of the preferred 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 ongoing slight negative impacts to non-target species overall.*

7.6.3.5 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 commercial quotas 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 such as seasons and trip/possession limits are effective.

National Standard 8 requires that management measures take into account fishing communities. Communities from Maine to North Carolina are involved in the harvesting of mackerel, squid and butterfish. Through implementation of the FMP for these species the Council seeks to achieve the primary objective of the Magnuson-Stevens Act which is to achieve optimum yield from these fisheries. It is important to keep in mind that by contributing to the overall functioning of and employment in coastal communities, the MSB fisheries have indirect social impacts as well. Social impacts are strongly aligned with changes to fishing opportunities and while difficult to measure can include impacts to families from income changes/volatility, safety-at-sea (related to changes in fishery operations due to regulation changes), job satisfaction and stability, and general frustration by individuals due to management's impacts especially if they perceive the management actions to be unreasonable or ill-informed. Unless otherwise noted, expanded fishing opportunities or less burdensome regulations that result in increased revenue for more individuals will have concomitant (i.e. naturally accompanying) positive social impacts. Likewise, reduced fishing opportunities or more burdensome regulations that result in lower revenue to fewer individuals will have concomitant negative social impacts.

The first cumulative human community effect of the FMP has been to guide the development of the domestic harvest and processing fishery infrastructure. Part of this fishery rationalization process included the development of limited access programs to control capitalization while maintaining harvest levels that are sustainable. In addition, by meeting the National Standards prescribed in the

MSA, the Council has strived to meet one of the primary objectives of the act - to achieve optimum yield in each fishery. None of the preferred measures would force lower harvests than have occurred in recent years and they are unlikely to result in substantial changes to levels of effort or the character of that effort relative to the status quo.

The indirectly affecting actions and activities described above have both positive and negative human community affects. For example agricultural pollution may negatively impact marine resources negatively affecting human communities, but there are also benefits to human communities from the food and jobs created during agricultural operations. The same tradeoff will exist for each of the indirectly affecting activities, resulting on overall indirect negative impacts on human communities by reducing marine resource availability; however, this effect is not quantifiable. NMFS has several means under which it can review non-fishing actions of other Federal or state agencies prior to permitting or implementation of those projects. This serves to minimize the extent and magnitude of indirect negative impacts those actions could have on human communities.

It is anticipated that future management actions will 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, if temporarily.
By providing revenues and contributing to the overall functioning of and employment in coastal communities, Council-managed fisheries have both direct and indirect positive social impacts. As previously described in this section, the preferred alternatives are unlikely to result in significant changes to levels of fishing effort or the character of that effort relative to current conditions. Overall, the relevant past, present, and reasonably foreseeable future actions, including the proposed action, *the cumulative effects are expected to yield non-significant positive impacts.* The lower butterfish quotas are not less than recent landings, and should help maximize long term sustainable revenues.

7.6.4 Proposed Action on all the VECs

The Council's preferred alternatives (i.e. the proposed actions) are described in section 5.0. The direct and indirect impacts of the proposed action on the VECs are described in above in this section. 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 7.6.3).

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. They should generally reinforce existing impacts.

The preferred alternatives are expected to have moderate positive impacts on the managed resources due to catch limits that optimize long-term sustainable yield. Non-target species, habitat, and protected resources effects should remain similar given the lack of expected substantial changes to effort. Human community effects vary by participant, but none of the proposed quotas would restrict landings compared to recent landings.

The preferred alternatives are consistent with other management measures that have been implemented in the past for all Council-managed resources. These measures are part of a broader management scheme for all Council-managed fisheries. 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 in trend 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 measures 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. Cumulatively, through 2025, it is anticipated that the preferred alternatives will result in non-significant impacts on all VECs, ranging from no impact to slight negative to moderately positive.

8.0 WHAT LAWS APPLY TO THE ACTIONS CONSIDERED IN THIS DOCUMENT?

8.1 Magnuson-Stevens Fishery Conservation and Management Act

8.1.1 NATIONAL STANDARDS

Section 301 of the Magnuson-Stevens Fishery Conservation and Management Act requires that fishery management plans contain conservation and management measures that are consistent with the ten National Standards:

In General. – Any fishery management plan prepared, and any regulation promulgated to implement any such plan, pursuant to this title shall be consistent with the…national standards for fishery conservation and management.

(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 proposed measures would facilitate optimum yield while preventing overfishing.

(2) Conservation and management measures shall be based upon the best scientific information available.

The data sources considered and evaluated during the development of this action include, but are not limited to: permit data, landings data from vessel trip reports, information from resource trawl surveys, sea sampling (observer) data, data from the dealer weighout purchase reports, peer-reviewed assessments including the recent mackerel benchmark assessment, original literature, and descriptive information provided by fishery participants and the public. To the best of the Council's knowledge these data sources constitute the best scientific information available. All analyses based on these data have been reviewed by National Marine Fisheries Service and the public. The projections for rebuilding and ABCs were also reviewed by the Council's SSC and determined to constitute best available scientific information.

(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 fishery management plan addresses management of the mackerel, squid, and butterfish stocks throughout the range of the species in U.S. waters.

(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 manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.

None of the proposed measures would discriminate between residents of different States or assign/allocate fishing privileges among U.S. fishermen.

(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.

There is no allocation proposed. The proposed actions are efficient in that they should facilitate full utilization of the relevant quotas.

(6) Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

Changes in fisheries occur continuously, both as the result of human activity (for example, new technologies or shifting market demand) and natural variation (for example, oceanographic perturbations). In order to provide the greatest flexibility possible for future management decisions, the fishery management plan includes a framework adjustment mechanism with an extensive list of possible framework adjustment measures that can be used to quickly adjust the plan as conditions in the fishery change. Specifications are also reviewed annually and can be amended as appropriate.

(7) Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

As always, the Council considered the costs and benefits associated with the management measures proposed in the action when developing this action. This action should not create any duplications related to managing the MSB resources and is taken to utilize updated information on these stocks.

(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 economic impacts on such communities.

The human community impacts of the action are described above in Section 7.5 (the proposed measures would likely maintain yield and revenues to human 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.

The MSA defines "bycatch" as fish that are harvested in a fishery, but are not retained (sold, transferred, or kept for personal use), including economic discards and regulatory discards. Incidentally landed catch are fish, other than the target species, that are harvested while fishing for a target species and retained and/or sold. Previous actions have reduced bycatch to the extent practicable, as described elsewhere in this document. The RH/S cap should continue to control catch of those species in the mackerel fishery.

(10) Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

Fishing is a dangerous occupation; participants must constantly balance the risks imposed by weather against the economic benefits. According to the National Standard guidelines, the safety of the fishing vessel and the protection from injury of persons aboard the vessel are considered the same as "safety of human life at sea." The safety of a vessel and the people aboard is ultimately the responsibility of the master of that vessel. Each master makes many decisions about vessel maintenance and loading and about the capabilities of the vessel and crew to operate safely in a variety of weather and sea conditions. This national standard does not replace the judgment or relieve the responsibility of the vessel master related to vessel safety. No measures in this action are expected to negatively impact safety at sea.

8.1.2 Other Required Provisions of the Magnuson-Stevens Act

Section 303 of the MSA contains 15 additional required provisions for FMPs, which are listed and discussed below. Nothing in this action is expected to contravene any of these required provisions.

(1) contain the conservation and management measures, applicable to foreign fishing and fishing by vessels of the United States, which are-- (A) necessary and appropriate for the conservation and management of the fishery to prevent overfishing and rebuild overfished stocks, and to protect, restore, and promote the long-term health and stability of the fishery; (B) described in this subsection or subsection (b), or both; and (C) consistent with the National Standards, the other provisions of this Act, regulations implementing recommendations by international organizations in which the United States participates (including but not limited to closed areas, quotas, and size limits), and any other applicable law

The MSB FMP has evolved over time through 20 Amendments and currently uses Acceptable Biological Catch recommendations from the Council's Scientific and Statistical Committee to sustainably manage the Mackerel, Squid, and Butterfish fisheries. Under the umbrella of limiting catch to the Acceptable Biological Catch, a variety of other management and conservation measures have been developed to meet the goals of the fishery management plan and remain consistent with the National Standards. The current measures are codified in the Code of Federal Regulations (50 C.F.R. § 648 Subpart B - http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&SID=1e9802ffddb05d0243d9c657fade956c&rgn=div5&view=text&node=50:12.0.1.1.5&idno=50). This action proposes measures that should continue to promote the long-term health and stability of the fisheries, consistent with the MSA.

(2) contain a description of the fishery, including, but not limited to, the number of vessels involved, the type and quantity of fishing gear used, the species of fish involved and their location, the cost likely to be incurred in management, actual and potential revenues from the fishery, any recreational interest in the fishery, and the nature and extent of foreign fishing and Indian treaty fishing rights, if any

Every Amendment to the MSB Fishery Management Plan provides this information. This document updates this information as appropriate in Section 6.

(3) assess and specify the present and probable future condition of, and the maximum sustainable yield and optimum yield from, the fishery, and include a summary of the information utilized in making such specification

Full assessment reports are available at: https://www.fisheries.noaa.gov/about/resource-evaluation-and-assessment-northeast or by contacting Council staff. The preferred measures use the most recent assessments, which combine biological, fishery, and other data to estimate resource productivity.

(4) assess and specify-- (A) the capacity and the extent to which fishing vessels of the United States, on an annual basis, will harvest the optimum yield specified under paragraph (3); (B) the portion of such optimum yield which, on an annual basis, will not be harvested by fishing vessels of the United States and can be made available for foreign fishing; and (C) the capacity and extent to which United States fish processors, on an annual basis, will process that portion of such optimum yield that will be harvested by fishing vessels of the United States

Based on past performance, if any MSB species are sufficiently abundant and available, the domestic fishery has the desire and ability to fully harvest the available quotas, and domestic processors can process the fish/squid.

(5) specify the pertinent data which shall be submitted to the Secretary with respect to commercial, recreational, and charter fishing in the fishery, including, but not limited to, information regarding the type and quantity of fishing gear used, catch by species in numbers of fish or weight thereof, areas in which fishing was engaged in, time of fishing, number of hauls, and the estimated processing capacity of, and the actual processing capacity utilized by, United States fish processors

Previous Amendments have specified the data that must be submitted to NMFS in the form of vessel trip reports, vessel monitoring system trip declarations and catch reports, and dealer reports.

(6) consider and provide for temporary adjustments, after consultation with the Coast Guard and persons utilizing the fishery, regarding access to the fishery for vessels otherwise prevented from harvesting because of weather or other ocean conditions affecting the safe conduct of the fishery; except that the adjustment shall not adversely affect conservation efforts in other fisheries or discriminate among participants in the affected fishery

There are no such requests pending, but the plan contains provisions for framework actions to make modifications regarding access/permitting if necessary.

(7) describe and identify essential fish habitat for the fishery based on the guidelines established by the Secretary under section 305(b)(1)(A), minimize to the extent practicable adverse effects on such habitat caused by fishing, and identify other actions to encourage the conservation and enhancement of such habitat

Section 6.3 of this document summarizes essential fish habitat (EFH). Amendments 9 and 11 evaluated habitat impacts, updated essential fish habitat designations, and implemented measures to reduce habitat impacts (primarily related to tilefish essential fish habitat). Amendment 16 implemented measures to protect deep-sea corals. An upcoming review of EFH will review EFH designations and potential adverse impacts to EFH from Council-managed fisheries.

(8) in the case of a fishery management plan that, after January 1, 1991, is submitted to the Secretary for review under section 304(a) (including any plan for which an amendment is submitted to the Secretary for such review) or is prepared by the Secretary, assess and specify the nature and extent of scientific data which is needed for effective implementation of the plan

The preparation of this action included a review of the scientific data available to assess the impacts of all alternatives considered. No additional data was deemed needed for effective implementation of the plan at this time.

(9) include a fishery impact statement for the plan or amendment (in the case of a plan or amendment thereto submitted to or prepared by the Secretary after October 1, 1990) which shall assess, specify, and describe the likely effects, if any, of the conservation and management measures on-- (A) participants in the fisheries and fishing communities affected by the plan or amendment; and (B) participants in the fisheries conducted in adjacent areas under the authority of another Council, after consultation with such Council and representatives of those participants;

Section 7.5 of this document provides an assessment of the likely effects on fishery participants and communities from the considered actions.

(10) specify objective and measurable criteria for identifying when the fishery to which the plan applies is overfished (with an analysis of how the criteria were determined and the relationship of the criteria to the reproductive potential of stocks of fish in that fishery) and, in the case of a fishery which the Council or the Secretary has determined is approaching an overfished condition or is overfished, contain conservation and management measures to prevent overfishing or end overfishing and rebuild the fishery

A recent omnibus framework also streamlined incorporation of new overfished/overfishing reference points (they are automatically incorporated once accepted through a peer-review process).

(11) establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the

fishery, and include conservation and management measures that, to the extent practicable and in the following priority-- (A) minimize bycatch; and (B) minimize the mortality of bycatch which cannot be avoided

NMFS has implemented an omnibus amendment to implement a revised standardized reporting methodology since the previous methodology was invalidated by court order. See http://www.greateratlantic.fisheries.noaa.gov/mediacenter/2013/09/draftsbrmamendment.html for details.

(12) assess the type and amount of fish caught and released alive during recreational fishing under catch and release fishery management programs and the mortality of such fish, and include conservation and management measures that, to the extent practicable, minimize mortality and ensure the extended survival of such fish

The MSB fisheries are primarily commercial. There are some discards in the recreational mackerel fishery, but these are minimal related to the overall scale of the mackerel fishery. There are no size limits that would lead to regulatory recreational discarding of mackerel. There are no specific catch and release fishery management programs. There is some recreational longfin squid fishing, but it is thought to be relatively minor.

(13) include a description of the commercial, recreational, and charter fishing sectors which participate in the fishery and, to the extent practicable, quantify trends in landings of the managed fishery resource by the commercial, recreational, and charter fishing sectors

This document updates this information as appropriate in Section 6. There is minimal recreational and charter fishing for squid, and no measures in this action would restrict such activity.

(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.

Substantial harvest reductions are not anticipated as part of this action when considering recent fishery performance.

(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 annual specifications process addresses this requirement. Acceptable Biological Catch recommendations from the Council's Scientific and Statistical Committee are designed to avoid overfishing and form the upper bounds on catches. There are a variety of proactive and reactive accountability measures for these fisheries, fully described in the Code of Federal Regulations.

8.1.3 DISCRETIONARY PROVISIONS OF THE MAGNUSON-STEVENS ACT

Section 303b of the MSA contains 14 additional discretionary provisions for Fishery Management Plans. See https://www.fisheries.noaa.gov/topic/laws-policies#magnuson-stevens-act. Of import for this action, these discretionary provisions allow seasons, fishery closures, trip limits, and measures to control incidental catch of non-target species.

8.1.4 ESSENTIAL FISH HABITAT ASSESSMENT

The measures under the preferred alternatives proposed in this action are not expected to result in substantial changes in effort that impacts habitat, as described in Section 7. Therefore, the Council concluded in section 7 of this document that the proposed measures will have no additional adverse impacts on EFH that are more than minimal or temporary. Thus no mitigation is necessary. The adverse impacts of bottom trawls used in MSB fisheries on other managed species (not MSB), which were determined to be more than minimal and not temporary in Amendment 9, were minimized to the extent practicable by the Lydonia and Oceanographer canyon closures to squid fishing. In addition, Amendment 1 to the Tilefish FMP closed those canyons plus Veatch's and Norfolk Canyons to all bottom trawling. Deepwater corals were also protected in Amendment 16. Therefore, the adverse habitat impacts of MSB fisheries "continue to be minimized." Amendment 11 revised the MSB EFH designations and EFH impacts will continue to be monitored and addressed as appropriate.

8.2 NEPA

8.2.1 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?

The impacts of this action are not expected to be significant as no substantial changes in effort appear likely to result from this action..

2. Can the proposed action reasonably be expected to significantly affect public health or safety?

As described in Section 7 of this document, none of the proposed measures substantially alter the manner in which the industry conducts fishing activities for the target species. Therefore, the proposed actions in these fisheries are not expected to adversely impact public health or 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?

The action proposed addresses management of the MSB fisheries, which was established in the FMP and modified in various amendments, frameworks, and specifications. Although there are shipwrecks present in the area where fishing occurs, including some registered on the National Register of Historic Places, vessels typically avoid fishing too close to wrecks due to the possible loss or entanglement of fishing gear. As described in Section 7 of this document, none of the measures substantially alter the manner in which the industry conducts fishing activities for the target species. Therefore, it is not likely that the preferred alternative would adversely affect the historic resources listed above.

4. Are the proposed action's effects on the quality of the human environment likely to be highly controversial?

The proposed action modifies existing measures contained in the FMP in a similar fashion as previous years so are not likely to be controversial, especially given the proposed measures are unlikely to change fishing effort.

5. Are the proposed action's effects on the human environment likely to be highly uncertain or involve unique or unknown risks?

While there is always a degree of variability in the year to year performance of the relevant fisheries, and the projections used to develop ABCs involve some uncertainty, they are not unusually uncertain nor do they involve unique or unknown risks.

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?

The proposed action modifies existing measures and the modifications have been proposed and evaluated consistent with the existing fishery management plan and therefore is neither likely to establish a precedent for future actions with significant effects nor to represent a decision in principle about a future consideration.

7. Is the proposed action related to other actions that when considered together will have individually insignificant but cumulatively significant impacts?

The Cumulative effects of the preferred alternatives on the biological, physical, and human environment are described in Section 7 of this document. The overall interaction of the proposed action with other past, present and reasonably foreseeable future actions, including non-fishing activities, are not expected to result in significant Cumulative effects on the biological, physical, and human components of the environment.

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?

The action proposed addresses management of the MSB fisheries, which was established in the FMP and modified in various amendments, frameworks, and specifications. Other types of commercial fishing already occur in this area, and although it is possible that historic or cultural resources such as shipwrecks could be present, vessels try to avoid fishing too close to wrecks due to the possible loss or entanglement of fishing gear. Therefore, it is not likely that the preferred alternative would result in substantial impacts to unique areas.

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?

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 (see Section 7 of this document) in a manner that would substantially increase interaction risks to ESA-listed species.

This action falls within the range of impacts considered in the Batched Fisheries Biological Opinion for the MSB Fisheries (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, it was determined that allowing these fisheries 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 protected species above the amount that was previously considered in the 2013 Batched Biological Opinion. Therefore, conducting the proposed action during the reinitiation period would not be likely to jeopardize the continued existence of any whale, sea turtle, Atlantic salmon, or sturgeon species.

As described in Section 6.4.1, the proposed action is not likely to adversely affect any designated critical habitat. Specifically, the MSB fisheries will not affect the essential physical and biological features of North Atlantic right whales or loggerhead sea turtles (Northwest Atlantic Ocean DPS) 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?

As described in Section 7 of this document, overall fishing effort is not expected to substantially increase in magnitude under the proposed action. In addition, none of the proposed measures are expected to substantially alter fishing methods, activities, or the spatial and/or temporal distribution of fishing effort. Thus, it is not expected that they would threaten a violation of Federal, State, or local law or requirements imposed for the protection of the environment. The proposed measures have been found to be consistent with other applicable laws as described in this Section.

11. Can the proposed action reasonably be expected to adversely affect stocks of marine mammals as defined in the Marine Mammal Protection Act?

The MSB fisheries are known to interact with MMPA protected species. As described in Section 7 of this document, fishing effort is not expected to substantially increase in magnitude under the proposed measures. In addition, none of the proposed measures are expected to substantially alter fishing methods, activities, or the spatial and/or temporal distribution of fishing effort in a manner that would increase interaction risks with marine mammals. Based on this and the information provided in Section 7.3, 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?

As described in Section 7 of this document, none of the proposed measures are expected to jeopardize the sustainability of any target species affected by the action. The preferred alternatives are consistent with the FMP and best available scientific information. As such, the proposed action is expected to ensure the long term sustainability of harvests from the MSB stocks. The proposed action is not expected to jeopardize the sustainability of any non-target species (see section 7 of this document) because the proposed measures are not expected to result in substantial increases in overall fishing effort. In addition, none of the measures are expected to substantially alter fishing methods or the temporal and/or spatial distribution of fishing activities. Therefore, none of the proposed actions are expected to jeopardize the sustainability of managed or other non-target species.

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?

The proposed action is not expected to cause damage to the ocean, coastal habitats, and/or EFH as defined under the Magnuson Stevens Act and identified in the FMP (see Section 7). In general, bottom tending mobile gear, primarily otter trawls, which are used to harvest mackerel, squid, and butterfish, have the potential to adversely affect EFH for the benthic lifestages of a number of species in the Northeast region that are managed by other FMPs. However, because as described in Section 7 of this document none of the management measures proposed in this action should cause any substantial increase in overall fishing effort relative to the status quo, they are not expected to have any substantial negative impact on EFH or on coastal and ocean habitats.

14. Can the proposed action reasonably be expected to adversely affect vulnerable marine or coastal ecosystems, including but not limited to, deep coral ecosystems?

Deep coral ecosystems have been protected from bottom-tending mobile gear used in the MSB fisheries by previous Council actions. Overall fishing effort is not expected to substantially increase in magnitude under the proposed action (see Section 7 of this document). In addition, none of the proposed measures are expected to substantially alter fishing methods, activities, or the spatial and/or temporal distribution of fishing effort. Thus, it is not expected that they would adversely affect vulnerable marine or coastal ecosystems, including but not limited to, deep coral ecosystems.

15. Can the proposed action reasonably be expected to adversely affect biodiversity or ecosystem functioning (e.g., benthic productivity, predator-prey relationships, etc.)?
These fisheries are prosecuted using bottom otter trawls, which have the potential to impact bottom habitats. In addition, a number of non-target species are taken incidentally to the prosecution of these fisheries. However, fishing effort is not expected to substantially increase in magnitude under the proposed measures (see Section 7 of this document). In addition, none of the proposed measures are expected to substantially alter fishing methods, activities or the spatial and/or temporal distribution of fishing effort. Therefore, the proposed action is not expected to have a substantial impact on biodiversity or ecosystem function (e.g. food webs) within the affected area.

16. Can the proposed action reasonably be expected to result in the introduction or spread of a nonindigenous species?
National Oceanic and Atmospheric Administration Administrative Order 216-6A and the Companion Manual contains criteria for determining the significance of the impacts of a proposed action and it includes the possibility of introducing or spreading a nonindigenous species. There is no evidence or indication that these fisheries have ever resulted or would ever result in the introduction or spread of

nonindigenous species.

DETERMINATION

In view of the information presented in this document and the analysis contained in the supporting Environmental Assessment prepared for this action, it is hereby determined that these proposed MSB FMP measures 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.

______________________________ __________________

Michael Pentony — Date

Greater Atlantic Regional Administrator, NOAA

8.3 Marine Mammal Protection Act

The various species of marine mammals occurring in the management unit of the mackerel, squid, and butterfish FMP that are afforded protection under the Marine Mammal Protection Act of 1972 (MMPA) are described in Section 6.4. As provided in section 6.4, various MMPA protected species have the potential to interact with the gear types used in the FMP (i.e., mid-water and/or bottom trawl gear). None of the proposed measures are expected to significantly alter fishing methods or activities or result in substantially increased effort. The Council has reviewed the impacts of the proposed measures on marine mammals and concluded that the management actions proposed are consistent with the provisions of the MMPA and would not alter existing measures to protect the species likely to occur in management units of the MSB fisheries. A final determination of consistency with the MMPA will be made by the agency when this action is approved. For further information on the potential marine mammal impacts of the fishery and the proposed management action, see Sections 6 and 7 of this Environmental Assessment.

8.4 Endangered Species Act

The MSB fishery was considered in the batched fisheries Biological Opinion issued by NMFSon 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 North 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, memorandum, 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 memorandum 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 our analysis of the proposed action into consideration, we do not expect the proposed action, in conjunction with other activities, to result in jeopardy to 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 affect endangered and threatened species or critical habitat in any manner beyond what has been considered in prior consultations on this fishery.

8.5 Administrative Procedures Act

Section 553 of the Administrative Procedure Act establishes procedural requirements applicable to informal rulemaking by Federal agencies. The purpose of these requirements is to ensure public access to the Federal rulemaking process, and to give the public adequate notice and opportunity for comment. At this time, the Council is not requesting any abridgement of the rulemaking process for this action.

8.6 Paperwork Reduction Act

The purpose of the Paperwork Reduction Act (PRA) is to control and, to the extent possible, minimize the paperwork burden for individuals, small businesses, nonprofit institutions, and other persons resulting from the collection of information by or for the Federal Government. This action would change the timing for dealer reporting of *Illex* squid, and NMFS will address PRA requirements as part of any implementation.

8.7 Coastal Zone Management Act

Section 307(c)(1) of the Federal Coastal Zone Management Act of 1972 requires that all Federal activities that directly affect the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable. Pursuant to the Coastal Zone Management Act regulations at 15 CFR 930.35, a negative determination may be made if there are no coastal effects and the subject action: (1) Is identified by a state agency on its list, as described in ' 930.34(b), or through case-by-case monitoring of unlisted activities; or (2) which is the same as or is similar to activities for which consistency determinations have been prepared in the past; or (3) for which the Federal agency undertook a thorough consistency assessment and developed initial findings on the coastal effects of the activity. NMFS is reviewing applicable coastal policies of affected states and will make an appropriate determination as part of the rulemaking process.

8.8 Section 515 (Data Quality Act)

Pursuant to NOAA guidelines implementing section 515 of Public Law 106-554 (the Data Quality Act), all information products released to the public must first undergo a Pre-Dissemination Review to ensure and maximize the quality, objectivity, utility, and integrity of the information (including statistical information) disseminated by or for Federal agencies. The following section addresses these requirements.

Utility
The information presented in this document should be 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, as well as the Council's rationale.

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

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, and through the Regulations.gov website. The Federal Register documents will provide metric conversions for all measurements.

Integrity
Prior to dissemination, information associated with this action, independent of the specific intended distribution mechanism, is safeguarded from improper access, modification, or destruction, to a degree commensurate with the risk and magnitude of harm that could result from the loss, misuse, or unauthorized access to or modification of such information. All electronic information disseminated by NOAA Fisheries 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 MSA; and NOAA Administrative Order 216-100, Protection of Confidential Fisheries Statistics.

Objectivity
For purposes of the Pre-Dissemination Review, this document is considered to be a Natural Resource Plan. Accordingly, the document adheres to the published standards of the MSA; the Operational Guidelines, FMP Process; the EFH Guidelines; the National Standard Guidelines; and NOAA Administrative Order 216-6A, Compliance with the National Environmental Policy Act and its

Companion Manual.

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. 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 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 Mackerel, Squid and Butterfish Monitoring Committee or other NMFS staff with expertise on the subject matter.

Despite current data limitations, the conservation and management measures proposed for this action were selected based upon the best scientific information available. The analyses conducted in support of the proposed action were conducted using information from the most recent complete calendar years, generally through 2019 except as noted. The data used in the analyses provide the best available information on the number of seafood dealers operating in the northeast, the number, amount, and value of fish purchases made by these dealers. 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 these fisheries.

The policy choices are clearly articulated in Section 5 of this document as well as the management alternatives considered in this action. The supporting science and impact analyses, upon which the policy choices are based, are described in Sections 6 and 7 of this document. All supporting materials, information, data, and analyses within this document have been, to the maximum extent practicable, properly referenced according to commonly accepted standards for scientific literature to ensure transparency.

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

8.9 Regulatory Flexibility Analysis

The purpose of the Regulatory Flexibility Act is to reduce the impacts of burdensome regulations and recordkeeping requirements on small businesses. To achieve this goal, the Regulatory Flexibility Act requires Federal agencies to describe and analyze the effects of proposed regulations, and possible alternatives, on small business entities. Section 12.0 at the end of this document will include the Regulatory Flexibility Act Analysis.

8.10 Executive Order (E.O.) 12866 (Regulatory Planning and Review)

To enhance planning and coordination with respect to new and existing regulations, this Executive Order requires the Office of Management and Budget (OMB) to review regulatory programs that are considered to be significant. Section 12.0 at the end of this document includes the Regulatory Impact Review, which includes an assessment of the costs and benefits of the proposed action, in accordance with the guidelines established by Executive Order 12866. The analysis shows that this action is not a significant regulatory action because it will not affect in a material way the economy or a sector of the economy.

8.11 Executive Order (E.O.) 13132 (Federalism)

This Executive Order established nine fundamental federalism principles for Federal agencies to follow when developing and implementing actions with federalism implications. The Executive Order also lists a series of policy making criteria to which Federal agencies must adhere when formulating and implementing policies that have federalism implications. However, no federalism issues or implications have been identified relative to the measures proposed measures. This action does not contain policies with federalism implications sufficient to warrant preparation of an assessment under Executive Order 13132. The affected states have been closely involved in the development of the proposed management measures through their representation on the Council (all affected states are represented as voting members of at least one Regional Fishery Management Council). No comments were received from any state officials relative to any federalism implications that may be associated with this action

8.12 Executive Order (E.O.) 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). NOAA guidance NAO 216-6A, Companion Manual, Section 10(A) requires the consideration of EO 12898 in NEPA documents. 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. The public comment process is an opportunity to identify issues that may be related to environmental justice, but none have been raised relative to this action. The public has never requested translations of documents pertinent to the Atlantic sea scallop fishery. With respect to subsistence consumption of fish and wildlife, federal agencies are required to collect, maintain, and analyze information on the consumption patterns of populations who principally rely on fish and(or) wildlife for subsistence. GARFO tracks these issues, but there are no federally recognized tribal agreements for subsistence fishing of the species relevant for this action.

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10.0 LIST OF AGENCIES AND PERSONS CONSULTED

In preparing this annual specifications analysis the Council consulted with the NMFS, New England and South Atlantic Fishery Management Councils, Fish and Wildlife Service, Department of State, and the states of Maine through Florida through their membership on the Mid-Atlantic, New England and/or South Atlantic Fishery Management Councils. In addition, states that are members within the management unit were consulted through the Coastal Zone Management Program consistency process. Letters were sent to each of the following states within the management unit reviewing the consistency of the proposed action relative to states' Coastal Zone Management Programs: Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia and Florida.

11.0 LIST OF PREPARERS AND POINT OF CONTACT

This environmental assessment was prepared by the following member of the Council staff: Jason Didden. Questions about this environmental assessment or additional copies may be obtained by contacting Jason Didden, Mid-Atlantic Fishery Management Council, 800 N. State Street, Dover, DE 19901 (302-674-2331). This Environmental Assessment may also be accessed by visiting the Council website at www.mafmc.org.

12.0 REGULATORY FLEXIBILITY ANALYSIS (BASIS FOR CERTIFICATION) AND REGULATORY IMPACT REVIEW

12.1 Initial Regulatory Flexibility Analysis

The Regulatory Flexibility Act (RFA), first enacted in 1980, and codified at 5 U.S.C. 600-611, was designed to place the burden on the government to review all regulations to ensure that, while accomplishing their intended purposes, they do not unduly inhibit the ability of small entities to compete. The RFA recognizes that the size of a business, unit of government, or nonprofit organization frequently has a bearing on its ability to comply with a Federal regulation. Major goals of the RFA are: 1) to increase agency awareness and understanding of the impact of their regulations on small business; 2) to require that agencies communicate and explain their findings to the public; and 3) to encourage agencies to use flexibility and to provide regulatory relief to small entities.

The RFA emphasizes predicting significant adverse impacts on small entities as a group distinct from other entities and on the consideration of alternatives that may minimize the impacts, while still achieving the stated objective of the action. When an agency publishes a proposed rule, it must either, (1)"certify" that the action will not have a significant adverse impact on a substantial number of small entities, and support such a certification declaration with a "factual basis", demonstrating this outcome, or, (2) if such a certification cannot be supported by a factual basis, prepare and make available for public review an Initial Regulatory Flexibility Analysis (IRFA) that describes the impact of the proposed rule on small entities.

This document provides the factual basis supporting a certification that the proposed regulations will not have a "significant impact on a substantial number of small entities" and that an IRFA is not needed in this case. Certifying an action must include the following elements, and each element is subsequently elaborated upon below:

A. A statement of basis and purpose of the rule
B. A description and estimate of the number of small entities to which the rule applies
C. Description and estimate of economic impacts on small entities, by entity size and industry
D. An explanation of the criteria used to evaluate whether the rule would impose significant economic impacts
E. An explanation of the criteria used to evaluate whether the rule would impose impacts on a substantial number of small entities
F. A description of, and an explanation of the basis for, assumptions used

A – Basis and purpose of the rule

The bases of the rules proposed in this action are the provisions of the MSA for federal fishery management to prevent overfishing, achieve optimum yield, reduce bycatch to the extent practicable, and conserve non-target species. Optimum yield is defined as the amount of fish which will achieve the maximum sustainable yield, as reduced by any relevant economic, social, or ecological factor. The purpose of the rules associated with the preferred alternatives is to implement specifications for the MSB fisheries that institute quotas and related measures that will restrict catch so as to avoid overfishing while facilitating catch within the constraint of avoiding overfishing such that optimum yield is achieved. Failure to implement the preferred measures described in this document could result in overfishing, stock depletion, and failure to reach optimum yield on an ongoing basis. To assist with further evaluation of the measures proposed in this document, a brief summary of the preferred alternatives is provided next. The purpose and need for this action is described in Section 4.2, while a full description of all alternatives is provided in Section 5.

Mackerel A – Maintain the Status Quo Mackerel Specifications for 2021-2022

The current mackerel ABC, 29,185 mt, and associated measures would be maintained for 2021-2022

Illex B – Maintain the Status Quo *Illex* Specifications for 2021 with monitoring modifications

The current *Illex* ABC, 30,000 mt, and associated measures would be maintained for 2021. 48-hour dealer reporting of *Illex* would be required for part of the year, and the closure trigger would be slightly lowered to 94%, both to help avoid quota overages, which have occurred several times in recent years.

Longfin A – Maintain the Status Quo Longfin Specifications for 2021-2023

The current Longfin ABC, 23,400 mt, and associated measures would be maintained for 2021-2023

Butterfish B – Set 2021-2022 Butterfish Specifications based on new assessment.

Butterfish ABCs and associated measures based on those ABCs, would be set at 11,993 mt for 2021 and 17,854 mt for 2022. These measures are lower than the current measures (and 2021 lower than 2022), but would still allow landings to increase from 2017-2019 levels (highest recent landing was 3,681 mt in 2017) compared even to 2021's 5,350 mt limit for directed fishing.

B – Description and estimate of the number of small entities to which the rule applies

The measures proposed in this action primarily apply to the vessels that hold limited access permits for MSB fisheries. There are also incidental permits that allow small-scale landings, and more vessels hold incidental permits, but landings of MSB species by incidental permit holders are relatively minor and no changes are proposed for the incidental trip limits so those vessels would not be impacted.

Many MSB-permitted vessels hold multiple permits and some small entities own multiple vessels with limited access MSB permits. Staff queried NMFS databases for 2019 (the most recent year for which small business identification information are available) MSB limited access permits, and then cross-referenced those results with ownership data provided by the Social Science Branch of NMFS' Northeast Fisheries Science Center. This analysis found that 350 separate vessels held limited access MSB permits in 2018. Approximately 254 entities owned those vessels, and based on current SBA definitions (under $11 million to be a commercial fishing small business entity), 245 were small business entities. All of the entities that had revenue (223) fell into the commercial fishing category. For those 223 with revenues, their average revenue was $1.34 million in 2019.

C – Description and estimate of economic impacts on small entities

See section 7.4 for more details on socio-economic impacts. This action should not have negative impacts on any participating entities. Mackerel and Longfin quotas would be maintained. *Illex* specifications would be maintained although the closure threshold would be lowered from 95% to 94% to avoid quota overages, which have occurred in recent years. The landings that can occur up to the 94% closure threshold would still be higher than the 2017-2019 quotas. 2019 landings were only slightly above the landings at the 94% threshold even with the 2019 overage. Avoiding quota overages also has the long term benefit of avoiding overfishing. Butterfish quotas would be reduced, but would still allow for increases from how the fishery has operated from 2017-2019.

D/E – An explanation of the criteria used to evaluate whether the rule would impose significant economic impacts/ An explanation of the criteria used to evaluate whether the rule would impose impacts on a substantial number of small entities

The criteria used to evaluate whether the rule would impose significant economic impacts was whether the landings (and therefore ex-vessel revenues) from the preferred alternatives would be constraining beyond the current constraints, which persist if no action is taken. Since none of the measures would substantially constrain the fisheries compared to recent performance, there would not be significant impacts on any entities.

<u>F – A description of, and an explanation of the basis for, assumptions</u>

Other than those described directly in the above analyses, the primary assumption utilized in the above analyses is that comparing upcoming fishery operation to how the fishery operated over 2017-2019 is appropriate. Using the most recent three years of fishery operation is standard practice for Regulatory Flexibility Analysis and there is no indication that such an approach is contraindicated in this case since doing so captures what the industry has recently experienced versus potential impacts going forward from implementation of the proposed specifications.

12.2 Regulatory Impact Review

INTRODUCTION

Executive Order 12866 requires a Regulatory Impact Review (RIR) in order to enhance planning and coordination with respect to new and existing regulations. This Executive Order requires the Office of Management and Budget (OMB) to review regulatory programs that are considered to be "significant." Section 7 assesses the costs and benefits of the Proposed Action and found the impacts to be mostly neutral or positive. The analysis included in this RIR further demonstrates that this action is not a "significant regulatory action" because it will not affect in a material way the economy or a sector of the economy.

Executive Order 12866 requires a review of proposed regulations to determine whether or not the expected effects would be significant, where a significant regulatory action is one that may:

1* Have an annual effect on the economy of $100 million or more, or adversely affect in a material way the economy, a sector of the economy, productivity, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

2* Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

3* Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

4* Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

OBJECTIVES

The objectives of the MSB FMP are described above.

PROBLEM STATEMENT

The purpose of the measures proposed in this action are described in Section 4 of this document but is generally to set specifications for the MSB fisheries. This action is needed to prevent overfishing and achieve optimum yield in the MSB fisheries.

ANALYSIS OF ALTERNATIVES

Executive Order 12866 mandates that proposed measures be analyzed below in terms of: (1) changes in net benefits and costs to stakeholders, (2) changes to the distribution of benefits and costs within the industry, (3) changes in income and employment, (4) Cumulative effects of the regulation, and (5) changes in other social concerns. As described in Section 7, none of the preferred measures will substantially limit the fisheries compared to recent performance. These findings support a determination that this action is not significant for purposes of Executive Order 12866.

There should not be substantial distributional issues (all permit holders are impacted similarly), and impacts on income and employment should mirror the impacts on fishing revenues described above (i.e. should be very minor). As described in Section 7, the Council has concluded that no significant Cumulative effects will result from the proposed specifications. There are no other expected social concerns.

DETERMINATION OF EXECUTIVE ORDER 12866 SIGNIFICANCE

Given the analysis in Section 7 and summary information above, the action overall should have neutral impacts on participants in the MSB fisheries that are well below the $100 million threshold for a significance determination. 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 is also similar to actions taken previously that set MSB specifications, and as such does not raise novel legal or policy issues. As such, the Proposed Action is not considered significant as defined by Executive Order 12866.

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