MSB FMP GOALS/OBJECTIVES AND *ILLEX* PERMITS AMENDMENT

MACKEREL, SQUID, AND BUTTERFISH (MSB) FISHERY MANAGEMENT PLAN (FMP)

Includes Draft Environmental Assessment (EA) and

Initial Regulatory Flexibility Analysis

Prepared by the

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

National Marine Fisheries Service (NMFS)

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1.0 EXECUTIVE SUMMARY AND TABLE OF CONTENTS

In this Amendment to the Mackerel, Squid, and Butterfish (MSB) Fishery Management Plan (FMP) the Council considers revisions to the MSB FMP goals and objectives and modifications to *Illex illecebrosus* squid (simply "*Illex*" hereafter) fishery permitting, plus related management measures.

The objectives of this action were to:

A. Review and modify the MSB FMP goals and objectives to ensure they reflect the intent of the Council.

   The Council is considering this objective because the current MSB objectives have not been reviewed since the merged MSB plan was adopted in 1981. The Magnuson–Stevens Fishery Conservation and Management Act (the "Magnuson-Stevens Act" hereafter) has been amended several times since then. The Council has also adopted an Ecosystem Approach to Fisheries Management (EAFM) Guidance Document (http://www.mafmc.org/eafm), and added chub mackerel to the FMP with specific goals and objectives that were informed by the EAFM Guidance Document.

B. Consider the appropriate number of vessels in the directed *Illex* squid fishery and design appropriate management measures for permitted vessels to avoid more frequent and disruptive fishery closures.

   The Council is considering this objective because of the increasing race to fish observed in the *Illex* fishery due to the underlying fleet overcapitalization (fishing power exceeds what is necessary to harvest the quota) and increases in previously latent participation.

After scoping in January-February 2019, the Council developed a range of alternatives and associated analyses. The Council held hearings and accepted comments in March and April 2020 and selected preferred alternatives to recommend to NOAA Fisheries for approval and implementation at a July 2020 Council meeting (via webinar). Additional comments were also submitted and reviewed prior to final action at the July 2020 meeting. NOAA Fisheries will publish a proposed rule along with this Environmental Assessment for public comment. After considering public comments on the proposed rule, NOAA Fisheries will publish a final rule with implementation details if the Amendment is approved by NOAA Fisheries.

All actions are potential until approved and implemented by NOAA Fisheries. This document explains the potential actions and examines their potential impacts. Compared to no action, the preferred alternatives are expected to result in positive benefits to the nation by maintaining the sustainability of the resources, facilitating optimum yield (i.e., fully harvesting available quotas), and taking into account the importance of the *Illex* fishery resource to fishing communities[1]. From a National Environmental Policy Act (NEPA) perspective, this action should not result in significant impacts on valued ecological components. 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 and this document constitutes an Environmental Assessment (EA) to satisfy the impact analysis

[1] From the Magnuson-Stevens Act, "the term 'fishing community' means a community which is substantially dependent on or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew and United States fish processors that are based in such community."

requirements of NEPA. A summary of the preferred alternative is provided below, followed by a qualitative summary of the expected impacts from the preferred alternative relative to taking no action (i.e. versus maintaining the status quo). All current alternatives are detailed in Section 5 and their impacts are analyzed in Section 7. The alternatives have been streamlined from the public hearing document, but are within the range of those in the public hearing document.

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 July 2020 with Council action, and the agency has decided to proceed under the 1978 regulations.

Preferred Alternative Overview

Alternative 4: Under Alternative 4, a Tiered system would be created. The proposed tiers, qualification criteria, and trip limits are described in the table below. Only current moratorium permits could potentially requalify, so having a current moratorium permit is also a requirement.

Table 1. Preferred Alternative ("#4") Summary

Tier	Qualification Criteria	Trip Limit	Approximate Qualifying Vessels
1	Either: Landed at least 500,000 pounds *Illex* in at least one year between 1997 and 2013, or Purchased and installed a refrigerated seawater system, plate freezing system, or blast freezer between January 1, 2012 and August 2, 2013 and landed a minimum of 200,000 pounds of *Illex* in the 2013 fishing year	None	35
2	Landed at least 100,000 pounds *Illex* in one year between 1997 and 2018	62,000 pounds	13
3	Landed at least 50,000 pounds *Illex* in one year between 1997 and 2018	20,000 pounds	2

Approximately 25 vessels would not requalify, and would only be eligible for an open-access incidental permit. With this alternative, analyses (further discussed in Sections 5 and 7) indicate that the fishery would still have more than sufficient capacity to harvest the current quota, even if making similar numbers of trips per vessel as vessels made in 2019. Requalifying Tier 1 permits would have to obtain a baseline measurement of their vessel fish hold volume and be subject to a 10% upgrade restriction on vessel fish hold volume. Requalifying vessels/permits would be required to report daily catch reporting of *Illex* via Vessel Monitoring Systems (VMS). Many participants are using VMS for daily catch reporting but the regulations are somewhat ambiguous so this action is affirming that requirement.

Rationale for Alternative 4 as preferred: The Council acknowledged that this action would have some positive and negative economic consequences for different fishery participants but ultimately concluded that Alternative 4 best balances the needs of historic participants, present participants, and fishing communities when considering the provisions of the MSA and guiding National Standards (see sections 4.2 and 8.1). Of the options considered by the Council, this alternative would requalify a middle range of vessels – other alternatives requalify more or less vessels. The volumetric baseline and upgrade restriction is designed to help further freeze the footprint of the fishery's physical capacity, complementing the permitting changes, and the VMS reporting measure clarifies ambiguity in current regulations that are designed to assist quota monitoring.

Impacts Summary

Managed resources (Section 7.1)

For the managed resource, i.e. *Illex*, the baseline condition is moderate positive. While there is no quantitative assessment, the resource has continued to produce landings since the 1970s, and a variety of analyses reviewed by the Council's Scientific and Statistical Committee (SSC) in May 2020 suggest that fishing mortality has likely been low. The impacts of the preferred option are likely slight positive compared to taking no-action. Since the resulting fleet will likely still have the capacity to harvest the full quota in a manner not dissimilar to previous years, the preferred alternative is not likely to substantively change total catch. Since additional racing to fish should be mitigated by avoiding some activation of latent effort (i.e. the vessels that would be removed or have access limited), this alternative should help closures occur in a timely fashion before quota/ABC overages occur, which has happened in recent years (e.g. 2018 and 2019). The impact is slight positive compared to no action because quota/ABC overages have been relatively small compared to the overall ABC, and recent changes to monitoring should also minimize the risk of future substantial overages. Overall impacts would remain positive for *Illex*. Given the relatively very low incidental catches of relevant species in the *Illex* fishery, other species managed in the FMP should not be affected (and any catches that do occur have been and will continue to be accounted for in their own management).

Habitat (Section 7.2)

For habitat, including Essential Fish Habitat (EFH) the baseline condition is slight negative because while bottom trawling can negatively impact habitat, the Council has taken a number of actions over the years to mitigate the impacts from bottom trawling (e.g. Tilefish habitat closures and closures to protect deep water corals). There is no information to suggest that the preferred alternative would substantially change the operation of the fishery in terms of overall effort or the general character of the effort as pertaining to habitat, but might involve slightly lower unintended effort related to avoiding quota overages. Therefore compared to taking no action, the preferred action would have negligible to slight positive impacts. Overall impacts would remain slight negative.

Protected Resources (Section 7.3)

For protected resources, the baseline is slight negative for ESA-listed species, and slight negative for other non-ESA listed marine mammal stocks/species in poor condition exceeding PBR (i.e., bottlenose dolphin stocks). For other mammal stocks/species not exceeding PBR, the baseline is negligible to slight positive. By reducing participants, the preferred alternative would be expected to contribute to a reduction in quota overages and the associated unintended effort. So compared to no action, impacts would be negligible to slight positive for protected resources. Given the relatively minor effect on total *Illex* effort expected under this action, the impacts are not expected to be enough to alter the baseline conditions.

Non-target fish species (Section 7.4)

For non-target fish species the baseline condition is slight negative because while some MSB fisheries do have substantial bycatch, the Council has taken a number of actions over the years to mitigate the impacts from bycatch in fisheries in this FMP (e.g. scup gear restricted areas and the butterfish and river herring/shad caps). For non-target species specific to this action, there should be negligible impacts - there are relatively very low incidental catches of other species in the *Illex* fishery compared to catch limits for those species, and there is no information to suggest that the preferred alternative would substantially change the operation of the fishery in terms of overall effort or the general character of the effort in any way that would substantially affect non-target catches. Given the negligible impacts, the baseline condition, slight negative, should persist.

Socio-Economic and Human Communities (Section 7.5)

For human communities as they relate to the *Illex* fishery, the baseline condition is moderate positive given the variability of the fishery (as expected given the life history of *Illex*). The fishery supports a number of vessels, as described in Section 6.3, and provides a variety of jobs related directly to fishing and associated support services.

Relative to no action/Alternative 1, the preferred Alternative 4, which eliminates approximately 39 vessels from the primary directed fishery, would be slightly more positive due to partly addressing racing to fish issues. While Alternative 4 eliminates 39 vessels from the directed fishery, which will limit the potential for a worsening race to fish, the remaining vessels have sufficient capacity to race to fish and could still expand their capacities to harvest quota even faster. Thus the problems with racing to fish detailed in this action will likely persist (i.e. disruption of dependent participants and communities, profit dissipation, safety issues and yield reduction issues), but they will be somewhat more limited with Alternative 4 than with no action.

There will be distributional impacts with any of these alternatives, including the no action because one vessel's quota access loss is another's gain and one vessel's quota access gain is another's loss. Given the vessels are trying to access the same quota, gains and losses will generally cancel out with these distributional impacts from the overall fishery perspective.

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2.0 LIST OF ACRONYMS AND ABBREVIATIONS

ABC	**Acceptable Biological Catch**
ACL	**Annual Catch Limit**
ACT	**Annual Catch Target**
ASMFC	**Atlantic States Marine Fisheries Commission or Commission**
B	**Biomass**
CFR	**Code of Federal Regulations**
CPH	**Confirmation of Permit History**
CV	**coefficient of variation**
DAH	**Domestic Annual Harvest**
DAP	**Domestic Annual Processing**
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	**Atlantic 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**
SARC	**Stock Assessment Review Committee**
SAW	**Stock Assessment Workshop**
SNE	**Southern New England**
SSB	**Spawning Stock Biomass**
SSC	**Scientific and Statistical Committee**
US	**United States**
VTR	**Vessel Trip Report**

3.0 LISTS OF TABLES, AND FIGURES

3.1 LIST OF TABLES

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4.0 INTRODUCTION, BACKGROUND, AND PROCESS

In general, the *Illex* fishery is managed with annual quotas and limited access. Landings can be highly variable, but the fishery had an exceptionally productive series of years from 2017-2019. The Council took action on this Amendment in mid-2020 and development of this document began in 2020, so most analyses use 2019 as a terminal year, but 2020 and 2021 were also exceptionally strong years for *Illex* landings, creating the only period of five consecutive strong years in the history of the fishery (there were closures in each year since 2017, which have generally been even individually rare). Throughout the history of the domestic fishery (the fishery transformed from a foreign fishery to domestic in the early 1980s), relatively few vessels have accounted for most landings – in most years 5-20 vessels account for the vast majority of landings.

The fishery is nearly entirely commercial. Catches are limited via a commercial quota, which is based on an Acceptable Biological Catch (ABC) set by the Council's SSC and reduced to account for limited discards based on observer data. There is uncertainty regarding optimal catch levels, but a series of recent analyses have strongly suggested that fishing mortality has likely been low, and after a long period of ABCs being at 24,000 metric tons (mt) (since 2000), the SSC raised the ABC to 26,000 mt for 2019 and 30,000 mt for 2020, and 33,000 mt for 2021. Details on recent considerations regarding ABCs are available at https://www.mafmc.org/ssc, see especially the May 2020 SSC meeting. A research track assessment was ongoing during development of this action, and could produce information 2023 and beyond.

Based on recent fishery performance, including early closures of the directed *Illex* fishery, some *Illex* fishery participants requested that the Council consider further restricting access to the directed fishery to ensure stability and continued access to the quota for participants and communities that have been active in the fishery and have come to depend on access to the *Illex* fishery. This is the focus of this action.

4.1 NEED, PURPOSE, AND OBJECTIVES

This action is **needed** because of the increasing race to fish observed in the *Illex* fishery due to the underlying fleet overcapitalization (fishing power exceeds what is necessary to harvest the quota) and increases in previously latent participation as the resource has become more valuable, available, and/or more productive. The associated **purpose** of this action is to consider further limiting access to the *Illex* fishery by removing some current moratorium permits to better, if not perfectly, align the fleet's capacity with existing quotas, which should constrain the potential for worse racing to fish. The Council's recommended action is designed as a step to freezing the fishery's "footprint" and constrain the worsening of the race to fish given the existing excess capacity. Public comments were nearly universally against catch shares for this fishery at this time. Catch shares, as a secure privilege to access a certain amount of fish, can more directly address excess capacity and racing to fish (e.g. Birkenbach et al 2017), but the Council is trying to be proactive in a pragmatic fashion to take an incremental step toward better aligning the capacity of the fleet with the existing quotas at this time.

In terms of recently observed racing to fish, not only has the number of vessels participating increased substantially since the quota began to be caught in 2017 (Table 10), but the landings in the weeks before closures have been increasing both within years and more generally across years (figure 22). This supports industry testimony that the early closures are pushing vessels to fish harder than they otherwise would. The annual landings per active vessel were also declining over this period. The count

of vessels landing over 100,000 pounds (which account for almost all landings) increased from 20 in 2017, to 26 in 2018, to 32 in 2019 (table 10). Dividing landings in those years by those counts of vessels results in average landings per primary active vessels declining from 2.5 million pounds per vessel in 2017, to 2.0 million pounds per vessel in 2018, and then to 1.9 million pounds per vessel in 2019, further demonstrating that the race to fish is diluting the quota available to each participating vessel before a closure occurs, and that there is excess capacity in the *Illex* fishery.

There has been some concern stated that the considered permit requalification options could create races to fish in other fisheries, particularly into the longfin squid fishery. However, whether some vessels seek out longfin due to not re-qualifying or whether some vessels seek out longfin due to a closure happening earlier than would happen if access is not further limited, there is the potential for a switch to longfin squid in either case, supported by the fact that a greater proportion of re-qualifiers have longfin permits compared to non-requalifiers (see permit overlap figures in Section 5, e.g. Figure 9). The primary re-qualifier group also has equivalent or more longfin landings revenues in most years, at least for the preferred alternative (Figure 8). So some degree of re-directed effort is likely in either case of taking no action or further restricting access.

The specific challenges associated with the rapid increases in participation and increasing racing to fish identified by the Council include the following:

- With racing to fish, fishery participants typically use more and more capital and/or effort in an increasingly rushed attempt to catch a limited quota before closure, increasing costs until profits are dissipated, creating a loss of efficiency (see Warming 1911 and Gordon 1954 for some of the noted first of many discussions of this phenomena, or for more recent examples see Homans and Wilen 1997, Homans and Wilen 2005, or Ling and Smith 2014).

- Safety at sea: Racing to fish can lead to taking more risks related to weather, maintenance, and/or overloading. (e.g. see NRC 1991 and FAO 2016 for reviews of related literature as well as Pfeiffer and Gratz 2016).

- Monitoring difficulties: Higher weekly landings make it more difficult to close the fishery at the quota. The quota was exceeded by about 5% in 2018 and 10% in 2019, leading to ABC overages of about 6% and 10%. Projection method modifications and monitoring changes starting in 2021 should lessen the risk of future overages separate from this action, but NMFS staff have long cited difficulties closing this high volume fishery given the race to fish.

- Potential yield reduction: While the *Illex* stock appears to be in a high productivity state with a low risk of overfishing related to the ABCs set by the Council given its SSC advice, catching the quota earlier may mean that smaller squid are harvested, which means that more individuals are harvested per metric ton, which can reduce yield per recruit and total yield given the fast-growing nature of *Illex* (NAFO 1978, NEFSC 1999).

- Increased entry/participation risks gear conflicts, as raised in public comments, both from commercial and recreational perspectives. User and/or gear conflicts could stem from overcrowding in the relatively small fishery area (between coral protection areas and other restricted gear areas inshore) or from inshore displacement of the historical fleet, which provided public comments that they (including large vessels) will be forced inshore into the summer longfin squid fishery from continued early *Illex* closures.

- Negative effects for historically dependent and invested communities from early closures, shortened seasons, and/or rapid changes in the distribution of landings among ports. Analyses highlight the

dependence of N. Kingston and Cape May, and National Standard 8 guidance requires taking into account the importance of fisheries to fishing communities, and favors alternatives that, all else being equal, provide for the more sustainable participation of, and avoids adverse impacts on, such communities.

- Historical participants have less operational flexibility to engage in other fisheries and are generally more dependent on *Illex* (described later in document).

Accordingly, the objectives of this action are to: In the context of the updated FMP goals and objectives, consider the appropriate number of vessels in the directed *Illex* squid fishery and design appropriate management measures for permitted vessels to reduce the severity of disruptive fishery closures. The Council is considering this objective because there is considerable latent effort - a relatively small portion of vessels with limited access ("moratorium") squid permits account for the majority of landings in most years, and the Council is concerned that activation (recent and future) of latent permits could lead to disruptive shortened seasons on these semelparous, sub-annual species. Further restricting access will help to ensure access to the quota for participants that have participated on a regular basis and have a greater degree of dependency on the *Illex* fishery.

4.2 REGULATORY AUTHORITY

As discretionary provisions of FMPs, the Magnuson-Stevens Act states that any FMP may establish a limited access system for the fishery in order to achieve optimum yield if, in developing such system, the Council and the Secretary take into account:

(A) present participation in the fishery – see sections 6.3 and 7.5
(B) historical fishing practices in, and dependence on, the fishery – see sections 6.3 and 7.5
(C) the economics of the fishery – see sections 6.3 and 7.5
(D) the capability of fishing vessels used in the fishery to engage in other fisheries – see sections 6.3 and 7.5
(E) the cultural and social framework relevant to the fishery and any affected fishing communities – see sections 6.3 and 7.5
(F) the fair and equitable distribution of access privileges in the fishery – see section 8.1

The Council must also take into account the Magnuson-Stevens Act's ten national standards during all decisions (https://www.fisheries.noaa.gov/national/laws-and-policies/national-standard-guidelines). National Standards 4, 5, 6, and 8 are particularly relevant to this action:

National Standard 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 privilege.

National Standard 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.

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

National Standard 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 by utilizing economic and social data… 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.

Compliance with these and other National standards is detailed in section 8.1

4.3 FMP HISTORY AND MANAGEMENT OBJECTIVES

Management of the MSB fisheries began through the implementation of three separate FMPs (one each for mackerel, squid, and butterfish) in 1978. The plans were merged in 1983. Over time a wide variety of management issues have been addressed including stock rebuilding, habitat conservation, bycatch minimization, and limiting participation in the fisheries. The history of the plan and its amendments can be found at http://www.mafmc.org/fisheries/fmp/msb.

The Council identified review of FMP goals and objectives via strategic planning in order to ensure that FMP goals and objectives remain relevant. The current MSB objectives have not been reviewed since the merged MSB plan was adopted in 1981. The Magnuson–Stevens Fishery Conservation and Management Act ("Magnuson-Stevens Act") has been amended several times since then, and the Council has also since adopted two Strategic Plans and an Ecosystem Approach to Fisheries Management (EAFM) Guidance Document (http://www.mafmc.org/eafm). Chub mackerel were also added to the FMP with specific goals and objectives that were informed by the EAFM Guidance Document. The EAFM goal is to manage for ecologically sustainable utilization of living marine resources while maintaining ecosystem productivity, structure, and function.

The goals and objectives are not alternatives in the traditional sense, but generally inform decision making, so the previous and updated goals and objectives are reviewed in this section rather than in the alternative section. There was near unanimous support throughout the various stages of development of this action to update the goals and objectives as described below.

The previous MSB FMP objectives were:

1. Enhance the probability of successful (i.e., the historical average) recruitment to the fisheries.

2. Promote the growth of the U.S. commercial fishery, including the fishery for export.

3. Provide the greatest degree of freedom and flexibility to all harvesters of these resources consistent with the attainment of the other objectives of this FMP.

4. Provide marine recreational fishing opportunities, recognizing the contribution of recreational fishing to the national economy.

5. Increase understanding of the conditions of the stocks and fisheries.

6. Minimize harvesting conflicts among U.S. commercial, U.S. recreational, and foreign fishermen.

The updated MSB FMP objectives developed through this action are:

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 socioeconomic impacts of management measures, including impacts to other fisheries.
>
> 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.

Public comments stated that this action may conflict with the new FMP Goals and Objectives. However, the Council has attempted to balance some of the trade-offs that are inherent and in fact anticipated in the Goals and Objectives, especially the Objectives within Goal 2; Objective 2.1

highlights freedom, flexibility, and minimizing additional restrictions, "consistent with attainment of the other objectives of this FMP." Objective 2.3 is "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." The Council is attempting to balance such social and economic needs, and has judged this to be a case where the "other objectives" do necessitate additional restrictions. The "operational flexibility" noted in Objective 2.2 has different meaning for different participants, and the Council is balancing the flexibility for some participants to diversify their revenue sources with the existing lack of flexibility for other participants, who are more dependent on *Illex,* to engage in other fisheries besides *Illex*, at least at some times of the year. One of the key tradeoffs involved in this action is that there will be some economic costs to vessels that do not requalify. This document analyzes those costs, which were also described in the public hearing documents, hearings, and meetings. Together with public comments, these analyses allowed the Council to account for present and historical participation as well as the other required considerations for limited access programs.

4.4 MANAGEMENT UNIT AND GEOGRAPHIC SCOPE

The management unit (fish stock definition) for *Illex* is all *Illex* under U.S. jurisdiction in the Northwest Atlantic, with a core fishery management area from Maine to North Carolina.

4.5 PROCESS

Development of this particular action began in late 2017 when the Council included "Capacity amendment for *Illex* squid" in the "Possible Additions" section of its 2018 Implementation Plan. The topic was specifically noticed in the Federal Register for the October 2018 meeting and discussed at that meeting regarding development of a scoping guide. A control date was previously noticed in the Federal Register in 2013, and subsequent GARFO permit renewal applications through the initiation of this action (scoping for which was also noticed in the Federal Register) highlighted the 2013 control date. The 2013 control date notification in the Federal Register stated that "NMFS intends this notice to promote awareness of possible rulemaking, alert interested parties of potential eligibility criteria for future access, and discourage speculative entry into and/or investment in the *Illex* squid fishery while the Council considers if and how access to the *Illex* squid fishery should be controlled." The Council reaffirmed the August 2, 2013, control date at its August 2018 Council meeting.

After scoping in January-February 2019, the Council developed a range of alternatives and associated analyses. The Council held hearings and accepted comments in March and April 2020 and selected preferred alternatives to recommend to NOAA Fisheries for approval and implementation at a July 2020 Council meeting (via webinar). NOAA Fisheries will publish a proposed rule along with this Environmental Assessment for public comment. After considering public comments on the proposed rule, NOAA Fisheries will publish a final rule with implementation details if the Amendment is approved by NOAA Fisheries.

All actions are potential until implemented by NOAA Fisheries. This document explains the potential actions and examines their potential impacts. The preferred alternatives are expected to result in positive benefits to the nation by maintaining the sustainability of the resources, facilitating optimum yield (i.e.,

fully harvesting available quotas), and taking into account the importance of the *Illex* fishery resource to fishing communities.

From a National Environmental Policy Act (NEPA) perspective, this action should not result in significant impacts on valued ecological components. 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 and this document constitutes an Environmental Assessment (EA) to satisfy the impact analysis requirements of NEPA. This review was conducted in the context of the 1978 CEQ NEPA Regulations. NEPA reviews initiated prior to the effective date of the updated 2020 CEQ NEPA regulations may be conducted using the 1978 version of the regulations. The effective date of the 2020 CEQ NEPA Regulations was September 14, 2020. Since the Council took final action and the development of this review began before that date, this EA was created within the context of the 1978 CEQ NEPA Regulations.

5.0 WHAT ALTERNATIVES ARE CONSIDERED IN THIS DOCUMENT?

This section describes the alternatives. Detailed analyses of the potential effects of the alternatives are included in Section 7. For all alternatives, only vessels that currently have moratorium permits could potentially requalify. Different alternatives would remove different numbers of latent or formerly latent permits. All discussions regarding predicted numbers of qualifiers are preliminary based on data in NMFS databases at the time of analysis. During actions when landings are used for a permit qualification, the final number of qualifiers may be different due to corrections made to databases during appeals processes.

5.1 ALTERNATIVE 1: "No Action, Keep Status Quo Management"

No action would be taken to modify the current *Illex* moratorium permitting system. The current approximately 74 moratorium permits would maintain their permits as they currently exist. All other *Illex* measures would also persist, including the absence of trip limits for moratorium permits until the fishery closes, at which point moratorium permits switch to a 10,000-pound trip limit (with only one landing per day). With incidental permits, which are open-access, a vessel may not fish for, possess, or land more than 10,000 pounds of *Illex* squid per trip at any time, and may only land *Illex* squid once on any calendar day. With this alternative, analyses (further discussed in Section 7) indicate that the fishery would have substantial excess capacity relative to current quotas, even if just making similar numbers of trips per vessel as vessels made in 2019.

5.2 ALTERNATIVE 2: "50,000 pounds 1997-2019"

Under Alternative 2, only those current moratorium permits that had history documenting at least 50,000 pounds of *Illex* in at least any one year from 1997-2019 would maintain their moratorium permit. Requalifying permits would have to obtain a baseline measurement of their vessel fish hold volume and be subject to a 10% upgrade restriction on vessel fish hold volume[2]. Requalifying permits would be required to report daily catch reporting of *Illex* via Vessel Monitoring Systems (VMS). Landings analyses indicate that approximately 51 of the current moratorium permits would requalify, so approximately 24 would not requalify. For those 24, they would only be eligible for the above-described open-access permit. With this alternative, analyses (further discussed in Section 7) indicate

[2] Hold volume details (applies to alternatives 2-5): vessels would be required to obtain a fish hold measurement from an individual credentialed as a Certified Marine Surveyor with a fishing specialty by the National Association of Marine Surveyors (NAMS) or from an individual credentialed as an Accredited Marine Surveyor with a fishing specialty by the Society of Accredited Marine Surveyors (SAMS). Vessels that are upgraded or used as replacement vessels would have to be resurveyed by a surveyor (accredited as above) unless the replacement vessel already had an appropriate certification and the documentation would have to be submitted to NMFS. Vessels that are sealed by the Maine State Sealer of Weights and Measures will also be deemed to meet this requirement. The hold capacity measurement would serve as another permit baseline in addition to existing vessel length and horsepower baselines. The fish hold baseline would be established by the vessel issued the *Illex* limited access permit at the time this action becomes effective, if approved, or by the first replacement vessel in excess of 25 feet length overall. The fish hold volume could be increased by up to 10 percent of the MRI's baseline hold measurement, whether through refitting or vessel replacement. For vessels that are also issued an Atlantic Mackerel Tier 1 or 2 permit and have previously established a fish hold baseline, existing hold measurements and baseline from the mackerel permit could be used if the *Illex* permit is issued to the same vessel that established the mackerel fish hold baseline.

that the fishery would have more than sufficient capacity to harvest the current quota, even if making similar numbers of trips per vessel as vessels made in 2019.

Rationale: This option is included so that a reasonable range of options is considered. Of the options in this document besides taking "no-action," this alternative would requalify the most vessels as it uses a low landings threshold relative to the high volume nature of the fishery. Counting recent landings also facilitates consideration of current/recent participation in the fishery. The volumetric baseline and upgrade restriction is designed to help freeze the footprint of the fishery's physical capacity, and the VMS reporting measure clarifies ambiguity in current regulations that are designed to assist quota monitoring.

The capacity of the vessels that would qualify under this requalification criteria was estimated by this action's FMAT to be 58,526 MT. This total capacity estimate was based on a static number of trips (i.e. the number of trips each vessel took was held equal to 2019 levels), and a physical definition of capacity. For vessels that were not active in 2019, their capacity scores are taken from the average per vessel trip capacity for their vessel type in 2019 vessels, and the average number of trips that those vessel types took in 2019. The physical capacity estimates are based on the fixed vessel attributes, which in this case are length, horsepower, tonnage and hold capacity. The model used for this estimate has been used worldwide by the FAO, and also NMFS, to estimate vessel capacity. If trips increased, so would the capacity estimates. Accordingly, the resulting fleet would have more than sufficient capacity to achieve optimum yield.

The figure below describes annual *Illex* dependency relative to all revenues for Alternative 2. Dependence on *Illex* revenues for **non**-requalifiers is on the **left** and for ***requalifiers*** is on the ***right***. The blue numbers for each year show the MRIs that had at least some revenues (any species) in each year. For example there are 51 requalifiers in this option but in 2019 only 46 had some revenues from any species ("C"). The median of active MRIs' *Illex* dependence is represented by a black horizontal line (e.g. "A"). If the median is zero (or close to zero) in a year it will not be visible. The solid bars indicate the typical (i.e. the middle 50% group) MRIs' dependence on *Illex* revenues. This is called the interquartile range (IQR). If no bar is visible then that middle group's dependence is at or near zero for that year. The vertical lines or "whiskers" extend to an observation about 1.5 times the IQR to highlight outliers (the dots) even further out. This boxplot (Figure below) shows that for Alternative 1 there are no non-requalifiers with any substantial ongoing dependence on *Illex* (note the nearly empty left side). There is a wide range of dependencies for the 51 requalifying MRIs on the right side. In 2019, the median dependency on *Illex* by requalifiers (far right) was about 30% ("A") and the typical MRIs (middle 50% of MRIs) ranged from 0% dependence to about 50% dependence ("Bs") but at least one had about 100% dependence on *Illex* (the top of the vertical line near "C").

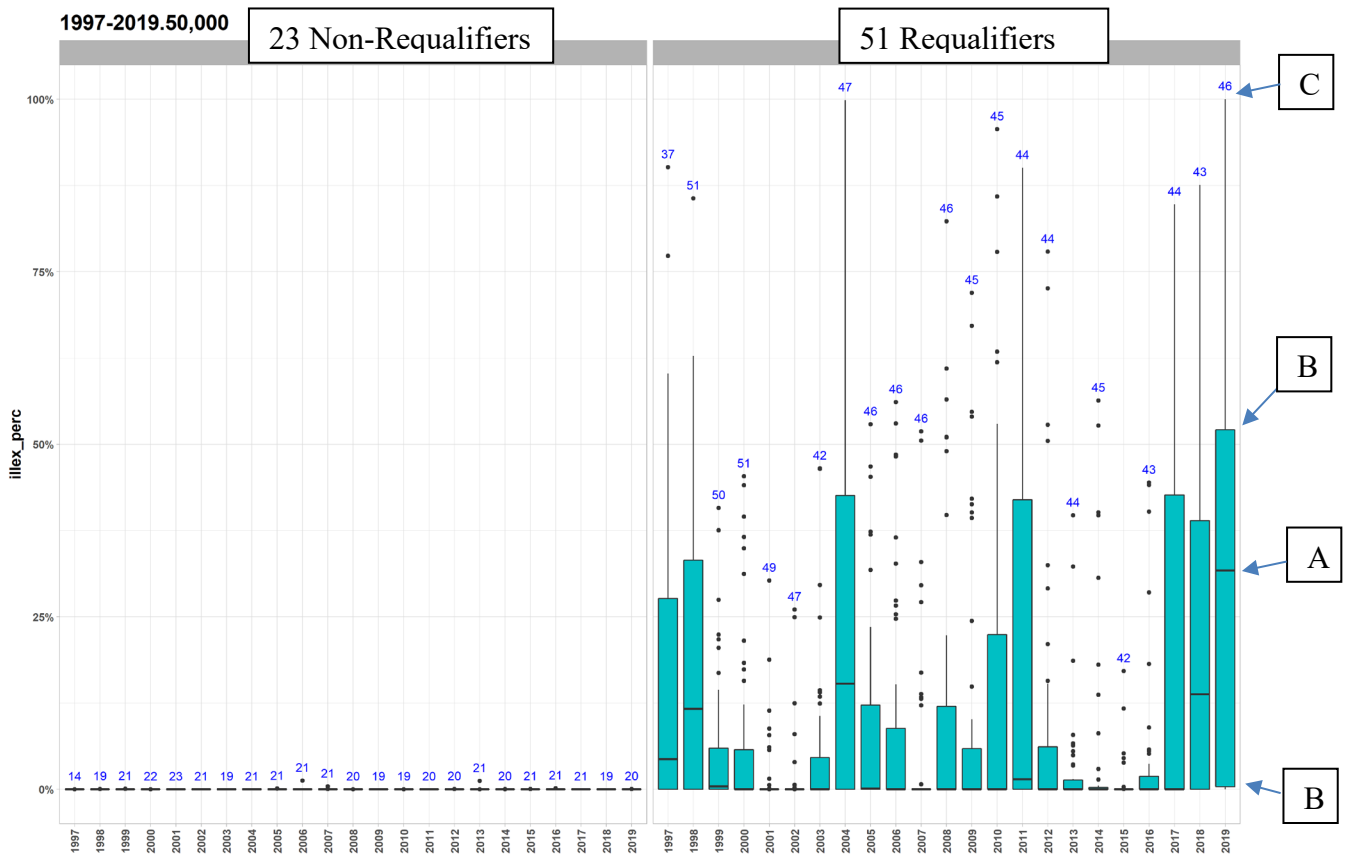


Figure 1. MRI *Illex* Revenue Dependencies for Alternative 2
Bar is the interquartile (middle) range (IQR); black horizontal line is the median; vertical lines extend to observations near 1.5 * IQR; outliers are dots.

The figure below demonstrates that for this option, non-requalifiers as a group have very little revenue from *Illex* (top red component), matching the MRI-level analysis above. Most of their revenues in recent years came from scallops (bottom blue component). For re-qualifiers, in addition to *Illex*, scallops and longfin squid (middle orange component) are major contributions.

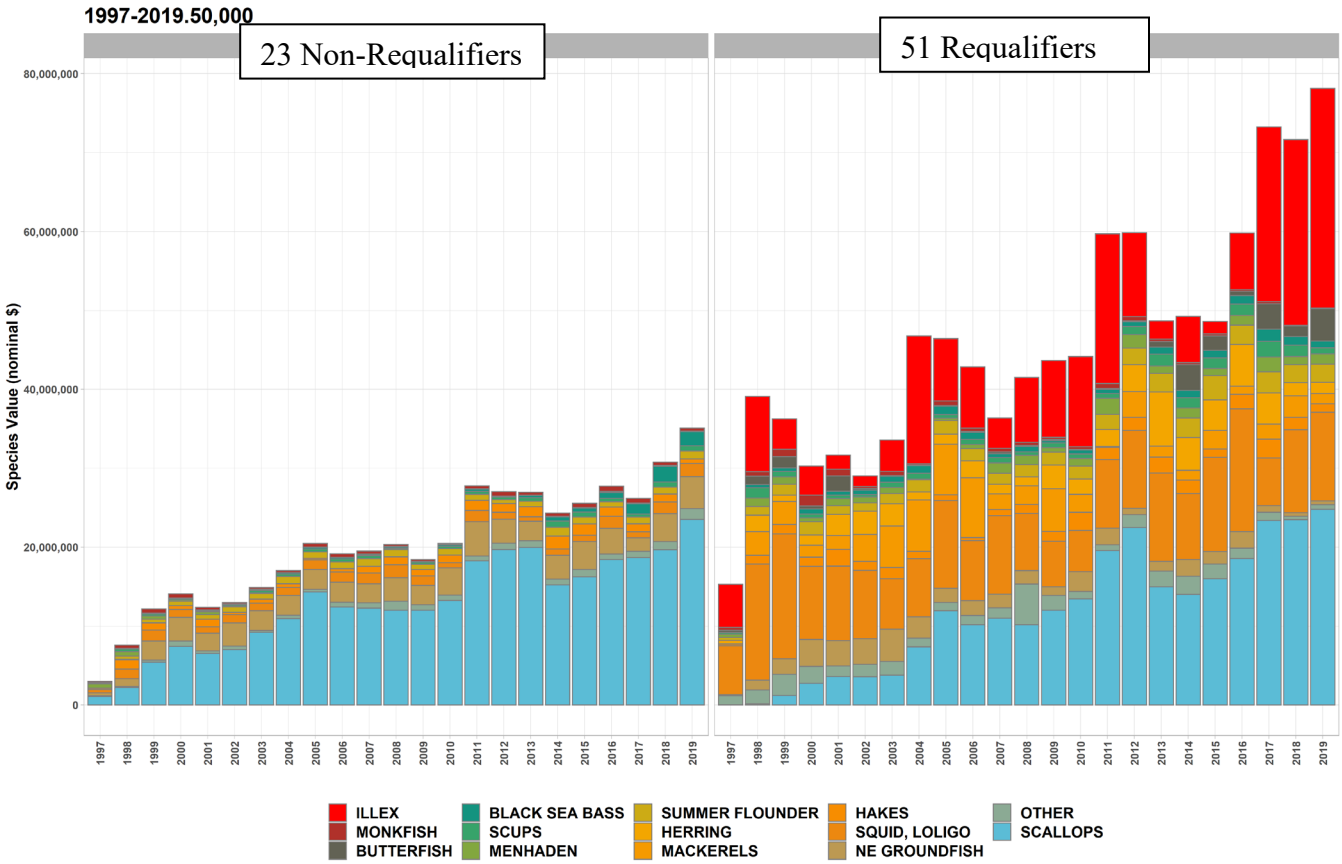


Figure 2. Species revenues, by year, for Alternative 2 .Species in the top 10 for any year are included.

Depending on the MRI and the MRI's permit suite, possession of other permits may allow participation in other fisheries, which is a required consideration for limited access systems. The figures below provide information on permits that the FMAT determined might be most relevant – some permits such as spiny dogfish and tilefish have been omitted. Counts of MRIs that have the permit are shaded black, and counts of MRIs that do not have the permit are shaded grey. The figure below reflects the other permits held by non-requalifiers and requalifiers for this alternative. Inactive permits currently in confirmation of permit history are not included in this analysis so not quite all 2019 *Illex* MRIs are included.

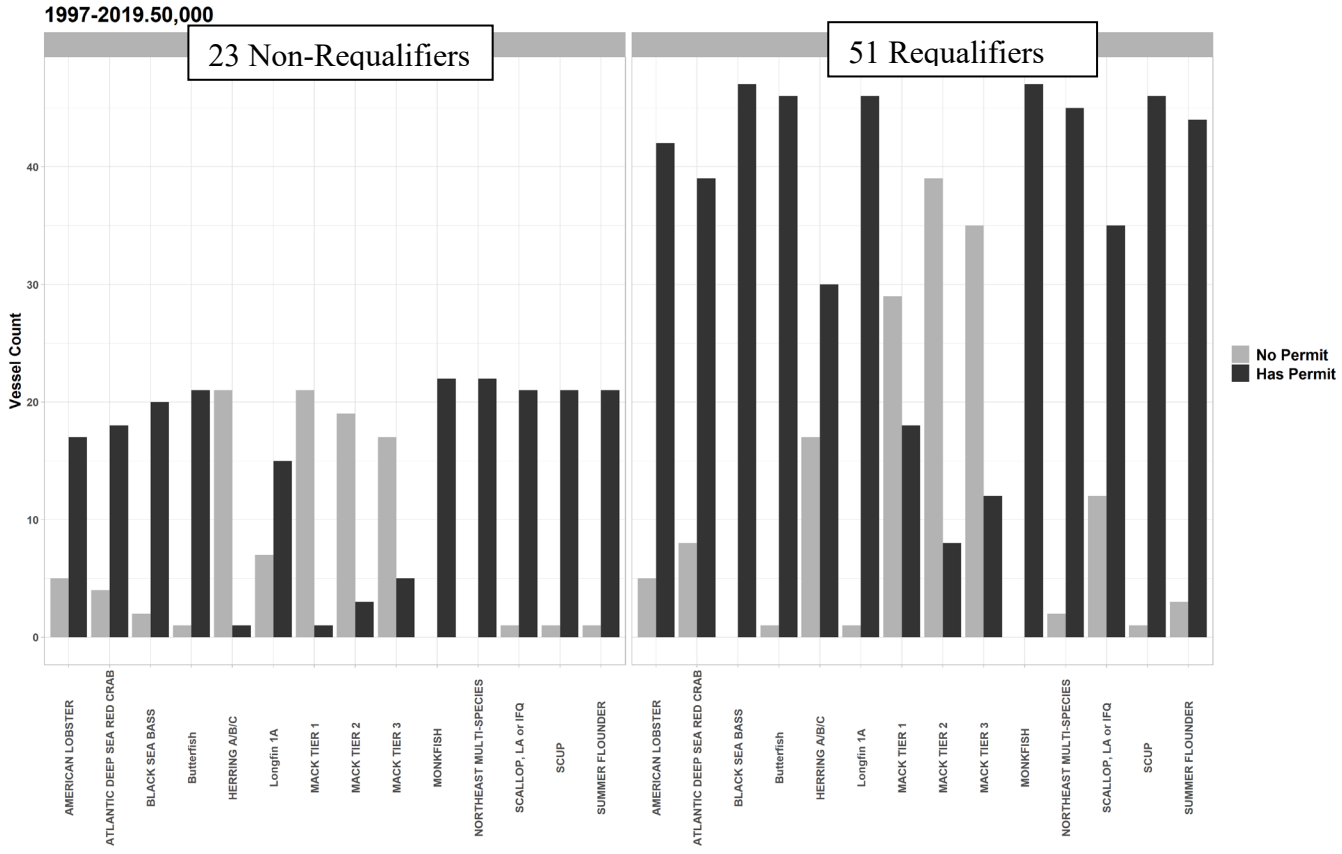


Figure 3. Permit distributions under Alternative 2.

5.3 ALTERNATIVE 3: "1,000,000 pounds twice, both early and late"

Under Alternative 3, only those current moratorium permits that had history documenting at least 1,000,000 pounds of *Illex* in at least any one year from 1997-2013 ***and also*** 1,000,000 pounds of *Illex* in at least any one year from 2014-2019 would maintain their moratorium permit. Requalifying permits would have to obtain a baseline measurement of their vessel fish hold volume and be subject to a 10% upgrade restriction on vessel fish hold volume. Requalifying permits would be required to report daily catch reporting of *Illex* via Vessel Monitoring Systems (VMS). Landings analyses indicate that approximately 13 of the current moratorium permits would requalify, so approximately 61 would not

requalify. For those 61, they would only be eligible for the above-described open-access permit. With this alternative, analyses (further discussed in Section 7) indicate that the fishery would have the capacity to harvest the current quota, even if making similar numbers of trips per vessel as vessels made in 2019.

Rationale: This option is included so that a reasonable range of options is considered. Of the options in this document, this alternative would requalify the fewest vessels as it uses a high threshold and also requires that high threshold to occur in both of the earlier and later time periods. The volumetric baseline and upgrade restriction is designed to help freeze the footprint of the fishery's physical capacity, and the VMS reporting measure clarifies ambiguity in current regulations that are designed to assist quota monitoring.

The capacity of the vessels that would qualify under this requalification criteria was estimated by this action's FMAT to be 29,574 MT. This total capacity estimate was based on a static number of trips (i.e. the number of trips each vessel took was held equal to 2019 levels), and a physical definition of capacity. For vessels that were not active in 2019, their capacity scores are taken from the average per vessel trip capacity for their vessel type in 2019 vessels, and the average number of trips that those vessel types took in 2019. The physical capacity estimates are based on the fixed vessel attributes, which in this case are length, horsepower, tonnage and hold capacity. The model used for this estimate has been used worldwide by the FAO, and also NMFS, to estimate vessel capacity. If trips increased, so would the capacity estimates. Accordingly, the resulting fleet would have sufficient capacity to achieve optimum yield during years when the resource is available for an extended period of time. However, during a short season, it is possible that the substantial participant reductions involved in this action could hinder achieving optimum yield.

Alternative 3 requalifies the fewest (13) MRIs. While in most years most non-requalifiers (left side) still had relatively little dependence on *Illex* (the bars representing the middle group of vessels are on or near zero in most years), there are some years where the range of the bars (representing the middle 50% of MRIs) extends beyond 10% dependence (including in 2019 which was above 25%), and there are numerous outliers in nearly every year, indicating ongoing participation but not enough to requalify under this option. There is a wide range of dependencies for the 13 requalifiers, and the requalifying MRIs tend to have relatively high dependencies in *Illex* compared to other alternatives.

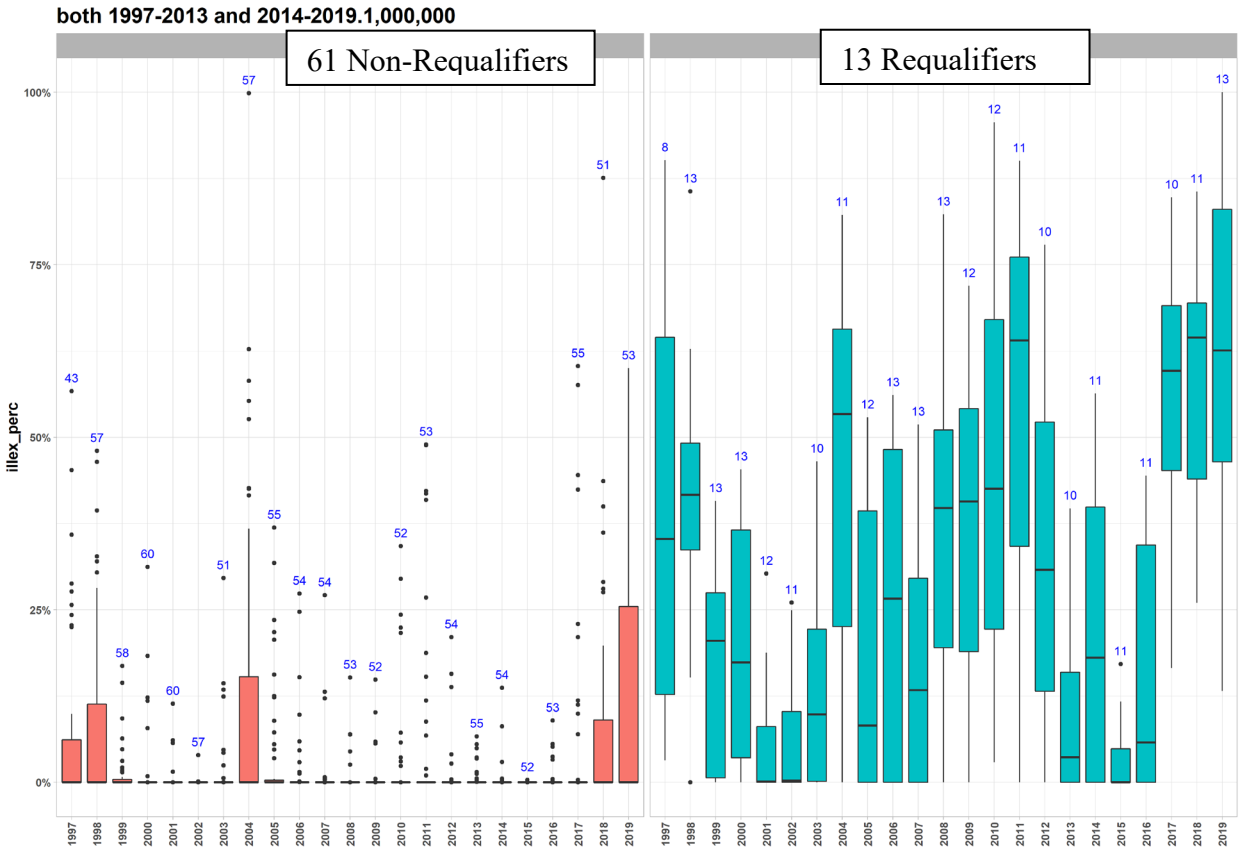


Figure 4. MRI *Illex* Revenue Dependencies for Alternative 3.

Bar is the interquartile (middle) range (IQR); black horizontal line is the median; vertical lines extend to observations near 1.5 * IQR; outliers are dots.

For Alternative 3, *Illex* contributes more for the non-requalifiers revenues as a group than any other alternative, but is still a relatively small portion. Scallops remain the dominant revenue source in recent years for non-requalifiers. For the few (13) requalifiers in this group, *Illex* frequently contributes more to total revenues than other individual species. For requalifiers, total revenues are lower as would be expected with so few MRIs in the requalifying group.

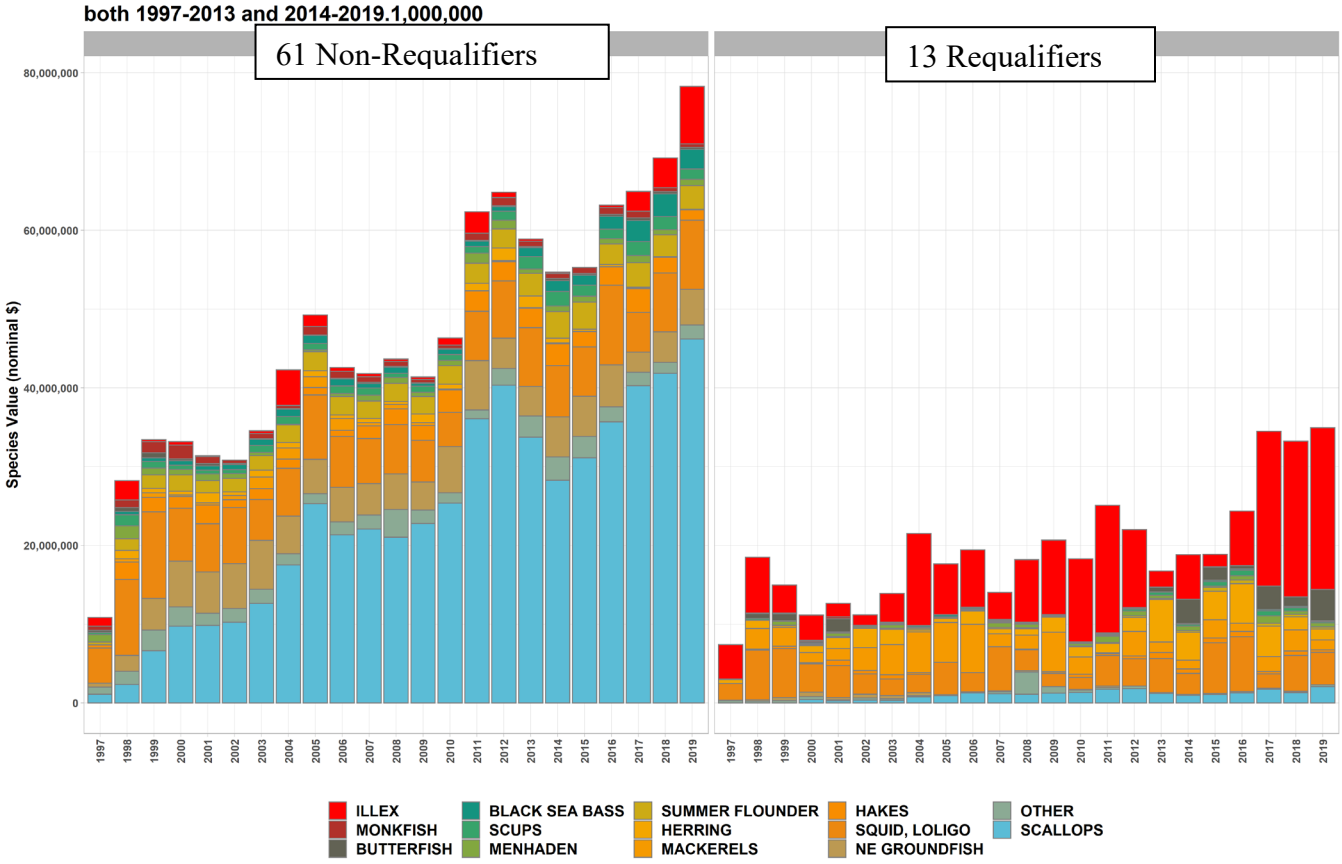


Figure 5. Species revenues, by year, for Alternative 3. Species in the top 10 for any year are included.

Depending on the MRI and the MRI's permit suite, possession of other permits may allow participation in other fisheries, which is a required consideration for limited access systems. The figures below provide information on permits that the FMAT determined might be most relevant – some permits such as spiny dogfish and tilefish have been omitted. Counts of MRIs that have the permit are shaded black, and counts of MRIs that do not have the permit are shaded grey. The figure below reflects the other permits held by non-requalifiers and requalifiers for this alternative. Inactive permits currently in confirmation of permit history are not included in this analysis so not quite all 2019 *Illex* MRIs are included.

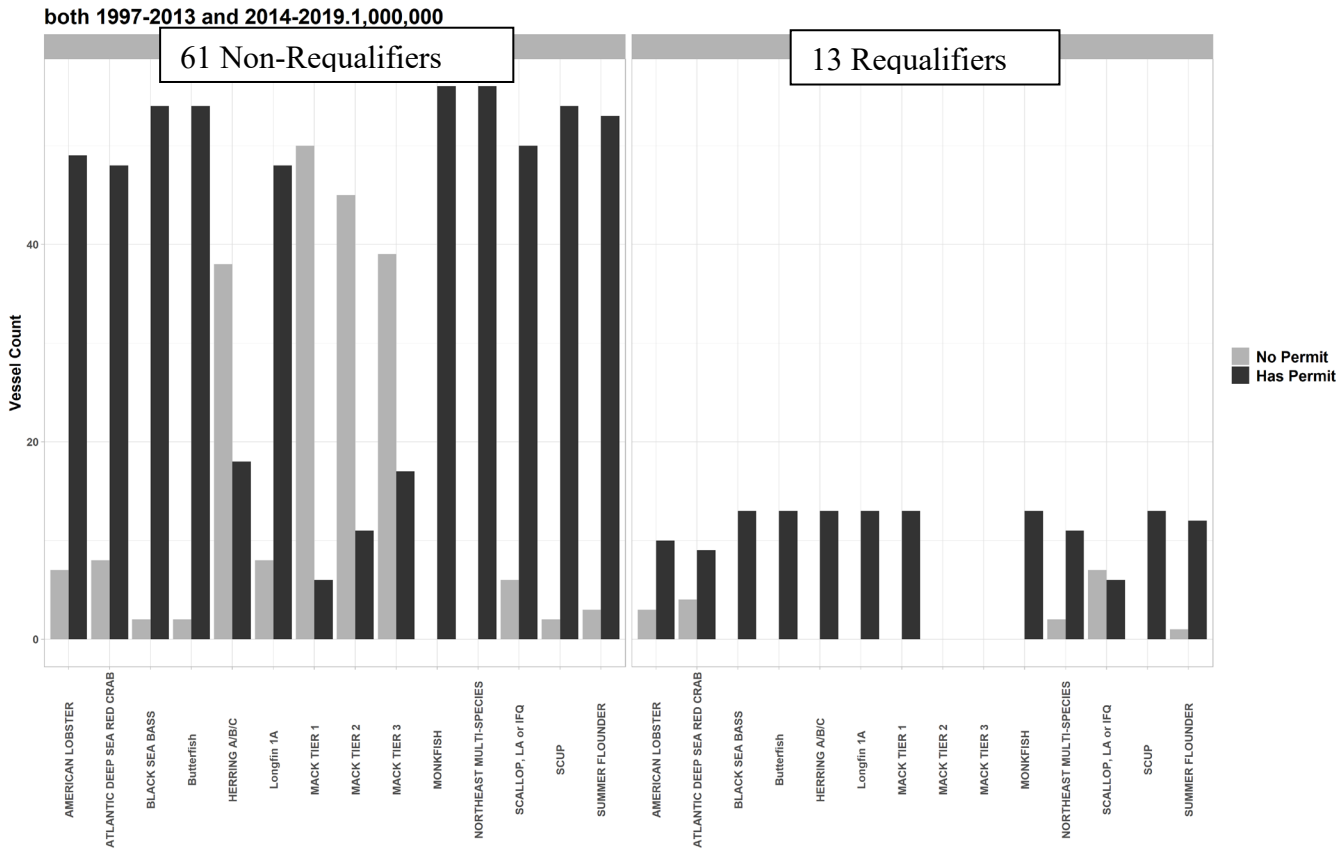


Figure 6. Permit distributions under Alternative 3.

5.4 ALTERNATIVE 4 (Preferred): "Tier 1 Stops at 2013"

Under Alternative 4, a Tiered system would be created. The proposed tiers, qualification criteria, and trip limits are described in the table below for current moratorium permits. Only current moratorium permits can requalify.

Table 2. Summary of Alternative 4 (Preferred)

Tier	Qualification Criteria	Trip Limit	Approximate Qualifying Vessels
1	Either: Landed at least 500,000 pounds *Illex* in at least one year between 1997 and 2013, or Purchased and installed a refrigerated seawater system, plate freezing system, or blast freezer between January 1, 2012 and August 2, 2013 and landed a minimum of 200,000 pounds of *Illex* in the 2013 fishing year	None	35
2	Landed at least 100,000 pounds *Illex* in one year between 1997 and 2018	62,000 pounds	13
3	Landed at least 50,000 pounds *Illex* in one year between 1997 and 2018	20,000 pounds	2

Approximately 24 vessels would not requalify, and would only be eligible for the above-described open-access permit. However 26 would not qualify for a Tier 1 or Tier 2 permit, which have the greatest potential to continue to higher landings and are included in capacity estimates. The trip limit for Tier 2 should also constrain that Tier from substantially increasing landings compared to recent years. With this alternative, analyses (further discussed in Section 7) indicate that the fishery would have more than sufficient capacity to harvest the current quota , even if making similar numbers of trips per vessel as vessels made in 2019. It is not possible to exactly specify how many vessels would use the provision to qualify based on a 2013 equipment installation, but it is unlikely to be more than a couple. Requalifying Tier 1 permits would have to obtain a baseline measurement of their vessel fish hold volume and be subject to a 10% upgrade restriction on vessel fish hold volume. Requalifying permits would be required to report daily catch reporting of *Illex* via Vessel Monitoring Systems (VMS).

The 62,000 pound threshold was based on the median of only directed trips (i.e. only including trips over 10,000 pounds) by the relevant vessels in Tier 2 over 2017-2019. This was picked so that the trip limit was reflective of directed trips by these vessels during the time when they began to be active in the fishery and so that present participation could be considered and accounted for.

Rationale: This is the preferred alternative. The Council acknowledged that this action would have positive and negative economic consequences for some fishery participants but ultimately concluded that Alternative 4 best balances the needs of historic participants, present participants, and dependent fishing communities when considering the provisions of the MSA and guiding National Standards (see sections 4.2 and 8.1 for detailed discussions). Of the options in this document, this alternative would requalify a middle range of vessels – other alternatives requalify more or less vessels. The volumetric

baseline and upgrade restriction is designed to help freeze the footprint of the fishery's physical capacity, and the VMS reporting measure clarifies ambiguity in current regulations that are designed to assist quota monitoring. The provision to qualify with a 200,000-pound 2013 landing if new equipment had recently been installed allows accounting for vessel upgrades occurring right around the control date.

The capacity of the vessels that would qualify under this requalification criteria was estimated by this action's FMAT to be 56,128 MT. This total capacity estimate was based on a static number of trips (i.e. the number of trips each vessel took was held equal to 2019 levels), and a physical definition of capacity. For vessels that were not active in 2019, their capacity scores are taken from the average per vessel trip capacity for their vessel type in 2019 vessels, and the average number of trips that those vessel types took in 2019. The physical capacity estimates are based on the fixed vessel attributes, which in this case are length, horsepower, tonnage and hold capacity. The model used for this estimate has been used worldwide by the FAO, and also NMFS, to estimate vessel capacity. If trips increased, so would the capacity estimates. Accordingly, the resulting fleet would have more than sufficient capacity to achieve optimum yield.

For Tier 2, there is more activity, especially in recent years (again see figure below). The impacts on those vessels are considered in the context of the proposed 62,000 pound trip limit in Section 7.

Tier 3/Incidental Tier 2 Tier 1

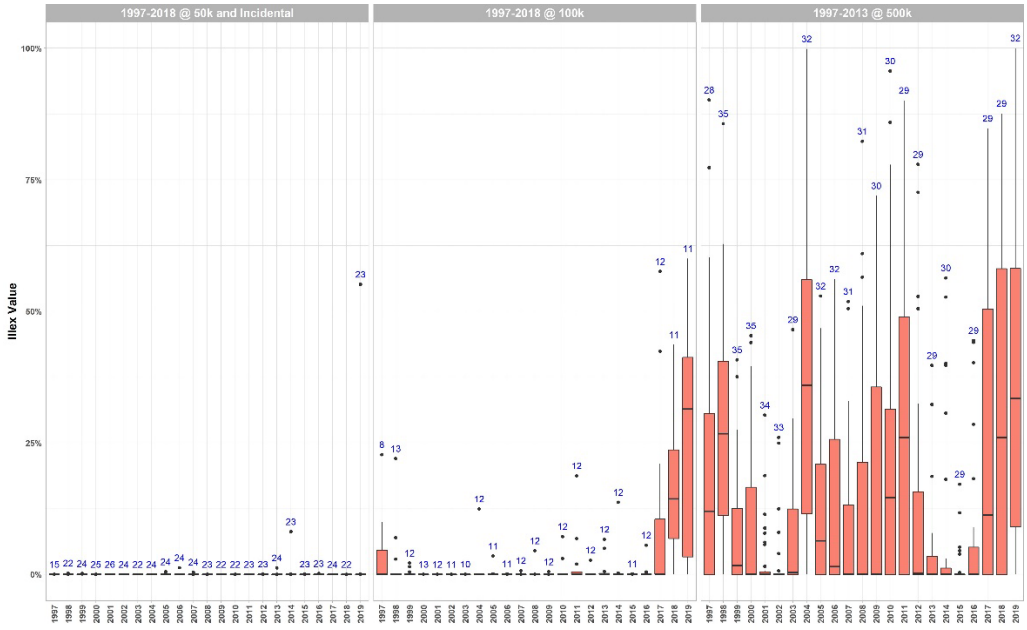


Figure 7. MRI *Illex* Revenue Dependencies For Alternative #4.
(Bar is the interquartile (middle) range (IQR); black horizontal line is the median; vertical lines extend to observations near 1.5 * IQR; outliers are dots; numbers are count of vessels with some revenues)

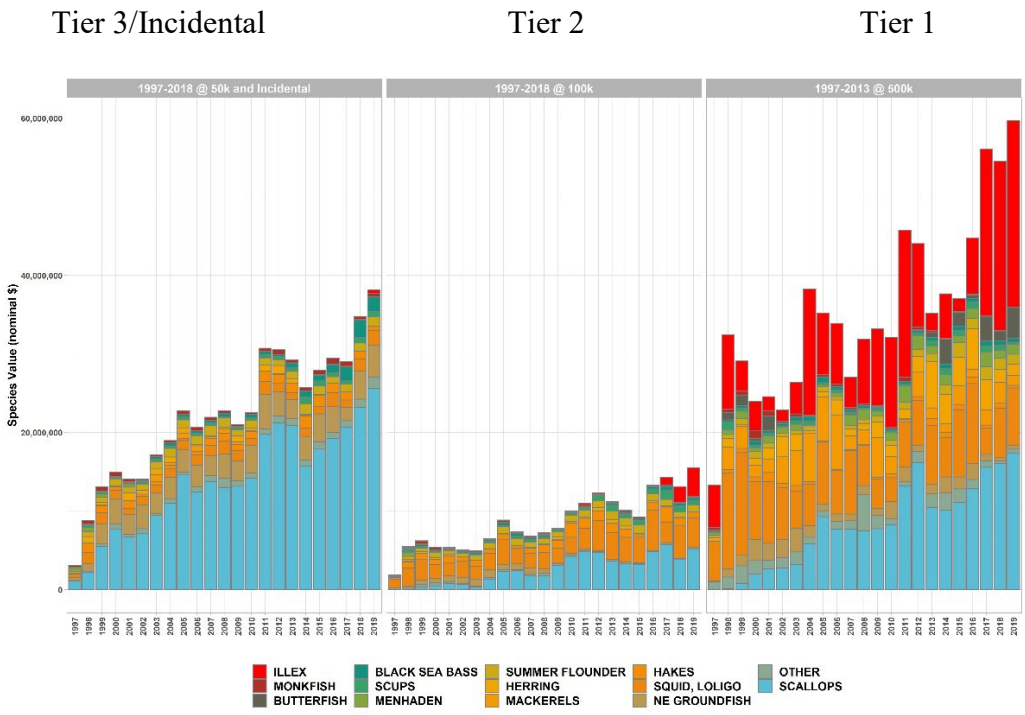


Figure 8. Species revenues, by year, for Alternative 4. Species in the top 10 for any year are included.

The figure above reinforces that most revenues from Tier 2 and 3 come from other species, though the increases in revenues from *Illex* in the most recent years are evident.

Depending on the MRI and the MRI's permit suite, possession of other permits may allow participation in other fisheries, which is a required consideration for limited access systems. The figures below provide information on permits that the FMAT determined might be most relevant – some permits such as spiny dogfish and tilefish have been omitted. Counts of MRIs that have the permit are shaded black, and counts of MRIs that do not have the permit are shaded grey. The figure below reflects the other permits held by non-requalifiers and requalifiers for this alternative. Inactive permits currently in confirmation of permit history are not included in this analysis so not quite all 2019 *Illex* MRIs are included.

Tier 3/Incidental --Tier 2 -- Tier 1

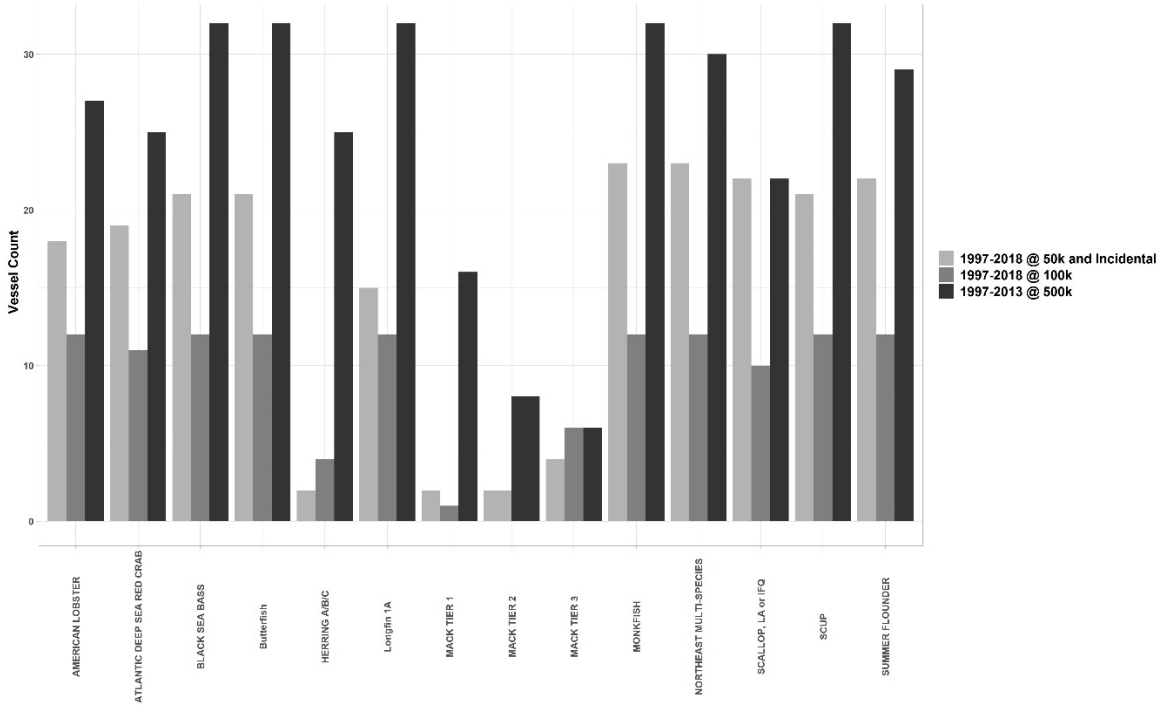


Figure 9. Permit distributions under Alternative 4.

5.5 ALTERNATIVE 5: "Tier 1 qualification extends to 2019 with higher landings"

Under Alternative 5, a Tiered system would be created. The proposed tiers, qualification criteria, and trip limits are described in the table below for requalifying vessels that currently have moratorium permits.

Table 3. Summary of Alternative 5

Tier	Qualification Criteria	Trip Limit	Approximate Qualifying Vessels
1	Either: Landed at least 500,000 pounds *Illex* in at least one year between 1997 and 2013, or Landed at least 1,000,000 pounds *Illex* in at least one year between 2014 and 2019	None	42
2	Landed at least 100,000 pounds *Illex* in one year between 1997 and 2019	90,000 pounds	7
3	Landed at least 50,000 pounds *Illex* in one year between 1997 and 2018	47,000 pounds	2

Approximately 23 vessels would not requalify, and would only be eligible for the above-described open-access permit. However 25 would not qualify for a Tier 1 or Tier 2 permit, which have the greatest potential to continue to higher landings given the trip limits and are included in capacity estimates. Tiered vessels in this alternative would generally be able to operate has they have in recent years, but would be constrained from further increases. With this alternative, analyses (further discussed in Section 7) indicate that the fishery would have more than sufficient capacity to harvest the current quota even if making similar numbers of trips per vessel as vessels made in 2019. Requalifying Tier 1 permits would have to obtain a baseline measurement of their vessel fish hold volume and be subject to a 10% upgrade restriction on vessel fish hold volume. Requalifying permits would be required to report daily catch reporting of *Illex* via Vessel Monitoring Systems (VMS).

Rationale: This option is included so that a reasonable range of options is considered. Of the options in this document, this alternative would requalify a middle range of vessels – other alternatives requalify more or less vessels. This alternative allows consideration of more current landings. The volumetric baseline and upgrade restriction is designed to help freeze the footprint of the fishery's physical capacity, and the VMS reporting measure clarifies ambiguity in current regulations that are designed to assist quota monitoring.

The capacity of the vessels that would qualify under this requalification criteria was estimated by this action's FMAT to be 57,803 MT. This total capacity estimate was based on a static number of trips (i.e. the number of trips each vessel took was held equal to 2019 levels), and a physical definition of capacity. For vessels that were not active in 2019, their capacity scores are taken from the average per vessel trip capacity for their vessel type in 2019 vessels, and the average number of trips that those vessel types took in 2019. The physical capacity estimates are based on the fixed vessel attributes, which in this case are length, horsepower, tonnage and hold capacity. The model used for this estimate

has been used worldwide by the FAO, and also NMFS, to estimate vessel capacity. If trips increased, so would the capacity estimates. Accordingly, the resulting fleet would have more than sufficient capacity to achieve optimum yield.

For Tier 2, there is more activity, especially in recent years (again see figure below). The impacts on those vessels were considered in the context of the proposed 90,000 pound trip limit. This trip limit was based on the upper range of observed trips by vessels that would be in this Tier. Overall for alternative #5 (7 vessels), if 2015-2019 trips over the proposed 90,000-pound trip limit were limited to 90,000 pounds, the revenue loss represented a negligible portion of total combined revenues for these vessels. One vessel would have had losses in one year (2018) that amounted to less than 1% of their total 2018 revenues.

Tier 3/Incidental Tier 2 Tier 1

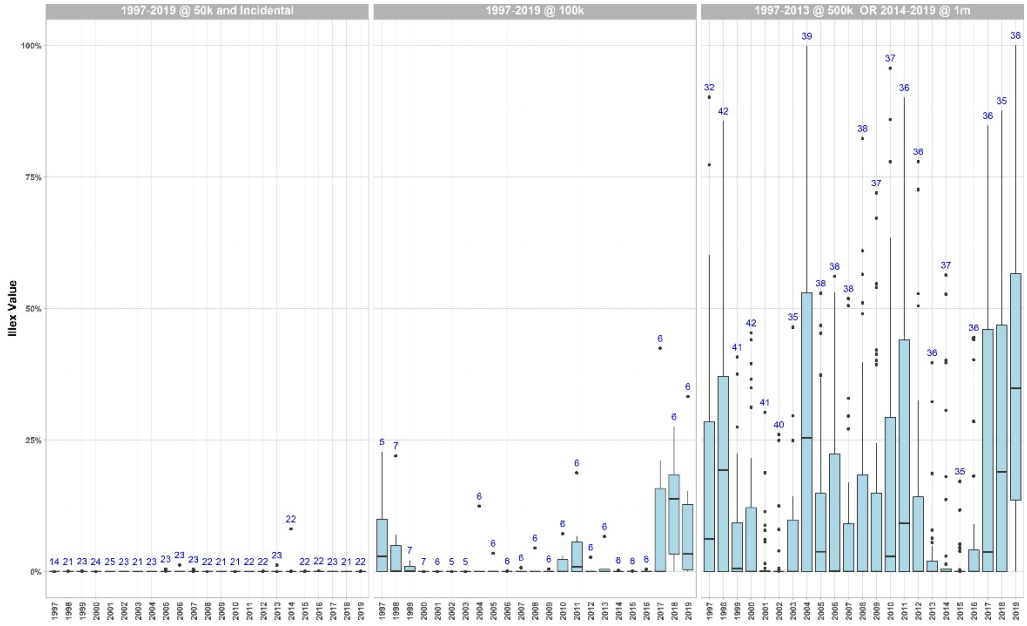


Figure 10. MRI *Illex* Revenue Dependencies For Committee Tier #5 Alternative.
(Bar is the interquartile (middle) range (IQR); black horizontal line is the median; vertical lines extend to observations near 1.5 * IQR; outliers are dots; numbers are count of vessels with some revenues)

Tier 3/Incidental Tier 2 Tier 1

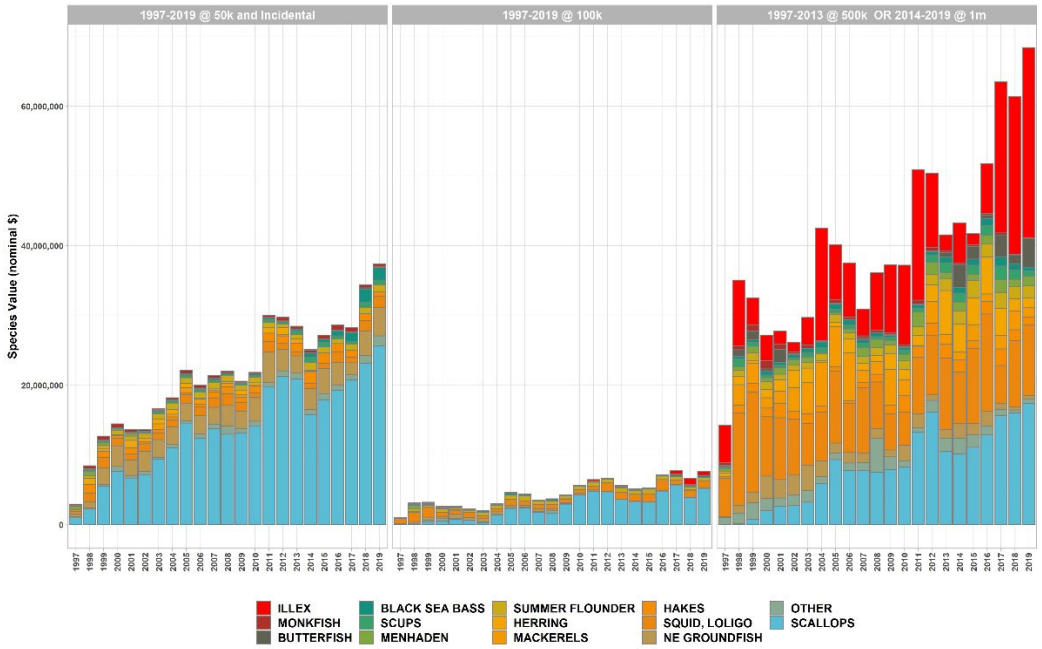


Figure 11. Species revenues, by year, for Alternative 5. Species in the top 10 for any year are included.

The figure above reinforces that most revenues from Tier 2 and 3 come from other species.

Depending on the MRI and the MRI's permit suite, possession of other permits may allow participation in other fisheries, which is a required consideration for limited access systems. The figures below provide information on permits that the FMAT determined might be most relevant – some permits such as spiny dogfish and tilefish have been omitted. Counts of MRIs that have the permit are shaded black, and counts of MRIs that do not have the permit are shaded grey. The figure below reflects the other permits held by non-requalifiers and requalifiers for this alternative. Inactive permits currently in confirmation of permit history are not included in this analysis so not quite all 2019 *Illex* MRIs are included.

Tier 3/Incidental --Tier 2 -- Tier 1

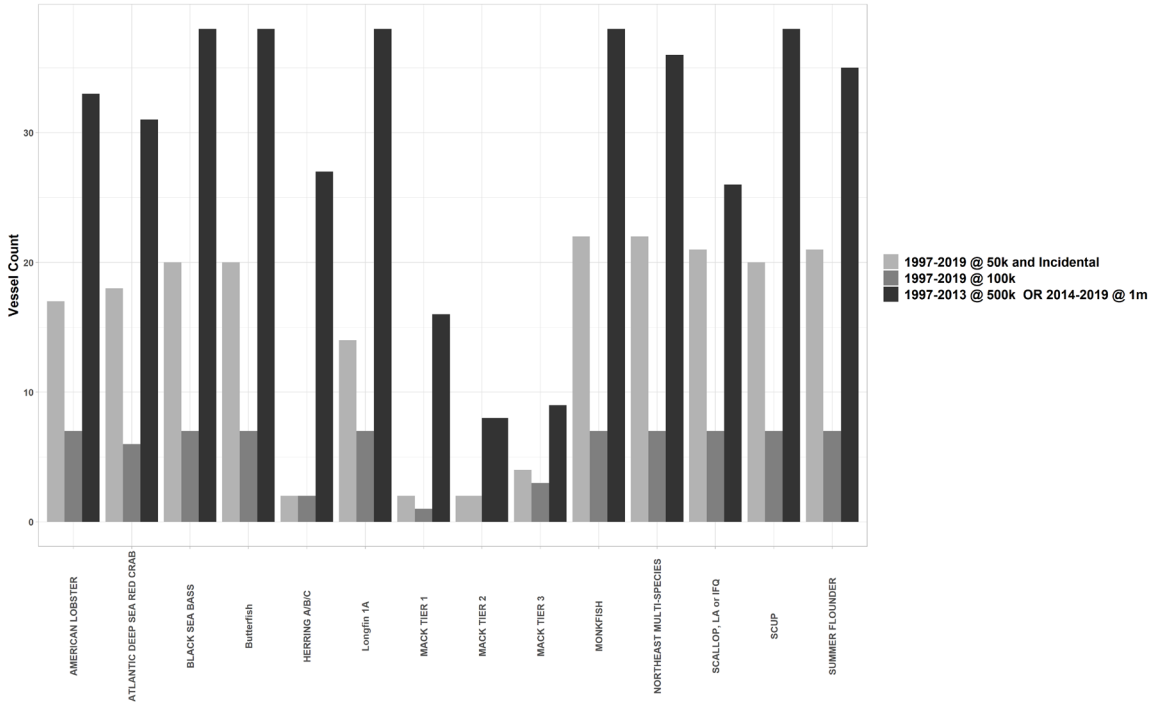


Figure 12. Permit distributions under Alternative 5.

5.6 CONSIDERED BUT REJECTED FROM FURTHER ANALYSIS

The Council considered the possibility of implementing a "catch share" or limited access privilege program early in the development process, but very few scoping comments supported moving forward with such measures. The Council presented a matrix of many options of years and thresholds in the public hearing document. The full range of those options is presented in Appendix A. The alternatives carried forward for analysis in this EA fully cover the range of alternatives described in the public hearing document.

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 and non-target species. Because the effects of this action are strongly focused on *Illex*, primarily *Illex* is described in detail in this document. The recent EA for 2021 MSB specifications (MAFMC 2021) and the recent EA for initiation of management of chub mackerel (MAFMC 2020) can be consulted for details on the other species (Atlantic mackerel, chub mackerel, butterfish, and longfin squid) managed by this FMP.
2. Habitat including EFH for the managed resources and non-target species
3. Endangered and other protected resources
4. Human communities

The affected environment consists of those physical, biological, and human components of the environment that are or will be meaningfully connected to *Illex* fishing (predominantly commercial), and are described below. Overviews of the managed species and of the physical environment are described 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 AND NON TARGET FISH SPECIES

***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. However, a working group created by the Council developed a series of analyses, and after a holistic review the SSC determined that catches up to 30,000 mt are currently unlikely to cause overfishing. Analyses conducted by the working group indicated that fishing activity from 2000-2018 occurred in at most 2-10% of the available shelf habitat occupied by *Illex* squid. An analysis of VMS data, together with assumptions regarding gear efficiency, potential depletion thresholds, and the relative densities of squid in fished and unfished areas suggested that credible ranges of seasonal fishing mortality rates on squid that vary by about 30-fold, ranging from F~0.01 – 0.3 with a values <F=0.1 being most likely. A review of the life history of *Illex* also suggested that it is likely highly resilient to low levels of exploitation because of the presence of multiple cohorts, batch spawning, and higher fecundity than originally estimated. (MAFMC SSC 2020). A research track assessment (RTA) has begun, but even if it successfully develops information on the status of the *Illex* stock and its productivity, this RTA will not be available for use for management until the summer of 2022.

Mackerel

Unless noted, 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 most recent assessment model, the status of Mackerel is overfished with overfishing occurring (NEFSC 2018), and a rebuilding program is underway (MAFMC 2019) with a target rebuilding date of 2023. A planned 2021 update of the assessment using data through 2019 is underway, and will inform future management.

Butterfish

Unless noted, 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. 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; recruitment has been low in recent years. If recruitment returns to average levels, then the stock is predicted to build to the target biomass quickly. The MSY biomass is 42,247 mt, and the MSY is 31,136 mt.

Longfin Squid

Unless noted, 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. 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, while not an accepted fishing mortality reference, was near the long term median.

Chub Mackerel

Unless noted, the information on chub mackerel is from Amendment 21 to the MSB FMP (https://www.mafmc.org/msb), which became effective in 2020.

Atlantic chub mackerel are found throughout the Atlantic coast from Maine through Florida, and in both the Gulf of Mexico and the Caribbean Sea. There is no chub mackerel assessment, and sparse catches occur in the NEFSC fall survey (none in the spring survey). Abundance and 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.

Non-Target Species in the *Illex* Fishery

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 low, 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 low levels of discards in this fishery do not present management concerns.

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).

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 4. 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

Table 5. 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

6.2 PHYSICAL ENVIRONMENT AND HABITAT, INCLUDING EFH

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° F from the New York Bight north in the winter to over 80 °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 FMSY.

-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.

Habitat, Including Essential Fish Habitat (EFH)

Pursuant to the Magnuson-Stevens Act / 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: https://www.fisheries.noaa.gov/new-england-mid-atlantic/habitat-conservation/essential-fish-habitat-efh-northeast/. 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 6. 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;	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

Species	Life Stage	Geographic Area	Depth (meters)	Habitat Type and Description
		Massachusetts Bay, Boston Harbor, Cape Cod Bay, and Buzzards Bay		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
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

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

Species	Life Stage	Geographic Area	Depth (meters)	Habitat Type and Description
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 certain bays and estuaries in the Gulf of Maine	<100	Sub-tidal hard bottom habitats in sheltered nests, holes, or rocky crevices
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

Species	Life Stage	Geographic Area	Depth (meters)	Habitat Type and Description
Red hake	Juveniles	Gulf of Maine, Georges Bank, and the Mid-Atlantic, including Passamaquoddy Bay to Cape Cod Bay in the Gulf of Maine, Buzzards Bay and Narragansett Bay, Long Island Sound, Raritan Bay and the Hudson River, and lower Chesapeake Bay	Mean high water-80	Intertidal and sub-tidal soft bottom habitats, 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
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

Species	Life Stage	Geographic Area	Depth (meters)	Habitat Type and Description
Spiny dogfish	Juveniles	Primarily the outer continental shelf and slope between Cape Hatteras and Georges Bank and in the Gulf of Maine	Deep water	Pelagic and epibenthic habitats
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 Maine, to 900 om slope	Benthic habitats on a wide variety of bottom types, including sand, gravel, broken shells, pebbles, and soft mud
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

Species	Life Stage	Geographic Area	Depth (meters)	Habitat Type and Description
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
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.

6.3 HUMAN COMMUNITIES AND ECONOMIC ENVIRONMENT

6.3.0 Introduction

This section describes the socio-economic character of the *Illex* fishery. The recent EA for 2021 MSB specifications (MAFMC 2021) and the recent EA for initiation of management of chub mackerel (MAFMC 2020) can be consulted for details on other species (Atlantic mackerel, chub mackerel, butterfish, and longfin squid) managed by this FMP. Additional community information is 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/socioeconomics/social-indicators-fishing-communities-0. The current regulations for *Illex* are summarized by NMFS at https://www.fisheries.noaa.gov/species/shortfin-squid and detailed in the federal code of regulations (https://www.ecfr.gov/ - Title 50, Chapter VI, Part 648).

If less 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 subsequent specifications. The MSB Advisory Panel created a "Fishery Performance Report" for each MSB 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 obtained 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.

6.3.1 Fishery Performance

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 through 2019, which was the information the Council had when making its decisions.

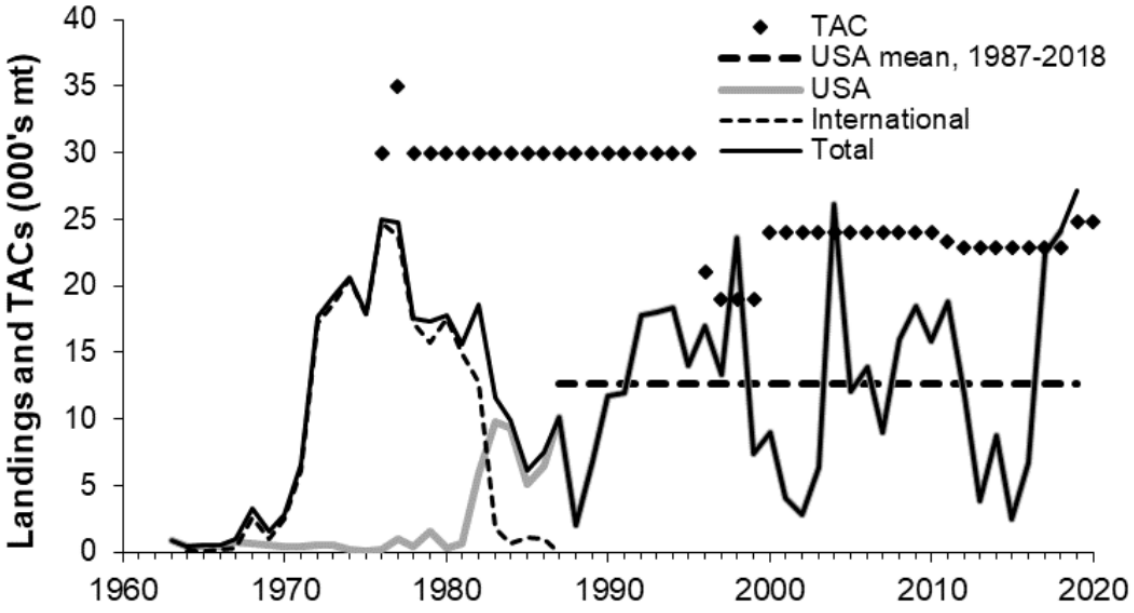


Figure 13. Landings (000's mt) of *Illex* illecebrosus from NAFO Subareas 5+6, by fleet during 1963-2019, and TACs (000's mt) for the same region during 1975-2019. Fishery closures occurred during 1998, 2004 and 2017-2019

Price has trended up in recent years. Revenues are even more variable due to the variability of landings, which is not unexpected for a sub-annual species (see figures on the next page).

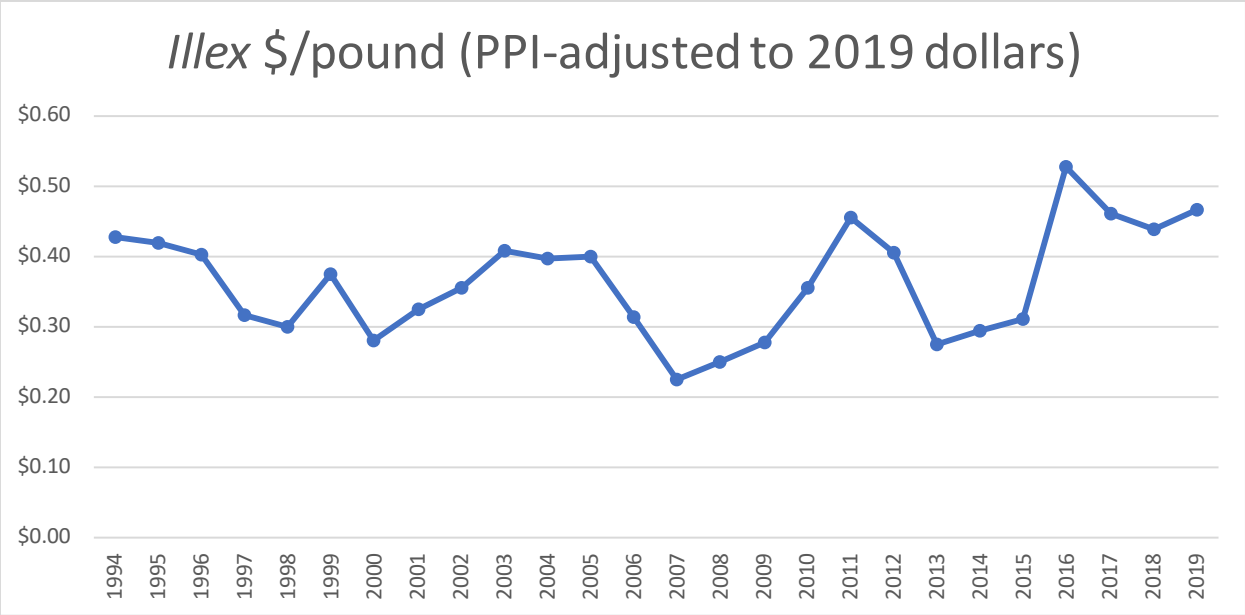


Figure 14. Inflation-adjusted ex-vessel Prices for *Illex* landings during 1982-2019.

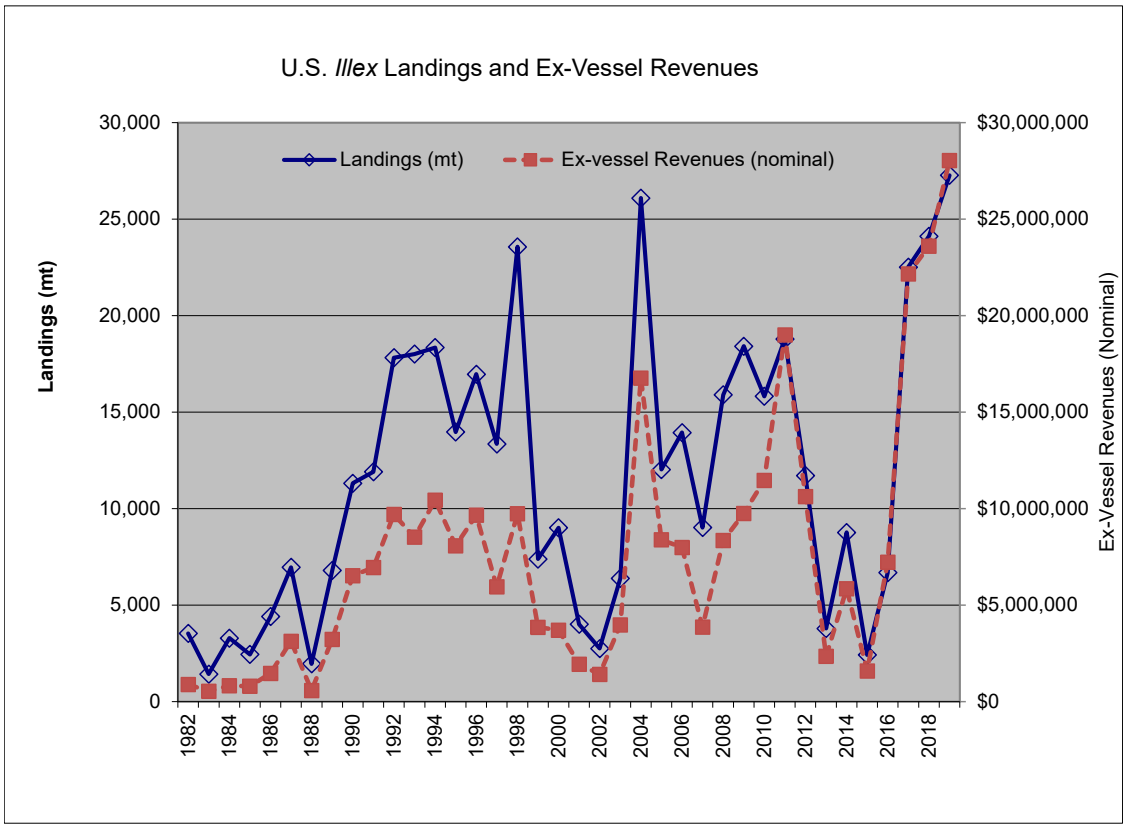


Figure 15. Landings and Nominal Ex-Vessel Revenues for *Illex* landings during 1982-2019.

The *Illex* fishery takes place near the shelf break primarily during June to October, when the species is available to the U.S. bottom trawl fishery. The figures immediately below describe recent and more historical catch locations. For 2019, the map is zoomed out and is based on quartiles of total catch, indicating the compact spatial nature of most landings. Maps for years prior to 2019 are zoomed-in on the area with active fishing and are binned slightly differently, based on various thresholds of metric tons caught (VTR data). Mis-reported location data in VTRs will cause some locations to be erroneously identified but the general spatial pattern of landings should be reflected in these figures.

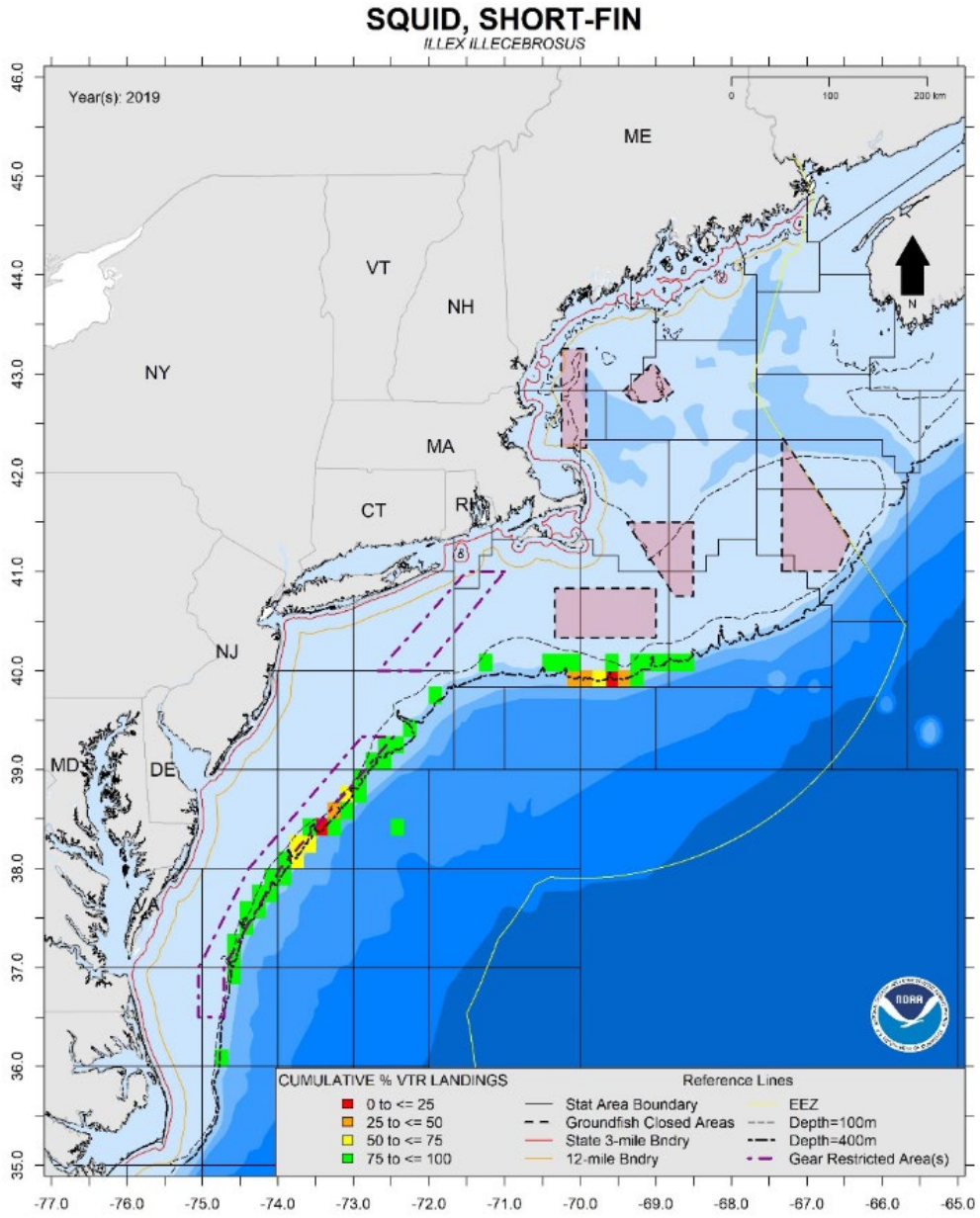


Figure 16. Distribution of landings (mt) from bottom trawl trips with *Illex* landings > 4.536 mt (10,000 lbs), by ten-minute square, during 2019 (VTR data)

Figure 17. Approximate Primary 2018 *Illex* Catch Locations (from dealer and VTR data)

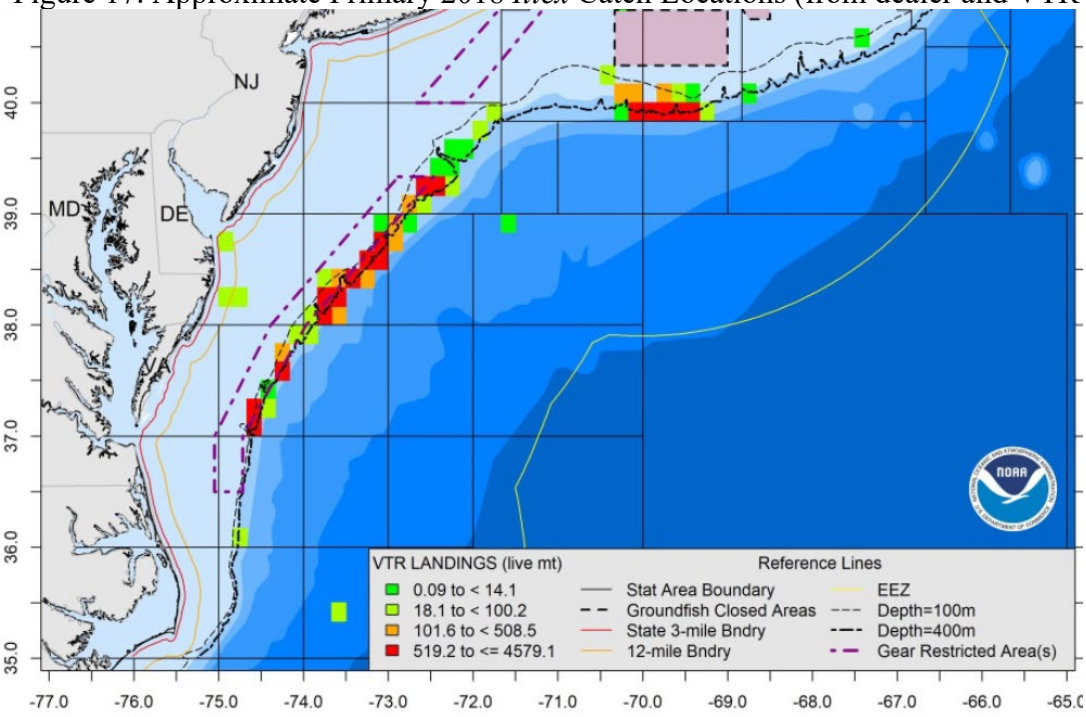


Figure 18. Approximate Primary 2017 *Illex* Catch Locations (from dealer and VTR data)

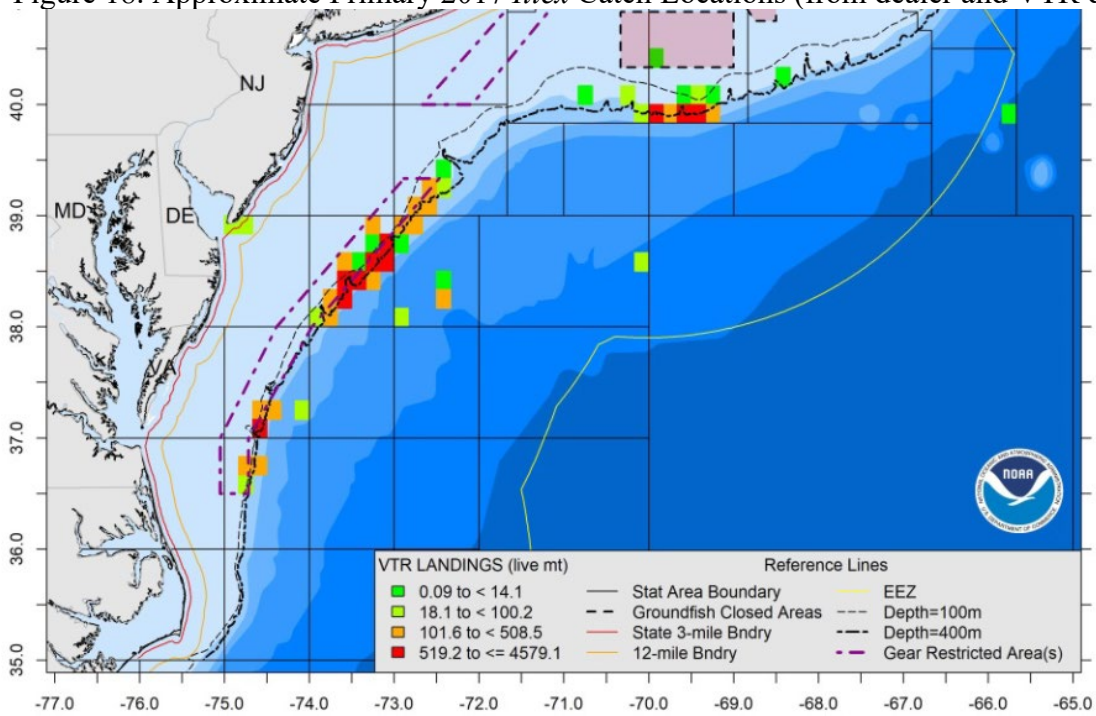


Figure 19. Approximate Primary 2013-2016 *Illex* Catch Locations (from dealer and VTR data)

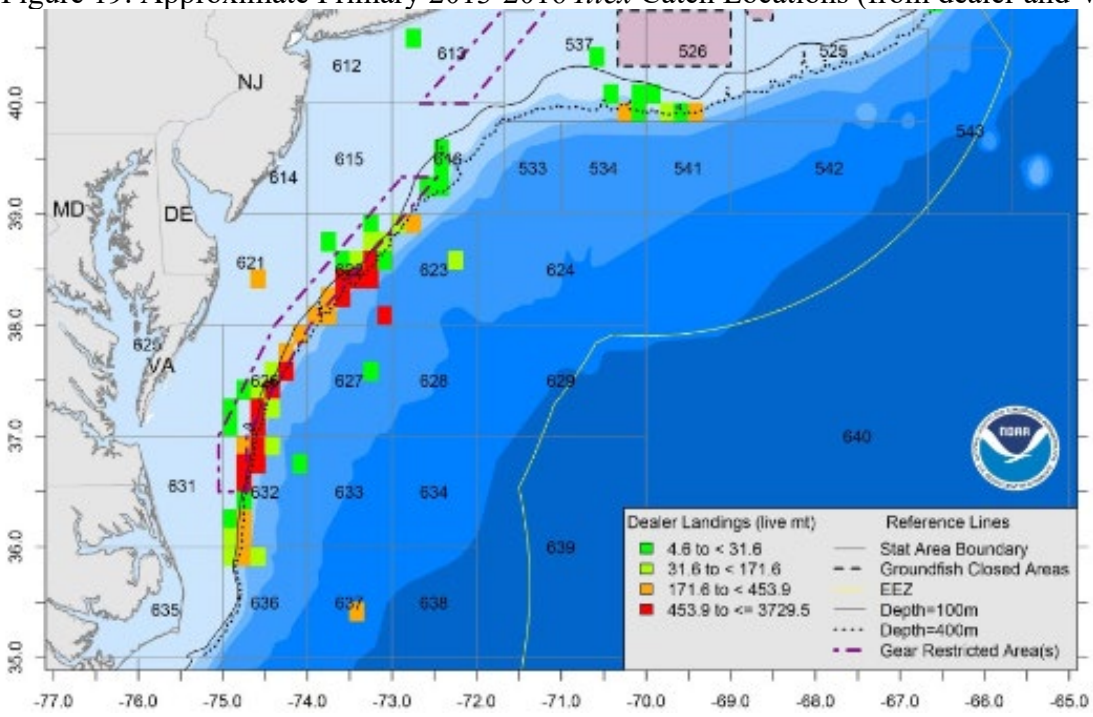
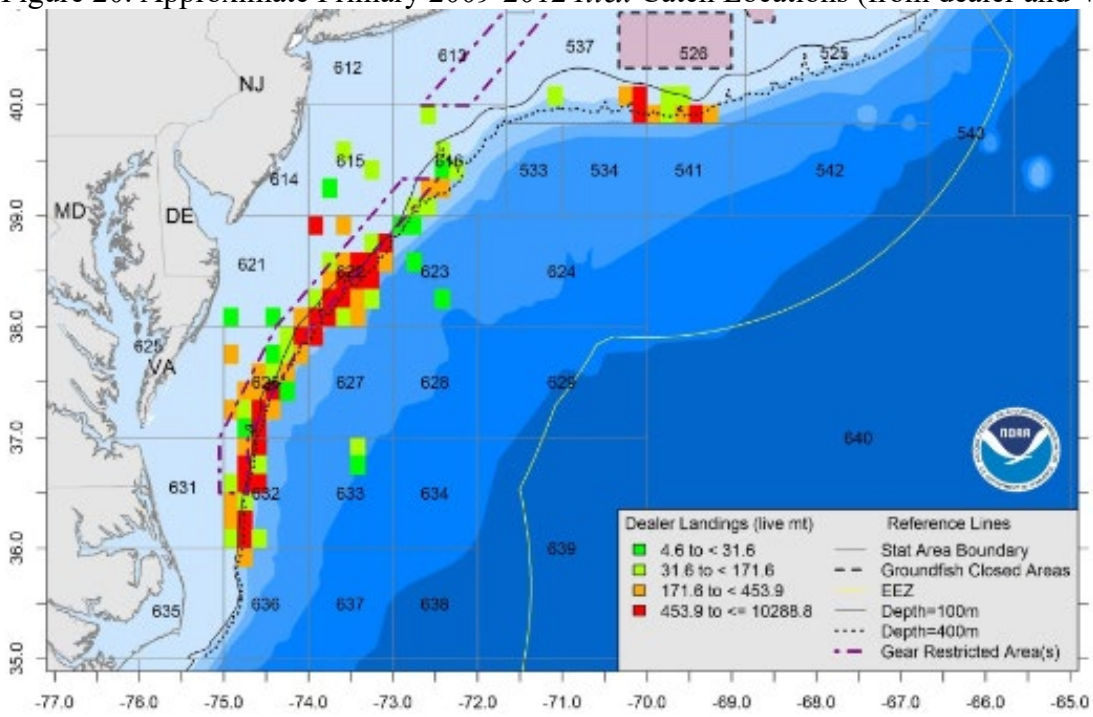


Figure 20. Approximate Primary 2009-2012 *Illex* Catch Locations (from dealer and VTR data)



In most years the preponderance of *Illex* landings have occurred in Rhode Island and New Jersey ports (see table below). Recent years have seen more landings in Massachusetts and Virginia usually has lower level of landings as well. Further breakdowns of landings by port may violate data confidentiality rules. Appendix 2 provides annual state by state landings revenues when data confidentiality issues are not violated.

Table 7. Recent *Illex* Landings by State

Year	RI	NJ	MA	Other	Total
2017	10,458	11,292	4	763	22,516
2018	9,429	12,359	1,541	781	24,110
2019	8,480	9,797	8,122	764	27,164

The tables immediately below and Figure 21 describe vessel participation including 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, the sizes of participating vessels, numbers of participants per year, and information regarding trip characteristics. Table 10 and Figures 21-22 illustrate the classic occurrence of racing to fish described frequently in fisheries literature, where when there is excess capacity to catch a quota, more vessels than are needed to catch the quota enter a fishery, and all participating vessels are forced to land as much fish as quickly as possible before the quota closes. Also, just 25 vessels made up 95% on landings in 2019, approximately 1/3 of the existing moratorium permits. Consistent racing to fish against the quota is a relatively new occurrence in the *Illex* fishery, occurring only in the most recent three years of the last 20 years 2000-2019 (the quota was achieved one other time, in 2004).

Table 8. 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

Table 9. *Illex* Vessel Sizes in 2019.

Length (ft)	All Active 2019 Permits	Top 15 Accounting for 81% of 2019 Landings	Top 25 Accounting for 95% of 2019 Landings
50+ to 60	2	0	0
60+ to 80	38	6	16
80+ to 100	19	3	3
100+ to 120	3	1	1
120+ to 140	3	3	3
140+ to 150	2	2	2
Totals	67	15	25

For this table, "Active" just means the permit is on a vessel and not in Confirmation of Permit History (i.e. not "on the shelf")

Table 10. 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

Figure 21. 1997-2019 *Illex* Fishery Trip Information

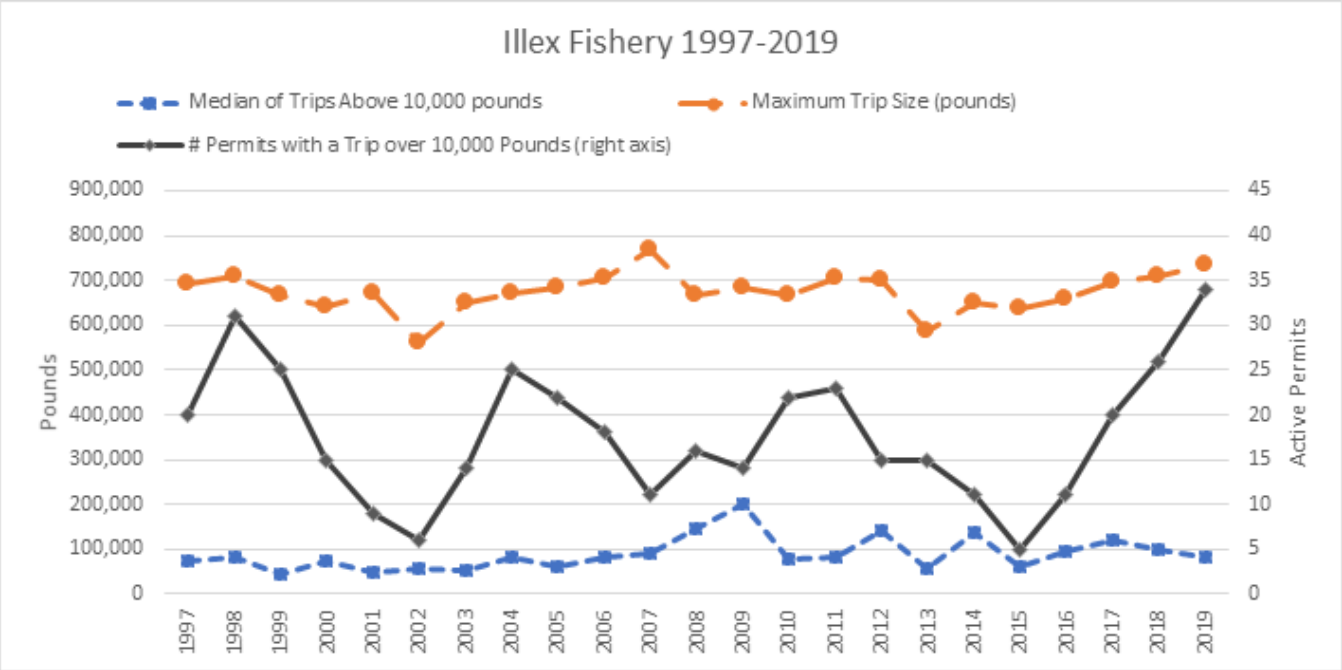
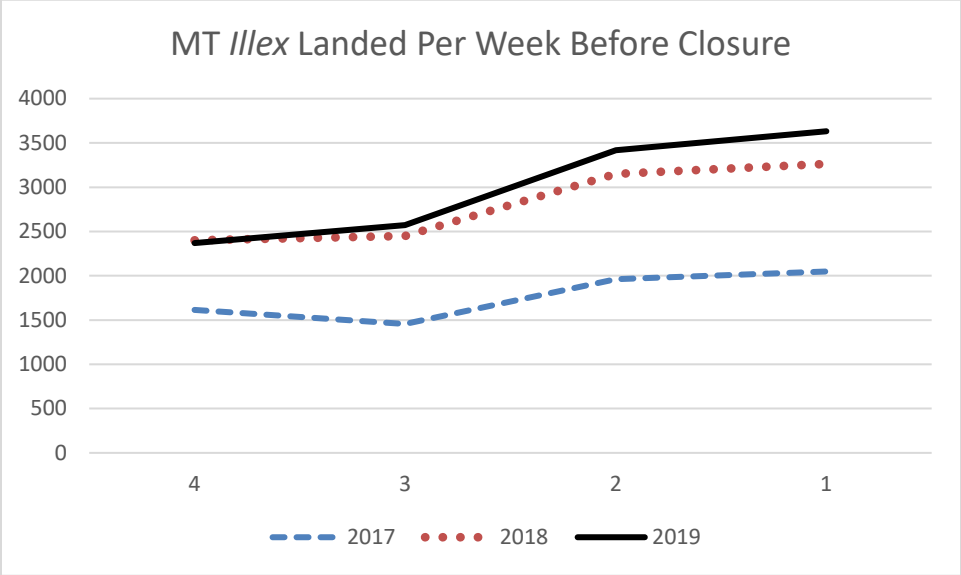


Figure 22. Illex landed per week 2017-2019 in each week before closure.



6.3.2 Communities

Cape May, NJ, North Kingston, RI, Point Judith, RI, Wanchese, NC, and Hampton, VA have historically been ports with substantial *Illex* landings. Table 11 lists the active ports in recent years, and Table 12 provides information regarding the dependence of those ports on *Illex* in 2011-2013, 2014-2016, and 2017-2019[3]. MSB Advisory Panel members have highlighted that the low relative value of *Illex* in a given port in terms of ex-vessel value may mask potential impacts to particular dealers, especially given the high value of scallops in some ports. Tables 13 and 14 lists ports' share of total 2010-2019 *Illex* landings by weight. Table 15 identifies the numbers of vessels listing the relevant states as their home or principal port.

Table 11. Rankings of ports with substantial *Illex* landings 2017-2019.

Port Rank	2017	2018	2019
1	Cape May	Cape May	Cape May
2	N Kingstown	N Kingstown	New Bedford
3	Pt. Judith	Pt. Judith	N Kingstown
4	Hampton, VA	New Bedford	Pt. Judith
5		Hampton, VA	Gloucester
6			Hampton, VA

Table 12. Dependence on *Illex* for Relevant Ports

	Illex as a percent of total port vessel revenues					
	Cape May	New Bedford	N. Kingston	Pt Judith	Gloucester	Hampton
2011-2013	7%	<1%	44%	1%	<1%	1%
2014-2016	2%	<1%	31%	1%	<1%	1%
2017-2019	16%	<1%	59%	4%	1%	4%

Table 13. Ports' Share of 2010-2019 *Illex* landings (by weight)

Port	% *Illex*
Cape May, NJ	47%
North Kingston, RI	35%
Point Judith, RI	7%
New Bedford, MA	6%
Hampton, VA	3%
All others	2%
Total	100%

[3] These three periods were selected to cover a variety of fishery production levels.

Table 14. Ports' Share *Illex* landings (by weight) divided by same time periods as Table 12.

PORT	% Landings 2011-2013	PORT	% Landings 2014-2016	PORT	% Landings 2017-2019
Cape May, NJ	53%	North Kingston, RI	62%	Cape May, NJ	45%
North Kingston, RI	40%	Cape May, NJ	33%	North Kingston, RI	26%
Hampton, VA	3%	Hampton, VA	3%	Pt. Judith, RI	12%
Pt. Judith, RI	2%	Pt. Judith, RI	2%	New Bedford, MA	11%
Wanchese, NC	2%	New Bedford, MA	0%	Hampton, VA	3%
Other	0%	Other	0%	Gloucester, MA	2%
				Other	0%

Table 15. *Illex* Vessels' Principal and Homeport States

Illex Permits/Vessels by principal and homeport state		
State	Principal State	Homeport State
ME	-	-
NH	-	-
MA	12	14
RI	14	11
CT	3	3
NY	4	4
NJ	26	26
PA	-	1
DE	-	-
MD	-	-
VA	6	5
NC	3	4
ACTIVE VESSELS*	68	
CPH PERMITS**	8	
TOTAL PERMITS	76	

*Vessels with *Illex* moratorium permits in 2019.

**Confirmation of Permit History (i.e. "on the shelf")

Social Indicators for Fishing Communities

Social indicators are measures that describe and evaluate the social, economic, and psychological well-being of individuals or communities. They were developed to characterize community well-being for coastal communities engaged in fishing activities. First the various indices are described, and then the most recent (2016[4]) indicator ratings for the active *Illex* ports are provided in Figures 23-28. Additional details on the social vulnerability indicators is available at https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0. These indicators help provide context for the importance of the *Illex* fishery and potential impacts.

Social Vulnerability Indices

The social vulnerability indices represent social factors that can shape either an individual or community's ability to adapt to change. These factors exist within all communities regardless of the importance of fishing.

Labor force characterizes the strength and stability of the labor force and employment opportunities that may exist. A high rank means likely fewer employment opportunities and a more vulnerable population.

Housing characteristics is a measure of infrastructure vulnerability and includes factors that indicate housing that may be vulnerable to coastal hazards. A high rank means a more vulnerable infrastructure and a more vulnerable population. On the other hand, the opposite interpretation might be that more affordable housing could be less vulnerability for some populations.

Poverty is a commonly used indicator of vulnerable populations. A high rank indicates a high rate of poverty and a more vulnerable population.

Population composition shows the presence of populations who are traditionally considered more vulnerable due to circumstances often associated with low incomes and fewer resources. A high rank indicates a more vulnerable population.

Personal disruption represents factors that disrupt a community member's ability to respond to change because of personal circumstances affecting family life or educational levels or propensity to be affected by poverty. A high rank indicates more personal disruption and a more vulnerable population.

Gentrification Pressure Indices

The gentrification pressure indices characterize those factors that, over time, may indicate a threat to the viability of a commercial or recreational working waterfront, including infrastructure.

[4] While *Illex* landings were not high in 2016, the indicators are general in nature and not directly related to *Illex* fishing.

Housing Disruption represents factors that indicate a fluctuating housing market where some displacement may occur due to rising home values and rents. A high rank means more vulnerability for those in need of affordable housing and a population more vulnerable to gentrification.

Retiree migration characterizes areas with a higher concentration of retirees and elderly people in the population. A high rank indicates a population more vulnerable to gentrification as retirees seek out the amenities of coastal living.

Urban sprawl describes areas experiencing gentrification through increasing population and higher costs of living. A high rank indicates a population more vulnerable to gentrification.

Fishing Engagement and Reliance Indices

The fishing engagement and reliance indices portray the importance or level of dependence of commercial or recreational fishing to coastal communities.

Commercial fishing engagement measures the presence of commercial fishing through fishing activity as shown through permits, fish dealers, and vessel landings. A high rank indicates more engagement.

Commercial fishing reliance measures the presence of commercial fishing in relation to the population size of a community through fishing activity. A high rank indicates more reliance.

Recreational fishing engagement measures the presence of recreational fishing through fishing activity estimates. A high rank indicates more engagement.

Recreational fishing reliance measures the presence of recreational fishing in relation to the population size of a community. A high rank indicates increased reliance.

Climate Change Indices

The climate change indices characterize environmental conditions that may affect the sustainability of essential commercial and recreational fishing businesses and infrastructure.

Sea level rise risk signifies the overall risk of inundation from sea level rise from one foot level to six foot level projections over the next ~90 years. The indicator represents the possibility of inundation based upon the combined projections at each stage of sea level rise and could vary depending upon future circumstances. A high rank indicates a community more vulnerable to sea level rise.

Storm surge risk refers to the overall risk of flooding from hurricane storm surge categories 1-5. The indicator represents the "worst-case" possibility of inundation based on the combined hurricane storm surge categories and could vary depending on future circumstances. A high rank indicates a community more vulnerable to a particular hurricane storm surge.

Figure 23. Cape May Vulnerability Indicators

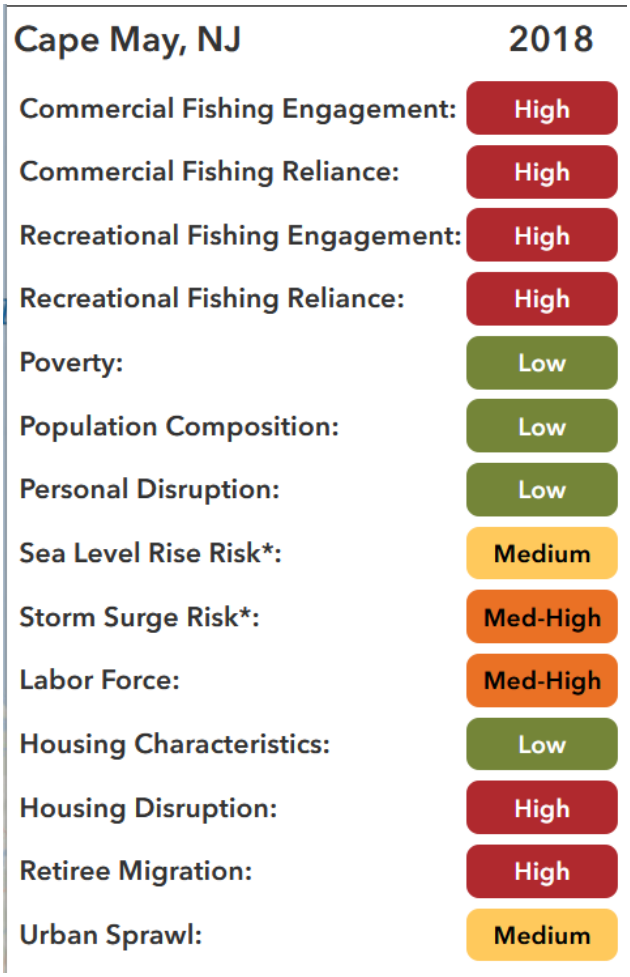


Figure 24. New Bedford Vulnerability Indicators

Figure 25. North Kingston/Saunderstown, RI Vulnerability Indicators

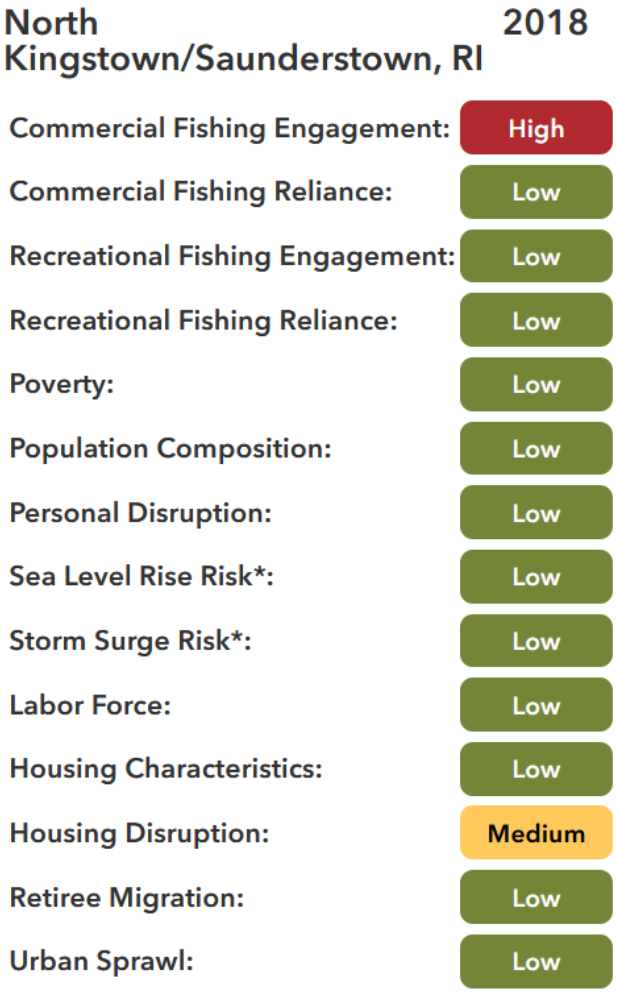


Figure 26. Narragansett/Point Judith RI Vulnerability Indicators

Figure 27. Gloucester, MA Vulnerability Indicators

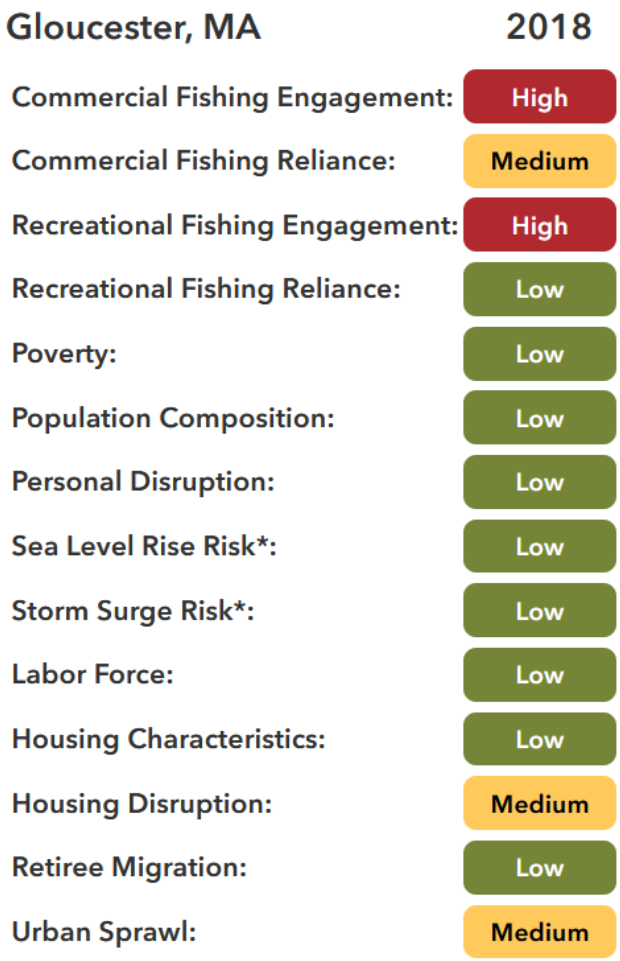
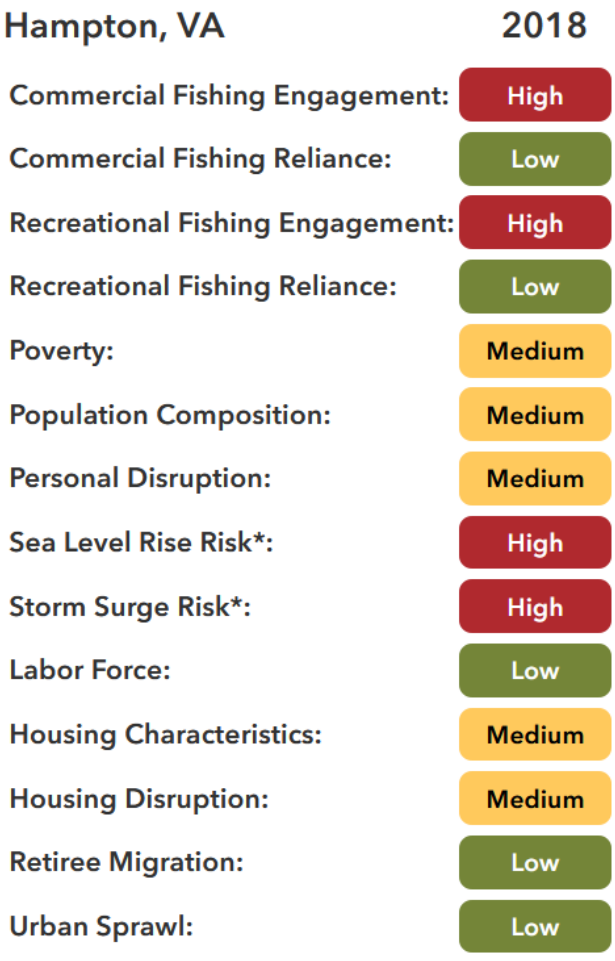


Figure 28. Hampton, VA Vulnerability Indicators



6.4 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). While this action is focused on Illex, which are predominantly caught with bottom trawl, information on mid-water trawl (used in the mackerel fishery) is also included for reference.

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

Species	**Status**[2]	***Potential to interact with MSB fishing gear?***
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***
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

Species	Status[2]	*Potential to interact with MSB fishing gear?*
Critical Habitat		
Northwest Atlantic DPS of Loggerhead Sea Turtle	ESA (Protected)	No
North Atlantic Right Whale Critical Habitat	ESA (Protected)	No

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[5]. 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

[5] 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.

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, as well as 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 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 indicates a 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 October 17, 2017, ESA 7(a)(2)/7(d) memorandum .

As the primary concern for both MMPA protected and ESA listed species is the potential for the fishery to interact (e.g., bycatch, entanglement) with these species it is necessary to consider (1) species occurrence in the affected environment of the fishery and how the fishery will overlap in time and space with this occurrence; and (2) data and observed records of protected species interaction with particular fishing gear types, 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 status, trends, 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).

Status and Trends

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).

Distribution and Occurrence

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

This section contains a brief summary of the status and trends, and occurrence and distribution of minke whales in the affected environment of the MSB fishery.

Status and Trends

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.

Occurrence and Distribution

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 16). 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 35°N) wintering/calving grounds and high latitude spring/summer foraging grounds (primarily north of 41°N;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 f 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

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

Status and Trends

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).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).

Occurrence and Distribution

Table 17 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 17, 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

This section contains a brief summary of the status and trends, and occurrence and distribution of Atlantic sturgeon in the affected environment of the MSB fishery.

Status and Trends

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).

Occurrence and Distribution

The marine range of U.S. Atlantic sturgeon extends from Labrador, Canada, to Cape Canaveral, Florida. All five DPSs of Atlantic sturgeon have the potential to be located anywhere in this marine range (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 biologyand 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).

6.4.2.5 Atlantic Salmon (Gulf of Maine (GOM) DPS)

This section contains a brief summary of the status and trends, and occurrence and distribution of Atlantic salmon in the affected environment of the MSB fishery.

Status and Trends

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).

Occurrence and Distribution

The freshwater range of Atlantic salmon (GOM DPS) 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 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**

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

Status and Trends

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).

Occurrence and Distribution

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[6]; 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[7]. Available information on gear interactions with a given species (or species group) is provided in the sections below. The sections to follow are not a comprehensive review of all fishing gear types known to interact with a given species; emphasis is only being placed on the primary gear types used to prosecute 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

[6] 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/.

[7] 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.

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.[8] 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)[9], 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.

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

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

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 extremely 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[10], the estimated average annual bycatch during 2011-2015 of Atlantic sturgeon in bottom otter trawl gear is 777.4 individuals.

[10] 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.

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.

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).[11] 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 extremely 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.

[11] 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.

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), shows that minke whales are the only large whale species in which an interaction with midwater trawl gear has been observed or documented.[12] 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.[13] In 2008, several minke whales were observed dead in bottom trawl gear

[12] 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

[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:

attributed to the northeast bottom trawl fishery; estimated annual mortality attributed to this fishery in 2008 was 7.8 minke whales (Waring et al. 2015). Since 2008, serious injury and mortality records for minke whales in U.S. waters have shown zero interactions with bottom trawl (northeast or Mid-Atlantic) gear.[14] Based on this information, large whale interactions with bottom trawl gear are expected to be extreemly 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 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.

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); 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.

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,[15] 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.[16]

6.4.3.5 Giant Manta Ray

Bottom Trawl

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

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

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 extremely rare.

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

The alternatives considered are fully described in Section 5. A descriptive label is included for each alternative below when considering impacts – reference 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 (*Illex*) 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, and the impact of that effort on stock status and the quality/quantity of habitat (see Table 19). 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, measures that limit catch are considered a factor related to changes in effort.

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 18. 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[17].	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.

[17] 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 19. 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	Alternatives that improve the quality or quantity of habitat	Alternatives that degrade the quality/quantity or increase disturbance of habitat	Alternatives that do not impact habitat quality
Human communities (socioeconomic)	Highly variable but generally stable in recent years (see condition of the resources table for details)	Alternatives that increase revenue and social well-being of fishermen and/or communities	Alternatives that decrease revenue and social well-being of fishermen and/or communities	Alternatives that do not impact revenue and social well-being of fishermen and/or communities
	Impact Qualifiers			
A range of impact qualifiers is used to indicate any existing uncertainty	Negligible	To such a small degree to be indistinguishable from no impact		
	Slight (sl), 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 20. Summary Baseline conditions of VECs considered in this action

VEC		Baseline Condition	
		Status/Trends, Overfishing?	**Status/Trends, Overfished?**
Target stocks (section 6.1)	**Atl. mackerel**	Yes (2019 was terminal year of last assessment)	Yes (2019 was terminal year of last assessment)
	Butterfish	No	No
	Longfin Squid	Unknown	No
	***Illex* Squid**	Unknown, but appears unlikely based on SSC holistic evaluation.	Unknown, but appears unlikely based on SSC holistic evaluation.
	Chub Mackerel	Unknown	Unknown
Non-target species (principal species listed in section 6.1)	See Section 6.1	There are a variety of species incidentally caught in the *Illex* fishery. While Atlantic mackerel, red hake, and bluefish have been declared overfished, none are caught in substantial enough quantities to warrant any conclusion other than that the *Illex* fishery having a negligible impact on them.	
Habitat (section 6.2)		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, so baseline is slight negative.	
Protected resources (section 6.4)	**Sea turtles**	Leatherback and Kemp's ridley sea turtles are classified as endangered under the ESA; loggerhead (NW Atlantic Ocean DPS) and green (North Atlantic DPS) sea turtles are classified as threatened.	
	Fish	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; Giant manta ray listed as threatened under the ESA	
	Large whales	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.	
	Small cetaceans	Pilot whales, species of dolphins, and harbor porpoise are all 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 gillnet gear.
	Pinnipeds	Gray, harbor, hooded, and harp seals are protected under the MMPA.
Human communities (section 6.3)		The MSB stocks, including *Illex*, support substantial fisheries and related support services.

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7.1 MANAGED RESOURCES IMPACTS

7.1.1 Impacts on Mackerel

Current resource condition: The most recent assessment found the mackerel stock to be overfished with overfishing occurring in the terminal year of the assessment (2016). Projections indicated there should have been no overfishing in 2017 and that the stock should be rebuilding under current ABCs.

Relative to the mackerel ABC, there is negligible catch of mackerel in the *Illex* fishery, and mackerel catches are controlled separately, including any incidental catch. Therefore, the *Illex* fishery, whether modified or not as proposed herein (i.e. with no action or any action), should have negligible impacts on the mackerel stock. Given the relatively low participation in the *Illex* fishery by vessels that would not requalify, it is unlikely that substantial effort would be redirected into the mackerel fishery by vessels that would not re-qualify. Even if this occurred, existing measures should avoid mackerel ABC overages.

7.1.2 Impacts on Butterfish

Current resource condition: 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; recruitment has been low in recent years. If recruitment returns to average levels, then the stock is predicted to build to the target biomass quickly.

Relative to the butterfish ABC, there is negligible catch of butterfish in the *Illex* fishery, and butterfish catches are controlled separately, including any incidental catch. Therefore, the *Illex* fishery, whether modified or not as proposed herein (i.e. with no action or any action), should have negligible impacts on the butterfish stock. Given the relatively low participation in the *Illex* fishery by vessels that would not requalify, it is unlikely that substantial effort would be redirected into the butterfish fishery by vessels that would not re-qualify. Even if this occurred, existing measures should avoid butterfish ABC overages.

7.1.3 Impacts on Longfin Squid

Current resource condition: 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, while not an accepted fishing mortality reference, was near the long term median.

Relative to the longfin squid ABC, there is negligible catch of longfin squid in the *Illex* fishery, and longfin squid catches are controlled separately, including any incidental catch. Therefore, the *Illex* fishery, whether modified or not as proposed herein (i.e. with no action or any action), should have negligible impacts on the longfin squid stock. Given the relatively low participation in the *Illex* fishery by vessels that would not requalify, it is unlikely that substantial effort would be

redirected into the longfin squid fishery by vessels that would not re-qualify. Even if this occurred, existing measures should avoid longfin squid ABC overages.

7.1.4 Impacts on *Illex* Squid

Current resource condition: while there is no accepted analytical assessment and projection method for setting *Illex* squid ABCs, catches have usually been limited to an amount deemed sustainable and unlikely to cause overfishing by the SSC based on the best available scientific information. The SSC has incrementally increased *Illex* ABCs since 2019 based on analyses that have suggested sufficient escapement occurs to populate the next generation with recent catches, and that the risk of overfishing is likely low due to the apparent high productive regime of recent years. As such, while overfishing or overfished status cannot be determined for *Illex*, the current baseline condition is likely moderate positive.

ALTERNATIVE 1: "No Action, Keep Status Quo Management"
The current resource condition should generally be maintained because the fishery is closed when it approaches its quota, and the quota and closure procedures are designed to avoid ABC overages (including a set-aside for anticipated discards). The fishery has however had several quota/ABC overages in recent years because the high-volume nature of the fishery and increasing participation makes it challenging to precisely close the fishery. In 2018 the fishery exceeded its 24,000 MT ABC by 6.3% and in 2019 the fishery exceeded its 26,000 MT ABC by 9.3%. In the long term it would still be expected that management measures should generally maintain a sustainable stock (similar to under other alts), but based on the recent overages, the no action impact is negative in relation to the action alternatives (2-5) in that no action would carry a higher risk of occasional overfishing due to the higher risk of racing to fish and quota overages with more vessels potentially able to participate in the fishery. Only 35 vessels participated in the fishery in 2019 compared to the potentially 74 permits, and only 25 represented 95% of landings. The degree is likely slightly negative compared to the action alternatives because the Council (separately through the specifications process) reduced the closure trigger to 94% and required dealers to electronically report landings within 48-hours after-landing from July 15 until any directed closure, which should also reduce but not necessarily eliminate the chance of further overages. NMFS also seeks to continually improve their projecting approaches, which should also reduce, but also not eliminate, the chance of overages in the future. Closures and overages are also likely to take place during times of high abundance, which may further attenuate the negative impacts of any overages. The greater the reduction in permits the greater the reduction in chances of worsening racing to fish, so the degree of difference in impact would be most with Alternative 3, and least with Alternatives 2 and 5 (which qualify a similar number of vessels without constraining trip limits). While Alternative 4 qualifies a similar number of permits as alternatives 2 and 5, the constraining trip limits should put its relative impact in between the other alternatives in terms of constraining the race to fish. Again, only slightly negative impacts would be expected compared to any action alternative, especially since other than with Alternative 3, additional capacity beyond the quota remains, so racing to fish may be more limited with the action alternatives, but will still likely occur at current quotas if squid are highly available/abundant.

ALTERNATIVE 2: “50,000 pounds 1997-2019”

Compared to not taking action, Alternative 2 would eliminate approximately 24 vessels from the directed fishery. Limiting participation will reduce the potential for additional racing for fish, but will not end racing to fish. Limiting additional racing to fish will limit the potential for additional quota/ABC overages (either frequency or magnitude), so compared to no action, this alternative would have a positive impact on the *Illex* stock (ABCs are designed to avoid overfishing). The impact is slight because other measures have been implemented in a reactionary fashion to mitigate past quota overages, and management would continue to react to reduce ABC overages and the possibility of overfishing in order to maintain sustainability. The impact is also slight because the remaining vessels may still increase their rates of landings - as detailed in Section 7.5, the remaining vessels would still have more capacity than the current quota at even a static number of trips. Closures and overages are also likely to take place during times of high abundance, which may further attenuate the negative impacts of any overages.

The impact, while slight, would be more positive than Alternative 1 (no action), and due to the numbers of vessels requalifying without substantially constraining trip limits, would be less positive than Alternatives 3 and 4, and similar to Alternative 5.

ALTERNATIVE 3: “1,000,000 pounds twice, both early and late”

Compared to not taking action, Alternative 3 would eliminate approximately 61 vessels from the directed fishery. Limiting participation will reduce the potential for additional racing for fish, but will not end racing to fish. Limiting additional racing to fish will limit the potential for additional quota/ABC overages (either frequency or magnitude), so compared to no action, this alternative would have a positive impact on the *Illex* stock (ABCs are designed to avoid overfishing). The impact is slight because other measures have been implemented in a reactionary fashion to mitigate past quota overages, and management would continue to react to reduce ABC overages and the possibility of overfishing in order to maintain sustainability. Closures and overages are also likely to take place during times of high abundance, which may further attenuate the negative impacts of any overages.

The impact, while slight, would be more positive than any other alternative because this alternative eliminates the most vessels, and would reduce potential participants substantially compared to recent years when overages occurred (so even during a year of high *Illex* abundance/availability and favorable market conditions, landings should occur at a slower pace).

ALTERNATIVE 4 (Preferred): “Tier 1 Stops at 2013”

Compared to not taking action, Alternative 4 would eliminate approximately 26 vessels from the primary directed fisheries, Tier 1 and Tier 2. The trip limit for Tier 2 (13 vessels) should also constrain that Tier from substantially increasing landings compared to recent years.

Some concern has been voiced that the trip limits for Alternative 4 could cause increased *Illex* discarding. This could occur if a vessel does not know how much *Illex* is coming up in a net and

the addition of that squid to that which is already on board exceeds the trip limit. This occurrence should not appreciably affect discards for several reasons:
1. Vessels in the Tiers with a trip limit have accounted for a small portion of catch overall, and any discarded catch would only be a portion of their last tow from a particular trip.
2. Some vessels have catch sensors which would minimize the chances of such events.
3. The trip limit was set based on median landings amounts to provide an amount that a typical trip would be landing.

The discard set aside in *Illex* specifications ensures that discards are accounted for, and staff regularly reviews discards for trends. If regulatory discards began to unexpectedly increase, then the trip limit would be reviewed and measures taken to minimize discards to the extent practicable.

Limiting participation will reduce the potential for additional racing for fish, but will not end racing to fish. Limiting additional racing to fish will limit the potential for additional quota/ABC overages (either frequency or magnitude), so compared to no action, this alternative would have a positive impact on the *Illex* stock (ABCs are designed to avoid overfishing). The impact is slight because other measures have been implemented in a reactionary fashion to mitigate past quota overages, and management would continue to react to reduce ABC overages and the possibility of overfishing in order to maintain sustainability. The impact is also slight because the remaining vessels may still increase their rates of landings - as detailed in Section 7.5, the remaining vessels would still have more capacity than the current quota at even a static number of trips. Closures and overages are also likely to take place during times of high abundance, which may further attenuate the negative impacts of any overages.

The impact, while slight, would be more positive than Alternative 1 (no action), and due to the numbers of vessels requalifying without substantially constraining trip limits, would be more positive than alternatives 2 and 5, and less than Alternative 3.

ALTERNATIVE 5: “Tier 1 qualification extends to 2019 with higher landings”

Compared to not taking action, Alternative 5 would eliminate approximately 25 vessels from the primary directed fisheries, Tier 1 and Tier 2. The trip limit for Tier 2 (7 vessels) may allow increased landings compared to recent years.

Some concern has been voiced that the trip limits for Alternative 4 could cause increased *Illex* discarding. This could occur if a vessel does not know how much *Illex* is coming up in a net and the addition of that squid to that which is already on board exceeds the trip limit. This occurrence should not appreciably affect discards for several reasons:
1. Vessels in the Tiers with a trip limit have accounted for a small portion of catch overall, and any discarded catch would only be a portion of their last tow from a particular trip.
2. Some vessels have catch sensors which would minimize the chances of such events.
3. The trip limit was set based on median landings amounts to provide an amount that a typical trip would be landing.

The discard set aside in *Illex* specifications ensures that discards are accounted for, and staff regularly reviews discards for trends. If regulatory discards began to unexpectedly increase, then the trip limit would be reviewed and measures taken to minimize discards to the extent practicable.

Limiting participation will reduce the potential for additional racing for fish, but will not end racing to fish. Limiting additional racing to fish will limit the potential for additional quota/ABC overages (either frequency or magnitude), so compared to no action, this alternative would have a positive impact on the *Illex* stock (ABCs are designed to avoid overfishing). The impact is slight because other measures have been implemented in a reactionary fashion to mitigate past quota overages, and management would continue to react to reduce ABC overages and the possibility of overfishing in order to maintain sustainability. The impact is also slight because the remaining vessels may still increase their rates of landings - as detailed in Section 7.5, the remaining vessels would still have more capacity than the current quota at even a static number of trips. Closures and overages are also likely to take place during times of high abundance, which may further attenuate the negative impacts of any overages.

The impact, while slight, would be more positive than Alternative 1 (no action), and due to the numbers of vessels requalifying without substantially constraining trip limits, would be less positive than Alternatives 3 and 4, and similar to Alternative 2.

7.2 HABITAT IMPACTS

As discussed 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 an overall current resource condition, 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). Ongoing fishing, and ongoing and new non-fishing activities may also hinder recovery.

7.2.1 Impacts on Managed Species Habitat

Illex fishing uses otter trawling on sand/mud substrates offshore near the shelf break. However, habitat for the managed species (MSB) generally consists of the water column, which is not known to be 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 fishing/bottom trawling, so no impacts on habitat for longfin squid eggs are expected from any increase or decrease in fishing effort by bottom trawls. Since bottom 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, these fisheries are unlikely to further impact MSB habitat (regardless of intensity). Also, nothing in this action is expected to increase effort in the MSB fisheries – the measures being considered would limit participants to a subset of the total *Illex* moratorium permits currently held, and the resulting fleets should all still have the capacity to harvest the current quota.

7.2.2 Impacts on Other Federally Managed Species Habitat

Illex fishing uses otter trawling on sand/mud substrates offshore near the shelf break. Potential impacts of the alternatives on other federally-managed species EFH are discussed below.

Habitat Impacts from Alternative 1 (No action)

As described in section 6.2 above, bottom trawling 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 EFH closures and deepwater coral protections), the baseline and impact of no action is best characterized as overall slight negative, and will result in continued interactions with habitat similar to past years (also, any impacts are occurring to areas that are already historically/heavily fished and impacted). With effort anticipated to be similar under the no action or action alternatives, impacts would also be expected to be similar among all alternatives.

Habitat Impacts from Alternatives 2-5

These alternatives may impact the number of potential participants in the *Illex* squid fishery, but since the resulting fleet should generally still have the capacity to harvest the full quota (or most in the case of Alternative 3) in a manner not dissimilar to previous years, these alternatives are not likely to substantively change the amount or character of effort in the *Illex* fishery as it pertains to habitat - fewer participants means there is more quota to fish on for each participant. With overall effort essentially staying the same and habitat impacts occurring relative and in proportion to effort, habitat impacts would be similar to no action, i.e. slight negative from any of the action alternatives, and similar to previous years.

However, when alternatives are compared to each other or the no action, there is some variability of the level of impacts to habitat. Alternatives 2 through 5 all will result in the removal of some number of vessels from the primary directed fishery. In general, the removal of vessels from the directed fishery should equate to less gear being fished because of the expected reduced chance of quota overages and resulting reduced chance of unintended effort. Alternative 3 could interfere with catching the quota (reducing effort), but for the others the effect on overall effort is primarily related to avoiding unintended effort accompanying quota overages. Quota/ABC overages, while occurring in recent years, have not been severe however. Taking into consideration the above, the following impacts are expected:

Alternative 2:
Relative to the No Action, which will continue to requalify 74 moratorium permits/vessels, Alternative 2 will eliminate 24 vessels from the directed fishery and therefore, is expected to result in negligible to slight positive impacts to habitat. Relative to Alternative 5, Alternative 2 will requalify a similar number of vessels that can direct on *Illex* substantially unconstrained, and therefore those two alternatives would be expected to have similar impacts. Because Alternatives 3 and 4 requalify fewer vessels that can direct on *Illex* substantially unconstrained, Alternative 2 would have slightly negative impacts compared to Alternatives 3 and 4.

Alternative 3:
Relative to the No Action which will continue to requalify 74 moratorium permits/vessels, Alternative 3 will eliminate 61 vessels from the directed fishery and therefore, is expected to result in negligible to moderate positive impacts to habitat because the small number of remaining vessels could have difficulty achieving the quota. Relative to Alternatives 2, 4, and 5, Alternative 3 will requalify the lowest numbers of vessels that may not achieve the quota, and therefore, relative to Alternatives 2, 4, and 5, Alternative 3 is expected to result in negligible to moderate positive impacts to habitat.

Alternative 4:
Relative to the No Action which will continue to requalify 74 moratorium permits/vessels, Alternative 4 will eliminate 26 vessels from the primary directed fishery (not Tier 1 or Tier 2). The trip limit for Tier 2 (13 vessels) should also constrain that Tier from substantially increasing landings compared to recent years. Therefore Alternative 4 is expected to result in negligible to slight positive impacts to habitat. Relative to Alternatives 2 and 5, alternative 4 will requalify a lower numbers of vessels that can direct on *Illex* substantially unconstrained, and therefore, relative to Alternatives 2 and 5, Alternative 4 is expected to result in negligible to slight positive impacts to habitat. Relative to Alternative 3, Alternative 4 will requalify a higher numbers of vessels that can direct on *Illex* substantially unconstrained, and therefore, relative to Alternative 3, Alternative 4 is expected to result in negligible to slight negative impacts to habitat.

Alternative 5:
Relative to the No Action which will continue to requalify 74 moratorium permits/vessels, Alternative 5 will eliminate 25 vessels from the primary directed fishery (not Tier 1 or Tier 2) and therefore, is expected to result in negligible to slightly positive impacts to habitat. Relative to Alternative 2, Alternative 5 will requalify a similar number of vessels that can direct on *Illex* substantially unconstrained, and therefore those two alternatives would be expected to have similar impacts. Because Alternatives 3 and 4 requalify fewer vessels that can direct on *Illex* substantially unconstrained, Alternative 5 would have slightly negative impacts compared to Alternatives 3 and 4.

7.3 PROTECTED RESOURCES IMPACTS

7.3.1 Introduction

The impacts of the alternatives on protected species take into account impacts to ESA-listed species, as well as impacts to MMPA protected species in good condition (i.e., marine mammal stocks whose PBR level have not been exceeded) or poor (i.e., marine mammal stocks that have exceeded or are near exceeding their PBR level) condition. For ESA-listed species, any action that results in interactions or take is expected to have some level of negative impacts, including actions that reduce interactions. Actions expected to result in positive impacts on ESA-listed species include only those that contain specific measures to ensure no interactions (i.e., no take). By definition, all ESA-listed species are in poor condition and any take can negatively impact that species' recovery. The stock conditions for marine mammals not listed under the ESA varies by species; however, all are in need of protection. For marine mammal stocks that have their PBR level reached or exceeded, some level of negative impacts would be expected from alternatives that result in the potential for interactions between fisheries and those stocks. For species that are at more sustainable levels (i.e., PBR levels have not been exceeded), alternatives not expected to change fishing behavior or effort 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 duration), and the presence of protected species (ESA-listed and MMPA protected) in the same area and time as the gear, with risk of an interaction increasing with increases in of any of these factors.

7.3.2 Impacts

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 (i.e., the PBR level has not been exceeded; see 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 duration), 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 the No Action scenario is not expected to change from current operating conditions, the No Action Alternative is not expected to introduce new or elevated interaction risks to these non-ESA listed marine mammal stocks in poor condition. Specifically, the amount of gear in the water, 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 Alternative is likely to result in slight negative impacts to non-ESA listed marine mammal stocks/species in poor condition (i.e., bottlenose dolphin stocks).

Alternatively, there are also many non-ESA listed marine mammals that, even with continued fishery interactions, are maintaining an optimum sustainable level (i.e., PBR levels have not been exceeded) over the last several years. For these stocks/species, it appears that the fishery management measures that have been in place over this timeframe have resulted in levels of effort that result in interaction levels that are not expected to impair the stocks/species ability to remain at an optimum sustainable level. These fishery management measures, therefore, have resulted in indirect 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 Alternative is 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 status quo level of negative impacts to ESA listed species to be slight. Under the No Action, the amount of trawl gear, tow durations, 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.

General Action Alternative Impacts:

Impacts to protected resources (ESA and MMPA species) are affected by changes in fishing behavior (e.g., area fished) and effort (e.g., number of vessels fishing, amount of gear fished, gear soak/tow duration). Specifically, as provided in section 7.3.1, interaction risks to protected species are strongly associated with amount, time, and location of gear in the water (components of effort), with vulnerability of an interaction increasing with increases in any or all of these factors. These are the components of effort that are considered in making impact determinations for protected species. If there are potential increases in any of these factors, then the potential risk of an interaction also is expected to increase. If none of these factors will be met, then the risks of an interaction with protected species are not expected to be greater than status quo. If there are potential decreases in any of these factors, then the potential risk of an interaction may decrease.

None of the action alternatives have the potential to increase effort. Specifically, versus no action, the proposed action alternatives seek to mitigate the race to fish (which can lead to quota overages and additional unintended effort) by constraining participation in the fishery. To the extent that participation in the *Illex* fishery is constrained, the probability of quota overages (and associated unintended effort) should be qualitatively reduced. However, given past trends in the fishery (e.g., the occurrence of a small number of minor ABC overages; see section 7.1.4), the level of effort reduction resulting from any of the proposed alternatives is, expected to be negligible to slight.

Given the resource condition of ESA-listed species (see Table 19, Section 6.4, and Section 7.3.1), the operation of the fishery poses some level of risk to the species. Even if fishing effort declines, as interactions can still occur, some level of negative impacts to listed species are expected. Given this, and the fact that alternatives 2 through 5 will not provide incentive for effort to increase above and beyond status quo conditions, impacts to listed species from any of these alternatives are expected to continue to be slight negative. However, when alternatives are compared to each other or the no action, there is some variability of the level of impacts to ESA-listed species. Alternatives 2 through 5 all will result in the removal of some number of vessels from the directed fishery. In general, the removal of vessels from the directed fishery should equate to less gear being fished and less potential for vessels and listed species to overlap in time and space because of the expected reduced chance of quota overages and resulting reduced chance of unintended effort. Alternative 3 could interfere with catching the quota, but for the others the effect on overall effort is related to avoiding unintended effort accompanying quota overages. Quota/ABC overages, while occurring in recent years, have not been severe however.

7.3.3 Alternatives Comparison – Protected Resources

Taking into consideration the above, the following impacts are expected:

Alternative 2:
Relative to the No Action, which will continue to requalify 74 moratorium permits/vessels, Alternative 2 will eliminate 24 vessels from the directed fishery and therefore, is expected to result in negligible to slight positive impacts to protected resources. Relative to Alternative 5, Alternative 2 will requalify a similar number of vessels that can direct on *Illex* substantially unconstrained, and therefore those two alternatives would be expected to have similar impacts. Because Alternatives 3 and 4 requalify fewer vessels that can direct on *Illex* substantially unconstrained, Alternative 2 would have slightly negative impacts compared to Alternatives 3 and 4.

Alternative 3:
Relative to the No Action which will continue to requalify 74 moratorium permits/vessels, Alternative 3 will eliminate 61 vessels from the directed fishery and therefore, is expected to result in negligible to moderate positive impacts to protected resources because the small number of remaining vessels could have difficulty achieving the quota. Relative to Alternatives 2, 4, and 5, Alternative 3 will requalify the lowest numbers of vessels that may not achieve the quota, and therefore, relative to Alternatives 2, 4, and 5, Alternative 3 is expected to result in negligible to moderate positive impacts to protected resources.

Alternative 4:
Relative to the No Action which will continue to requalify 74 moratorium permits/vessels, Alternative 4 will eliminate 26 vessels from the primary directed fishery (not Tier 1 or Tier 2). The trip limit for Tier 2 (13 vessels) should also constrain that Tier from substantially increasing landings compared to recent years. Therefore Alternative 4 is expected to result in negligible to slight positive impacts to protected resources. Relative to Alternatives 2 and 5, alternative 4 will requalify a lower numbers of vessels that can direct on *Illex* substantially unconstrained, and therefore, relative to Alternatives 2 and 5, Alternative 4 is expected to result in negligible to slight positive impacts to protected resources. Relative to Alternative 3, Alternative 4 will requalify a higher numbers of vessels that can direct on *Illex* substantially unconstrained, and therefore, relative to Alternative 3, Alternative 4 is expected to result in negligible to slight negative impacts to protected resources.

Alternative 5:
Relative to the No Action which will continue to requalify 74 moratorium permits/vessels, Alternative 5 will eliminate 25 vessels from the primary directed fishery (not Tier 1 or Tier 2) and therefore, is expected to result in negligible to slightly positive impacts to protected resources. Relative to Alternative 2, Alternative 5 will requalify a similar number of vessels that can direct on *Illex* substantially unconstrained, and therefore those two alternatives would be expected to have similar impacts. Because Alternatives 3 and 4 requalify fewer vessels that can direct on *Illex* substantially unconstrained, Alternative 5 would have slightly negative impacts compared to Alternatives 3 and 4.

As provided in section 7.3.1, in regards to MMPA protected species, depending on the resource condition of the species, impacts to MMPA protected species may vary. Since some bottlenose dolphin stocks are above PBR (i.e., in poor condition; see section AE) and it's not possible to conclusively know whether any measure in this action could reduce takes to below the PBR level for the stock, impacts of each alternative are the same as those provided above for ESA listed species immediately above.

For other MMPA protected species that are in good condition (i.e., PBR levels have not been exceeded), the No Action Alternative, which will maintain status quo operating conditions, is expected to result in slight positive impacts to these species (see section 7.3.1 for rationale). Alternatives 2 through 5 will result in the removal of some number of vessels from the directed fishery. In general, the removal of vessels from the directed fishery should equate to less gear being fished and less potential for vessels and listed species to overlap in time and space because of the expected reduced chance of quota overages and resulting reduced chance of unintended effort. Alternative 3 could interfere with catching the quota, but for the others the effect on overall effort is related to avoiding unintended effort accompanying quota overages. Quota/ABC overages, while occurring in recent years, have not been severe however. Based on this:

1. Relative to Alternatives 2 through 5, the No action is expected to result in negligible to slight negative impacts to MMPA protected species in good condition; and,

2. Relative to each other, the highest positive impacts are expected from alternative 3 (i.e., out of the alternatives, results in the fewest vessels requalified that may not achieve the quotas). The lowest positive impacts would be expected from Alternatives 2 and 5 because they requalify a similar number of vessels that can direct on *Illex* substantially unconstrained, and the highest number among the action alternatives. Since the trip limits in Alternative 4 will constrain Tier 2 to some degree, Alternative 4's positive impacts are between Alternative 3 and Alternatives 2/5.

7.4 NON-TARGET RESOURCE IMPACTS

Even at the higher effort levels in 2017-2019, the *Illex* fishery had very low levels of incidental catch of non-target species (see Section 6.1). While there are several species occasionally caught incidentally in the *Illex* fishery that are overfished and/or rebuilding (e.g. Atlantic mackerel, bluefish, and red hake), the quantities of these fish appear to be negligible relative to the ABCs in those respective fisheries. Management of those other fisheries also accounts for total catch. Given the negligible non-target catch in the *Illex* fishery, impacts on non-target species related to the operation of the *Illex* fishery are likely negligible for either no action or action alternatives, as total effort is likely to be similar under any alternative.

Either the no action or action alternatives may have effects in terms of re-direction of effort. For any alternative, vessels may re-direct once the *Illex* fishery closes. Given the varied permit suites that differ from vessel to vessel, changes in management from year to year, and changes in markets year to year, it is not possible to predict what fisheries any vessel might re-direct into after a closure of the *Illex* fishery. The same is true for vessels that would, or would not, re-qualify under any of the action alternatives. However, if some vessels would have to participate less in the *Illex* fishery due to losing access, that means other vessels could participate longer in the *Illex* fishery, potentially offsetting any redirected effort effects and affirming the overall negligible effects of this action on non-target species. While the race to fish can generally have negative impacts on non-target species if vessels become less careful due to pending quota closures, the extremely low non-target catches in the Illex fishery mean this is not an issue for this fishery/action.

7.5 SOCIOECONOMIC IMPACTS

All discussions regarding predicted numbers of qualifiers are preliminary based on data in NMFS databases at the time of analysis. During actions when landings are used for a permit qualification, the final number of qualifiers may be different due to corrections made to databases during appeals processes.

7.5.1 ALTERNATIVE 1: "No Action, Keep Status Quo Management"

Recent and historical participation in the *Illex* squid fishery are described in Section 6. Fewer vessels participate in years where market conditions dictate lower prices, and/or when squid availability is low. On the other hand, if both market and availability conditions are favorable, more vessels participate. Market conditions affect profitability and the incentive to fish for *Illex*, and include import/export prices as well as the cost of inputs such as fuel and labor (for Illex and other fisheries). Recently revenues have been at record highs (Figure 3) and participation has been increasing (Table 10). Given the variability of the fishery, the baseline condition is best characterized as moderate positive.

Increasing participation and robust availability has led to closures in each year since 2017. Closure dates were September 15, 2017, August 15, 2018, August 21, 2019, and August 31, 2020. However, as recently as 2013-2016 landings and participation were much lower. Under Alternative 1, any and all of the current 74 *Illex* moratorium permits could potentially fish or not fish *Illex* during any year. All of them fishing in any year is very unlikely, as some have been re-purposed to other fisheries and are unlikely to re-enter the *Illex* fishery.

It is expected that fishing communities would continue to derive moderate positive impacts from *Illex* fishing, and that those impacts would vary from year to year given the nature of the *Illex* fishery. Due to the year-to-year variation in catch and effort in the fishery, it is difficult to fully quantify human community impacts but the current fishery supports a number of vessels, as described in Section 6.3, and provides a variety of jobs related directly to fishing and also in associated support services. To the extent that management affects *Illex* squid, the current conditions of the fishery should generally be maintained since the ABCs and catch should be sustainable given the Council's risk policy and implementation of that risk policy in specifications. A primary concern by the Council however has been disruption of participants and communities that are dependent on the fishery, due to increasing racing to fish. Several background information components illustrate the issue.

Over-Capacity Under No Action

The capacity of the vessels that would qualify under the least restrictive requalification criteria (Alternative 2) was estimated by this action's FMAT to be 58,526 MT for those 51 vessels. The capacity for the 23 non-qualifying vessels is uncertain given their lack of participation in the

Illex fishery, but since their capacities would be greater than zero, the capacity of the no action is greater than 58,526 MT. This total capacity estimate was based on a static number of trips (i.e. the number of trips each vessel took was held equal to 2019 levels), and a physical definition of capacity. For vessels that were not active in 2019, their capacity scores are taken from the average per vessel trip capacity for their vessel type in 2019 vessels, and the average number of trips that those vessel types took in 2019. The physical capacity estimates are based on the fixed vessel attributes, which in this case are length, horsepower, tonnage and hold capacity. The model used for this estimate has been used worldwide by the FAO, and also NMFS, to estimate vessel capacity. If trips increased, so would the capacity estimates. In 2019, the time period from May 15 until closure August 21 was 14 weeks. If the fishery had run another 4 weeks for a total of 18 weeks, that would have expanded the season by approximately 29%. If trips had expanded likewise had the quota not shut the fishery down, the capacity estimates would increase similarly. Accordingly, there is substantially more capacity in this fishery than the current quotas under the no-action alternative.

In terms of recently observed racing to fish, not only has the number of vessels participating increased substantially since the quota began to be caught in 2017 (Table 10), but the landings in the weeks before closures have been increasing both within years and more generally across years (figure 22). This supports industry testimony that the early closures are pushing vessels to fish harder than they otherwise would. The annual landings per active vessel were also declining over this period. The count of vessels landing over 100,000 pounds (which account for almost all landings) increased from 20 in 2017, to 26 in 2018, to 32 in 2019 (table 10). Dividing landings in those years by those counts of vessels results in average landings per primary active vessels declining from 2.5 million pounds per vessel in 2017, to 2.0 million pounds per vessel in 2018, and then to 1.9 million pounds per vessel in 2019, further demonstrating that the race to fish is diluting the quota available to each participating vessel before a closure occurs, and that there is excess capacity in the *Illex* fishery. Consistent racing to fish against the quota is a relatively new occurrence in the *Illex* fishery, occurring only in the most recent three years of the last 20 years 2000-2019 (the quota was achieved one other time, in 2004).

Ability of Additional Vessels to Increase Landings.

While it's not possible to know how vessels may participate in the future or at what level, it does appear that increased catch by even a handful of formerly latent/less active participants could have a substantial impact on how soon the fishery closes at the current quota, and what level of access participants with regular participation over the years may have in the future, potentially worsening racing to fish. In 2019, landings by the top 20 vessels accounted for 90% of the landings, and ranged from approximately 7.3 to 0.8 million pounds, with a median of 1.6 million pounds. The season lasted approximately 14 weeks, so the top vessel averaged around 0.52 million pounds per week and the median vessel (out of the top 20) averaged 0.12 million pounds per week. Based on this information, five inactive (or minimally active) permits performing like the top vessel for 10 weeks could thus land nearly 26 million pounds, or 47% of the quota. Five inactive (or minimally active) permits performing like the median of the top 20 vessels for 10 weeks could likewise land nearly 6 million pounds, or 11% of the quota.

Impacts on Dependent Vessels and Communities from No Action

As additional vessels enter the fishery or expand their participation, existing/historical participants will be able to catch less fish before the quota is exhausted, at least during productive years. Examination of revenue changes after closure indicates that historical participants are more impacted by closures than recent entrants. Staff compared the reduction in revenues for the 51 days before versus after the 2019 closure (on August 21) for the Tier 1 and Tier 2 vessels in the Council-recommended alternative #4. Combined Tier 1 revenues fell 76% after the closure, while combined Tier 2 revenues fell 32%.

No action would continue to increase the vulnerability of the more dependent vessels by allowing all 74 of the current permits status-quo access to the fishery. While new entrants gain the value of the quota they access, they are not as dependent on this fishery as the historical participants based on these relative revenue changes post-closure. Figures 17-28 in Section 5 describing dependence on *Illex* and the mix of revenues by species for qualifiers and non-requalifiers also show the differential dependence on *Illex* by historical versus latent and/or recently-entering participants.

In each action alternative the re-qualifying vessels as a group dad have their best revenue years in 2017-2019 due to increasing revenues from both scallops and *Illex*. Likewise non-requalifiers were also generally near or at their peak revenues as a group in 2017-2019 (Figures 2, 5, 8, 11). While these vessels have obtained high revenues in recent years, future disruption of access by those participants who are dependent on the *Illex* fishery is a concern of the Council due to potential impacts on the associated fishing communities. Given the small portion of landings that would be affected by any Alternative except Alternative 3, the requalifying vessels would only have landed a small amount of additional *Illex* had the non-requalifying vessels not participated in recent years, but again the focus is on looking forward and constraining recent/additional entry to preserve access for the historically dependent fleet. While the impacts on fishing communities can not be quantified, the dependencies of vessels with more regular landings that qualify for the higher Tiers are described in Figures 1-12. Analyses in this document also highlight the dependence of N. Kingston, RI and Cape May, NJ on *Illex*. In all cases the re-qualifying vessels with a history of landings exhibit a higher dependency on *Illex* than the non-requalifying vessels. Under no action, these more dependent vessels would continue to be vulnerable to quota dilution and disruption if more vessels enter the fishery or from recently-activated vessels. While from a vessel revenue perspective the total revenues will be very similar under all alternatives (expect perhaps Alternative 3), there is a potential for a moderate negative impact on fishing communities from the instability that could occur due to the historically more dependent vessels losing consistent access to the quota.

Other Impacts from No Action

-Adding additional capacity into an already overcapitalized fishery, whether via new participants' vessels or existing participants adding to their vessels' fishing power in an increasingly rushed attempt to catch a limited quota before closure, increases costs and dissipates profits (e.g. Warming 1911, Gordon 1954, Homans and Wilen 1997, Homans and Wilen 2005, or

Ling and Smith 2014). In the long run, the impact can be moderately negative as profits are dissipated due to higher costs.

Racing to fish is also known to negatively impact vessel safety (e.g. see NRC 1991 and FAO 2016 for reviews of related literature as well as Pfeiffer and Gratz 2016). No action would perpetuate the circumstance where recent/additional entry of previously latent vessels exacerbates racing to fish and thus safety issues. Safety issues can have high negative impacts for fishing participants and communities.

Catching the quota earlier may mean that smaller squid are harvested, which means that more individuals are harvested per metric ton, which can reduce yield per recruit and total yield given the fast-growing nature of *Illex* (NAFO 1978, NEFSC 1999). Quota/ABC overages, while small to date, also have the potential to negatively affect long term yield through overfishing. Given the apparent productivity of the *Illex* resource in recent years the negative impacts related to yield concerns are likely slightly negative.

Under no-action all current permit holders retain the current value of their permits. Permits can be sold as part of the vessel's permit package but cannot be split from other permits. Since the permits are typically sold as part of a package and often with a vessel, it is difficult to determine the value of a single permit, and based on staff conversations with industry, permit transactions have already been accounting for potential reduced access for permits without substantial history. However, given the recent performance of the fishery and discussions with industry contacts, an *Illex* permit could be worth $250,000 or more especially if it has good history (permit sales have already taken into account potential action to further restrict permits and the potential loss of permits with less history). Permits with less history, such as those that would not re-qualify, would sell for less according to staff discussions with industry contacts. However there may be decreased value for permits given their access to fish is less secure under the no action, so the net effect may be negligible, though there are distributional effects.

Increased entry/participation risks gear conflicts, as raised in public comments, both from commercial and recreational perspectives. User and/or gear conflicts could stem from overcrowding in the relatively small fishery area (between coral protection areas and other restricted gear areas inshore) or from inshore displacement of the historical fleet, which provided public comments that they (including large vessels) will be forced inshore into the summer longfin squid fishery from continued early *Illex* closures. It is hard to quantify the impacts of potential gear conflicts but based on public comments there appears to at least be the potential for decreased satisfaction by some fishermen due to the potential for gear conflicts. However there may be increased satisfaction from fishermen who retain their permits under no action, so the net effect may be negligible, though there are distributional effects among participants.

No action would also not impose the costs of vessel hold measurement requirements, a vessel hold baseline, and/or additional VMS reporting described in the action alternatives.

In summary, the no action, in the short run is likely to have moderate positive socioeconomic impacts related to the variable revenues, profits, and jobs typically supported by the *Illex* fishery. However in the long run, by not fully addressing racing to fish, there will likely be moderate

negative impacts compared to the baseline, primarily related to disruption of dependent participants and communities, profit dissipation, and safety issues.

Comparison with Alternatives 2-5

Distributional effects in terms of which vessels get to fish, are likely to generally cancel each other out as during a productive year the full quota is likely to be caught by all vessels except for Alternative 3. Compared to no action, all alternatives would impose the costs of vessel hold measurement requirements, a vessel hold baseline, and/or additional VMS reporting described in the action alternatives. These costs are uniform across the action alternatives but differ from the no action. The vessel hold measurement and VMS reporting parts of the action alternatives are likely to be slight negatives given their relatively low cost, all 74 vessels currently have VMS requirements, and some vessels already have hold measurements. The vessel hold baseline is also treated as a cost given it limits how vessels may be configured, but it is not possible to determine the nature of that cost for each vessel. Accordingly, the comparison focus below is on the general race to fish effects, which aligns with the primary concerns of the Council regarding this action (as described in the purpose and need statement above).

Alternative 2:
Relative to Alternative 2, which eliminates 24 vessels from the directed fishery, the no action would be slightly more negative in the long run but likely similar in the near-term. Total vessel revenues are unlikely to be substantially affected. Reducing participants will limit the potential for a worsening race to fish and associated problems, but the remaining vessels have sufficient capacity to race to fish and could still expand their capacities to harvest quota even faster. Thus the problems with racing to fish described above will likely persist, but they will be somewhat more limited with Alternative 2 than with no action.

Alternative 3:
Relative to Alternative 3, which eliminates 61 vessels from the directed fishery, the no action would be highly more positive. While the racing to fish issues might be eliminated for the remaining vessels, they could have issues catching the current quotas, especially if the season is short and/or vessel breakdowns occurred, which could reduce overall revenues, profits, and jobs.

Alternative 4:
Relative to Alternative 4, which eliminates 26 vessels from the primary directed fishery (not Tier 1 or Tier 2), the no action would be slightly more negative in the long run but likely similar in the near-term. Total vessel revenues are unlikely to be substantially affected. Reducing participants will limit the potential for a worsening race to fish and associated problems, but the remaining vessels have sufficient capacity to race to fish and could still expand their capacities to harvest quota even faster. Thus the problems with racing to fish described above will likely persist, but they will be somewhat more limited with Alternative 4 than with no action.

Alternative 5:
Relative to Alternative 5, which eliminates 25 vessels from the primary directed fishery (not Tier 1 or Tier 2), the no action would be slightly more negative. Total vessel revenues are unlikely to be substantially affected. Reducing participants will limit the potential for a worsening race to fish and associated problems, but the remaining vessels have sufficient capacity to race to fish and could still expand their capacities to harvest quota even faster. Thus the problems with racing to fish described above will likely persist, but they will be somewhat more limited with Alternative 5 than with no action.

7.5.2 ALTERNATIVE 2: "50,000 pounds 1997-2019"

Impacts can be divided into several categories. The first category of impacts consists of the primarily distributional access impacts between vessels based on losing or retaining a permit. In general these effects will cancel each other out among alternatives – one vessel's quota access loss is another's gain and there is no net impact for the fishery. These distributional access effects can be observed in Section 5 in the descriptions of the Alternatives. From the fishery access perspective the permits that would not requalify under this option landed 0% (rounded to nearest whole percent) of the total *Illex* landed from 2011-2013, 0% (rounded) of the total *Illex* landed from 2014-2016 and 0% (rounded) of the total *Illex* landed from 2017-2019. Given the high volume nature of the fishery, any permit that had any level of activity in the fishery would requalify under this option. From the permit-holders' perspective, *Illex* accounted for 0% of their landings in the same time periods. The distributional effects should be in proportion to recent landings that would have been impacted had these measures been in place, so the distributional impacts should be similar to no action and Alternative 5, and less than all other action alternatives.

The second category of impacts is related to the value of the permit as they can be bought and sold. This will also be largely a distributional issue. Permits can be sold as part of the vessel's permit package but cannot be split from other permits. Since the permits are typically sold as part of a package and often with a vessel, it is difficult to determine the value of a single permit, and based on staff conversations with industry, permit transactions have already been accounting for potential reduced access for permits without substantial history. However, given the recent performance of the fishery and discussions with industry contacts, an *Illex* permit could be worth $250,000 or more especially if it has good history (permit sales have already taken into account potential action to further restrict permits and the potential loss of permits with less history). Permits with less history, such as those that would not re-qualify, would sell for less according to staff discussions with industry contacts. Vessels that don't requalify lose the value of their permit, but those that do likely have the value of the permit increase, so the net effect is likely negligible and similar among all alternatives, though there are certainly distributional effects.

A third category of impacts relates to the vessel volume hold and reporting requirements. Requalifying or Tier 1 vessels would need to obtain hold measurements and be subject to a 10% upgrade restriction. The hold measurement/upgrade restrictions have associated costs. Informal contacts by council staff with a few marine surveyors revealed that a fish hold measurement

could run approximately $10-$80 per foot of vessel length, which could range from $750 - $6,000 for a 75 foot vessel to $1,500 - $12,000 for a 150 foot vessel, depending on the surveyor, the boat design, and travel expenses. To the extent that surveys are already required for insurance purposes these costs may be already part of a vessel's operating costs, and about a third of the requalifying *Illex* permitted vessels already have hold documentation due to their mackerel permits. Public comments indicated that such surveys can be found for the lower of the above ranges. The vessel hold baseline is treated as a cost given it limits how vessels may be configured, but it is not possible to determine the nature of that cost for each vessel. All limited access permitted *Illex* vessels must already use VMS and many already report their daily *Illex* catches via VMS. Accordingly, costs for clarifying that daily *Illex* catches by limited access vessels must be reported via VMS should be minimal. These costs are equal across the action alternatives, but differ compared to the no action are a slight negative impact on participants given the overall costs of fishing.

For comparing among alternatives (including the no action), a final impact category is the focus of comparative impacts, and includes examining fishery-wide impacts on total short term revenues as well as the long term issues with racing to fish.

Total short term revenues

Given Alternative 1 (no action), Alternative 2, Alternative 4, and Alternative 5 would all maintain a fleet with more than sufficient capacity to harvest recent quotas, they are all equal in that respect. Total *Illex* revenues would not be expected to differ among them in any given year and would primarily depend on the quota amounts and market prices. In the short run, those alternatives should allow the positive impacts from the operation of the *Illex* fishery to continue. However, because the small fleet in Alternative 3 may not harvest the quota, Alternatives 1, 2, 4, and 5 are equally more positive relative to Alternative 3. Because of the potential failure to harvest optimum yield under Alternative 3, all the other alternatives have equally high positive impacts compared to Alternative 3 from the perspective of total short term revenues.

Long Term Racing to Fish Issues

In the long run, by not fully addressing racing to fish, there will likely be moderate negative impacts primarily related to disruption of dependent participants and communities, profit dissipation, and safety issues as detailed under no action/Alternative 1. Relative to no action/Alternative 1, Alternative 2, which eliminates 24 vessels from the directed fishery, would be slightly more positive related to the racing to fish issues. While Alternative 2 eliminates 24 vessels, which will limit the potential for a worsening race to fish (and the negative impacts described for the no-action/Alternative 1), the remaining vessels have sufficient capacity to race to fish and could still expand their capacities to harvest quota even faster. Thus the problems with racing to fish detailed above for no action/Alternative 1 will likely persist (i.e. disruption of dependent participants and communities, profit dissipation, safety issues and yield reduction issues), but they will be somewhat more constrained with Alternative 2 than with no action. Based on the numbers of reduced permits in the action alternatives and accompanying trip limits among the action alternatives, Alternative 2 would have similar related impacts as Alternative 5

and negative impacts compared to Alternatives 3 and 4, at least in terms of racing to fish problems.

Summary

Alternative 2 should facilitate full attainment of the quota, and has relatively low distributional effects relative to recent fishery performance. The problems with racing to fish detailed above for no action/Alternative 1 will likely persist - they will be somewhat more constrained, but not as much as with other alternatives that result in a smaller fleet.

7.5.3 ALTERNATIVE 3: "1,000,000 pounds twice, both early and late"

Impacts can be divided into several categories. The first category consists of the primarily distributional access effects between vessels based on losing or retaining a permit. In general these effects will cancel each other out – one vessel's quota access loss is another's gain. These distributional access effects can be observed in Section 5 in the descriptions of the Alternatives. From the fishery perspective the permits that would not requalify under this option landed 12% (rounded to nearest whole percent) of the total *Illex* landed from 2011-2013, 3% (rounded) of the total *Illex* landed from 2014-2016 and 19% (rounded) of the total *Illex* landed from 2017-2019. From the permit-holders' perspective, *Illex* accounted for 6% (rounded) of their total landings revenues from 2011-2013, 1% (rounded) of their total landings revenues from 2014-2016 and 27% (rounded) of their total landings revenues from 2017-2019. The distributional effects should be in proportion to recent landings that would have been impacted had these measures been in place, so the distributional impacts should be greatest with this alternative compared to all others including the no action. Since with this alternative the quota may not be caught, distributional impacts may not cancel out (see below regarding impacts to total revenues).

The second category of impacts is related to the value of the permit as they can be bought and sold. This will also be largely a distributional issue. Permits can be sold as part of the vessel's permit package but cannot be split from other permits. Since the permits are typically sold as part of a package and often with a vessel, it is difficult to determine the value of a single permit, and based on staff conversations with industry, permit transactions have already been accounting for potential reduced access for permits without substantial history. However, given the recent performance of the fishery and discussions with industry contacts, an *Illex* permit could be worth $250,000 or more especially if it has good history (permit sales have already taken into account potential action to further restrict permits and the potential loss of permits with less history). Permits with less history, such as those that would not re-qualify, would sell for less according to staff discussions with industry contacts. Vessels that don't requalify lose the value of their permit, but those that do likely have the value of the permit increase, so the net effect is likely negligible and similar among all alternatives, though there are certainly distributional effects.

A third category of impacts relates to the vessel volume hold and reporting requirements. Requalifying or Tier 1 vessels would need to obtain hold measurements and be subject to a 10% upgrade restriction. The hold measurement/upgrade restrictions have associated costs. Informal contacts by council staff with a few marine surveyors revealed that a fish hold measurement could run approximately $10-$80 per foot of vessel length, which could range from $750 - $6,000 for a 75 foot vessel to $1,500 - $12,000 for a 150 foot vessel, depending on the surveyor, the boat design, and travel expenses. To the extent that surveys are already required for insurance purposes these costs may be already part of a vessel's operating costs, and about a third of the requalifying *Illex* permitted vessels already have hold documentation due to their mackerel permits. Public comments indicated that such surveys can be found for the lower of the above ranges. The vessel hold baseline is treated as a cost given it limits how vessels may be configured, but it is not possible to determine the nature of that cost for each vessel. All limited access permitted *Illex* vessels must already use VMS and many already report their daily *Illex* catches via VMS. Accordingly, costs for clarifying that daily *Illex* catches by limited access vessels must be reported via VMS should be minimal. These costs are equal across the action alternatives, but differ compared to the no action are a slight negative impact on participants given the overall costs of fishing.

For comparing among alternatives (including the no action), a final impact category is the focus of comparative impacts, and includes examining fishery-wide impacts on total short term revenues as well as the long term issues with racing to fish.

Total short term revenues

Under Alternative 3, we would still expect substantial *Illex* landings that would moderately positively impact fishing communities (see Section 6.3). Because of the potential failure to fully harvest optimum yield under Alternative 3 given the few vessels that would requalify, impacts are highly more negative compared to all the other alternatives from the perspective of total short term revenues.

Long Term Racing to Fish Issues

In the long run, by substantially (but not fully) addressing racing to fish, there will likely be moderate positive impacts primarily related to avoiding disruption of dependent participants and communities, profit dissipation, and safety issues as detailed under no action/Alternative 1. Relative to no action/Alternative 1, Alternative 3, which eliminates 61 vessels from the directed fishery, would be moderately more positive in terms of Racing to Fish Issues (i.e. disruption of dependent participants and communities, profit dissipation, safety issues and yield reduction issues). With so few vessels, the race to fish might be largely solved at current quota levels. Since all the other action alternatives would likely allow the race to fish to substantially persist, Alternative 3 is also moderately more positive in terms of Racing to Fish Issues in an equal and moderate degree compared to all the other action alternatives.

Summary

Alternative 3 may not facilitate full attainment of the quota, and has relatively high distributional effects relative to recent fishery performance. The problems with racing to fish detailed above for no action/Alternative 1 may be addressed given the small resulting fleet, but at the potentially high cost of not attaining the quota.

7.5.4 ALTERNATIVE 4: "Tier 1 Stops at 2013" (Preferred)

Impacts can be divided into several categories. The first category consists of the primarily distributional access effects between vessels based on losing or retaining a permit. In general these effects will cancel each other out – one vessel's quota access loss is another's gain. These distributional access effects can be observed in Section 5 in the descriptions of the Alternatives. With this alternative, the effects must be considered by Tier since the trips limits assigned to the Tiers would affect how impacted participants would be. Similar figures were constructed for each Tier alternative as were constructed for other non-tier action alternatives. Tier 3 vessels were included in the non-requalifier analysis to preserve data confidentiality – but they have not been substantially active in *Illex* recently (2017-2019). Similar to Alternatives 2 and 5, there appear to be negligible impacts for vessels that are in Tier 3 or would not requalify at all (Figure 8). There are no Tier 3 vessels that regularly derived a substantial portion of their revenues from *Illex*. In 2019 there was a new entrant into the fishery that would not requalify and in 2019 derived a substantial portion of their revenues from *Illex*. This level of granularity is typically confidential, but the permit owner has stated this in public comments already. The Council took the effect on this vessel into account when taking action, but ultimately decided that a single year of participation, after scoping for the action had already occurred, was not sufficient to justify re-qualification.

For Tier 2, there is more activity, especially in recent years (Figure 8). The impacts on those vessels are considered in the context of the proposed 62,000 pound trip limit. This trip limit was based on the median directed trip sizes by these vessels from 2017-2019 so that present participation could be robustly accounted for – there are negligible landings of *Illex* by these vessels over the 62,000 pound trip limit before 2017. Overall for alternative Tier 2 vessels under Alternative #4 (13 vessels), if 2015-2019 trips over the proposed 62,000-pound trip limit were limited to 62,000 pounds, the revenue loss represented 1.6% of total combined revenues for these 13 vessels over these five years ($1.1 million).[18] Revenues were reduced on a per-trip basis for each vessel's relevant trips and then summed and compared to each vessel's total annual revenues. 2015-2016 revenue losses would have been zero (all trips were below the trip limit). 2017 revenue losses would have been 0.8% of total combined revenues, with a loss range per vessel of 0% to 15.0%. 2018 revenue losses would have been 1.5% of total combined revenues, with a loss range of 0% to 3.6%. 2019 revenue losses would have been 4.7% of total combined revenues, with a loss range of 0% to 14.8%. So while there are some vessels that may have had more than negligible landings in 2019, in most years their revenues would have been minimally

[18] Staff confirmed that there are not substantial other species landings revenues on trips that have more than 20% of *Illex* revenues on a trip being affected.

affected. From a fishery perspective, any reduction in landings from these vessels due to the trip limit would be expected to be used by other vessels so there is minimal net effect on the fishery despite the distributional effects on these vessels.

Technical analyses by the FMAT indicate that the trip capacities for Tier 2 vessels are between approximately 90,000 pounds and 103,000 pounds so the proposed trip limit does introduce some inefficiency for Tier 2 vessels, but would allow some participation compared to not allowing any access. [19] The Council determined that providing some access justified the potential inefficiency introduced by the trip limit (impacts would be greater if they only had an incidental trip limit). The distributional effects should be in proportion to recent landings that would have been impacted had these measures been in place. As described in Section 5, Tier 3 vessels should be minimally impacted compared to recent landings but Tier 2 vessels would be more impacted especially in the most recent years due to the lower trip limits for Tier 2 under this Alternative. Thus relative to other alternatives, the distributional impacts are less than Alternative 3, but greater than Alternatives 1, 2, or 5. But again from a fishery perspective the distributional impacts likely cancel out.

It is not possible to precisely specify how the trip limit may affect the future profitability of vessels in Tier 2. Too many external factors affect future profitability, including: costs (e.g. fuel), *Illex* prices, other species' prices, variation in species' abundances, variation in species' availabilities, and variation in management. Several observations may be relevant for context however. These vessels operated with negligible *Illex* revenues before 2017. In 2017 only 1 vessels would have had more than 5% of revenues affected. In 2018 zero vessels would have had more than 5% of revenues affected. In 2019 only 3 vessels would have had more than 5% of revenues affected. Most of the affected vessels also made multiple trips near or under 62,000 pounds, suggesting, but not proving, that they can at least at times operate at a profit with trips of 62,000 pounds (again depends on myriad future conditions). However, landing less pounds/dollars on some trips will decrease these vessels annual profitability, but only slightly for most of them given *Illex* accounts for a small portion of their total annual revenues in most years. Also, if these vessels can not operate at a profit in the *Illex* fishery, most have other permits that they will likely use to re-optimize their fishing strategy, and they in fact used those other permits for almost all of their landings/revenues prior to 2017. It is not possible to predict which permits they might use since so many factors (some mentioned above) affect the profitability of each fishery for each participant in a given year. Based on past operations, Figure 8 suggests that these potential Tier 2 vessels have relied on a variety of species over the years, but primarily scallops and longfin squid. Given the management of scallops, these vessels cannot direct additional effort into the scallop fishery. Given the number of longfin squid Tier 1 moratorium permits that exist (about 228), it is not anticipated that some redirecting by these 13 vessels would have a substantial effect on the trajectory of longfin squid landings.

[19] The FMAT used observer data on costs to estimate a cost based per-trip capacity to compare against the trip limits being considered for Tier 2 in alternatives #4 and #5. The cost based estimates show the landings per trip needed to minimize a vessel's average total cost. This is termed the "optimal scale", or the point of minimum average total cost. Reported costs from sea sampled data were the basis of trip costs used in the "low cost estimates" scenario. "High cost" estimates doubled those costs since the observer data is likely missing some costs. Also included are depreciation and the opportunity cost of capital based on a previous study J. Walden published in Marine Policy, which did not change between scenarios.

There was some concern about whether the trip limits might interact with on-vessel processing type to create some unexpected impacts. For the 13 potential Tier 2 vessels, most have iced their recent *Illex* catch but there are several vessels that have refrigerated sea water or freezer capabilities. Discussion with L. Hendrickson (NEFSC), who provided the processing-type information, noted that vessels may change their processing type over time for from year to year. There is no available information that processing type would be a better indicator than recent landings quantities in terms of predicting impacts related to potential trip limits.

There was also some concern about how the Tier 2 trip limits and changes in behavior might affect processors. From 2017-2019 (again the years when these vessels began to have landings), the 13 vessels Tier 2 landed at 5 dealers and the total *Illex* landings from these 13 potential Tier 2 vessels represented 3% of the fish those dealers purchased in terms of dollar value, ranging from 1% to 7%. So these vessels' Illex landings represented a small percent of total purchases for a subset of *Illex* dealers. Given 1) the Tier 2 vessels may still land some *Illex* at these dealers, 2) vessels could land at different dealers regardless of this action, 3) if these Tier 2 vessels land less *Illex* some other vessel may land more *Illex* at these dealers, and 4) the small overall portion of their total purchases affected, it does not appear that the trip limits on these vessels should have a substantial impact on dealers.

The second category of impacts is related to the value of the permit as they can be bought and sold. This will also be largely a distributional issue. Permits can be sold as part of the vessel's permit package but cannot be split from other permits. Since the permits are typically sold as part of a package and often with a vessel, it is difficult to determine the value of a single permit, and based on staff conversations with industry, permit transactions have already been accounting for potential reduced access for permits without substantial history. However, given the recent performance of the fishery and discussions with industry contacts, an *Illex* permit could be worth $250,000 or more especially if it has good history (permit sales have already taken into account potential action to further restrict permits and the potential loss of permits with less history). Permits with less history, such as those that would not re-qualify, would sell for less according to staff discussions with industry contacts. Vessels that don't requalify lose the value of their permit, but those that do likely have the value of the permit increase, so the net effect is likely negligible and similar among all alternatives, though there are certainly distributional effects.

A third category of impacts relates to the vessel volume hold and reporting requirements. Requalifying or Tier 1 vessels would need to obtain hold measurements and be subject to a 10% upgrade restriction. The hold measurement/upgrade restrictions have associated costs. Informal contacts by council staff with a few marine surveyors revealed that a fish hold measurement could run approximately $10-$80 per foot of vessel length, which could range from $750 - $6,000 for a 75 foot vessel to $1,500 - $12,000 for a 150 foot vessel, depending on the surveyor, the boat design, and travel expenses. To the extent that surveys are already required for insurance purposes these costs may be already part of a vessel's operating costs, and about a third of the requalifying *Illex* permitted vessels already have hold documentation due to their mackerel permits. Public comments indicated that such surveys can be found for the lower of the above ranges. The vessel hold baseline is treated as a cost given it limits how vessels may be configured, but it is not possible to determine the nature of that cost for each vessel. All limited

access permitted *Illex* vessels must already use VMS and many already report their daily *Illex* catches via VMS. Accordingly, costs for clarifying that daily *Illex* catches by limited access vessels must be reported via VMS should be minimal. These costs are equal across the action alternatives, but differ compared to the no action are a slight negative impact on participants given the overall costs of fishing.

For comparing among alternatives (including the no action), a final impact category is the focus of comparative impacts, and includes examining fishery-wide impacts on total short term revenues as well as the long term issues with racing to fish.

Total short term revenues

Given Alternative 1 (no action), Alternative 2, Alternative 4, and Alternative 5 would all maintain a fleet with more than sufficient capacity to harvest recent quotas, they are all equal in that respect. Total *Illex* revenues would not be expected to differ among them in any given year and would primarily depend on the quota amounts and market prices. In the short run, those alternatives should allow the positive impacts from the operation of the *Illex* fishery to continue. However, because the small fleet in Alternative 3 may not harvest the quota, Alternatives 1, 2, 4, and 5 are equally more positive relative to Alternative 3. Because of the potential failure to harvest optimum yield under Alternative 3, all the other alternatives have equally high positive impacts compared to Alternative 3 from the perspective of total short term revenues.

Long Term Racing to Fish Issues

In the long run, by not fully addressing racing to fish, there will likely be moderate negative impacts primarily related to disruption of dependent participants and communities, profit dissipation, and safety issues as detailed under no action/Alternative 1. Relative to no action/Alternative 1, Alternative 4, which eliminates approximately 26 vessels from the primary directed fishery (Tiers 1 and 2), would be slightly more positive in terms of Racing to Fish Issues. While having fewer participants will limit the potential for a worsening race to fish, the remaining vessels have sufficient capacity to race to fish and could still expand their capacities to harvest quota even faster. Thus the problems with racing to fish detailed above for no action/Alternative 1 will likely persist (i.e. disruption of dependent participants and communities, profit dissipation, safety issues and yield reduction issues), but they will be somewhat more limited with Alternative 4 than with no action. Based on the numbers of reduced permits in the action alternatives and controls on Tier 2, Alternative 4 would have a more positive impact regarding limiting racing to fish than Alternatives 2 and 5 but a less positive impact than Alternative 3.

In terms of being the preferred alternative, the Council is aware that this alternative will not solve the over-capacity and racing to fish issues in the *Illex* fishery, but it is designed to prevent a scenario where there is substantial activation of latent effort and expansion of recently-activated effort, which would disrupt the vessels that more regularly rely on *Illex* for more substantial portions of their revenues. It is also designed to reduce impacts on more recently-entering vessels

through the proposed trip limits, which consider very recent landings which were higher and not reflective of long-term participation. With this alternative, the Council has attempted to balance the needs of vessels and fishing communities that have demonstrated more regular participation in the *Illex* fishery with present/new participation in the fishery, to reduce the chance that there is a rapid worsening of the race to fish and the associated challenges discussed in Section 4 and in the no-action/Alternative 1 impacts.

Summary

Alternative 4 should facilitate full attainment of the quota, and has moderate distributional effects relative to recent fishery performance. The problems with racing to fish detailed above for no action/Alternative 1 will likely persist - they will be somewhat more constrained, compared to the no action, and more so than Alternatives 2 and 5 (less so than Alternative 3).

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7.5.5 ALTERNATIVE 5: "Tier 1 qualification extends to 2019 with higher landings"

Impacts can be divided into several categories. The first category consists of the primarily distributional access effects between vessels based on losing or retaining a permit. In general these effects will cancel each other out – one vessel's quota access loss is another's gain. These distributional access effects can be observed in Section 5 in the descriptions of the Alternatives. With this alternative, the effects must be considered by Tier since the trips limits assigned to the Tiers would affect how impacted participants would be. Similar figures were constructed for each Tier alternative as were constructed for other action alternatives. Tier 3 vessels were included in the non-requalifier analysis to preserve data confidentiality – but they have not been substantially active recently (2017-2019). In almost all years there are no vessels in this group that derived a substantial portion of their revenues from *Illex*. Technical analyses by the FMAT indicate that the trip capacities for Tier 2 vessels are between approximately 85,000 pounds and 92,000 pounds so the proposed trip limit might introduce some slight inefficiency for Tier 2 vessels [20], but minimally so given their recent activity, which is the designed purpose for the Tier 2 trip limit in this alternative. As described in Section 5, a minimal proportion of recent landings were made by trips above the proposed Tier 2 trip limit. One vessel would have had losses in one year (2018) that amounted to less than 1% of their total 2018 revenues. So the inclusion of trip limits in Alternative 5 would not be expected to change recent operation of the fishery.

The distributional effects should be in proportion to recent landings that would have been impacted had these measures been in place. Thus relative to other alternatives, the distributional impacts are less than Alternatives 3 and 4, and similar to Alternatives 1 and 2. But again from a fishery perspective the distributional impacts likely cancel out.

The second category of impacts is related to the value of the permit as they can be bought and sold. This will also be largely a distributional issue. Permits can be sold as part of the vessel's permit package but cannot be split from other permits. Since the permits are typically sold as part of a package and often with a vessel, it is difficult to determine the value of a single permit, and based on staff conversations with industry, permit transactions have already been accounting for potential reduced access for permits without substantial history. However, given the recent performance of the fishery and discussions with industry contacts, an *Illex* permit could be worth $250,000 or more especially if it has good history (permit sales have already taken into account potential action to further restrict permits and the potential loss of permits with less history). Permits with less history, such as those that would not re-qualify, would sell for less according to staff discussions with industry contacts. Vessels that don't requalify lose the value of their permit, but those that do likely have the value of the permit increase, so the net effect is likely negligible and similar among all alternatives, though there are certainly distributional effects.

[20] The FMAT used observer data on costs to estimate a cost based per-trip capacity to compare against the trip limits being considered for Tier 2 in alternatives #4 and #5. The cost based estimates show the landings per trip needed to minimize a vessel's average total cost. This is termed the "optimal scale", or the point of minimum average total cost. Reported costs from sea sampled data were the basis of trip costs used in the "low cost estimates" scenario. "High cost" estimates doubled those costs since the observer data is likely missing some costs. Also included are depreciation and the opportunity cost of capital based on a previous study J. Walden published in Marine Policy, which did not change between scenarios.

A third category of impacts relates to the vessel volume hold and reporting requirements. Requalifying or Tier 1 vessels would need to obtain hold measurements and be subject to a 10% upgrade restriction. The hold measurement/upgrade restrictions have associated costs. Informal contacts by council staff with a few marine surveyors revealed that a fish hold measurement could run approximately $10-$80 per foot of vessel length, which could range from $750 - $6,000 for a 75 foot vessel to $1,500 - $12,000 for a 150 foot vessel, depending on the surveyor, the boat design, and travel expenses. To the extent that surveys are already required for insurance purposes these costs may be already part of a vessel's operating costs, and about a third of the requalifying *Illex* permitted vessels already have hold documentation due to their mackerel permits. Public comments indicated that such surveys can be found for the lower of the above ranges. The vessel hold baseline is treated as a cost given it limits how vessels may be configured, but it is not possible to determine the nature of that cost for each vessel. All limited access permitted *Illex* vessels must already use VMS and many already report their daily *Illex* catches via VMS. Accordingly, costs for clarifying that daily *Illex* catches by limited access vessels must be reported via VMS should be minimal. These costs are equal across the action alternatives, but differ compared to the no action are a slight negative impact on participants given the overall costs of fishing.

For comparing among alternatives (including the no action), a final impact category is the focus of comparative impacts, and includes examining fishery-wide impacts on total short term revenues as well as the long term issues with racing to fish.

Total short term revenues

Given Alternative 1 (no action), Alternative 2, Alternative 4, and Alternative 5 would all maintain a fleet with more than sufficient capacity to harvest recent quotas, they are all equal in that respect. Total *Illex* revenues would not be expected to differ among them in any given year and would primarily depend on the quota amounts and market prices. In the short run, those alternatives should allow the positive impacts from the operation of the *Illex* fishery to continue. However, because the small fleet in Alternative 3 may not harvest the quota, Alternatives 1, 2, 4, and 5 are equally more positive relative to Alternative 3. Because of the potential failure to harvest optimum yield under Alternative 3, all the other alternatives have equally high positive impacts compared to Alternative 3 from the perspective of total short term revenues.

Long Term Racing to Fish Issues

In the long run, by not fully addressing racing to fish, there will likely be moderate negative impacts primarily related to disruption of dependent participants and communities, profit dissipation, and safety issues as detailed under no action/Alternative 1. Relative to no action/Alternative 1, Alternative 5, which eliminates 25 vessels from the primary directed fishery, would be slightly more positive in terms of Racing to Fish Issues. While Alternative 5 eliminates 25 vessels from the primary directed fishery, which will limit the potential for a worsening race to fish, the remaining vessels have sufficient capacity to race to fish and could

still expand their capacities to harvest quota even faster. Thus the problems with racing to fish detailed above for no action/Alternative 1 will likely persist (i.e. disruption of dependent participants and communities, profit dissipation, safety issues and yield reduction issues), but they will be somewhat more limited with Alternative 5 than with no action. Based on the numbers of reduced permits in the action alternatives and accompanying trip limits among the action alternatives, Alternative 5 would have similar related impacts as Alternative 2 and negative impacts compared to Alternatives 3 and 4, at least in terms of racing to fish problems.

Summary

Alternative 5 should facilitate full attainment of the quota, and has low distributional effects relative to recent fishery performance. The problems with racing to fish detailed above for no action/Alternative 1 will likely persist - they will be somewhat more constrained, but not as much as with other alternatives that result in a smaller fleet.

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7.6 CUMULATIVE IMPACTS

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 protected species (i.e., ESA-listed and/or MMPA protected) 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 protected species (i.e., ESA-listed and/or MMPA protected), the context is largely focused since the 1980s and 1990s, when NMFS began generating stock assessments for marine mammals and turtles that occur in 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, January 1, 2022 through December 31, 2026. The temporal scope of this analysis does not extend beyond 2026 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 in Section 7.0 are focused on the cumulative effects of the proposed action (i.e., the suite of preferred alternatives) in combination with the relevant past, present, and reasonably foreseeable future actions over these time scales.

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. Some past actions are still relevant to the present and/or future actions.

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 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 included 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)[21], 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.

[21] "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."

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 placement of scour protection at wind turbine foundations, and over cables that are not buried to target depth in the sediment, converting soft substrates into hard substrates. This could alter species composition and predator/prey relationships by increasing favorable habitat for some species and decreasing habitat for others. The placement of wind turbines will also establish new vertical structure in the water column, which could serve as reefs for bottom species, fish aggregating devices for pelagic species, and substrate for the colonization of other species, e.g. mussels. Various authors have studied these types of effects (e.g. Bergström et al. 2013, Dannheim et al. 2019, Degraer et al. 2019, Langhamer 2012, Methratta and Dardick 2019, Stenberg et al. 2015).

Elevated levels of sound produced during site assessment activities, construction, and operation of offshore wind facilities will impact the soundscape[22]. 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

[22] See NMFS Ocean Noise Strategy Roadmap: https://cetsound.noaa.gov/Assets/cetsound/documents/Roadmap/ONS_Roadmap_Final_Complete.pdf

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)[23] (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[24] 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 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.

[23] See NMFS Ocean Noise Strategy Roadmap (footnote #2)

[24] Changes in required flight altitudes due to proposed turbine height would affect aerial survey design and protocols (BOEM 2020a).

Offshore wind energy development is being considered in parts of the outer continental shelf that overlap with nearly all Council-managed resources, but development in the offshore shelf-break/canyon area where the Illex fishery occurs is not expected in the near future. 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.[25] 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 (ESA-listed and/or MMPA protected), the severity of these behavioral or physiological impacts is based on the species' hearing threshold , the overlap of this threshold with the frequencies emitted by the survey, as well as the duration of time the surveys would operate, as these factors influence exposure rate (Ellison et al. 2011; Ellison et al. 2018; Finneran 2015; Finneran 2016; Madsen et al. 2006; Nelms et al. 2016; Nowacek et al. 2007; Nowacek et al. 2015; NRC 2000; NRC 2003; NRC 2005; Piniak 2012; Popper et al. 2014; Richardson et al. 1995; Thomsen et al. 2006; Weilgart 2013). If fishery resources are affected by seismic surveys, then so in turn the

[25] 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).

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.

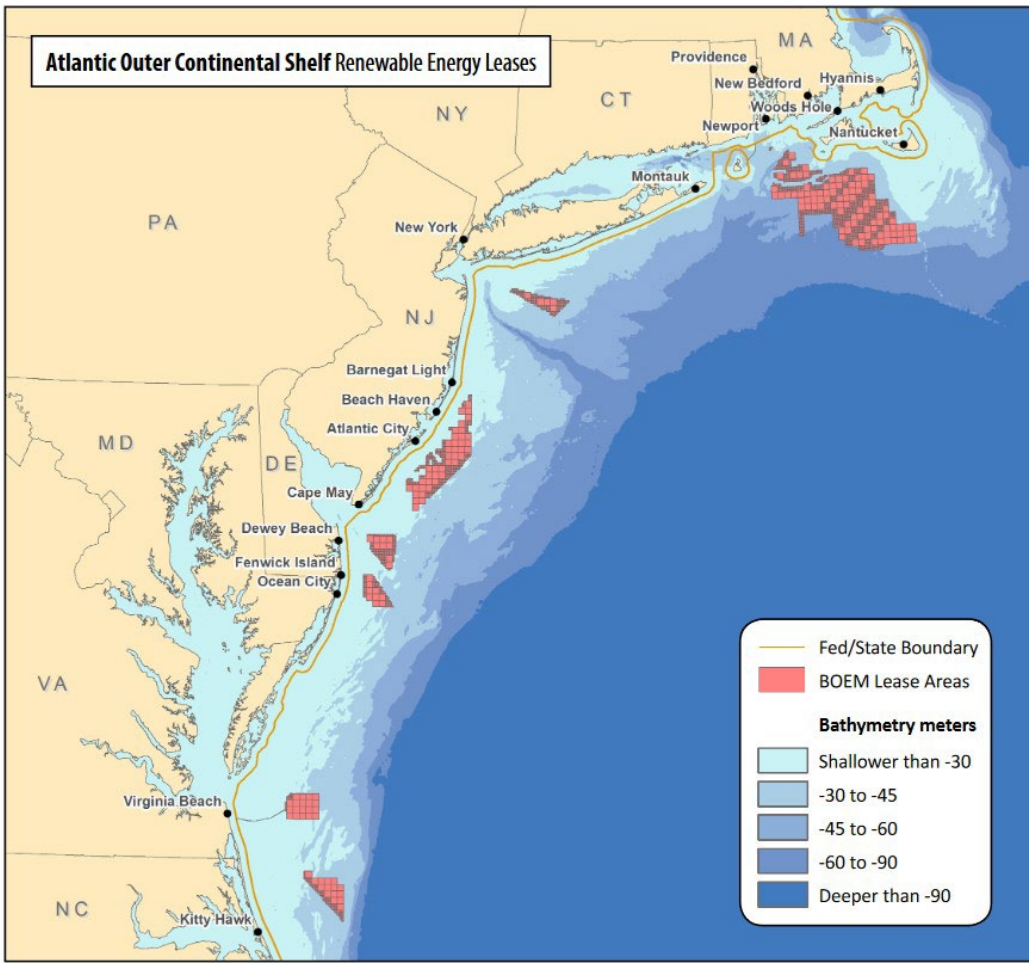

Figure 29: BOEM approved renewable energy lease areas in federal waters in the Atlantic Ocean off the Mid-Atlantic and New England
(source: BOEM Map Book of Outer Continental Shelf Renewable Energy Lease Areas, https://www.boem.gov/sites/default/files/renewable-energy-program/Mapping-and-Data/Renewable_Energy_Leases_Map_Book_March_2019.pdf)

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 30). 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 31). 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 30 (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.

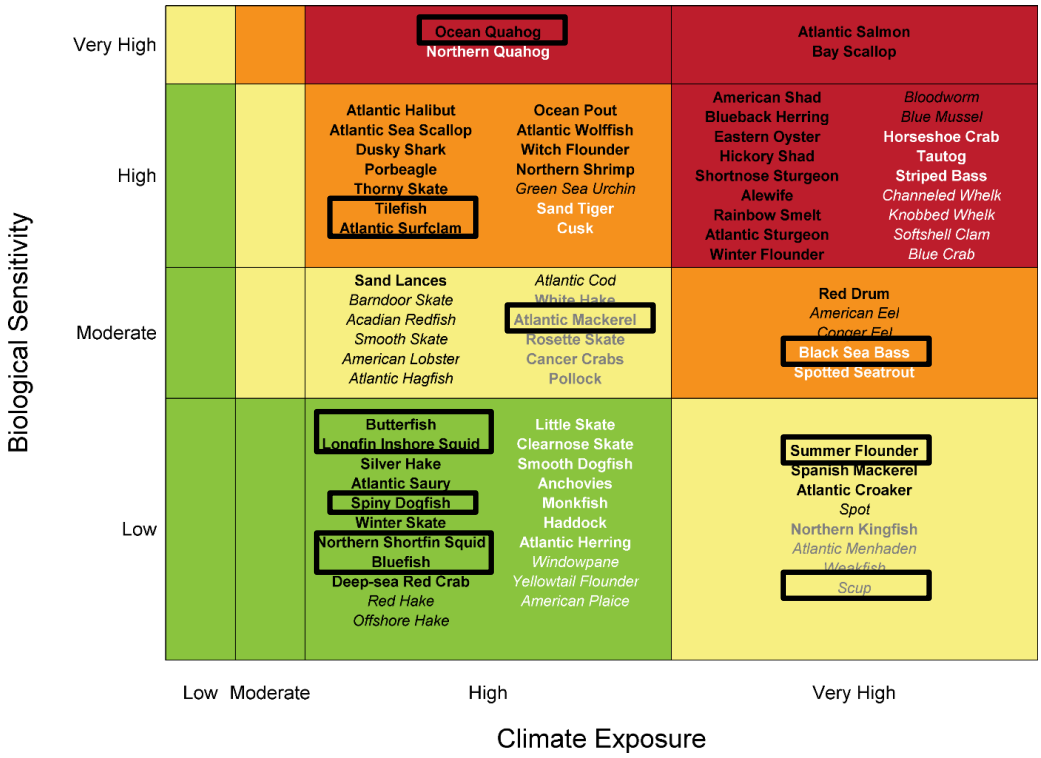

Figure 30: Overall climate vulnerability score for Greater Atlantic species, with Mid-Atlantic Council managed species highlighted with black boxes.
Overall climate vulnerability is denoted by color: low (green), moderate (yellow), high (orange), and very high (red). Certainty in score is denoted by 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.

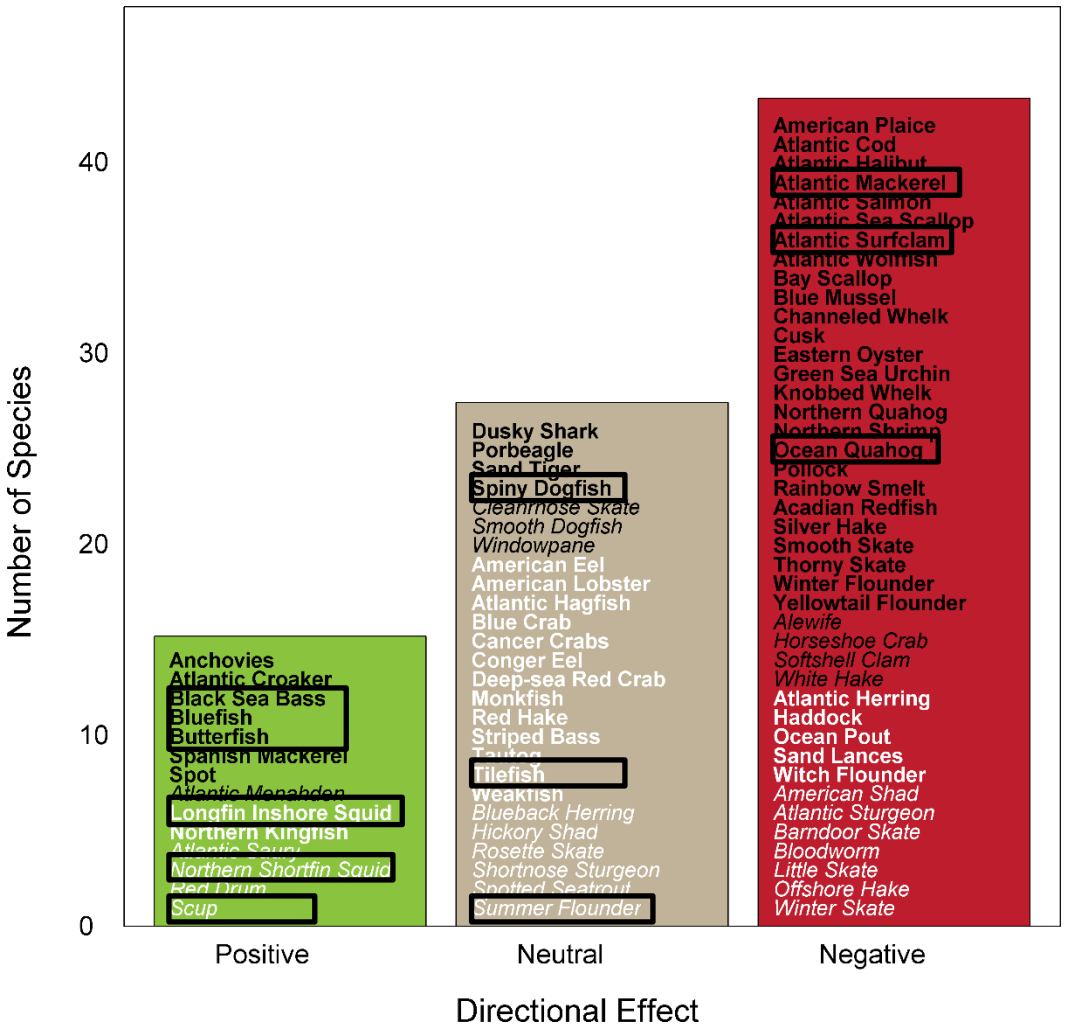

Figure 31: Directional effect of climate change for Council-managed species highlighted with black boxes.

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 alternative is not expected to result in significantly changed levels of fishing effort or substantial 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. 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 direct and indirect effects of the preferred permitting alternative is 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. The 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 and Habitat Areas of Particular Concern were 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 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 as related to habitat in this fishery. The preferred actions are thus expected to have no 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 action, *the cumulative effects are expected to yield non-significant impacts on habitat that are slight negative.*

7.6.3.3Magnitude 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.[26] Taking into consideration this information, past fishery management actions have contributed to a long-term trend toward positive 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

[26] 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.

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. By reducing participants, the preferred alternative would be expected to contribute to a reduction in quota overages and the associated unintended effort. So compared to no action, impacts would be negligible to slight positive for protected resources. Given the relatively minor effect on total Illex effort expected under this action, the impacts are not expected to be enough to alter the baseline conditions.

Overall, the relevant past, present, and reasonably foreseeable future actions, including the proposed action, *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.*

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

The combined impacts of past federal fishery management actions on non-target species have been mixed. 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 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. Given the very low bycatch in the *Illex* fishery, this action should have no impact on non-target species. 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 indirect effects of the preferred permitting alternative is 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.*

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. By additionally controlling participation, the preferred alternative should facilitate the continued participation of those vessels, communities, and people who are dependent on access to the *Illex* resource.

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.* Despite the potential for slight negative short-term effects on human communities due to reduced revenue to non-qualifiers, positive long-term effects are expected due to the long-term sustainability of the managed stocks and the avoidance of additional disruption due to excessive additional participation.

7.6.4 Proposed Action on all the VECs

The Council's preferred alternative (i.e. the proposed action) is 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 alternative is not expected to result in any significant impacts, positive or negative. The preferred alternatives would control participation in the Illex fishery without hindering optimum yield, thus providing for the sustained participation of the relevant fishing communities that have demonstrated dependence on the Illex resource.

The preferred alternative is expected to have slight positive impacts on the managed resource (*Illex*). There should be negligible non-target species effects given the very low bycatch, and slight positive habitat impacts given the slight impacts on effort as pertaining to habitat relative to the status quo. Impacts on protected resources should not be substantially changed. Human community effects vary by participant, but the Council judged that increasing participation could endanger the stability of the fishery and dependent communities and vessels based on recent fishery performance and early closures.

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 measure implemented in these fisheries, the overall long-term trend is positive.

There are no significant cumulative effects associated with the preferred alternatives based on the information and analyses presented in this document and in past FMP documents (see table below). 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 positive.

Table 21: Summary of cumulative effects of the preferred alternatives.

	Managed Resources	**Non-Target Species**	**Habitat**	**Protected Resources**	**Human Communities**
Direct/Indirect Impacts of Preferred Alternatives	slight positive (section 7.1)	Negligible (section 7.4)	Negligible to slight positive (section 7.2)	Slight negative to slight positive (section 7.3)	Slight positive (section 7.5)
Combined Cumulative Effects Assessment Baseline Conditions	Positive (sections 6.1 and 7.6)	Slight negative (section 6.1 and 7.6)	Slight Negative (6.2 and 7.6)	Slight Negative to Slight Positive (sections 6.4 and 7.6)	Positive (6.3 and 7.6)
Significant Cumulative Effects	None	None	None	None	None

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 fleets that would result from the preferred alternative would have more than sufficient capacity to fully harvest optimum yield despite the proposed access restrictions. Reducing the number of participants should mitigate additional acceleration of in-season quota usage and reduce the chance of quota overages that could contribute to 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 and 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.

(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, in accordance with the jurisdiction of U.S. law.

(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.

This action proposes to modify the *Illex* limited access moratorium permit system after the Council took into account (i.e. gave consideration to) various factors as required by the Magnuson-Stevens Act including but not limited to:

(A) present participation in the fishery – See section 6.3, which details present participation in the fishery. The preferred alternative utilizes several Tiers, and with the proposed trip limits, a very small percentage of recent revenues of vessels that do not re-qualify for unlimited trip limits are affected. Thus the effects on vessels that do not re-qualify for Tier 1 permits are generally small. Partly to account for present participation, the Council extended qualification for Tier 2 through 2018 – the Council had identified this *Illex* action as a possible addition to 2018 activities in late 2017 (it was included as such in the 2018 Implementation Plan), and the topic was specifically noticed in the Federal Register for the October 2018 meeting and discussed at that meeting. Thus there is some consideration for landings extending through the entire calendar year when development of this action had already begun. The trip limits for Tiers 2 and 3 also take into account landings through 2019, even beyond the qualification date to further account for present/recent participation.
(B) historical fishing practices in, and dependence on, the fishery – see section 6.3
(C) the economics of the fishery – see sections 6.3 and 7.5
(D) the capability of fishing vessels used in the fishery to engage in other fisheries – see sections 6.3 and 7.5, which details other permits held by participants and the other fisheries that contribute revenues for affected vessels.
(E) the cultural and social framework relevant to the fishery and any affected fishing communities – see sections 6.3 and 7.5. Public comments throughout the process also facilitated taking into account and considering these issues.
(F) the fair and equitable distribution of access privileges in the fishery – the Council based re-qualification on landings history with consideration of investments that may have been made near the time of the utilized control date (2013). Provisions for Tier 2 also allow qualification landings into the year when development of this action began. During the qualification periods recommended in this action, the *Illex* moratorium permits in question had access to the *Illex* fishery and the proposed management measures are not expected to discriminate between residents of different States. The 2013 control date was noticed in the Federal Register, and subsequent GARFO permit renewal applications through the initiation of this action (which was also noticed in the Federal Register) highlighted the 2013 control date.

Limiting participation should limit worsening of racing to fish, increasing the likelihood that fishery closures can be accurately projected and implemented. This reduces chances for ABC overages, which promotes conservation. No analysis has suggested that the resulting fleet would allow an individual or corporation to acquire or control an excessive number of permits.

(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.

By reducing the number of permits, the risk of additional racing to fish should be lowered. This allows remaining vessels to fish in ways that are more efficient given their overall operations and preserve access to the fishery by vessels that have demonstrated dependence upon *Illex*. In setting trip limits for Tiers 2 and 3 in the preferred alternative, the Council also directly considered the efficiency of different trip limits based on analysis from the Social Sciences Branch of the NEFSC. The Council's recommended action is based on a number of considerations besides economic allocation, as described in Section 4.

(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. The preferred alternative was developed in response to the changing nature of the *Illex* fishery and recent early closures partly due to recent increases in participation.

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

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.

(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.

This national standard reflects the core intent of this action. The increased participation and early closures have degraded the sustained participation of communities that have demonstrated dependence on the *Illex* resource. Allowing continued expansion of participation under the current/status-quo limited access system has the potential to impose adverse effect on dependent fishing communities as the season may be further reduced. This action is designed to increase stability of quota access to requalifying vessels. The proposed Tier system is designed to minimize the adverse effects on those

vessels that would not re-qualify, because the proposed Tier trips limits allow participation at a level that would not impact a substantial portion of those vessels total revenues.

(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 Magnuson-Stevens Act 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 in the squid fisheries to the extent practicable, as described elsewhere in this document. The proposed measures are not anticipated to change this situation.

(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. By reducing increases in the race to fish by reducing participants, the proposed permit restrictions could slightly help mitigate incentives to fish for quota in dangerous conditions to secure landings before closures. The proposed permit changes also should enable the remaining vessels to increase revenues, that could be used to maintain vessels and safety equipment.

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 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) and summarized at http://www.greateratlantic.fisheries.noaa.gov/regs/infodocs/msbinfosheet.pdf. 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 Atlantic Mackerel, Squid, and Butterfish 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

This provision is addressed via assessments that are conducted through a peer-reviewed process at the NMFS Northeast Fisheries Science Center. The available information is summarized in every Amendment and Specifications document – see Section 6. Full assessment reports are available at: https://www.fisheries.noaa.gov/new-england-mid-atlantic/population-assessments/fishery-stock-assessments-new-england-and-mid-atlantic. Given the limited information on MSY for *Illex*, the Council's SSC has used a number of ancillary analyses to develop an ABC that should be sustainable. An ongoing assessment may provide additional information on MSY in the near future.

(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 and capacity analyses, if the species in this FMP 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. New analyses specific to *Illex* are presented in this document that show the fleet resulting from the preferred alternatives would have more than sufficient capacity to harvest optimum yield.

(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

Amendments 8 and 9 to the fishery management plan established biological reference points for the species in the plan, and Amendment 10 contained measures for butterfish rebuilding. Framework 13 established a 5-year rebuilding program for Atlantic mackerel. If a fishery is declared overfished or if overfishing is occurring, another Amendment or Framework would be undertaken to implement effective corrective measures.

(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 developed an updated standardized bycatch reporting methodology to address a court order. See https://www.fisheries.noaa.gov/new-england-mid-atlantic/fisheries-observers/fisheries-monitoring-operations-northeast 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 Atlantic mackerel, squid, and butterfish 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 for *Illex* squid; previous actions, including the EA for 2021 MSB specifications also updated this information.

(14) to the extent that rebuilding plans or other conservation and management measures which reduce the overall harvest in a fishery are necessary, allocate any harvest restrictions or recovery benefits fairly and equitably among the commercial, recreational, and charter fishing sectors in the fishery.

This action is not implementing a rebuilding plan or reducing overall harvest in the *Illex* fishery.

(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. While Illex is exempt from annual catch limits, Acceptable Biological Catch (ABC) 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 CFR (https://www.ecfr.gov/cgi-bin/ECFR?page=browse).

8.1.3 Discretionary Provisions of the Magnuson-Stevens Act

Section 303b of the Magnuson-Stevens Act contains 14 additional discretionary provisions for Fishery Management Plans. They may be read on pages 59 and 60 of the National Marine Fisheries Service's redline version of the Magnuson-Stevens Act at: http://www.nmfs.noaa.gov/msa2007/MSA_Amended%20by%20Magnuson-Stevens%20Reauthorization%20Act%20%281-31-07%20draft%29.pdf.

Critical for this action, as discretionary provisions of FMPs, the Magnuson-Stevens Fishery Conservation and Management Act (MSA) states that any FMP may establish a limited access system for the fishery in order to achieve optimum yield if, in developing such system, the Council and the Secretary take into account—

(A) present participation in the fishery;
(B) historical fishing practices in, and dependence on, the fishery;
(C) the economics of the fishery;
(D) the capability of fishing vessels used in the fishery to engage in other fisheries;
(E) the cultural and social framework relevant to the fishery and any affected fishing communities;
(F) the fair and equitable distribution of access privileges in the fishery; and
(G) any other relevant considerations.

The Council considered a range of options for re-qualifying permits so that present participation and historical practices were taken into account. The impact analyses in this document also helped for these

issues to be taken into account. The information presented in this document considers the economics of the fishery so that impacts to communities can be accounted for. The ability, or lack of ability of vessels to participate in other fisheries was considered and taken into account through the economic analyses in Section 7.5. The extensive comments from potential participants also allowed for various perspectives on fairness and equity to be taken into account.

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, 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. 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?

As described in Section 7 of this document, the proposed action is not expected to substantially increase effort, decrease effort, or change the overall nature of how fishing is conducted for MSB species. There may be slight impacts associated with the proposed action for maintaining the sustainability of the *Illex* squid fishery by avoiding quota overages, but they are not expected to be significant. Further limiting access may have some positive socioeconomic impacts for re-qualifiers and some negative socioeconomic impacts for non re-qualifiers but again they are not expected to be significant given each group's respective fishery performance.

Managed resources (Section 7.1)

Since additional racing to fish should be mitigated by avoiding some activation of latent effort (i.e. the vessels that would be removed or have access limited), this alternative should help closures occur in a timely fashion before quota/ABC overages occur, which has happened in recent years. The impact is slight positive since quota/ABC overages have been relatively small compared to the overall ABC, and recent changes to monitoring should also minimize the risk of future substantial overages. Given the relatively very low incidental catches of other managed species in the *Illex* fishery, other species managed in the FMP should not be affected (and any catches that do occur have been and will continue to be accounted for in their own management).

Habitat (Section 7.2)

There is no information to suggest that the preferred alternative would substantially change the operation of the fishery in terms of overall effort or the general character of the effort as pertaining to habitat, but might involve slightly lower effort related to avoiding quota overages. Therefore compared to taking no action, the preferred action would have negligible to slight positive impacts (impacts would remain slight negative).

Protected Resources (Section 7.3)

By reducing participants, the preferred alternative would be expected to contribute to a reduction in quota overages and the associated unintended effort. So compared to no action, impacts would be negligible to slight positive for protected resources. Given the relatively minor effect on total *Illex* effort expected under this action, the impacts are not expected to be enough to alter the baseline conditions.

Non-target fish species (Section 7.4)

For non-target species specific to this action, there should be negligible impacts - there is relatively very low incidental catches of other species in the *Illex* fishery, and there is no information to suggest that the preferred alternative would substantially change the operation of the fishery in terms of overall effort or the general character of the effort in any way that would substantially affect non-target catches.

Socio-Economic and Human Communities (Section 7.5)

Human community impacts from the preferred alternative are mixed among participants. Compared to taking no-action, this alternative would have a moderate positive impact on re-qualifiers because they would obtain more secure access to the quota and the value of their permit would likely increase. Compared to taking no-action, this alternative would have a moderate negative impact on non-re-qualifiers for Tier 1 (with an unlimited trip limit) because they would lose some directed fishing access to the squid quota and would also lose the value of their permit or have that value reduced through Tiering. Permits are often sold in packages and the value of a single permit can be hard to determine. The impact is moderate because if the vessels had a substantial history of *Illex* catches they would have requalified. Overall, given the dependence of both historical participants and some communities on *Illex*, the Council judged that reducing the chance of further overcapitalization through this action would provide an overall benefit to human communities. While to some degree this action involves a transfer of impacts, the Council judged that limiting participants will increase the stability of the fishery and create benefits for the remaining participants, providing for more sustained participation by those vessels and communities that have demonstrated dependence on the *Illex* fishery through their landings history.

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. The proposed action could limit competition for fish, allowing operators the flexibility to avoid poor weather conditions, resulting in fewer safety concerns overall. 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, and follows a similar process conducted for longfin squid several years ago. No unexpected effects arose due to implementation of that action. The preferred alternatives are based on a combination of scientific information and policy choices. The scientific information upon which the alternatives are based has been reviewed by subject matter experts or otherwise peer reviewed. The alternatives were developed through a public process with many opportunities for public input. As a result, the described effects of the proposed action on the quality of the human environment are not expected to be highly controversial from a scientific perspective.

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, as described in Section 7 of this document, none of the measures substantially alter the way the industry conducts fishing activities for the target species. As a result, the effects on the human environment of the proposed measures are not highly uncertain nor do they involve unique or uncertain 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 impacts of the preferred alternatives on the biological, physical, and human environment are described in Section 7 of this document. The overall interactions 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 impacts 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 also 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 lead to an 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 increase interaction risks to ESA-listed species.

This action falls within the range of impacts considered in the Batched Fisheries Biological Opinion for the Atlantic Mackerel, Squid, and Butterfish 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 listed 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, the proposed action is not likely to adversely affect any designated critical habitat. The Atlantic mackerel, squid, and butterfish fisheries will not affect the essential physical and biological features of North Atlantic right whales or loggerhead (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?

As provided in section 6.4, the MSB fisheries has the potential to interact with various species of marine mammals protected under the MMPA. 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 and there are minimal non-target interactions in the *Illex* fishery. 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 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 change 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.)?

Illex are prosecuted using bottom otter trawls, which have the potential to impact bottom habitats. Minimal non-target species are taken incidentally to the prosecution of the *Illex* fishery. Fishing effort is not expected to substantially increase or decrease 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?

There is no evidence or indication that these fisheries have ever resulted or would ever result in the introduction or spread of nonindigenous species, and this action is not expected to change the general operation of the fishery.

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 which inhabit the management unit of this FMP that are afforded protection under the Marine Mammal Protection Act of 1972 (MMPA) are described in Section 6.4. None of the measures are expected to significantly alter fishing methods or activities or result in 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 inhabit the management units of the subject fisheries. 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 NMFS on December 16, 2013. The Opinion concluded that the fishery 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 Magnuson-Stevens Act 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 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 modify existing collections and add new collections associated with a new baseline measurement and upgrade restriction. NMFS is preparing the appropriate supporting statements to document such changes to existing collections under the Paperwork Reduction Act.

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 Executive Order 12898 (Environmental Justice)

Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations provides guidelines to ensure that potential impacts on these populations are identified and mitigated, and that these populations can participate effectively in the NEPA process (EO 12898 1994). 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. There is insufficient demographic data on participants in the Illex fishery (i.e., vessel owners, crew, dealers, processors, employees of supporting industries) to quantify the income and minority status of potentially affected fishery participants. However, it is qualitatively known that people of racial or ethnic minorities constitute a substantial portion of the employees in the seafood processing sector, particularly in communities such as New Bedford. Without more data, it is

difficult to fully determine how this action may impact various population segments. 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 Illex fishery.

For primary port communities relevant to this action (Section 6.3.2), county level minority rates are well below the state averages, except Hampton, VA. Poverty rates are below or within 3% of state averages. The NOAA Fisheries Community Social Vulnerability Indices, especially the poverty, population composition, and personal disruption indices can help identify the communities where environmental justice may be of concern. New Bedford, MA is a primary ports that ranked high for at least one of these three indices; Hampton, VA ranked medium for all three indexes. Regarding 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 for Illex.

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.

Together with the associated proposed rule, 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 Magnuson-Stevens Act; 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 Magnuson-Stevens Act; 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 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 year when development begun, 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 primarily 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 involves 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 at the end of this document includes the Regulatory Flexibility Act Analysis to assess whether this action will have a "significant impact on a substantial number of small entities."

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 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

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10.0 LIST OF AGENCIES AND PERSONS CONSULTED

In preparing this document 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 or participation with 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.

11.0 LIST OF PREPARERS AND POINT OF CONTACT

This environmental assessment was drafted by Jason Didden of the MAFMC staff. Review and document improvement was conducted jointly with the NMFS staff at the Greater Atlantic Regional Office in Gloucester, MA and the Northeast Fisheries Science Center in Woods Hold, MA. 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 INITIAL REGULATORY FLEXIBILITY ANALYSIS 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 basis of the rules proposed in this action are the provisions of the MSA for federal fishery management to establish a limited access system. Limited access has been previously incorporated into the MSB FMP and this action could modify the existing provisions regarding limited access.

This action is needed to 1) prevent future excessive increases in participation in the directed *Illex* fishery. The purpose of this action is to consider measures that would further limit access in the *Illex* fishery.

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 detailed in Section 4.1, while a full description of all alternatives is provided in Section 5.

Preferred Alternative Overview

Alternative 4: Under Alternative 4, a Tiered system would be created. The proposed tiers, qualification criteria, and trip limits are described in the table below. Only current moratorium permits could potentially requalify, so having a current moratorium permit is also a requirement.

Tier	Qualification Criteria	Trip Limit	Approximate Qualifying Vessels
1	Either: Landed at least 500,000 pounds *Illex* in at least one year between 1997 and 2013, or Purchased and installed a refrigerated seawater system, plate freezing system, or blast freezer between January 1, 2012 and August 2, 2013 and landed a minimum of 200,000 pounds of *Illex* in the 2013 fishing year	None	35
2	Landed at least 100,000 pounds *Illex* in one year between 1997 and 2018	62,000 pounds	13
3	Landed at least 50,000 pounds *Illex* in one year between 1997 and 2018	20,000 pounds	2

Approximately 25 vessels would not requalify, and would only be eligible for an open-access incidental permit. With this alternative, analyses (further discussed in Section 7) indicate that the fishery would have more than sufficient capacity to harvest the current quota , even if making similar numbers of trips per vessel as vessels made in 2019. Requalifying Tier 1 permits would have to obtain a baseline measurement of their vessel fish hold volume and be subject to a 10% upgrade restriction on vessel fish hold volume. Requalifying permits would be required to report daily catch reporting of *Illex* via Vessel Monitoring Systems (VMS).

Rationale for Alternative 4 as preferred: The Council acknowledged that this action would have positive and negative economic consequences for some fishery participants but ultimately concluded

that Alternative 4 best balances the needs of historic participants, present participants, and fishing communities when considering the provisions of the MSA and guiding National Standards (see sections 4.2 and 8.1 for detailed discussions). Of the options considered by the Council, this alternative would requalify a middle range of vessels – other alternatives requalify more or less vessels. The volumetric baseline and upgrade restriction is designed to help freeze the footprint of the fishery's physical capacity, and the VMS reporting measure clarifies ambiguity in current regulations that are designed to assist quota monitoring.

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

The measures proposed in this action apply to entities that hold limited access permits for *Illex* squid. In 2019 there were approximately 68 *Illex* moratorium permits on vessels, with another 7-8 "on the shelf" in *confirmation of permit history*. Of the 68 permits on vessels, they belonged to 55 separate entities[27]. Of those 55 entities, 54 had some revenues in 2019. All of the entities that had revenue fell into the commercial fishing category. Of those with revenues, all but 5 were considered small businesses based on current SBA definitions (under $11 million to be a commercial fishing small business entity). Counting the entity with no revenues as a small entity, there were 50 small entities. For those 49 small business entities with revenues, their average revenue was $2.5 million in 2019. The 5 that were considered larger than small businesses averaged $24.7 million.

C – Description and estimate of economic impacts on small entities

The economic impacts are described in detail in Section 7.5 of this document, and summarized below for the preferred alternatives that would change management measures.

Alternative 4- This alternative would requalify approximately 35 vessels with a Tier 1 permit that continues to allow unlimited landings when the fishery is open, 13 permits for a Tier 2 permit that would allow trips up to 62,000 pounds, and 2 permits for a Tier 3 permit that would allow trips up to 20,000 pounds. 25 vessels with current moratorium permits would only be able to apply for an incidental permit. The 35 vessels which could receive a Tier 1 permit would have positive impacts related to reduced dilution of available quota among participants and their permit's value would likely rise accordingly. Tier 3 vessels were not active 2017-2019 so their negative impacts do not relate to recent revenues, but the value of the permit itself would still be reduced due to the lower trip limit. Permits can be sold as part of the vessel's permit package but cannot be split from other permits. Since the permits are typically sold as part of a package and often with a vessel, it is difficult to determine the value of a single permit, and based on staff conversations with industry, permit transactions have already been accounting for potential reduced access for permits without substantial history. However, given the recent performance of the fishery and discussions with industry contacts, an *Illex* permit could be worth $250,000 or more especially if it has good history (permit sales have already taken into account potential action to further restrict permits and the potential loss of permits with less history). It is not possible to estimate what the residual value of a Tier 3 permit might be. While the original permit holders did not have to pay for their permit, those who have acquired a permit through transfers likely paid for a permit suite that included the *Illex* permit. Permits with less history, such as those that would not re-qualify, would sell for less according to staff discussions with industry contacts.

[27] Based on ownership data provided by the Social Science Branch of NMFS' Northeast Fisheries Science Center

For the 13 vessels that would be in Tier 2 under Alternative 4, if 2015-2019 trips over the proposed 62,000-pound trip limit were limited to 62,000 pounds, the revenue loss represented 1.6% of total combined revenues for these 13 vessels over these five years ($1.1 million). 2015-2019 is considered since participation has changed in recent years and this 5-year period illustrates the changes. Revenues were reduced on a per-trip basis for each vessel's relevant trips and then summed and compared to each vessel's total annual revenues. 2015-2016 revenue losses would have been zero. 2017 revenue losses would have been 0.8% of total combined revenues, with a loss range of 0% to 15.0%. 2018 revenue losses would have been 1.5% of total combined revenues, with a loss range of 0% to 3.6%. 2019 revenue losses would have been 4.7% of total combined revenues, with a loss range of 0% to 14.8%. The value of the permit itself would also be reduced due to the attachment of a trip limit (see above discussion regarding permit values). It is not possible to estimate what the residual value of a Tier 2 permit might be.

For the vessels that would not receive any Tiered permit, only one had landings that would be affected by the incidental 10,000 pound trip limit, but in 2019 a majority of it's revenues would be impacted. This level of granularity is typically confidential, but the permit owner has stated this in public comments already. The 25 vessels not receiving any Tiered permit would also lose the value of their permit, in a similar fashion as described above for Tiers 2 and 3, but to a greater degree since they could only obtain an incidental permit if this action is implemented. Since an incidental permit is open access, there is no particular value for possession of an incidental permit.

D/E – An explanation of the criteria used to evaluate whether Alternative 4 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

This measure would not impose significant impacts on a substantial number of small entities, because few vessels (40) would be impacted, and the impacts to those vessels appear slight based on the mostly minor contribution of *Illex* to their average revenues. The hold measurement requirement does not present a substantial cost (and many already have obtained the measurements due to requirements in the mackerel fishery). Most vessels are already reporting their catches via VMS and this action merely clarifies that this is required due to some ambiguity in the current regulations.

F – A description of, and an explanation of the basis for, assumptions

Other than those described directly in the above analyses, the primary assumption utilized in the above analyses is that comparing future fishery operation to how the fishery operated over 2015-2019 is appropriate. Using recent 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 measures.

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." 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 in Section 4 above.

Consistent with those objectives, the proposed measures seek to facilitate optimum yield consistent with avoiding overfishing, reducing worsening of racing to fish, and providing for the sustainability of dependent fishing communities. While further limiting access does reduce flexibility for some harvesters, it should help maintain access for active harvesters (improving their own flexibility). Vessels that would lose access do not appear to have substantial dependence on access to the *Illex* fishery.

AFFECTED ENTITIES

A description of the entities affected by this action is provided in section 12.1 above, and Section 6.6 provides additional detail on participation in the MSB fisheries.

PROBLEM STATEMENT

This action is **needed** due to 1) the staleness of the MSB FMP objectives and 2) the rapid increases in fishing participation[28] leading to associated fishing community effects related to the current number of permitted vessels in the directed *Illex* fishery and early fishery closures. The associated **purposes** of this action are 1) to develop modernized MSB FMP goals and objectives and 2) to consider further limiting access to the *Illex* fishery.

ANALYSIS OF ALTERNATIVES and DETERMINATION OF EXECUTIVE ORDER 12866 SIGNIFICANCE

Executive Order 12866 requires a review of proposed regulations to determine whether or not the expected effects would be significant. Consideration of the 4 factors mentioned above provides support that this action is not significant for purposes of Executive Order 12866.

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;

The entire *Illex* fishery is worth $30 million or less annually, and only a relatively small portion of the overall fishery may be affected by this action, as described in Section 7. Also as described in Section 7, the proposed measures should help maintain the sustainability of vessels and communities that are dependent on the *Illex* fishery, and as such should positively rather than adversely affect 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;

This action is consistent with previous actions by the Council and NOAA Fisheries, and there is no known conflict with other agencies.

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

There is no known impact on any entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof.

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.

This action is consistent with previous actions by the Council and NOAA Fisheries, and there is no known conflict with legal mandates, the President's priorities, or the principles set forth in the Executive Order.

As such, the Proposed Action is not considered significant as defined by Executive Order 12866.

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Appendix 1 – Annual State by State *Illex* landings.

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DOC/NOAA FISHERIES/GARFO
APSD MONITORING & ANALYSIS DIVISION
ILLEX SQUID LANDINGS & VALUE BY STATE 2000 - 2019
FROM NMFS DEALER WEIGHOUT DATABASE

YEAR	MAINE			MASSACHUSETTS			RHODE ISLAND		
	LBS LAND	VALUE	EX-VESSEL PRICE	LBS LAND	VALUE	EX-VESSEL PRICE	LBS LAND	VALUE	EX-VESSEL PRICE
2000				15,245	$6,004	$0.39	9,066,006	$2,109,796	$0.23
2001				582	$279	$0.48	7,143,562	$1,604,540	$0.22
2002				3,765	$1,905	$0.51	5,264,144	$1,255,271	$0.24
2003							10,161,786	$3,206,424	$0.32
2004				1,277	$785	$0.61			
2005				181,487	$134,944	$0.74	15,678,337	$5,899,785	$0.38
2006							18,085,252	$5,582,102	$0.31
2007							7,845,100	$1,912,823	$0.24
2008				1,145	$958	$0.84	11,757,361	$4,146,994	$0.35
2009				15,558	$13,070	$0.84			
2010				9,952	$5,604	$0.56	12,431,607	$5,327,184	$0.43
2011	1,256	$1,276	$1.02	3,919	$2,231	$0.57	16,078,840	$9,060,381	$0.56
2012	1,118	$1,353	$1.21	921	$971	$1.05			
2013				1,719	$1,739	$1.01			
2014				93,323	$50,030	$0.54	10,291,096	$3,742,838	$0.36
2015				1,197	$1,860	$1.55			
2016				43,685	$51,651	$1.18	10,405,994	$5,514,020	$0.53
2017				9,791	$9,680	$0.99	23,054,999	$13,536,539	$0.59
2018				3,397,056	$1,356,146	$0.40	20,786,875	$11,887,382	$0.57
2019				17,906,387	$7,200,099	$0.40	18,695,753	$10,908,249	$0.58

	CONNECTICUT			NEW YORK			NEW JERSEY		
	LBS LAND	VALUE	EX-VESSEL PRICE	LBS LAND	VALUE	EX-VESSEL PRICE	LBS LAND	VALUE	EX-VESSEL PRICE
2000							8,708,583	$1,515,560	$0.17
2001							1,297,217	$204,617	$0.16
2002									
2003									
2004							30,973,571	$6,740,325	$0.22
2005				16,571	$6,037	$0.36			
2006				42,605	$30,160	$0.71			
2007	2,559	$1,794	$0.70	5,855	$6,158	$1.05			
2008									
2009									
2010							20,335,605	$5,670,902	$0.28
2011							22,631,562	$9,154,668	$0.40
2012							13,346,864	$4,529,848	$0.34
2013				373	$370	$0.99	4,440,669	$1,129,434	$0.25
2014				6,026	$6,320	$1.05			
2015				1,110	$1,376	$1.24	868,191	$153,569	$0.18
2016				3,386	$4,930	$1.46	3,872,709	$1,488,531	$0.38
2017				5,472	$5,916	$1.08	24,894,184	$8,044,796	$0.32
2018				10,893	$7,041	$0.65	27,247,086	$9,749,563	$0.36
2019							21,598,662	$9,210,256	$0.43

DOC/NOAA FISHERIES/GARFO
APSD MONITORING & ANALYSIS DIVISION
ILLEX SQUID LANDINGS & VALUE BY STATE 2000 - 2019
FROM NMFS DEALER WEIGHOUT DATABASE

	VIRGINIA			NORTH CAROLINA		
	LBS LAND	VALUE	EX-VESSEL PRICE	LBS LAND	VALUE	EX-VESSEL PRICE
2000				85,267	$11,197	$0.13
2001	169,414	$20,736	$0.12	466	$192	$0.41
2002				92,245	$14,732	$0.16
2003				534,040	$107,375	$0.20
2004				2,478,843	$494,057	$0.20
2005	689,692	$196,452	$0.28	1,442,668	$275,508	$0.19
2006				885,948	$155,470	$0.18
2007				248,509	$47,765	$0.19
2008						
2009	621,047	$77,669	$0.13			
2010	958,893	$222,611	$0.23	1,149,142	$230,473	$0.20
2011	1,490,807	$413,484	$0.28	1,232,768	$343,509	$0.28
2012	634,173	$158,623	$0.25			
2013				216	$326	$1.51
2014						
2015	38,136	$8,080	$0.21			
2016	383,786	$153,562	$0.40			
2017						
2018	1,658,130	$605,230	$0.37			
2019						

	CONFIDENTIAL			TOTAL
	LBS LAND	VALUE	EX-VESSEL PRICE	
2000				17,875,101
2001				8,611,241
2002				5,360,154
2003				10,695,826
2004				33,453,691
2005				18,008,755
2006				19,013,805
2007				8,102,023
2008				11,758,506
2009				636,605
2010				34,885,199
2011				41,439,152
2012				13,983,076
2013				4,442,977
2014				10,390,445
2015				908,634
2016				14,709,560
2017				47,964,446
2018				53,100,040
2019				58,200,802
	154,273,674	$42,008,889	$0.27	154,273,674

Grand Total
567,813,712