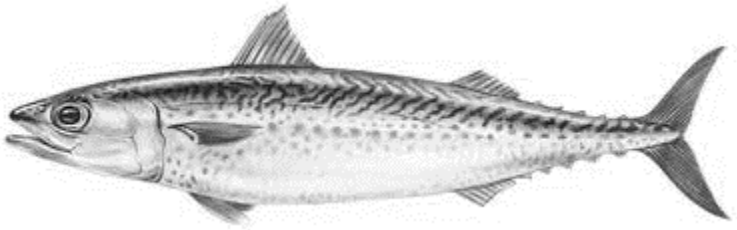
Amendment 21 to the Atlantic Mackerel, Squid, and Butterfish Fishery Management Plan

Measures to Manage Atlantic Chub Mackerel (*Scomber colias)*

Including an Environmental Assessment and Regulatory Flexibility Act Analysis



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1. EXECUTIVE SUMMARY

Amendment Background

A targeted commercial chub mackerel fishery developed in the Mid-Atlantic and Southern New England in recent years. Total coastwide landings (i.e., commercial and recreational) peaked at 5.25 million pounds in 2013 and averaged 2.88 million pounds per year during 2013-2015. Prior to 2013, landings did not exceed 500,000 pounds per year. After 2015, landings decreased and averaged 251,856 pounds per year for 2016-2018.

The increase in landings during 2013-2015 compared to earlier years, as well as concerns about the potential role of chub mackerel in the ecosystem as a prey species, prompted the Mid-Atlantic Fishery Management Council (the Council) to adopt an annual chub mackerel landings limit and a possession limit as part of the Unmanaged Forage Omnibus Amendment (MAFMC 2017a). These measures were implemented in September 2017 and are the first regulations for chub mackerel fisheries off the U.S. east coast (82 Federal Register 40721, August 28, 2017). As recommended by the Council, all the current chub mackerel management measures will expire after December 31, 2020. They are intended to be placeholder measures to be replaced by new measures developed through this amendment to make chub mackerel a stock in the Atlantic Mackerel, Squid, and Butterfish (MSB) Fishery Management Plan (FMP).

The purposes of this amendment are to:

1) Consider managing the Atlantic chub mackerel stock off the U.S. east coast as a stock in the MSB FMP while meeting all Magnuson-Stevens Fishery Conservation and Management Act (MSA) requirements for stocks in need of conservation and management.
2) Consider implementing discretionary management measures (i.e., not required under the MSA) for Atlantic chub mackerel fisheries off the U.S. east coast.

A range of management alternatives to address these purposes were considered, as summarized in Table 1 and described in more detail in section 5. This action is needed to ensure the sustainability of the emerging targeted chub mackerel fishery, prevent overfishing, and resolve competing interests.

Summary of Management Measures and Expected Impacts

This amendment contains two overarching alternatives: a no action alternative (alternative 1) and an alternative to add chub mackerel to the MSB FMP while meeting all the MSA requirements for stocks in need of conservation and management and potentially implementing other discretionary measures (alternative 2). Alternative 2 contains many sub-alternatives. The expected impacts of all alternatives are summarized in Table 2 and described in more detail in section 7.

Under the no action alternative (alternative 1), there would be no chub mackerel management measures starting on January 1, 2021. This is not expected to result in a notable change in fishing behavior, fishing effort, fishing mortality for chub mackerel or non-target species, landings, or interactions between fishing gear and protected species, or impacts to habitat for the foreseeable future. The management measures which have been in place since September 2017 do not appear to have impacted the fishery as landings in 2017 and 2018 were well below the allowable level. The fishery appears to be largely limited by market demand, low historical participation, and trends in the *Illex* squid fishery. Thus, if chub mackerel becomes unmanaged under the no action

alternative, impacts to chub mackerel, non-target species, human communities, protected species, and habitat are expected to remain similar to current conditions for the foreseeable future. This is expected to result in moderate to slight positive impacts for chub mackerel and non-target species by maintaining their current positive, presumed positive, or unknown stock status, depending on the species. It is expected to result in slight positive socioeconomic impacts due to *status quo* levels of commercial and for-hire revenues, angler satisfaction, and spillover benefits to support businesses. Impacts to species listed under the Endangered Species Act (ESA) are expected to be negligible to slight negative, depending on the species. Impacts to non-ESA listed marine mammals whose potential biological removal (PBR) levels have been reached or exceeded are expected to be slight negative because any potential for interaction between fishing gear and those species, including *status quo* levels of interactions, have negative impacts. Impacts to non-ESA listed marine mammals whose PBR levels have not been reached or exceeded are expected to be slight positive as the positive stock status of those species should be maintained. Impacts to habitat are expected to be slight negative as *status quo* levels of bottom trawl fishing effort will continue to impact habitats.

Although fishing effort is not expected to change in the foreseeable future under the no action alternative, it has the potential to increase over the longer term as there would be no restrictions on chub mackerel landings starting in 2021. If this were to occur, impacts to chub mackerel, non-target species, protected species, and habitat could be more negative than the current impacts of the fishery. The degree of these potential negative impacts would depend on the degree of any increase in fishing effort. Socioeconomic impacts could be both positive due to increased landings and revenues, and negative if increased fishing mortality results in decreased availability and thus decreased revenues and fishing opportunities in future years.

Under alternative 2 (add chub mackerel to the MSB FMP), measures to address the MSA requirements for stocks in need of conservation and management would be implemented. Additional discretionary management measures could also be implemented. This would likely have moderate positive impacts on chub mackerel by helping to maintain the current unknown but presumed positive status of the stock (MAFMC 2018b). The impacts of alternative 2 on non-target species, human communities, protected species, and habitat will vary based on the sub-alternatives selected for specific management measures. Under all combinations of sub-alternatives, fishing effort, fishing mortality, and interactions between fishing gear and protected species and fishing gear and habitat are not expected to exceed recent levels. Thus, the impacts of alternative 2 on chub mackerel, non-target species, human communities, protected species, and habitat are expected to be generally similar to those of the no action alternative for the foreseeable future.

The magnitude of the impacts of alternative 2 may vary slightly depending on the sub-alternatives chosen. The impacts of all sub-alternatives under alternative 2 are described in section 7. Only those sub-alternatives with noteworthy impacts on chub mackerel, non-target species, human communities, protected species, and/or habitat are summarized here. Because alternative 2 would place some restrictions on fishing effort, it has the potential for greater positive impacts for chub mackerel, non-target species, human communities, protected species, and habitat, compared to the no action alternative which would allow for virtually unlimited fishing effort.

Two alternatives for status determination criteria (SDCs) were considered (alternative set 2.C.I). These alternatives would establish a level of annual catch above which overfishing is presumed

to occur. Under both alternatives, the stock is presumed to be overfished when overfishing occurs three years in a row. An overfished designation triggers a requirement for a rebuilding plan, which would likely necessitate changes in management measures. Neither alternative is expected to impact fishing effort or landings compared to current conditions, therefore, these alternatives are generally expected to have similar impacts on chub mackerel, non-target species, human communities, protected species, and habitat as the no action alternative. However, by establishing a threshold level of catch above which action should be taken to restrict fishing effort, both alternatives could have additional slight positive impacts by helping to ensure that the current stock status of chub mackerel (i.e., unknown, but presumed positive) is maintained, ensuring that the fishery can continue to achieve OY, limiting the potential for increased interactions with protected species, and limiting the potential for additional habitat impacts compared to the no action alternative.

A range of alternatives for acceptable biological catch (ABC; alternative 2.C.II), optimum yield (OY; alternative set 2.C.III), expected South Carolina through Florida catch (alternative set 2.C.IV), management uncertainty (alternative set 2.C.VI), and expected discards (alternative set 2.C.VII) were considered. These alternatives work together to determine the total allowable landings (TAL) limit in a given year. The impacts of these alternatives cannot be meaningfully assessed when considered independently; therefore, three potential TALs resulting from various combinations of these alternatives were considered: the lowest potential TAL (2.73 million pounds), the preferred TAL (4.50 million pounds), and the highest potential TAL (5.07 million pounds). All three example TALs are higher than commercial and recreational landings in all past years except 2013; therefore, they are not expected to notably impact fishing effort, fishing mortality, landings, interactions with protected species, or impacts to habitat compared to current conditions. Therefore, they are expected to have largely similar impacts as the no action alternative. However, by limiting potential increases in landings, all TAL options could have some additional positive impacts by helping to prevent overfishing, ensuring that the fishery can continue to achieve OY, limiting the potential for increased interactions with protected species, and limiting the potential for additional habitat impacts compared to the no action alternative.

A range of alternatives for in-season commercial fishery closures were considered, including a no action alternative (alternative 2.D.I.a) and alternatives to close the commercial fishery when 90, 95, or 100% of the TAL is projected to be landed (alternatives 2.D.I.b-d). Alternatives were considered for 0; 1,000; 10,000; or 40,000 pound possession limits after the commercial fishery is closed in-season (alternatives 2.D.IIa-d). The impacts of these alternatives will vary based on the combination of in-season closure threshold and possession limits used. Rather than analyze the impacts of each possible combination, four examples were analyzed, as summarized below.

Under the no action alternative for in-season closures (alternative 2.D.I.a), the commercial fishery would never close in-season. Commercial landings would not be restricted after the TAL is reached. This could pose challenges for constraining fishing effort to acceptable levels and preventing overfishing. As previously stated, commercial landings are not expected to exceed any of the potential TALs in the foreseeable future due to constraints such as market demand, low participation in the fishery to date, and trends in the *Illex* squid fishery. Thus, overages are not expected under this alternative for in-season closure. However, if fishing effort were to increase notably over the longer term, this alternative could have slight to moderate negative impacts on chub mackerel, non-target species, protected species, and habitat due to increases in fishing mortality, the potential for interactions with protected species, and impacts to habitat.

Socioeconomic impacts could be both slight positive due to the potential for increased landings and slight negative if ACL overages result in overfishing and a decline in availability of chub mackerel in future years. The magnitude of the impacts on all VECs would vary based on the level of the ACL overage.

Other than the no action alternative for in-season closures, the least restrictive combination of in-season closure alternatives is a 40,000 pound possession limit (alternative 2.D.II.d) when 100% of the TAL is projected to be landed (alternative 2.D.I.d). If these measures had been in place in the past, they could have resulted in a slight overage of the recommended ABC in only one of the past 20 years (2013), assuming no changes in fishing behavior besides trips being limited to these possession limits. Therefore, this combination of alternatives is expected to have slight negative impacts for chub mackerel due to a slight chance of resulting in overfishing. It is not expected to have notably different impacts on non-target species, human communities, protected species, or habitat compared to the no action alternative because it would not restrict fishing effort or landings compared to all past years except 2013. Similarly, no other combinations of the in-season closure threshold and possession limit alternatives, including the preferred alternatives, are expected to impact fishing behavior, fishing effort, fishing mortality, interactions with protected species, or impacts to habitat compared to current conditions. Therefore, they are generally expected to have similar impacts as the no action alternative. However, if fishing effort were to increase over the longer term, all alternatives in these alternative sets, with the exception of the no action alternative, could have some slight positive impacts on chub mackerel, non-target species, protected species, and habitat by helping to constrain fishing effort.

Three alternatives regarding ACL overages were considered (alternative set 2.D.III). Under the no action alternative (alternative 2.D.III.a), ACL overages would not require deductions from a future year's annual catch target (ACT). This could have negative impacts if the lack of mitigation for ACL overages negatively impacts the stock status of chub mackerel. It could also have negative impacts for non-target species, protected species, and habitat as there would not be a strong incentive to reduce fishing effort after the ACL is reached. Socioeconomic impacts could also be slight negative if an ACL overage results in reduced availability of chub mackerel in future years. However, slight positive socioeconomic impacts could also occur if the overage is due to landings exceeding the TAL. The magnitude of all these impacts would vary based on the magnitude of the ACL overage. As described in previous sections, ACL overages are not expected in the foreseeable future due to constraints such as market demand and low historical participation in the fishery. The other two alternatives in this alternative set would require reductions in a future year's ACT if the ACL is exceeded. The ACT deduction would apply to either a combined commercial and recreational ACT (alternative 2.D.III.b) or sector-specific ACTs (alternative 2.D.III.c), depending on the alternative and which sector was responsible for the ACL overage. The required overage paybacks under alternatives 2.D.III.b and 2.D.III.c would have identical impacts on chub mackerel, non-target species, protected species, and habitat. They are both expected to have slight positive impacts for chub mackerel by mitigating any ACL overages and helping to ensure that fishing effort is constrained to acceptable levels by creating an incentive to prevent ACL overages. Both alternatives 2.D.III.b and 2.D.III.c could have slight negative socioeconomic impacts due to reductions in potential landings (and thus reduced potential revenues, angler satisfaction, and spillover benefits to support businesses) in the year in which the ACT deduction is applied. However, these negative impacts could be partially offset by the higher landings in the year in which the overage occurred. Under alternative 2.D.III.c, only the sector(s) (commercial and/or recreational) responsible for the ACL

overage would have an ACT deduction in a future year. This could have some socioeconomic benefits as it could be viewed as more fair than applying the deduction to a single ACT for both commercial and recreational fisheries, regardless of which sector caused the overage (alternative 2.D.II.b). Under both alternatives 2.D.III.b and 2.D.III.c, fishing effort is expected to be similar to current conditions; therefore, both of these alternatives are expected to have similar impacts on protected species and habitat as the no action alternative.

All other sub-alternatives in alternative set 2 (i.e., alternative set 2.A: EFH, alternative set 2.B: management unit, alternative set 2.C.V: separate or combined commercial and recreational catch limits, alternative set 2.E: permit requirements, and alternative set 2.F: administrative alternatives) are expected to have comparatively minor or negligible impacts on chub mackerel, non-target species, human communities, protected species, and habitat because they are mostly administrative in nature and should not have notable impacts on vessel operations or fishing effort. The impacts of all alternatives are described in section 7.

Under all possible combinations of sub-alternatives under alternative 2, fishing effort over the long term would be constrained to a greater extent than under the no action alternative. Therefore, compared to the no action alternative, alternative 2 has a greater potential for positive impacts to chub mackerel, non-target species, human communities, protected species, and habitat due to the greater likelihood of preventing overfishing, constraining fishing effort, and maintaining a sustainable fishery that can produce OY.

Cumulative Impacts

When the preferred alternatives are considered in conjunction with all other impacts from past, present, and reasonably foreseeable future actions, they are not expected to result in any significant impacts, positive or negative; therefore, no significant cumulative effects on chub mackerel, non-target species, human communities, protected species, or habitats are associated with the preferred alternatives (section 7.5).

Conclusions

A description of the expected environmental impacts and cumulative impacts resulting from each of the alternatives are provided in section 7. The preferred alternatives are not associated with significant impacts to the biological, socioeconomic, or physical environment, individually or in conjunction with other actions; therefore, a “Finding of No Significant Impact” is warranted.

Table 1: Management alternatives considered in this amendment. Preferred alternatives are bold.

- 1: No Action
- **2: Manage as stock in MSB FMP**
  - 2.A: EFH
    - **2.A.I: FMAT recommendation**
    - 2.A.II: EFH based on strict interpretation of data
  - 2.B: Management unit
    - **2.B.I: ME-NC**
    - 2.B.II: ME-FL
  - 2.C: SDCs, MSY, ABC, OY, ACLs, ACTs, and landings limits
    - 2.C.I: SDCs
      - **2.C.II.a: Overfishing SDC based on reverse control rule approach; overfished SDC = 3 consecutive years of overfishing**
      - 2.C.II.B: Overfishing SDC based on refined ORCs approach; overfished SDC = 3 consecutive years of overfishing
    - **2.C.II: ABC for 2020-2022 = 2,300 MT / 5.07 mil lb**
    - 2.C.III: OY for 2020-2022
      - **2.C.III.a: OY=ABC= 2300 mt**
      - 2.C.III.b: OY=ABC-36%= 1,472 mt
    - 2.C.IV: Expected SC-FL catch (assumes alternative 2.B.II is selected)
      - 2.C.IV.a: No action - no expected SC-FL catch
      - 2.C.IV.b: 12,600 lb
      - **2.C.IV.c: 84,500 lb**
    - 2.C.V: Separate or combined commercial and recreational catch limits
      - **2.C.V.a: Singe ACL with no commercial and recreational sub-ACLs or ACTs**
      - 2.C.V.b: Commercial and recreational sub-ACLs
      - 2.C.V.c: Single ACL with commercial and recreational sub-ACTs
    - 2.C.VI: Management uncertainty buffer
      - 2.C.VI.a: No action - no management uncertainty buffer
      - **2.C.VI.b: 4%**
    - 2.C.VII: Expected discards
      - 2.C.VII.a: No action - no expected discards
      - 2.C.VII.b: 3%
      - **2.C.VII.c: 6%**
      - 2.C.VII.d: 10%
  - 2.D: Accountability measures
    - 2.D.I: Trigger for in-season closure of commercial fishery
      - 2.D.I.a: No action/no in-season closure
      - **2.D.I.b: In-season closure when 90% of TAL projected to be landed** (preferred in combination with 2.D.II.d)
      - 2.D.I.c: In-season closure when 95% of TAL projected to be landed
      - **2.D.I.d: In-season closure when 100% of TAL projected to be landed** (preferred in combination with 2.D.II.c)

        - 2.D.II: Commercial possession limit when fishery closed in-season
            - 2.D.II.a: 0 lb
            - 2.D.II.b: 1,000 lb
            - **2.D.II.c: 10,000 lb** (preferred in combination with 2.D.I.d)
            - **2.D.II.d: 40,000 lb** (preferred in combination with 2.D.I.b)
        - 2.D.III: ACL overage paybacks
            - 2.D.III.a: No action (no ACL overage paybacks)
            - **2.D.III.b: If a single ACT is used, when the ACL is exceeded, catch in excess of the ACT will be deducted from a future ACT**
            - 2.D.III.c: If commercial and recreational ACLs or ACTs are used, when the single or sector-specific ACL is exceeded, adjustments to the commercial and/or recreational ACTs will be made in a following year depending on which sector was responsible for the overage.
    - 2.E: Permit requirements
        - 2.E.I: Commercial permit requirements
            - 2.E.I.a: No action (no permit requirements)
            - 2.E.I.b: Require any GARFO commercial permit
            - **2.E.I.c: Require any GARFO MSB commercial permit**
            - 2.E.I.d: Create a new chub mackerel permit
        - 2.E.II: Party/charter permit requirements
            - 2.E.II.a: No action (no permit requirements)
            - 2.E.II.b: Require any GARFO party/charter permit
            - **2.E.II.c: Require a GARFO MSB party/charter permit**
            - 2.E.II.d: Create a new chub mackerel permit
    - 2.F: Administrative alternatives
        - 2.F.I: Specifications
            - 2.F.I.a: No action
            - **2.F.I.b: MSB specifications process applies to chub mackerel**
        - **2.F.II: MSY=ABC**
        - 2.F.III: ABC control rule
            - 2.F.III.a: No action
            - **2.F.III.b: Council ABC control rule applies to chub mackerel**
        - 2.F.IV: SBRM
            - 2.F.IV.a: No action
            - **2.F.IV.b: SBRM applies to chub mackerel**

Table 2: Summary of expected impacts of the alternatives on the VECs, with a focus on the foreseeable future. Longer-term impacts are more uncertain and could differ from the impacts shown below. For example, the longer-term impacts of the no action alternative on most VECs could be more negative than the expected impacts over the foreseeable future. "0" indicates no impact or a negligible impact. "+" indicates a positive impact and "-" indicates a negative impact. "Sl" indicates a slight impact. An impact symbol without "sl" indicates a moderate impact. Some alternatives are grouped together due to their similar impacts on the VECs. The alternatives for ABC, OY, expected SC-FL catch, management uncertainty, and expected discards are not considered independently, but are grouped into three TAL scenarios. Similarly, the alternatives for in-season closure thresholds and possession limits are not considered independently. Three example combinations are shown.

Alternative	Chub Mackerel	Non-Target Species	Human Communities	ESA Listed Species	MMPA Species	Habitat
1: No action	+	Sl+	Sl+	Sl- to 0	Sl- to Sl+	Sl-
2: Manage chub mackerel as stock in MSB FMP (preferred)	+	Sl+	Sl+	Sl- to 0	Sl- to Sl+	Sl-
2.A: EFH (2 alternatives)	Sl+	Sl+	Sl- & Sl+	0	0	Sl+
2.B: Management unit (2 alternatives)	+	Sl+	Sl+	0	0	0
2.C.I: SDCs (2 alternatives)	Sl+	Sl+	0	Sl- to 0	Sl- to Sl+	Sl-
Most restrictive, preferred, and least restrictive TAL scenarios	+	Sl+	Sl+	Sl- to 0	Sl- to Sl+	Sl-
2.C.V.a: Combined commercial and recreational catch limits (preferred)	0	0	Sl+	0	0	0
2.C.V.b-c: Separate commercial and recreational catch limits	0	0	Sl-	0	0	0
2.D.I.a: No action on in-season closure	0 to Sl-	0 to Sl-	Sl- & Sl+	Sl- to 0	Sl- to Sl+	Sl-
2.D.I.d & 2.D.II.d: Least restrictive in-season closure threshold and possession limit alternatives	Sl-	Sl+	0	Sl- to 0	Sl- to Sl+	Sl-

Alternative	Chub Mackerel	Non-Target Species	Human Communities	ESA Listed Species	MMPA Species	Habitat
2.D.I.b & 2.D.II.a: Most restrictive in-season closure threshold and possession limit alternatives	+	Sl+	0	Sl- to 0	Sl- to Sl+	Sl-
2.D.I.b, 2.D.I.d, 2.D.II.c, & 2.D.II.d: preferred in-season closure threshold and possession limit alternatives	+	Sl+	0	Sl- to 0	Sl- to Sl+	Sl-
2.D.III.a: No ACL overage paybacks	Sl-	Sl-	Sl- & Sl+	Sl- to 0	Sl- to Sl+	Sl-
2.D.III.b: ACL overage paybacks under combined commercial and recreational ACL and ACT (preferred)	Sl+	Sl+	Sl-	Sl- to 0	Sl- to Sl+	Sl-
2.D.III.c: ACL overage paybacks under separate commercial and recreational ACLs and/or ACTs	Sl+	Sl+	Sl- & Sl+	Sl- to 0	Sl- to Sl+	Sl-
2.E.I.a and 2.E.I.b: No action on commercial and recreational permits, respectively	Sl-	0	Sl-	0	0	0
2.E.I.b-d and 2.E.II.b-d: Require a fishing permit	Sl+	0	Sl- and Sl+	0	0	0
2.F.I.a: No action on specifications	Sl-	0	Sl-	0	0	0
2.F.I.b: MSB specifications process applies to chub mackerel (preferred)	Sl+	0	Sl+	0	0	0
2.F.II: MSY=ABC (preferred)	0	0	Sl+	0	0	0
2.F.III.a-b: ABC control rule and risk policy	+	0	Sl+	0	0	0
2.F.IV.a-b: SBRM	0	0	0	0	0	0

2. List of Acronyms and Abbreviations

ABC	Acceptable Biological Catch
ACL	Annual Catch Limit
ACT	Annual Catch Target
AM	Accountability Measure
ATGTRT	Atlantic Trawl Gear Take Reduction Team
B	Biomass
B_{MSY}	Biomass at Maximum Sustainable Yield
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CI	Confidence Interval
Council	Mid-Atlantic Fishery Management Council
CPUE	Catch Per Unit Effort
CV	Coefficient of Variation
DPS	Distinct Population Segment
EA	Environmental Assessment
EAFM	Ecosystem Approach to Fisheries Management
EC	Ecosystem Component
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
ESA	Endangered Species Act
FMAT	Fishery Management Action Team
FMP	Fishery Management Plan
GARFO	NMFS Greater Atlantic Regional Fisheries Office
HAPC	Habitat Area of Particular Concern
HMS	Highly Migratory Species
LOF	MMPA List of Fisheries
MAFMC	Mid-Atlantic Fishery Management Council
MMPA	Marine Mammal Protection Act
MRIP	Marine Recreational Information Program
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSB	Atlantic Mackerel, Squid, and Butterfish
MSY	Maximum Sustainable Yield
MT	Metric Tons
NEFOP	Northeast Fisheries Observer Program
NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OFL	Overfishing Limit
ORCS	Only Reliable Catch Series
OY	Optimum Yield
PBR	Potential Biological Removal

PSE	Percent Standard Error
RHL	Recreational Harvest Limit
SBRM	Standardized Bycatch Reduction Methodology
SDC	Status Determination Criteria
SSB	Spawning Stock Biomass
SSC	Scientific and Statistical Committee
TAL	Total Allowable Landings Limit
VEC	Valued Ecosystem Component
VMS	Vessel Monitoring System
VTR	Vessel Trip Report

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4. PURPOSE AND BACKGROUND

4.1. NEPA PURPOSE AND NEED FOR ACTION

Council on Environmental Quality (CEQ) regulations require that Environmental Assessments (EAs) contain purpose and need statements. These statements specify the underlying purpose and need to which the agency is responding in proposing the management alternatives under consideration.

The purposes of this action are to:

- Consider managing the Atlantic chub mackerel stock off the U.S. east coast as a stock in the MSB FMP while meeting all MSA requirements for stocks in need of conservation and management.
- Consider implementing discretionary management measures (i.e., not required under the MSA) for Atlantic chub mackerel fisheries off the U.S. east coast.

Section 5 describes the alternatives considered by the Council to address these purposes. Alternatives which would meet the first purpose listed above include alternatives 2.A (EFH), 2.B (management unit), 2.C.I (SDCs), 2.C.II (ABC), 2.D (AMs), 2.C.II (MSY), and 2.F.IV (SBRM). Alternatives which would meet the second purpose listed above include alternatives 2.C.III (OY), 2.C.V (separate or combined commercial and recreational catch limits), 2.E (permit requirements), 2.F.I (specifications), 2.F.III (ABC control rule), and other alternatives which would define the catch and landings limits in upcoming years (alternatives 2.C.IV, 2.C.VI, and 2.C.VII)

This action is needed to ensure the sustainability of the emerging targeted chub mackerel fishery, prevent overfishing, and resolve competing interests. Section 4.4 provides background information on these issues.

4.2. FMP GOALS AND OBJECTIVES

The current MSB FMP objectives have been in place since 1981 and apply to all species currently in the FMP (i.e., Atlantic mackerel, longfin squid, *Illex* squid, and butterfish). These objectives are to:

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 Council agreed that these FMP objectives should not apply to chub mackerel. They adopted a separate set of goals and objectives for chub mackerel. If this amendment is approved and implemented, chub mackerel would have a separate set of FMP goals and objectives from the other stocks in the FMP.

These goals and objectives differ from the NEPA purpose and need statements in the previous section in that they are broader, longer-term, and more aspirational. They do not address specific management strategies. They apply to the FMP as a whole, rather than to a single management action (e.g., this amendment).

The Council's proposed chub mackerel FMP goals and objectives are:

- *Goal 1*: Maintain a sustainable chub mackerel stock.
    - *Objective 1.1:* Prevent overfishing and achieve and maintain sustainable biomass levels that achieve optimum yield in the fisheries and meet the needs of chub mackerel predators.
    - *Objective 1.2:* Consider and account for, to the extent practicable, the role of chub mackerel in the ecosystem, including its role as prey, as a predator, and as food for humans.
- *Goal 2:* Optimize economic and social benefits from utilization of chub mackerel, balancing the needs and priorities of different user groups.
    - *Objective 2.1:* Allow opportunities for commercial and recreational chub mackerel 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 2.2:* To the extent practicable, minimize additional limiting restrictions on the *Illex* squid fishery.[1]
    - *Objective. 2.3:* Balance social and economic needs of various sectors of the chub mackerel fisheries (e.g., commercial, recreational, regional) and other fisheries, including recreational fisheries for highly migratory species.
- *Goal 3:* Support science, monitoring, and data collection to enhance effective management of chub mackerel fisheries.
    - *Objective 3.1:* Improve data collection to better understand the status of the chub mackerel stock, the role of chub mackerel 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.

The Council is in the early stages of developing a separate amendment to consider revising the current MSB FMP objectives.[2] This amendment may result in revised chub mackerel goals and objectives.

4.3. Regulatory Authority

The MSA as currently amended requires a Council to prepare an FMP (and subsequent FMP amendments as needed), "for each fishery under its authority that requires conservation and management." Under the MSA, conservation and management "refers to all of the rules, regulations, conditions, methods, and other measures (A) which are required to rebuild, restore, or maintain, and which are useful in rebuilding, restoring, or maintaining, any fishery resource and the marine environment; and (B) which are designed to assure that (i) a supply of food and other products may be taken, and that recreational benefits may be obtained, on a continuing basis; (ii) irreversible or long-term adverse effects on fishery resources and the marine environment are avoided; and (iii) there will be a multiplicity of options available with respect to future uses of these resources."

According to the NMFS MSA Guidelines and National Standards Guidelines, "stocks that are predominately caught in Federal waters and are overfished or subject to overfishing, or likely to become

[1] The relationship between the chub mackerel and *Illex* squid fisheries is described in section 6.2.1.

[2] More information is available at: http://www.mafmc.org/actions/illex-permitting-msb-goals-amendment

overfished or subject to overfishing, are considered to require conservation and management." Beyond such stocks, the guidelines include a non-exhaustive list of factors to consider when deciding whether a stock requires conservation and management (50 CFR 600.305(c)). Table 3 lists these factors and describes their applicability to chub mackerel.

The MSA identifies several required provisions of FMPs for stocks that require conservation and management. FMPs must specify the management unit, maximum sustainable yield (MSY), OY, status determination criteria, mechanisms for specifying annual catch limits (ACLs) in relation to the ABC, accountability measures (AMs) for when ACLs are exceeded, and essential fish habitat (EFH) descriptions (MSA section 303(a); 50 CFR 600.310).

The MSA also states that FMPs may contain discretionary measures such as vessel permit requirements, possession limits, gear restrictions, minimum fish size limits, fishing seasons, and "other measures, requirements, or conditions and restrictions as are determined to be necessary and appropriate for the conservation and management of the fishery" (MSA section 303(b)).

Alternatives 2.A (EFH), 2.B (management unit), 2.C.I (SDCs), 2.C.II (ABC), 2.D (AMs), 2.C.II (MSY), and 2.F.IV (SBRM) address the FMP requirements under the MSA. Alternatives 2.C.III (OY), 2.C.V (separate or combined commercial and recreational catch limits), 2.E (permit requirements), 2.F.I (specifications), 2.F.III (ABC control rule), and other alternatives which would define the catch and landings limits in upcoming years (alternatives 2.C.IV, 2.C.VI, and 2.C.VII) are discretionary measures.

Table 3: List of factors to consider when evaluating whether a stock requires conservation and management under the MSA (50 CFR 600.305 (c)).

Factor	Applies to chub mackerel?
(i) The stock is an important component of the marine environment	Insufficient data are available to assess the role of chub mackerel in the ecosystem (section 6.1.1).
(ii) The stock is caught by the fishery.	Yes (i.e., the *Illex* squid fishery; section 6.2.1).
(iii) Whether an FMP can improve or maintain the condition of the stock.	Yes. Catch limits implemented through an FMP can help prevent catch from exceeding sustainable levels. Catch is not thought to have exceeded sustainable levels in the past (section 5.2.3.2).
(iv) The stock is a target of a fishery.	Yes (section 6.2.1).
(v) The stock is important to commercial, recreational, or subsistence users.	Yes (commercial stakeholders who target and process chub mackerel; recreational users who harvest or use as bait; section 6.2).
(vi) The fishery is important to the Nation or to the regional economy.	The fishery can be important to some commercial and recreational fishermen[3] and some commercial fish dealers in some years (section 6.2).
(vii) The need to resolve competing interests and conflicts among user groups and whether an FMP can further that resolution.	Yes (e.g., section 5.3.7).

[3] In this document, "fishermen" refers to all individuals who fish, regardless of gender.

Factor	Applies to chub mackerel?
(viii) The economic condition of a fishery and whether an FMP can produce more efficient utilization.	Potentially. Efficient utilization is not currently a major concern given limited participation in the fishery to date (section 6.2.1).
(ix) The needs of a developing fishery, and whether an FMP can foster orderly growth.	Yes (section 6.2.1).
(x) The extent to which the fishery is already adequately managed by states, by state/Federal programs, or by Federal regulations pursuant to other FMPs or international commissions, or by industry self-regulation, consistent with the requirements of the Magnuson-Stevens Act and other applicable law.	The only existing management measures for the fishery off the U.S. east coast will expire after 2020 (section 4.4).

4.4. BACKGROUND

As described in more detail in section 6.2.1, a targeted commercial chub mackerel fishery developed in the Mid-Atlantic and Southern New England in recent years. Total coastwide landings (i.e., commercial and recreational) peaked at 5.25 million pounds in 2013 and averaged 2.88 million pounds per year during 2013-2015. Prior to 2013, landings did not exceed 500,000 pounds per year. After 2015, landings decreased and averaged 251,856 pounds per year for 2016-2018 (see Table 5 and Figure 9 in section 6.2).

The increase in landings during 2013-2015 compared to earlier years, as well as concerns about the potential role of chub mackerel in the ecosystem as a prey species, prompted the Council to adopt an annual chub mackerel landings limit and a possession limit as part of the Unmanaged Forage Omnibus Amendment (henceforth referred to as the Forage Amendment; MAFMC 2017a). These measures were implemented in September 2017 and are the first regulations for chub mackerel fisheries off the U.S. east coast (82 Federal Register 40721, August 28, 2017). The annual landings limit is 2.86 million pounds, which applies to all commercial landings of chub mackerel by federally-permitted vessels throughout the mid-Atlantic and New England. Once this limit is reached, commercial fishing vessels will be restricted to a 40,000 pound possession limit in mid-Atlantic federal waters. This possession limit will only come into effect once the annual landings limit is met and will only apply to vessels fishing in mid-Atlantic federal waters. The landings and possession limits are not expected to result in a change in landings compared to recent levels (section 6.2.1). The Forage Amendment also implemented a requirement that all commercial vessels which retain any amount of chub mackerel in mid-Atlantic federal waters possess any of the existing NMFS Greater Atlantic Regional Fisheries Office (GARFO) commercial fishery permits.

As recommended by the Council, all current chub mackerel management measures will expire after December 31, 2020. They are intended to be placeholder measures to be replaced by new measures developed through this amendment to make chub mackerel a stock in the MSB FMP. During development of the Forage Amendment, the Council acknowledged that chub mackerel may warrant management as a stock in need of conservation and management under the MSA given the emerging targeted commercial fishery. However, the Council was concerned about leaving the fishery unregulated during the time required to develop and implement an amendment to meet all MSA requirements for stocks in need of conservation and management. For this reason, the Council decided to implement temporary management measures through the Forage Amendment.

The Council developed these temporary management measures through the Forage Amendment without designating chub mackerel as a stock in need of conservation and management or as an ecosystem component species. The MSA requirements for stocks in need of conservation and management do not apply to ecosystem component species. The National Standards Guidelines, as revised in 2009, stated that "as a default, all stocks in an FMP are considered to be 'in the fishery', unless they are identified as ecosystem component species through an FMP amendment process."[4] Revisions to these guidelines, finalized in October 2016, after the Council took final action on the Forage Amendment, removed this language.

During development of the Forage Amendment, GARFO advised that chub mackerel does not fit the definition of an ecosystem component species and that any management measures developed for this species should have a sunset provision until the Council could integrate chub mackerel as a stock under the FMP.

The goal of the Forage Amendment was to prohibit the development of new and expansion of existing directed commercial fisheries on unmanaged forage species in mid-Atlantic federal waters until the Council has had an adequate opportunity to assess the scientific information relating to any new or expanded directed fisheries and consider potential impacts to existing fisheries, fishing communities, and the marine ecosystem. The Council agreed that although the Forage Amendment was a precursor to the Chub Mackerel Amendment, the goals and objectives of the Chub Mackerel Amendment should not be the same as those of the Forage Amendment (section 4.2).

Additional context to this amendment is provided by the Council's Ecosystem Approach to Fisheries Management (EAFM) Guidance Document, approved by the Council in August 2016 (MAFMC 2019). The Council defines EAFM as a fishery management approach which recognizes the biological, economic, social, and physical interactions among components of ecosystems and attempts to manage fisheries to achieve optimum yield while taking those interactions into account. The purpose of the EAFM Guidance Document is to facilitate the transition from single-species management toward an approach that manages fisheries within a broader ecosystem context. Forage species and their management are a key focus area in the EAFM Guidance Document, which states: "it shall be 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."

As described in more detail in section 6.1.1, chub mackerel are considered a forage species due to their schooling behavior and relatively small size. They are both a forage species and a predator of other forage species (Okey et al. 2014); however, their role as prey for any predators in this region cannot be accurately quantified with currently available data.

Changes in prey aggregations may or may not result in significant changes in the vital rates of predators. Predator aggregations on specific prey can facilitate commercial and/or recreational fisheries for those predators. This can lead to human user group conflicts reflecting competing interests that may be independent of ecological impacts of the multispecies interactions. Thus, multispecies interactions can include ecological dimensions related to the health of marine populations and human dimensions related to competing human uses. These problems can be difficult to tease apart without a scientific evaluation of the ecological role of prey species, which may vary in importance by year, season, location, availability of other prey species, and other factors.

[4] A "stock in an FMP," "stock in a fishery," and a "stock in need of conservation and management" are synonymous terms.

Optimal management of forage species ultimately depends on tradeoffs between their direct and indirect harvest value in economic markets and other ecosystem services they provide to "natural" and human dimensions of the ecosystem. Assessing these tradeoffs requires consideration of factors such as the species ecology and uses of and substitutes for these species within the economy. Cultural and social preferences play a role in assessments of such tradeoffs. To the extent practical, the Council evaluated and considered these tradeoffs when selecting preferred alternatives in this amendment.

Given current data limitations (section 4.5), it is not possible to scientifically evaluate how each alternative considered in this document would meet the Council's policy "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" as outlined in the EAFM Guidance Document. However, most alternatives considered in this document would meet this goal by placing bounds on chub mackerel catch and establishing a framework through which ecosystem considerations could be incorporated into future management measures.

4.5. Data Limitations and Research Needs

Scientific experts on the Council's Scientific and Statistical Committee (SSC) and the Chub Mackerel Fishery Management Action Team (FMAT) reviewed the available data and concluded that chub mackerel are so data poor that even stock assessment methods designed for data poor stocks would not be appropriate to assess the abundance of this species. Major concerns regarding the ability to assess the status of the stock include low and sporadic catches in fisheries independent surveys; only a few years of directed fishing effort; the influence of factors other than abundance on fishery and survey catch per unit effort (e.g., temperature, price and availability of substitute species); limited data on age structure, growth, and maturity in U.S. Atlantic waters; and uncertainty regarding stock structure in U.S. waters. In addition, limited fishery-dependent data are available from inshore areas, which could include important chub mackerel habitats.

Priority metrics for evaluating catch limits, as identified by the SSC include catch and effort information in the directed chub mackerel fishery, age and length composition in the catch and fishery independent surveys, and the spatial distribution of catch. Additional areas of research needs identified by the SSC include recruitment, an egg survey in the South Atlantic, stock structure and definition (which could be used to compare productivity in the eastern and western Atlantic), ageing precision and validation, and information on chub mackerel diet that may help establish links to ecosystem productivity to assess potential stock productivity (MAFMC 2018b). This information could also help refine the EFH description for chub mackerel.

Fishery catch per unit effort (CPUE) has not been thoroughly analyzed and will be challenging to assess due to the significant overlap between the chub mackerel and *Illex* squid fisheries. Targeted fishing effort was very low until 2013 and has since been variable (section 6.2.1). CPUE likely fluctuates based on factors not related to abundance or availability of chub mackerel.

The Northeast Fisheries Science Center (NEFSC) bottom trawl surveys provide an example of the severe data limitations for this species. These trawl surveys are a valuable source of information for stock assessments and management of many species. However, they were not designed to effectively sample fast-swimming, schooling pelagic species like chub mackerel. As such, catchability of chub mackerel in these surveys is likely low. In addition, large portions of the chub mackerel stock may exist outside of the survey domains. Only 76 NEFSC bottom trawl survey tows between 1992 and 2016 caught any chub mackerel and this survey has gone six consecutive years without catching any chub mackerel (personal communication, Michele Traver and Chris Tholke, NEFSC).

In addition, the ecological role of chub mackerel in the western North Atlantic is very poorly documented. As described in more detail in section 6.1.1, a thorough literature review by Council and NMFS staff identified only one study with quantitative data on the role of chub mackerel in the diets of any predators off the U.S. east coast. Manooch et al. (1984) found that chub mackerel made up 0.2% (by frequency of occurrence) of the diets of dolphinfish sampled off North Carolina through Texas. This lack of data is likely due in part to the difficulty of visually distinguishing partially-digested chub mackerel from related species such as Atlantic mackerel (*Scomber scomber*), bullet mackerel (*Auxis rochei*), and frigate mackerel (*Auxis thazard*; Paine et al. 2007; personal communication with John Graves, Virginia Institute of Marine Science; Steve Poland, N.C. Division of Marine Fisheries, and Michelle Staudinger, University of Massachusetts Amherst). Targeted chub mackerel surveys may be necessary to refine the EFH description to identify areas important for different life history stages and/or habitat attributes within those areas.

4.6. FMP History

Management of the MSB fisheries began through the implementation of three separate FMPs (one for Atlantic mackerel, one for longfin and *Illex* squid, and one for butterfish) in 1978. The plans were merged in 1983. Over time, a variety of management issues have been addressed through subsequent FMP amendments and framework adjustments, including stock rebuilding, habitat conservation, bycatch minimization, and limiting participation in the fisheries. Section 7.5.1 lists major FMP amendments and frameworks. More information on the history of the FMP and its amendments is available at: http://www.mafmc.org/fisheries/fmp/msb.

5. Management Alternatives

5.1. Alternative 1: No Action

As previously stated, the Council developed the first management measures for Atlantic chub mackerel in U.S. waters through the Forage Amendment (MAFMC 2017a). These measures have been in effect since September 2017 and include the following:

- A 2.86 million pound annual landings limit for all chub mackerel landed by commercial fishermen in the mid-Atlantic and New England
- A 40,000 pound possession limit which applies only to commercial fishermen in the Mid-Atlantic after the annual landings limit is reached
- A requirement for all commercial vessels which possess chub mackerel in Mid-Atlantic federal waters to have a commercial fishing permit for any species from GARFO

All the measures listed above will expire after December 31, 2020. The Council intended for these measures to be replaced by longer-term management measures which will be developed through this amendment. If new management measures are not implemented or additional action is not taken, then Atlantic chub mackerel will be unmanaged in U.S. waters starting January 1, 2021.

The no action alternative is not a preferred alternative. As described in section 4, the Council believes that chub mackerel would benefit from management as a stock in an FMP with all the associated MSA requirements for a stock in need of conservation and management.

5.2. Alternative 2: Manage Chub Mackerel as a Stock in the MSB FMP (Preferred)

Under alternative 2, chub mackerel would be added as a stock in the MSB FMP. This is a preferred alternative. As described in section 4, the Council believes that chub mackerel would benefit from

management as a stock in an FMP with all the associated MSA requirements for a stock in need of conservation and management.

If chub mackerel is added to the MSB FMP, the name of that FMP would be modified from the Atlantic Mackerel, Squid, and Butterfish FMP to the Mackerel, Squid, and Butterfish FMP.

Several sub-alternatives were considered regarding the MSA requirements for stocks in need of conservation and management as well as for discretionary measures, as described in the following sections. If alternative 2 is selected, then one alternative from each of the following alternative sets should also be selected: 2.A (EFH), 2.B (management unit), 2.C.I (SDCs), 2.C.III (OY for 2020-2022), 2.C.V (separate or combined commercial and recreational catch limits), 2.C.VI (management uncertainty buffer for 2020-2022), 2.C.VII (expected discards for 2020-2022), 2.D.I (trigger for in-season closure of the commercial fishery), 2.D.II (possession limit during in-season closure), 2.D.III (ACL overage paybacks), 2.E.I (commercial permit requirements), 2.E.II (party/charter permit requirements), 2.F.I (specifications), 2.F.III (ABC control rule), and 2.F.IV (SBRM).

5.2.1. ALTERNATIVE SET 2.A: ESSENTIAL FISH HABITAT (REQUIRED UNDER MSA)

The MSA requires that FMPs describe essential fish habitat (EFH) in text and maps for all life states of stocks managed in FMPs as stocks in need of conservation and management. The MSA defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The Council considered two alternatives for chub mackerel EFH, as described below. These alternatives are mutually exclusive. Only one may be selected.

The Council is currently undertaking a multi-year effort to provide new and improved habitat science products (e.g., more comprehensive habitat use information, integrative habitat use modeling tools, and refined maps) that will allow the Council to review and potentially revise its existing EFH maps and text descriptions. When these improved habitat science products are available, the Council may consider initiating a separate action to revise the chub mackerel EFH text and maps adopted through this amendment.

The MSA also allows for designation of habitat areas of particular concern (HAPCs). HAPCs are areas within EFH which are identified as priorities for conservation, management, and/or research based on one or more of the following considerations: (1) the importance of the ecological function provided by the habitat, (2) the extent to which the habitat is sensitive to human-induced environmental degradation, (3) whether, and to what extent, development activities are, or will be, stressing the habitat type, and (4) the rarity of the habitat type (50 CFR 600.815).

The Council did not develop or analyze any alternatives for chub mackerel HAPCs. The Council agreed that chub mackerel HAPCs are not necessary or appropriate at this time given data limitations and given that there has been no indication that special habitat protections beyond the designation of EFH are needed.

A no action alternative for EFH is encompassed within alternative 1 (no action), which would not add chub mackerel to the MSB FMP as a stock in need of conservation and management. If the Council choses alternative 2 (add chub mackerel to the MSB FMP), then they must meet the MSA requirement for EFH.

5.2.1.1. ALTERNATIVE 2.A.I: FMAT RECOMMENDED EFH (PREFERRED)

The EFH text descriptions and maps recommended by the Council are based on the recommendations of the chub mackerel FMAT. They are based on a combination of fishery and survey data, literature

sources, and expert judgment. They are intentionally broad and are intended to cover the entire likely distribution of Atlantic chub mackerel in the U.S. EEZ.

Proposed Egg EFH

The Council proposes the following EFH text description for chub mackerel eggs:

> *EFH for chub mackerel eggs includes pelagic waters throughout the exclusive economic zone (EEZ) from North Carolina to Texas, including intertidal and subtidal areas, at temperatures of 15 - 25° C.*

The Council proposes that all U.S. marine waters throughout the EEZ from North Carolina to Texas, including intertidal and subtidal areas, be identified in maps as EFH for chub mackerel eggs (Figure 1).

Berrien (1978) identified chub mackerel eggs in plankton survey catches from North Carolina through Florida. No documentation has been found to date of chub mackerel eggs in the Gulf of Mexico; however, chub mackerel larvae have been collected throughout the Gulf of Mexico, as shown in Figure 8 in section 6.1.1 and summarized in various reports (e.g., Houde et al. 1976, Houde et al. 1979). It can be assumed that chub mackerel larvae collected in the Gulf of Mexico originated there.

A depth range of 1 to 75 meters is supported by Berrien (1978) and Hernández and Ortega (2000), the latter of which includes information from other regions and information on the closely related Pacific chub mackerel (*Scomber japonicus*). Berrien (1978) suggested that the distribution of chub mackerel eggs may extend beyond the continental shelf. Data from beyond the shelf edge are lacking due to a lack of sampling. It may be reasonable to assume that chub mackerel egg distribution extends beyond the shelf; therefore, the Council recommends an EFH description and map that encompass all waters in the EEZ (i.e., out to 200 nautical miles from shore) from North Carolina through Texas. The EEZ is the farthest possible reach of EFH under the MSA.

Berrien (1978) collected chub mackerel eggs at temperatures of 20 - 25° C from North Carolina through Florida. Other studies report spawning at temperatures of 15 - 20° C (Collette and Nauen 1983, Perrotta et al. 2001). Therefore, it can be assumed that eggs may be present at temperatures ranging from 15 to 25° C.

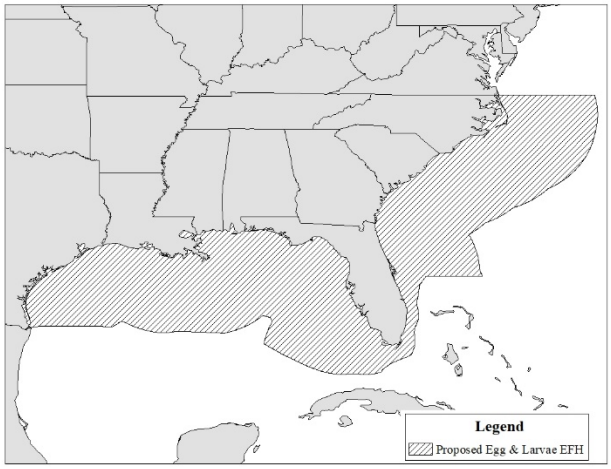

Figure 1: Proposed egg and larval chub mackerel EFH map (alternative 2.A.I).

Proposed Larval EFH

The Council proposes the following EFH text description for chub mackerel larvae:

> *EFH for chub mackerel larvae includes pelagic waters throughout the EEZ from North Carolina to Texas, including intertidal and subtidal areas, at temperatures of 15 - 30 °C.*

The Council proposes that all U.S. marine waters throughout the EEZ from North Carolina through Texas be identified in maps as EFH for chub mackerel larvae (Figure 1).

A depth range of 25 - 75 meters from North Carolina through Texas at temperatures of 15 - 30 °C is supported by several scientific reports, as well as catches in the Southeast Area Assessment and Monitoring Programs plankton survey (Figure 8, Houde et al. 1976, Berrien 1978, Houde et al. 1979, Hernández and Ortega 2000, Richardson 2010).

Berrien (1978) suggested that the distribution of chub mackerel larvae may extend beyond the continental shelf. As previously stated, data from beyond the shelf edge are lacking due to a lack of sampling. It may be reasonable to assume that chub mackerel larval distribution extends beyond the shelf; therefore, the Council recommends that larval EFH for chub mackerel extend from 25 meters depth to the EEZ (i.e., 200 nautical miles from shore). As previously stated, the EEZ is the farthest possible reach of EFH under the MSA.

As described above for eggs and below for adults and juveniles, available data and literature suggest that these other life stages can be found in shallow waters, potentially including intertidal and subtidal areas. The FMAT and Council agreed that it is reasonable to assume that if other life stages can be found in shallow waters, larvae may also be found there as well. As previously stated, the FMAT and Council agreed that broad EFH designations are appropriate for chub mackerel given current data limitations.

Proposed juvenile and adult EFH

Due to similarities in juvenile and adult distributions and a lack of differentiation between the two life stages in many data sets, the Council proposes that juvenile and adult chub mackerel share the same EFH text description and map.

The Council proposes the following EFH text description for juvenile and adult chub mackerel:

> *EFH for chub mackerel juveniles and adults includes pelagic waters throughout the EEZ from Maine through Texas, including intertidal and subtidal areas, at temperatures of 15 - 30° C.*

The Council proposes that all U.S. marine waters throughout the EEZ, including intertidal and subtidal areas, from Maine through Texas be identified in maps as EFH for juvenile and adult chub mackerel (Figure 2).

This corresponds with the entire known distribution of chub mackerel in U.S. waters based on state and federal trawl surveys,[5] commercial and recreational fisheries-dependent data, and literature sources (e.g., Collette and Nauen 1983, Perrotta et al. 2001, Collette 2002). These sources suggest that adults and juveniles are commonly present in nearshore and offshore waters of Southern New England, the Mid Atlantic Bight, the South Atlantic, and Gulf of Mexico during the summer and early fall or year-round, depending on the area (Figure 7, Figure 8, and Figure 10 in section 6). Historical records and fisheries

[5] The NEFSC fall bottom trawl survey and the New Jersey Ocean Trawl Survey have collected juvenile and adult chub mackerel. Data through 2016 for other state and federal trawl survey data sets were examined, but did not include records of adult or juvenile chub mackerel catch.

data suggest that chub mackerel are rarely caught in the Gulf of Maine, though they have periodically been present in that region in notable quantities (Collette 2002). They may become more prevalent in the Gulf of Maine as ocean waters continue to warm.

The temperature range referenced above is based on literature sources (Collette and Nauen 1983, Perrotta et al. 2001) and NEFSC fall bottom trawl survey data through 2016.

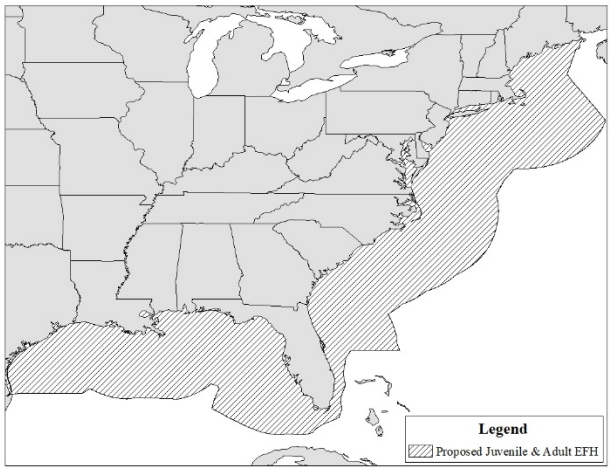

Figure 2: Proposed juvenile and adult chub mackerel EFH map (alternative 2.A.I).

5.2.1.2. ALTERNATIVE 2.A.II: EFH BASED ON STRICT INTERPRETATION OF DATA

The Council-recommended EFH text descriptions and maps in the previous section are based on a combination of fishery and survey data, literature sources, and expert judgment. They are intended to encompass broad areas. The following non-preferred EFH descriptions are based strictly on available data and literature. These alternatives are not preferred because they do not account for data limitations and potential changes in distribution over time.

> *EFH for chub mackerel eggs includes pelagic waters from 1-75 meters depth from North Carolina to Texas, including intertidal and subtidal areas, at temperatures of 15 - 25° C.*
>
> *EFH for chub mackerel larvae includes pelagic waters from 25 to 75 meters depth from North Carolina to Texas, including intertidal and subtidal areas, at temperatures of 15 - 30 °C.*
>
> *EFH for chub mackerel juveniles and adults includes pelagic waters from 5 to 300 meters depth from Maine through Texas, including intertidal and subtidal areas, at temperatures of 15 - 30° C.*

These EFH descriptions vary from the preferred EFH alternative in that they have more restrictive inshore and offshore boundaries. In addition, unlike under the preferred alternative, the inshore and offshore boundaries vary by life stage under this alternative.

As described in more detail in section 5.2.1.1, the EFH descriptions for eggs and larvae under this alternative are based on the Southeast Area Assessment and Monitoring Programs plankton survey, Houde et al. 1976, Berrien 1978, Houde et al. 1979, Hernández and Ortega 2000, and Richardson 2010. The EFH description for juveniles and adults under this alternative is based on state and federal trawl surveys, commercial and recreational fisheries-dependent data, and literature sources (e.g., Collette and Nauen 1983, Perrotta et al. 2001, Collette 2002).

5.2.2. ALTERNATIVE SET 2.B: MANAGEMENT UNIT (REQUIRED UNDER MSA)

As defined in the National Standards Guidelines, the management unit is "a fishery or that portion of a fishery identified in an FMP as relevant to the FMP's management objectives." In practice, the management unit defines the geographic area over which the management measures in an FMP apply.

The Council considered two alternatives for the chub mackerel management unit, as summarized below. These alternatives are mutually exclusive. Only one may be selected. A no action alternative for the management unit is encompassed within alternative 1, which would not add chub mackerel to the MSB FMP as a stock in need of conservation and management. If the Council choses alternative 2 (add chub mackerel to the MSB FMP), then they must meet the MSA requirement to define a management unit.

Chub mackerel are a migratory species that can be found in Mid-Atlantic, New England, South Atlantic, Gulf of Mexico, and Caribbean waters either year-round or seasonally. Stock structure within this broad range is not well understood. Studies from other regions suggest that chub mackerel are genetically uniform across broad areas (Scoles et al. 1998, Hernández and Ortega 2000, Zardoya et al. 2004). The degree of mixing between different regions in the U.S. EEZ is unknown but could be considerable.

The Council asked the SSC to specify the geographic area over which the ABC applies based on their expert judgement. The SSC recommended an ABC that applies from Maine through the east coast of Florida (MAFMC 2018b). The range of management alternatives considered through this amendment was informed by the SSC's ABC recommendation; therefore, management unit alternatives extending beyond the U.S. east coast were not considered.

Both management unit alternatives include federal waters off New England. Commercial harvest of chub mackerel off southern New England using mesh smaller than 6.5 inches in diameter is currently restricted by the northeast multispecies small mesh fishery exemption regulations developed by the New England Fishery Management Council. Virtually all commercial chub mackerel harvest occurs with mesh smaller than 6.5 inches in diameter. The multispecies small mesh regulations contain a list of exempted species, including all species managed in Mid-Atlantic Council's FMPs (except for the ecosystem component species designated through the Forage Amendment). This amendment proposes to add chub mackerel to the MSB FMP; therefore, addition of chub mackerel to the list of species exempt from the northeast multispecies small mesh regulations would help to meet the full intent of this amendment. This may be considered in the proposed rule for this amendment.

5.2.2.1. ALTERNATIVE 2.B.I: MAINE THROUGH NORTH CAROLINA MANAGEMENT UNIT (PREFERRED)

Under this alternative, the chub mackerel management unit would be federal waters from Maine through North Carolina. This is a preferred alternative.

The SSC recommended an ABC for Maine through the east coast of Florida (MAFMC 2018b). All catch throughout that region would count towards the ABC. Under this alternative, the Council would not be able to regulate chub mackerel fisheries in South Carolina through Florida; however, catch in those states would still count towards the ABC. Expected catch from South Carolina through Florida would be subtracted from the ABC to derive an ACL that applies to catch from Maine through North Carolina (e.g., Figure 3 in section 5.2.3.5.1). The expected level of catch from South Carolina through Florida would be recommended by the Monitoring Committee through the specifications process (section 5.2.6.1). Alternatives for expected South Carolina through Florida catch in 2020-2022 are listed in section 5.2.3.4. This is similar to how Canadian catch is accounted for in the specification of Atlantic

mackerel catch and landings limits. The Atlantic mackerel ABC applies to both U.S. and Canadian catch; however, Canada is not included in the management unit for Council management.

Over the past 20 years (1999-2018),[6] commercial and recreational landings of chub mackerel in Florida averaged 8,034 pounds per year and peaked at 76,835 pounds in 2011. During this time period, Florida landings accounted for 0.3% of total east coast landings. No landings were reported in South Carolina or Georgia. According to a comment letter provided by the Florida Fish and Wildlife Conservation Commission (FL FWC 2019), there is no directed fishery for chub mackerel off the east coast of Florida.

The Council agreed that given the scale of chub mackerel landings in South Carolina through Florida, this portion of the stock's range is immaterial to proper management and excluding those states from the management unit would not impair the Council's ability to meet the FMP goals of maintaining a sustainable stock, optimizing economic and social benefits from utilization of chub mackerel, and supporting science, monitoring, and data collection to enhance effective management of chub mackerel fisheries (section 4.2). This recommendation is supported by the National Standard 3 Guidelines, as described in more detail in section 8.1.1.

5.2.2.2. ALTERNATIVE 2B.II: MAINE THROUGH EAST COAST OF FLORIDA MANAGEMENT UNIT

Under this alternative the chub mackerel management unit would be all federal waters off the U.S. east coast. This alternative would align the management unit with the area over which the SSC's ABC recommendation applies (MAFMC 2018b). This would allow the Council to regulate chub mackerel fisheries throughout that entire region. Under this alternative, there would be no differentiation of catch or landings limits among regions. The ABC, ACL, annual catch target (ACT), commercial quota, and recreational harvest limit (if used) would apply uniformly across Maine through Florida with no state or regional allocations.

As described in the previous section, the Council did not select this as a preferred alternative because they agreed that given the scale of chub mackerel landings in South Carolina through Florida, this portion of the stock's range is immaterial to proper management and including those states in the management unit is not necessary to meet the FMP goals of maintaining a sustainable stock, optimizing economic and social benefits from utilization of chub mackerel, and supporting science, monitoring, and data collection to enhance effective management of chub mackerel fisheries (section 4.2).

5.2.3. ALTERNATIVE SET 2.C: SDCS, ABC, OY, ACLS, ACTS, AND LANDINGS LIMITS

5.2.3.1. ALTERNATIVE SET 2.C.I: SDCS (REQUIRED UNDER MSA)

SDCs are metrics for determining if a stock is overfished or experiencing overfishing. If the Council manages chub mackerel as a stock in the fishery, SDCs will be defined and automatically updated based on the latest stock assessment that is peer reviewed and accepted for use in management, consistent with the process used for all other stocks in the Council's FMPs (MAFMC 2018a). A peer-reviewed and accepted stock assessment is not currently available for chub mackerel; therefore, the Council must use proxy metrics for SDCs. Two alternatives were considered, as described below. These alternatives are mutually exclusive. Only one may be selected. A no action alternative for SDCs is encompassed within alternative 1 (no action), which would not add chub mackerel to the MSB FMP as a stock in need of

[6] 2018 commercial data are preliminary.

conservation and management. If the Council choses alternative 2 (add chub mackerel to the MSB FMP), then they must meet the MSA requirement for SDCs.

It is important to emphasize that the proxy SDCs in the alternatives described below do not influence the ABC or other catch limits. They will only be used to determine if overfishing is occurring or if the stock is overfished. Any SDCs implemented through this amendment will remain in place until replaced with SDCs derived from a peer reviewed and accepted stock assessment or until modified through a future FMP action. SDCs cannot be modified through specifications (section 5.2.6.1).

As context for both alternatives, it should be noted that in July 2018 the SSC agreed that an overfishing limit (OFL) could not be specified based on the available information. They agreed that stock size and productivity cannot be determined, there is no information to determine reference points for biomass levels, and little information exists to determine reference points for fishing mortality rates. They recommended an ABC of 2,300 mt (5.07 million pounds) based on historical fishery data, knowledge of species with similar life histories, and expert judgement (MAFMC 2018b).

Based on the recommendations of the SSC and FMAT, potential approaches for developing SDCs other than those described in the following sections were deemed inappropriate given significant data limitations. For example, fishery-independent survey indices, fishery CPUE, and estimates of fishing mortality rates have been used to derive proxy SDCs in other data-poor situations; however, these would be impractical or inappropriate metrics for chub mackerel SDCs at this time. Specific data concerns are described in section 4.5.

5.2.3.1.1. ALTERNATIVE 2.C.I.A: REVERSE ABC CONTROL RULE APPROACH (PREFERRED)

Under the Council's ABC control rule for a stock with a typical life history, biomass at or above biomass at maximum sustainable yield, and an OFL coefficient of variation (CV) of 150%, the ABC is 76% of the OFL. This control rule is intended to be used to derive an ABC from an OFL, taking into account the Council's risk policy and scientific uncertainty. This approach was used to work backwards from the ABC to derive an overfishing SDC for chub mackerel (i.e., the ABC was divided by 0.76). Although stock status is unknown as there is no stock assessment, it is assumed that biomass is currently at or above biomass at maximum sustainable yield given the scale of the fisheries and the SSC's recent discussions (MAFMC 2018b). An OFL CV of 150% was assumed to be appropriate given notable data limitations. The SSC typically uses a default OFL CV of 100% but has used a 150% CV in situations with high levels of uncertainty associated with knowledge of the stock (e.g., surf clams in December 2018). The resulting proposed chub mackerel proxy overfishing SDC is 3,026 mt (6.67 million pounds). In other words, when more than 3,026 mt of chub mackerel are harvested from Maine through the east coast of Florida in a given year, overfishing is assumed to have occurred.

The proposed overfished SDC is three consecutive years of catch above 3,026 mt (6.67 million pounds). That is, if catch exceeds 3,026 mt in three consecutive years, then the stock would be presumed overfished. An overfished designation triggers a requirement for a rebuilding plan.

Studies from other parts of the world and of closely related species suggest that chub mackerel are somewhat resilient to fishing pressure but that heavy fishing pressure, especially when combined with unfavorable environmental conditions, can lead to poor recruitment (e.g., Parrish and MacCall 1978). As such, an overfished SDC defined as three consecutive years of overfishing may not be overly risky for this species.

The Council selected these as the preferred SDCs due to their basis in existing Council management practices for the ABC.

5.2.3.1.2. ALTERNATIVE 2.C.I.B: REFINED ORCS APPROACH

A subset of the FMAT considered an alternative approach for deriving an overfishing SDC based on a data-poor model refined by Free et al. (2017). This approach, referred to as the refined Only Reliable Catch Series (ORCS) approach, recommends deriving an OFL by multiplying a catch statistic (e.g., the 90th percentile of catch) by a scalar. A range of scalars are provided in Free et al. (2017). The appropriate scalar should be selected based on stock status (over, under, or fully exploited according to the model output) and the desired level of risk of overfishing versus risk of foregone yield. An online application to apply this approach to any species is available at: https://cfree.shinyapps.io/refined_orcs_approach/. This approach suggests that chub mackerel are most likely underexploited. As shown in table 2 in Free et al. (2017), a scalar of 1.62 aligns with the Council's 40% maximum acceptable risk of overfishing for an underexploited stock. If the ABC of 2,300 mt (5.07 million pounds) is used as the catch statistic to multiply by this scalar, the resulting OFL is 3,726 metric tons (8.21 million pounds). This is about 23% greater than the overfishing SDC generated based on the control rule approach described in the previous section.

Under this alternative, the overfished SDC would be three consecutive years of catch above 3,726 mt (8.21 million pounds). That is, if catch exceeds 3,726 mt in three consecutive years, then the stock would be presumed overfished and a requirement for a rebuilding plan would be triggered.

This was not selected as a preferred alternative for SDCs for a variety of reasons. GARFO expressed concern about their ability to approve this alternative due to the fact that it was not reviewed by the NEFSC or SSC and has been untested for chub mackerel in this region. Unlike the preferred alternative, this alternative is not based on previous Council precedent. In addition, there is limited ability within the Free et al. (2017) approach to tailor the model to the unique characteristics of any individual species. The FMAT members who evaluated this approach had some concerns about the appropriateness of the relative weighting of the factors in the model. For example, the influence of price on stock status seemed unreasonably large for chub mackerel.

5.2.3.2. ALTERNATIVE 2.C.II: ABC FOR 2020-2022 = 2,300 MT / 5.07 MILLION POUNDS (PREFERRED)

The National Standards Guidelines (50 CF 600.310) define an ABC as "a level of a stock or stock complex's annual catch that accounts for scientific uncertainty in the estimate of the OFL and any other scientific uncertainty…and should be specified based on the ABC control rule". The OFL is the overfishing limit and is the level of annual catch above which overfishing is occurring.

As mandated by the MSA, the SSC is responsible for recommending ABCs to the Council. The Council's ABC control rule and risk policy guide the SSC in making their recommendations. The ABC control rule contains provisions related to consideration of scientific uncertainty. The risk policy defines the acceptable risk of overfishing associated with the ABC, which varies based on stock size such that there is a lower tolerance for risk at lower stock sizes. The Council cannot set catch limits which exceed the ABCs recommended by the SSC.

The SSC recommended an ABC of 2,300 mt (5.07 million pounds) during their July 2018 meeting. They concluded that insufficient information exists to assess the status and trends of chub mackerel in the northwest Atlantic. Thus, they relied on expert judgment to derive their ABC recommendation. Their ABC recommendation is based loosely on the historic high for commercial and recreational landings

(i.e., around 5.25 million pounds in 2013) and assumptions about discards. This level of ABC will prevent the fishery from achieving its historic high, but will allow landings to exceed those in every other year over the past 20 years (Table 5 in section 6.2). They agreed that this level of catch is unlikely to result in overfishing given the general productivity of this species in fisheries throughout the world combined with the relatively low fishery capacity in U.S. Atlantic waters. They agreed that this ABC should apply from Maine through the east coast of Florida (MAFMC 2018b).

No alternative ABCs were provided by the SSC; however, the Council considered a range of alternatives for setting catch limits less than or equal to the SSC's recommended ABC, as described in the next section.

The Council proposes that this ABC be in place for three years, with interim SSC and Council review each year. The value of the ABC can be modified each year through the specifications process (section 5.2.6.1).

5.2.3.3. ALTERNATIVE SET 2.C.III: OY FOR 2020-2022

The MSA defines OY as "the amount of fish which (A) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems; (B) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and (C) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery." In practice, OY takes the form of a reduction in the ABC.

The Council considered two alternatives for OY for 2020-2022, as described in the following sections. These alternatives are mutually exclusive. Only one may be selected.

The Council proposes that the OY value implemented through this amendment be in place for three years, with interim Council review each year. The value of OY can be modified each year through the specifications process (section 5.2.6.1).

5.2.3.3.1. ALTERNATIVE 2.C.III.A: OY = ABC = 2,300 MT / 5.07 MILLION POUNDS (PREFERRED)

Under this alternative, the Council would set OY equal to the ABC recommended by the ABC. This is a preferred alternative.

No ecosystem considerations were included in the SSC's ABC recommendation of 2,300 mt/5.07 million pounds. The SSC noted that there is insufficient information on predation mortality or the role of chub mackerel in predator diets. As such, the SSC was unable to evaluate chub mackerel's role as forage using the information available.

A thorough literature review by Council and NMFS staff[7] identified only one study with quantitative data on the role of chub mackerel in the diets of any predators off the U.S. east coast. Manooch et al. (1984) found that chub mackerel made up 0.2% (by frequency of occurrence) of the diets of dolphinfish sampled off North Carolina through Texas. Several studies have quantified the importance of the family Scombridae to the diets of various fish and marine mammal predators; however, no studies quantifying the importance of chub mackerel at the species level have been found. For example, an analysis of the NEFSC food habits database prepared for the Forage Amendment found no records of chub mackerel as

[7] Available at: http://www.mafmc.org/s/12_Chub_lit_review_July2018.pdf

prey; however, "mackerels" were identified as prey for spiny dogfish, monkfish, and summer flounder (MAFMC 2017a).

The SSC noted that their recommended ABC will support improved fishery-dependent data collection and analysis. Their expert judgment is that this level of catch is unlikely to result in overfishing given the general productivity of chub mackerel in fisheries throughout the world, combined with the relatively low fishery capacity in this region (MAFMC 2018b).

After considering the SSC's discussion, staff's literature review, and public comments, the Council determined that there is no quantitative basis for setting OY less than the ABC to account for ecosystem concerns.

The 5.07 million pound ABC recommended by the SSC will prevent chub mackerel landings from reaching their historic high of 5.25 million pounds in 2013. As such, the impacts of commercial chub mackerel harvest on predators should not be greater than those seen over the past two decades or more. More importantly, setting OY less than the ABC will not necessarily address concerns about localized depletion expressed in public comments. The level of OY has limited impact on when and where the commercial chub mackerel fishery takes place. Spatial and temporal management measures could address concerns about localized depletion and user conflicts; however, the Council agreed not to consider developing potential alternatives for this type of management until after receiving the final results of a diet study which they recently funded. Final results are expected to be available in 2020.

5.2.3.3.2. ALTERNATIVE 2.C.III.B: OY = ABC - 36% = 1,472 MT / 3.25 MILLION POUNDS

Under this alternative, OY for 2020-2022 would be 1,472 mt or 3.25 million pounds. This is equivalent to a 36% reduction in the SSC's recommended ABC.

During the development of this action, some public comments suggested that the landings limit not increase from that implemented through the Forage Amendment.[8] Assuming all other preferred management alternatives are implemented, a 36% reduction from ABC to OY results in a total allowable landings limit (TAL) of 2.85 million pounds. The TAL implemented through the Forage Amendment is 2.86 million pounds. Thus, assuming all other preferred alternatives are implemented, this alternative would represent about a 1.65 million pound or 37% reduction in the TAL compared to the TAL under the preferred alternatives.

The Council did not select this as a preferred alternative because it is not supported by an analysis of ecosystem impacts. There is no quantitative evidence to suggest that this high level of foregone yield would result in notable ecosystem benefits.

5.2.3.4. ALTERNATIVE SET 2.C.IV: EXPECTED SC-FL CATCH FOR 2020-2022

As stated in section 5.2.2, all catch from Maine through the east coast of Florida will count towards the ABC. Under the preferred management unit alternative (alternative 2.B.I: Maine through North Carolina management unit), expected South Carolina through Florida catch would be subtracted from the ABC (or OY) to derive an ACL (or multiple sub-ACLs, depending on the alternative selected; section 5.2.3.5) which applies from Maine through North Carolina.

[8] A summary of public comments and all individual comments are available at: http://www.mafmc.org/actions/chub-mackerel-amendment.

The Council considered three alternatives for the value of expected South Carolina through Florida catch for 2020-2022, as described in the following sections. These alternatives are not relevant under the non-preferred management unit alternative (i.e., alternative 2.B.II: Maine through east coast of Florida management unit). One of the three alternatives below should be selected in combination with the preferred management unit alternative (alternative 2.B.I).

No specific consequences are pre-determined for situations when South Carolina through Florida catch is higher than expected. If this were to occur, the Monitoring Committee would discuss the appropriate management response, which could be a revision to the value of expected catch in future years. This value can be modified on an annual basis through the specifications process (section 5.2.6.1).

5.2.3.4.1. ALTERNATIVE 2.C.IV.A: NO ACTION (NO EXPECTED SC-FL CATCH FOR 2020-2022)

Under this alternative, no action would be taken on expected South Carolina through Florida catch when setting catch and landings limits for 2020 through 2022. Effectively, expected South Carolina through Florida catch would be set to zero. This is not a preferred alternative because the Council agreed that it is not reasonable to assume that there will be no commercial or recreational catch in the South Atlantic.

According to commercial dealer and Marine Recreational Information Program (MRIP) data, over the past twenty years (1999-2018), commercial and recreational landings in South Carolina through Florida were variable, occurred only in Florida, and averaged 8,034 pounds per year, with a high of 76,835 pounds in 2011 (mostly from the recreational fishery).

Estimates of recreational discards in numbers of fish are available through MRIP; however, these estimates are variable and sporadic and should be considered uncertain. Commercial discards in the South Atlantic are unknown given the limitations of the available datasets. Observer coverage in the South Atlantic is much more limited than in the northeast. South Atlantic commercial discard logbooks though 2017 included no records of chub mackerel, though there were some records of unclassified mackerels (personal communication, Kevin McCarthy, Southeast Fisheries Science Center). Northeast commercial discard data are summarized in section 5.2.3.7.

As previously stated, the value of expected South Carolina through Florida catch should be reviewed and, if necessary, modified on an annual basis through the specifications process (section 5.2.6.1).

5.2.3.4.2. ALTERNATIVE 2.C.IV.B: 12,600 POUNDS OF EXPECTED SC-FL CATCH FOR 2020-2022

Under this alternative, expected South Carolina through Florida catch for 2020 through 2022 would be set to 12,600 pounds. This is equivalent to average commercial and recreational landings in this region during 2008-2017 increased by 10% to account for discards. As described in the previous section, discards are not well quantified; however, a 10% discard rate may be a reasonable assumption. Northeast (i.e., Maine through North Carolina) observer and northeast VTR data for commercial trips which caught any amount of chub mackerel over the past 5, 10, or 15 years (through 2017) showed that between 3% and 6% of total observed or reported chub mackerel catch was discarded, depending on the years and dataset. MRIP data suggest that the recreational discard rate is much higher (Table 7); however, when considered as a proportion of total commercial and recreational catch, the recreational fishery accounts for a very small proportion of total catch (e.g., Table 5).

The Council did not select this as a preferred alternative. Instead, they chose the more conservative alternative summarized in the next section. The preferred alternative better accounts for the uncertainty and variability in the data and results in only a 1% difference in the resulting TAL compared to this alternative.

As previously stated, the value of expected South Carolina through Florida catch should be reviewed and, if necessary, modified on an annual basis through the specifications process (section 5.2.6.1).

5.2.3.4.3. ALTERNATIVE 2.C.IV.C: 84,500 POUNDS OF EXPECTED SC-FL CATCH FOR 2020-2022 (PREFERRED)

Under this alternative, expected South Carolina through Florida catch for 2020 through 2022 would be set to 84,500 pounds. This is a conservative estimate based on the highest annual South Atlantic landings shown in commercial dealer and MRIP data (i.e., 76,835 pounds in 2011, mostly from the recreational fishery), increased by about 10% to account for discards. The rationale behind 10% discards is described in the previous section.

The Council selected this as a preferred alternative because it is a conservative approach that accounts for the uncertainty and variability in the data and results in only a 1-2% difference in the resulting TAL compared to the other alternatives considered.

As previously stated, the value of expected South Carolina through Florida catch should be reviewed and, if necessary, modified on an annual basis through the specifications process (section 5.2.6.1).

5.2.3.5. ALTERNATIVE SET 2.C.V: SEPARATE OR COMBINED COMMERCIAL AND RECREATIONAL CATCH LIMITS

Three alternatives for commercial and recreational ACLs and ACTs were considered, as described in the following sections. These alternatives are mutually exclusive. Only one may be selected. Under all three alternatives, the values of the ACLs and ACTs for each year can be modified through the specifications process (section 5.2.6.1); however, the number of ACLs and ACTs (i.e., ACLs and/or ACTs shared between the commercial and recreational sectors or split between the two sectors) cannot be modified through specifications and would require a larger FMP action.

5.2.3.5.1. ALTERNATIVE 2.C.V.A: SINGLE ACL WITH NO SUB-ACLS OR ACTS (PREFERRED)

Under this alternative, there would be no separation of catch limits into commercial and recreational components. All catch would count towards one ACL and one ACT. All landings would count towards one landings limit (Figure 3). The MSA requires AMs for ACLs (section 5.2.4). Under this alternative, AMs would only be triggered if total catch (i.e., commercial and recreational) exceeded the ACL. AMs would not be evaluated separately for the two sectors. The Council selected this as a preferred alternative.

Recreational catch data are variable and uncertain. Based on available data, recreational landings constituted 1% of total landings over the past 5, 10, and 15 years (through 2017). Discards are not well quantified, especially for the recreational fishery. As such, any allocation of catch to the recreational fishery based on past catch would be quite small and would be based on uncertain data. For this reason, the Council agreed that it would not be appropriate to allocate catch among the commercial and recreational sectors as sub-ACLs or ACTs.

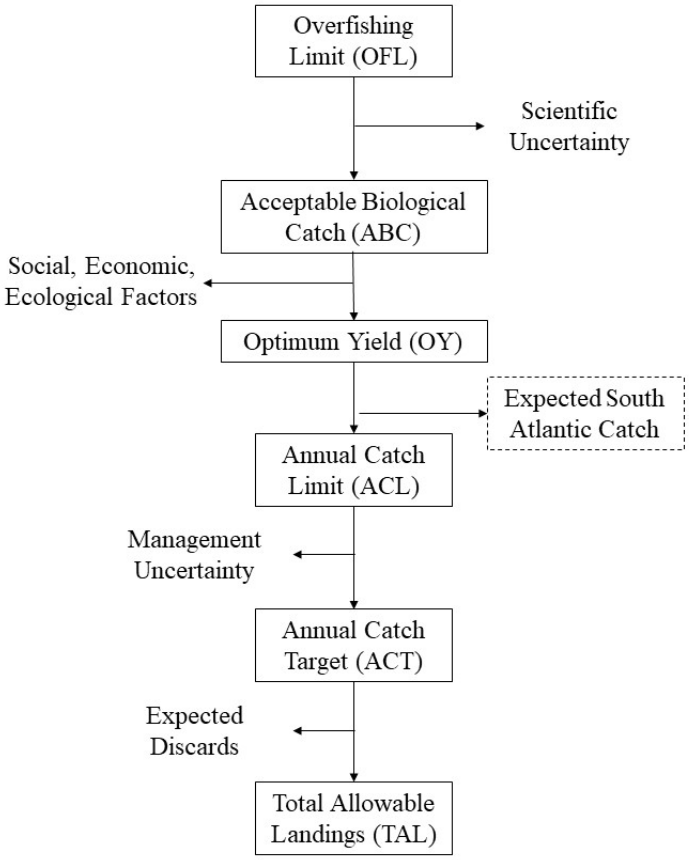

Figure 3: Process for deriving chub mackerel catch and landings limits under alternative 2.C.V.a. Expected South Atlantic catch would be subtracted from the ABC if the management unit is Maine through North Carolina. If the management unit covers the entire east coast, expected South Atlantic catch would not be subtracted from the ABC (section 5.2.2). Based on application of the Council's ABC control rules, an OFL was not specified for 2020-2022; however, it may be used in the future.

5.2.3.5.2. ALTERNATIVE 2.C.V.B: COMMERCIAL AND RECREATIONAL SUB-ACLS WITH SECTOR-SPECIFIC ACTS

Under this alternative, the chub mackerel ABC/OY would be divided into commercial and recreational ACLs. Sector-specific ACTs and landings limits (i.e., a commercial quota and recreational harvest limit or RHL) would be derived from those ACLs (Figure 4).

The MSA requires AMs for ACLs (section 5.2.4). Under this alternative, AMs would be evaluated separately for the commercial and recreational sectors as each sector would have its own ACL.

Recreational catch data are variable and uncertain. Based on available data, recreational landings constituted 1% of total landings over the past 5, 10, and 15 years (through 2017). Discards are not well quantified, especially for the recreational fishery. As such, any allocation of catch to the recreational fishery based on past catch would be quite small and would be based on uncertain data. For this reason, the Council agreed that it would not be appropriate to allocate catch among the commercial and recreational sectors as sub-ACLs or ACTs. Therefore, they did not select this as a preferred alternative.

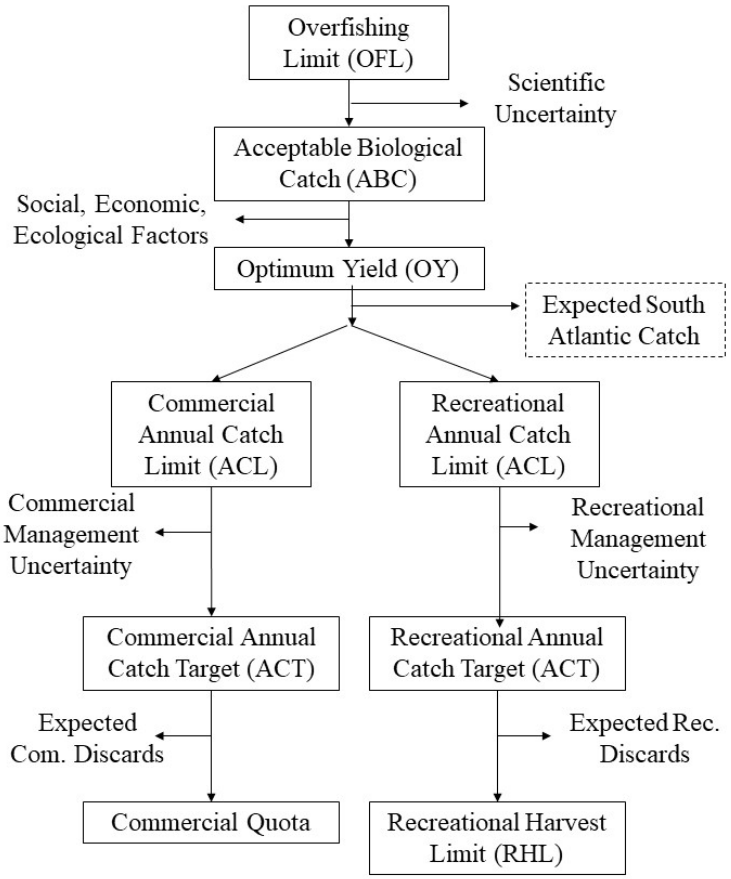

Figure 4: Process for deriving chub mackerel catch and landings limits under alternative 2.C.V.b. Expected South Atlantic catch would be subtracted from the ABC if the management unit is Maine through North Carolina. If the management unit covers the entire east coast, expected South Atlantic catch would not be subtracted from the ABC (section 5.2.2). Based on application of the Council's ABC control rules, an OFL was not specified for 2020-2022; however, it may be used in the future.

5.2.3.5.3. ALTERNATIVE 2.C.V.C: SINGLE ACL WITH COMMERCIAL AND RECREATIONAL ACTS

Under this alternative, a single ACL applying to both the commercial and recreational sectors would be divided into commercial and recreational ACTs. These sector-specific ACTs would be used to derive a commercial quota and RHL (Figure 5). The MSA requires AMs for ACLs (section 5.2.4). Under this alternative, AMs would only be triggered if total catch (i.e., commercial and recreational) exceeded the ACL. AMs would not be evaluated separately for the two sectors.

Recreational catch data are variable and uncertain. Based on available data, recreational landings constituted 1% of total landings over the past 5, 10, and 15 years (through 2017). Discards are not well quantified, especially for the recreational fishery. As such, any allocation of catch to the recreational fishery based on past catch would be quite small and would be based on uncertain data. For this reason, the Council agreed that it would not be appropriate to allocate catch among the commercial and recreational sectors as separate ACTs. Therefore, they did not select this as a preferred alternative.

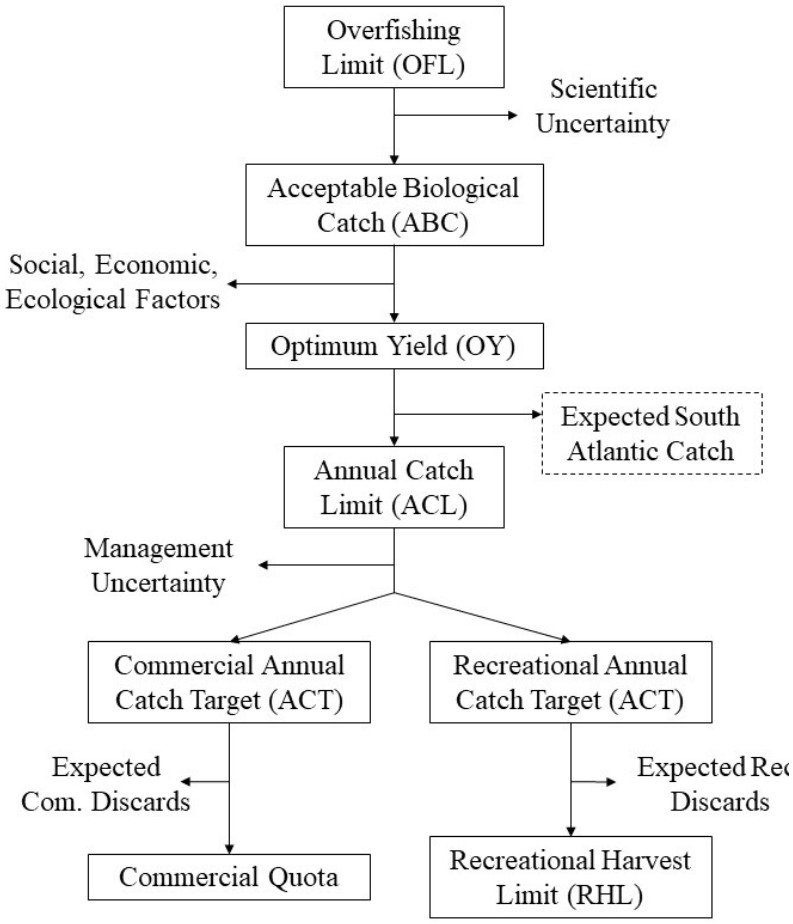

Figure 5: Process for deriving chub mackerel catch and landings limits under alternative 2.C.V.c. Expected South Atlantic catch would be subtracted from the ABC if the management unit is Maine through North Carolina. If the management unit covers the entire east coast, expected South Atlantic catch would not be subtracted from the ABC (section 5.2.2). Based on application of the Council's ABC control rules, an OFL was not specified for 2020-2022; however, it may be used in the future.

5.2.3.6. ALTERNATIVE SET 2.C.VI: MANAGEMENT UNCERTAINTY BUFFER

The ACT is set equal to or less than the ACL to account for management uncertainty (e.g., Figure 3). According to the National Standards Guidelines, management uncertainty "refers to uncertainty in the ability of managers to constrain catch so that the ACL is not exceeded, and the uncertainty in quantifying the true catch amounts (i.e., estimation errors). The sources of management uncertainty could include: Late catch reporting; misreporting; underreporting of catches; lack of sufficient inseason management, including inseason closure authority; or other factors."

The Council considered two alternatives for management uncertainty for deriving the 2020-2022 ACT (or ACTs, if separate commercial and recreational catch limits are used; section 5.2.3.5). These alternatives are mutually exclusive. Only one may be selected. Under both alternatives, the management uncertainty buffer should be reviewed and, if necessary, modified on an annual basis through the specifications process (section 5.2.6.1).

5.2.3.6.1. ALTERNATIVE 2.C.VI.A: NO ACTION - NO MANAGEMENT UNCERTAINTY BUFFER

Under this alternative, there would be no management uncertainty buffer and the ACT would be set equal to the ACL (or sector-specific ACL, depending on the other alternatives selected; section 5.2.3.5).

Estimation errors are likely low for the commercial chub mackerel fishery given that fewer than five vessels and dealers are associated with over 95% of landings and given existing reporting requirements (e.g., VTRs and dealer reports). Estimation errors may be of greater concern for the recreational fishery; however, recreational harvest accounted for about 1% of total landings over the past 15 years.

Unintentional misreporting could be an issue due to similarities in appearance between chub mackerel and other small scombrids such as Atlantic mackerel. The Council and NMFS have taken steps to address this by developing a species identification guide which was sent to many NMFS commercial and party/charter permit holders and other target groups.[9] MRIP has also taken steps to address this issue by adding chub mackerel to the core list of species for trainings of field samplers from Maine through Virginia.

Late catch reporting should not be a major issue due to existing requirements for submission of VTRs for every trip on either a weekly basis or within 48 hours of returning to port, depending on the permit category. Dealer reports must be submitted weekly.

Some fishermen and dealers may not be aware of the requirements to report all catch (landings and discards) regardless of target species or management status of the species in question. Reporting of all catch and landings to the species level through VTRs and dealer reports has been a longstanding requirement; however, as suggested by public comments during the Forage Amendment, some individuals may not be fully aware of or complying with this requirement. The degree of this under-reporting is unknown. This is not likely an issue for the top vessels and dealers in the commercial fishery as they participate in many federally-managed fisheries and are well aware of these reporting requirements.

For all these reasons, a 0% management uncertainty buffer may be supportable; however, the Council agreed to take a more conservative approach and recommended a 4% management uncertainty buffer, as described in more detail in the next section.

5.2.3.6.2. ALTERNATIVE 2.C.VI.B: 4% MANAGEMENT UNCERTAINTY BUFFER (PREFERRED)

Under this alternative, the ACT would be 4% lower than the ACL (or sector-specific ACL, depending on the other alternatives selected; section 5.2.3.5) to account for management uncertainty. This is a preferred alternative.

Potentially relevant sources of management uncertainty are described in more detail in the previous section and include misreporting due to species identification issues and under-reporting on VTRs due to misunderstandings of the requirement to report all catch on VTRs, including catch of unmanaged species and discarded catch. In addition, the Council noted that there is some uncertainty regarding how the fishery will respond to the management measures implemented through this amendment. Many types of management measures considered through this amendment (e.g., ACL overage paybacks, recreational permit requirements) have never been used for chub mackerel off the U.S. east coast, though they have been used in many other fisheries.

[9] An electronic version of the guide is available at: http://www.mafmc.org/s/Small_scombrid_ID_guide.pdf

The Council selected this as a preferred alternative along with a 6% buffer for estimated discards, noting that these two alternatives add up to a 10% reduction from the ACL to the TAL. Analysis completed after Council decision making suggests that 4% is a reasonable buffer between the ACL and the ACT to account for management uncertainty. For example, 4% of the preferred ACL of 5.06 million pounds is 202,321 pounds. As described in section 5.2.4.2.4, forty thousand pounds was considered a reasonable minimum level of chub mackerel landings to define a directed chub mackerel trip. Thus, a 4% management uncertainty buffer equates to a maximum of 5 directed fishery trips. Considered in combination with the other preferred alternatives (e.g., the alternatives for in-season commercial fishery closure, section 5.2.4), this is expected to be a reasonable buffer between the ACL and ACT to prevent ACL overages.

5.2.3.7. ALTERNATIVE SET 2.C.VII: EXPECTED DISCARDS

Under all alternatives considered, the Council proposes using a landings limit (or sector-specific landings limits, depending on the other alternatives selected; section 5.2.3.5) to help ensure that catch does not exceed the ACL (or sector-specific ACL, depending on the other alternatives selected; section 5.2.3.5). Landings limits are derived by subtracting expected discards from the ACT (or ACTs; e.g., Figure 3).

The Council considered four alternatives for expected discards for deriving the 2020-2022 landings limits. These alternatives are mutually exclusive. Only one may be selected. Under all alternatives in this alternative set, the value of expected discards should be reviewed and, if necessary, modified on an annual basis through the specifications process (section 5.2.6.1).

5.2.3.7.1. ALTERNATIVE 2.C.VII.A: NO ACTION - NO EXPECTED DISCARDS

Under this alternative, expected discards would not be specified and the TAL would be set equal to the ACT (or, depending on the other alternatives selected, the commercial quota and RHL would be set equal to the sector-specific ACTs). The Council agreed that this would not be appropriate given that discards have been reported in northeast observer data, northeast VTR data, and MRIP data (Table 4 below and Table 7 in section 6.2.2). If the expected discards value is set too low, this could increase the risk that the ACL is exceeded and AMs are triggered.

Table 4: Percent of commercial chub mackerel catch that was discarded, based on northeast fisheries observer and northeast VTR data. The associated number of trips is in parentheses.

Years	Observer Discard %	VTR Discard %
2003-2017 (15 years)	6% (217 trips)	3% (1,894 trips)
2008-2017 (10 years)	5% (199 trips)	3% (1,869 trips)
2013-2017 (5 years)	4% (156 trips)	3% (1,540 trips)
2013-2015 (top 3)	4% (95 trips)	3% (740 trips)
2013 (historic high)	3% (27 trips)	1% (120 trips)

5.2.3.7.2. ALTERNATIVE 2.C.VII.B: 3% EXPECTED DISCARDS

Under this alternative, the TAL would be 3% lower than the ACT to account for expected discards (or, depending on the other alternatives selected, the commercial quota and RHL would be 3% lower than the sector-specific ACTs). This alternative is based on the commercial discard rate in 2013 according to northeast observer data. Based on public comments and available data, 2013 was the year with the

highest targeted chub mackerel commercial fishing effort; thus, it is logical that this year would have a low discard rate, compared to a longer time series (Table 4). The 2,300 mt/5.07 million pound ABC recommended by the SSC is loosely based on catch in 2013 (section 5.2.3.2; MAFMC 2018b). In this sense, a 3% expected discards rate would align with the time period of data used to set the ABC.

The Council did not select this as a preferred alternative. They instead recommended a more conservative alternative of a 6% discards buffer, which is based on a longer time series of data (Table 4).

5.2.3.7.3. ALTERNATIVE 2.C.VII.C: 6% EXPECTED DISCARDS (PREFERRED)

Under this alternative, the TAL would be 6% lower than the ACT to account for expected discards (or, depending on the other alternatives selected, the commercial quota and RHL would be 6% lower than the sector-specific ACTs). This alternative is based on the commercial discard rate during 2003-2017 according to northeast observer data (Table 4). The Council selected this as a preferred alternative because it is based on 15 years of data. It does not explicitly account for recreational data; however, recreational discards in numbers of fish or weight are generally very low compared to commercial discards, especially in years with targeted commercial fishing effort (Table 4, above, and Table 5 and Table 7 in section 6.2).

5.2.3.7.4. ALTERNATIVE 2.C.VII.D: 10% EXPECTED DISCARDS

Under this alternative, the TAL would be 10% lower than the ACT to account for expected discards (or, depending on the other alternatives selected, the commercial quota and RHL would be 10% lower than the sector-specific ACTs). This discard rate is higher than that shown in northeast observer and VTR data over the past 5, 10, or 15 years (Table 4). This was presented to the Council as a conservative alternative to account for uncertainty regarding the true level of discards in the commercial and recreational fisheries.

As shown in Table 4, the discard rates calculated based on observer data are not supported by a high number of data points (e.g., an average of 15 observed trips per year during 2003-2017). VTRs provide many more data points; however, VTRs are meant to include fishermen's best estimates of catch, not exact amounts. In addition, public comments suggest that VTRs may under-count unmanaged species and discards due to misunderstanding of the VTR requirements. As shown in Table 7 in section 6.2.2, the recreational discard rate can be quite high in some years; however, recreational discards in numbers of fish averaged only 4,612 fish per year during 1999-2018 for the entire east coast. Recreational discard estimates provided by MRIP are based on anglers' self-reported estimates after the fishing trip has ended; thus, issues of recall and fish identification are of concern. A 10% discard rate was presented as a way to address these uncertainties in the available data. The Council did not select this as a preferred alternative because they agreed that it is too conservative given the available data (e.g., Table 4).

5.2.4. ALTERNATIVE SET 2.D: ACCOUNTABILITY MEASURES (REQUIRED UNDER MSA)

The MSA requires that FMPs contain "measures to ensure accountability." The National Standards Guidelines state that AMs "are management controls to prevent ACLs, including sector-ACLs, from being exceeded, and to correct or mitigate overages of the ACL if they occur. AMs should address and minimize both the frequency and magnitude of overages and correct the problems that caused the overage in as short a time as possible. NMFS identifies two categories of AMs, inseason AMs and AMs for when the ACL is exceeded. The FMP should identify what sources of data will be used to implement AMs (e.g., inseason data, annual catch compared to the ACL, or multi-year averaging approach)" (50 CFR 600.310 (g)).

The Council considered a range of alternatives for in-season AMs (alternative set 2.D.I and 2.D.II) and AMs for when the ACL is exceeded (alternative 2.D.III), as described below. One alternative from each of these three alternative sets should be selected if alterative 2 (manage chub mackerel as a stock in the MSB FMP) is selected. Under all alternatives, ACL overages would be evaluated by comparing a single-year of total catch (landings and dead discards) to the ACL, or sector-specific ACLs.

For consistency with other Council-managed species, the Council decided not to develop in-season closure alternatives for the recreational fishery. MRIP provides the most comprehensive recreational catch and landings data. These data are aggregated into two-month "waves". Preliminary data are generally not available until two months after the end of each wave. Final estimates are typically available in April of the following year. Given this time lag in data availability, in-season AM authority is not used for any Council-managed recreational fisheries.

5.2.4.1. ALTERNATIVE SET 2.D.I: TRIGGER FOR IN-SEASON CLOSURE OF THE COMMERCIAL FISHERY

The Council considered three alternatives for in-season closure of the commercial fishery, as described below. Some of these alternatives were based on precedent from the Atlantic mackerel fishery, as described below. These alternatives are not necessarily mutually exclusive when coupled with different possession limits from alternative set 2.D.II, for example, as under the Council's preferred alternatives described in more detail in the following sections. If the no action alternative for in-season closure (alternative 2.D.I.a) is selected, then no corresponding alternative for possession limit (alternative set 2.D.II) is needed. Under all other alternatives in alternative set 2.D.I, a corresponding possession limit alternative should also be selected.

5.2.4.1.1. ALTERNATIVE 2.D.I.A: NO ACTION ON IN-SEASON CLOSURE

Under this alternative, the Council would take no action on in-season closure of the commercial fishery. There would be no restrictions on commercial possession or landings after commercial landings exceed the TAL (or the commercial quota, depending on which alternative is selected from alternative set 2.C.V; section 5.2.3.5). The Council did not select this as a preferred alternative because they agreed that it would be inconsistent with the MSA requirements to prevent ACL overages.

5.2.4.1.2. ALTERNATIVE 2.D.I.B: COMMERCIAL FISHERY CLOSURE WHEN 90% OF THE TAL IS PROJECTED TO BE LANDED (PREFERRED IN COMBINATION WITH ALTERNATIVE 2.D.II.D)

Under this alternative, NMFS would close the commercial fishery for chub mackerel when 90% of the TAL is projected to be landed or when 90% of the commercial quota is projected to be landed, depending on which alternative is selected from alternative set 2.C.V (separate or combined commercial and recreational catch limits, section 5.2.3.5). After the fishery is closed, some level of possession may be allowed, depending on the other alternatives selected (section 5.2.4.2).

This is a preferred alternative when used in combination with alternatives 2.D.II.d (40,000 pound possession limit), 2.D.I.d (in-season closure when 100% of the TAL is projected to be landed), and 2.D.II.c (10,000 pound possession limit). Under this combination of preferred alternatives, a 40,000 pound possession limit would be triggered when 90% of the TAL is projected to be landed and a 10,000 pound possession limit would be triggered when 100% of the TAL is projected to be landed. This multi-level closure structure is similar to what is used in the Atlantic mackerel fishery (e.g., 84 Federal Register 26634, June 7, 2019).

Given recent fishery characteristics (section 6.2.1), it was assumed that these measures, when used in combination with the other preferred alternatives for 2020-2022 specifications, will sufficiently limit targeted fishing effort to prevent an ACL overage. The analysis summarized in section 7.1.2.6 (completed after final action by the Council) supports this conclusion. It suggests that if the preferred alternatives had been in place in the past, the preferred ACL would not have been reached.

5.2.4.1.3. ALTERNATIVE 2.D.I.C: COMMERCIAL FISHERY CLOSURE WHEN 95% OF THE TAL IS PROJECTED TO BE LANDED

Under this alternative, NMFS would close the commercial fishery for chub mackerel when 95% of the TAL is projected to be landed or when 95% of the commercial quota is projected to be landed, depending on which alternative is selected from alternative set 2.C.V (section 5.2.3.5). After the fishery is closed, some level of possession may be allowed, depending on the other alternatives selected (section 5.2.4.2). This was not selected as a preferred alternative. The preferred alternatives, summarized in the previous section, were deemed sufficient and appropriate for ensuring that the ACL is not exceeded.

5.2.4.1.4. ALTERNATIVE 2.D.I.D: COMMERCIAL FISHERY CLOSURE WHEN 100% OF THE TAL IS PROJECTED TO BE LANDED (PREFERRED IN COMBINATION WITH ALTERNATIVE 2.D.II.D)

Under this alternative, NMFS would close the commercial fishery for chub mackerel when 100% of the TAL is projected to be landed or when 100% of the commercial quota is projected to be landed, depending on which alternative is selected from alternative set 2.C.V (section 5.2.3.5). After the fishery is closed, some level of possession may be allowed, depending on the other alternatives selected (section 5.2.4.2).

This is a preferred alternative when used in combination with alternatives 2.D.II.c, 2.D.I.b, and 2.D.II.d. Under this combination of preferred alternatives, a 40,000 pound possession limit would be triggered when 90% of the TAL is projected to be landed and a 10,000 pound possession limit would be triggered when 100% of the TAL is projected to be landed. This multi-level closure structure is similar to what is used in the Atlantic mackerel fishery (e.g., 84 Federal Register 26634, June 7, 2019).

Given recent fishery characteristics (section 6.2.1), it is assumed that these measures, when used in combination with the other preferred alternatives for 2020-2022 specifications, will sufficiently limit targeted fishing effort to prevent an ACL overage. The analysis summarized in section 7.1.2.6 (completed after final action by the Council) supports this conclusion. It suggests that if the preferred alternatives had been in place in the past, the preferred ACL would not have been reached.

5.2.4.2. ALTERNATIVE SET 2.D.II: COMMERCIAL POSSESSION LIMIT WHEN FISHERY IS CLOSED IN-SEASON

The Council considered four alternatives for commercial possession limits when the fishery is closed in-season. These alternatives are not necessarily mutually exclusive when coupled with different possession limits from alternative set 2.D.I, for example, as under the Council's preferred alternatives described in more detail in the previous and following sections. If the no action alternative for in-season closure (alternative 2.D.I.a) is selected, then no corresponding alternative for possession limit (alternative set 2.D.II) is needed. A no action alternative for possession limits during an in-season closure is not included because it is encompassed within alternative 2.D.I.a. Under all other alternatives in alternative set 2.D.I, a corresponding possession limit alternative should be selected.

Under all alternatives in this alternative set, any chub mackerel catch above the possession limit, including unintentional catch, would need to be discarded. The amount of chub mackerel which are

caught incidentally while targeting other species has not been thoroughly analyzed and likely varies by target species, gear type, vessel speed, location of fishing, and other factors. In general, higher possession limits are expected to result in fewer discards, though they could increase the likelihood of exceeding the ACL and ABC, depending on the other management measures used.

5.2.4.2.1. ALTERNATIVE 2.D.II.A: NO COMMERCIAL POSSESSION ALLOWED AFTER IN-SEASON CLOSURE

Under this alternative, commercial vessels would not be allowed to retain chub mackerel after the commercial fishery is closed in-season due to an AM.

5.2.4.2.2. ALTERNATIVE 2.D.II.B: 1,000 POUND COMMERCIAL POSSESSION LIMIT AFTER IN-SEASON CLOSURE

Under this alternative, commercial vessels would be restricted to a 1,000 pound chub mackerel possession limit after the commercial fishery is closed due to an AM. As previously stated, a small number of vessels are responsible for most chub mackerel landings. If those vessels are excluded from the calculation, 96% of the trips which landed chub mackerel during 1998-2017 landed less than 1,000 pounds, based on northeast commercial dealer data.

5.2.4.2.3. ALTERNATIVE 2.D.II.C: 10,000 POUND COMMERCIAL POSSESSION LIMIT AFTER IN-SEASON CLOSURE (PREFERRED IN COMBINATION WITH ALTERNATIVE 2.D.I.D)

Under this alternative, commercial vessels would be restricted to a 10,000 pound chub mackerel possession limit after the commercial fishery is closed due to an AM.

Ten thousand pounds is approximately the average trip-level landings of chub mackerel based on northeast commercial fishery data for 1998-2017. As previously stated, a small number of vessels are responsible for most chub mackerel landings. If those vessels are excluded from the calculation, about 99% of the trips which landed chub mackerel during 1998-2017 landed less than 10,000 pounds.

This is a preferred alternative when used in combination with alternatives 2.D.I.d, 2.D.I.b, and 2.D.II.d. Under this combination of preferred alternatives, a 40,000 pound possession limit would be triggered when 90% of the TAL is projected to be landed and a 10,000 pound possession limit would be triggered when 100% of the TAL is projected to be landed. Given recent fishery characteristics (section 6.2.1), it is assumed that these measures, when used in combination with the other preferred alternatives for 2020-2022 specifications, will sufficiently limit targeted fishing effort to prevent an ACL overage.

5.2.4.2.4. ALTERNATIVE 2.D.II.D: 40,000 POUND COMMERCIAL POSSESSION LIMIT AFTER IN-SEASON CLOSURE (PREFERRED IN COMBINATION WITH ALTERNATIVE 2.D.I.B)

Under this alternative, commercial vessels would be restricted to a 40,000 pound chub mackerel possession limit after the commercial fishery is closed due to an AM. This is similar to the current management measures (section 5.1). When the current management measures were developed, the Council chose a 40,000 pound possession limit to be enforced after the annual landings limit is reached because it is approximately the amount of chub mackerel needed to fill a bait truck. Given the low value of chub mackerel (Table 6), fishermen may not target chub mackerel when restricted to a 40,000 pound possession limit; however, they would have an incentive to land chub mackerel caught incidentally. A 40,000 pound possession limit could, therefore, discourage discards. The number of trips which landed more than 40,000 pounds of chub mackerel over the past 20 years is confidential as it is associated with fewer than three vessels and/or dealers.

This is a preferred alternative when used in combination with alternatives 2.D.I.b, 2.D.I.d, and 2.D.II.d. Under this combination of preferred alternatives, a 40,000 pound possession limit would be triggered when 90% of the TAL is projected to be landed and a 10,000 pound possession limit would be triggered when 100% of the TAL is projected to be landed. Given recent fishery characteristics (section 6.2.1), it is assumed that these measures, when used in combination with the other preferred alternatives for 2020-2022 specifications, will sufficiently limit targeted fishing effort to prevent an ACL overage.

5.2.4.3. ALTERNATIVE SET 2.D.III: ACL OVERAGE PAYBACKS

The Council considered a range of alternatives for ACL overage paybacks, as described in the following sections. These alternatives are mutually exclusive. Only one should be selected.

5.2.4.3.1. ALTERNATIVE 2.D.III.A: NO ACTION - NO ACL OVERAGE PAYBACKS

Under this alternative, no action would be taken on ACL overage paybacks. No changes to catch limits in a future year would be required if the ACL is exceeded. The Council did not select this as a preferred alternative because they agreed that ACL overage paybacks are a necessary type of AM to mitigate for the negative impacts of ACL overages.

5.2.4.3.2. ALTERNATIVE 2.D.III.B: ACL OVERAGE PAYBACKS UNDER SINGLE ACL AND ACT (PREFERRED)

If a single ACL and ACT are used (i.e., no separation of commercial and recreational catch limits; alternative 2.VI.a), when the ACL is exceeded, catch in excess of the ACT will be deducted from the ACT in a following year as a single-year adjustment. The deduction will occur at the ACT level to account for the fact that the overage resulted from management uncertainty (i.e., management measures did not constrain catch to the ACT).

ACT deductions may require adjustments to management measures (e.g., possession limits, minimum fish sizes, open and closed seasons) to prevent the following year's reduced ACT from being exceeded. Any such adjustments to management measures would be made through the specifications process. The conditions which resulted in the overage and expected catch in the future year would be considered when determining if adjustments are needed and, if so, what specific adjustments should be made.

This is a preferred alternative because it would help mitigate potential negative impacts of ACL overages and it aligns with the Council's preferred alternative for a single ACL and ACT (alternative 2.C.V.a).

5.2.4.3.3. ALTERNATIVE 2.D.III.C: ACL OVERAGE PAYBACKS UNDER COMMERCIAL AND RECREATIONAL ACLS OR ACTS

If separate commercial and recreational ALCs or ACTs are used (alternatives 2.C.V.b and 2.C.V.c) and there is an ACL overage, adjustments to the commercial and/or recreational ACTs will be made in a following year, depending on which sector (commercial or recreational) was responsible for the ACL overage. Whichever sector exceeded their ACT would be deemed responsible for the ACL overage, either entirely or in part, and would be required to take a reduction in their ACT for a following year. The exact amount in pounds of the commercial or recreational fishery contribution to the ACL overage would be deducted from the commercial or recreational ACT in a following year. For example, if the commercial fishery was entirely responsible for the overage and exceeded the commercial ACT by 3 million pounds, but the ACL was only exceeded by 1 million pounds, then the commercial ACT in a following year would be reduced by 1 million pounds, not 3 million pounds. The deduction would occur

at the ACT level to account for the fact that the overage resulted from management uncertainty (i.e., management measures did not constrain catch to the ACT).

ACT deductions may require adjustments to management measures (e.g., possession limits, minimum fish sizes, open and closed seasons) to prevent the following year's reduced ACT from being exceeded. Any such adjustments to management measures would be made through the specifications process. The conditions which resulted in the overage and expected catch in the future year would be considered when determining if adjustments are needed and, if so, what specific adjustments should be made.

This is not a preferred alternative because, as described in section 5.2.3.5.1, the Council proposes using a single ACL and ACT for commercial and recreational catch.

5.2.5. ALTERNATIVE SET 2.E: PERMIT REQUIREMENTS

Fishing permits are not required under the MSA. They can be a useful management tool because they can be used to assess and, if desired, limit the number of potential fishery participants. They also provide an important link to fisheries-dependent data reporting.

The Council considered a range of alternatives for chub mackerel permit requirements, as described in the following sections. One alternative from each of alternative sets 2.E.I (commercial permit requirements) and 2.E.II (recreational permit requirements) should be selected.

All permit requirements would apply throughout the management unit (section 5.2.2). Most alternatives would require one of the existing GARFO fishing permits. None of these alternatives would change the regulations associated with those permits, including the regulations regarding vessel trip reports (VTRs), vessel replacement and upgrade, and other requirements (50 CFR 648.4).

Data collection and reporting requirements associated with each permit type are summarized below. For example, all existing GARFO commercial and party/charter permits require submission of VTRs for every trip. Fishermen are required to report all catch (i.e., landings and discards) of all species on VTRs. VTRs also include other information, such as areas fished, target species, and gear used.

The NMFS Greater Atlantic Regional Administrator may request that any vessel carrying one of the existing GARFO commercial permit types carry a fisheries observer. Fisheries observers collect information on catch, discards, fishing effort, and biological data such as length, weight, maturity, and age.

An approved vessel monitoring system (VMS) is a condition of some permits, as noted in the following sections. VMS can provide information such as vessel location, gear type, trip type, catch, and other information.

5.2.5.1. ALTERNATIVE SET 2.E.I: COMMERCIAL PERMIT REQUIREMENTS

The Council considered four alternatives for commercial permit requirements, as described below.

5.2.5.1.1. ALTERNATIVE 2.E.I.A: NO ACTION ON COMMERCIAL PERMIT REQUIREMENTS

Under this alternative, the chub mackerel permit requirements implemented through the Forage Amendment would remain in place through 2020. Starting on January 1, 2021, commercial vessels retaining chub mackerel would not be subject to any permit requirements. Under the current requirements, all commercial vessels which retain any chub mackerel in mid-Atlantic federal waters must have a GARFO commercial fishing permit for any species. Currently, over 60 different permit categories meet this requirement, all of which require weekly or monthly submission of VTRs (depending on the permit) for every trip. The GARFO regional administrator may request that vessels

with any of these permits carry fisheries observers. An approved VMS is required as a condition of 25 of these permit categories.

This was not selected as a preferred alternative because it could limit the amount of fishery-dependent data collected on chub mackerel. It is not known how many vessels commercially harvest chub mackerel and do not have GARFO fishing permits for other species. It is possible that all vessels which may commercially harvest chub mackerel in the management unit have GARFO permits for other species; therefore, they would be required to report chub mackerel and all other catch on their VTRs as a condition of those other permits. Any vessels which commercially harvest chub mackerel in the management unit and do not have a GARFO permit for another species would not be required to submit federal VTRs starting January 1, 2021 under this alternative.

5.2.5.1.2. ALTERNATIVE 2.E.I.B: REQUIRE ANY GARFO COMMERCIAL FISHING PERMIT

Under this alternative, all commercial vessels which retain any chub mackerel in the management unit (section 5.2.2) must have a GARFO commercial fishing permit for any species. As previously stated, over 60 permit categories currently meet this requirement, all of which require submission, either on a weekly or monthly basis, of VTRs for every trip. The GARFO regional administrator may request that vessels with any of these permits carry fisheries observers. An approved VMS is required as a condition of 25 of these permit types. This alternative would help ensure that fisheries-dependent data on commercial chub mackerel harvest is collected. This was not selected as a preferred alternative because the Council agreed that if chub mackerel are managed in the MSB FMP, the required permits should be associated with that FMP.

5.2.5.1.3. ALTERNATIVE 2.E.I.C: REQUIRE ANY GARFO MSB COMMERCIAL FISHING PERMIT (PREFERRED)

Under this alternative, all commercial vessels which retain any chub mackerel in the management unit (section 5.2.2) must have any of the existing federal commercial permits for Atlantic mackerel, *Illex* squid, longfin squid, or butterfish. This includes 8 limited access permits for longfin squid, butterfish, *Illex* squid, and Atlantic mackerel (qualification criteria apply), as well as open access incidental permits for squid/butterfish and Atlantic mackerel (no qualification criteria with the exception of vessel size restrictions).

Most of the limited access permits require VMS. The open access permits do not require VMS. All 8 permit types require submission, on a weekly basis, of VTRs for every trip. The GARFO regional administrator may request that vessels with any of these permit types carry a fisheries observer.

This was selected as a preferred alternative because it has all the data collection benefits associated with the previous alternative and will also help communicate to fishermen that chub mackerel are part of the MSB FMP and are subject to regulations within that FMP. Many of the vessels which would be affected by the alternative likely already have one of the qualifying permits. It is not known how many vessels would be required to obtain a new permit under this alternative. Commercial vessels could acquire the open access Atlantic mackerel incidental permit to meet this requirement. This alternative would not require vessels to have obtained an MSB permit prior to implementation of this amendment. This alternative would not limit access to the commercial chub mackerel fishery.

5.2.5.1.4. ALTERNATIVE 2.E.I.D: CREATE A NEW CHUB MACKEREL COMMERCIAL FISHING PERMIT

Under this alternative, a new federal open access commercial permit category would be created for chub mackerel. Any commercial vessels retaining chub mackerel in the management unit (section 5.2.2) would be required to have this permit. Vessels with this permit would be required to submit a VTR for every trip on a weekly basis, consistent with the regulations for other MSB commercial permits. The GARFO regional administrator could request that these vessels carry fisheries observers. VMS would not be required. No additional requirements beyond those which are standard across all GARFO commercial permits would be associated with this permit. This alternative would create a single permit category for chub mackerel; it would not create different permit types for different levels of harvest.

This was not selected as a preferred alternative because it would create an administrative burden on GARFO to create and administer the new permit category and on fishermen who would need to apply for a new permit type. The Council agreed that these administrative burdens would not be justified given that this alternative has the same data collection benefits as the two previous alternatives.

5.2.5.2. ALTERNATIVE SET 2.E.II: PARTY/CHARTER PERMIT REQUIREMENTS

The Council considered three alternatives for party/charter permit requirements, as described below. No permit requirements were considered for private anglers because private angler permits are not currently required for other species managed by the Council.

5.2.5.2.1. ALTERNATIVE 2.E.II.A: NO ACTION ON PARTY/CHARTER PERMIT REQUIREMENTS

Under this alternative, no permit would be required for party or charter vessels to retain chub mackerel in the management unit (section 5.2.2). This was not selected as a preferred alternative because vessels without a federal permit are not required to submit VTRs; thus, this alternative could limit the amount of fishery-dependent data collected on chub mackerel. It is not known how many party/charter vessels may harvest chub mackerel and do not have GARFO fishing permits for other species. It is possible that all party/charter vessels which may harvest chub mackerel in the management unit have GARFO permits for other species; therefore, they would be required to report chub mackerel and all other catch on their VTRs as a condition of those other permits.

5.2.5.2.2. ALTERNATIVE 2.E.II.B: REQUIRE ANY GARFO PARTY/CHARTER FISHING PERMIT

Under this alternative, party and charter vessels would be required to have any existing federal party/charter permit through GARFO in order to retain chub mackerel in the management unit (section 5.2.2). This includes 7 different party/charter permit categories (i.e., summer flounder, scup, black sea bass, mackerel/squid/butterfish, bluefish, tilefish, and northeast multispecies). All federal party/charter permits are currently open access and require submission of VTRs for each trip. VTRs for all but one of these 7 permit categories (i.e., northeast multispecies) must be submitted electronically within 48 hours of reaching port following the end of a fishing trip. This was not selected as a preferred alternative because the Council agreed that if chub mackerel are managed in the MSB FMP, the required permits should be associated with that FMP.

5.2.5.2.3. ALTERNATIVE 2.E.II.C: REQUIRE THE MSB PARTY/CHARTER FISHING PERMIT (PREFERRED)

Under this alternative, party and charter vessels would be required to have a MSB party/charter permit through GARFO in order to retain chub mackerel in the management unit (section 5.2.2). This is an open access permit which requires submission of electronic VTRs for every fishing trip within 48 hours

of reach port following the end of the trip. It is not known how many vessels would be required to obtain a new permit under this alternative. This alternative would not require vessels to have obtained an MSB permit prior to implementation of this amendment. This alternative would not limit access to the party/charter chub mackerel fishery.

This was selected as a preferred alternative because it has all the data collection benefits associated with the previous alternative and will also help to communicate to fishermen that chub mackerel are part of the MSB FMP and are subject to regulations within that FMP.

5.2.6. ALTERNATIVE SET 2.F: ADMINISTRATIVE ALTERNATIVES

The alternatives in alternative set 2.F are largely administrative in nature and are based on established practice for all other Council-managed species, including all species currently in the MSB FMP. These alternatives are summarized below. If the Council chooses alternative 2 (manage chub mackerel as a stock in the MSB FMP), then only one alternative from each of alternative sets 2.F.I (specifications), 2.F.III (ABC control rule and risk policy), and 2.F.IV (SBRM) should be selected.

5.2.6.1. ALTERNATIVE SET 2.F.I: SPECIFICATIONS

Specifications refers to a process used by the Council for annual modifications to certain management measures. Specifications are a discretionary management tool under the MSA. Each FMP specifies which measures can be changed through specifications. Changes which cannot be made through specifications can be made through other FMP actions such as amendments. As described in more detail in section 5.3.8, the Council recommended that no chub mackerel management measures be implemented or modified through framework actions.

5.2.6.1.1. ALTERNATIVE 2.F.I.A: NO ACTION ON SPECIFICATIONS

Under this alternative, no action would be taken to define which chub mackerel measures can be implemented or changed through specifications. All changes to chub mackerel management measures would require an FMP amendment. As described in more detail in section 5.3.8, the Council recommended that no chub mackerel management measures be implemented or modified through framework actions.

5.2.6.1.2. ALTERNATIVE 2.F.I.B: MSB SPECIFICATIONS PROCESS ALSO APPLIES TO CHUB MACKEREL (PREFERRED)

Under this preferred alternative, the specifications process currently used for Atlantic mackerel, longfin and *Illex* squid, and butterfish would also apply to chub mackerel (50 CFR 648.22). Under this process, the Monitoring Committee recommends ACTs which are equal to or less than the ACLs to account for management uncertainty. Landings limits (e.g., TALs, commercial quotas, RHLs) are derived by subtracting expected discards from the ACTs. The level of expected discards is recommended by the Monitoring Committee.

The regulations specify a number of other management measures which may be modified through the specifications process. These include, but are not limited to possession limits, gear restrictions, minimum fish sizes, and fishing seasons.

Specifications for catch and landings limits may be set for up to three years at a time, with interim review by the Monitoring Committee and Council each year.

5.2.6.2. ALTERNATIVE 2.F.II: MSY = ABC (PREFERRED)

The MSA requires that FMPs specify MSY for managed fisheries. The National Standards Guidelines (50 CF 600.310) define MSY as "the largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological, environmental conditions and fishery technological characteristics (e.g. gear selectivity), and the distribution of catch among fleets."

Under this preferred alternative, the MSB FMP would specify that for chub mackerel, MSY is equivalent to the ABC. This is based on precedent from other Council managed species. The Council did not find sufficient justification to differ from past precedent. No other alternative ways of defining MSY for chub mackerel were put forward or deemed appropriate. This alternative is justified based on the SSC's conclusion that their recommended ABC is unlikely to result in overfishing (MAFMC 2018b), as well as the lack of a stock assessment or other analytical information to inform an alternative approach.

5.2.6.3. ALTERNATIVE SET 2.F.III: ABC CONTROL RULE AND RISK POLICY

The Council's ABC control rule and risk policy guide the SSC in recommending ABCs that take scientific uncertainty into account and prevent overfishing. The Council considered two alternatives regarding the ABC control rule and risk policy for chub mackerel, as described below.

5.2.6.3.1. ALTERNATIVE 2.F.III.A: NO ACTION ON ABC CONTROL RULE AND RISK POLICY

Under this alternative, no action would be taken to specify an ABC control rule and risk policy for chub mackerel. An ABC would still be required; however, the SSC would not be required to follow a defined control rule and risk policy when recommending an ABC. This is not a preferred alternative because the Council agreed that the control rule and risk policy used for all other Council managed species should also apply to chub mackerel, as described in more detail in the next section.

5.2.6.3.2. ALTERNATIVE 2.F.III.B: EXISTING ABC CONTROL RULE AND RISK POLICY APPLY TO CHUB MACKEREL (PREFERRED)

Under this alternative, the Council's existing ABC control rule and risk policy, which apply to all stocks managed as "stocks in need of conservation and management" in the Council's FMPs, would also apply to chub mackerel. This is a preferred alternative. The Council's ABC control rule and risk policy are defined in the regulations at 50 CFR sections 648.20 and 648.21 and summarized briefly below.

The regulations for the ABC control rule specify that the Council can set ABCs for up to three years at a time for all stocks, with the exception of five years for spiny dogfish. ABCs across the three years may vary or be constant based on an averaging approach as long as the probably of overfishing does not exceed 50% in any given year and averages 40% or less across all three years.

The ABC control rule also defines the situations in which the SSC should derive an ABC from an OFL probability distribution that is analytically derived and accepted by the SSC, modified by the assessment team and accepted by the SSC, or modified by the SSC.

The Council's risk policy describes the Council's tolerance for overfishing at a given level of biomass depending on whether the stock's life history is considered typical or atypical.[10] The risk policy states

[10] An atypical stock has a life history that: a) results in a relatively high vulnerability to exploitation, and b) has not been fully addressed through the stock assessment and biological reference point development process. The SSC determines whether a stock is considered typical or atypical based on the best available information.

that, for stocks with typical life histories and which are not under a rebuilding plan, if spawning stock biomass (SSB) is greater than or equal to spawning stock biomass at maximum sustainable yield (SSB_{MSY}), then the ABC should have a 40% probability of overfishing. If SSB is less than SSB_{MSY}, then the probability of overfishing should decrease based on the linear relationship shown in Figure 6.

The regulations also state, "An ABC for stocks with an OFL that cannot be specified will be determined by using control rules based on biomass and catch history and application of the MAFMC's risk policy." This is the case for chub mackerel as there is no peer reviewed and accepted stock assessment. Thus, although the ABC was not derived by applying a CV to an OFL and considering the acceptable level of risk of overfishing, it was recommended in a manner consistent with the Council's existing ABC control rule and risk policy regulations (section 5.2.3.2). If analytical information becomes available to calculate the probability of overfishing associated with an ABC, the regulations at 50 CFR sections 648.20 and 648.21 will be used to guide the SSC in their decision making regarding future ABCs.

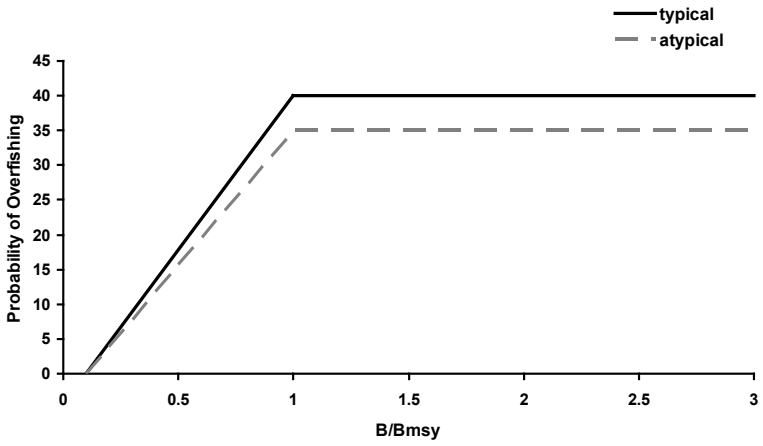

Figure 6: Graphical representation of the Council's risk policy.

5.2.6.4. ALTERNATIVE SET 2.F.IV: STANDARDIZED BYCATCH REPORTING METHODOLOGY (SBRM, REQUIRED)

The Council considered two alternatives related to SBRM, as described below. The MSA requires that all FMPs "establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery."

5.2.6.4.1. ALTERNATIVE 2.F.IV.A: NO ACTION ON SBRM

Under this alternative, no action would be taken to specify an SBRM for chub mackerel. This is not a preferred alternative because a standard SBRM currently applies to all FMPs managed by the Mid-Atlantic and New England Fishery Management Councils. The Council agreed that if chub mackerel is added to the MSB FMP, it should also be covered by the current SBRM requirements, as described in more detail in the next section.

5.2.6.4.2. ALTERNATIVE 2.F.IV.B: SBRM OMNIBUS AMENDMENT PROVISIONS ALSO APPLY TO CHUB MACKEREL (PREFERRED)

Under this alternative, the current SBRM for all Mid-Atlantic Council FMPs would also apply to chub mackerel. This is a preferred alternative.

The Omnibus SBRM Amendment, implemented in 2015, revised the bycatch reporting requirements associated with all FMPs managed by the Mid-Atlantic and New England Fishery Management Councils. The current SBRM for all FMPs defines seven elements: (1) The methods by which data and information on discards are collected and obtained; (2) the methods by which these data are analyzed and utilized to determine the appropriate allocation of at-sea observers; (3) a performance measure by which the effectiveness of the SBRM can be measured, tracked, and utilized to effectively allocate the appropriate number of observer sea days; (4) a process to provide the Councils with periodic reports on discards occurring in fisheries they manage and on the effectiveness of the SBRM; (5) a measure to enable the Councils to make changes to the SBRM through framework adjustments and/or annual specification packages; (6) a description of sources of available funding for at-sea observers and a formulaic process for prioritizing at-sea observer coverage allocations to match available funding; and (7) measures to implement consistent, cross-cutting observer service provider approval and certification procedures and to enable the Councils to implement either a requirement for industry-funded observers or an observer set-aside program through a framework adjustment rather than an FMP amendment (80 Federal Register 37182, June 30, 2015).

The SBRM is described in more detail in the omnibus amendment document, available at: http://www.mafmc.org/msb, and in the final rule to implement the changes (80 Federal Register 37182, June 30, 2015).

5.3. Considered But Rejected Management Alternatives

The Council agreed that certain management measures are not appropriate for the chub mackerel fishery at this point in time. These measures, and the rationale for not fully analyzing them in this amendment, are listed below. Although alternatives for these types of management measures were not fully developed and analyzed through this amendment, the Council may develop them through future actions.

5.3.1. Forage ABC Risk Policy

As described in more detail in section 5.2.6.3.2, the Council's risk policy defines the acceptable level of risk of overfishing associated with an ABC. When biomass is below the target level, the acceptable level of risk declines in a proportional manner with declines in biomass. The Council has discussed the idea of developing a separate risk policy for forage species such that the acceptable risk of overfishing at any biomass level would be lower for a forage species than for a non-forage species (e.g., see figure 1 in MAFMC 2019).

As noted throughout this document, there are major data limitations for chub mackerel. Chub mackerel's role in the ecosystem cannot be quantitatively assessed with available data; thus, most alternatives in this document do not explicitly account for ecosystem considerations. The exception is alternative 2.C.III.b, which would set OY lower than the ABC to address ecosystem concerns expressed in public comments. This is not supported by a quantitative analysis (section 5.2.3.3.2) and was not preferred by the Council.

Given current data limitations, it is not possible to quantify the precise probability of overfishing associated with any chub mackerel ABC; therefore, a quantitative forage-based risk policy was not deemed appropriate for chub mackerel. As described in section 5.2.6.3.2, the recommended chub mackerel ABC was based on the SSC's expert judgement in accordance with the current regulations on the ABC control rule and risk policy.

5.3.2. Recreational Management Measures

The Council did not develop recreational management measures such as possession limits, minimum fish sizes, and open seasons for chub mackerel through this amendment. As described in section 6.2.2, recreational catch of chub mackerel appears to be low but the data are limited, making it difficult to develop effective recreational management measures. There are also concerns about potential misidentification as chub mackerel are similar in appearance to Atlantic mackerel. Chub mackerel may be misidentified at Atlantic mackerel and misreported in charter/party logbooks and as part of data collections for MRIP. There are no federal possession limits, minimum fish sizes, or season restrictions for recreational Atlantic mackerel fisheries.

5.3.3. Commercial Possession Limit Prior to Fishery Closure

The Council did not develop alternatives for commercial possession limits prior to fishery closure due to an AM (section 5.2.4). Most chub mackerel landings over the past 20 years are from a small number of trawl vessels (section 6.2.1). Dealer data show that these vessels have occasionally landed a few hundred thousand pounds of chub mackerel at a time.[11] As previously stated, it is believed that 40,000 pounds is the lowest amount of chub mackerel which may be landed by these vessels based on market factors (section 5.2.4.2.4). The Council agreed that the commercial fishery possession limits prior to in-season closure are unnecessary at this point in time as the other alternatives considered for in-season AMs are likely to be sufficient to constrain the fishery to prevent ACL overages.

Directed fishery possession limits are not currently used for *Illex* squid, longfin squid, or butterfish permit holders.

5.3.4. Commercial Minimum Fish Size Limits

Minimum fish size limits are typically used to reduce fishing mortality on immature fish; however, a minimum size limit for chub mackerel may provide little additional biological benefits considering current fishery selectivity. Northeast fisheries observer data suggest that about 88% of the chub mackerel caught in bottom otter trawls are at least 20 cm in length. As suggested in Daley and Leaf (2019) and supported by comments from fishermen, it is possible that chub mackerel's fast swimming speed reduces the potential for capture of larger individuals. Several scientific studies have documented the length at maturity for chub mackerel in various regions. The length at maturity varies by study. Daley (2018) examined chub mackerel caught in commercial fisheries in the Mid-Atlantic and Southern New England and found that 50% of females reached maturity at about 27 cm. According to observer data, about 73% of the chub mackerel caught in bottom trawls are at least 27 cm.

Minimum fish size limits require discarding of all fish below that size limit. Given that chub mackerel are predominantly caught with bottom otter trawls off the U.S. east coast (section 6.2.1), it can be assumed that most discarded chub mackerel would not survive. Therefore, a minimum fish size likely would increase mortality on this species without sufficient benefits of protecting immature fish.

5.3.5. Commercial Gear Restrictions

As previously described, most chub mackerel landed on the U.S. east coast over the past 20 years were caught on bottom trawl vessels which also participate in the *Illex* squid fishery (section 6.2.1).

[11] More details on chub mackerel landings from these vessels are not provided to protect confidential data representing fewer than three vessels and/or dealers.

Regulations for that fishery specify gear requirements (see 50 CFR 648.23), including gear restrictions for specific regulated mesh areas (50 CFR 648.80). The Council did not see a need to develop additional gear restrictions for chub mackerel beyond what vessels are currently subject to in other fisheries.

5.3.6. LIMITED ACCESS

As previously described, a small number of vessels are responsible for most chub mackerel landings over the past 20 years. By mid-Atlantic standards, these vessels are large and fast. They are also able to freeze or store catch in refrigerated sea water. This ability may be especially relevant as chub mackerel prefer water temperatures of around 20°C (68°F) or greater (section 6.1.1). These factors seem to be limiting participation to a handful of vessels which also participate in the *Illex* squid fishery. For this reason, the Council agreed that it is not necessary to develop management measures to further restrict participation in chub mackerel fisheries at this time.

5.3.7. SPATIAL/TEMPORAL MANAGEMENT TO BENEFIT CHUB MACKEREL PREDATORS

Through scoping and public hearings for the Forage Amendment and the Chub Mackerel Amendment, some recreational tuna and marlin fishermen expressed concerns that the commercial chub mackerel fishery could reduce the abundance of chub mackerel in specific areas, even at levels of harvest that do not negatively impact the stock as a whole. Specifically, these stakeholders were concerned that commercial chub mackerel fishing may cause negative socioeconomic impacts for recreational tuna and marlin fisheries, including fishing tournaments. They argued that the presence of chub mackerel in certain offshore canyon areas in the late summer and early fall attracts tunas and marlins and if commercial fishing reduces the local abundance of chub mackerel, then the tuna and marlin will not come to those areas. Based on public comments and recreational catch data, this is not believed to have occurred to date; however, if it were to occur, it could negatively impact recreational fisheries that rely on the presence of tunas and/or billfish in certain areas at certain times of year. This could be especially problematic for recreational fishing tournaments.

Some recreational fishermen requested consideration of spatial and/or seasonal closures of the commercial chub mackerel fishery to address these concerns. Certain commercial fishery stakeholders expressed strong opposition to such closures, arguing that they could effectively eliminate the directed commercial chub mackerel fishery given that it only occurs in certain areas at certain times of year and could also negatively impact the *Illex* squid fishery (section 6.2.1).

The concerns raised by recreational and commercial fishing stakeholders represent not only the competing interests of the two sectors, but also differing opinions regarding the relative importance of human uses of chub mackerel (e.g., as a source of revenue, as a human food source, and as bait in other fisheries) compared to leaving chub mackerel in the ecosystem to serve as prey for recreationally-important predators.

As previously stated, there are virtually no quantitative scientific data on the role of chub mackerel in the diets of any predators off the U.S. east coast (with the one known exception of Manooch et al. 1984). This presents challenges for analyzing the potential impacts of any spatial/temporal closures of the chub mackerel fishery to benefit predators. To address this gap, in 2018, the Council funded a study to assess the contribution of chub mackerel to the diets of white and blue marlins and bigeye and yellowfin tunas. These predators were identified as priority species by stakeholders. Sampling will occur in commercial and recreational fisheries from New Jersey through North Carolina during 2018 and 2019. This study

will use a combination of traditional stomach content analysis, genetic barcoding techniques, and stable isotope analysis. The Council plans to postpone consideration of any spatial/temporal management measures for the chub mackerel fishery until after consideration of final results of this study.

An analysis of the timing and location of fishing effort for both the commercial chub mackerel fishery and the recreational fisheries of concern would be needed to analyze the impacts of any spatial and temporal management measures aimed at addressing the potential for localized depletion and user conflicts. The location of the commercial chub mackerel fishery can be analyzed based on observer, VTR, and study fleet data. Comparable datasets on the location of recreational fishing effort are not available. This will pose challenges for evaluating spatial closures of the commercial chub mackerel fishery if the Council decides to consider such measures in the future.

5.3.8. FRAMEWORK ACTIONS

The Council's FMPs identify certain management measures which can be modified through framework adjustments, rather than FMP amendments. Framework adjustments are typically completed in less time than amendments because, unlike with FMP amendments, the Council does not hold scoping or public hearings for framework adjustments and there are fewer steps in the rulemaking process.

Only measures which have been previously considered and analyzed in an FMP or FMP amendment may be modified through framework adjustments. If the measures proposed through a framework adjustment represent significant departures from previously analyzed measures, or if they could have significant or controversial impacts, then an FMP amendment may be required, even if the action was previously identified as a frameworkable item.

After much debate at their October 2018 meeting, the Council agreed that no chub mackerel management measures should be modified or implemented through a framework action. All changes which cannot be made through specifications (section 5.2.6) must be made through an FMP amendment. Based on the Council's October 2018 decision, the current MSB FMP regulations for framework actions would not apply to chub mackerel.

6. DESCRIPTION OF THE AFFECTED ENVIRONMENT

The affected environment consists of the physical, biological, and human components of the environment expected to experience impacts if any of the actions considered in this document were to be implemented. This document focuses on four aspects of the affected environment, which are defined as valued ecosystem components (VECs; Beanlands and Duinker 1984).

The VECs include:

- Chub mackerel and non-target species
- Human communities
- Protected species
- Physical habitat

The following sections describe the recent condition of the VECs. Section 7 describes the expected impacts of the alternatives on each VEC.

6.1. CHUB MACKEREL AND NON-TARGET SPECIES

The following sections summarize the current conditions of chub mackerel and non-target species. Only chub mackerel and those non-target species which make up at least 1% of the catch on directed chub mackerel trips are addressed. All other species and their associated fisheries are not expected to be

meaningfully impacted by any of the alternatives considered in this amendment. This amendment will not impact fishing mortality for species other than chub mackerel and non-target species. The other MSB FMP species will only be impacted if they are non-target species in the chub mackerel fishery. For example, Atlantic mackerel and chub mackerel are generally not caught together. No alternatives in this document are expected to impact Atlantic mackerel or the Atlantic mackerel fisheries.

6.1.1. CHUB MACKEREL

Distribution, biology, and stock status

Atlantic chub mackerel are a schooling pelagic species. They are found on the continental shelf to depths of about 250-300 meters throughout much of the western and eastern Atlantic Ocean. They can be found throughout U.S. Atlantic waters (Collette and Nauen 1983, Collette 2002). However, they are not commonly encountered in the NEFSC's bottom trawl surveys. Most chub mackerel catches in this survey occur south of the Hudson Shelf Valley in warm water temperatures (i.e., generally higher than about 20°C or about 68°F; Figure 7; personal communication, John Manderson, Michele Traver, and Chris Tholke, NEFSC). State trawl surveys and recreational catch data suggest that chub mackerel are also found in inshore waters.

The stock structure of chub mackerel in the western Atlantic Ocean has not been well studied. Studies from other regions suggest, based on differences in morphology, spawning seasons, and/or sizes at maturity, that sub-stocks may exist (Hernández and Ortega 2000, Chen et al. 2009, Weber and McClatchie 2012, Cerna and Plaza 2014, Yasuda et al. 2014). However, chub mackerel are genetically uniform across wide areas (Scoles et al. 1998, Hernández and Ortega 2000, Zardoya et al. 2004). For example, Scoles et al. (1998) found no significant genetic differentiation between chub mackerel from the eastern Mediterranean Sea, the Ivory Coast, and South Africa; however, they did find significant genetic differentiation between chub mackerel from the western and eastern Atlantic.

Migratory patterns in the western North Atlantic are also not well understood. In the northern hemisphere, chub mackerel migrate between northern areas in warmer months and southern areas in cooler months (Collette and Nauen 1983). Adults prefer temperatures of 15-20°C (about 60-70°F; Collette and Nauen 1983, Perrotta et al. 2001). Some studies suggest that juveniles tend to be found closer inshore than adults (Hernández and Ortega 2000, Castro 1993).

Atlantic chub mackerel grow rapidly during the first year of life (Hernández and Ortega 2000, Perrota et al. 2005, Velasco et al. 2011, Daley and Leaf 2019). They can reach at least age 13 (Carvalho et al. 2002). Daley and Leaf (2019) found that most fish sampled from commercial fishery catches off the northeast U.S. were age 3.

Atlantic chub mackerel spawn in several batches (Collette and Nauen 1983). Spawning areas likely occur from North Carolina through the Gulf of Mexico (Figure 8; Houde et al. 1976, Berrien 1978, Houde et al. 1979, Richardson et al. 2010, Daley 2018). Daley (2018) suggested that chub mackerel reach maturity around age two, though other studies have published a range of ages at maturity (e.g., Hernández and Ortega 2000).

The stock status of chub mackerel in the western Atlantic Ocean is unknown as there have been no quantitative assessments of this species in this region. However, it is assumed that biomass is currently at or above biomass at maximum sustainable yield given the scale of the fisheries and the SSC's recent discussions (MAFMC 2018b).

Large fluctuations in abundance have been reported around the world, including in the mid-Atlantic and New England (Goode 1884, Hernández and Ortega 2000). These fluctuations may be partly the result of environmental influences such as temperature and upwelling strength on recruitment (Hernández and Ortega 2000). Given that chub mackerel are a fully pelagic species, ocean processes likely influence their availability in any given area, as well as their recruitment.

Predator/Prey Relationships

Chub mackerel are opportunistic predators with a seasonally variable diet of small crustaceans (especially copepods), small fish, and squid (Collette and Nauen 1983, Castro and Del Pino 1995, Sever et al. 2006). Adults tend to consume larger prey and more fish prey than juveniles (Castro 1993).

Very few quantitative estimates of the contribution of chub mackerel to the diets of predator species in the western North Atlantic are available. This is likely due in part to the difficulty of visually distinguishing partially-digested chub mackerel from related species such as Atlantic mackerel (*Scomber scomber*), bullet mackerel (*Auxis rochei*), and frigate mackerel (*Auxis thazard*; Paine et al. 2007; personal communication with John Graves, Virginia Institute of Marine Science; Steve Poland, N.C. Division of Marine Fisheries, and Michelle Staudinger, University of Massachusetts Amherst). The family Scombridae has been documented in the diets of some fish, marine mammal, avian, and shark species in the western North Atlantic (Montevecchi and Myers 1997; Smith et al. 2015; MAFMC 2017a; Staudinger et al. 2019; personal communication, Nancy Kohler, NEFSC;). However, few studies identify chub mackerel to the species level in the diets of any predators. A thorough literature review by Council and NMFS staff[12] identified only one study with quantitative data on the role of chub mackerel in the diets of any predators off the U.S. east coast. Manooch et al. (1984) found that chub mackerel made up 0.2% (by frequency of occurrence) of the diets of dolphinfish sampled off North Carolina through Texas. Chub mackerel have been documented as prey for some predators in other parts of the world. For example, they are important prey for blue marlin at certain times of year off Portugal (Veiga et al. 2011) and Cabo San Lucas (Abitia-Cardenas et al. 1999). They have also been documented as prey for Cory's shearwaters in the eastern North Atlantic (Granaderio et al. 1998, Alonso et al. 2012, Alonso et al. 2018), for long-beaked common dolphins off South Africa (Ambrose et al. 2013), and short-beaked common dolphins off the Iberian Peninsula (Marcalo et al. 2018). It should be emphasized that diet composition of a predator species may vary by geography and can be plastic. Therefore, the importance of chub mackerel in the diets of predators in other parts of the world does not necessarily indicate its importance off the U.S. east coast. More diet information would be required to better establish this relationship.

In 2018, the Council funded a study focusing on chub mackerel and other prey in the diets of tunas and marlins, which were identified by public comments as predators of key interest. The Council will review the final results of this study once they are available, likely in 2020.

[12] Available at: http://www.mafmc.org/s/12_Chub_lit_review_July2018.pdf

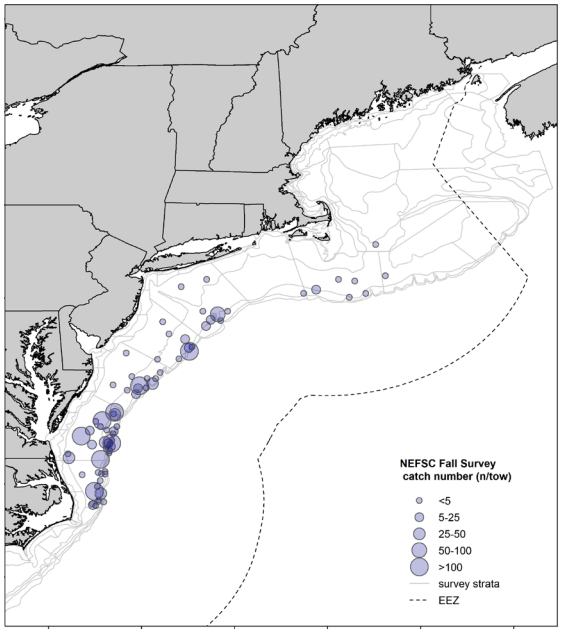

Figure 7: NEFSC fall survey chub mackerel catch in numbers per tow, 1963-2016 (source: Michele Traver and Chris Tholke, NEFSC, personal communication).

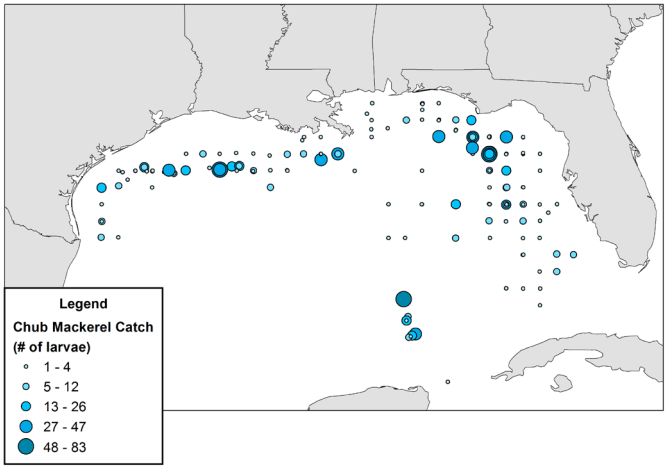

Figure 8: Southeast Area Monitoring and Assessment Program larval survey catches of chub mackerel larvae, 1983-2014.

6.1.2. NON-TARGET SPECIES

Non-target species are those species caught incidentally while targeting other species. Non-target species may be retained or discarded. Northeast Fisheries Observer Program (NEFOP) data were examined to determine which species are most commonly caught when chub mackerel are targeted.

NEFOP observers are deployed based on gear and area-based fleets defined through the SBRM. The NEFSC estimates discards of FMP species by those fleets.[13] These analyses are not fishery-specific and do not include several potentially important bycatch species (e.g., river herrings and shads); thus, they have limited utility for fishery-specific management decisions. SBRM is not intended to be the

[13] Estimates may be found at https://www.nefsc.noaa.gov/fsb/SBRM/.

definitive estimation methodology nor is it a compendium of discard rates and total discards (Wigley et al. 2007). Accordingly, a chub mackerel-specific analysis is presented below. This analysis does not adhere to the stratification used to place observers and, as noted below, it is based on a small number of data points. Therefore, the approximate nature of this information should be emphasized.

Due to the notable overlap with the *Illex* squid fishery, it can be difficult to distinguish a directed chub mackerel trip from a directed *Illex* squid trip. During development of the Forage Amendment (MAFMC 2017a), individuals familiar with the recent targeted commercial chub mackerel fishery said vessels have little incentive to land fewer than 40,000 pounds of chub mackerel at a time. Forty thousand pounds of chub mackerel can fill a truck. Given the low value of chub mackerel (i.e., $0.45 per pound, on average, during 2009-2018 and $0.26 per pound or less in years when at least 1 million pounds were landed; Table 6), and the growing, but still limited, market for chub mackerel in this region, fishermen may experience difficulties selling fewer than 40,000 pounds at a time. For this reason, trips which targeted chub mackerel were defined as trips where at least 40,000 pounds of chub mackerel were landed. This is likely a low threshold; however, alternative metrics to define directed chub mackerel trips (e.g., trips where at least 50% of the landings were chub mackerel) resulted in a very small number of data points. A threshold of 40,000 pounds of chub mackerel landed per trip resulted in 8 observed trips on 4 vessels between 1999 and 2018.

On these eight trips, the other species most commonly caught (i.e., species with the greatest observed catches by weight) were, in descending order: *Illex* squid, longfin squid, butterfish, and round herring. All other species accounted for less than 0.5% of total observed catch across these 8 trips. These results did not change when 5,000 pounds, 10,000 pounds, 20,000 pounds, or 30,000 pounds of kept chub mackerel was used as the threshold to define a chub mackerel trip. These various threshold levels of chub mackerel catch were associated with 19 or fewer trips during 1998-2018.

On an aggregate level across all 8 observed trips where at least 40,000 pounds of chub mackerel were retained, *Illex* squid accounted for a slightly higher proportion of total catch than chub mackerel. It is possible that on some of these trips, *Illex* squid was the primary target species and chub mackerel was either a secondary target or a non-target species. Precise information regarding observed discards on these 8 trips is not included here to protect confidential information associated with fewer than three dealers.

Illex squid, longfin squid, butterfish, and round herring are all managed by the Mid-Atlantic Fishery Management Council. *Illex* squid, longfin squid, and butterfish are all managed under the MSB FMP. Round herring is managed as an ecosystem component species in all Mid-Atlantic Council FMPs. None of these species are known to be overfished or experiencing overfishing, though some have an unknown stock status. More detailed life history and management information is provided below.

Illex *squid*

Illex squid are an oceanic, semi-pelagic schooling cephalopod species distributed between Newfoundland and the Florida Straits (Hendrickson and Holmes 2004, Arkhipkin et al. 2015). Their overfished/overfishing status is unknown. *Illex* squid relative abundance and biomass indices from the NEFSC fall bottom trawl surveys are highly variable and without trend. Relative abundance was near the long-term median during 2015-2017 (NEFSC 2018a). There has been a downward trend in *Illex* mean body weight in the survey since 1981; however, squid size is likely highly influenced by environmental conditions.

ABCs are set by the Council's SSC to avoid overfishing given the best available science. Recent SSC advice suggests that landings of between 24,000 and 26,000 mt of *Illex* squid do not appear to have caused harm to the *Illex* stock and that setting the 2019 and 2020 ABC at 26,000 mt will likely not result in a greater than a 40% chance of causing overfishing. Catch-based AMs (e.g., ACL overage paybacks) which would account for catch in other fisheries such as the chub mackerel fishery are not used for *Illex* squid. *Illex* squid are exempt from the ACL and AM requirements of the MSA due to their life span of less than one year.

Longfin Squid

Longfin squid are a neritic (from the shore to the edge of the continental shelf), semi-pelagic schooling cephalopod species primarily distributed between Georges Bank and Cape Hatteras, NC. The species, and the fishery, generally occur offshore in the winter and inshore during the summer, with mixing and migrations from one to the other in spring and fall (Jacobson 2005, Arkhipkin et al. 2015). The current biomass reference point was developed during the 2010 stock assessment; however, no overfishing threshold was recommended. Longfin squid relative abundance and biomass indices from the NEFSC fall bottom trawl survey are highly variable (e.g. NEFSC 2018b). The 2017 stock assessment found the stock biomass to be at 174% of the target in 2016 (NEFSC 2017b).

ABCs are set by the Council's SSC to avoid overfishing given the best available science. Catch-based AMs (e.g., ACL overage paybacks) which would account for catch in other fisheries such as the chub mackerel fishery are not used for longfin squid. Longfin squid are exempt from the ACL and AM requirements of the MSA due to their short life history.

Atlantic Butterfish

Atlantic butterfish are a semi-pelagic schooling fish species primarily distributed between Nova Scotia, Canada and Florida. They are most abundant from the Gulf of Maine to Cape Hatteras, NC. They are fast-growing, short-lived, and form loose schools (Cross et al. 1999). The stock is not overfished and overfishing is not occurring, with SSB at 141% of the target biomass in 2016, according to the most recent assessment update (NEFSC 2017a). The 2018 NEFSC survey index of 418 butterfish per tow was the second highest in the time series (NEFSC 2019a).

ABCs are set by the Council's SSC to avoid overfishing given the best available science. Butterfish AMs include ACL overage repayments, which account for catch in other fisheries such as the chub mackerel fishery.

Round Herring

Round herring are an ecosystem component species in all Mid-Atlantic Council FMPs. The round herring stock is not believed to be in poor condition; however, there is no stock assessment for this species. The Council implemented a 1,700 pound per trip commercial possession limit for this and many other forage species in the mid-Atlantic as a proactive measure through the Forage Amendment (MAFMC 2017a).

Groundfish Non-Target Species

As described in section 5.2.2, the management unit alternatives considered in this amendment have implications for the small mesh multispecies regulations developed by the New England Fishery Management Council. These regulations are intended to restrict bycatch of groundfish species. Exemptions from these restrictions can been approved if the incidental catch of regulated groundfish species (i.e., cod, haddock, pollock) referenced at 50 CFR 648.2, in the exempted fisheries is less than

5% of the total catch by weight and if it can be demonstrated that the exemption will not jeopardize fishing mortality objectives.

During 1999-2018, 19 observed commercial fishing trips kept at least 5,000 pounds of chub mackerel in waters south of New York. No observed trips caught chub mackerel north of New York. As previously stated, this is a very low threshold to define a chub mackerel trip. On these 19 trips, the only groundfish species recorded in the catch were red hake/ling, silver hake/whiting, and black hake/offshore hake; there was no catch of regulated groundfish species. On all 19 trips, catch of these species accounted for 1% or less of the total catch. An evaluation of VTR data for trips landing more than 5,000 pounds of chub mackerel during 1999-2019 indicated no regulated groundfish species catch and minor bycatch of whiting that ranged from 0.01-0.65% of total catch for such trips.

As previously stated, the commercial chub mackerel fishery operates as a subset of the *Illex* squid fishery. The commercial vessels which account for the vast majority of commercial chub mackerel landings also target *Illex* squid. They tend to target chub mackerel only in years when *Illex* squid are not widely available. For this reason, bycatch of groundfish in the *Illex* squid fishery was also examined to help assess the potential for interactions between the chub mackerel fishery and groundfish. During 2017-2019, regulated species accounted for only 0.03% of total catch on observed tows targeting *Illex* squid (those whose catch is more than 50% *Illex* squid - a proxy for trips that may target chub mackerel) in waters south of Georges Bank.

For these reasons, the management alternatives in this document are expected to have negligible impacts on groundfish species.

6.2. HUMAN COMMUNITIES

This section summarizes commercial and recreational chub mackerel catches over the past 20 years (1998 - 2017 or 1998 - 2018), with a focus on Maine through the east coast of Florida. Landings in the Gulf of Mexico are not insignificant, averaging 90,790 pounds of commercial landings and 88,615 pounds of recreational landings per year during 1998-2017 according to data from commercial fish dealers and MRIP. However, given the SSC's ABC recommendation (section 5.2.3.2), this amendment does not contain alternatives for chub mackerel management measures in the Gulf of Mexico (section 5.2.2); instead, the focus is on fisheries along the Atlantic coast.

Descriptive information on the fisheries is included, and where possible, quantitative commercial fishery and economic information is presented. This section establishes a descriptive baseline against which to compare predicted socioeconomic changes resulting from each management alternative considered in this document.

6.2.1. COMMERCIAL CHUB MACKEREL FISHERIES

Chub mackerel have been caught as bycatch in the *Illex* squid fishery in the Mid-Atlantic for many years. In 2003, NMFS funded a study through the Saltonstall-Kennedy grant program to evaluate whether a sufficient abundance exists to sustain a chub mackerel fishery as an alternative to the *Illex* squid fishery in years when *Illex* are not available. The study concluded that a viable fishery is possible; however, barriers exist, such as a mismatch between the horsepower of existing vessels and the fast swimming speed of the fish (Haskin Shellfish Research Laboratory 2004). Since that time, the chub mackerel fishery has become more established, though it remains an alternative to the *Illex* squid fishery.

Commercial chub mackerel landings increased notably in 2013 (Figure 9, Table 5). This increase is the result of a small number of trawl vessels targeting chub mackerel in some years. These vessels also participate in the *Illex* squid fishery. Some fishermen describe chub mackerel as a "bailout" species which they sometimes target when they are not able to harvest *Illex* squid. Chub mackerel tend to be harvested in the same areas and times of year when *Illex* squid are harvested; however, fishermen say they typically will not harvest both species at the same time because the quality of both species suffers when they are stored together.

According to public comments, a small number of vessels on the east coast are capable of harvesting chub mackerel in profitable quantities because vessels need to be large, fast, and have refrigerated sea water or freezing capabilities in order to harvest this fast-swimming, low-value, warm water species. Landings data seem to support these statements.

Fewer than 5 vessels accounted for more than 95% of chub mackerel landings over the last 20 years (1998-2017). The chub mackerel landings from these vessels were sold to fewer than three dealers; therefore, much of the data associated with these vessels and dealers are considered confidential. It is worth noting that these vessels have occasionally landed a few hundred thousand pounds of chub mackerel at a time.

During 1999-2018, a total of 31 dealers across five east coast states purchased chub mackerel. Most of these dealers purchased low amounts of chub mackerel (i.e., less than 20,000 pounds total over the 20-year period) and did not purchase chub mackerel every year. New York and New Jersey had the highest number of dealers which purchased any amount of chub mackerel across this 20-year period (11 dealers each), followed by Rhode Island (7 dealers). Northeast dealer data indicate that as many as 30 vessels per year landed chub mackerel in the mid-Atlantic and southern New England. Southeast landings data are not compiled in a manner that allows for determination of the number of vessels which landed chub mackerel in that region.

Like landings, the annual average ex-vessel price per pound varied during 1999-2018, averaging $0.37 (adjusted to 2017 dollars). There appears to be a relationship between price and volume landed, though this relationship is neither linear nor consistent across time. In general, years with higher landings had lower average annual prices per pound, and vice versa (Table 6).

According to dealer data, about 96% of the chub mackerel landed by commercial fishermen from Maine through the east coast of Florida from 1998 through 2017 were caught with bottom otter trawls. Bottom otter trawls accounted for at least 95% of the landings in each state, with the exception of Florida and New York. Trawl gear is banned in Florida state waters. About 38% of the landings in Florida were caught with cast nets, 28% with purse seines, and 25% with hand lines. About 37% of the landings in New York were caught with gillnets. New York is the only state with notable amounts of landings (40%) associated with an unknown gear type in the dealer data.

Nearly all commercial chub mackerel landings (>97%) from Maine through the east coast of Florida over the past 20 years occurred during June-October. The highest proportion of landings occurred in September (37%). June, July, August, and October contributed about equally to commercial landings (13-16%).

According to northeast observer data, during 1998-2017, about 93% of the observed chub mackerel catch was kept and about 7% was discarded. VTR data show that 97% of the catch was kept and 3% was discarded. According to observer data, most chub mackerel discards (about 84%) occurred due to a lack of market.

According to VTR data, over 90% of the landings originated from statistical areas south of New York. Much of these landings came from statistical areas which overlap with the shelf break (Figure 10). About 80% of landings in Maine through North Carolina resulted from catch at about 50-100 fathoms depth according to VTR, NEFSC study fleet, and northeast observer data. The location of catches from South Carolina through Florida has not been thoroughly analyzed. Over the past 20 years (1998 - 2017), less than 1% of coast-wide commercial landings occurred in South Carolina through Florida (with all of those landings occurring in Florida).

Public comments suggest that most chub mackerel landed on the east coast are processed for use as human food, much of which is shipped overseas, and lesser amounts are used as bait in other fisheries (e.g., section 6.2.2).

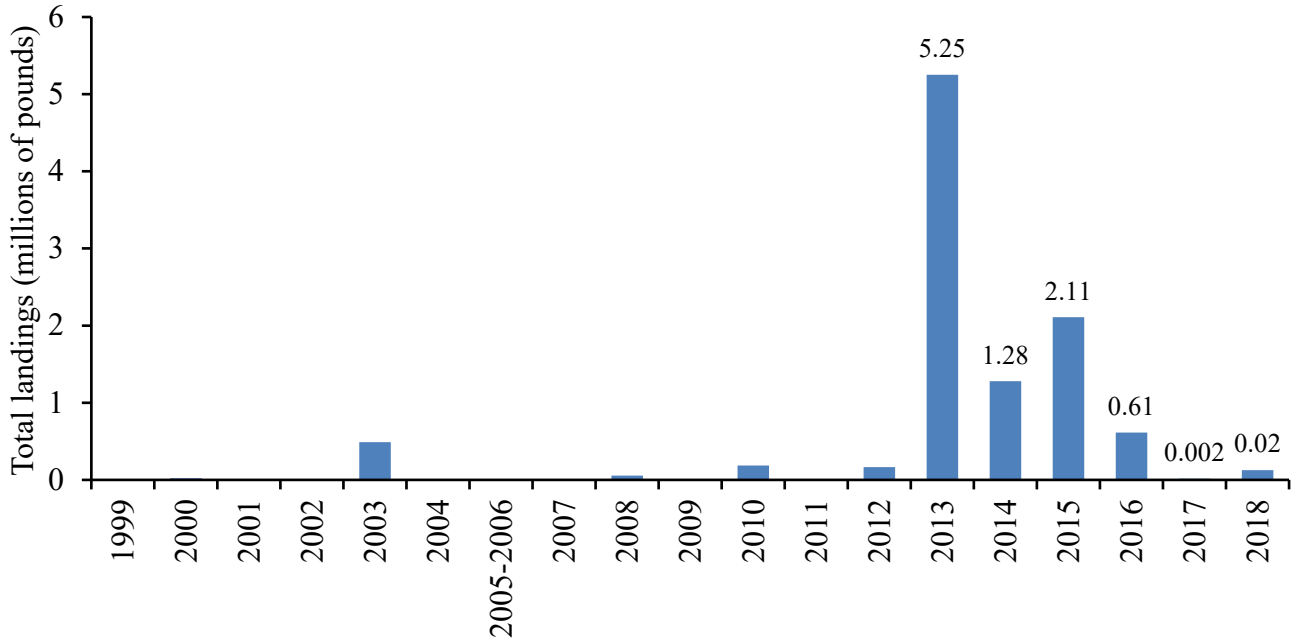

Figure 9: Annual commercial and recreational chub mackerel landings from Maine through the east coast of Florida, as shown in commercial dealer and MRIP data. Landings in some years are combined to protect confidential data representing fewer than three vessels and/or dealers.

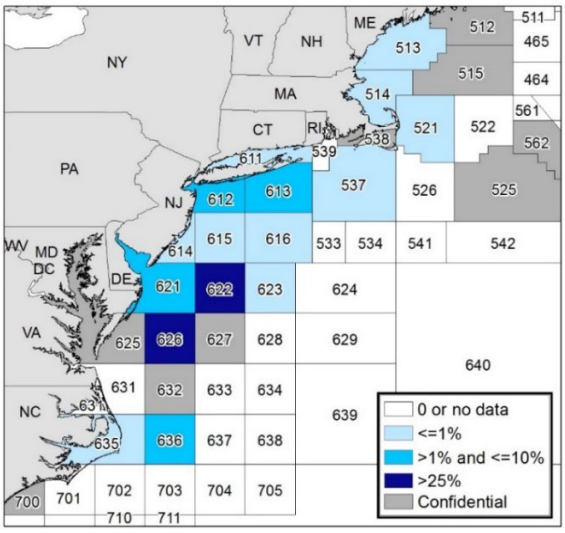

Figure 10: Percent of commercial chub mackerel landings (by weight) by statistical area, 1998-2017 as shown in northeast VTR data. Data associated with fewer than three vessels and/or dealers are confidential. Confidential landings collectively accounted for less than 10% of the total.

Table 5: Annual commercial and recreational chub mackerel landings from Maine through the east coast of Florida, in pounds, 1999-2018. Landings in some years are combined to protect confidential data representing fewer than three vessels and/or dealers.

Year	Commercial landings (dealer data)	MRIP-estimated recreational harvest[14]	Alternative recreational harvest estimate[15]	Total landings using MRIP recreational estimates	Total landings using alternative MRIP recreational estimates
1999	8,033	0	0	8,033	8,033
2000	16,254	6,991	6,991	23,245	23,245
2001	4,457	0	0	4,457	4,457
2002	705	0	42,046	705	42,751
2003	488,338	0	0	488,338	488,338
2004	168	0	1,978	168	2,146
2005-2006	202	0	0	202	202
2007	729	0	0	729	729

[14] MRIP-estimated annual harvest in weight should be considered minimum values which may not be reflective of the actual harvest in weight. For more information on MRIP estimates of harvest in weight, see: https://www.st.nmfs.noaa.gov/recreational-fisheries/data-and-documentation/glossary

[15] The alternative harvest estimates were calculated by Council staff by multiplying the MRIP values for harvest in numbers of fish in Florida by the average weight per chub mackerel recorded by MRIP samplers across the Atlantic coast during 1998 - 2017 (i.e., 1.00178722 pounds per fish, based on 16 fish). Florida is the only state with MRIP-estimated harvest in numbers but not in weight during 1998-2017.

2008	54,855	0	0	54,855	54,855
2009	117	0	0	117	117
2010	186,666	0	388	186,666	187,054
2011	6,034	356	76,915	6,390	82,949
2012	165,402	0	0	165,402	165,402
2013	5,250,807	0	0	5,250,807	5,250,807
2014	1,230,953	48,087	48,087	1,279,040	1,279,040
2015	2,108,343	0	0	2,108,343	2,108,343
2016	610,825	2,092	2,092	612,917	612,917
2017	2,202	13,262	13,262	15,464	15,464
2018	22,357	104,831	104,831	127,187	127,187

Table 6: Total commercial landings (in pounds) from Maine through the east coast of Florida and average price per pound for chub mackerel and *Illex* squid. Prices are adjusted to 2017 prices based on the gross domestic product deflator index. Landings in some years are combined to protect confidential data representing fewer than three vessels and/or dealers.

Year	Chub mackerel landings	Chub mackerel ex-vessel value	Avg. chub mackerel price per pound	*Illex* squid landings	Avg. *Illex* squid price per pound
1999	8,033	$1,903	$0.24	16,289,021	$0.17
2000	16,254	$3,776	$0.23	19,866,592	$0.13
2001	4,457	$3,223	$0.72	8,837,567	$0.16
2002	705	$202	$0.29	6,061,729	$0.18
2003	488,338	$18,691	$0.04	14,090,521	$0.22
2004	168	$73	$0.43	57,534,687	$0.23
2005-2006	202	$78	$0.48	57,266,469	$0.24
2007	729	$234	$0.32	19,889,858	$0.17
2008	54,855	$5,237	$0.10	35,054,428	$0.21
2009	117	$101	$0.87	40,605,638	$0.21
2010	186,666	$26,460	$0.14	34,887,221	$0.29
2011	6,034	$3,293	$0.55	41,439,330	$0.42
2012	165,402	$58,633	$0.35	25,813,134	$0.38
2013	5,250,807	$962,301	$0.18	8,359,998	$0.26
2014	1,230,953	$321,165	$0.26	19,327,085	$0.29
2015	2,108,343	$471,279	$0.22	5,339,292	$0.29
2016	610,825	$104,524	$0.17	14,734,491	$0.48
2017	2,202	$2,653	$1.20	49,640,092	$0.45
2018	22,357	$19,466	$0.87	53,169,317	$0.45
1999-2018 average	**507,872**	**$100,165**	**$0.48**	**27,800,341**	**$0.26**

6.2.2. RECREATIONAL CHUB MACKEREL FISHERIES

Data on recreational chub mackerel catch, landings, and effort are available from MRIP and the southeast region headboat survey. Both data sets show sporadic catches. MRIP data are more comprehensive than the southeast region headboat survey data and show an average of 19,394 chub mackerel caught and 14,782 chub mackerel harvested per year from 1999 - 2018 across the U.S. Atlantic coast. An average of 9,987 pounds of annual recreational harvest was estimated; however, this should be considered a minimum value which may not be reflective of the actual harvest in weight.[16] In about half of those years, no recreational catch or harvest was estimated. To account for likely underestimates of recreational harvest in weight in some years, Council staff calculated alternative estimates, as shown in Table 7. These alternative estimates suggest that an average of 16,035 pounds of chub mackerel were harvested by recreational fishermen across the east coast during 1999-2018. About 37% of the harvest (in numbers of fish) was caught in state waters, with the remaining 63% caught in federal waters. Most chub mackerel catch and harvest occurred on private/rental boats; however, if only the preferred management unit of Maine through North Carolina (section 5.2.2.1) is considered, the proportion of catch and harvest from party and charter boats exceeded that from private/rental boats by 9-12% (Table 8). Recreational catch in numbers of fish was roughly evenly distributed between New York, New Jersey, and Florida. Most harvest in numbers of fish occurred in Florida (41%), New Jersey (28%), and New York (25%; Table 9). Most catch and harvest occurred during wave 4 (July and August; Table 10).

Chub mackerel may be rarely encountered on recreational trips. There may also be instances of misreporting chub mackerel as Atlantic mackerel or other similar species, especially in datasets that rely on self-reported angler data (including some aspects of MRIP data).

MRIP estimates are generally more precise at the annual and coast-wide level than when broken down by region, state, wave (i.e., two-month estimation periods), or mode (i.e., type of fishing such as shore, private/rental boat, party boat, or charter boat). A proportional standard error (PSE) value is provided with all MRIP estimates. A PSE is a measure of precision that expresses the standard error of an estimate as a percentage of the estimate. A PSE value greater than 50 indicates a very imprecise estimate. The associated PSEs were greater than 50 in more than two thirds of the years during 1998 - 2018 in which any amount of chub mackerel harvest greater than zero pounds or fish was estimated (PSEs cannot be calculated for estimates of zero). As such, recreational chub mackerel data should be considered uncertain and imprecise.

The Council has heard anecdotal descriptions of recreational chub mackerel harvest, including reports of catch on for-hire vessels out of New York and New Jersey. There have also been reports of chub mackerel harvest for use as live bait on recreational trips out of Maryland and Virginia targeting white marlin, blue marlin, sailfish, spearfish, yellowfin tuna, bigeye tuna, and/or wahoo. According to public comments, this live bait fishery occurs on the edges of certain offshore canyons, especially Norfolk Canyon, where chub mackerel and their predators are concentrated in the late summer and early fall (MAFMC 2017b).

[16] For more information on MRIP estimates of harvest in weight, see: https://www.st.nmfs.noaa.gov/recreational-fisheries/data-and-documentation/glossary

Table 7: MRIP-estimated recreational catch and harvest of chub mackerel from the Atlantic coast, 1999-2018 based on MRIP data downloaded May 2, 2019.

Year	MRIP catch (# of fish)	MRIP harvest (# of fish)[17]	MRIP harvest (lb)	Alternative harvest estimate (lb)[18]	MRIP percent retained
1999	0	0	0	0	--
2000	4,461	4,461	6,991	6,991	100%
2001	821	0	0	0	0%
2002	41,971	41,971	0	42,046	100%
2003	0	0	0	0	--
2004	1,974	1,974	0	1,978	100%
2005	0	0	0	0	--
2006	0	0	0	0	--
2007	0	0	0	0	--
2008	0	0	0	0	--
2009	0	0	0	0	--
2010	387	387	0	388	100%
2011	78,036	78,036	355	76,915	100%
2012	15,569	0	0	0	0%
2013	0	0	0	0	--
2014	60,191	49,813	48,087	48,087	83%
2015	0	0	0	0	--
2016	2,575	2,087	2,093	2,092	81%
2017	24,417	12,083	13,263	13,262	49%
2018	157,471	104,830	128,949	128,949	67%
Avg.	19,394	14,782	9,987	16,035	71%

Table 8: Proportion of total chub mackerel catch and harvest by mode in numbers of fish, 1999-2018, based on MRIP data downloaded May 2, 2019. Values do not add to exactly 100% due to rounding.

Mode	Catch (numbers of fish)		Harvest (numbers of fish)	
	ME-NC	ME-FL	ME-NC	ME-FL
Party/charter boat	45%	31%	55%	33%
Private/rental boat	54%	68%	43%	66%
Shore	2%	1%	2%	1%

[17] MRIP-estimated annual harvest in weight should be considered minimum values which may not be reflective of the actual harvest in weight. For more information on MRIP estimates of harvest in weight, see: https://www.st.nmfs.noaa.gov/recreational-fisheries/data-and-documentation/glossary

[18] The alternative harvest estimates were calculated by Council staff by multiplying the MRIP values for harvest in numbers of fish in Florida by the average weight per chub mackerel recorded by MRIP samplers across the Atlantic coast during 1998 - 2017 (i.e., 1.00178722 pounds per fish, based on 16 fish). Florida is the only state with MRIP-estimated harvest in numbers but not in weight during 1998-2017.

Table 9: Proportion of total chub mackerel catch and harvest by state, 1999-2018 based on MRIP data downloaded May 2, 2019.

State	Catch (numbers of fish)	Harvest (numbers of fish)	Harvest (pounds)	Harvest (modified weight, pounds)[19]
ME	0%	0%	0%	0%
NH	3%	3%	1%	1%
MA	0%	0%	0%	0%
RI	0%	0%	0%	0%
CT	3%	4%	6%	4%
NY	33%	25%	48%	30%
NJ	31%	28%	45%	28%
DE	0%	0%	0%	0%
MD	0%	0%	0%	0%
VA	0%	0%	0%	0%
NC	0%	0%	0%	0%
SC	0%	0%	0%	0%
GA	0%	0%	0%	0%
FL	31%	41%	0%	38%
Total	100%	100%	100%	100%

Table 10: Proportion of total chub mackerel catch and harvest in numbers of fish by wave, Maine through the east coast of Florida, 1999-2018 based on MRIP data downloaded May 2, 2019. Wave 1 catch and harvest occurred only in Florida.

Wave	Catch (numbers of fish)	Harvest (numbers of fish)
1 (Jan-Feb)	31%	40%
2 (Mar-Apr)	0%	0%
3 (May-Jun)	1%	1%
4 (Jul-Aug)	46%	47%
5 (Sep-Oct)	23%	12%
6 (Nov-Dec)	0%	0%
Total	100%	100%

[19] The alternative harvest estimates were calculated by Council staff by multiplying the MRIP values for harvest in numbers of fish in Florida by the average weight per chub mackerel recorded by MRIP samplers across the Atlantic coast during 1998 - 2017 (i.e., 1.00178722 pounds per fish, based on 16 fish). Florida is the only state with MRIP-estimated harvest in numbers but not in weight during 1998-2017.

6.3. PROTECTED SPECIES

Protected species are those listed as threatened or endangered under the ESA and/or afforded protections under the MMPA. Table 11 lists protected species which occur in the affected environment of this action and have the potential to be affected by the proposed action (i.e., there have been observed/documented interactions with the gear type(s) used in the commercial and recreational fisheries (i.e., primarily bottom trawl and hook and line gear).

Table 11: Protected species that may occur in the affected environment for this action. Species italicized and in bold are MMPA strategic stocks.

Species	**Status**[2]	***Observed/documented interactions with bottom trawl or hook and line gear?***
Cetaceans		
North Atlantic right whale (Eubalaena glacialis)	***Endangered***	***Yes***
Humpback whale, West Indies DPS, (*Megaptera novaeangliae*)	Protected (MMPA)	Yes
Fin whale (Balaenoptera physalus)	***Endangered***	***Yes***
Sei whale (Balaenoptera borealis)	***Endangered***	***Yes***
Blue whale (Balaenoptera musculus)	***Endangered***	***No***
Sperm whale (Physeter macrocephalus	***Endangered***	***No***
Minke whale (*Balaenoptera acutorostrata*)	Protected (MMPA)	Yes
Pilot whale (*Globicephala spp.)*[3]	Protected (MMPA)	Yes
Pygmy sperm whale (*Kogia breviceps*)	Protected (MMPA)	No
Dwarf sperm whale (*Kogia sima*)	Protected (MMPA)	No
Risso's dolphin (*Grampus griseus*)	Protected (MMPA)	Yes
Atlantic white-sided dolphin (*Lagenorhynchus acutus*)	Protected (MMPA)	Yes
Short Beaked Common dolphin (*Delphinus delphis*)	Protected (MMPA)	Yes
Atlantic Spotted dolphin (*Stenella frontalis*)	Protected (MMPA)	No
Striped dolphin (*Stenella coeruleoalba*)	Protected (MMPA)	No
Beaked whales (*Ziphius and Mesoplodon spp*)[4]	Protected (MMPA)	No
Bottlenose dolphin (Tursiops truncatus)[5]	***Protected (MMPA)***	***Yes***
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	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
Critical Habitat		
Northwest Atlantic DPS of Loggerhead Sea Turtle	ESA (Protected)	No
North Atlantic Right Whale Critical Habitat	ESA (Protected)	No

Notes:

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

[2] 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 are 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. 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.

6.3.1. Protected Species and Critical Habitat Not Likely to be Affected by the Proposed Action

This action is not likely to affect certain protected species or their designated critical habitat via interactions with gear or destruction of essential features of critical habitat (Table 11). This determination has been made because either the occurrence of the species is not known to overlap with the area primarily affected by the action and/or there have never been documented interactions between the species and bottom otter trawl gear

(https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; NMFS NEFSC FSB 2018; http://www.nefsc.noaa.gov/fsb/take_reports/nefop.html). In the case of critical habitat, this determination has been made because operation of the chub mackerel and other MSB fisheries will not affect the essential physical and biological features of North Atlantic right whale or loggerhead (Northwest Atlantic Ocean distinct population segment) critical habitat and therefore, will not result in the destruction or adverse modification of any species critical habitat (NMFS 2014; NMFS 2015a,b).

6.3.2. Protected Species Potentially Affected by the Proposed Action

Table 11 provides a list of protected species of sea turtles, marine mammals, and fish which have the potential to become entangled or bycaught in bottom otter trawl gear (i.e., the gear type responsible for most chub mackerel landings). To aid in the identification of MMPA protected species potentially affected by the action, the MMPA List of Fisheries and marine mammal stock assessment reports for the Atlantic Region were referenced (https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries). To aid in identifying ESA listed species potentially affected by the action, the 2013 Biological Opinion issued by NMFS on the operation of seven commercial fisheries, including the MSB FMP, and its impact on ESA listed species was referenced (NMFS 2013). The 2013 Opinion, which considered the best available information on ESA listed species and observed or documented ESA listed species interactions with gear types used to prosecute the 7 FMPs (e.g., gillnet, bottom trawl, and pot/trap), concluded that the seven fisheries may adversely affect, but were not likely to jeopardize the continued existence of any ESA listed species. The Opinion included an incidental take statement authorizing the take of specific numbers of ESA listed species of sea turtles, Atlantic salmon, and Atlantic sturgeon. Reasonable and prudent measures and terms and conditions were also issued with the incidental take statement to minimize impacts of any incidental take.

Until recently, the 2013 Opinion remained in effect; however, new information on North Atlantic right whales has been made available that may reveal effects of the fisheries analyzed in the 2013 Opinion that may not have been previously considered (Pettis et al. 2018, Pace et al. 2017). As a result, per an October 17, 2017, ESA 7(a)(2)/7(d) memo issued by NMFS, the 2013 Opinion has been reinitiated. This memo concluded 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. The chub mackerel fishery was not considered in the 2013 Opinion as it was unmanaged at the time; however, the chub mackerel fishery will not represent a new FMP, it will be added as a component of the MSB FMP. In addition, as previously stated, the commercial chub mackerel fishery uses the same gear type and operates in the same areas and at the same time of year as the *Illex* squid fishery. Also, adding the chub mackerel fishery to the MSB FMP is not expected to result in change in fishing effort in any fisheries, as described in more detail in section 7. Taking these facts into consideration, we expect the conclusions regarding the MSB FMP in the October 17, 2017 memo are also applicable to chub mackerel fishery.

The primary concern for protected species is the potential for interactions (e.g., bycatch, entanglement) with fishing gear. In order to understand the potential risk of an interaction, it is necessary to consider (1) species occurrence in the affected environment of the fishery and how the fishery will overlap in time and space with this occurrence; and (2) data and observed records of protected species interactions with particular fishing gear types. Information on species occurrence in the affected environment of the chub mackerel fishery is provided below, while information on protected species interactions with specific fishery gear is provided in section 6.4.3.

6.3.2.1. SEA TURTLES

This section contains a brief summary of the occurrence and distribution of sea turtles in the affected environment of this action (Table 11). Additional background information on the life history and range-wide status of affected sea turtles 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), and recovery plans for the loggerhead sea turtle (Northwest Atlantic DPS; NMFS and USFWS 2008), leatherback sea turtle (NMFS and USFWS 1992, 1998a), Kemp's ridley sea turtle (NMFS et al. 2011), and green sea turtle (NMFS and USFWS 1991, 1998b).

A general overview of sea turtle occurrence and distribution in the Northwest Atlantic Ocean is provided below to assist in understanding how the proposed action may overlap in time and space with sea turtles. Maps depicting the range-wide distribution and occurrence of sea turtles in the Greater Atlantic Region can be found at: https://www.greateratlantic.fisheries.noaa.gov/protected/section7/listing/index.html, http://marinecadastre.gov/, and http://seamap.env.duke.edu/.

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 seasonally 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 2002; Epperly et al. 1995a,b,c; Griffin et al. 2013; Morreale & Standora 2005). They occur in Virginia foraging areas as early as late April and on the most northern foraging grounds in the Gulf of Maine 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, most have migrated south to waters offshore of North Carolina, particularly south of Cape Hatteras, NC and further south, although hard-shelled sea turtles can occur year-round in waters off Cape Hatteras, NC, 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 (similar time frame as hard-shelled sea turtles), with most leaving the Northwest Atlantic shelf by mid-November (James et al. 2005; James et al. 2006; Dodge et al. 2014).

6.3.2.2. LARGE WHALES

Large whales, such as humpback, North Atlantic right, fin, sei, and minke whales are found throughout the waters of the Northwest Atlantic Ocean. In general, these species follow an annual pattern of migration between low latitude (south of 35°N) wintering/calving grounds and high latitude spring/summer foraging grounds (primarily north of 41°N; Hayes et al. 2017; Hayes et al. 2018; NMFS 1991, 2005, 2010, 2011a, 2012). This is a simplification of whale movements, particularly as it relates to winter movements. It is unknown if all individuals of a population migrate to low latitudes in the winter, although increasing evidence suggests that for some species (e.g., right and humpback whales), some portion of the population remains in higher latitudes throughout the winter (Brown et al. 2002; Clapham et al. 1993; Cole et al. 2013; Khan et al. 2010, 2011, 2012; Khan et al. 2009; NOAA 2008; Swingle et al. 1993; Vu et al. 2012; Hayes et al. 2017; Hayes et al. 2018). 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. Large whales consistently return to these foraging areas each year, therefore these areas can be considered important areas for whales (Baumgartner et al. 2003; Baumgartner & Mate 2003; Brown et al. 2002; Kenney & Hartley 2001; Kenney et al. 1986; Kenney et al. 1995; Mayo & Marx 1990; Payne et al. 1986; Payne et al. 1990; Schilling et al. 1992). For additional information on the biology, status, and range wide distribution of whale species, see the marine mammal stock assessment reports provided at: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region.

6.3.2.3. SMALL CETACEANS AND PINNIPEDS

Table 11 lists the small cetaceans and pinnipeds that may occur in the affected environment of this action. Small cetaceans can be found throughout the year in the Northwest Atlantic Ocean. Within this range, there are seasonal shifts in distribution and abundance. Pinnipeds are primarily found throughout the year or seasonally from New Jersey to Maine. Increasing evidence indicates that some species (e.g., harbor seals) may be extending their range seasonally into waters as far south as Cape Hatteras, NC (35°N). For additional information on the biology and range wide distribution of the small cetaceans and pinnipeds listed in Table 11, refer to the marine mammal stock assessment reports provided at: http://www.nmfs.noaa.gov/pr/sars/region.htm.

6.3.2.4. ATLANTIC STURGEON

The marine range of Atlantic sturgeon extends from Labrador, Canada, to Cape Canaveral, Florida. All five Atlantic sturgeon distinct population segments (DPSs) have the potential to be located anywhere in this marine range (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; ASMFC 2017). Based on fishery-independent and dependent data, as well

as data collected from tracking and tagging studies in the marine environment, Atlantic sturgeon appear to primarily occur inshore of the 50 meter depth contour (Stein et al. 2004 a,b; Erickson et al. 2011; Dunton et al. 2010); however, Atlantic sturgeon are not restricted to these depths and 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). There is no evidence to date that all Atlantic sturgeon make these seasonal movements. Therefore, Atlantic sturgeon may be present throughout the marine environment throughout the year. For additional information on the biology, status, and range wide distribution of each Atlantic sturgeon DPS, refer to 77 Federal Register 5880 (February 6, 2012) and 77 Federal Register 5914 (February 6, 2012), ASSRT (2007), and ASMFC (2017).

6.3.2.5. ATLANTIC SALMON

The wild populations of Atlantic salmon are listed as endangered under the ESA. Their freshwater range occurs entirely in Maine in the watersheds from the Androscoggin River to the Dennys River. 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; USASAC 2004; Hyvarinen et al. 2006; Lacroix and McCurdy 1996; Lacroix et al. 2004, 2005; Reddin 1985; Reddin and Short 1991; Reddin and Friedland 1993, Sheehan et al. 2012; NMFS and USFWS 2005, 2016; Fay et al. 2006). For additional information on the on the biology, status, and range-wide distribution of the Gulf of Maine DPS of Atlantic salmon, refer to NMFS and USFWS (2005), NMFS and USFWS (2016), and Fay et al. (2006).

6.3.3. FISHING GEAR INTERACTIONS WITH PROTECTED SPECIES

Several protected species are vulnerable to interactions with fishing gear. Interaction risks vary by gear type, quantity, and soak or tow time. Available information on gear interactions with a given protected species (or species group) is provided in the sections below. These sections are not a comprehensive review of all fishing gear types known to interact with protected species; focus is placed on interaction risks associated with bottom trawls and hook and line gear, the primary gears used to harvest chub mackerel off the U.S. east coast in the commercial and recreational fisheries respectively.

6.3.3.1. BOTTOM OTTER TRAWL INTERACTIONS WITH SEA TURTLES

Sea turtle interactions with bottom trawl gear have been observed on Georges Bank and in the mid-Atlantic; however, most of the observed interactions have occurred in the mid-Atlantic (Warden 2011a,b; Murray 2015). As no sea turtle interactions with bottom trawl gear have been observed in the Gulf of Maine, and few sea turtle interactions have been observed on Georges Bank, there is insufficient data available to conduct a robust model-based analysis on sea turtle interactions with bottom trawl gear in these regions or produce a bycatch estimate for these regions. As a result, the bycatch estimates and discussion below are for bottom trawl gear in the mid-Atlantic.

Bottom trawl gear poses an injury and mortality risk to sea turtles, specifically due to forced submergence (Sasso and Epperly 2006). Green, Kemp's ridley, leatherback, loggerhead, and unidentified sea turtles have been documented interacting (e.g., bycaught) with bottom trawl gear. However, estimates are available only for loggerhead sea turtles. Warden (2011a,b) estimated that from 2005-2008, the average annual loggerhead interactions in bottom trawl gear in the Mid-Atlantic was 292 (CV=0.13, 95% CI=221-369), with an additional 61 loggerheads (CV=0.17, 95% CI=41-83) interacting with trawls, but released through a Turtle Excluder Device. The 292 average annual observable loggerhead interactions equates to approximately 44 adult equivalents (Warden 2011a,b). Most recently, Murray (2015) estimated that from 2009-2013, the total average annual loggerhead interactions in bottom trawl gear in the mid-Atlantic was 231 (CV=0.13, 95% CI=182-298). This equates to approximately 33 adult equivalents (Murray 2015). Bycatch estimates provided in Warden (2011a) and Murray (2015) are a decrease from the average annual loggerhead bycatch in bottom otter trawls during 1996-2004, which Murray (2008) estimated at 616 sea turtles (CV=0.23, 95% CI over the nine-year period: 367-890). This decrease is likely due to decreased fishing effort in high-interaction areas (Warden 2011a, b).

6.3.3.2. BOTTOM OTTER TRAWL INTERACTIONS WITH ATLANTIC STURGEON

Atlantic sturgeon interactions (i.e., bycatch) with bottom trawl gear have been observed since 1989. These interactions have the potential to result in injury or mortality (NMFS NEFSC FSB 2015, 2016, 2017, 2018). Three documents using data collected by NEFOP describe bycatch of Atlantic sturgeon in bottom trawl gear: Stein et al. (2004b), ASMFC (2007), and Miller and Shepard (2011). None of these documents provide estimates of bycatch by DPS. Miller and Shepard (2011), the most recent of the three documents, analyzed fishery observer and VTR data to estimate the average annual number of Atlantic sturgeon interactions in otter trawl in the Northeast Atlantic that occurred from 2006 to 2010. This is considered the most accurate predictor of annual Atlantic sturgeon interactions in the Northeast bottom trawl fisheries (NMFS 2013).

Based on the findings of Miller and Shepard (2011), NMFS (2013) estimated that the annual bycatch of Atlantic sturgeon in bottom trawl gear to be 1,342 sturgeon. Miller and Shepard (2011) reported observed Atlantic sturgeon interactions in trawl gear with small (< 5.5 inches) and large (≥ 5.5 inches) mesh sizes and concluded that, based on NEFOP observed sturgeon mortalities, relative to gillnet gear, bottom trawl gear posed less risk of mortality to Atlantic sturgeon. The estimated mortality rate in gillnet gear was 20%, while that in otter trawl gear was 5%. Similar conclusions were reached in Stein et al. (2004b) and ASMFC (2007); after review of observer data from 1989-2000 and 2001-2006, both studies concluded that observed mortality is much higher in gillnet gear than in trawl gear. However, an important consideration to these findings is that observed mortality is considered a minimum of what actually occurs and therefore, the conclusions reached by all three studies are not reflective of the total mortality associated with either gear type. To date, total Atlantic sturgeon mortality associated with gillnet or trawl gear remains uncertain.

6.3.3.3. BOTTOM OTTER TRAWL INTERACTIONS WITH ATLANTIC SALMON

Atlantic salmon interactions (i.e., bycatch) with bottom trawls have been observed since 1989. In many instances, these interactions resulted in injury and mortality (NMFS NEFSC FSB 2018). The NEFOP and At-Sea Monitoring Programs documented a total of 15 individual salmon

incidentally caught on more than 60,000 observed commercial fishing trips from 1989 through August 2013 (NMFS 2013; Kocik et al. 2014). Of those 15 salmon, four were observed caught in bottom trawl gear (Kocik, NEFSC, personal communication, February 2013).The genetic identity of these captured salmon is unknown; however, the NMFS 2013 Biological Opinion considers all 15 fish to be part of the Gulf of Maine DPS, although some may have originated from the Connecticut River restocking program (i.e., those caught south of Cape Cod, Massachusetts). Since 2013, no additional Atlantic salmon have been observed in bottom trawl gear (NMFS NEFSC FSB 2018). Based on the above information, bottom trawl interactions with Atlantic salmon are likely rare (NMFS 2013; Kocik et al. 2014).

6.3.3.4. BOTTOM OTTER TRAWL INTERACTIONS WITH MARINE MAMMALS

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 2019 LOF (84 Federal Register 22051, May 16, 2019) categorizes the commercial mid-Atlantic bottom trawl fishery as a Category II fishery.

Bottom Otter Trawl Interactions with Large Whales

With the exception of minke whales, there have been no observed interactions with large whales and bottom trawl gear (https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; https://www.nefsc.noaa.gov/fsb/take_reports/nefop.html; https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries; https://www.nefsc.noaa.gov/publications/crd/). The earliest documented bottom trawl interaction with a minke whale was in 2004, where one minke whale was found fresh dead in trawl gear attributed to the northeast bottom trawl fishery (Waring et al. 2007). In 2008, several minke whales were observed dead in bottom trawl gear attributed to the northeast bottom trawl fishery; estimated annual mortality attributed to this fishery in 2008 was 7.8 minke whales (Waring et al. 2015). Since 2008, serious injury and mortality records for minke whales in U.S. waters have shown zero interactions with bottom trawl (northeast or Mid-Atlantic) gear (Henry et al. 2016; Henry et al. 2017; Hayes et al. 2019; Waring et al. 2015; 84 Federal Register 22051, May 26, 2019). Based on this information, large whale interactions with bottom trawl gear are expected to be rare to nonexistent.

Bottom Otter Trawl Interactions with Small Cetaceans and Pinnipeds

Small cetaceans and pinnipeds are vulnerable to interactions with bottom trawl gear (Lyssikatos 2015; Chavez-Rosales et al. 2017; Hayes et al. 2017; Hayes et al. 2018; Hayes et al. 2019; 84 Federal Register 22051, May 16, 2019). Table 12 is based on the most recent LOF issued in May 2019 and provides a list of species that have been observed (incidentally) seriously injured and/or killed by LOF Category II trawl fisheries that operate in the affected environment of this action (84 Federal Register 22051, May 16, 2019).

Table 12: Small cetacean and pinniped species observed seriously injured and/or killed by Category II trawl fisheries in the affected environment of this action.

Fishery	Category	Species Observed or reported Injured/Killed
Northeast Bottom Trawl	II	Harp, Harbor, Gray seals
		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, Harbor seals
Sources: MMPA LOF 84 Federal Register 22051 (May 16, 2019).		

The Atlantic Trawl Gear Take Reduction Team (ATGTRT) was convened in 2006 to address incidental mortality and serious injury of long-finned pilot whales, short-finned pilot whales, common dolphins, and white sided dolphins resulting from interactions with bottom and mid-water trawl fisheries in New England and the mid-Atlantic. None of the stocks of concern to the ATGTRT are classified as MMPA "strategic stocks," nor do they currently interact with a Category I fishery; therefore, it was determined that development of a take reduction plan was not necessary. In lieu of a take reduction plan, the ATGTRT developed an Atlantic Trawl Gear Take Reduction Strategy. The Atlantic Trawl Gear Take Reduction Strategy identifies informational and research tasks, as well as education and outreach needs necessary to provide the basis for decreasing mortalities and serious injuries of marine mammals to insignificant levels approaching zero. It also identifies voluntary measures that can be adopted by trawl fisheries to potentially reduce the incidental capture of marine mammals.

6.3.3.1. HOOK AND LINE GEAR INTERACTIONS WITH PROTECTED SPECIES

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

Large whales are known to interact with hook and line gear; however, in the most recent (2011-2015) mortality and serious injury determinations for baleen whales, the majority of cases identified with confirmed hook and line or monofilament entanglement did not result in the

serious injury or mortality to the whale (89.3% observed/reported whales had a serious injury value of 0; 10.7% had a serious injury value of 0.75; none of the cases resulted in mortality; Henry et al. 2017).[20] In fact, 85.7% of the whales observed or reported with a hook/line or monofilament entanglement were resighted gear free and healthy. Confirmation of the health of the other remaining whales remain unknown as no resightings had been made over the timeframe of the assessment. Based on this information, while large whale interactions with hook and line gear are possible, there is a low probability that an interaction will result in serious injury or mortality to any large whale species. Therefore, relative to other gear types, such as fixed gear, hook and line gear represents a low source serious injury or mortality to any large whale (Henry et al. 2017).

Table 11 provides a list of small cetaceans and pinnipeds that occur in the affected environment of this action. Of these species, only bottlenose dolphin stocks have been identified (primarily through stranding records/data) as entangled in hook and line gear. In some cases, these entanglements have resulted in the serious injury or mortality to the animal. Specifically, based on stranding data from 2007-2013, estimated mean annual mortality for each bottlenose stock due to interactions with hook and line gear was approximately one animal (Waring et al. 2014; Waring et al. 2016; Palmer 2017).[21] Based on this, although interactions with hook and line gear are possible, relative to other gear types such as trawl gear, hook and line gear represents a low source serious injury or mortality to any bottlenose dolphin stock.

ESA listed species of sea turtles are known to interact with hook and line gear, particularly in nearshore southern waters (e.g., Virginia, south; NMFS 2013; STDN 2016; Palmer 2017). The impacts of these interactions on sea turtle populations is still under investigation, thus no conclusions can currently be made on the impact of hook and line gear on the continued survival of sea turtle populations. However, as serious injury and mortality to sea turtles can be incurred by hook and line gear interactions, hook and line gear does pose a risk to these species.

ESA-listed species of Atlantic sturgeon are known to interact with hook and line gear, particularly in nearshore waters from the Gulf Maine to Southern New England (NMFS 2013; ASMFC 2017). Injury and mortality to Atlantic sturgeon can be incurred by hook and line gear interactions, and therefore, can pose a risk to these species. However, the extent to which these interactions are impacting Atlantic sturgeon DPSs is still under investigation and therefore, no conclusions can currently be made on the impact of hook and line gear on the continued survival of Atlantic sturgeon DPSs (NMFS 2013; NMFS 2011b; ASMFC 2017).

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[20] Any injury leading to a significant health decline (e.g., skin discoloration, lesions near the nares, fat loss, increased cyamid loads) is classified as a serious injury (SI) and will result in a SI value set at 1 (Henry *et al*. 2017).

[21] Stranding data provided in Waring et al. (2015), Hayes et al. 2017, Hayes et al. (2018), and Hayes et al. (2019) were not considered in estimating mean annual mortality as not all bottlenose dolphin stocks are addressed in these stock assessment reports. As all bottlenose dolphin stocks are considered in Waring et al. (2014a) and Waring et al. (2016), these stock assessment reports were used to estimate mean annual mortality. Estimates of mean annual mortality were calculated based on the total number of animals that stranded between 2007-2013, and that were determined to have incurred serious injuries or mortality as result of interacting with hook and line gear. In addition, any animals released alive with no serious injuries were not included in the estimate. Also, if maximum or minimum number of animals stranded were provided, to be conservative, we considered the maximum estimated number in calculating our mean annual estimate of mortality.

There have been no observed/documented interactions between Atlantic salmon and hook and line gear (NMFS NEFSC FSB 2018). Based on this information, hook and line gear are not expected to pose an interaction risk to any Atlantic salmon and therefore, are not expected to be source of injury or mortality to this species.

6.4. Physical Environment and Essential Fish Habitat

Climate, physiographic, and hydrographic differences separate the New England/mid-Atlantic region from the South Atlantic. Cape Hatteras, NC marks the boundary between these two areas, though there is mixing across this boundary. As described in section 6.2, most chub mackerel fishing effort occurs in Southern New England and the mid-Atlantic; however, some recreational chub mackerel harvest occurs in the South Atlantic. As described in section 6.4.2, recreational hook and line gear has a much lower potential for adverse impacts to habitat than bottom otter trawl gear (the dominant gear in the commercial chub mackerel fishery). In addition, over the past 20 years (through 2018), more than 99% of total commercial and recreational chub mackerel catch occurred in Southern New England and the mid-Atlantic. For these reasons, the unique habitat characteristics of the South Atlantic are not emphasized in this document. Habitat considerations for New England and the mid-Atlantic are summarized below.

The inshore areas of New England and the mid-Atlantic are relatively physically uniform and are influenced by many large coastal rivers and estuarine areas. The continental shelf (characterized by water less than 650 feet in depth) extends seaward approximately 120 miles off Cape Cod, MA. It narrows gradually to 70 miles off New Jersey and is 20 miles wide at Cape Hatteras, NC. 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 ºF in the New York Bight and north in the winter to over 80 ºF off Cape Hatteras, NC in summer.

A number of distinct subsystems are found in New England and the mid-Atlantic (i.e. the Northeast U.S. Shelf). 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. More information on the affected physical and biological environments is available in Stevenson et al. (2004).

The NEFSC produces regular updates on conditions of the northeast shelf ecosystem. Highlights from the 2019 update (NEFSC 2019c) regarding habitat include:

- Measures to reduce nutrient inputs appear to have significantly improved water quality in the Chesapeake Bay.
- The northeast U.S. shelf continues to be among the fastest warming waters globally.
- The most northerly Gulf Stream north wall positions were recorded in 2014-2017.
- The mid-Atlantic summer 2018 sea surface temperatures were the third highest on record. Bottom temperatures are also increasing, with the past six years being above average.
- Summer primary production is increasing in the mid-Atlantic and New England, driving by warmer temperatures and increased bacterial remineralization and nutrient recycling.
- Seasonal peaks in abundance of certain key zooplankton species has shifted.

6.4.1. ESSENTIAL FISH HABITAT (EFH)

Pursuant to the MSA EFH Provisions (50 CFR Part 600.815 (a)(1)), an FMP must describe EFH by life history stage for each managed species in the plan. This amendment proposes to implement EFH descriptions for chub mackerel, as described in section 5.2.1. The proposed chub mackerel EFH descriptions focus on pelagic waters and denote preferred temperature ranges. They are based on a combination of fishery and survey data, literature sources, and expert judgment. They are intentionally broad and are intended to cover the entire likely distribution of Atlantic chub mackerel in the U.S. EEZ.

Table 13 lists the mandatory EFH requirements of FMPs and also identifies the sections of this document which meet each requirement.

Table 14 summarizes the designated EFH for life stages of other federally-managed species that occur within the affected environment of this action.

Table 13: Mandatory EFH contents for FMPs and associated section of this document where each requirement is addressed.

Mandatory Content	Section of Document
1) Description and identification of EFH	5.2.1.1
2) Fishing activities that may adversely affect EFH	6.4.2, 7.4, 7.5.2.4
3) Non-MSA fishing activities that may adversely affect EFH	6.4.2*
4) Non-fishing related activities that may adversely affect EFH	7.5.1.2
5) Cumulative impacts analysis	7.5
6) Conservation and enhancement	6.4.2
7) Prey species	6.1.1
8) Identification of HAPCs	5.2.1 (none identified)
9) Research and information needs	4.5
10) Review and revision of EFH components of FMPs	5.2.1

* Impacts are described by gear type, not management body.

Table 14: Geographic distributions and habitat characteristics of Essential Fish Habitat designations for fish and shellfish species managed by the New England and Mid-Atlantic fishery management councils in the Greater Atlantic region, up-dated January 2018.

Species	Life Stage	Geographic Area	Depth (m)	Habitat Type and Description
Acadian redfish	Larvae	Gulf of Maine and the southern portion of Georges Bank, and on the continental slope north of 37°38'N	Not applicable	Pelagic habitats
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	Eggs	Gulf of Maine, Georges Bank and estuaries from Passamaquoddy Bay to Saco Bay, Maine and from Massachusetts Bay to Cape Cod Bay, Massachusetts Bay	Not applicable	Pelagic habitats
American plaice	Larvae	Gulf of Maine, Georges Bank, Southern northeast and bays and estuaries from Passamaquoddy Bay to Saco Bay, Maine and from Massachusetts Bay to Cape Cod Bay, Massachusetts Bay	Not applicable	Pelagic habitats
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 butterfish	Eggs	Inshore estuaries and embayments from Massachusetts Bay to the south shore of Long Island, New York, in Chesapeake Bay, and on the continental shelf and slope, primarily from Georges Bank to Cape Hatteras, North Carolina	Generally in depths of 1500 or less	Pelagic habitats

Species	Life Stage	Geographic Area	Depth (m)	Habitat Type and Description
Atlantic butterfish	Larvae	Inshore estuaries and embayments in Boston harbor, from the south shore of Cape Cod to the Hudson River, in Delaware and Chesapeake bays, and on the continental shelf from the Great South Channel (western Georges Bank) to Cape Hatteras, North Carolina	Generally 40-350	Pelagic habitats
Atlantic butterfish	Juveniles	Inshore estuaries and embayments from Massachusetts Bay to Pamlico Sound, North Carolina, in inshore waters of the Gulf of Maine and the South Atlantic Bight, and on the inner and outer continental shelf from southern New England to South Carolina	Generally 10-280	Pelagic habitats
Atlantic butterfish	Adults	Inshore estuaries and embayments from Massachusetts Bay to Pamlico Sound, North Carolina, inshore waters of the Gulf of Maine and the South Atlantic Bight, on Georges Bank, on the inner continental shelf south of Delaware Bay, and on the outer continental shelf from southern New England to South Carolina	Generally 10-250	Pelagic habitats
Atlantic cod	Eggs	Gulf of Maine, Georges Bank, and the Mid-Atlantic and in the following estuaries: Englishman/ Machias Bay to Blue Hill Bay; Sheepscot River, Casco Bay, Saco Bay, Great Bay, Massachusetts Bay, Boston Harbor, Cape Cod Bay, and Buzzards Bay	Not applicable	Pelagic habitats
Atlantic cod	Larvae	Gulf of Maine, Georges Bank, and the Mid-Atlantic and in the following estuaries: Englishman/ Machias Bay to Penobscot Bay; Sheepscot River, Casco Bay, Saco Bay, Great Bay, Massachusetts Bay, Boston Harbor, Cape Cod Bay, and Buzzards Bay	Not applicable	Pelagic habitats
Atlantic cod	Juveniles	Gulf of Maine, Georges Bank, and Southern New England, including nearshore waters from eastern Maine to Rhode Island and the following estuaries: Passamaquoddy Bay to Saco Bay; Massachusetts Bay, Boston Harbor, Cape Cod Bay, and Buzzards Bay	Mean high water-120	Structurally-complex intertidal and sub-tidal habitats, including eelgrass, mixed sand and gravel, and rocky habitats (gravel pavements, cobble, and boulder) with and without attached macroalgae and emergent epifauna

Species	Life Stage	Geographic Area	Depth (m)	Habitat Type and Description
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	Eggs & Larvae	Gulf of Maine, Georges Bank, and continental slope south of Georges Bank	Not applicable	Pelagic habitats
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 herring	Larvae	Gulf of Maine, Georges Bank, and the upper Mid-Atlantic Bight, including the following estuaries: Passamaquoddy Bay to Cape Cod Bay, Narragansett Bay, Raritan Bay, and the Hudson River	Not applicable	Inshore and offshore pelagic habitats
Atlantic herring	Juveniles	Entire northeast region, including the following estuaries: Passamaquoddy Bay to Cape Cod Bay, Buzzards Bay to Long Island Sound, Gardiners Bay to Delaware Bay	To 300	Intertidal and sub-tidal pelagic habitats
Atlantic herring	Adults	Entire Northeast region, including Passamaquoddy Bay to Great Bay; Massachusetts Bay to Cape Cod Bay; Buzzards Bay to Long Island Sound; Gardiners Bay to Delaware Bay; and Chesapeake Bay	To 300	Sub-tidal pelagic habitats
Atlantic mackerel	Eggs	Inshore estuaries and embayments from Great Bay, New Hampshire to the south shore of Long Island, New York, in inshore and offshore waters of the Gulf of Maine, and on the continental shelf from Georges Bank to Cape Hatteras, North Carolina (mostly north of 38˚ N)	Not applicable	Pelagic habitats, generally in the upper 15 meters of water column
Atlantic mackerel	Larvae	Inshore estuaries and embayments from Great Bay, New Hampshire to the south shore of Long Island, New York, inshore waters of the Gulf of Maine, and on the	Not applicable	Pelagic habitats, generally in upper 200 meters of water column

Species	Life Stage	Geographic Area	Depth (m)	Habitat Type and Description
		continental shelf from Georges Bank to Cape Hatteras, North Carolina		
Atlantic mackerel	Juveniles	Inshore estuaries and embayments from Passamaquoddy Bay, Maine to the Hudson River, and on the continental shelf from Georges Bank to Cape Hatteras, North Carolina	Generally found over depths of 20-100	Pelagic habitats
Atlantic mackerel	Adults	Inshore estuaries and embayments from Passamaquoddy Bay, Maine to the Hudson River, and on the continental shelf from Georges Bank to Cape Hatteras, North Carolina	Generally found over depths <170	Pelagic habitats
Atlantic salmon	Eggs, larvae, and fry	Designated streams and rivers in New England	<1	Riffle and run habitats in shallow, well-oxygenated, fresh water streams with gravel/rocky substrates,
Atlantic salmon	Parr	Designated streams and rivers in New England	<1	Variety of riverine habitats
Atlantic salmon	Smolts	Designated streams and rivers in New England, including coastal areas adjacent to river mouths out to three miles	Not applicable	Variety of riverine, lacustrine, estuarine, and coastal marine habitats used during downstream migration
Atlantic salmon	Adults	Designated streams and rivers in New England, including coastal areas adjacent to river mouths out to three miles	Not applicable	Variety of riverine, lacustrine, estuarine, and coastal marine habitats used during upstream spawning migration and by spent adults following spawning, as they return to the ocean
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	Not applicable	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	18-110	Benthic habitats initially attached to shells, gravel, and small rocks (pebble,

Species	Life Stage	Geographic Area	Depth (m)	Habitat Type and Description
		following estuaries: Passamaquoddy Bay to Sheepscot River; Casco Bay, Great Bay, Massachusetts Bay, and Cape Cod Bay		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	Larvae	U.S. waters north of 41˚N latitude and east of 71˚W longitude	Not applicable	Pelagic and sub-tidal
Atlantic wolffish	Juveniles	U.S. waters north of 41˚N latitude and east of 71˚W longitude	70-184	Sub-tidal benthic habitats
Atlantic wolffish	Adults	U.S. waters north of 41˚N latitude and east of 71˚W longitude	<173	A wide variety of sub-tidal sand and gravel substrates once they leave rocky spawning habitats, but not on muddy bottom
Barndoor skate	Juveniles and adults	Primarily on Georges Bank and in Southern New England and on the continental slope	40-400 on shelf and to 750 on slope	Sub-tidal benthic habitats on mud, sand, and gravel substrates
Black sea bass	Eggs	Continental shelf and estuarine waters from Cape Cod, Massachusetts to Cape Hatteras, North Carolina	Not applicable	Pelagic habitats
Black sea bass	Larvae	Continental shelf and estuarine waters from Cape Cod, Massachusetts to Cape Hatteras, North Carolina	Not applicable	Pelagic habitats
Black sea bass	Juveniles and adults	Continental shelf and estuarine waters from the southwestern Gulf of Maine and Cape Hatteras, North Carolina	Inshore in summer and spring	Benthic habitats with rough bottom, shellfish and eelgrass beds, man-made structures in sandy-shelly areas, also offshore clam beds and shell patches in winter
Bluefish	Eggs	Continental shelf from Montauk Point, New York south to Key West, Florida, including the Gulf Stream	Mid-shelf depths	Pelagic habitats

Species	Life Stage	Geographic Area	Depth (m)	Habitat Type and Description
Bluefish	Larvae	Continental shelf from Montauk Point, New York, south to Key West, Florida, including the “slope sea" and Gulf Stream between latitudes 29° 00 N and 40° 00 N	>15	Pelagic habitats
Bluefish	Juveniles	Continental shelf from Nantucket Island south to Key West, Florida, including the “slope sea" and Gulf Stream between latitudes 29° 00 N and 40° 00 N, and all major estuaries between Penobscot Bay, Maine and St. Johns River, Florida	No information	Pelagic habitats
Bluefish	Adults	Continental shelf from Cape Cod Bay south to Key West, Florida, including the “slope sea" and Gulf Stream between latitudes 29° 00 N and 40° 00 N, and all major estuaries between Penobscot Bay, Maine and St. Johns River, Florida	No information	Pelagic habitats
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	Larvae	Outer continental shelf and slope throughout the region, including two seamounts	320-1300 on slope and to 2000 on seamounts	Pelagic habitats
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

Species	Life Stage	Geographic Area	Depth (m)	Habitat Type and Description
Golden tilefish	Eggs and larvae	Outer continental shelf and slope from U.S.-Canada boundary to the Virginia-North Carolina boundary	Not applicable	Water column
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	Eggs	Coastal and offshore waters in the Gulf of Maine, Southern New England, and on Georges Bank, including certain bays and estuaries in the southwest Gulf of Maine and Buzzards Bay, Massachusetts Bay	Not applicable	Pelagic habitats
Haddock	Larvae	Same as eggs with addition off Narragansett Bay	Not applicable	Pelagic habitats
Haddock	Juveniles	Inshore and offshore waters in the Gulf of Maine, on Georges Bank, and on the continental shelf in the Mid-Atlantic region	40-140 and as shallow as 20 in coastal Gulf of Maine	Sub-tidal benthic habitats on hard sand (particularly smooth patches between rocks), mixed sand and shell, gravelly sand, and gravel
Haddock	Adults	Offshore waters in the Gulf of Maine, on Georges Bank, and on the continental shelf in Southern New England	50-160	Sub-tidal benthic habitats on hard sand (particularly smooth patches between rocks), mixed sand and shell, gravelly sand, and gravel and adjacent to boulders and cobbles along the margins of rocky reefs
Little skate	Juveniles	Coastal waters in the Gulf of Maine, Georges Bank, and the continental shelf in the Mid-Atlantic region as far south as Delaware Bay, including certain bays and estuaries in the Gulf of Maine	Mean high water-80	Intertidal and sub-tidal benthic habitats on sand and gravel, also found on mud
Little skate	Adults	Coastal waters in the Gulf of Maine, Georges Bank, and the continental shelf in the Mid-Atlantic region as far south as Delaware Bay, including certain bays and estuaries in the Gulf of Maine	Mean high water-100	Intertidal and sub-tidal benthic habitats on sand and gravel, also found on mud
Longfin inshore squid	Eggs	Inshore and offshore waters from Georges Bank southward to Cape Hatteras	Generally <50	Bottom habitats attached to variety of hard bottom types, macroalgae, sand, and mud

Species	Life Stage	Geographic Area	Depth (m)	Habitat Type and Description
Longfin inshore squid	Pre-recruits	Inshore and offshore continental shelf waters from Georges Bank to South Carolina, in the southwestern Gulf of Maine, and in embayments such as Narragansett Bay, Long Island Sound, and Raritan Bay, along edge of shelf in winter	Generally 6-160	Pelagic habitats
Longfin inshore squid	Recruits	Inshore and offshore continental shelf waters from Georges Bank to South Carolina, in inshore waters of the Gulf of Maine, and in embayments such as Narragansett Bay, Long Island Sound, Raritan Bay, and Delaware Bay, along edge of shelf in winter	Generally 6-200, found as deep as 400	Pelagic habitats
Monkfish	Eggs	Continental shelf and slope throughout the region	Not applicable	Pelagic habitats
Monkfish	Larvae	Continental shelf and slope throughout the region	Not applicable	Pelagic habitats
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
Northern shortfin squid	Eggs	Outer continental shelf and slope within the latitudinal range of 40°N to 35°50' N	113-377	Pelagic habitats
Northern shortfin squid	Pre-recruits	Outer continental shelf and slope as far south as South Carolina, on Georges Bank, and on the inner continental shelf off New Jersey and southern Maine and New Hampshire, also in Gulf Stream	40-400	Pelagic habitats
Northern shortfin squid	Recruits	Continental shelf and slope from Georges Bank to South Carolina, and inshore and offshore waters of the Gulf of Maine, also beyond shelf break and Bear Seamount	40-400, but caught as deep as 2500	Pelagic habitats

Species	Life Stage	Geographic Area	Depth (m)	Habitat Type and Description
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
Offshore hake	Eggs	Outer continental shelf and slope from Georges Bank to 37°N	100-1500	Pelagic habitats
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	Larvae	Outer continental shelf and slope from Georges Bank to 37°N	60-1500	Pelagic habitats
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	Eggs	Inshore and offshore waters in the Gulf of Maine (including certain bays and estuaries in the southwest Gulf of Maine), on Georges Bank, and in Southern New England	Not applicable	Pelagic habitats
Pollock	Larvae	Inshore and offshore waters in the Gulf of Maine (including certain bays and estuaries in the Gulf of Maine), on Georges Bank, and in the Mid-Atlantic	Not applicable	Pelagic 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,	Pelagic and benthic habitats on the tops and edges of offshore banks and shoals with mixed rocky

Species	Life Stage	Geographic Area	Depth (m)	Habitat Type and Description
			Cape Cod Bay, and Narragansett Bay	substrates, often with attached macro algae
Red hake	Eggs	Gulf of Maine, Georges Bank, and the Mid-Atlantic, including Buzzards Bay, Massachusetts Bay and Narragansett Bay, Rhode Island	Not applicable	Pelagic habitats
Red hake	Larvae	Gulf of Maine, Georges Bank, and the Mid-Atlantic, including certain bays and estuaries in the southwest Gulf of Maine, Buzzards Bay and Narragansett Bay, Raritan Bay, and the Hudson River	Not applicable	Pelagic habitats
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	Eggs and larvae	Estuaries between southern New England and coastal Virginia	Not applicable	Pelagic waters
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	Eggs	Gulf of Maine to Cape May, New Jersey, including Cape Cod Bay and Massachusetts Bay	Not applicable	Pelagic habitats
Silver hake	Larvae	Gulf of Maine to Cape May, New Jersey, including Cape Cod Bay and Massachusetts Bay	Not applicable	Pelagic habitats

Species	Life Stage	Geographic Area	Depth (m)	Habitat Type and Description
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	Eggs	Continental shelf from Cape Cod, Massachusetts, to Cape Canaveral, Florida	Most common 10-110	Pelagic waters
Summer flounder	Larvae	Continental shelf from Cape Cod, Massachusetts, to Cape Canaveral, Florida, in nearshore waters south of Cape Hatteras, North Carolina	Most common 12-50 miles from shore in depths of 10-70	Pelagic waters
Summer flounder	Juveniles	Continental shelf and estuaries from Cape Cod, Massachusetts, to Cape Canaveral, Florida	To maximum 152	Benthic habitats, including inshore estuaries, salt marsh creeks, seagrass beds, mudflats, and open bay areas
Summer flounder	Adults	Continental shelf from Cape Cod, Massachusetts, to Cape Canaveral, Florida, including shallow coastal and estuarine waters during warmer months	To maximum 152 in colder months	Benthic habitats
Spiny dogfish	Juveniles	Primarily the outer continental shelf and slope between Cape Hatteras and Georges Bank and in the Gulf of Maine	Deep water	Pelagic and epibenthic habitats

Species	Life Stage	Geographic Area	Depth (m)	Habitat Type and Description
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	Eggs	Gulf of Maine, including bays and estuaries in New Hampshire and Massachusetts Bay, and the outer continental shelf and slope	Not applicable	Pelagic habitats
White hake	Larvae	Gulf of Maine, including Massachusetts Bay and Cape Cod Bay, Southern New England, and Georges Bank	Not applicable	Pelagic habitats
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	Eggs & Larvae	Continental shelf and certain bays and estuaries from Georges Bank to Cape Hatteras, North Carolina	Not applicable	Pelagic 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

Species	Life Stage	Geographic Area	Depth (m)	Habitat Type and Description
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	Larvae	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	0-70	Pelagic, but near bottom as they get older
Winter flounder	Juveniles	Coastal Gulf of Maine, Georges Bank, and continental shelf in Southern New England and Mid-Atlantic to Absecon Inlet, New Jersey, including bays and estuaries from eastern Maine to northern New Jersey	Mean high water - 60	Intertidal and sub-tidal benthic habitats on a variety of bottom types, such as mud, sand, rocky substrates with attached macro algae, tidal wetlands, and eelgrass; young-of-the-year juveniles on muddy and sandy sediments in and adjacent to eelgrass and macroalgae, in bottom debris, and in marsh creeks
Winter flounder	Adults	Coastal Gulf of Maine, Georges Bank, and continental shelf in Southern New England and Mid-Atlantic to Absecon Inlet, New Jersey, including bays and estuaries from eastern Maine to northern New Jersey	Mean high water - 70	Intertidal and sub-tidal benthic habitats on muddy and sandy substrates, and on hard bottom on offshore banks; for spawning adults, also see eggs
Winter skate	Juveniles	Coastal waters from eastern Maine to Delaware Bay, including certain bays and estuaries from eastern Maine to Chincoteague Bay, Virginia, and on Georges Bank and the continental shelf in Southern New England and the Mid-Atlantic	0-90	Sub-tidal benthic habitats on sand and gravel substrates, are also found on mud
Winter skate	Adults	Coastal waters from eastern Maine to Delaware Bay, including certain bays and estuaries in Maine and New Hampshire, and on Georges Bank and the continental shelf in Southern New England and the Mid-Atlantic	0-80	Sub-tidal benthic habitats on sand and gravel substrates, are also found on mud
Witch flounder	Eggs	Continental shelf throughout the region	Not applicable	Pelagic habitats

Species	Life Stage	Geographic Area	Depth (m)	Habitat Type and Description
	Larvae	Continental shelf throughout the region	Not applicable	Pelagic habitats
	Juveniles	Gulf of Maine and outer continental shelf and slope	50-400 and to 1500 on slope	Sub-tidal benthic habitats with mud and muddy sand substrates
	Adults	Gulf of Maine and outer continental shelf and slope	35-400 and to 1500 on slope	Sub-tidal benthic habitats with mud and muddy sand substrates
Yellowtail flounder	Eggs	Coastal and continental shelf waters in the Gulf of Maine, on Georges Bank, and in the Mid-Atlantic region as far south as the upper Delmarva peninsula, including certain bays and estuaries in the Gulf of Maine	Not applicable	Pelagic habitats
Yellowtail flounder	Larvae	Coastal and continental shelf waters in the Gulf of Maine, on Georges Bank, and in the Mid-Atlantic region as far south as Cape Hatteras, North Carolina, including certain bays and estuaries in the Gulf of Maine	Not applicable	Pelagic habitats
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

6.4.2. FISHERY IMPACT CONSIDERATIONS

Fishing activities are generally not expected to impact EFH for chub mackerel and other species which inhabit the water column. EFH for many other species includes the sea floor and structured habitat (Table 14).

As previously stated, bottom otter trawls accounted for the vast majority of chub mackerel landings over the past 20 years (section 6.2). Otter trawl doors can create furrows in sand, mud, and gravel/rocky substrates. Studies have found furrow depths that range from 2 to 10 cm. Bottom trawl gear can also re-suspend and disperse surface sediments and can smooth topographic features. It can also result in reduced abundance, and in some cases reduced diversity, of benthic species such as nematodes, polychaetes, and bivalves. It can have short-term positive ecological impacts such as increased food value and increased chlorophyll production in surface sediments. The duration of these impacts varies by sediment type, depth, and frequency of the impact (e.g., a single trawl tow vs. repeated tows). Some studies documented effects that lasted only a few months. Other studies found effects that lasted up to 18 months. Impacts tend to have shorter durations in dynamic environments with less structured bottom composition

compared to less dynamic environments with structured bottom. Shallower water, stronger bottom currents, more wave action, finer-grained sediments, and higher frequencies of natural disturbance are characteristics that make environments more dynamic (Stevenson et al. 2004).

Recreational hook and line gear generally has minimal impacts on physical habitat and EFH in this region. Weighted hook and line gear can contact the bottom, but the magnitude and footprint of any impacts resulting from this contact is likely minimal (Stevenson et al. 2004). Thus, the recreational chub mackerel fisheries are expected to have very minor or no impacts on habitat.

The Mid-Atlantic Council developed some fishery management actions with the sole intent of protecting marine habitats. For example, in Amendment 9 to the MSB FMP, the Council determined that bottom trawls used in MSB fisheries have the potential to adversely affect EFH for some federally-managed fisheries (MAFMC 2008). As a result of Amendment 9, closures to squid trawling were developed for portions of Lydonia and Oceanographer Canyons. Subsequent closures were implemented in these and Veatch and Norfolk Canyons to protect tilefish EFH by prohibiting all bottom trawling activity (MAFMC 2009). In addition, amendment 16 to the MSB FMP prohibits the use of all bottom-tending gear in fifteen discrete zones and one broad zone where deep sea corals are known or highly likely to occur (MAFMC 2016).

The impacts of chub mackerel fisheries on habitat have not been assessed; however, given the significant overlap between the chub mackerel and *Illex* squid fisheries (section 6.2.1), it is likely that the impacts of the chub mackerel fishery are very similar to those of the *Illex* squid fishery. The impacts of the *Illex* squid fishery on habitat were assessed in Amendment 9 (MAFMC 2008). Since that time, there have been no significant changes in the manner in which the *Illex* squid fishery is prosecuted relative to habitat impacts. As described in section 7.4, none of the alternatives considered in this document are expected to have different impacts on habitat than the impacts of the *Illex* squid fishery. Therefore, no additional alternatives to minimize adverse effects on EFH were considered as part of this management action.

7. Environmental Consequences of Alternatives

This EA analyzes the expected impacts of the alternatives on each VEC. The alternatives are compared to the current conditions of the VECs and to each other. The current conditions of the VECs are summarized in Table 15 and described in more detail in section 6. Impacts are described both in terms of their direction (negative, positive, or negligible/no impact) and magnitude (slight, moderate, or high) based on the guidelines in Table 16.

The alternatives are not compared to a theoretical condition where the fisheries are not operating. The commercial chub mackerel fishery is an emerging fishery (section 6.2.1) which is expected to continue at some level into the foreseeable future. Targeted recreational fishing effort is likely minimal; however, some level of recreational harvest does occur (section 6.2.2). None of the alternatives considered in this document would prohibit commercial or recreational chub mackerel fishing; thus, it would not be appropriate to compare the impacts of the alternatives against the impacts of a theoretical situation with no chub mackerel fishing effort.

In general, alternatives which may result in or contribute to overfishing or an overfished status for target or non-target species are considered to have negative impacts for those species. Conversely, alternatives which maintain a positive stock status, end overfishing, and/or rebuild to the biomass target are considered to have positive impacts on target and non-target species (Table 16).

Socioeconomic impacts are considered in relation to potential changes in landings, prices, revenues, fishing opportunities, and angler satisfaction. Alternatives which could lead to increased availability of target species and/or increased CPUE could lead to increased landings. Increased landings are generally considered to have positive socioeconomic impacts because they could result in increased revenues (for commercial and for-hire vessels) and angler satisfaction (for recreational fishery participants); however, if an increase in landings leads to a decrease in price or a decline in SSB for any of the landed species, then negative socioeconomic impacts could also occur.

The alternatives have the potential to impact commercial and recreational fishermen who harvest chub mackerel, as well as individuals and businesses providing support services such as vessel maintenance, fuel, ice, and other services. Consumers of chub mackerel and of species harvested while using chub mackerel as bait will also be indirectly impacted by chub mackerel management measures. Indirect impacts to support services and consumers cannot be precisely quantified with available data and are thus considered qualitatively. Alternatives which allow for increased landings of chub mackerel are generally expected to have positive socioeconomic impacts on individuals and businesses involved in support services and on consumers by contributing to the overall functioning of and employment in coastal communities.

As previously stated, bottom trawls are the predominant gear type in the commercial fishery. The recreational fishery uses hook and line almost exclusively. As described in sections 6.3.3 and 6.4.2, bottom trawl gear has a much greater potential for impacts to habitat and protected species than hook and line gear.

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) and in poor condition (i.e., marine mammal stocks that have exceeded or are near exceeding their PBR level) condition. For ESA-listed species, any action that results in interactions or take is expected to have negative impacts, including actions that reduce interactions. Actions expected to result in positive impacts on ESA-listed species include only those that contain specific measures to ensure no interactions (i.e., no take). By definition, all ESA-listed species are in poor condition and any take can negatively impact their recovery. The stock conditions for marine mammals not listed under the ESA varies by species; however, all are in need of protection. For marine mammal stocks that have their PBR level reached or exceeded, negative impacts would be expected from alternatives that result in the potential for interactions between fisheries and those stocks. For species that are at more sustainable levels (i.e., PBR levels have not been reached or 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 (Table 16).

Alternatives that improve the quality or quantity of habitat or allow for recovery of impacted habitats are expected to have positive impacts on habitat. Alternatives that degrade the quality or quantity, or increase disturbance of habitat are expected to have negative impacts (Table 16). A reduction in fishing effort is likely to decrease the time that fishing gear is in the water, thus reducing the potential for interactions between fishing gear and habitat. However, most areas where the commercial and recreational chub mackerel fisheries take place have been fished by multiple fishing fleets over many decades and are unlikely to see a measurable improvement in their condition in response to a decrease in effort in the chub mackerel fishery.

Changes in fishing effort under each alternative are a key consideration when assessing potential impacts on all VECs. Increased fishing effort can lead to increased fishing mortality for target and non-target species and an increased likelihood of interactions between fishing gear and protected species and fishing gear and habitat. It can also lead to increased catches and thus increased commercial and for-hire revenues and increased angler satisfaction.

Fishing effort is influenced by many factors including, but not limited to, management measures (e.g., catch and landings limits, possession limits, gear restrictions, seasonal closures), price and availability of all potential target species, and weather. Many of these factors are largely outside the scope of this amendment, though some may be indirectly impacted by the management measures under consideration. In this document, changes in fishing effort are largely estimated based on changes in landings and possession limits. There is not a direct correlation between landings limits and fishing effort. For example, even under lower landings limits, fishing effort could increase if lower fish availability results in fishermen taking more trips to offset lower catch rates. In addition, as described in section 6.2.1, commercial chub mackerel fishing effort is largely influenced by availability of *Illex* squid. When availability of *Illex* squid is high, commercial fishermen tend to target *Illex* squid instead of chub mackerel. The chub mackerel and *Illex* squid fisheries can experience large swings in availability, and therefore effort, independent of any regulatory changes. For example, spatial distribution patterns and recruitment of *Illex* squid are primarily determined by environmental factors (Boyle and Rodhouse 2005, NEFSC 2019b). The same is likely also true for chub mackerel. Future availability of some species can be predicted based on recruitment estimates or survey indices of young fish. This information is not available for chub mackerel. For all these reasons, future changes in effort are difficult to predict with certainty. Future changes in fishing effort under each alternative are described generally and largely assume that other factors besides the measures addressed in the alternative will remain similar to conditions in the recent past.

The alternatives which impact landings and possession limits are expected to have the greatest impact on fishing effort. Many alternatives work together to determine the landings limits. For example, when considering only a scenario in which commercial and recreational sub-ACLs or ACTs are not used (alternative 2.C.V.a), there are 48 possible combinations of the alternatives for OY (alternative set 2.C.III), expected SC-FL catch (alternative set 2.C.IV), management uncertainty (alternative set 2.C.VI), and expected discards (alternative set 2.C.VII), resulting in TALs ranging from 2.73 to 5.07 million pounds (Table 17). It is important to consider how the alternatives will work together to impact the VECs. Rather than analyzing all potential combinations of these alternatives, three examples are analyzed in the following sections: the preferred combination of alternatives, the combination of alternatives resulting in the highest TAL, and the combination of alternatives resulting in the lowest TAL (Table 17). All other possible combinations of alternatives fall within this range. As shown in Figure 11, the alternatives for OY have the greatest impact on the range of possible TALs. The differences in the potential TALs under the different alternatives for expected SC-FL catch, management uncertainty, and expected discards are much smaller than the differences in the potential TALs under the two OY alternatives.

Table 15: Recent conditions of VECs (described in more detail in section 6).

VEC		**Condition**	
		Overfishing?	**Overfished?**
Chub mackerel (section 6.1.1)		No[22]	No[23]
Non-target species (section 6.1.2)	*Illex squid*	Unknown	Unknown
	Longfin squid	Unknown	No
	Butterfish	No	No
	Round herring	Unknown	Unknown
Human communities (section 6.2)	Chub mackerel supports an emerging commercial fishery which averaged 958,371 pounds of landings and $196,205 in ex-vessel revenues (adjusted to 2017 dollars) during 2009-2018. Fewer than five vessels and dealers accounted for over 95% of commercial chub mackerel landings over the past 20 years (through 2018). Recreational harvest is sporadic and variable. Most commercial and recreational landings occur in Rhode Island, New York, New Jersey, Virginia, and Florida.		
Protected species (section 6.3)	Sea turtles	Leatherback and Kemp's ridley sea turtles are endangered. Loggerhead (NW Atlantic Ocean DPS) and green (North Atlantic DPS) sea turtles are threatened.	
	Fish	Atlantic salmon, shortnose sturgeon, and the New York Bight, Chesapeake, Carolina, and South Atlantic DPSs of Atlantic sturgeon are endangered. The Atlantic sturgeon Gulf of Maine DPS is threatened. Cusk are a candidate species.	
	Large whales	All are protected under the MMPA. North Atlantic right, fin, blue, sei, and sperm whales are endangered.	
	Small cetaceans	Pilot whales, dolphins, and harbor porpoise are protected under the MMPA. The Atlantic Trawl Gear Take Reduction Strategy was developed to identify measures to reduce the mortality and serious injury of small cetaceans in trawl gear.	
	Pinnipeds	Gray, harbor, hooded, and harp seals are protected under the MMPA.	
Habitat (section 6.4)	Commercial fishing impacts are complex, variable, and typically adverse. Recreational fishing has minimal impacts. Non-fishing activities had historically negative but site-specific effects.		

[22] There is no stock assessment for chub mackerel; therefore, the true stock status is unknown. Based on the proposed SDCs in alternative set 2.C, the stock is not overfished and overfishing is not occurring.

[23] See previous footnote.

Table 16: Guidelines for defining the direction and magnitude of impacts of alternatives on each VEC.

General Definitions				
VEC	**Resource Condition**	**Direction of Impact of Action**		
		Positive (+)	Negative (-)	No Impact (0)
Target and non-target species	Overfished status defined by the MSA	Alternatives expected to maintain biomass above the overfished threshold*	Alternatives expected to maintain or result in biomass below the overfished threshold*	Alternatives that do not impact stock status
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 varies by species	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	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	Varies by fishery and community (some landings stable, some decreasing, some increasing)	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 or social well-being of fishermen and/or communities

	Magnitude of Impact	
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 positive or negative	To an average degree (i.e., more than "slight", but not "high")
	High, 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 overfished status, but this must be justified within the impact analysis.

Table 17: All possible combinations of sub-alternatives under alternative 2 which impact the TAL, assuming commercial and recreational sub-ACLs or ACTs are not used. Cells shaded in green (scenario 23) are the preferred alternatives. Cells shaded in yellow (scenario 1) result in the highest TAL. Cells shaded in pink (scenario 48) are the result in the lowest TAL.

Alternatives				TAL (mil lb)	Scenario
2.C.III.a: OY=ABC	2.C.IV.a: 0 lb SC-FL	2.C.VI.a: 0 mgmt uncertainty	2.C.VII.a: 0 disc	5.07	1
			2.C.VII.b: 3% disc	4.92	2
			2.C.VII.c: 6% disc	4.77	3
			2.C.VII.d: 10% disc	4.56	4
		2.C.VI.b: 4% mgmt uncertainty	2.C.VII.a: 0 disc	4.87	5
			2.C.VII.b: 3% disc	4.72	6
			2.C.VII.c: 6% disc	4.58	7
			2.C.VII.d: 10% disc	4.38	8
	2.C.IV.b: 12,600 lb SC-FL	2.C.VI.a: 0 mgmt uncertainty	2.C.VII.a: 0 disc	5.06	9
			2.C.VII.b: 3% disc	4.91	10
			2.C.VII.c: 6% disc	4.75	11
			2.C.VII.d: 10% disc	4.55	12
		2.C.VI.b: 4% mgmt uncertainty	2.C.VII.a: 0 disc	4.86	13
			2.C.VII.b: 3% disc	4.71	14
			2.C.VII.c: 6% disc	4.56	15
			2.C.VII.d: 10% disc	4.37	16
	2.C.IV.c: 84,500 lb SC-FL	2.C.VI.a: 0 mgmt uncertainty	2.C.VII.a: 0 disc	4.99	17
			2.C.VII.b: 3% disc	4.84	18
			2.C.VII.c: 6% disc	4.69	19
			2.C.VII.d: 10% disc	4.49	20
		2.C.VI.b: 4% mgmt uncertainty	2.C.VII.a: 0 disc	4.79	21
			2.C.VII.b: 3% disc	4.64	22
			2.C.VII.c: 6% disc	4.50	23
			2.C.VII.d: 10% disc	4.31	24
2.C.III.b: OY=ABC - 36%	2.C.IV.a: 0 lb SC-FL	2.C.VI.a: 0 mgmt uncertainty	2.C.VII.a: 0 disc	3.25	25
			2.C.VII.b: 3% disc	3.15	26
			2.C.VII.c: 6% disc	3.05	27
			2.C.VII.d: 10% disc	2.92	28
		2.C.VI.b: 4% mgmt uncertainty	2.C.VII.a: 0 disc	3.12	29
			2.C.VII.b: 3% disc	3.02	30
			2.C.VII.c: 6% disc	2.93	31
			2.C.VII.d: 10% disc	2.80	32
	2.C.IV.b: 12,600 lb SC-FL	2.C.VI.a: 0 mgmt uncertainty	2.C.VII.a: 0 disc	3.23	33
			2.C.VII.b: 3% disc	3.14	34
			2.C.VII.c: 6% disc	3.04	35
			2.C.VII.d: 10% disc	2.91	36
		2.C.VI.b: 4% mgmt uncertainty	2.C.VII.a: 0 disc	3.10	37
			2.C.VII.b: 3% disc	3.01	38
			2.C.VII.c: 6% disc	2.92	39
			2.C.VII.d: 10% disc	2.79	40
	2.C.IV.c: 84,500 lb SC-FL	2.C.VI.a: 0 mgmt uncertainty	2.C.VII.a: 0 disc	3.16	41
			2.C.VII.b: 3% disc	3.07	42
			2.C.VII.c: 6% disc	2.97	43
			2.C.VII.d: 10% disc	2.84	44
		2.C.VI.b: 4% mgmt uncertainty	2.C.VII.a: 0 disc	3.03	45
			2.C.VII.b: 3% disc	2.94	46
			2.C.VII.c: 6% disc	2.85	47
			2.C.VII.d: 10% disc	2.73	48

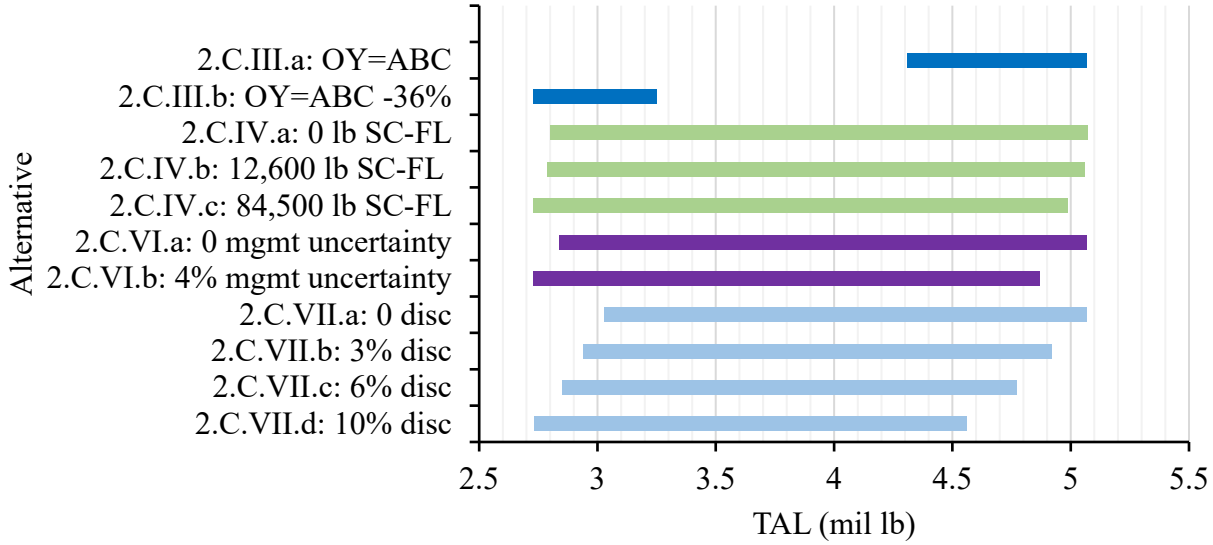


Figure 11: Range of possible TALs under various management alternatives. For example, depending on the other alternatives selected, the TAL under alternative 2.C.III.a (OY=ABC) could range from 4.31 to 5.07 million pounds.

7.1. Impacts of the Alternatives on Chub Mackerel and Non-Target Species

The following sections describe the impacts of each alternative on chub mackerel and non-target species. For the reasons described in the following sections, of all the action alternatives, the alternatives for OY and AMs are expected to have the greatest impacts on chub mackerel and non-target species. The other action alternatives are expected to have comparatively minor or negligible impacts on chub mackerel and non-target species.

The impacts to non-target species summarized below focus only on the primary non-target species identified in section 6.1.2 (i.e., *Illex* squid, longfin squid, Atlantic butterfish, and round herring). All other non-target species account for very low percentages of catch on trips where chub mackerel were landed in notable quantities (e.g., 0.5% or less across 8 observed trips where at least 40,000 pounds of chub mackerel were landed; section 6.1.2). For this reason, all alternatives in this document are expected to have negligible impacts on other non-target species besides the four primary non-target species.

7.1.1. Impacts of No Action (Alternative 1) on Chub Mackerel and Non-Target Species

All chub mackerel management measures currently in place in this region will expire after December 31, 2020 (section 4.4). If the Council takes no additional action, there will be no chub mackerel management measures in U.S. Atlantic waters as of January 1, 2021.

As previously stated, there were no chub mackerel management measures until September 2017. Commercial chub mackerel landings in 2017 and 2018 were 2,202 and 22,356 pounds, respectively, well below the current TAL of 2.86 million pounds. The current chub mackerel management measures likely have not impacted fishing effort or fishing mortality for chub mackerel or non-target species. Other factors such as market demand, participation in the *Illex* squid fishery, and the small number of historically participating vessels and dealers likely had a greater impact on landings during 2017 and 2018 than the management measures. For example,

fewer than five vessels and dealers accounted for over 95% of commercial chub mackerel landings over the past 20 years (through 2018). It appears that only a few relatively large (by Mid-Atlantic standards), fast vessels with refrigerated sea water or freezing capabilities can harvest chub mackerel in profitable quantities. These vessels do not target chub mackerel every year. Availability of *Illex* squid appears to be the strongest determinant of directed chub mackerel fishing effort. This is illustrated both by public comments and by landings data. For example, as shown in Table 6, landings of *Illex* squid were low in 2013 and 2015; however, these years had some of the highest chub mackerel catches. Conversely, *Illex* squid landings were high in 2017 and 2018. Chub mackerel landings were low in those years (section 6.2.1). For these reasons, if chub mackerel were to return to an unmanaged state under the no action alternative, fishing effort and fishing mortality are not expected to differ from historic levels in the foreseeable future. Future market demand and fishery participation may differ from that of the recent past; however, based on conditions in the fishery to date, fishing effort is not expected to notably increase in the foreseeable future under the no action alternative.

The stock status of chub mackerel in U.S. Atlantic waters is unknown as there is no stock assessment. However, it is assumed that the stock is not overfished and overfishing is not occurring (MAFMC 2018b; section 7.1.2.3). Historic levels of harvest, including the historic high of 5.25 million pounds landed in 2013 (Table 5), are assumed to have a low risk of overfishing (MAFMC 2018b). Thus, if the Council takes no action and the chub mackerel fishery becomes unregulated on January 1, 2021, there may be little risk of negative impacts to chub mackerel stock status in the foreseeable future. The presumed positive stock status of chub mackerel would be expected to be maintained under the no action alternative; therefore, this alternative is expected to have moderate positive impacts on chub mackerel.

Likewise, impacts to non-target species are expected to remain similar to current conditions under the no action alternative. As previously stated, the number of participants in the chub mackerel fishery is low and fishing effort is variable and low in most years (section 6.1.2). For these reasons, the chub mackerel fishery likely has minor impacts on the stock status of non-target species. As described in section 6.1.2, the primary non-target species in the chub mackerel fishery have a positive or unknown stock status. The no action alternative is not expected to result in a change in stock status for any non-target species. Thus, alternative 1 is expected to have slight positive impacts on non-target species by maintaining their current stock status (i.e., positive or unknown status).

Chub mackerel fishing effort over the longer term is uncertain. If the fishery expands beyond recent levels, then the risk of negative impacts to the stock status of chub mackerel and non-target species could increase, depending on the scale of the increase in fishing effort. There is no indication that fishing effort will increase notably in the foreseeable future under any of the management alternatives considered in this document, including the no action alternative.

As described in later sections, alternative 2 (manage chub mackerel as a stock in the MSB FMP) and the associated sub-alternatives would establish a management framework for chub mackerel and would place some limitations on fishing effort and thus fishing mortality of both chub mackerel and non-target species. Although fishing effort is not expected to increase compared to historic levels under either the no action alternative or alternative 2, fishing effort has the potential to increase to a greater level under alternative 1 than under alternative 2. Thus, the positive impacts of alternative 1 on chub mackerel and non-target species may be lesser in

magnitude than the positive impacts of alternative 2, which are described in more detail in the following sections.

7.1.2. Impacts of Managing Chub Mackerel as a Stock in the MSB FMP (Alternative 2, Preferred) on Chub Mackerel and Non-Target Species

If the Council adds chub mackerel as a stock in the MSB FMP, then the MSA requirements for EFH, management unit, SDCs, MSY, ABC, OY, ACLs, and AMs must also be met. The impacts of these types of management measures are summarized in the following sections. Collectively, they would be expected to result in moderate positive impacts for chub mackerel by helping to ensure that overfishing does not occur.

The impacts of alternative 2 on non-target species will vary based on the catch limits and other management measures implemented, as described in the following sections. Managing chub mackerel as a stock in an FMP is not expected to have direct impacts on non-target species and is not expected to impact the stock status of any non-target species. Thus, the impacts of this alternative on non-target species are expected to be identical to those of the no action alternative (i.e., slight positive for the reasons described in section 7.1.1). Indirect impacts to non-target species may derive from the specific measures implemented if chub mackerel is managed as a stock in the FMP. These impacts are described in the following sections for the relevant management measures.

Although fishing effort, and thus fishing mortality for chub mackerel and non-target species, is not expected to increase in the foreseeable future if no action is taken (section 7.1.1), there is the potential for fishing effort to increase to a greater extent under the no action alternative compared to alternative 2. Therefore, the positive impacts of alternative 2 on chub mackerel and non-target species are expected to be greater in magnitude than the impacts of the no action alternative.

7.1.2.1. Impacts of EFH Alternatives (Alternative Set 2.A) on Chub Mackerel and Non-Target Species

As described in section 5.2.1, the Council considered two alternatives for EFH. A no action alternative for EFH is encompassed within alternative 1, which would not add chub mackerel to the MSB FMP as a stock in need of conservation and management. If the Council choses alternative 2 (add chub mackerel to the MSB FMP), then they must meet the MSA requirement for EFH. The two EFH sub-alternatives under alternative 2 include two different sets of EFH descriptions/maps. The preferred alternative (alternative 2.A.I) would identify a larger area as EFH than the non-preferred alternative (alternative 2.A.II). Federal agencies are required to consult with NMFS if they authorize, fund, or undertake actions that may adversely affect EFH. Through these consultations, NMFS advises on how to avoid, reduce, or mitigate adverse effects to EFH. Establishing EFH for chub mackerel would not necessarily require actions to restrict fishing or non-fishing activities; rather, it would require that the impacts of fishing and non-fishing activities on EFH are considered and addressed if appropriate. This could have slight positive impacts on chub mackerel. The impacts are expected to be slight as opposed to moderate or high because there is no evidence that current activities are having substantial impacts on chub mackerel habitat.

Impacts to non-target species under both EFH alternatives are also expected to be slight positive as all non-target species share at least some habitat areas with chub mackerel.

The magnitude of the slight positive impacts for chub mackerel and non-target species will be greater under the preferred alternative (alternative 2.A.I) compared to the non-preferred alternative (alternative 2.A.II) as the preferred alternative would identify a larger area as EFH and thus would require an EFH consultation for a greater number of potential projects and activities.

7.1.2.2. IMPACTS OF MANAGEMENT UNIT ALTERNATIVES (ALTERNATIVE SET 2.B) ON CHUB MACKEREL AND NON-TARGET SPECIES

As described in more detail in section 5.2.2, the Council considered two management unit alternatives. The preferred alternative (alternative 2.B.I) would establish a management unit of Maine through North Carolina. The non-preferred alternative (alternative 2.B.II) would establish a management unit of Maine through the east coast of Florida. Any catch limits, landings limits, possession limits, and permit requirements implemented through this amendment would apply throughout the management unit.

Over 99% of total chub mackerel landings over the past 20 years (through 2018) occurred in Maine through North Carolina. Thus, both management unit alternatives are expected to have moderate positive impacts on the chub mackerel stock because they would ensure that any management measures implemented address at least 99% of the fishery as defined by past landings. This should help ensure that the fisheries are managed effectively so that overfishing does not occur.

The alternative for a Maine through Florida management unit (alternative 2.B.II) aligns more closely with the distribution of the stock (section 6.1.1), as well as with the SSC's recommended ABC. In this sense, the moderate positive impacts of a Maine through Florida management unit are expected to be greater in magnitude than the impacts of a Maine through North Carolina management unit as a greater proportion of the stock area will be covered by any catch limits, landings limits, possession limits, and permit. Differences in impacts between the two alternatives are only expected to be noteworthy if South Carolina through Florida catch increases compared to historical levels. There is no indication that this will occur in the foreseeable future. Catch in that region has been much lower than in the mid-Atlantic and southern New England (e.g., accounting for less than 1% of east coast landings during 1999-2018). There is no known directed fishery for chub mackerel in the South Atlantic.

Given that over 99% of chub mackerel landings historically occurred within the geographic area defined by the preferred management unit, it can be assumed that most fishing effort and most interactions with non-target species also occur within that area. Thus, minimal differences are expected in the impacts of both management unit alternatives on non-target species.

The management unit alternatives will not directly impact fishing effort and fishing mortality for non-target species; thus, they will not have direct impacts on non-target species. Indirect impacts may result from the management measures implemented in the management unit. The impacts of the management measures considered in this document are described in later sections.

In general, both management unit alternatives considered are expected to have slight positive impacts on non-target species as they are expected to maintain the current stock status of all non-target species. None of the key non-target species in the chub mackerel fishery are known to have a poor stock status (section 6.1.2).

7.1.2.3. IMPACTS OF SDC ALTERNATIVES (ALTERNATIVE SET 2.C.I) ON CHUB MACKEREL AND NON-TARGET SPECIES

As described in section 5.2.3.1, the Council considered two alternatives for SDCs. These alternatives would establish a level of annual catch above which overfishing is presumed to occur. Under both alternatives, the stock is presumed to be overfished when overfishing occurs three years in a row. An overfished designation triggers a requirement for a rebuilding plan, which would likely necessitate changes in management measures. The overfishing threshold under the preferred alternative (alternative 2.C.I.a) is 6.67 million pounds of catch per year. The overfishing threshold under the non-preferred alternative (alternative 2.C.I.b) is 8.21 million pounds of catch per year.

Commercial and recreational landings peaked in 2013 at 5.25 million pounds (Table 5). Discards are not well quantified but may have been 3-6% of total catch in 2013 (section 5.2.3.7). Thus, 5.57 million pounds is a reasonable, though potentially conservative, estimate of the historic high for annual catch. This is 17% lower than the overfishing SDC under alternative 2.C.I.a and 32% lower than the overfishing SDC under alternative 2.C.I.b. As described in section 7.1.1, chub mackerel catch is not expected to exceed historic levels in the foreseeable future, even if no action is taken and the fishery becomes unmanaged in 2021. For these reasons, neither SDC alternative is expected to impact fishing behavior, fishing effort, or fishing mortality in the foreseeable future. However, by establishing a threshold level of catch above which action is taken to reduce fishing mortality and rebuild the stock, both SDC alternatives could have slight positive impacts for chub mackerel by helping to mitigate for overfishing if it occurs. By helping to constrain fishing effort, both alternatives could also have slight positive impacts for non-target species. These impacts are largely indirect. Direct impacts will derive from any management measures implemented in response to catch exceeding the threshold level defined by the SDC.

The preferred SDC alternative (alternative 2.C.I.a) includes a lower threshold to define overfishing; therefore, it could have greater positive impacts than the non-preferred alternative (alternative 2.C.I.b) if fishing effort were to increase beyond historic levels in the future.

7.1.2.4. IMPACTS OF ALTERNATIVES FOR ABC (ALTERNATIVE 2.C.II), OY (ALTERNATIVE SET 2.C.III), EXPECTED SC-FL CATCH (ALTERNATIVE SET 2.C.IV), MANAGEMENT UNCERTAINTY (ALTERNATIVE SET 2.C.VI), AND EXPECTED DISCARDS (ALTERNATIVE SET 2.C.VII) ON CHUB MACKEREL AND NON-TARGET SPECIES

As described in section 5, the Council considered a range of alternatives for ABC (alternative 2.C.II), OY (alternative set 2.C.III), expected South Carolina through Florida catch (alternative set 2.C.IV), management uncertainty (alternative set 2.C.VI), and expected discards (alternative set 2.C.VII). These alternatives work together to determine the resulting TAL for 2020-2022 (e.g., Figure 3). Their impacts on the TAL and on fishing effort and fishing mortality compared to recent levels cannot be meaningfully assessed when considered independently from each other. The impacts on fishing effort and fishing mortality compared to current conditions will depend on how the TAL compares to recent levels of landings. For example, a 4% management uncertainty buffer (alternative 2.C.IV.b) will result in a lower TAL than a 0% management uncertainty buffer (alternative 2.CIV.a); however, fishing effort will not necessarily be lower with a 4% management uncertainty buffer because the level of the TAL compared to recent landings depends on multiple other alternatives. Thus, rather than independently considering each alternative which contributes to the TAL, three TAL scenarios were analyzed.

Under all three TAL scenarios, the OY alternative has the greatest impact on the TAL, followed by the alternative for expected discards, the management uncertainty alternative, and the expected South Carolina through Florida catch alternative. For example, as shown in Figure 11, the differences in the potential TALs under the different alternatives for expected SC-FL catch, management uncertainty, and expected discards are much smaller than the differences in the potential TALs under the two OY alternatives.

This amendment would implement a TAL for 2020-2022. Thus, the impacts of the TAL are not considered beyond that time frame. As described in more detail below, none of the TAL scenarios, including the most restrictive TAL, are expected to constrain fishing effort within that time frame compared to recent levels (Table 5, Table 17).

Most Restrictive TAL Scenario

When considering all possible combinations of alternatives in this document, the most restrictive potential TAL is 2.73 million pounds (Table 17). This is based on the combination of alternatives 2.C.II (ABC=5.07 mil lb), 2.C.III.b (OY=ABC - 36%), 2.CIV.c (84,500 pounds of expected SC-FL catch), 2.C.VI.b (4% management uncertainty), and 2.C.VII.d (10% discards). The other alternatives considered in this document do not impact the TAL. The resulting TAL is 4% lower than the current landings limit (in place through 2020; section 4.4). It is 48% lower than the historic high for landings in 2013 but at least 23% higher than landings in all other years dating back to at least 1998 (Table 5). This TAL could allow for increased landings compared to most recent years (except 2013); however, as described in section 7.1.1, fishing effort is not expected to increase beyond recent levels for the foreseeable future due to factors such as market demand, the influence of the *Illex* squid fishery, and low participation in the chub mackerel fishery to date. Thus, this TAL scenario is not expected to result in a change in fishing effort and fishing mortality for chub mackerel and non-target species compared to recent levels. Therefore, the current stock status of chub mackerel and all non-target species are expected to be maintained under this TAL scenario. As previously stated, the stock status of chub mackerel is unknown but presumed to be positive (i.e., not overfished, overfishing not occurring; MAFMC 2018b). The stock status of the primary non-target species are positive or unknown, depending on the species (section 6.1.2). Therefore, the most restrictive TAL scenario is expected to have moderate positive impacts on chub mackerel and slight positive impacts on non-target species by maintaining their current positive or unknown stock status. Impacts to non-target species are expected to be slight because the chub mackerel fishery likely has minor impacts on the stock status of non-target species (section 7.1.1). As previously stated, these impacts are not expected to differ from the impacts of the chub mackerel fishery over the past 20 or more years.

Preferred TAL Scenario

The preferred alternatives for ABC (alternative 2.C.II), OY (alternative 2.C.III.a), expected South Carolina through Florida catch (alternative 2.CIV.c), management uncertainty (alternative 2.C.VI.b), and expected discards (alternative 2.C.VII.c) result in a TAL of 4.50 million pounds.

This TAL is 57% higher than the current landings limit (in place through 2020; section 4.4). It is 14% lower than the historic high for landings in 2013, but more than double the landings in all other years dating back to at least 1998 (Table 5). This TAL could allow for increased landings compared to most recent years (except 2013); however, as described in section 7.1.1, fishing effort is not expected to increase beyond recent levels for the foreseeable future due to factors such as market demand, the influence of the *Illex* squid fishery, and low participation in the chub

mackerel fishery to date. For this reason, this TAL scenario is not expected to result in a change in fishing effort and fishing mortality for chub mackerel and non-target species compared to recent levels. Thus, the current stock status of chub mackerel and all non-target species are expected to be maintained under this TAL scenario. The stock status of chub mackerel is unknown but presumed to be positive (i.e., not overfished, overfishing not occurring; MAFMC 2018b). The stock status of the primary non-target species is positive or unknown, depending on the species (section 6.1.2). Therefore, the preferred TAL scenario is expected to have moderate positive impacts on chub mackerel and slight positive impacts on non-target species by maintaining their current positive or unknown stock status. Impacts to non-target species are expected to be slight because the chub mackerel fishery likely has minor impacts on the stock status of non-target species (section 7.1.1). As previously stated, these impacts are not expected to differ from the impacts of the chub mackerel fishery over the past 20 or more years.

Least Restrictive TAL Scenario

When considering all possible combinations of alternatives in this document (with the exception of the no action alternative), the least restrictive potential TAL is 5.07 million pounds (Table 17). This is based on the combination of alternatives 2.C.II (ABC=5.07 mil lb), 2.C.III.a (OY=ABC), 2.CIV.a (0 pounds of expected SC-FL catch), 2.C.VI.a (0% management uncertainty), and 2.C.VII.a (0% discards). The other alternatives considered in this document do not impact the TAL.

The resulting TAL is 77% higher than the current landings limit (in place through 2020; section 4.4. It is 3% lower than the historic high for landings in 2013, but more than double the landings in all other years dating back to at least 1998 (Table 5). This TAL could allow for increased landings compared to most recent years (except 2013); however, as described in section 7.1.1, fishing effort is not expected to increase beyond recent levels for the foreseeable future due to factors such as market demand, the influence of the *Illex* squid fishery, and low participation in the chub mackerel fishery to date. For this reason, this TAL scenario is not expected to result in a change in fishing effort and fishing mortality for chub mackerel and non-target species compared to recent levels. Thus, the current stock status of chub mackerel and all non-target species are expected to be maintained under this TAL scenario. The stock status of chub mackerel is unknown but presumed to be positive (i.e., not overfished, overfishing not occurring; MAFMC 2018b). The stock status of the primary non-target species is positive or unknown, depending on the species (section 6.1.2). Therefore, the least restrictive TAL scenario is expected to have moderate positive impacts on chub mackerel and slight positive impacts on non-target species by maintaining their current positive or unknown stock status. Impacts to non-target species are expected to be slight because the chub mackerel fishery likely has minor impacts on the stock status of non-target species (section 7.1.1). As previously stated, these impacts are not expected to differ from the impacts of the chub mackerel fishery over the past 20 or more years.

Comparison of TAL Scenarios

As described above, the most restrictive, preferred, and least restrictive TAL scenarios are all expected to have moderate positive impacts on chub mackerel and slight positive impacts on non-target species. This is because fishing effort and fishing mortality are expected to remain similar to recent levels for the foreseeable future, which should maintain the current positive, presumed positive, or unknown stock status of chub mackerel and the primary non-target species (section 6.1). The magnitude of these positive impacts is expected to be greatest under the most

restrictive TAL scenario because this scenario would place the lowest cap on potential future landings. The magnitude of these positive impacts is expected to be lowest under the least restrictive TAL scenario because this scenario would place the highest cap on potential future landings.

If landings were to increase such that the full TAL is harvested under any of the three scenarios, negative impacts to the chub mackerel stock would not be expected because all three TALs are expected to constrain fishing mortality such that overfishing does not occur (MAFMC 2018b). Negative impacts would also not be expected for non-target species because landings would still be constrained to historic levels (i.e., at least 3% lower than those in 2013, the historic high) and discards account for a small proportion of chub mackerel catch (section 5.2.3.7.1). Further, mortality for most non-target species is impacted by management measures in other fisheries (e.g., AMs). As previously stated, historic levels of fishing effort have contributed to the current positive, presumed positive, or unknown stock status of chub mackerel and the primary non-target species (section 6.1).

7.1.2.5. IMPACTS OF COMMERCIAL AND RECREATIONAL CATCH LIMIT ALTERNATIVES (ALTERNATIVE SET 2.C.V) ON CHUB MACKEREL AND NON-TARGET SPECIES

As described in section 5.2.3.5, the Council considered three alternatives regarding separation of commercial and recreational catch limits. The preferred alternative is to manage both sectors under a shared ACL, ACT, and TAL (alternative 2.C.V.a).

Fishing effort and fishing mortality for chub mackerel and non-target species will be impacted by the values assigned to the catch and landings limits. They will not be impacted by the decision of whether commercial and recreational catch limits should be combined or separate. For this reason, none of the alternatives in alternative set 2.C.V are expected to have direct or indirect impacts on chub mackerel or non-target species.

7.1.2.6. IMPACTS OF ACCOUNTABILITY MEASURE ALTERNATIVES (ALTERNATIVE SET 2.D) ON CHUB MACKEREL AND NON-TARGET SPECIES

Impacts of In-Season Closure Alternatives (Alternative Sets 2.D.I and 2.D.II) on Chub Mackerel and Non-Target Species

As described in sections 5.2.4.1 and 5.2.4.2, the Council considered a range of alternatives for in-season commercial fishery closures, including a no action alternative (alternative 2.D.I.a) and alternatives to close the commercial fishery when 90, 95, or 100% of the TAL (or commercial quota, depending on other alternatives selected; section 5.2.3.5) is projected to be landed (alternatives 2.D.I.b-d). Alternatives were considered for 0; 1,000; 10,000; or 40,000 pound possession limits once the commercial fishery is closed in-season (alternatives 2.D.IIa-d). The impacts of these alternatives on chub mackerel and non-target species will vary based on the combination of in-season closure threshold and possession limit alternatives used. There are many possible combinations of these alternatives. Rather than analyze the impacts of each possible combination, four examples were analyzed, as summarized below. These four examples cover the range of possibilities from most to least restrictive and include: 1) the no action alternative, 2) the least restrictive combination of action alternatives, 3) the most restrictive combination of action alternatives, and 4) the preferred alternatives.

Under the no action alternative (alternative 2.D.I.a), the commercial fishery would never close in-season. Commercial landings would not be restricted after the TAL is reached. This could

pose challenges for preventing ABC overages and preventing overfishing. As described in previous sections, commercial landings are not expected to exceed any of the potential TALs in the foreseeable future due to constraints such as market demand, participation in the *Illex* squid fishery, and low participation in the chub mackerel fishery to date. Thus, overages are not expected, even under the no action alternative for in-season closure. For this reason, this alternative may have little risk of negative impacts to chub mackerel and non-target species for the foreseeable future. However, if fishing effort were to increase over the longer term, this alternative could pose challenges for restricting catch to acceptable levels. Thus, the impacts of this alternative on chub mackerel and non-target species are likely to be negligible for the foreseeable future (as fishing effort is not expected to be impacted), but could be slight negative if fishing effort were to increase notably beyond recent levels as this could lead to an increase in fishing mortality for chub mackerel and non-target species. These negative impacts would likely be slight, as opposed to moderate or high, negative because other measures (e.g., ACL overage paybacks) will play a role in restricting fishing effort. Compared to all other possible combinations of in-season closure alternatives, the no action alternative has the greatest potential for negative impacts to chub mackerel and non-target species.

With the exception of the no action alternative, the least restrictive combination of alternatives in alternative sets 2.D.I and 2.D.II is a 40,000 pound possession limit (alternative 2.D.II.d) when 100% of the TAL is projected to be landed (alternative 2.D.I.d). As previously stated, 40,000 pounds may be the lowest amount that the key players in the fishery are willing to land due to market constraints (section 5.2.4.2.4). Thus, this combination of alternatives could lead to some reduction in fishing effort after the TAL is projected to be fully landed. If the preferred TAL (i.e., 4.50 million pounds; Table 17) had been in place in the past, it would have only been reached in 2013 (Table 5). Assuming no other changes in fishing behavior besides those trips above 40,000 pounds being limited to that amount after the TAL was reached, this combination of alternatives would have resulted in 4.80 million pounds of commercial landings in 2013. Assuming a 6% discard rate (section 5.2.3.7.3), this would have resulted in 5.09 million pounds of commercial catch, which is slightly higher than the recommended ABC of 5.07 million pounds (section 5.2.3.2). Thus, this combination of alternatives could have slight negative impacts for chub mackerel as there is a slight risk of resulting in overfishing. This risk is slight as commercial landings in all other past years were notably lower than in 2013 (Table 5) and the fishery is not expected to expand beyond recent levels in the foreseeable future due to constraints such as market demand, participation in the *Illex* squid fishery, and low historical participation in the chub mackerel fishery. Fishing mortality for non-target species would likely not increase to the extent that the stock status of any non-target species is negatively impacted; thus the current stock status of all non-target species (i.e., not overfished, overfishing not occurring, or unknown, depending on the species; section 6.1.2) would likely be maintained. Thus, this combination of alternatives would likely have slight positive impacts on non-target species. These impacts would be slight because the chub mackerel fishery is not likely a major contributor to fishing mortality for any non-target species. Compared to all other possible combinations of in-season closure alternatives, this combination of alternatives has the second highest potential for negative impacts to chub mackerel. Impacts to non-target species are expected to be similar to all other possible combinations of alternatives except for the no action alternative. As previously stated, the no action alternative has the greatest potential for negative impacts.

The most restrictive combination of in-season closure threshold and possession limit alternatives is a 0 pound possession limit (i.e., no possession allowed) after 90% of the TAL is projected to

be landed. This combination of alternatives should help prevent ABC overages, thus preventing overfishing and maintaining the (presumed) positive stock status of chub mackerel (MAFMC 2018b), resulting in moderate positive impacts for the stock. No changes to the current positive (i.e., not overfished, overfishing not occurring) or unknown stock status of the key non-target species would be expected (section 6.1.2). Thus, this combination of alternative would also be expected to have slight positive impacts for non-target species. Impacts to non-target species would be slight because the chub mackerel fishery is not likely a major contributor to fishing mortality for any non-target species. This combination of alternatives is expected to have similar impacts on chub mackerel and non-target species as the preferred combination of alternatives (see below), as both combinations of alternatives would maintain the current positive, presumed positive, or unknown stock status of chub mackerel and non-target species. Compared to the no action alternative and the least restrictive combination of alternatives described above, these impacts are more positive.

The preferred combination of alternatives is for a 40,000 pound possession limit (alternative 2.D.II.d) once 90% of the TAL is projected to be landed (alternative 2.D.I.b), followed by a 10,000 pound possession (alternative 2.D.II.c) limit after 100% of the TAL is projected to be landed (alternative 2.D.I.d). As previously stated, 40,000 pounds may be the lowest amount that the key players in the fishery are willing to land due to market constraints (section 5.2.4.2.4). Thus, this combination of alternatives could lead to some reduction in fishing effort after the TAL is projected to be fully landed. Landings exceeded 90% of the preferred TAL (i.e., 4.50 million pounds; Table 17) only once, in 2013 (Table 5). Assuming no other changes in fishing behavior besides those trips above 40,000 and 10,000 pounds being limited to those amounts after 90% and 100% TAL was reached, this combination of alternatives would have resulted in 4.40 million pounds of commercial landings in 2013. The proposed TAL of 4.50 million pounds would not have been reached. Assuming a 6% discard rate (section 5.2.3.7.3), this would have resulted in 4.66 million pounds of commercial catch, which is 8% lower than the recommended ABC of 5.07 million pounds (section 5.2.3.2). Thus, this combination of alternatives should prevent overfishing and maintain the positive (presumed) stock status of chub mackerel (MAFMC 2018b). Fishing mortality for non-target species would likely not increase, thus the current stock status of all non-target species (i.e., not overfished, overfishing not occurring, or unknown, depending on the species; section 6.1.2) should be maintained. Thus, this combination of alternatives would likely have slight positive impacts on non-target species. Impacts to non-target species would be slight because the chub mackerel fishery is not likely a major contributor to fishing mortality for any non-target species. This combination of alternatives is expected to have similar impacts on chub mackerel and non-target species as the most restrictive combination of alternatives (see above), as both combinations of alternatives would maintain the current positive, presumed positive, or unknown stock status of chub mackerel and non-target species. Compared to the no action alternative and the least restrictive combination of alternatives described above, these impacts are more positive.

In summary, the no action alternatives for in-season closure have the greatest potential for negative impacts to chub mackerel and non-target species, followed by the least restrictive combination of alternatives. The most restrictive and preferred combination of alternatives have identical expected impacts and are both expected to maintain the current positive, presumed positive, or unknown stock status of chub mackerel and non-target species, depending on the species.

Impacts of ACL Overage Payback Alternatives (Alternative Set 2.D.III) on Chub Mackerel and Non-Target Species

Alternative set 2.D.III contains three alternatives regarding ACL overages (section 5.2.4.3). Under the no action alternative (alternative 2.D.III.a), ACL overages would not require deductions from a future year's ACT. This could have negative impacts on chub mackerel if the lack of mitigation for ACL overages negatively impacts the stock status of chub mackerel. It could also have negative impacts for non-target species as there would not be a strong incentive to reduce fishing effort after the ACL is reached. This would pose challenges for constraining fishing effort to acceptable levels. The magnitude of these negative impacts on chub mackerel and non-target species would vary based on the magnitude of the ACL overage. As described in previous sections, ACL overages are not expected in the foreseeable future due to constraints such as market demand, participation in the *Illex* squid fishery, and low historical participation in the chub mackerel fishery. Thus, any potential ACL overages would not likely be major and the impacts of this alternative on chub mackerel and non-target species would likely be slight negative.

The other two alternatives in this alternative set would require reductions in a future year's ACT if the ACL is exceeded. The ACT deduction would apply to either a combined commercial and recreational ACT (alternative 2.D.III.b) or sector-specific ACTs (alternative 2.D.III.c), depending on the alternative and which sector was responsible for the ACL overage. The required overage paybacks under alternatives 2.D.III.b and 2.D.III.c would have identical impacts on chub mackerel and non-target species. They are both expected to have slight positive impacts by mitigating for any ACL overages and helping to ensure that fishing effort is constrained to acceptable levels by creating an incentive to prevent ACL overages. Impacts are expected to be slight because ACL overage paybacks are one of many proposed mechanisms to constrain fishing effort and, as previously stated, ACL overages are not anticipated in the foreseeable future due to constraints such as market demand, participation in the *Illex* squid fishery, and low historical participation in the chub mackerel fishery.

In summary, the no action alternative for ACL overage pay backs is expected to have slight negative impacts on chub mackerel and non-target species. The other two alternatives are expected to have identical slight positive impacts.

7.1.2.7. IMPACTS OF PERMIT REQUIREMENT ALTERNATIVES (ALTERNATIVE SET 2.E) ON CHUB MACKEREL AND NON-TARGET SPECIES

As described in section 5.2.5, the Council considered a range of alternatives for permit requirements. The expected impacts of those alternatives on chub mackerel and non-target species are described below.

Impacts of the No Action Alternatives for Permits

Under alternatives 2.E.I.a and 2.E.II.a, no action would be taken on permit requirements for commercial and for-hire vessels, respectively. The current permit requirements for commercial vessels would remain in place through December 31, 2020 (section 4.4). Starting on January 1, 2021, there would be no permit requirements for vessels which retain chub mackerel off the U.S. east coast. If no action is taken, vessels which retain chub mackerel in the management unit would not be required to comply with various reporting requirements (section 5.2.5) unless they have federal permits for other species.

The number of commercial and for-hire vessels which retain chub mackerel caught in the management unit and do not already have a GARFO permit for another species is unknown but likely low. These vessels do not account for a significant amount of total chub mackerel landings. For example, over the past 20 years through 2017 (when the permit requirements through the Forage Amendment came into effect), 4,787 pounds of chub mackerel, equivalent to 0.0005% of all chub mackerel landings reported by commercial fish dealers from Maine through Florida,[24] were not associated with a GARFO permit number. Dealer data suggest that these landings were associated with 12 or fewer vessels. When considering only the past 10 years (through 2008), the data suggest that these landings were associated with 4 or fewer vessels.

The commercial dealer data examined for this analysis account for all federal dealers and most state-only permitted dealers. It likely accounts for the majority of commercial chub mackerel landings over the past 20 years, including landings from vessels without federal permits for any species. A similarly comprehensive data set for for-hire landings is not available. For-hire landings are reported through VTRs; however, VTRs are only required of those vessels with fishing permits. Therefore, chub mackerel landings from for-hire vessels which did not have a federal fishing permit is unknown.

The no action alternatives for permit requirements could have indirect slight negative impacts for the chub mackerel stock because information necessary for effective management would not necessarily be collected from all vessels which could participate in the fishery. However, these impacts are expected to be very small in magnitude because, as described above, the number of vessels which catch chub mackerel in the management unit and do have GARFO commercial or party/charter permits for other species is likely very low and these vessels likely account for very small amounts of chub mackerel catch.

Impacts to non-target species are expected to be negligible as the permit requirements will not impact fishing mortality or the stock status of non-target species. The impacts of the information collection aspects of these alternatives are expected to be very minor for non-target species. Vessels with notable catch of the key non-target species (section 6.1.2) should have GARFO permits for other species and are thus already subject to catch reporting and observer requirements.

Impacts of All Other Permit Alternatives, Including Preferred Alternatives

With the exception of the no action alternatives described above, all permit alternatives would require vessels to have a GARFO permit in order to possess chub mackerel caught in the management unit. The GARFO permits which would meet this requirement vary by alternative (section 5.2.5). The preferred alternatives would require all vessels which retain chub mackerel caught in the management unit to have a commercial or party/charter MSB permit through GARFO (alternatives 2.E.I.c and 2.E.II.c). A variety of information collection requirements are associated with all GARFO permits (section 5.2.5). Thus, by requiring a GARFO permit, these alternatives would ensure that important fisheries-dependent data are collected. This would help facilitate effective management. This could have indirect slight positive impacts on chub

[24] Given that the vast majority of commercial landings occurred in the mid-Atlantic and southern New England, this proportion is virtually unchanged when considering only Maine-North Carolina landings.

mackerel. Direct impacts are not expected because none of the permit alternatives will directly impact fishing effort, fishing mortality, or stock status.

Impacts to non-target species are expected to be negligible as the permit requirements will not impact fishing mortality or the stock status of non-target species. The impacts of the information collection aspects of these alternatives are expected to be very minor for non-target species. Vessels with notable catch of the key non-target species (section 6.1.2) should have GARFO permits for other species and thus will not be impacted by the information collection requirements of any of the chub mackerel permit alternatives as they are already subject to those requirements due to their other permits.

Compared to the no action alternatives (which, as described above are expected to have indirect slight negative impacts for chub mackerel and negligible impacts for non-target species), all other permit requirement alternatives are expected to have positive impacts on chub mackerel for the reasons described above. No differences are expected in the impacts to non-target species from any of the permit requirement alternatives, including the no action alternatives, for the reasons described above.

7.1.2.8. IMPACTS OF ADMINISTRATIVE ALTERNATIVES (ALTERNATIVE SET 2.F) ON CHUB MACKEREL AND NON-TARGET SPECIES

The expected impacts of the alternatives in alternative set 2.F on chub mackerel and non-target species are summarized below.

Impacts of Specifications Alternatives (Alternative Set 2.F.I) on Chub Mackerel and Non-Target Species

Alternative set 2.F.I contains two alternatives. Under alternative 2.F.I.a, no action on specifications would be taken. All changes to chub mackerel management measures would require an amendment as the Council agreed that no chub mackerel management measures should be implemented or modified through a framework adjustment (section 5.3.8). This could result in slight negative impacts for chub mackerel if it hinders the Council's ability to react to new information in a timely manner. This could create challenges for managing the fisheries to prevent overfishing and achieve OY. This alternative is not expected to have any meaningful impacts on non-target species.

Under alternative 2.F.II.b, the specifications process used for the other species in the MSB FMP would also apply to chub mackerel. This process allows the Council to modify management measures in a timely manner in response to new information. This could result in slight positive impacts for chub mackerel by helping to ensure that the fishery is managed to prevent overfishing. It is not expected to have any meaningful impacts on non-target species.

When comparing these two alternatives to each other, alternative 2.F.II.b is expected to have positive impacts for chub mackerel and similar impacts to non-target species as alternative 2.F.II.a.

Impacts of Alternative 2.F.II (MSY=ABC) on Chub Mackerel and Non-Target Species

Under alternative 2.F.II, the FMP would specify that MSY for chub mackerel is equal to the ABC. This is purely administrative in nature and will not impact any management measures. As such, it is not expected to have any direct or indirect impacts on chub mackerel or non-target species.

Impacts of ABC Control Rule and Risk Policy Alternatives (Alternative Set 2.F.III) on Chub Mackerel and Non-Target Species

Alternative set 2.F.III contains two alternatives. Under alternative 2.F.III.a, no action would be taken on an ABC control rule and risk policy for chub mackerel. An ABC would still be required; however, the process for developing the ABC would not be defined through an ABC control rule and risk policy. Although the SSC would not be required to use the Council's existing ABC control rule and risk policy for chub mackerel under alternative 2.F.III.a, they would not be prohibited from doing so.

Under alternative 2.F.III.b, the Council's existing ABC control rule and risk policy would apply to chub mackerel. The ABC control rule and risk policy are defined in the regulations at 50 CFR 648.20 and 648.21 and are described in section 5.2.6.3.2. The regulations allow for deviations from the control rule methods; however, a justification for the deviation must be provided along with a description of the methods used to derive the ABC and an explanation of how the deviation is consistent with National Standard 2. Therefore, even under alternative 2.F.III.b, the SSC has flexibility in recommending an ABC.

There are no meaningful differences between these alternatives in terms of their impacts on chub mackerel and non-target species. Under both alternatives in this alternative set, the chub mackerel ABC would be specified based on the best available science and would be expected to prevent overfishing. Thus, both alternatives are expected to have moderate positive impacts on chub mackerel by helping to maintain the current (presumed) positive stock status (i.e., not overfished, overfishing not occurring; MAFMC 2018b).

Neither alternative is expected to have meaningful impacts on non-target species. Impacts to non-target species will vary based on the value of the ABC and associated management measures and will not be influenced by the process used to derive the ABC.

Impacts of SBRM Alternatives (Alternative Set 2.F.IV) on Chub Mackerel and Non-Target Species

Alternative set 2.F.IV contains two alternatives regarding SBRM, which specifies the methodology used to estimate discards. Under alternative 2.F.IV.a, no action would be taken on an SBRM for the chub mackerel fisheries. A methodology for estimating discards in the commercial chub mackerel fishery would not be defined. Under alternative 2.F.IV.b, the current SBRM for all Mid-Atlantic Council FMPs would also apply to chub mackerel (section 5.2.6.4.1).

Under the current SBRM, discards are estimated at the level of gear and area-based fleets. They are not estimated at the level of fisheries for individual species. The chub mackerel fishery is not unique in terms of gear used and areas fished (section 6.2); therefore, estimates of discards are not expected to differ under either alternative and both alternatives are expected to have identical impacts on chub mackerel and non-target species. These alternatives are not expected to have meaningful impacts on chub mackerel and non-target species as they will not impact fishing mortality or stock status for any species.

7.2. SOCIOECONOMIC IMPACTS OF THE ALTERNATIVES

The following sections describe the socioeconomic impacts of the alternatives and include quantitative evaluations of available data for each alternative where possible. As previously described, quantitative data are not available for all relevant socioeconomic impacts and future changes in relevant factors such as fishing effort, landings, and revenues are not easily

quantified. For these reasons, qualitative assessments of the likely socioeconomic impacts of each alternative are also included.

As described in the following sections, of all the action alternatives, the alternatives for OY, AMs, and permit requirements are expected to have the greatest socioeconomic impacts. The other action alternatives are expected to have comparatively minor or negligible socioeconomic impacts.

7.2.1. SOCIOECONOMIC IMPACTS OF NO ACTION (ALTERNATIVE 1)

All chub mackerel management measures currently in place in this region will expire after December 31, 2020 (section 4.4). If the Council takes no additional action, there will be no regulations on chub mackerel harvest in U.S. Atlantic waters as of January 1, 2021. For the reasons described in section 7.1.1, commercial and recreational landings are not expected to increase beyond recent levels under the no action alternative. The current regulations have been in place since September 2017 and likely have not impacted fishing behavior. Thus, removal of those regulations after December 31, 2020 under the no action alterative is not expected to change the socioeconomic impacts of the fishery in the short term compared to current conditions.

If conditions in the fishery were to change over the longer term such that chub mackerel is targeted to a greater extent than has occurred over the past 20 years, then the no action alternative could have mixed (i.e., both positive and negative) long-term socioeconomic impacts. Positive socioeconomic impacts could occur due to the removal of restrictions on the amount of chub mackerel harvest, which could lead to increased revenues, fishing opportunities, and angler satisfaction. If fishing effort were to increase to the extent that chub mackerel availability is reduced, then negative socioeconomic impacts could also occur over the long-term due to decreased harvest and revenues. The magnitude of these impacts would vary based on the magnitude of the increase in fishing effort.

As described in section 6.2, the commercial and recreational chub mackerel fisheries are not major economic contributors at the regional level in terms of total dollar value, especially when compared to many other fisheries in the region. However, they are important seasonal fisheries for some fishermen and communities. For example, some commercial fishermen who typically rely on summer and fall harvests of *Illex* squid have described chub mackerel as a "bailout" species which can fill an economic gap in years when *Illex* squid availability is low. The same can be said for commercial fish dealers who typically rely on *Illex* squid.

Public comments also suggest that chub mackerel are a popular bait among a small but potentially growing number of recreational fishermen who target tunas and marlins in the mid-Atlantic. Public comments also suggest that anglers on party boats will occasionally catch chub mackerel when other fish aren't available and this can be a positive experience for anglers who fish for the experience of fishing rather than to bring fish home to eat (section 6.2.2).

These can all be considered positive socio-economic impacts. When considered at a regional level, these impacts are slight positive due to the small number of affected individuals; however, the impacts could be moderate positive for those few individuals who harvest, catch, or buy and sell chub mackerel. The no action alternative would represent a continuation of these positive impacts because no changes in harvest or fishing behavior compared to current conditions would be expected under this alternative.

There is no indication that fishing effort, catch, or harvest will increase notably in the foreseeable future under any of the management alternatives considered in this document, including the no action alternative. However, an increase in harvest is possible under the no action alternative. If harvest were to increase beyond recent levels, commercial revenues could increase and other socioeconomic benefits could also occur (e.g., increased angler satisfaction, benefits for support service businesses). If harvest increases to the extent that overfishing occurs, then negative socioeconomic impacts could occur over the long term due to decreased availability resulting in decreased harvest, decreased revenues, and decreased commercial and recreational fishing opportunities. As previously stated, this is unlikely to occur in the foreseeable future given existing constraints on the fishery which are unrelated to the current chub mackerel management measures (section 6.2.1). Thus, the socioeconomic impacts of the no action alternative are expected to be slight positive in both the short and long term given the current understanding of the fishery.

Compared to alternative 2 (manage chub mackerel as a stock in the MSB FMP), the socioeconomic benefits of alternative 1 are expected to be greater in magnitude because there would be no restrictions specific to chub mackerel and commercial and recreational harvest could increase by a greater amount than under alternative 2.

7.2.2. Socioeconomic Impacts of Managing Chub Mackerel as a Stock in the MSB FMP (Alternative 2, Preferred)

If the Council adds chub mackerel as a stock in the MSB FMP, then the MSA requirements for EFH, management unit, SDCs, MSY, ABC, OY, ACLs, and AMs must also be met. As described in section 5, the Council is also proposing to implement additional discretionary management measures including possession limits and permit requirements under alternative 2. The socioeconomic impacts of each type of management measure are described in the following sections. Collectively, the measures under consideration are expected to result in both slight positive and slight negative socioeconomic impacts. Slight positive impacts are expected due to the implementation of measures to help ensure that the fishery continues to achieve OY and overfishing does not occur. Slight negative impacts are expected due to the creation of additional constraints on the fisheries and additional requirements for permitting and reporting. Overall, the socioeconomic impacts of alternative 2 are expected to be slight positive as the benefits of achieving OY are expected to outweigh the negative impacts associated with some sub-alternatives. In addition, as described in later sections, none of the management measures proposed for 2020-2022 are expected to restrict catch notably compared to recent levels.

Compared to alternative 1 (no action), the short-term socioeconomic benefits of alternative 2 are expected to be lesser in magnitude. Under alternative 1 there would be no fishing restrictions specific to chub mackerel and commercial and recreational harvest could increase by a greater amount than under alternative 2. However, this potential for increased catch also increases the risk of overfishing. Therefore, alternative 2 would likely have higher long-term socioeconomic benefits by preventing overfishing and more effectively achieving OY on a continuing basis.

7.2.2.1. Socioeconomic Impacts of EFH Alternatives (Alternative Set 2.A)

As described in section 5.2.1, the Council considered two alternatives for EFH. A no action alternative for EFH is encompassed within alternative 1, which would not add chub mackerel to the MSB FMP as a stock in need of conservation and management. If the Council chooses alternative 2 (add chub mackerel to the MSB FMP), then they must meet the MSA requirement

for EFH. Alternatives 2.A.I and 2.A.II consider two different sets of EFH descriptions/maps. The preferred alternative (alternative 2.A.I) would identify a larger area as EFH than the non-preferred alternative (alternative 2.A.II). Federal agencies are required to consult with NMFS if they authorize, fund, or undertake actions that may adversely affect EFH. Through these consultations, NMFS advises on how to avoid, reduce, or mitigate adverse effects to EFH.

Neither EFH alternative is expected to have direct socioeconomic impacts as neither would necessarily result in any restrictions on fishing on non-fishing activities; however, indirect impacts are possible. Establishing EFH for chub mackerel would require that the impacts of fishing and non-fishing activities on EFH be considered and addressed if appropriate. If such considerations help ensure that the fishery can achieve OY on a continuing basis, then indirect slight positive socioeconomic impacts could result from both EFH alternatives. If such considerations result in restrictions on fishing and/or non-fishing activities, then indirect slight negative impacts could also occur. These impacts may be felt differently by different groups. For example, a restriction on non-fishing activities could negatively impact individuals and communities which benefit from those activities but could positively impact chub mackerel fishermen if it helps ensure that availability of chub mackerel is not negatively impacted.

Both the positive and negative socioeconomic impacts of the EFH alternatives are expected to be slight as opposed to moderate or high because there is no evidence that current activities are having substantial impacts on chub mackerel habitat. The magnitude of both the slight positive and slight negative socioeconomic impacts will be greater under the preferred alternative (alternative 2.A.I) compared to the non-preferred alternative (alternative 2.A.II) as the preferred alternative would identify a larger area as EFH and thus would result in a greater number of potential projects and activities requiring an EFH consultation.

7.2.2.2. SOCIOECONOMIC IMPACTS OF MANAGEMENT UNIT ALTERNATIVES (ALTERNATIVE SET 2.B)

As described in more detail in section 5.2.2, the Council considered two management unit alternatives. The preferred alternative (alternative 2.B.I) would establish a management unit of Maine through North Carolina. The non-preferred alternative (alternative 2.B.II) would establish a management unit of Maine through the east coast of Florida. Any catch limits, landings limits, possession limits, and permit requirements would apply throughout the management unit.

Over 99% of total chub mackerel landings over the past 20 years (through 2018) occurred in Maine through North Carolina. Thus, under both management unit alternatives, any catch limits, landings limits, possession limits, and permit requirements would address at least 99% of the fishery as defined by past landings. This should help ensure that the fisheries are managed effectively so that overfishing does not occur, which should result in indirect slight positive socioeconomic impacts as it would help ensure that OY can be achieved on a continuing basis. As described in section 7.1.2.2, the differences between the two management unit alternatives in terms of preventing overfishing are expected to be minimal for the foreseeable future. Thus, the indirect slight positive socioeconomic impacts of the two alternatives are also expected to be similar in magnitude. These impacts are expected to be slight, as opposed to moderate or high, positive because the greatest impacts should result from the management measures implemented within the management unit. The expected socioeconomic impacts of the relevant management measures are described in later sections.

Although both management unit alternatives are expected to have generally slight positive socioeconomic impacts, some slight negative impacts are also expected due to the relationship between the permit alternatives (section 5.2.5) and the management unit alternatives. The socioeconomic impacts of the permit alternatives are described in section 7.2.2.7. For example, some of these alternatives are expected to have slight negative socioeconomic impacts due to the minimal costs (mostly time costs) associated with obtaining a new permit. These impacts will be greater under the alternative for a Maine through Florida management unit (alternative 2.B.II) compared to the alternative for a Maine through North Carolina management unit (alternative 2.B.I; preferred) as a greater number of vessels would be impacted. No differences in socioeconomic impacts are expected from the catch, landings, or possession limit alternatives under either management unit as all vessels which landed high enough amounts of chub mackerel in the past to be impacted by these alternatives operated in the mid-Atlantic and southern New England and thus will be equally impacted by either management unit alternative. For example, it is very unlikely that a notable number of vessels based in the South Atlantic landed enough chub mackerel over the past 20 years to be impacted by any of the possession limits under consideration (alternative set 2.D.II). South Atlantic landings data is not compiled in a manner that allows for identification of individual vessels; however, total South Atlantic landings from all vessels combined over the past 20 years (through 2018) exceeded 4,000 pounds in only one year.

In summary, the primary socioeconomic impacts of both management unit alternatives are expected to be indirect slight positive impacts resulting from the contribution of these alternatives to ensuring that OY can be achieved on a continuing basis. The socioeconomic impacts associated with the preferred alternative (alternative 2.B.I) would be slightly lesser in magnitude than the impacts of the non-preferred alternative (alternative 2.B.II) because fewer individuals and associated communities would be negatively affected by management measures within the management unit.

7.2.2.3. SOCIOECONOMIC IMPACTS OF SDC ALTERNATIVES (ALTERNATIVE SET 2.C.I)

As described in section 5.2.3.1, the Council considered two alternatives for SDCs. These alternatives would establish a level of annual catch above which overfishing is presumed to occur. Under both alternatives, the stock is presumed to be overfished when overfishing occurs three years in a row. An overfished designation triggers a requirement for a rebuilding plan, which would likely necessitate changes in management measures. The overfishing threshold under the preferred alternative (alternative 2.C.I.a) is 6.67 million pounds of catch per year. The overfishing threshold under the non-preferred alternative (alternative 2.C.I.b) is 8.21 million pounds of catch per year. The historic high for annual catch is about 5.57 million pounds in 2013 (section 7.1.2.3). This is 17% lower than the overfishing SDC under alternative 2.C.I.a and 32% lower than the overfishing SDC under alternative 2.C.I.b. As described in section 7.1.1, chub mackerel catch is not expected to exceed historic levels in the foreseeable future, even if no action is taken and the fishery becomes unmanaged in 2021. Catch is not expected to exceed the threshold levels under either SDC alternative; thus, neither alternative is expected to result in any changes to management measures, landings, or revenues. Therefore, no socioeconomic impacts are expected under either alternative. If catch were to exceed the SDCs, the preferred alternative (alternative 2.C.I.a) could have greater socioeconomic impacts than the non-preferred alternative (alternative 2.C.I.b) because it has a lower threshold for triggering a rebuilding program. These

impacts would be generally negative as a result of more restrictive measures being required to constrain catch.

By helping to ensure a positive stock status for chub mackerel, both SDC alternatives could have indirect slight positive socioeconomic impacts by helping the fishery achieve OY over the long term. These indirect slight positive impacts could be greater in magnitude under the preferred alternative (alternative 2.C.I.a) than under the non-preferred alternative (alternative 2.C.I.b) as the preferred alternative includes a lower threshold level of catch to define overfishing. However, as catch is not expected to exceed the threshold levels under either alternative in the foreseeable future, both SDC alternatives are most likely to have no socioeconomic impacts compared to current conditions.

7.2.2.4. SOCIOECONOMIC IMPACTS OF ALTERNATIVES FOR ABC (ALTERNATIVE 2.C.II), OY (ALTERNATIVE SET 2.C.III), EXPECTED SC-FL CATCH (ALTERNATIVE SET 2.C.IV), MANAGEMENT UNCERTAINTY (ALTERNATIVE SET 2.C.VI), AND EXPECTED DISCARDS (ALTERNATIVE SET 2.C.VII)

As described in section 5, the Council considered a range of alternatives for ABC (alternative 2.C.II), OY (alternative set 2.C.III), expected South Carolina through Florida catch (alternative set 2.C.IV), management uncertainty (alternative set 2.C.VI), and expected discards (alternative set 2.C.VII). These alternatives work together to determine the resulting TAL for 2020-2022 (e.g., Figure 3). Some of these alternatives have a greater impact on the TAL than others; however, their impacts on the TAL and thus on potential landings and revenues compared to recent levels cannot be meaningfully assessed when these alternatives are considered independently from each other. For this reason, three TAL scenarios were analyzed, as described below.

Under all three TAL scenarios, the OY alternative has the greatest impact on the TAL, followed by the expected discards alternative, management uncertainty alternative, and expected South Carolina through Florida catch. For example, as shown in Figure 11, the differences in the potential TALs under the different alternatives for expected SC-FL catch, management uncertainty, and expected discards are much smaller than the differences in the potential TALs under the two OY alternatives.

The three potential TALs analyzed below range from 2.73 million pounds to 5.07 million pounds. Potential revenues under the three TALs were calculated assuming the average price per pound during 2013-2015 of $0.12 (adjusted to 2017 prices; Table 6). These years were chosen to calculate an assumed price as they are the only three years during 1998-2018 when landings exceeded 1 million pounds. As shown in Table 6, price may be impacted by landings such that price tends to be lower when landings are higher.

This amendment would implement a TAL for 2020-2022. Thus, the impacts of the TAL are not considered beyond that time frame. As described in more detail below, none of the TAL scenarios, including the most restrictive TAL, are expected to notably constrain landings, and thus revenues, within that time frame compared to recent levels (Table 5, Table 17).

Most Restrictive TAL Scenario

When considering all possible combinations of alternatives in this document, the most restrictive potential TAL is 2.73 million pounds (Table 17). This is based on the combination of alternatives 2.C.II (ABC=5.07 mil lb), 2.C.III.b (OY=ABC - 36%), 2.CIV.c (84,500 pounds of expected SC-

FL catch), 2.C.VI.b (4% management uncertainty), and 2.C.VII.d (10% discards). The other alternatives considered in this document do not impact the TAL.

The most restrictive TAL is 4% lower than the current landings limit (in place through 2020; section 4.4). It is 48% lower than the historic high for landings in 2013; however, it is at least 23% higher than landings in all other years dating back to at least 1998 (Table 5). Therefore, it could allow for increased commercial and recreational landings compared to all past years over at least the past 20 years except for 2013. Assuming the average 2013-2015 price per pound of $0.22 (Table 6), this TAL could result in annual commercial revenues of $600,600. For these reasons, this TAL scenario is expected to have slight positive socioeconomic impacts. Impacts are expected to be slight as opposed to moderate or high positive as landings have been below this TAL for all but one of the past 20 or more years. Therefore, this TAL is not expected to have a major impact on fishing effort, landings, or revenues, compared to the past 20 or more years (except 2013).

Preferred TAL Scenario

The preferred alternatives for ABC (alternative 2.C.II), OY (alternative 2.C.III.a), expected South Carolina through Florida catch (alternative 2.CIV.c), management uncertainty (alternative 2.C.VI.b), and expected discards (alternative 2.C.VII.c) result in a TAL of 4.50 million pounds.

This TAL is 57% higher than the current landings limit (in place through 2020; section 4.4). It is 14% lower than the historic high for landings in 2013; however, it is more than double the landings in all other years dating back to at least 1998 (Table 5). Therefore, it could allow for increased commercial and recreational landings compared to all past years over at least the past 20 years except for 2013. Assuming the average 2013-2015 price per pound of $0.22 (Table 6), this TAL could result in annual commercial revenues of $990,000. For these reasons, this TAL scenario is expected to have slight positive socioeconomic impacts. Impacts are expected to be slight as opposed to moderate or high positive as landings have been below this TAL for all but one of the past 20 or more years. Therefore, this TAL is not expected to have a major impact on fishing effort, landings, or revenues, compared to the past 20 or more years (except 2013).

Least Restrictive TAL Scenario

When considering all possible combinations of alternatives in this document, the least restrictive potential TAL is 5.07 million pounds (Table 17). This is based on the combination of alternatives 2.C.II (ABC=5.07 mil lb), 2.C.III.a (OY=ABC), 2.CIV.a (0 pounds of expected SC-FL catch), 2.C.VI.a (0% management uncertainty), and 2.C.VII.a (0% discards).

The resulting TAL is 77% higher than the current landings limit (in place through 2020; section 4.4). It is 3% lower than the historic high for landings in 2013; however, it is more than double the landings in all other years dating back to at least 1998 (Table 5). Therefore, it could allow for increased commercial and recreational landings compared to all past years over at least the past 20 years except for 2013. Assuming the average 2013-2015 price per pound of $0.22 (Table 6), this TAL could result in annual commercial revenues of $1,115,400. For these reasons, this TAL scenario is expected to have slight positive socioeconomic impacts. Impacts are expected to be slight as opposed to moderate or high positive as landings have been below this TAL for all but one of the past 20 or more years. Therefore, this TAL is not expected to have a major impact on fishing effort, landings, or revenues, compared to the past 20 or more years (except 2013).

Comparison of TAL Scenarios

The most restrictive, preferred, and least restrictive TAL scenarios are all expected to have slight positive socioeconomic impacts because landings and revenues are expected to remain similar to recent levels (i.e., levels seen since at least 1998, with the exception of 2013) under all three scenarios. The magnitude of these slight positive impacts is expected to be greatest under the least restrictive TAL scenario because this scenario would allow landings to increase to the greatest extent. The magnitude of these slight positive impacts is expected to be lowest under the most restrictive TAL scenario because this scenario would allow for the smallest increase in landings of all TAL scenarios. These increases are possible, though not likely to be realized under any TAL scenario for the reasons described above.

Assuming the average price per pound would be constant across all three TAL scenarios (e.g., $0.22 per pound based on the 2013-2015 average), the least restrictive TAL scenario could allow for an additional $125,400 in commercial revenues compared to the preferred TAL scenario and an additional $514,800 in commercial revenues compared to the most restrictive TAL scenario. The preferred TAL scenario could allow for an additional $389,400 in commercial revenues compared to the most restrictive TAL scenario. The assumption of a constant price at different levels of landings may not be valid, as suggested in Table 6. Future prices are difficult to predict and are impacted by a variety of factors including market demand, availability, and the price, demand, and availability of other species.

7.2.2.5. SOCIOECONOMIC IMPACTS OF COMMERCIAL AND RECREATIONAL CATCH LIMIT ALTERNATIVES (ALTERNATIVE SET 2.C.V)

As described in section 5.2.3.5, the Council considered three alternatives regarding separation of commercial and recreational catch limits. The expected socioeconomic impacts of these alternatives are summarized below.

These alternatives determine which ACL overage payback alternative (alternative set 2.D.III) can be used. The socioeconomic impacts of the ACL overage payback alternatives are described in section 7.2.2.6.

Impacts of Combined Commercial and Recreational Catch Limits (Preferred)

The preferred alternative for commercial and recreational catch limits is to manage the two sectors under a shared ACL, ACT, and TAL (alternative 2.C.V.a). There would be no allocation between the two sectors. This could have slight positive socioeconomic impacts as neither sector would be constrained by the activities of the other. Both sectors would be constrained only by the combined catch and landings limits. As previously stated, in-season closure alternatives were not considered for the recreational fishery; however, they were considered for the commercial fishery. Thus, if the commercial fishery results in an overage of a combined commercial and recreational catch limit, only the commercial fishery has the potential to be impacted in-season. Given the scale of the recreational fishery over the past 20 years (Table 5) and the recommended ABC (section 5.2.3.2), it would be virtually impossible for the recreational fishery to result in an overage of combined commercial and recreational landings limits for the foreseeable future. For these reasons, and given that the impacts of AMs are considered separately (section 7.2.2.6) the socioeconomic impacts of this alternative are based only on the fact that neither sector would be constrained in-season by the activities of the other.

The expected impacts of this alternative are more positive than those of the other two alternatives in this set (described below). The differences in impacts between all three alternatives are expected to be minor for the reasons described below.

Impacts of Separate Commercial and Recreational Catch Limits

Under alternative 2.C.V.b, the commercial and recreational sectors would be managed with separate ACLs and separate ACTs. Under alternative 2.C.V.c, the two sectors would be managed under a single ACL and sector-specific ACTs. Both alternatives are expected to have slight negative socioeconomic impacts because the potential catch of each sector would be reduced due to an allocation to the other sector. The magnitude of these impacts is expected to be slight because the values assigned to the catch and landings limits will have the greatest impact on landings and, by association, commercial and for-hire revenues, angler satisfaction, and spillover benefits to support businesses. Based on past performance of the fisheries (Table 5), any allocation to the recreational fishery would likely be very small.

7.2.2.6. SOCIOECONOMIC IMPACTS OF ACCOUNTABILITY MEASURE ALTERNATIVES (ALTERNATIVE SET 2.D)

Socioeconomic Impacts of In-Season Closure Alternatives (Alternative Sets 2.D.I and 2.D.II)

As described in sections 5.2.4.1 and 5.2.4.2, the Council considered a range of alternatives for in-season commercial fishery closures, including a no action alternative (alternative 2.D.I.a) and alternatives to close the commercial fishery when 90, 95, or 100% of the TAL (or commercial quota, depending on other alternatives selected; section 5.2.3.5) is projected to be landed (alternatives 2.D.I.b-d). Alternatives were considered for 0; 1,000; 10,000; or 40,000 pound possession limits once the commercial fishery is closed in-season (alternatives 2.D.IIa-d). The socioeconomic impacts of these alternatives will vary based on the combination of in-season closure threshold and possession limit alternatives used. There are many possible combinations of these alternatives. Rather than analyze the impacts of each possible combination, four examples were analyzed.

Under the no action alternative (alternative 2.D.I.a), the commercial fishery would never close in-season. Commercial landings would not be restricted after the TAL is reached. This could have mixed socioeconomic impacts. Slight positive impacts could occur due to the potential for virtually unrestricted landings (except for restrictions imposed by other factors such as market demand) and, by association, potential revenues for commercial vessels and dealers from chub mackerel. However, if this alternative results in an ACL overage, reduced revenues for commercial vessels and reduced recreational opportunities could occur in a following year due to an ACL overage repayment. In addition, if fishing effort is not sufficiently constrained to sustainable levels and availability of chub mackerel declines, this could result in reduced fishing opportunities and associated revenues in future years. Thus, this alternative could also have slight negative long-term socioeconomic impacts to both commercial and recreational entities. ACLs overages are not expected in the foreseeable future due to constraints such as market demand, the influence of the *Illex* squid fishery, and low participation in the chub mackerel fishery to date, even under this no action alternative; therefore, these positive and negative socioeconomic impacts are expected to be slight, as opposed to moderate or high.

With the exception of the no action alternative, the least restrictive combination of alternatives in alternative sets 2.D.I and 2.D.II is a 40,000 pound possession limit (alternative 2.D.II.d) when

100% of the TAL is projected to be landed (alternative 2.D.I.d). As previously stated, 40,000 pounds may be the lowest amount that the key players in the fishery are willing to land due to market constraints (section 5.2.4.2.4). Therefore, this combination of alternatives could lead to some reduction in landings, and thus revenues, after the TAL is projected to be fully landed, compared to the no action alternative. If the preferred TAL (i.e., 4.50 million pounds; Table 17) had been in place in the past, it would have been reached only once, in 2013 (Table 5). Assuming no other changes in fishing behavior besides those trips above 40,000 pounds being limited to that amount after the TAL was reached, this combination of alternatives would have resulted in 4.80 million pounds of commercial landings in 2013, about 10% lower than actual 2013 landings. Assuming the average 2013 price per pound of $0.18, this would have resulted in about $864,000 in ex-vessel value, about 10% lower than actual 2013 ex-vessel value. This is greater than landings and ex-vessel value in all other years besides 2013 (Table 6). Commercial revenues, spillover benefits to support businesses, and other socioeconomic impacts would be expected to be similar to those in all past years except 2013. Therefore, the socioeconomic impacts of this combination of alternatives alternative are expected to be generally moderate positive, though less positive than the no action alternative.

The most restrictive combination of in-season closure threshold and possession limit alternatives is a 0 pound possession limit (i.e., no possession allowed) after 90% of the TAL is projected to be landed. Under the preferred TAL of 4.50 million pounds, this would result in a closure when 4.05 million pounds are projected to be landed. Landings would have been about 23% lower than actual 2013 landings. Assuming the average 2013 price per pound of $0.18, this would have resulted in about $729,000 in ex-vessel value, about 25% lower than actual 2013 ex-vessel value. However, landings and ex-vessel value would have been greater than in all other years besides 2013 (Table 6). Therefore, the socioeconomic impacts of this combination of alternatives are expected to be generally slight to moderate positive, though less positive than the impacts of the no action alternative and the least restrictive combination of alternatives.

The preferred combination of alternatives is for a 40,000 pound possession limit (alternative 2.D.II.d) once 90% of the TAL is projected to be landed (alternative 2.D.I.b), followed by a 10,000 pound possession limit (alternative 2.D.II.c) after 100% of the TAL is projected to be landed (alternative 2.D.I.d). If the preferred TAL (i.e., 4.50 million pounds; Table 17) had been in place in the past, commercial landings would have reached this 90% threshold only once, in 2013 (Table 5). Assuming no other changes in fishing behavior besides those trips above 40,000 and 10,000 pounds being limited to those amounts after 90% and 100% TAL was reached, this combination of alternatives would have resulted in 4.40 million pounds of commercial landings in 2013. Assuming the average 2013 price per pound of $0.18, this would have resulted in about $792,000 in ex-vessel value, about 18% lower than actual 2013 ex-vessel value. This is greater than landings and ex-vessel value in all other years besides 2013 (Table 6). Therefore, the socioeconomic impacts of this combination of alternatives are expected to be generally slight to moderate positive, though less positive than the impacts of the no action alternative and the least restrictive combination of alternatives. The impacts are expected to be more positive than the most restrictive combination of alternatives.

Under all three examples described above (excluding the no action alternatives), the in-season closure measures would impact only those few vessels and dealers which accounted for most chub mackerel landings over the past 20 years. Details about the potential economic impacts to

these vessels and dealers compared to their past revenues cannot be shared as this information is confidential.

The no action alternatives for in-season closure have the highest potential for both positive and negative socioeconomic impacts due to the highest potential revenues, but also the highest potential for overfishing and decreased availability of chub mackerel in future years. All other combinations of in-season closure alternatives have a low potential for overfishing and decreased availability. The least restrictive combination of alternatives has the second highest potential for positive socioeconomic benefits, followed by the preferred combination of alternatives and the most restrictive combination of alternatives. As previously stated, revenues under all possible combinations of in-season closure alternatives except for the no action alternatives have the potential to exceed those seen in all past years except 2013, assuming the preferred TAL of 4.50 million pounds is implemented.

Socioeconomic Impacts of ACL Overage Payback Alternatives (Alternative Set 2.D.III)

Alternative set 2.D.III contains three alternatives regarding ACL overages (section 5.2.4.3). Under the no action alternative (alternative 2.D.III.a), ACL overages would not require deductions from a future year's ACT. This could have mixed (i.e., both positive and negative) socioeconomic impacts. Positive impacts could occur if the ACL overage is due to landings exceeding the TAL. No reduction in potential landings would be required in a future year. This would presumably result in higher commercial and for-hire revenues than would otherwise occur, assuming no change in prices as a result of the higher landings. Negative impacts could occur if the lack of mitigation for ACL overages results in reduced availability of chub mackerel and reduced catches in future years. The magnitude of these positive and negative impacts would vary based on the magnitude of the ACL overage. As described in previous sections, ACL overages are not expected in the foreseeable future due to constraints such as market demand and low historical participation in the fishery. Thus, any potential ACL overages would not likely be major and the socioeconomic impacts of this alternative could be both slight positive (due to landings above the TAL) and slight negative (if chub mackerel availability decreases).

Under the preferred alternative (alternative 2.D.III.b), if a single ACT is used (i.e., no separation of commercial and recreational catch limits), when the ACL is exceeded, catch in excess of the ACT would be deducted from a following year's ACT as a single year adjustment. This alternative could have slight negative socioeconomic impacts due to reductions in potential landings (and thus reduced potential revenues, fishing opportunities, angler satisfaction, and spillover benefits to support businesses) in the year in which the ACT deduction is applied. However, these negative impacts could be partially offset by the higher landings in the year in which the overage occurred. The ACT deduction would apply to both commercial and recreational fisheries, regardless of which sector caused the ACL overage. This could create additional negative socioeconomic impacts if only one sector contributed to the ACL overage. An ACT deduction would require consideration of the conditions which resulted in the ACL overage to determine if changes in management measures (e.g., possession limits) are needed to prevent an additional overage from occurring. Changes in management measures could be sector-specific. However, if sector-specific adjustments to management measures are not sufficient to prevent an additional ACL overage, restrictions on the sector which did not contribute to the overage may also be needed. This would only occur when major ACL overages are caused by one sector. This is not anticipated in the foreseeable future due to constraints such as market demand and low historical participation in the fishery.

Under alternative 2.D.III.c, if sector-specific (i.e., commercial and recreational) ACLs or ACTs are used, when the single or sector-specific ACL is exceeded, adjustments to the commercial and/or recreational ACTs will be made in a following year, depending on which sector (commercial or recreational) was responsible for the ACL overage (section 5.2.4.3.3). This alternative could have slight negative socioeconomic impacts due to reductions in potential landings (and thus reduced potential revenues, fishing opportunities, angler satisfaction, and/or spillover benefits to support businesses) in the year in which the ACT deduction is applied. However, these negative impacts could be partially offset by the higher landings in the year in which the ACL overage occurred. Under this alternative, the ACT deduction would apply only to the sector(s) which caused the ACL overage. This could have socioeconomic benefits compared to alternative 2.D.III.b (see previous paragraph) when one sector causes an overage that requires an ACT deduction in a future year. Under this alternative, the sector which did not contribute to the overage would not be penalized. This could be socially beneficial as it could be viewed as more fair than alternative 2.D.II.b, which could require both sectors to be penalized if only one caused a major ACL overage. As previously stated, notable ACL overages are not anticipated in the foreseeable future.

Under alternatives 2.C.V.b and 2.C.V.c, if the ACL overage payback provisions contribute to maintenance of the (presumed) positive stock status of chub mackerel (MAFMC 2018b), they could have indirect slight positive socioeconomic impacts by helping the fishery achieve OY on a continuing basis.

In summary, alternatives 2.D.III.a and 2.D.III.c are expected to have both slight positive and slight negative socioeconomic impacts. Alternative 2.D.III.b is expected to have mostly slight negative socioeconomic impacts, though some indirect slight positive impacts could also occur. Alternative 2.C.V.b has the greatest potential for negative socioeconomic impacts, followed by alternative 2.C.V.c, and then alternative 2.C.V.a.

7.2.2.7. SOCIOECONOMIC IMPACTS OF PERMIT REQUIREMENT ALTERNATIVES (ALTERNATIVE SET 2.E)

As described in section 5.2.5, the Council considered a range of alternatives for permit requirements. The expected socioeconomic impacts of those alternatives are described below.

Impacts of the No Action Alternatives for Permits

Under alternatives 2.E.I.a and 2.E.II.a, no action would be taken on permit requirements for commercial and for-hire vessels, respectively. The current commercial permit requirements would remain in place through December 31, 2020 (section 4.4). Starting on January 1, 2021, there would be no permit requirements for vessels which retain chub mackerel off the U.S. east coast. As described in section 5.2.5, a variety of reporting requirements are associated with all federal commercial and for-hire fishing permits. If no action is taken, vessels which retain chub mackerel in the management unit would not be required to comply with these reporting requirements unless they have federal permits for other species.

As described in section 7.1.2.7, the number of for-hire vessels which landed chub mackerel caught in either of the proposed management units (section 5.2.2) over the past 10 years and did not have any GARFO for-hire permits is unknown. It is likely that 4 or fewer commercial vessels which did not have any GARFO commercial permits landed chub mackerel caught in the

management unit over the last 10 years. These for-hire and commercial vessels likely did not account for a significant amount of total chub mackerel landings (section 7.1.2.7).

The no action alternatives for permit requirements could have indirect slight negative socioeconomic impacts because information necessary for effective management would not necessarily be collected from all vessels which could participate in the fishery. This could pose challenges for preventing overfishing and achieving OY. However, these impacts are expected to be very small in magnitude as the number of vessels which catch chub mackerel in the management unit and do not have GARFO commercial or party/charter permits for other species is likely very low and these vessels likely account for very small amounts of chub mackerel catch.

Impacts of All Other Permit Alternatives, Including Preferred Alternatives

With the exception of the no action alternatives, all permit alternatives would require vessels to have a GARFO permit in order to possess chub mackerel caught in the management unit. The permits which meet this requirement vary by alternative (section 5.2.5).

Alternatives 2.E.I.b and 2.E.II.b would require vessels to have any of the existing GARFO commercial or for-hire permits, respectively. This would impact fewer vessels compared to the other alternatives which would require a permit (i.e., alternatives 2.E.I.c, 2.E.I.d, 2.E.II.c, and 2.E.II.d). As previously described, the number of for-hire vessels which would be required to obtain a new permit under these alternatives is unknown. As described in section 7.1.2.7, around 4 commercial vessels may be impacted by this alternative, based on dealer data for 2009-2018 (i.e., dealer data suggest that 4 vessels sold chub mackerel to a dealer and did not have any GARFO commercial permits).

Alternatives 2.E.I.c and 2.E.II.c would require one of the existing GARFO MSB commercial or for-hire permits, respectively. These are preferred alternatives. Commercial dealer and permit data suggest that all vessels which sold chub mackerel to a dealer during 2009-2018 had a GARFO MSB permit in the years when the sales occurred. Therefore, alternative 2.E.I.c would likely impact the same number of commercial vessels as alternative 2.E.I.b (i.e., around 4 vessels). VTR and permit data suggest that 52 vessels landed chub mackerel on for-hire trips during 2009-2018 and did not have the GARFO MSB party/charter permit (though all had at least one other GARFO party/charter permit). Therefore, at least 52 vessels may be impacted by alternative 2.E.II.c.

Alternatives 2.E.I.d and 2.E.II.d would require a chub-mackerel specific commercial or for-hire permit, respectively. This would require creation of a new permit category. This would impact the greatest number of vessels as all vessels which retain chub mackerel caught in the management unit would be required to obtain a new permit. Dealer and permit data suggest that at least 130 commercial vessels landed chub mackerel over the past 10 years (through 2018). VTR and permit data suggest that at least 197 for-hire vessels landed chub mackerel over the past 10 years. Therefore, these alternatives could impact at least 130 commercial vessels and at least 197 for-hire vessels.

All alternatives described above are expected to have slight negative socioeconomic impacts due to the minor costs (mostly time costs) associated with obtaining a new permit for those individuals who do not already have a qualifying permit. These impacts are expected to be greatest under alternatives 2.E.I.d and 2.E.II.d (require a new chub mackerel permit), followed

by alternatives 2.E.I.c/2.E.II.c (require any MSB permit), and 2.E.I.b/2.E.II.b (require any GARFO permit) due to the relative number of vessels impacted under each alternative. All impacts are slight negative compared to the no action alternatives (alternatives 2.E.I.a and 2.E.II.b) as no vessels would be subject to chub mackerel-specific permit requirements under the no action alternatives.

Alternatives 2.E.I.c and 2.E.II.c would require creation of a new chub mackerel permit for commercial and for-hire fishing, respectively. This could have slight negative impacts for GARFO due to the administrative burden associated with creating and managing a new permit category.

All alternatives which would require a GARFO permit would also have indirect slight positive socioeconomic impacts if the information collection requirements associated with the permits help facilitate effective management, prevention of overfishing, and attainment of OY. The magnitude of these indirect slight positive impacts will be identical across all alternatives which would require a GARFO permit. These impacts will be positive compared to the no action alternatives (alternatives 2.E.I.a and 2.E.II.b).

In summary, the socioeconomic impacts of alternatives 2.E.I.b-d and 2.E.II.b-d are expected to include both direct slight negative impacts for those vessels not already issued a qualifying permit and indirect slight positive impacts to all entities due to improved data collection.

7.2.2.8. SOCIOECONOMIC IMPACTS OF ADMINISTRATIVE ALTERNATIVES (ALTERNATIVE SET 2.F)

The expected socioeconomic impacts of the alternatives in alternative set 2.F are summarized below.

Socioeconomic Impacts of Specifications Alternatives (Alternative Set 2.F.I)

Alternative set 2.F.I contains two alternatives. Under alternative 2.F.I.a, no action on specifications would be taken. All changes to chub mackerel management measures would require an amendment to the FMP as the Council agreed that no management measures for chub mackerel should be implemented or modified through a framework adjustment (section 5.3.8). This could result in slight negative socioeconomic impacts if it hinders the Council's ability to react to new information in a timely manner. This could create challenges for managing the fisheries to prevent overfishing and achieve OY.

Under alternative 2.F.II.b, the specifications process used for the other species in the MSB FMP would also apply to chub mackerel. This process allows the Council to modify management measures in a timely manner in response to new information. This could result in slight positive socioeconomic impacts compared to the no action alternative by helping to ensure that the fishery is managed to prevent overfishing and to ensure that OY can be achieved.

Socioeconomic Impacts of Alternative 2.F.II (MSY=ABC)

Under alternative 2.F.II, the FMP would specify that MSY for chub mackerel is equal to the ABC. This is largely administrative in nature as it will not directly impact any management measures; however, setting MSY equal to the ABC maximizes the level at which the Council could set OY; therefore, this alternative could have slight positive indirect socioeconomic impacts.

Socioeconomic Impacts of ABC Control Rule and Risk Policy Alternatives (Alternative Set 2.F.III)

Alternative set 2.F.III contains two alternatives. Under alternative 2.F.III.a, no action would be taken on an ABC control rule and risk policy for chub mackerel. An ABC would still be required; however, the process for developing the ABC would not be defined through an ABC control rule and risk policy. Although the SSC would not be required to use the Council's existing ABC control rule and risk policy for chub mackerel under alternative 2.F.III.a, they would not be prohibited from doing so.

Under alternative 2.F.III.b, the Council's existing ABC control rule and risk policy would apply to chub mackerel. The ABC control rule and risk policy are defined in the regulations at 50 CFR 648.20 and 648.21 and are described in section 5.2.6.3.2. The regulations allow for deviations from the control rule methods; however, a justification for the deviation must be provided along with a description of the methods used to derive the ABC and an explanation of how the deviation is consistent with National Standard 2. Therefore, even under alternative 2.F.III.b, the SSC has flexibility in recommending an ABC.

Under both alternatives in this alternative set, the chub mackerel ABC would be specified based on the best available science and would be expected to prevent overfishing and allow the fishery to achieve OY. Thus, both alternatives are expected to have identical slight positive socioeconomic impacts.

Socioeconomic Impacts of SBRM Alternatives (Alternative Set 2.F.IV)

Alternative set 2.F.IV contains two alternatives regarding SBRM, which specifies the methodology used to deploy observers and estimate discards. Under alternative 2.F.IV.a, no action would be taken on an SBRM for the chub mackerel fisheries. A methodology for estimating discards in the commercial chub mackerel fishery would not be defined. Under alternative 2.F.IV.b, the current SBRM for all Mid-Atlantic Council FMPs would also apply to chub mackerel (section 5.2.6.4.1).

Under the current SBRM, observers are deployed and discards are estimated at the level of gear and area-based fleets, not at the level of fisheries for individual species. The chub mackerel fishery is not unique in terms of gear used and areas fished. As described in section 6.2, there is significant overlap between the commercial chub mackerel fishery and the *Illex* squid fishery, which is already covered by SBRM. Therefore, no meaningful changes would be anticipated under either alternative in this alternative set. These alternatives are not expected to have any meaningful socioeconomic impacts.

7.3. Impacts of the Alternatives on Protected Species

The following sections describe the expected impacts of the alternatives on protected species. Impacts are summarized separately for ESA-listed species, non-ESA listed MMPA species which have had their PBR level reached or exceeded, and non-ESA listed MMPA species whose PBR has not been exceeded.

As shown in Table 5, the commercial fishery accounted for over 99% of total chub mackerel harvest over the past 20 years. The commercial fishery is predominantly a bottom otter trawl fishery and the recreational fishery is predominantly a hook and line fishery. As described in section 6.3.3, some ESA listed and MMPA protected species are risk of interacting with bottom trawl and/or hook and line gear.

The risk of an interaction is strongly associated with the amount of gear in the water, the time the gear is in the water (e.g., soak time, tow time), and the presence of protected species in the same area and time as the gear, with risk of an interaction increasing with increases in of any of these factors.

The impacts of the alternatives vary between ESA-listed and MMPA-protected species. For ESA-listed species, any action that could result in take (including ongoing take) is expected to have some level of negative impacts, including actions that reduce interactions because some take is still occurring and all ESA-listed stocks are by definition at critical levels. ESA-listed species which may be impacted by this action include large whales, sea turtles, Atlantic sturgeon, and Atlantic salmon (section 6.3). For MMPA stocks which are not also ESA-listed, impacts vary based on stock condition and the potential for the action to impact fishing effort. For MMPA species that have had their PBR level reached or exceeded (i.e., bottlenose dolphins; section 6.3), negative impacts would be expected from any action that has the potential to result in interactions with this species. For MMPA species whose PBR levels have not been exceeded and thus are at more sustainable levels (i.e., minke, humpback, pilot and whales; Risso's, Atlantic white sided, and short beaked common dolphins; harbor porpoise; and harbor, gray, harp, and hooded seals; section 6.3), any action 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.

As described in more detail in the following sections, of all the action alternatives, the alternatives for OY are expected to have the greatest impacts on protected species due to their impact on the TAL. The other action alternatives are expected to have comparatively minor or negligible impacts on protected species.

7.3.1. IMPACTS OF NO ACTION (ALTERNATIVE 1) ON PROTECTED SPECIES

All chub mackerel management measures currently in place in this region will expire after December 31, 2020 (section 4.4). If the Council takes no additional action, there will be no regulations on chub mackerel harvest in U.S. Atlantic waters as of January 1, 2021. As described in more detail in section 7.1.1, due to factors such as market demand, the influence of the *Illex* squid fishery, and low historical participation in the chub mackerel fishery, fishing effort and fishing behavior, including the location, amount, and duration of time that gear is in the water, are not expected to increase beyond recent levels under the no action alternative for the foreseeable future. Given this, new or elevated interaction risks to protected species are not expected. Thus, the impacts of the no action alternative on protected species are not expected to differ from those of the current impacts of the fishery, which are described below.

Chub mackerel fishing effort over the longer term is uncertain. If the fishery expands beyond recent levels under the no action alternative, then the risk of negative impacts to protected species could increase, depending on the scale of the increase in fishing effort. There is no indication that fishing effort will increase notably in the foreseeable future under any of the management alternatives considered in this document, including the no action alternative. Therefore, the impacts of future large increases in fishing effort are not the focus of the analysis.

Impacts to ESA-Listed Species

As described in sections 6.3.3 and 7.3, the commercial chub mackerel fishery has the potential to interact with some ESA-listed species (i.e., sea turtles, Atlantic sturgeon, and Atlantic salmon)

due to the gear type used (i.e., bottom otter trawl). The risk of an interaction is strongly associated with the amount of gear in the water, the time the gear is in the water (e.g., tow time), and the presence of ESA-listed species in the same area and time as the gear, with risk of an interaction increasing with increases in of any of these factors. As a small number of vessels participate in the chub mackerel fishery and fishing effort is relatively low in most years (section 6.2.1), continuation of these operating conditions under alternative 1 is not expected to introduce new or elevated interaction risks to listed species. Specifically, the amount of gear in the water, tow times, and overlap between listed species and fishery gear in space and time is not expected to change relative to current conditions. Given this, and information provided in section 6.3 and 7.3, alternative 1 is expected to have negligible to slight negative impacts on ESA-listed species, with negligible impacts expected for listed species of large whales (given no documented or observed interactions with bottom trawl gear) and slight negative impacts expected for listed species of sea turtles, Atlantic salmon, and Atlantic surgeon.

Impacts to Non-ESA Listed MMPA Species

As described in sections 6.3.3 and 7.3, the commercial chub mackerel fishery has the potential to interact with some MMPA species due to the gear type used (i.e., bottom otter trawl). These interactions can result in serious injury or mortality. Assessments of the impacts of the chub mackerel fishery on marine mammals are not available; therefore, the most recent (2012-2016) information on marine mammal interactions with commercial fisheries has been considered as a collective representation of the risk posed by these fisheries to marine mammal stocks (Hayes et al. 2019). Although this information does not address the effects of the chub mackerel fishery specifically, review of the information shows that thus far, operation of any fishery has not resulted in a collective level of take that threatens the continued existence of most non-ESA listed marine mammal populations and therefore, current management measures are keeping takes of most non-ESA listed marine mammals below their PBR levels. Bottlenose dolphin stocks are an exception (Hayes et al. 2019). Although bottlenose dolphin stocks have experienced levels of take that have resulted in the exceedance of their PBR, take reduction strategies and/or plans (i.e., Atlantic Trawl Gear Take Reduction Strategy and Bottlenose Dolphin Take Reduction Plan) have been implemented to reduce bycatch in the relevant fisheries.

As previously stated, any potential for interactions with non ESA-listed marine mammal species which have had their PBR levels reached or exceeded is considered to have some level of negative impact to these species due to the poor stock status of those species. As noted above, the risk of an interaction is strongly associated with the amount of gear in the water, the time the gear is in the water (e.g., tow time), and the presence of non-listed marine mammal species in the same area and time as the gear, with risk of an interaction increasing with increases in of any of these factors. Given the small number of vessels participating in the chub mackerel fishery and given that fishing effort is low in most years (section 6.2.1), continuation of these operating conditions under alternative 1 is not expected to introduce new or elevated interaction risks to non ESA-listed marine mammal species. Specifically, the amount of gear in the water, tow times, and overlap between these species and fishery gear in space and time is not expected to change relative to current conditions. Taking into consideration this information, as well as information provided in in section 6.3, alternative 1 is likely to result in slight negative impacts on non-listed MMPA stocks/species which have had their PBR levels exceeded (i.e., bottlenose dolphin stocks).

For those non-listed marine mammal species at more sustainable levels due to their PBR levels not being exceeded (section 7.3), it appears that the fishery management measures that have been in place over this timeframe have resulted in levels of effort that equate to 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. Thus, given that alternative 1 is not expected to significantly change chub mackerel fishing effort relative to current operating conditions, the impacts of alternative 1 on non-listed MMPA species at more sustainable levels are expected to be slight positive (i.e., continuation of current operating conditions is not expected to result in exceedance of any of these stocks/species PBR level).

Comparison with Other Alternatives

Alternative 2 (manage chub mackerel as a stock in the MSB FMP) and the associated sub-alternatives would place some limitations on chub mackerel fishing effort. Although fishing effort is not expected to increase compared to historic levels under either the no action alternative or alternative 2, fishing effort has the potential to increase to a greater extent under alternative 1 than under alternative 2 and the associated sub-alternatives. Thus, alternative 1 has a greater potential for negative impacts to protected species than alternative 2. If fishing effort over the longer term were to increase under alternative 1 to the extent that the stock status of protected is impacted, then the impact to ESA-listed species could range from negligible (for listed species of large whales given no documented or observed interactions with bottom trawl gear) to moderate negative (for listed species of sea turtles, Atlantic salmon, and Atlantic surgeon; see above and sections 6.3.3 and 7.3). Impacts could be moderate negative impacts for non-listed MMPA stocks/species which have had their PBR levels exceeded (i.e., bottlenose dolphin stocks). Depending on the scale of the increase, impacts could also be slight negative for non-listed MMPA species at more sustainable levels if the increase results in exceedance of their PBR levels. Given the scale of the chub mackerel fishery to date (section 6.2), it is not likely that fishing effort under the no action alternative will increase over the long term to the extent that the magnitude of negative impacts to protected species is high for any species.

7.3.2. Impacts of Managing Chub Mackerel as a Stock in the MSB FMP (Alternative 2, Preferred) on Protected Species

If the Council adds chub mackerel as a stock in the MSB FMP, then the MSA requirements for EFH, management unit, SDCs, MSY, ABC, OY, ACLs, and AMs must also be met. As described in section 5, the Council is also proposing to implement additional discretionary management measures including possession limits and permit requirements under alternative 2.

The impacts of the alternatives on protected species derive from changes in the amount, location, and duration of gear in the water. Many of the sub-alternatives under alternative 2 have the potential to influence these aspects of fishing effort in future years; however, the act of managing chub mackerel as a stock in the MSB FMP will not directly impact fishing effort. When considering the impacts of alternative 2 separately from the sub-alternatives for specific management measures, no direct or meaningful indirect impacts to protected species are expected. The impacts of the sub-alternatives for specific management measures are described in the following sections.

Under all sub-alternatives, some level of fishing effort would continue to occur. No combinations of sub-alternatives are expected to result in notable reductions in fishing effort compared to recent levels. Some combinations of sub-alternatives could allow for increases in fishing effort; however, notable increases are unlikely in the foreseeable future due to constraints such as market demand and low participation in the fishery to date. Therefore, under all possible combinations of sub-alternatives under alternative 2, interactions with protected species could be similar to recent levels. Thus alternative 2 is generally expected to have similar impacts as the no action alternative. For the reasons described in the previous section, these impacts are negligible to slight negative impacts for ESA-listed species, slight negative for non-ESA listed marine mammals whose PBR levels have been reached or exceeded, and slight positive for non-ESA listed marine mammals whose PBR levels have not been reached or exceeded. The magnitude of these impacts will vary slightly depending on the sub-alternatives used, as described in the following sections.

7.3.2.1. IMPACTS OF EFH ALTERNATIVES (ALTERNATIVE SET 2.A) ON PROTECTED SPECIES

As described in section 5.2.1, the Council considered two alternatives for EFH. A no action alternative for EFH is encompassed within alternative 1 (no action), which would not add chub mackerel to the MSB FMP as a stock in need of conservation and management. If the Council choses alternative 2 (add chub mackerel to the MSB FMP), then they must meet the MSA requirement for EFH. The two EFH sub-alternatives under alternative 2 consider two different sets of EFH descriptions/maps. The preferred alternative (alternative 2.A.I) would identify a larger area as EFH than the non-preferred alternative (alternative 2.A.II). Federal agencies are required to consult with NMFS if they authorize, fund, or undertake actions that may adversely affect EFH. Through these consultations, NMFS advises on how to avoid, reduce, or mitigate adverse effects to EFH. Establishing EFH for chub mackerel would not necessarily require actions to restrict fishing or non-fishing activities; rather, it would require that the impacts of fishing and non-fishing activities on EFH are considered and addressed if appropriate. In this way, both EFH alternatives are largely administrative in nature.

Neither EFH alternative will impact fishing effort or the location or duration of time that fishing gear is in the waters. As such, they are not expected to directly or indirectly impact any protected species. Thus, it is expected that both EFH alternatives will have negligible impacts on protected species as fishing effort and the location and duration of time that fishing gear is in the waters are not expected to be impacted under either alternative.

7.3.2.2. IMPACTS OF MANAGEMENT UNIT ALTERNATIVES (ALTERNATIVE SET 2.B) ON PROTECTED SPECIES

As described in more detail in section 5.2.2, the Council considered two management unit alternatives. The preferred alternative (alternative 2.B.I) would establish a management unit of Maine through North Carolina. The non-preferred alternative (alternative 2.B.II) would establish a management unit of Maine through the east coast of Florida. Any catch limits, landings limits, possession limits, and permit requirements implemented through this amendment would apply throughout the management unit.

Over 99% of total chub mackerel landings over the past 20 years (through 2018) occurred in Maine through North Carolina. Thus, both management unit alternatives would ensure that any management measures implemented through this amendment address at least 99% of the fishery

as defined by past landings. As previously stated, there is no indication that the regional proportions of landings will change in the foreseeable future.

The management unit alternatives will not directly impact fishing effort or the location and duration of time that gear is in the water; thus, they will not have direct impacts on protected species. Indirect impacts may result from the management measures implemented within the management unit. The impacts of these management measures on protected species are described in later sections (e.g, sections 7.3.2.4 and 7.3.2.6).

7.3.2.3. IMPACTS OF SDC ALTERNATIVES (ALTERNATIVE SET 2.C.I) ON PROTECTED SPECIES

As described in section 5.2.3.1, the Council considered two alternatives for SDCs. These alternatives would establish a level of annual catch above which overfishing is presumed to occur. Under both alternatives, the stock is presumed to be overfished when overfishing occurs three years in a row. An overfished designation triggers a requirement for a rebuilding plan, which could necessitate changes in management measures. The overfishing threshold under the preferred alternative (alternative 2.C.I.a) is 6.67 million pounds of catch per year. The overfishing threshold under the non-preferred alternative (alternative 2.C.I.b) is 8.21 million pounds of catch per year. The historic high for annual catch was around 5.57 million pounds (section 7.1.2.3). This is 17% lower than the overfishing SDC under alternative 2.C.I.a and 32% lower than the overfishing SDC under alternative 2.C.I.b. As described in section 7.1.1, chub mackerel catch is not expected to exceed historic levels in the foreseeable future, even if no action is taken and the fishery becomes unmanaged in 2021. Because catch is not expected to exceed the threshold levels under either SDC alternative, neither alternative is expected to result in any changes to management measures, fishing effort, fishing behavior, or the location or duration of time that gear is in the water. Thus, both SDC alternatives are expected to have similar impacts on protected species as the no action alternative. For the reasons described section 7.3.1, these impacts are expected to be negligible to slight negative for ESA-listed species, slight negative for non-ESA listed marine mammals whose PBR levels have been reached or exceeded, and slight positive for non-ESA listed marine mammals whose PBR levels have not been reached or exceeded.

Both SDC alternatives could have some indirect benefits for protected species by helping to ensure that fishing effort does not expand greatly beyond historic levels. As previously stated, there is no indication that fishing effort will increase in the foreseeable future. However, if this were to occur, both SDC alternatives could require implementation of management measures to constrain fishing effort. Depending on the scale of the increase in catch and any measures implemented, this could result in reduced fishing effort and a reduction in the amount of time that gear is in the water, which could reduce the likelihood of interactions with protected species. When both alternatives are compared to one another, alternative 2.C.I.a (preferred alternative) may have a greater magnitude of positive impacts than alternative 2.C.I.b as alternative 2.C.I.a includes a lower threshold level of catch to define overfishing. It is worth reiterating that these impacts are speculative as catch is not expected to exceed the threshold levels under either SDC alternative in the foreseeable future.

7.3.2.4. Impacts of Alternatives for ABC (Alternative 2.C.II), OY (Alternative Set 2.C.III), Expected SC-FL Catch (Alternative Set 2.C.IV), Management Uncertainty (Alternative Set 2.C.VI), and Expected Discards (Alternative Set 2.C.VII) on Protected Species

As described in section 5, the Council considered a range of alternatives for ABC (alternative 2.C.II), OY (alternative set 2.C.III), expected South Carolina through Florida catch (alternative set 2.C.IV), management uncertainty (alternative set 2.C.VI), and expected discards (alternative set 2.C.VII). These alternatives work together to determine the resulting TAL for 2020-2022 (e.g., Figure 3). The TAL will play a large role in determining fishing effort and the location and duration of time that fishing gear is in the water, and thus impacts to protected species. Some alternatives have a greater impact on the TAL than others; however, their impacts on the TAL cannot be meaningfully assessed when considered independently from each other. The impacts on fishing effort will depend on how the TAL compares to recent levels of landings. For example, a 4% management uncertainty buffer (alternative 2.C.IV.b) will result in a lower TAL than a 0% management uncertainty buffer (alternative 2.CIV.a); however, fishing effort will not necessarily be lower with a 4% management uncertainty buffer because the level of the TAL compared to recent landings depends on multiple other alternatives. For this reason, rather than independently considering each alternative which contributes to the TAL, three TAL scenarios were analyzed, as described below.

This amendment would implement a TAL for 2020-2022. Thus, the impacts of the TAL are not considered beyond that time frame. Under all three TAL scenarios, the OY alternative has the greatest impact on the TAL, followed by the expected discards alternative, management uncertainty alternative, and expected South Carolina through Florida catch. For example, as shown in Figure 11, the differences in the potential TALs under the different alternatives for expected SC-FL catch, management uncertainty, and expected discards are much smaller than the differences in the potential TALs under the two OY alternatives.

As described in more detail below, none of the TAL scenarios, including the most restrictive TAL, are expected to constrain fishing effort during 2020-2022 compared to recent levels (Table 5, Table 17). Therefore, none of the alternatives are expected to reduce the potential for interactions with protected species, compared to current conditions.

Most Restrictive TAL Scenario

When considering all possible combinations of alternatives in this document, the most restrictive potential TAL is 2.73 million pounds (Table 17). This is based on the combination of alternatives 2.C.II (ABC=5.07 mil lb), 2.C.III.b (OY=ABC - 36%), 2.CIV.c (84,500 pounds of expected SC-FL catch), 2.C.VI.b (4% management uncertainty), and 2.C.VII.d (10% discards). The other alternatives considered in this document do not impact the TAL.

The resulting TAL is 48% lower than the historic high for landings in 2013; however, it is at least 23% higher than landings in all other years dating back to at least 1998 (Table 5). Therefore, this TAL scenario could allow for increased landings compared to most recent years. As described in section 7.1.1, fishing effort is not expected to increase beyond recent levels for the foreseeable future due to factors such as market demand and low participation in the fishery to date. For this reason, this TAL scenario is not expected to result in a change in fishing effort or a change in the location or duration of time that fishing gear is in the water compared to recent levels. Thus, the impacts of this TAL scenario on protected species are not expected to differ

from those of the no action alternative (alternative 1). For the reasons described in section 7.3.1, these impacts are expected to be negligible to slight negative for ESA-listed species, slight negative for non-ESA listed MMPA species which have had their PBR levels reached or exceeded, and slight positive for non-ESA listed MMPA species whose PBR levels have not been reached or exceeded.

Preferred TAL Scenario

The preferred alternatives for ABC (alternative 2.C.II), OY (alternative 2.C.III.a), expected South Carolina through Florida catch (alternative 2.CIV.c), management uncertainty (alternative 2.C.VI.b), and expected discards (alternative 2.C.VII.c) result in a TAL of 4.50 million pounds.

This TAL is 14% lower than the historic high for landings in 2013; however, it is more than double the landings in all other years dating back to at least 1998 (Table 5). Therefore, this TAL scenario could allow for increased landings compared to recent levels. As described in section 7.1.1, fishing effort is not expected to increase beyond recent levels for the foreseeable future due to factors such as market demand and low participation in the fishery to date. For this reason, this TAL scenario is not expected to result in a change in fishing effort or a change in the location or duration of time that fishing gear is in the water compared to recent levels. Thus, the impacts of this TAL scenario on protected species are not expected to differ from those of the no action alternative (alternative 1). For the reasons described in section 7.3.1, these impacts are expected to be negligible to slight negative for ESA-listed species, slight negative for non-ESA listed MMPA species which have had their PBR levels reached or exceeded, and slight positive for non-ESA listed MMPA species whose PBR levels have not been reached or exceeded.

Least Restrictive TAL Scenario

When considering all possible combinations of alternatives in this document (with the exception of the no action alternative), the least restrictive potential TAL is 5.07 million pounds (Table 17). This is based on the combination of alternatives 2.C.II (ABC=5.07 mil lb), 2.C.III.a (OY=ABC), 2.CIV.a (0 pounds of expected SC-FL catch), 2.C.VI.a (0% management uncertainty), and 2.C.VII.a (0% discards). All other alternatives considered in this document do not impact the TAL.

The resulting TAL is 3% lower than the historic high for landings in 2013; however, it is more than double the landings in all other years dating back to at least 1998 (Table 5). Therefore, this TAL scenario could allow for increased landings compared to recent levels. As described in section 7.1.1, fishing effort is not expected to increase beyond recent levels for the foreseeable future due to factors such as market demand and low participation in the fishery to date. For this reason, this TAL scenario is not expected to result in a change in fishing effort or a change in the location or duration of time that fishing gear is in the water compared to recent levels. Thus, the impacts of this TAL scenario on protected species are not expected to differ from those of the no action alternative (alternative 1). For the reasons described in section 7.3.1, these impacts are expected to be negligible to slight negative for ESA-listed species, slight negative for non-ESA listed MMPA species which have had their PBR levels reached or exceeded, and slight positive for non-ESA listed MMPA species whose PBR levels have not been reached or exceeded.

Comparison of TAL Scenarios

As described above, the most restrictive, preferred, and least restrictive TAL scenarios are all expected to have similar impacts on protected species (i.e., negligible to slight negative impacts

for ESA-listed species, slight negative impacts for non-ESA listed MMPA species which have had their PBR levels reached or exceeded, and slight positive impacts for non-ESA listed MMPA species whose PBR levels have not been reached or exceeded). This is because fishing effort and the location and duration of time that fishing gear is in the water are expected to remain similar to recent levels during 2020-2022 under all three scenarios. Given this information, all scenarios, relative to each other, are expected to result in negligible impacts to protected species.

If landings were to increase such that the full TAL is harvested under any of the three scenarios, impacts to protected species are not expected to differ from the impacts of the fishery in recent years. Landings would still be constrained to historic levels (i.e., at least 3% lower than those in 2013, the historic high) under all three TAL scenarios.

7.3.2.5. IMPACTS OF COMMERCIAL AND RECREATIONAL CATCH LIMIT ALTERNATIVES (ALTERNATIVE SET 2.C.V) ON PROTECTED SPECIES

As described in more detail in section 5.2.3.5, the alternatives in alternative set 2.C.V consider whether commercial and recreational fisheries should be managed with combined or separate catch limits. The preferred alternative is to manage both sectors under a shared ACL, ACT, and TAL (alternative 2.C.V.a).

None of the alternatives in alternative set 2.C.V would directly influence the overall level of the catch or landings limits. They also would not specify the level of allowable catch that will be assigned to the commercial or the recreational fishery. In this sense, they are largely administrative in nature. They will not impact fishing effort or the location of or duration of time that fishing gear is in the water and they will not have direct or indirect impacts on any protected species.

7.3.2.6. IMPACTS OF ACCOUNTABILITY MEASURE ALTERNATIVES (ALTERNATIVE SET 2.D) ON PROTECTED SPECIES

Impacts of In-Season Closure Alternatives (Alternative Sets 2.D.I and 2.D.II) on Protected Species

As described in sections 5.2.4.1 and 5.2.4.2, the Council considered a range of alternatives for in-season commercial fishery closures, including a no action alternative (alternative 2.D.I.a) and alternatives to close the commercial fishery when 90, 95, or 100% of the TAL (or commercial quota, depending on other alternatives selected; section 5.2.3.5) is projected to be landed (alternatives 2.D.I.b-d). Alternatives were considered for 0; 1,000; 10,000; or 40,000 pound possession limits once the commercial fishery is closed in-season (alternatives 2.D.IIa-d). The impacts of these alternatives on protected species will vary based on the combination of in-season closure threshold and possession limit alternatives used. There are many possible combinations of these alternatives. Rather than analyze the impacts of each possible combination, four examples were analyzed.

Under the no action alternative (alternative 2.D.I.a), the commercial fishery would never close in-season. Commercial landings would not be restricted after the TAL is reached. This could limit the Council's ability to restrict fishing effort to acceptable levels. Thus, this alternative could have similar impacts as the no action alternative (alternative 1) on protected species. For the reasons described in section 7.3.1, those impacts are expected to be slight negative for ESA-listed species and non-ESA listed marine mammals which have had their PBR levels reached or exceeded. They are expected to be slight positive for non-ESA listed marine mammals which

have not had their PBR levels reached or exceeded. As previously stated, it is not expected that fishing effort will increase beyond recent levels under the no action alternative due to factors such as market demand, the influence of the *Illex* squid fishery, and low historical participation in the chub mackerel fishery. Thus, although fishing effort would not be constrained to the TAL under this alternative, it is unlikely that fishing effort would increase to the extent that impacts to protected species are notably different than the past impacts of the fishery. For example, it is unlikely that this no action alternative would result in PBR levels being exceeded for any marine mammal stocks which have not had their PBR levels exceeded in recent years.

With the exception of the no action alternative, the least restrictive combination of alternatives in alternative sets 2.D.I and 2.D.II is a 40,000 pound possession limit (alternative 2.D.II.d) when 100% of the TAL is projected to be landed (alternative 2.D.I.d). As previously stated, 40,000 pounds may be the lowest amount that the key players in the fishery are willing to land due to market constraints (section 5.2.4.2.4). Thus, this combination of alternatives could lead to some reduction in fishing effort after the TAL is projected to be fully landed, compared to the no action alternative. If the preferred TAL (i.e., 4.50 million pounds; Table 17) had been in place in the past, it would have been reached only once, in 2013 (Table 5). Thus, this combination of alternatives would have resulted in reduced fishing effort in only one of the past 20 (or more) years. This combination of alternatives, when considered in combination with all possible TALs, could allow for an increase in fishing effort compared to most past years; however, this is not anticipated over the foreseeable future due to other constraints such as market demand and low participation in the fishery to date. For these reasons, this combination of alternatives is not expected to have notably different impacts on protected species than the no action alternative (i.e., slight negative impacts for ESA-listed species and non-ESA listed marine mammals whose PBR levels have been reached or exceeded, and slight positive impacts for non-ESA listed marine mammals whose PBR levels have not been reached or exceeded for the reasons described in section 7.3.1).

The most restrictive combination of in-season closure threshold and possession limit alternatives is a 0 pound possession limit (i.e., no possession allowed) after 90% of the TAL is projected to be landed. Under the preferred TAL of 4.50 million pounds (Table 17), this would prevent landings from reaching their historic high in 2013, but it would not prevent the fishery from exceeding the landings which occurred in all other past years over past 20 years or longer. For the reasons previously stated, a notable increase in fishing effort is not expected in the foreseeable future. Thus, this combination of alternatives is not expected to have notably different impacts on protected species compared to the no action alternative (i.e., slight negative impacts for ESA-listed species and non-ESA listed marine mammals whose PBR levels have been reached or exceeded, and slight positive impacts for non-ESA listed marine mammals whose PBR levels have not been reached or exceeded for the reasons described in section 7.3.1).

The preferred combination of alternatives is for a 40,000 pound possession limit (alternative 2.D.II.d) once 90% of the TAL is projected to be landed (alternative 2.D.I.b), followed by a 10,000 pound possession (alternative 2.D.II.c) limit after 100% of the TAL is projected to be landed (alternative 2.D.I.d). As previously stated, 40,000 pounds may be the lowest amount that the key players in the fishery are willing to land due to market constraints (section 5.2.4.2.4). Thus, this combination of alternatives could lead to some reduction in fishing effort after the TAL is projected to be fully landed, compared to the no action alternative. Landings exceeded 90% of the preferred TAL (i.e., 4.50 million pounds; Table 17) only once, in 2013 (Table 5).

Assuming no other changes in fishing behavior besides those trips above 40,000 and 10,000 pounds being limited to those amounts after 90% and 100% TAL was reached, this combination of alternatives would have resulted in 4.40 million pounds of commercial landings in 2013. Landings (and thus, presumably fishing effort) in all other past years would not have been impacted. Therefore, this than the no action alternative (i.e., slight negative impacts for ESA-listed species and non-ESA listed marine mammals whose PBR levels have been reached or exceeded, and slight positive impacts for non-ESA listed marine mammals whose PBR levels have not been reached or exceeded for the reasons described in section 7.3.1).

Impacts of ACL Overage Payback Alternatives (Alternative Set 2.D.III) on Protected Species

Alternative set 2.D.III contains three alternatives regarding ACL overages (section 5.2.4.3). Under the no action alternative (alternative 2.D.III.a), ACL overages would not require deductions from a future year's ACT; thus, there would not be a strong incentive to reduce fishing effort after the ACL is reached. This could pose challenges for constraining fishing effort to the level allowed for under the ACL and TAL.

The other two alternatives in this alternative set would require reductions in a future year's ACT if the ACL is exceeded. The ACT deduction would apply to either a combined commercial and recreational ACT (alternative 2.D.III.b) or sector-specific ACTs (alternative 2.D.III.c), depending on the alternative and which sector was responsible for the ACL overage. The ACL overage paybacks under alternatives 2.D.III.b-c should have identical impacts on protected species. They are both expected to help ensure that fishing effort is constrained to acceptable levels by creating an incentive to prevent ACL overages.

Under all three ACL overage payback alternatives, fishing effort will be influenced primarily by the TAL. As previously stated, under all TAL options considered in this document, fishing effort is expected to remain similar to recent levels in the foreseeable future due to factors such as market demand and low participation in the fishery to date. For the reasons described in section 7.3.2.4, all TAL options are expected to have generally slight negative impacts on ESA listed species and non-ESA listed marine mammals whose PBR levels have been reached or exceeded. All TAL options are expected to have generally slight positive impacts on non-ESA listed marine mammals whose PBR levels have not been reached or exceeded. The impacts of all ACL overage payback alternatives on protected species are expected to be the same as those of the TAL as fishing effort is not expected to vary under any of three alternatives for the foreseeable future.

The impacts of the ACL overage alternatives will differ if fishing effort were to increase notably in the future. This is not expected; however, if it were to occur, alternative 2.D.III.a (no ACL overage paybacks) could result in a higher level of fishing effort than alternatives 2.D.III.a-b (ACL overage paybacks required) as it would create a lesser incentive to reduce fishing effort after the ACL is reached. As such, compared to alternatives 2.D.III.a-b, it could have greater negative impacts on protected species.

7.3.2.7. IMPACTS OF PERMIT REQUIREMENT ALTERNATIVES (ALTERNATIVE SET 2.E) ON PROTECTED SPECIES

As described in section 5.2.5, the Council considered a range of alternatives for permit requirements. The preferred alternatives would require all vessels which retain chub mackerel

caught in the management unit to have a commercial or party/charter MSB permit through GARFO (alternatives 2.E.I.c and 2.E.II.c).

None of the permit requirement alternatives will impact fishing effort or the location of or duration of time that fishing gear is in the water. In this sense, they are largely administrative in nature in terms of their impacts on protected species. They will not have direct or indirect impacts on any protected species.

7.3.2.8. IMPACTS OF ADMINISTRATIVE ALTERNATIVES (ALTERNATIVE SET 2.F) ON PROTECTED SPECIES

As described in section 5.2.6, the Council considered a range of alternatives regarding the specifications process, MSY, the ABC control rule and risk policy, and SBRM. Under the preferred alternatives, MSY would equal the ABC (alternative 2.F.II) and the current policies and regulations for the MSB specifications process (alternative 2.F.I.b), the Council's ABC control rule and risk policy, and SBRM would apply to chub mackerel (alternatives 2.F.I.b, 2.F.III.b, and 2.F.IV.b).

None of the alternatives in alternative set 2.F will directly impact fishing effort or the location of or duration of time that fishing gear is in the water. Thus, they will not have direct impacts on any protected species. Indirect impacts may derive from management measures implemented under these alternatives. The impacts of these measures are analyzed in other sections of this document (e.g., ABCs, section 7.3.2.4).

7.4. IMPACTS OF THE ALTERNATIVES ON HABITAT

This section summarizes the expected impacts of each alternative on habitat. As previously described, impacts are evaluated based on expected changes in fishing effort and potential changes in the quality or quantity of habitat.

Many habitat areas within the footprint of the chub mackerel fishery have been impacted by fishing activities over many years. The Council has minimized impacts to habitat from the MSB fisheries (of which the commercial chub mackerel fishery could be considered a subset due to its close relationship with the *Illex* squid fishery; section 6.2.1) through closure of several canyon areas through Amendment 9 to the MSB FMP (MAFMC 2008) and Amendment 1 to the Tilefish FMP (MAFMC 2009), and protections for deep sea corals via Amendment 16 to the MSB FMP (MAFMC 2016). However, as an overall current resource condition, many habitats in the area of operation of the chub mackerel fishery are degraded from historical fishing effort in a variety of fisheries and from non-fishing activities.

It should be noted that longfin squid were identified as one of the primary non-target species in the chub mackerel fishery (section 6.1.2). Longfin squid use hard bottom, submerged vegetation, other natural or artificial structure, and sand or mud to attach/anchor eggs. However, as determined in Amendment 9 to the MSB FMP, there are no known preferences for different types of substrates or indications that fishing activity may negatively impact longfin squid egg EFH (though the eggs themselves may be impacted; MAFMC 2008). Therefore, longfin squid EFH is not given special consideration in the sections below. The other primary non-target species (i.e., *Illex* squid, Atlantic butterfish, and round herring; section 6.1.2) inhabit the water column; thus, their habitats are not expected to be impacted by chub mackerel fishing activity. As shown in Table 14, EFH for several other species includes substrate, submerged vegetation, and/or structure. These habitats could be impacted by bottom otter trawl gear (section 6.4.2).

As described in the following sections, of all the action alternatives, the alternatives for OY are expected to have the greatest impacts on habitat due to their impact on the TAL. The other action alternatives are expected to have comparatively minor or negligible impacts on habitat.

7.4.1. IMPACTS OF NO ACTION (ALTERNATIVE 1) ON HABITAT

All chub mackerel management measures currently in place in this region will expire after December 31, 2020 (section 4.4). If the Council takes no additional action, there will be no regulations on chub mackerel harvest in U.S. Atlantic waters as of January 1, 2021. For the reasons described in section 7.1.1, fishing effort, including the location, amount, and duration of time that gear is in the water, are not expected to increase beyond recent levels under the no action alternative for the foreseeable future. Thus, the impacts of the no action alternative on habitat are not expected to differ from the current impacts of the fishery, which are described below.

As shown in Table 5, the commercial fishery accounted for over 99% of total chub mackerel harvest over the past 20 years. The commercial fishery is predominantly a bottom otter trawl fishery and the recreational fishery is predominantly a hook and line fishery. As described in section 6.4.2, bottom otter trawls have generally negative impacts on habitat because otter trawl doors can create furrows in sand, mud, and gravel/rocky substrates. Bottom trawl gear can also re-suspend and disperse surface sediments and can smooth topographic features. It can result in reduced abundance, and in some cases reduced diversity, of benthic species such as nematodes, polychaetes, and bivalves. The duration of these impacts varies by sediment type, depth, and frequency of the impact (e.g., a single trawl tow vs. repeated tows). Recreational hook and line gear generally has minimal impacts on physical habitat and EFH in this region.

For these reasons, the expected impacts of the no action alternative on habitat are slight negative because *status quo* levels of fishing effort with bottom otter trawls will continue to result in the habitat impacts summarized above and in section 6.4.2. No additional impacts to habitat are expected beyond those resulting from past levels of fishing effort. Impacts are slight, as opposed to moderate or high, negative due to the small number of vessels actively participating in the chub mackerel fishery and low fishing effort in most years. In addition, the chub mackerel fishery does not impact habitat areas which are not also impacted by many other fisheries throughout the year (section 6.2.1).

Chub mackerel fishing effort over the longer term is uncertain. If the fishery expands beyond recent levels under the no action alternative, then the risk of negative impacts to habitat could increase, depending on the scale of the increase in fishing effort. There is no indication that fishing effort will increase notably in the foreseeable future under any of the management alternatives considered in this document, including the no action alternative.

As described in later sections, alternative 2 (manage chub mackerel as a stock in the MSB FMP) and the associated sub-alternatives would place some limitations on chub mackerel fishing effort. Although fishing effort is not expected to increase compared to historic levels under either the no action alternative or alternative 2, it has the potential to increase to a greater extent under alternative 1 than under alternative 2. Thus, alternative 1 has a greater potential for negative impacts to habitat than alternative 2.

7.4.2. IMPACTS OF MANAGING CHUB MACKEREL AS A STOCK IN THE MSB FMP (ALTERNATIVE 2, PREFERRED) ON HABITAT

If the Council adds chub mackerel as a stock in the MSB FMP, then the MSA requirements for EFH, management unit, SDCs, MSY, ABC, OY, ACLs, and AMs must also be met. As described in section 5, the Council is also proposing to implement additional discretionary management measures including possession limits and permit requirements under alternative 2.

The impacts of the alternatives on habitat derive from changes in the amount, location, and duration of gear in the water. Many of the sub-alternatives under alternative 2 have the potential to influence these aspects of fishing effort in future years; however, the act of managing chub mackerel as a stock in the MSB FMP will not directly impact fishing effort. When considering the impacts of alternative 2 separately from the sub-alternatives for specific management measures, no direct or meaningful indirect impacts to habitat are expected. The impacts of the sub-alternatives for specific management measures are described in the following sections.

Under all sub-alternatives, some level of fishing effort would continue to occur. No combinations of sub-alternatives are expected to result in notable reductions in fishing effort compared to recent levels. Some combinations of sub-alternatives could allow for increases in fishing effort; however, notable increases are unlikely in the foreseeable future due to constraints such as market demand, the influence of the *Illex* squid fishery, and low participation in the chub mackerel fishery to date. Therefore, under all possible combinations of sub-alternatives under alternative 2, impacts to habitat would likely be similar to current conditions. Thus alternative 2 is generally expected to have similar impacts on habitat as the no action alternative. For the reasons described in the previous section, these impacts are slight negative. Although fishing effort is not expected to increase compared to historic levels under either the no action alternative or alternative 2, it has the potential to increase to a greater extent under alternative 1 than under alternative 2. Thus, alternative 1 has a greater potential for negative impacts to habitat than alternative 2.

The magnitude of the impacts of alternative 2 will vary slightly depending on the sub-alternatives used, as described in the following sections.

7.4.2.1. IMPACTS OF EFH ALTERNATIVES (ALTERNATIVE SET 2.A) ON HABITAT

As described in section 5.2.1, the Council considered two alternatives for EFH. A no action alternative for EFH is encompassed within alternative 1 (no action), which would not add chub mackerel to the MSB FMP as a stock in need of conservation and management. If the Council choses alternative 2 (add chub mackerel to the MSB FMP), then they must meet the MSA requirement for EFH. The two EFH sub-alternatives under alternative 2 consider two different sets of EFH descriptions/maps. The preferred alternative (alternative 2.A.I) would identify a larger area as EFH than the non-preferred alternative (alternative 2.A.II). Both alternatives focus on pelagic waters.

Federal agencies are required to consult with NMFS if they authorize, fund, or undertake actions that may adversely affect EFH. Through these consultations, NMFS advises on how to avoid, reduce, or mitigate adverse effects to EFH. Establishing EFH for chub mackerel would not necessarily require actions to restrict fishing or non-fishing activities; rather, it would require that the impacts of fishing and non-fishing activities on EFH are considered and addressed if appropriate.

Chub mackerel EFH under both alternatives is restricted to pelagic waters; therefore, restrictions on fishing activities to avoid, reduce, or mitigate adverse impacts to chub mackerel EFH may not be needed as fishing gears generally have minimal impacts on pelagic habitats.

Some non-fishing activities can affect pelagic habitats. For example, the intake of seawater by liquefied natural gas operations impacts water temperature which could affect habitat suitability for chub mackerel and other species. This is an example of an activity that could be limited to varying degrees as a result of EFH consultations. In this sense, both EFH alternatives can have slight positive impacts on habitat by helping to avoid, reduce, or mitigate adverse impacts to EFH. As previously stated, the preferred alternative (alternative 2.A.I) would identify a greater area as EFH than the non-preferred alternative (alternative 2.A.II). As such, the slight positive impacts of the preferred EFH would be greater in magnitude than the impacts of the non-preferred EFH alternative as a larger area would be impacted.

7.4.2.2. IMPACTS OF MANAGEMENT UNIT ALTERNATIVES (ALTERNATIVE SET 2.B) ON HABITAT

As described in section 5.2.2, the Council considered two management unit alternatives. The preferred alternative (alternative 2.B.I) would establish a management unit of Maine through North Carolina. The non-preferred alternative (alternative 2.B.II) would establish a management unit of Maine through the east coast of Florida. Any catch limits, landings limits, possession limits, and permit requirements implemented through this amendment would apply throughout the management unit.

Over 99% of total chub mackerel landings over the past 20 years (through 2018) occurred in Maine through North Carolina. Thus, both management unit alternatives would ensure that any management measures implemented through this amendment address at least 99% of the fishery as defined by past landings. As previously stated, there is no indication that the regional proportions of landings will change in the foreseeable future.

The management unit alternatives will not directly impact fishing effort or the location and duration of time that gear is in the water; thus, they will not have direct impacts on habitat. Indirect impacts may result from the management measures implemented within the management unit. The impacts of these management measures are described in later sections.

7.4.2.3. IMPACTS OF SDC ALTERNATIVES (ALTERNATIVE SET 2.C.I) ON HABITAT

As described in section 5.2.3.1, the Council considered two alternatives for SDCs. These alternatives would establish a level of annual catch above which overfishing is presumed to occur. Under both alternatives, the stock is presumed to be overfished when overfishing occurs three years in a row. An overfished designation triggers a requirement for a rebuilding plan, which could necessitate changes in management measures. The overfishing threshold under the preferred alternative (alternative 2.C.I.a) is 6.67 million pounds of catch per year. The overfishing threshold under the non-preferred alternative (alternative 2.C.I.b) is 8.21 million pounds of catch per year. The historic high for annual catch was around 5.57 million pounds (section 7.1.2.3). This is 17% lower than the overfishing SDC under alternative 2.C.I.a and 32% lower than the overfishing SDC under alternative 2.C.I.b. As described in section 7.1.1, chub mackerel catch is not expected to exceed historic levels in the foreseeable future, even if no action is taken and the fishery becomes unmanaged in 2021. Because catch is not expected to exceed the threshold levels under either SDC alternative, neither alternative is expected to result

in any changes to management measures, fishing effort, fishing behavior, or the location or duration of time that gear is in the water. Thus, both SDC alternatives are expected to have similar impacts on habitat as the no action alternative. For the reasons described in the section 7.4.1, these impacts are slight negative.

As previously stated, there is no indication that fishing effort will increase beyond historic levels in the foreseeable future. However, if this were to occur, both SDC alternatives could require implementation of management measures to reduce fishing effort, depending on the scale of the increase. Any reduction in fishing effort that might occur as a result of either SDC alternative would not be expected to result in meaningful improvements in habitat as the habitats impacted by the chub mackerel fishery are impacted by many other fisheries.

7.4.2.4. IMPACTS OF ALTERNATIVES FOR ABC (ALTERNATIVE 2.C.II), OY (ALTERNATIVE SET 2.C.III), EXPECTED SC-FL CATCH (ALTERNATIVE SET 2.C.IV), MANAGEMENT UNCERTAINTY (ALTERNATIVE SET 2.C.VI), AND EXPECTED DISCARDS (ALTERNATIVE SET 2.C.VII) ON HABITAT

As described in section 5, the Council considered a range of alternatives for ABC (alternative 2.C.II), OY (alternative set 2.C.III), expected South Carolina through Florida catch (alternative set 2.C.IV), management uncertainty (alternative set 2.C.VI), and expected discards (alternative set 2.C.VII). These alternatives work together to determine the resulting TAL for 2020-2022 (e.g., Figure 3). The TAL will play a large role in determining fishing effort and the location and duration of time that fishing gear is in the water, and thus impacts to habitat. Some of these alternatives have a greater impact on the TAL than others; however, their impacts on the TAL cannot be meaningfully assessed when considered independently from each other. The impacts on fishing effort will depend on how the TAL compares to recent levels of landings. For example, a 4% management uncertainty buffer (alternative 2.C.IV.b) will result in a lower TAL than a 0% management uncertainty buffer (alternative 2.CIV.a); however, fishing effort will not necessarily be lower with a 4% management uncertainty buffer because the level of the TAL compared to recent landings depends on multiple other alternatives. For this reason, rather than independently considering each alternative which contributes to the TAL, three TAL scenarios were analyzed.

Under all three TAL scenarios, the OY alternative has the greatest impact on the TAL, followed by the expected discards alternative, management uncertainty alternative, and expected South Carolina through Florida catch. For example, as shown in Figure 11, the differences in the potential TALs under the different alternatives for expected SC-FL catch, management uncertainty, and expected discards are much smaller than the differences in the potential TALs under the two OY alternatives.

This amendment would implement a TAL for 2020-2022. The impacts of the TAL are not considered beyond that time frame. As described in more detail below, none of the TAL scenarios, including the most restrictive TAL, are expected to constrain fishing effort during 2020-2022 compared to recent levels (Table 5, Table 17). Therefore, none of the alternatives are expected to result in reduced impacts to habitat compared to recent levels.

Most Restrictive TAL Scenario

When considering all possible combinations of alternatives in this document, the most restrictive potential TAL is 2.73 million pounds (Table 17). This is based on the combination of alternatives

2.C.II (ABC=5.07 mil lb), 2.C.III.b (OY=ABC - 36%), 2.CIV.c (84,500 pounds of expected SC-FL catch), 2.C.VI.b (4% management uncertainty), and 2.C.VII.d (10% discards). The other alternatives considered in this document do not impact the TAL.

The resulting TAL is 48% lower than the historic high for landings in 2013; however, it is at least 23% higher than landings in all other years dating back to at least 1998 (Table 5). Therefore, this TAL scenario could allow for increased landings compared to recent levels. As described in section 7.1.1, fishing effort is not expected to increase beyond recent levels during 2020-2022 due to factors such as market demand and limited participation in the fishery to date. For this reason, this TAL scenario is not expected to result in a change in fishing effort or a change in the location or duration of time that fishing gear is in the water compared to recent levels. Thus, the impacts of this TAL scenario on habitat are not expected to differ from those of the no action alternative (alternative 1). For the reasons described in section 7.4.1, these impacts are expected to be slight negative.

Preferred TAL Scenario

The preferred alternatives for ABC (alternative 2.C.II), OY (alternative 2.C.III.a), expected South Carolina through Florida catch (alternative 2.CIV.c), management uncertainty (alternative 2.C.VI.b), and expected discards (alternative 2.C.VII.c) result in a TAL of 4.50 million pounds.

This TAL is 14% lower than the historic high for landings in 2013; however, it is more than double the landings in all other years dating back to at least 1998 (Table 5). Therefore, this TAL scenario could allow for increased landings compared to recent levels. As described in section 7.1.1, fishing effort is not expected to increase beyond recent levels in 2020-2022 due to factors such as market demand and low participation in the fishery to date. For this reason, this TAL scenario is not expected to result in a change in fishing effort or a change in the location or duration of time that fishing gear is in the water compared to recent levels. Thus, the impacts of this TAL scenario on habitat are not expected to differ from those of the no action alternative (alternative 1). For the reasons described in section 7.4.1, these impacts are expected to be slight negative.

Least Restrictive TAL Scenario

When considering all possible combinations of alternatives in this document (with the exception of the no action alternative), the least restrictive potential TAL is 5.07 million pounds (Table 17). This is based on the combination of alternatives 2.C.II (ABC=5.07 mil lb), 2.C.III.a (OY=ABC), 2.CIV.a (0 pounds of expected SC-FL catch), 2.C.VI.a (0% management uncertainty), and 2.C.VII.a (0% discards). The other alternatives considered in this document do not impact the TAL.

The resulting TAL is 3% lower than the historic high for landings in 2013; however, it is more than double the landings in all other years dating back to at least 1998 (Table 5). Therefore, this TAL scenario could allow for increased landings compared to recent levels. As described in section 7.1.1, fishing effort is not expected to increase beyond recent levels in 2020-2022 due to factors such as market demand and low participation in the fishery to date. For this reason, this TAL scenario is not expected to result in a change in fishing effort or a change in the location or duration of time that fishing gear is in the water compared to recent levels. Thus, the impacts of this TAL scenario on habitat are not expected to differ from those of the no action alternative

(alternative 1). For the reasons described in section 7.4.1, these impacts are expected to be slight negative.

Comparison of TAL Scenarios

As described above, the most restrictive, preferred, and least restrictive TAL scenarios are all expected to have slight negative impacts on habitat. This is because fishing effort and the location and duration of time that fishing gear is in the water are expected to remain similar to recent levels under all three scenarios. The least restrictive TAL scenario has the greatest potential for negative impacts to habitat because it could allow for the greatest increase in fishing effort compared to recent levels. The most restrictive TAL scenario has the lowest potential for negative impacts to habitat because it would allow for the smallest increase in fishing effort compared to recent levels.

If landings were to increase such that the full TAL is harvested under any of the three scenarios, impacts to habitat are not expected to differ from the impacts that the fishery has had in recent years. Landings would still be constrained to historic levels (i.e., at least 3% lower than those in 2013, the historic high) under all three TAL scenarios.

7.4.2.5. IMPACTS OF COMMERCIAL AND RECREATIONAL CATCH LIMIT ALTERNATIVES (ALTERNATIVE SET 2.C.V) ON HABITAT

As described in more detail in section 5.2.3.5, the alternatives in alternative set 2.C.V consider whether commercial and recreational fisheries should be managed with combined or separate catch limits. The preferred alternative is to manage both sectors under a shared ACL, ACT, and TAL (alternative 2.C.V.a).

None of the alternatives in alternative set 2.C.V will directly influence the level of the catch or landings limits. As such, they will not impact fishing effort or the location of or duration of time that fishing gear is in the water and they will not have direct or indirect impacts on habitat.

7.4.2.6. IMPACTS OF ACCOUNTABILITY MEASURE ALTERNATIVES (ALTERNATIVE SET 2.D) ON HABITAT

Impacts of In-Season Closure Alternatives (Alternative Sets 2.D.I and 2.D.II) on Habitat

As described in sections 5.2.4.1 and 5.2.4.2, the Council considered a range of alternatives for in-season commercial fishery closures, including a no action alternative (alternative 2.D.I.a) and alternatives to close the commercial fishery when 90, 95, or 100% of the TAL (or commercial quota, depending on other alternatives selected; section 5.2.3.5) is projected to be landed (alternatives 2.D.I.b-d). Alternatives were considered for 0; 1,000; 10,000; or 40,000 pound possession limits once the commercial fishery is closed in-season (alternatives 2.D.IIa-d). The impacts of these alternatives on habitat will vary based on the combination of in-season closure threshold and possession limit alternatives used. There are many possible combinations of these alternatives. Rather than analyze the impacts of each possible combination, four examples were analyzed.

Under the no action alternative (alternative 2.D.I.a), the commercial fishery would never close in-season. Commercial landings would not be restricted after the TAL is reached. This could limit the Council's ability to restrict fishing effort to acceptable levels. Thus, this alternative could have similar impacts as the overall no action alternative (alternative 1) on habitat. For the reasons described in section 7.4.1, those impacts are expected to be slight negative.

With the exception of the no action alternative, the least restrictive combination of alternatives in alternative sets 2.D.I and 2.D.II is a 40,000 pound possession limit (alternative 2.D.II.d) when 100% of the TAL is projected to be landed (alternative 2.D.I.d). As previously stated, 40,000 pounds may be the lowest amount that the key players in the fishery are willing to land due to market constraints (section 5.2.4.2.4). Thus, this combination of alternatives could lead to some reduction in fishing effort after the TAL is projected to be fully landed. If the preferred TAL (i.e., 4.50 million pounds; Table 17) had been in place in the past, it would have been reached only once, in 2013 (Table 5). Thus, this combination of alternatives would have resulted in reduced fishing effort in only one of the past 20 (or more) years. This combination of alternatives, when considered in combination with all possible TALs, could allow for an increase in fishing effort compared to most past years; however, this is not likely to occur in the foreseeable future due to other constraints such as market demand and low participation in the fishery to date. Fishing effort would be restricted to a greater extent than under the no action alternatives for in-season closure. Therefore, this combination of alternatives is expected to have slight negative impacts on habitat (for the reasons described in section 7.4.1). These impacts could be lesser in magnitude than under the no action alternatives for in-season closure.

The most restrictive combination of in-season closure threshold and possession limit alternatives is a 0 pound possession limit (i.e., no possession allowed) after 90% of the TAL is projected to be landed. Under the preferred TAL of 4.50 million pounds (Table 17), this would prevent landings from reaching their historic high in 2013, but it would not prevent the fishery from exceeding the landings in all other past years over past 20 years or longer. For the reasons previously stated, a notable increase in fishing effort is not expected in the foreseeable future. Fishing effort would be restricted to a greater extent than under all other in-season closure alternatives. Therefore, this combination of alternatives is expected to have slight negative impacts on habitat (for the reasons described in section 7.4.1), though these impacts could be lesser in magnitude than all other possible combinations of in-season closure alternatives.

The preferred combination of alternatives is for a 40,000 pound possession limit (alternative 2.D.II.d) once 90% of the TAL is projected to be landed (alternative 2.D.I.b), followed by a 10,000 pound possession (alternative 2.D.II.c) limit after 100% of the TAL is projected to be landed (alternative 2.D.I.d). As previously stated, 40,000 pounds may be the lowest amount that the key players in the fishery are willing to land due to market constraints (section 5.2.4.2.4). Thus, this combination of alternatives could lead to some reduction in fishing effort after the TAL is projected to be fully landed. Landings exceeded 90% of the preferred TAL (i.e., 4.50 million pounds; Table 17) only once, in 2013 (Table 5). Assuming no other changes in fishing behavior besides those trips above 40,000 and 10,000 pounds being limited to those amounts after 90% and 100% TAL was reached, this combination of alternatives would have resulted in 4.40 million pounds of commercial landings in 2013. Landings (and thus, presumably fishing effort) in all other past years would not have been impacted. This combination of alternatives, when considered in combination with all possible TALs, could allow for an increase in fishing effort compared to most past years; however, this is not likely to occur in the foreseeable future due to other constraints such as market demand and low participation in the fishery to date. Fishing effort would be restricted to a greater extent than under the no action alternatives and under the least restrictive combination of alternatives for in-season closure. Therefore, the preferred combination of alternatives is expected to have slight negative impacts on habitat (for the reasons described in section 7.4.1). These impacts could be lesser in magnitude than under

the no action alternatives and the least restrictive combination of alternatives for in-season closure.

In summary, of the four examples considered here, the no action alternative for in-season closure has the greatest potential for negative habitat impacts, followed by the least restrictive combination of alternatives, the preferred alternatives, and the most restrictive combination of alternatives.

Impacts of ACL Overage Payback Alternatives (Alternative Set 2.D.III) on Habitat

Alternative set 2.D.III contains three alternatives regarding ACL overages (section 5.2.4.3). Under the no action alternative (alternative 2.D.III.a), ACL overages would not require deductions from a future year's ACT; thus, there would not be a strong incentive to reduce fishing effort after the ACL is reached. This could pose challenges for constraining fishing effort to the level allowed for under the ACL and TAL.

The other two alternatives in this alternative set would require reductions in a future year's ACT if the ACL is exceeded. The ACT deduction would apply to either a combined commercial and recreational ACT (alternative 2.D.III.b) or sector-specific ACTs (alternative 2.D.III.c), depending on the alternative and which sector was responsible for the ACL overage. The ACL overage paybacks under alternatives 2.D.III.b-c should have identical impacts on habitat. They are both expected to help ensure that fishing effort is constrained to acceptable levels by creating an incentive to prevent ACL overages.

Under all three ACL overage payback alternatives, fishing effort will be influenced primarily by the TAL. As previously stated, under all TAL options considered in this document, fishing effort is expected to remain similar to recent levels in the foreseeable future due to factors such as market demand and low participation in the fishery to date. For the reasons described in section 7.4.2.4, all TAL options are expected to have generally slight negative impacts on habitat. The impacts of all ACL overage payback alternatives on habitat are expected to be the same as those of the TAL as fishing effort is not expected to vary under any of three alternatives for the foreseeable future.

The impacts of the ACL overage alternatives will differ if fishing effort were to increase notably in the future. This is not expected; however, if it were to occur, alternative 2.D.III.a (no ACL overage paybacks) could result in a higher level of fishing effort than alternatives 2.D.III.a-b (ACL overage paybacks required) as it would create a lesser incentive to reduce fishing effort after the ACL is reached. As such, compared to alternatives 2.D.III.a-b, it could have greater negative impacts on habitat.

7.4.2.7. IMPACTS OF PERMIT REQUIREMENT ALTERNATIVES (ALTERNATIVE SET 2.E) ON HABITAT

As described in section 5.2.5, the Council considered a range of alternatives for permit requirements. The preferred alternatives would require all vessels which retain chub mackerel caught in the management unit to have a commercial or party/charter MSB permit through GARFO (alternatives 2.E.I.c and 2.E.II.c).

None of the permit requirement alternatives will impact fishing effort or the location of or duration of time that fishing gear is in the water. Thus, they will not have direct or indirect impacts on habitat.

7.4.2.8. IMPACTS OF ADMINISTRATIVE ALTERNATIVES (ALTERNATIVE SET 2.F) ON HABITAT

As described in more detail in section 5.2.6, the Council considered a range of alternatives regarding the specifications process, MSY, the ABC control rule and risk policy, and SBRM. Under the preferred alternatives, MSY would equal the ABC (alternative 2.F.II) and the current policies and regulations for the MSB specifications process (alternative 2.F.I.b), the Council's ABC control rule and risk policy, and SBRM would apply to chub mackerel (alternatives 2.F.I.b, 2.F.III.b, and 2.F.IV.b).

None of the alternatives in alternative set 2.F will directly impact fishing effort or the location of or duration of time that fishing gear is in the water. Thus, they will not have direct impacts on habitat. Indirect impacts may derive from management measures implemented under these alternatives. The impacts of these measures (e.g., ABC) are analyzed in other sections of this document.

7.5. CUMULATIVE EFFECTS ANALYSIS

A cumulative effects analysis is required by the CEQ (40 CFR part 1508.7). The purpose of a cumulative effects analysis 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 formal cumulative impact assessment is not necessarily required under NEPA as part of an EA if the significance of cumulative impacts have been considered (U.S. EPA 1999).

The temporal scope of this analysis for target and non-target species, human communities, and habitat is primarily focused on actions that have taken place since 1976, when U.S. fisheries began to be managed under the MSA. For protected species, the scope of past and present actions extends back through the 1980s and 1990s when NMFS began generating stock assessments for marine mammals and sea turtles that inhabit waters of the U.S. EEZ.

The temporal scope of future actions for all VECs extends five years beyond the timeframe of the catch and landings limits proposed through this action (i.e., through 2027). The dynamic nature of resource management for these species and lack of information on projects that may occur in the future make it difficult to predict impacts beyond this timeframe with any certainty. The impacts discussed in this section 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.

The geographic scope of the cumulative effects analysis for target species, non-target species, human communities, and habitat is the range of the fisheries in the Western Atlantic Ocean (section 6.2). For protected species, the geographic range is the total range of each species (section 6.3).

7.5.1. 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.

The FMP's that have had the greatest impact on the MSB fisheries, other than the MSB FMP, are the Atlantic Herring FMP and the Northeast Small Mesh Multispecies FMP (both managed by

the New England Fishery Management Council) due to overlap in permits for vessels that participate in these fisheries.

7.5.1.1. PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE FISHERY MANAGEMENT ACTIONS

The earliest management actions implemented under the MSB FMP involved the sequential phasing out of foreign fishing for these species in US waters and the development of a domestic fishing fleet. Other MSB FMP actions which had substantial impacts on the MSB fisheries include:

- Amendment 5 implemented a limited access program to control capacity in the squid and butterfish fisheries.
- Amendment 11 implemented mackerel limited access, a recreational-commercial mackerel allocation, and EFH updates.
- Amendment 13 implemented ACLs and AMs.
- Amendment 14 increased and improved reporting and monitoring of the mackerel and longfin squid fisheries (e.g., minimization of unobserved catch, weekly vessel trip reporting, electronic vessel monitoring systems) and implemented a catch cap for river herrings and shads.
- Amendment 16 established deep sea coral zones, encompassing more than 38,000 square miles, where bottom-tending fishing gear is prohibited.
- The Unmanaged Forage Omnibus Amendment implemented a possession limit for over 50 previously unmanaged species, some of which are encountered in the MSB fisheries. As described in section 4.4, it also implemented the first management measures for chub mackerel.
- Amendment 20 modified the permit structure and possession limits for longfin squid and butterfish. The intent of these changes was to address latent capacity in the longfin squid fishery and prevent excessive longfin squid catch during certain times of year.
- Past annual specifications have also limited catches to avoid overfishing.

Several ongoing or planned fishery management actions are also relevant when considering cumulative effects. For example, the Council is in the early stages of developing an amendment to consider modifications to the permitting system for *Illex* squid, as well as revisions the goals and objectives of the MSB FMP.

In addition, the Council is currently undertaking a multi-year effort to provide new and improved habitat science products (e.g., more comprehensive habitat use information, integrative habitat use modeling tools, and refined maps) that will allow the Council to review and potentially revise its existing EFH maps and text descriptions. When these improved habitat science products are available, the Council may consider initiating an amendment to revise the EFH text and maps for some or all Council-managed species.

The Council is also developing an omnibus framework action to consider requiring electronic submission of commercial VTRs. The Council may also initiate an additional omnibus framework to modify their risk policy for setting ABCs.

If approved and implemented by NMFS, Amendment 8 to the New England Fishery Management Council's Atlantic Herring FMP, would cap overall Atlantic herring fishing mortality at 80% of sustainable levels, and even lower levels when biomass declines. A portion

of the available catch would be set aside to account for the role of Atlantic herring as forage in the ecosystem. The amendment would also ban mid-water trawling for herring-permitted vessels near the coast. In addition to Amendment 8, Atlantic herring catch limits for 2019 and upcoming years will be reduced compared to recent years. A June 2018 stock assessment concluded that although herring was not overfished and overfishing was not occurring in 2017, poor recruitment would likely result in a substantial decline in biomass and catch would need to be reduced to prevent overfishing and lower the risk of the stock becoming overfished (84 Federal Register 2760, February 8, 2019). Thus, the combination of the reduced catch limits resulting from the assessment and the changes proposed through Amendment 8 are likely to result in a reduction in Atlantic herring catches in upcoming years. Atlantic herring is an important bait in many commercial fisheries. Public comments suggest that the use of chub mackerel as bait has not been extensive and may be limited to commercial and recreational tuna and marlin fisheries. However, the reductions in herring catch resulting from the new stock assessment and Amendment 8 may increase demand for alternative bait sources.

Future New England Fishery Management Council actions may extend deep-water coral protections in the New England area, which could impact the potential for future expansion of the MSB fisheries.

Impacts of All Past, Present and Reasonably Foreseeable Future Fishery Management Actions

The MSA is the statutory basis for federal fisheries management. To the degree with which this regulatory regime is complied, the cumulative impacts of past, present, and reasonably foreseeable future federal fishery management actions on the VECs should generally be associated with positive long-term outcomes. Constraining fishing effort through regulatory actions can have negative short-term socioeconomic impacts. These impacts are sometimes necessary to bring about long-term sustainability of a resource, and as such should promote positive effects on human communities in the long-term. Generally, these actions have had slight negative impacts on habitat as even reduced levels of fishing effort result in habitat impacts from fishing gear on habitat. However, some actions have had direct or indirect long-term positive impacts on habitat 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 a range of impacts on non ESA-listed marine mammals from slight negative to slight positive, depending on the species.

7.5.1.2. PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE NON-FISHING ACTIONS

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 species that reside in those areas. The following discussion of impacts is based on past assessments of activities and assume these activities will likely continue as projects are proposed.

Examples of non-fishing activities include point source and non-point source pollution, shipping, dredging, storm events, wind energy development, oil and gas development, construction, and other activities. The impacts from these non-fishing 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 from at-sea disposal areas, oil and mineral resource exploration, aquaculture, construction of at-sea wind farms, bulk transportation of petrochemicals and significant storm events. Wherever these activities co-

occur, they are likely to work additively or synergistically to decrease habitat quality and as such may indirectly constrain the sustainability of target, non-target, and protected species. Decreased habitat suitability tends to reduce the tolerance of a species to the impacts of fishing effort. Direct negative impacts that have been observed to target, non-target, and protected species resulting from non-fishing activities include shifting distributions, decreased reproductive ability and success, disrupted or modified food web interactions, and increased disease. The overall impact on the affected species and their habitats on a population level is unknown, but likely to range from no impacts to slight negative impacts.

In addition to guidelines mandated by the MSA, NMFS reviews some non-fishing effects during the review process 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 authority. The jurisdiction of these activities is in "waters of the United States" and includes both riverine and marine habitats.

Global climate change will affect all components of marine ecosystems, including human communities. Physical changes that are occurring and will continue to occur 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. 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). Climate change will potentially exacerbate the stresses imposed by harvesting (fishing) and other non-fishing human activities and stressors (described in this section). Results from the Northeast Fisheries Climate Vulnerability Assessment (Hare et al. 2016) for Council-managed species indicate that climate change could have directional impacts that range from negative to positive, depending on the adaptability of these managed species to the changing environment. Overall, climate change is expected to have impacts that range from positive to negative on all VECs depending on the species. However, future mitigation and adaptation strategies to climate change may mitigate some of these impacts as the science surrounding predicting, evaluating, monitoring and categorizing these changes evolves.

In recent years, offshore wind energy and oil and gas exploration have become more relevant activities in this region. They are expected to impact all VECs, as described below. Construction activities may have both direct and indirect impacts on marine resources, ranging from temporary changes in availability to injury and mortality. Wind turbines and cables may influence water currents and electromagnetic fields, respectively, which can affect patterns of movement, spawning and recruitment success, and prey availability for various target, non-target, and protected species. Habitats directly at the turbine and cable sites would be affected, and there could be scouring concerns around turbines. Impacts on human communities in a general sense will be mixed – there will be economic benefits in the form of jobs associated with construction and maintenance, and replacement of some electricity generated using fossil fuels with renewable sources. There may be negative effects on fishing activities in terms of effort displacement, or making fishing more difficult or expensive near the turbines or cables.

While there are currently no operational wind farms in mid-Atlantic waters, potential offshore wind energy sites have been identified off Virginia, Maryland, New Jersey, Delaware, and New York. There are several proposals to develop wind farms in both nearshore and offshore waters. In New England, in addition to the existing Block Island Wind farm, offshore wind project

construction south of Massachusetts/Rhode Island may begin as early as 2020 (three projects including Vineyard Wind, Bay State Wind, and South Fork Wind Farm). Additional areas have been leased and will have site assessment activities in the next few years. These projects could have slight negative impacts on EFH, as well as fish species, and fishing communities if there are any negative impacts on those resources. Furthermore, there could be negative impacts on protected species of birds and marine mammals if they interact with the wind farms.

For oil and gas, this timeframe would include leasing and possible surveys. Seismic surveys impact the acoustic environment within which marine species live and have uncertain effects on fish behaviors that could cumulatively lead to negative population level impacts. The science on this is fairly uncertain. If marine resources are affected by seismic surveys, then so in turn the fishermen targeting these species would be affected. However, there would be an economic component in the form of increased jobs where there may be some positive effects on human communities.

The overall impact of offshore wind energy and oil and gas exploration on the affected species and their habitats on 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, as well as the effects of mitigation efforts

7.5.2. Magnitude and Significance of Cumulative Effects

In determining the magnitude and significance of the cumulative effects, the additive and synergistic effects of the proposed action (i.e., the suite of preferred alternatives), as well as past, present, and future actions, must be taken into account. The following sections describe the expected effects of these actions on each VEC. Those past, present, and reasonably foreseeable future actions which may impact the VECs, and the direction of those potential impacts, are summarized in section 7.5.1.

7.5.2.1. Magnitude and Significance of Cumulative Effects on Target and Non-Target Species

Overall, the cumulative effect of past, present, and reasonably foreseeable future fishing actions has resulted in positive effects on the species managed in the MSB FMP. Many of these actions likely also resulted in positive impacts for chub mackerel by constraining fishing effort and protecting habitats.

The Council has adopted conservation and management measures aimed at preventing overfishing while achieving, on a continuing basis, OY for managed species. For example, longfin squid were considered overfished in 2000, but action by the Council in subsequent years (i.e., reduced catch limits) resulted in stock rebuilding to the point that the species in no longer considered overfished. *Illex* squid has never been designated as overfished since passage of the Sustainable Fisheries Act, which amended the MSA in 1996. The butterfish stock has also been designated as fully rebuilt with a stock status above its target biomass. The latest assessment concluded it had never been overfished.

Past management measures implemented under the MSB FMP which help to control or reduce discards of non-target species in these fisheries, include: 1) limited entry and specifications which are intended to control or reduce fishing effort; 2) incidental and bycatch caps or allowances; and, 3) minimum mesh requirements. Actions taken through other FMPs have also

regulated MSB fishing to minimize bycatch, such as the Scup Gear Restricted Areas implemented through the Summer Flounder, Scup, and Black Sea Bass FMP.

In most cases the impacts of past, present and reasonably foreseeable non-fishing activities on target and non-target species were and are negative; however, these impacts are generally not quantifiable for pelagic and semi-pelagic species other than noting that climate change is likely to affect at least the distribution of these species (e.g., Overholtz et al 2011). Several offshore wind projects may begin construction in the near future. These could have potentially negative effects on longfin squid, at least during the construction phase, due to the potential for disruption of spawning behavior and reduced short-term recruitment. They could also have some positive effects if the areas around the wind turbines become de facto fishing closed areas. Given the fishing that regularly occurs on spawning squid over a broad area, such impacts during construction could be minor. Since these species occur over wide areas of the mid and north Atlantic Ocean and inhabit both inshore and offshore pelagic waters, it is not believed that any indirect anthropogenic activity currently impacts these populations significantly, even when considered together with the direct effects on these populations from fishing.

As noted above, none of the preferred alternatives are expected to result in significantly increased levels of fishing effort or changes to the character of that effort relative to current conditions. Therefore, the impacts of the fisheries on target and non-target species are not expected to change relative to current conditions under the preferred alternatives (i.e., generally positive for managed species and slight positive to slight negative for non-target species, depending on the species).

The proposed actions described in this document would positively reinforce the past and anticipated positive cumulative effects on target and non-target species by achieving the objectives specified in the respective FMPs. Therefore, the proposed action would have a positive, but not significant, effect on the managed species in consideration with other past, present, and reasonably foreseeable future actions.

7.5.2.2. MAGNITUDE AND SIGNIFICANCE OF CUMULATIVE EFFECTS ON HUMAN COMMUNITIES

Through implementation of this amendment, the Council seeks to achieve the primary objective of the MSA, which is to achieve OY from managed fisheries. As previously stated, by providing revenues and contributing to the overall functioning of and employment in coastal communities, the MSB fisheries and the chub mackerel fishery have both direct and indirect social impacts. The preferred alternatives are unlikely to result in substantial changes to levels of fishing effort or the character of that effort relative to current conditions.

Council management of the MSB fisheries through the original FMPs and subsequent amendments guided the development of domestic harvest and processing fishery infrastructure. Significant past management measures included development of limited access programs to control capitalization while maintaining sustainable harvest levels. FMP actions and annual specifications may have short term negative effects related to potentially reduced fishing opportunities; however, these actions generally also have long-term positive impacts for human communities by maintaining sustainable fisheries and allowing OY to be achieved on a continuing basis.

The non-fishing actions and activities described above have both positive and negative human community affects. For example, agricultural pollution may negatively impact marine resources and thus negatively impact human communities, but there are also benefits to human communities from the food and jobs created during agricultural operations. The same tradeoff exists for many non-fishing 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.

The proposed action, in conjunction with the past and future actions described above, should have ongoing positive, non-significant cumulative impacts for the communities which depend on these resources by maintaining stock sizes that lead to optimal sustainable harvests.

7.5.2.3. MAGNITUDE AND SIGNIFICANCE OF CUMULATIVE EFFECTS ON PROTECTED SPECIES

As described in section 6.3, numerous protected species inhabit the affected environment of this action. As previously stated, none of the preferred alternatives are expected to result in increases in fishing effort in the foreseeable future due to constraints such as market demand and low participation in the fishery to date. For the reasons described in section 7.3, the preferred alternatives are expected to have slight negative to slight positive impacts on protected species, depending on the alternative and species.

Prior to passage of the MSA and development of the MSB FMP, foreign prosecution of the MSB fisheries occurred at much higher levels of fishing effort and were likely a major source of mortality for a number of protected species. Elimination of these fisheries and subsequent controlled development of the domestic fisheries have resulted in lower fishing effort levels. The cumulative effect of the proposed measures in conjunction with past and future management actions under the FMP and take reduction measures developed under the MMPA should continue to reduce the impact of these fisheries on the protected species listed in section 6.3.

The indirectly negative actions described above are localized in nearshore and marine project areas where protected species occur; therefore, the magnitude of those impacts on protected species is expected to be limited due to limited exposure of the populations at large. Agricultural runoff may be much broader in scope and the impacts of nutrient inputs to the coastal system may be larger in magnitude; however, the impact on protected species is not quantifiable. NMFS has several means under which it can review non-fishing actions of other federal or state agencies that may impact protected species 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 protected species under NMFS' jurisdiction.

For these reasons, no significant cumulative impacts to protected species are expected. The resource conditions would be maintained (i.e., slight negative for ESA species and non-ESA listed MMPA species that have exceeded PBR; slight positive for non-ESA listed MMPA species below PBR), similar to previous years.

7.5.2.4. MAGNITUDE AND SIGNIFICANCE OF CUMULATIVE EFFECTS ON HABITAT

Overall, the cumulative effects of past, present, and reasonably foreseeable future fishing actions have resulted in slight negative effects on habitat, both in terms of MSB bottom trawl effort generally and on longfin squid eggs from all bottom trawling in applicable areas. Reductions in overall fishing effort and protection of sensitive habitats have mitigated some negative effects. The effects of the proposed action on habitat are expected to be slight negative for the reasons described in section 7.4.

Climate change is expected to have an impact on the physical characteristics and habitat aspects of marine ecosystems, and possibly change the very nature of these ecosystems. Increased frequency and intensity of extreme weather events (e.g., hurricanes), may change the physical structure of coastal areas. Water circulation, currents, and the proportion of source waters/freshwater intrusion is changing (NEFSC 2011). This influences salinity, water column stratification, transport of nutrients, and food web processes. All these factors, in addition to others like ocean acidification and changes to water chemistry, threaten living elements of the marine environment, such as corals and shellfish, and may be related to the observed shifts in the planktonic community structure that forms the basis of the marine food web (NEFSC 2011, Gledhill et al. 2015). Many additional activities, as described above, 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. Therefore, when considering the cumulative effects of this action in combination with past, present, and reasonably foreseeable future actions, impacts will remain slight negative and no significant impacts to the physical environment, habitat or EFH are expected.

7.5.3. SUMMARY OF CUMULATIVE EFFECTS

The direct impacts of the preferred alternatives on the VECs are described in section 7. Implementation of the measures considered in this document would be expected to generate positive impacts by preventing overfishing of chub mackerel and ensuring that the fisheries can achieve OY. Major increases in fishing effort are not expected; therefore, impacts to habitat, protected species, and non-target species are unlikely to change in a significant manner compared to current conditions. Indirect benefits of the preferred alternatives are likely to affect consumers and areas of the socioeconomic environment that interact in various ways with these fisheries. If management continues to prevent overfishing and rebuild overfished stocks, the fisheries and their associated communities should continue to benefit The impact of the proposed actions, when considered together with past, present, and reasonably foreseeable future actions are not expected to result in significant cumulative impacts on any of the VECs.

Table 18: Magnitude and significance of the cumulative, additive, and synergistic effects of the preferred alternatives, as well as past, present, and reasonably foreseeable future actions.

VEC	Current Status	Net Impact of Past, Present, and Reasonably Foreseeable Future Actions	Impact of the Preferred Actions	Significant Cumulative Effects
Chub Mackerel	Unknown but presumed positive - likely not overfished, overfishing likely not occurring (section 6.1.1)	Positive (section 7.5.2.1)	Moderate positive (section 7.1)	**None**
Non-target Species	Positive (not overfished, overfishing not occurring) or unknown depending on species (section 6.1.2)	Slight negative to slight positive (section 7.5.2.1)	Slight positive (section 7.1)	**None**
Human Communities	Emerging commercial fishery; recreational harvest is sporadic and variable (section 6.2)	Positive (section 7.5.2.2)	Slight negative to slight positive (section 7.2)	**None**
Protected Species	Varies by species (section 6.3)	Positive for most (section 7.5.2.3)	Slight negative to slight positive (section 7.3)	**None**
Habitat	Impacted by a variety of fishing and non-fishing activities (section 6.4)	Slight negative (section 7.5.2.4)	Slight negative (section 7.4)	**None**

8. APPLICABLE LAWS

8.1. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT (MSA)

Sections 4.3 and 5 describe how this action meets the MSA requirements for stocks in need of conservation and management. The following sections describe how this amendment is consistent with the ten National Standards and the EFH assessment requirements of the MSA.

8.1.1. NATIONAL STANDARDS

Section 301 of the MSA requires that FMPs contain conservation and management measures that are consistent with the ten National Standards. The consistency of the preferred alternatives with the ten National Standards is described below. Many preferred alternatives were modeled on measures previously implemented for other Council-managed species. The previous FMPs and amendments which implemented those measures describe their consistency with the ten National Standards (e.g., MAFMC 2011, MAFMC 2018a).

National Standard 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.

This amendment proposes implementing conservation and management measures that will prevent overfishing, while achieving OY for chub mackerel and the U.S. fishing industry on a continuing basis. Preferred alternatives include specification of OFL, MSY, and OY; catch limits; landings limits; and possession limits designed to ensure that the ABC recommended by

the SSC is not exceeded and that overfishing does not occur. Measures to mitigate the negative impacts of catch limit overages are also proposed (i.e., ACL overage paybacks, section 5.2.4.3).

National Standard 2: Conservation and management measures shall be based upon the best scientific information available.

The basis for each proposed management measure is described in section 5. Measures are based on fishery dependent and fishery independent data to the extent practicable. These data and the analysis in this document are reviewed by NMFS and corrected/revised as necessary. As previously described, chub mackerel are a severely data limited species. Many measures, including the ABC recommended by the SSC, are based on expert judgement of the best scientific information available rather than a rigorous scientific analysis (section 4.5, section 5, MAFMC 2018b). As new data and new analyses become available, the Council may decide to modify any of the management measures implemented through this amendment to ensure that they continue to be based upon the best scientific information available.

National Standard 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.

Chub mackerel are a migratory species found in Mid-Atlantic, New England, South Atlantic, Gulf of Mexico, and Caribbean waters either year-round or seasonally. Stock structure within this broad range is not well understood. Studies from other regions suggest that chub mackerel are genetically uniform across wide areas (Scoles et al. 1998, Hernández and Ortega 2000, Zardoya et al. 2004). The degree of mixing between different regions in the U.S. EEZ is unknown but could be considerable.

The Council asked the SSC to specify the geographic area over which the ABC applies based on their expert judgement. The SSC recommended an ABC that applies from Maine through the east coast of Florida (MAFMC 2018b). The range of management alternatives considered through this amendment was informed by the SSC's ABC recommendation; therefore, no alternatives for management measures in the Gulf of Mexico or Caribbean were considered. Ultimately, the Council approved a management unit of Maine through North Carolina. Catch from South Carolina through the east coast of Florida will count towards the ABC under this preferred alternative; however, the Council will not have the ability to develop management measures such as permit requirements or possession limits for fisheries in those states as they are outside the management unit.

The National Standard 3 Guidelines define management unit as "a fishery or that portion of a fishery identified in an FMP as relevant to the FMP's management objectives." They also state, "the choice of a management unit depends on the focus of the FMP's objectives, and may be organized around biological, geographic, economic, technical, social, or ecological perspectives…A less-than-comprehensive management unit may be justified if, for example…the unmanaged portion of the resource is immaterial to proper management." Section 4 of this document describes the purpose and need for this amendment, as well as the proposed FMP goals and objectives for chub mackerel.

Over the past 20 years, commercial and recreational landings of chub mackerel in Florida accounted for 0.3% of total east coast landings. No landings were reported in South Carolina or Georgia. According to a comment letter provided by the Florida Fish and Wildlife Conservation

Commission (FL FWC 2019), there is no directed fishery for chub mackerel off the east coast of Florida.

The Council agreed that given the scale of chub mackerel landings in South Carolina through Florida, this portion of the stock's range is immaterial to proper management and excluding those states from the management unit would not impair the Council's ability to meet the FMP goals of maintaining a sustainable stock, optimizing economic and social benefits from utilization of chub mackerel, and supporting science, monitoring, and data collection to enhance the effective management of chub mackerel fisheries (section 4.2). It is worth reiterating that under the preferred alternatives, although South Carolina through Florida are outside the management unit, the ABC, OY, and SDCs will account for South Atlantic catch.

If the fishery in the South Atlantic expands in the future, the Mid-Atlantic and South Atlantic Councils could work together to determine if a change in the management approach is warranted. The New England and South Atlantic Fishery Management Councils were consulted during development of the proposed management approach. Coordination with the New England Council took place through New England Council members on the MSB Committee and New England Council liaisons who attend each Mid-Atlantic Council meeting. Coordination with the South Atlantic Council took place through Mid-Atlantic Council members attending South Atlantic Council meetings as liaisons. In addition, the South Atlantic Council assisted with outreach to interested stakeholders prior to public hearings for this amendment.

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 privileges.

The preferred alternatives would implement a uniform set of management measures that apply to fishing in federal waters off Maine through North Carolina. No allocations among fishermen or states are proposed. None of the proposed management measures will discriminate between residents of different states.

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.

The preferred alternatives should promote efficiency because they will allow considerable flexibility for commercial and recreational fishermen and commercial fish dealers. For example, allocation of catch limits among the commercial and recreational sectors is not recommended. Possession limits are not proposed for the commercial fishery until 90% of the TAL is projected to be landed. No seasonal closures, gear restrictions, or minimum fish size limits are proposed. No recreational management measures other than permit requirements are proposed (section 5).

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

The preferred alternatives would implement a uniform set of management measures that apply to commercial and recreational fishermen fishing in federal waters off Maine through North Carolina. The preferred alternatives should allow for variations among, and contingencies in,

fisheries, fishery resources, and catches because they will allow considerable flexibility for commercial and recreational fishermen and commercial fish dealers. For example, possession limits are not proposed for the commercial fishery until 90% of the TAL is projected to be landed. This will allow maximum operational flexibility. No seasonal closures, gear restrictions, or minimum fish size limits are proposed. No recreational management measures other than permit requirements are proposed (section 5)

National Standard 7: Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

The Council considered the costs and benefits associated with each management alternative. As described in sections 7.2 and 8.10, the actions proposed in this document are not expected to result in notable new costs for fishery participants. None of the management measures considered, including non-preferred alternatives, would be expected to restrict the fisheries notably compared recent levels of effort and landings. Fishing effort and landings would be restricted compared to 2013 under all but the no action alternative; however, they would not be restricted compared to all other years over at least the past 20 years.

In developing the management alternatives, the Council sought to avoid unnecessary duplication with existing regulations. This is evidenced by objective 2.2 ("to the extent practicable, minimize additional limiting restrictions on the *Illex* squid fishery"), as well as the Council's decision not to develop alternatives for commercial possession limits prior to in-season closure, commercial gear requirements, commercial minimum fish sizes, or any management measures for the recreational fishery beyond permit requirements. The Council did not develop alternatives for these measures because they would be duplicative with existing regulations and/or would not be expected to provide measurable biological benefits and thus the costs could not be justified. The rationale for not developing and analyzing alternatives for these types of management measures is fully explained in section 5.3. In addition, the Council's preferred alternatives for permit requirements (alternatives 2.E.I.c and 2.E.II.c) would require commercial and recreational vessels to be permitted with one of the existing MSB commercial permits or the for-hire MSB permit. This alternative is less costly than the alternatives which would have created a new chub mackerel permit (alternatives 2.E.I.d and 2.E.II.d).

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 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.

As described in sections 7.2 and 8.10, the actions proposed in this document are not expected to result in notable new costs for fishery participants. None of the management measures considered would be expected to restrict the fisheries notably compared recent levels of effort and landings. Fishing effort and landings would be restricted compared to 2013 under all but the no action alternative; however, they would not be restricted compared to all other years over at least the past 20 years. No past participants in the fishery would be prohibited from continuing to participate at or close to their historic levels of participation. Limited access is not proposed. Trip limits are not proposed until landings approach the ACL. Under the preferred alternatives, annual landings could exceed those seen over at least the past 20 years, with the exception of 2013. As such, a change in revenues compared to those seen over the past 20 years is not expected.

In the long term, the proposed measures are expected to ensure sustainability of the fishery and provide indirect long-term socioeconomic benefits despite restricting how much chub mackerel can be harvested (section 7.2).

National Standard 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.

No measures aimed specifically at minimizing bycatch or the mortality of bycatch were considered. The impacts of all management alternatives on non-target species are described in section 7.1. None of the preferred alternatives are expected to negatively impact the stock status of non-target species. Under the preferred alternatives, existing requirements related to data collection for discarded species which apply to other Council-managed species would also apply to chub mackerel (e.g., VTRs, observer requirements, SBRM). Existing accountability measures for most of the primary non-target species would continue to address bycatch of those species.

National Standard 10: Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

Fishing participants must continually balance the risks imposed by weather and other factors against the potential 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 change current fishing practices or to negatively impact safety at sea.

8.1.2. ESSENTIAL FISH HABITAT ASSESSMENT

EFH assessments are required for any action that is expected to have an adverse impact on EFH, even if the impact is only minimal and/or temporary in nature (50 CFR Part 600.920 (e) (1-5)). As described in section 7, the preferred alternatives could allow for an increase in fishing effort compared to recent levels. This is not expected to happen over the foreseeable future due to constraints such as market demand and low participation in the chub mackerel fisheries to date. However, as it is possible under the preferred alternatives, the following EFH assessment was prepared.

Description of Action

As described in more detail in section 5, the proposed action includes the following preferred alternatives:

- Alternative 2: Manage chub mackerel as stock in MSB FMP
- Alternative 2.A.II: EFH defined based on the FMAT's recommendation
- Alternative 2.B.I: Maine through North Carolina Management Unit
- Alternative 2.C.I.a: Overfishing SDC based on reverse control rule approach; overfished SDC is 3 consecutive years of overfishing
- Alternative 2.C.II: ABC for 2020-2022 = 2,300 MT / 5.07 million pounds

- A TAL of 4.50 million pounds per year for 2020-2022 based on the following alternatives:
    - Alternative 2.C.III.a: OY for 2020-2022 = ABC
    - Alternative 2.C.IV.c: Expected South Carolina through Florida catch for 2020-2022 = 84,500 pounds
    - Alternative 2.C.V.a: Singe ACL with no commercial and recreational sub-ACLs or ACTs
    - Alternative 2.C.VI.b: 4% management uncertainty buffer
    - Alternative 2.C.VII.c: 6% discards buffer
- A 40,000 pound possession limit (alternative 2.D.II.d) when 90% of the TAL is projected to be landed (alternative 2.D.I.b), followed by a 10,000 pound possession limit (alternative 2.D.II.c) when 100% of the TAL is projected to be landed (alternative 2.D.I.d).
- Alternative 2.D.III.b: When the ACL is exceeded, catch in excess of the ACT will be deducted from a following year's ACT as a single year adjustment
- Alternative 2.E.I.c: Require any GARFO MSB commercial permit
- Alternative 2.E.II.c: Require a GARFO MSB party/charter permit
- Alternative 2.F.I.b: MSB specifications process applies to chub mackerel
- Alternative 2.F.II: MSY=ABC
- Alternative 2.F.III.b: Council ABC control rule and risk policy applies to chub mackerel
- Alternative 2.F.IV.b: SBRM applies to chub mackerel

Potential Adverse Effects of the Action on EFH

The types of habitat impacts caused by the gears used in the chub mackerel fisheries (predominantly bottom otter trawl in the commercial fishery and hook and line in the recreational fishery) are summarized in section 6.4.2.

As described in section 7, the proposed TAL of 4.50 million pounds could create the potential for increased fishing effort compared to recent years. This TAL is 14% lower than the historic high for landings in 2013; however, it is more than double the landings in all other years dating back to at least 1998 (Table 5). Fishing effort, the location of fishing effort, the amount of gear in the water, and the duration of time that gear is in the water are not expected to change substantially under this TAL given recent conditions in the fisheries, including low market demand, the influence of the *Illex* squid fishery, and limited participation in the chub mackerel fishery to date. These factors may result in landings below the preferred TAL. Therefore, the impacts of the preferred alternatives on habitat and EFH are expected to be slight negative due to continued *status quo* levels of impacts from fishing gears, especially bottom otter trawls (section 6.4.2). These impacts are expected to be similar to the impacts of the fishery in recent years.

Proposed Measures to Avoid, Minimize, or Mitigate Adverse Impacts of This Action

Amendment 9 to the MSB FMP considered the adverse impacts of bottom otter trawls in the MSB fisheries on habitat and closed Lydonia and Oceanographer Canyons to squid fishing (MAFMC 2008). Amendment 1 to the Tilefish FMP closed those canyons plus Veatch's and Norfolk Canyons to all bottom trawling (MAFMC 2009). Amendment 16 established deep sea coral protection zones where most types of bottom-tending gear are prohibited. These areas encompass about 38,000 square miles (MAFMC 2016). Although the chub mackerel fishery was not considered in those amendments, it is very similar to the *Illex* squid fishery, which was

considered. These amendments serve to minimize the adverse habitat impacts of MSB fisheries, including chub mackerel. None of the alternatives in this document were designed to avoid, minimize, or mitigate adverse impacts on EFH.

Federal regulations require periodic reviews of EFH. The Council is currently undertaking a multi-year effort to provide new and improved habitat science products (e.g., more comprehensive habitat use information, integrative habitat use modeling tools, and refined maps) that will allow the Council to review and potentially revise its existing EFH maps and text descriptions. When these improved habitat science products are available, the Council may consider initiating an additional action to consider habitat impacts if necessary.

Conclusions

Overall, the proposed action is expected to have slight negative impacts on EFH; therefore, an EFH consultation is required.

1.1. NEPA FINDING OF NO SIGNIFICANT IMPACT (FONSI)

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 (NOAA) 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 (i.e., the suite of preferred alternatives) 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 and summarized in Table 2, the preferred alternatives are expected to have both beneficial and slightly adverse impacts, depending on the alternative and VEC. Some alternatives will have no impacts or negligible impacts on one or more VECs. The preferred alternatives which could impact chub mackerel are expected to have slight to moderate positive impacts by helping to maintain the current presumed positive status of the stock (MAFMC 2018b). Similarly, those preferred alternatives which could impact non-target species are expected to have slight positive impacts by maintaining their current stock status (i.e., positive or unknown, depending on the species). The preferred alternatives which could impact human communities are expected to have mostly slight positive impacts due to the potential revenues, fishing opportunities, angler satisfaction, and spillover benefits under the preferred alternatives; however, some alternatives could also have slight negative socioeconomic impacts, for example, due to the potential for reduced landings in some situations and additional permit requirements. The preferred alternatives which could impact protected species are expected to have negligible to slight negative impacts on ESA-listed species and slight negative to slight positive impacts on non-ESA listed marine mammals, depending on the stock, due to continued *status quo* levels of interactions between fishing gear and those species. The preferred alternatives which could impact habitat are expected to have generally slight negative impacts by maintaining past levels of interactions between fishing gear and habitat.

As described in more detail in section 7, the impacts of all preferred alternatives on all VECs are expected to fall within the range of impacts that occurred from past levels of fishing effort and landings. None of the impacts are expected to be more positive or more negative than the

impacts of the fishery over the past 20 or more years. Under the preferred alternatives, fishing effort and behavior are not expected to change notably compared to recent levels. An increase in fishing effort and landings compared to most, but not all, recent years is possible under the preferred alternatives; however, fishing effort and landings are influenced by many factors other than the proposed management measures (section 6.2) and a notable increase is not expected. The proposed management measures will limit the magnitude of any potential increase in fishing effort and landings and thus will limit the magnitude of the resulting impacts of those increases on the VECs.

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

The preferred alternatives are not expected change current fishing practices, to negatively impact safety at sea, or to otherwise impact public health or safety. Fishery participants constantly balance the safety risks imposed by weather and other factors against the potential economic benefits. The safety of a vessel and the people aboard is ultimately the responsibility of the master of the vessel. Each master makes many decisions about vessel maintenance and loading, and about the capabilities of the vessel and crew to ensure safe operations in a variety of weather and sea conditions. This decision making is not expected to be impacted by the preferred alternatives.

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 preferred alternatives are not expected to alter fishing methods or activities or to substantially increase fishing effort. Many types of fishing already occur in the impacted areas. Although it is possible that historic or cultural resources such as shipwrecks could be present, vessels try to avoid fishing too close to most physical structures due to possible loss or entanglement of fishing gear. Therefore, it is not likely that the preferred alternatives would result in substantial impacts to unique areas.

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

As described in section 4.5, chub mackerel is a severely data-limited species. The proposed management measures and the analysis of their expected impacts on the VECs were based on analysis of available data to the extent possible; however, given notable data limitations, many proposed management measures and impacts conclusions were based on expert judgement. Many proposed management measures were modeled on existing measures for other Council-managed species (section 5).

As described in section 6.2, the commercial and recreational chub mackerel fisheries are not large in terms of number of participants and landings in most years. As described in section 7, the preferred alternatives are not expected to result in notable changes in fishing effort or landings compared to current conditions, and thus they are not expected to result in notable changes in the impacts of the fisheries on the VECs.

For these reasons, the preferred alternatives are not expected to have highly controversial effects on the quality of the human environment.

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

The impacts of the preferred alternatives on the human environment are described in section 7. The preferred alternatives are not expected to alter fishing methods or activities or to substantially increase fishing effort or the spatial and/or temporal distribution of current fishing effort. The impacts to target species, non-target species, and protected species will continue to be monitored. The preferred alternatives are not expected to have highly uncertain effects or to involve unique or unknown risks on the human environment.

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 preferred alternatives are not expected to substantially increase fishing effort or the spatial and/or temporal distribution of current fishing effort. The preferred alternatives are consistent with MSA requirements, the National Standards Guidelines, and precedent set by other FMP actions. The impacts of any future changes will be analyzed as to their significance in the process of developing and implementing them.

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

As discussed in section 7.5, the preferred alternatives are not expected to have individually insignificant, but cumulatively significant impacts. The preferred alternatives, together with past, present, and reasonably foreseeable future actions, 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 impacts of the preferred alternatives on the human environment are described in section 7. The preferred alternatives are not expected to alter fishing practices. 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 possible loss or entanglement of fishing gear. Therefore, it is not likely that the preferred alternatives would adversely affect the historic resources listed above.

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?

As previously stated, bottom otter trawls account for most chub mackerel catch and have the potential to interact with endangered and threatened species. As described in section 7.3, the expected levels of fishing effort under the preferred alternatives are expected to result in negligible to slight negative impacts for ESA-listed species (depending on the alternative and species) because they are not expected to contribute to the recovery of these populations.

The preferred alternatives are not expected to alter overall fishing operations, lead to a substantial increase of fishing effort, or alter the spatial and/or temporal distribution of current fishing effort in a manner that would increase interaction rates with protected species (section7.3).

Until recently, the NMFS 2013 Opinion on the operation of seven commercial fisheries, including the MSB FMP, remained in effect; however, new information on North Atlantic right whales has been made available that may reveal effects of the fisheries analyzed in the 2013 Opinion that may not have been previously considered (Pettis et al. 2018, Pace et al. 2017). As a result, per an October 17, 2017, ESA 7(a)(2)/7(d) memo issued by NMFS, the 2013 Opinion has been reinitiated. This memo concluded 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; therefore, the continuation of these fisheries during the reinitiation period would not be likely to jeopardize the continued existence of any ESA listed species. The chub mackerel fishery was not considered in the 2013 Opinion as it was unmanaged at the time; however, the chub mackerel fishery will not represent a new FMP, it will be added to the MSB FMP. In addition, as previously stated, the commercial chub mackerel fishery uses the same gear type and operates in the same areas and at the same time of year as the *Illex* squid fishery. Adding the chub mackerel fishery to the MSB FMP is not expected to result in change in fishing effort in any fisheries, as described in more detail in section 7. Taking these facts into consideration, the conclusions regarding the MSB FMP in the October 17, 2017 memo are also applicable to chub mackerel fishery.

The chub mackerel fisheries will not affect the essential physical and biological features of North Atlantic right whales or loggerhead sea turtles (Northwest Atlantic Ocean DPS) critical habitat and therefore, will not result in the destruction or adverse modification of critical habitat (NMFS 2014a; NMFS 2015a, 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, fishing effort is not expected to substantially increase under the preferred alternatives. In addition, none of the proposed measures are expected to substantially alter fishing methods, activities, or the spatial and/or temporal distribution of fishing effort. Thus, it is not expected that they would threaten a violation of Federal, State, or local law or requirements imposed for the protection of the environment. The proposed measures have been found to be consistent with other applicable laws as described in this section.

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

The gear used in the chub mackerel fishery is known to interact with MMPA protected species. As described in section 7, fishing effort is not expected to substantially increase under the preferred alternatives. In addition, none of the preferred alternatives are expected to substantially alter fishing methods, activities, or the spatial and/or temporal distribution of fishing effort. Based on this, and for the reasons described in section 7.3, impacts to non-ESA listed marine mammals are expected to range from slight negative to slight positive, depending on the species.

As previously described, some marine mammal stocks/species are experiencing levels of interactions that have resulted in exceedance of their PBR levels. These stocks/populations are not at an optimum sustainable level and therefore, their continued existence is at risk. As a result, any potential for an interaction is a detriment to their ability to recover from this condition. As interactions with non-ESA listed marine mammals are possible under all preferred alternatives, for these species/stocks, the proposed action is likely to result in slight negative impacts, depending on the alternative and species.

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 interaction levels that are not expected to impair their ability to remain at an optimum sustainable level. These fishery management measures, therefore, have resulted in slight positive impacts to these non-ESA listed marine mammal species/stocks, depending on the alternative and species. Should future fishery management actions maintain similar operating conditions as they have over the past several years, it is expected that these slight positive impacts would remain. Thus, given that the preferred alternatives are not expected to significantly change fishing effort relative to current conditions, the impacts on non-ESA listed species of marine mammals with positive stock status are expected to be slight positive (i.e., continuation of current operating conditions is not expected to result in exceedance of any of these stocks/species PBR level).

12. Can the proposed action reasonably be expected to adversely affect managed fish species?

As described in section 7, none of the preferred alternatives are expected to jeopardize the sustainability of chub mackerel; they are expected to prevent overfishing and ensure the long-term sustainability of the fishery.

The preferred alternatives are not expected to jeopardize the sustainability of any non-target species (section 7.1) because they are not expected to result in substantial increases in fishing effort. The current stock status of all non-target species (i.e., positive or unknown for the primary non-target species; section 6.1.2) is expected to be maintained under the preferred alternatives.

Although no groundfish species were identified as primary non-target species, the preferred alternatives have implications for the small mesh multispecies regulations developed by the New England Fishery Management Council. These regulations are intended to restrict bycatch of groundfish species. Exemptions from these restrictions can been approved if the incidental catch of regulated groundfish species in the exempted fisheries is less than 5% of the total catch by weight and if it can be demonstrated that the exemption will not jeopardize fishing mortality objectives. During 1999-2018, 19 observed commercial fishing trips kept at least 5,000 pounds of chub mackerel. As previously stated, this is likely a very low threshold to define a chub mackerel trip. On these 19 trips, the only regulated groundfish species recorded in the catch were red hake/ling, silver hake/whiting, and black hake/offshore hake. On all 19 trips, catch of these species accounted for 1% or less of the total catch. For this reason, the preferred alternatives, and any changes to the small mesh multispecies exemptions deemed necessary to meet the intent of this amendment, are expected to have negligible impacts on groundfish species.

None of the preferred alternatives are expected to substantially alter fishing methods or the temporal and/or spatial distribution of fishing activities. Therefore, none of the preferred alternatives are expected to jeopardize the sustainability of managed or 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 preferred alternatives are not expected to cause additional damage to ocean or coastal habitats, and/or EFH as defined under the MSA and identified in FMPs (section 7.4). Bottom otter trawl gear accounts for most chub mackerel catch and has the potential to adversely affect EFH for the benthic life stages of a number of species in the Northeast region (Table 14).

However, none of the preferred alternatives are expected to cause a substantial increase in fishing effort relative to current conditions; therefore, they are not expected to have substantial negative impacts on habitat and EFH.

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

The preferred alternatives are not expected to have significant impacts on the natural or physical environment, including vulnerable marine or coastal ecosystems. The preferred alternatives are not expected to alter fishing methods or activities or to substantially increase fishing effort or the spatial and/or temporal distribution of current fishing effort. The areas fished for chub mackerel have been fished for many years, and for a variety of species, and this action is not expected to change the locations of fishing activity. While some fishing may take place near the continental slope/shelf break where deep sea corals may be found in and around the submarine canyons, much of this area in the mid-Atlantic is now protected by a prohibition on bottom-tending gear in the Frank R. Lautenberg Deep Sea Coral Protection Area (81 Federal Register 90246; December 14, 2016). The preferred alternatives are not expected to alter fishing patterns relative to this protected area or in any other manner that would lead to adverse impacts on deep sea coral or other vulnerable marine or coastal ecosystems.

15. Can the proposed action reasonably be expected to adversely affect biodiversity or ecosystem functioning (e.g., benthic productivity, predator-prey relationships, etc.)?

As described in more detail in section 6.1.1, few studies have identified chub mackerel to the species level in the diets of any predators. Only one study with quantitative data on the role of chub mackerel in the diets of any predators off the U.S. east coast has been identified (Manooch et al. 1984). Chub mackerel have been documented as prey for some fish, sea bird, and marine mammal predators in other parts of the world; however, the diet composition of predators may vary by geography and can be plastic. Therefore, the importance of chub mackerel in the diets of predators in other parts of the world does not necessarily indicate its importance off the U.S. east coast. To address this data limitation, the Council funded a study focusing on chub mackerel and other prey in the diets of tunas and marlins, which were identified by public comments as predators of key interest. The Council will review the final results of this study once they are available, likely in 2020.

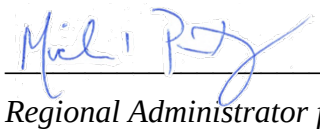
Due to current data limitations, the impacts of chub mackerel fisheries on biodiversity and ecosystem functioning have not been quantitatively assessed; however, impacts to components of the ecosystem (i.e., non-target species, habitat, and protected species) have been considered in this document. As described in section 7, the preferred alternatives are not expected to result in a notable change in the amount of or spatial/temporal distribution of effort. These expected levels of effort are not likely to negatively impact the stock status of non-target species (section 7.1), they are not likely to cause additional habitat damage beyond that previously caused by a variety of fisheries (section 7.4), and they are not expected to jeopardize any protected species (section 7.3). They are, however, not expected to contribute to the recovery of any endangered or threatened species. For these reasons, the preferred alternatives are not expected to have a substantial impact on biodiversity and ecosystem function 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 the fisheries impacted by the proposed action have ever resulted in the introduction or spread of nonindigenous species. The preferred alternatives are not expected to alter fishing methods or activities and are is not expected to substantially increase fishing effort or the spatial and/or temporal distribution of current fishing effort. Therefore, it is highly unlikely that the preferred alternatives would result in the introduction or spread of a non-indigenous species.

DETERMINATION

In view of the information presented in this document, it is hereby determined that the measures proposed in the Chub Mackerel Amendment will not significantly impact the quality of the human environment as described above 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.



_____ May 1, 2020

Regional Administrator for GARFO, NMFS, NOAA *Date*

that would otherwise occur if consultation had not been reinitiated. Based on this, the memo concluded that the continuation of these fisheries during the reinitiation period would not be likely to jeopardize the continued existence of any ESA listed species. Considering this and the analysis of impacts in section 7.3, the proposed action, in conjunction with other activities, is not expected to result in jeopardy of 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 the MSB fisheries.

8.4. Marine Mammal Protection Act

Section 6.3 lists and describes the marine mammal species which inhabit the affected environment of this action. As described in section 6.3, various marine mammal species have the potential to interact with the gear types used in the chub mackerel fishery (i.e., bottom trawl and hook and line gear). None of the proposed measures are expected to significantly alter fishing methods or activities or result in substantially increased fishing effort. The Council reviewed the impacts of the proposed measures on marine mammals (section 7.3) and concluded that they are consistent with the provisions of the MMPA. The preferred alternatives would not alter existing measures to protect marine mammals.

A final determination of consistency with the MMPA will be made by NMFS during rulemaking for this action.

8.5. Coastal Zone Management Act

The Coastal Zone Management Act of 1972, as amended, provides measures for ensuring productive fishery habitat while striving to balance development pressures with social, economic, cultural, and other impacts on the coastal zone. The Council developed this Amendment document and will submit it to NMFS. NMFS will determine whether the proposed actions are consistent to the maximum extent practicable with the coastal zone management programs for each state (Maine through North Carolina).

8.6. Administrative Procedure Act

Sections 551-553 of the Federal Administrative Procedure Act establish 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 notice and opportunity to comment before the agency promulgates new regulations.

The Administrative Procedure Act requires solicitation and review of public comments on actions taken in the development of an FMP and subsequent amendments and framework adjustments. There were many opportunities for public review, input, and access to the rulemaking process during the development of the proposed management measures described in this document and during the development of this document. This action was developed through a multi-stage process that was open to review by affected members of the public. The public had the opportunity to review and comment on management measures during the following meetings:

- Six Council meetings at the following dates and locations:
    - April 2017 in Avalon, NJ
    - August 2017 in Philadelphia, PA
    - December 2017 in Annapolis, MD
    - June 2018 in Philadelphia, PA
    - October 2018 in Cape May, NJ
    - March 2019 in Virginia Beach, VA
- Six scoping hearings in May 2017 at the following locations:
    - Brooklyn, NY
    - Newport News, VA
    - Ocean City, MD
    - Cape May, NJ
    - Narragansett, RI
    - Webinar
- Five public hearings at the following dates and locations:
    - December 2018 in Virginia Beach, VA
    - December 2018 in Berlin, MD
    - December 2018 in Narragansett, RI
    - December 2018 in Cape May, NJ
    - January 2019 via webinar
- Four MSB Advisory Panel and/or Committee meetings at the following dates and locations:
    - May 2018 in Baltimore, MD (joint Advisory Panel and Committee)
    - September 2018 via webinar (joint Advisory Panel and Committee)
    - February 2019 via webinar (Advisory Panel)
    - February 2019 via webinar (Committee)
- Three SSC meetings at the following dates and locations:
    - March 2017 via webinar
    - July 2017 in Baltimore, MD
    - July 2018 in Baltimore, MD
- Four Fishery Management Action Team meetings at the following dates and locations:
    - June 2017 in Gloucester, MA
    - April, May, and August 2019 via webinar
- The NMFS Highly Migratory Species Advisory Panel meeting in March 2018 in Silver Spring, MD.

The public will have further opportunity to comment on this document and the proposed management measures once NMFS publishes a request for comments notice in the Federal Register.

8.7. 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 of Information Product

This document includes a description of the purpose and need of the proposed action (section 4), the measures proposed (section 5), and the impacts of those measures (section 7). The rationale for selecting the preferred alternatives is also described (section 5).

Until a proposed rule is prepared and published, this document is the principal means by which the information contained herein is available to the public. The information provided in this document is based on the most recent available information from the relevant data sources. The development of this document and the decisions made by the Council are the result of a multi-stage public process (section 8.6). The information contained in this document has been improved based on comments from the public, the fishing industry, members of the Council, and NMFS.

This document is available as a printed publication and online. The Federal Register notice that will announce the proposed rule and the final rule and implementing regulations will be made available in printed publication, on GARFO's website, and through the Regulations.gov website. The Federal Register documents will provide metric conversions for all relevant measurements.

Integrity of Information Product

Prior to dissemination, information associated with this action, independent of the specific intended distribution mechanism, is safeguarded from improper access, modification, or destruction to a degree commensurate with the risk and magnitude of harm that could result from the loss, misuse, or unauthorized access to or modification of such information. All electronic information disseminated by NMFS adheres to the standards set out in Appendix III (Security of Automated Information Resources) of the Office of Management and Budget Circular A-130, the Computer Security Act, and the Government Information Security Act. All confidential information (e.g., dealer reports and VTRs) is safeguarded pursuant to the Privacy Act; Titles 13, 15, and 22 of the U.S. Code (confidentiality of census, business, and financial information); the confidentiality of statistics provisions of the MSA; and NOAA Administrative Order 216-100 (Protection of Confidential Fisheries Statistics).

Objectivity of Information Product

For purposes of the pre-dissemination review, this document is considered a Natural Resource Plan. Accordingly, this document adheres to the published standards of the MSA, the Operational Guidelines, FMP process, EFH Guidelines, National Standard Guidelines, and NOAA Administrative Order 216-6A (compliance with the National Environmental Policy Act) and its companion manual.

This document uses information of known quality from sources acceptable to the relevant scientific and technical communities. Landing and revenue information is based on information collected through the VTR and commercial dealer databases. Information on catch composition by tow is based on reports collected by NEFOP. These reports are developed using an approved, scientifically valid sampling process. Additional information is presented that has been accepted and published in peer-reviewed journals or by scientific organizations. Original analyses in this document were prepared using data from accepted sources and the analyses have been reviewed by members of the Chub Mackerel Fishery Management Action Team and other NMFS staff with expertise on the subject matter.

Despite current data limitations, the conservation and management measures proposed through this action were selected based upon the best scientific information available. The analyses conducted in support of the proposed action were conducted using information from the most recent complete calendar years, generally through 2018 except as noted. Specialists 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 (i.e., management alternatives considered in this action) are clearly articulated in section 5 of this document. The supporting science and impact analyses upon which the policy choices are based are described in sections 5-7. All supporting materials, information, data, and analyses within this document have been, to the maximum extent practicable, properly referenced according to commonly accepted standards for scientific literature to ensure transparency.

The review process used in preparation of this document will involve Council, NEFSC, GARFO, and NMFS Headquarters staff. The NEFSC's technical review is conducted by senior level scientists with specialties in population dynamics, stock assessment methods, population biology, and the social sciences. Review by GARFO staff is conducted by those with expertise in fisheries management and policy, habitat conservation, protected species, and compliance with the applicable law. The Council review process involves public meetings at which affected stakeholders have opportunity to provide comments on various aspects of the document (section 8.6). Final approval of the action proposed in this document and clearance of any rules prepared to implement resulting regulations is conducted by staff at NMFS Headquarters, the Department of Commerce, and the U.S. Office of Management and Budget.

8.8. 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, as well as to maximize the usefulness of information collected by the Federal government. The authority to manage information and recordkeeping requirements is vested with the Director of the Office of Management and Budget. This authority encompasses establishment of guidelines and policies, approval of information collection requests, and reduction of paperwork burdens and duplications.

The preferred alternatives will not result in any new reporting requirements; however, they may increase the number of individuals subject to existing reporting requirements. Specifically, under the preferred permit requirements alternatives, commercial and party/charter vessels which retain chub mackerel in the management unit would be required to have a commercial or recreational MSB permit through GARFO (section 5.2.5). Individuals who would be required to obtain such permits for the first time under this alternative would also be required to abide by the reporting requirements associated with those permits (e.g., 50 CFR §648.7). These are not new reporting requirements. As described in section 7.2.2.7, these alternatives could impact around 4 commercial vessels and at least 52 for-hire vessels.

8.9. Federalism/Executive Order 13132

Executive Order 13132 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.

No federalism issues or implications have been identified relative to the measures proposed in this amendment. 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 and MSB Committee. No comments were received from any state officials relative to any federalism implications that may be associated with this action.

8.10. Regulatory Flexibility Act and Regulatory Impact Review

This section provides analysis to address the requirements of Executive Order 12866 (Regulatory Planning and Review) and the Regulatory Flexibility Act. These two mandates are addressed together as many of their requirements are duplicative. In addition, many of their requirements duplicate those of the MSA and/or NEPA; therefore, this section contains several references to previous sections of this document.

8.10.1. Basis and Purpose of the Rule and Summary of Preferred Alternatives

This action is taken under the authority of the MSA and regulations at 50 CFR part 648.

Section 4.1 includes the NEPA purpose and need for this action. Section 4.2 lists the Council's FMP and amendment goals and objectives for chub mackerel.

As described in more detail in section 5, the preferred alternatives are as follows:

- Alternative 2: Manage chub mackerel as stock in MSB FMP
- Alternative 2.A.II: EFH defined based on the FMAT's recommendation
- Alternative 2.B.I: Maine through North Carolina Management Unit
- Alternative 2.C.I.a: Overfishing SDC based on reverse control rule approach; overfished SDC is 3 consecutive years of overfishing
- Alternative 2.C.II: ABC for 2020-2022 = 2,300 MT / 5.07 million pounds
- A TAL of 4.50 million pounds per year for 2020-2022 based on the following alternatives:
    - Alternative 2.C.III.a: OY for 2020-2022 = ABC
    - Alternative 2.C.IV.c: Expected South Carolina through Florida catch for 2020-2022 = 84,500 pounds
    - Alternative 2.C.V.a: Singe ACL with no commercial and recreational sub-ACLs or ACTs
    - Alternative 2.C.VI.b: 4% management uncertainty buffer
    - Alternative 2.C.VII.c: 6% discards buffer
- A 40,000 pound possession limit (alternative 2.D.II.d) when 90% of the TAL is projected to be landed (alternative 2.D.I.b), followed by a 10,000 pound possession limit (alternative 2.D.II.c) when 100% of the TAL is projected to be landed (alternative 2.D.I.d).
- Alternative 2.D.III.b: When the ACL is exceeded, catch in excess of the ACT will be deducted from a following year's ACT as a single year adjustment
- Alternative 2.E.I.c: Require any GARFO MSB commercial permit
- Alternative 2.E.II.c: Require a GARFO MSB party/charter permit

- Alternative 2.F.I.b: MSB specifications process applies to chub mackerel
- Alternative 2.F.II: MSY=ABC
- Alternative 2.F.III.b: Council ABC control rule and risk policy applies to chub mackerel
- Alternative 2.F.IV.b: SBRM applies to chub mackerel

8.10.2. REGULATORY FLEXIBILITY ACT

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

The Regulatory Flexibility Act emphasizes predicting significant adverse impacts on small entities as a group distinct from other entities, as well as consideration of alternatives that may minimize negative impacts to small entities, while still achieving the objective of the action (section 8.10.4). 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 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 that describes the impact of the proposed rule on small entities.

The sections below provide supporting analysis to assess whether the proposed regulations will have a "significant impact on a substantial number of small entities."

8.10.2.1. DESCRIPTION AND NUMBER OF ENTITIES TO WHICH THE RULE APPLIES

The small entities affected by the preferred alternatives include commercial and for-hire fishing operations which retain chub mackerel caught in the EEZ off Maine through North Carolina. Private anglers are not considered "entities" under the Regulatory Flexibility Act; therefore, economic impacts on private recreational anglers are not discussed here.

For Regulatory Flexibility Act purposes only, NMFS established small business size standards for businesses, including their affiliates, whose primary industry is commercial or recreational (i.e., for-hire) fishing (50 CFR §200.2). A business primarily engaged in commercial fishing is classified as a small business if it is independently owned and operated, is not dominant in its field of operation (including its affiliates), and has combined annual receipts not in excess of $11.0 million for all its affiliated operations worldwide. A for-hire fishing business is considered a small business if it is independently owned and operated, is not dominant in its field of operation (including its affiliates), and has combined annual receipts not in excess of $7.5 million.

Vessel ownership data were used to identify all individuals who owned fishing vessels during 2015-2017. Vessels were grouped according to common owners and the resulting groupings

were treated as businesses, or affiliates, for purposes of identifying small and large businesses. Affiliate data through 2018 were not available at the time of writing this document.[25]

Affiliates were identified as potentially impacted by this action if any of their associated vessels reported any amount of chub mackerel landings on VTRs submitted to the NMFS Greater Atlantic Regional Fisheries Office during 2008 - 2017. Landings reported as caught in statistical south of the North Carolina/South Carolina border (i.e., the southern extent of the preferred management unit) were excluded from this analysis.

The timeframe used to identify any amount of chub mackerel landings at the vessel level (i.e., 2008-2017) is longer than that used to group vessels into affiliates based on shared ownership (i.e., 2015-2017). Affiliates are identified based on ownership during only the most recent three years; therefore, it is not possible to use a longer time frame to identify potentially impacted affiliates (personal communication, Min-Yang Lee, NEFSC). By using a longer time frame for landings, affiliates associated with any amount of chub mackerel landings during 2008-2014, but no chub mackerel landings during 2015-2017, were identified as potentially impacted by this action. This helps to account for the sporadic nature of targeted fishing effort and variable year-to-year abundance in the mid-Atlantic and southern New England (sections 6.1.1 and 6.2).

Under the preferred alternatives, all commercial and for-hire vessels which retain any amounts of chub mackerel in the management unit would be required to have a federal MSB commercial or for-hire fishing permit. For this reason, even vessels with very low amounts of chub mackerel landings over the past ten years were included in this analysis.

The methodology used to identify potentially impacted affiliates may under-count the potentially impacted vessels and affiliates for a number of reasons. For example, the affiliate groupings are based on federal vessel ownership data and do not account for ownership of vessels without federal permits. The number of potentially impacted vessels which do not currently hold any federal permits is unknown; however, dealer data suggest that the number of vessels which sold chub mackerel to a commercial fish dealer during 2008-2017 and did not have a federal permit is likely less than 10. In addition, as previously stated, the affiliate groupings are based on vessel ownership during 2015-2017. As such, vessels which reported chub mackerel landings during 2008-2017, but were not associated with a federal permit in 2015-2017 were not included in the analysis. Lastly, the affiliate database does not account for 2013, the year with the highest commercial chub mackerel landings, though it does contain the second highest year (2015). It also does not account for the two highest years of estimated recreational landings within the management unit (2014 and 2018; Table 5).

Based on this methodology, 86 affiliates were identified as commercial businesses potentially impacted by this action. Of these, 85 (99%) were classified as small businesses based their average receipts in 2015-2017. These 86 affiliates had average annual revenues from commercial fishing of $1,343,855 during 2015-2017. Twenty-five commercial affiliates (29% of the 86 identified) had average annual revenues from commercial fishing of less than $100,000. Forty commercial affiliates (46% of the 86 identified) had average annual revenues from commercial fishing of greater than $100,000 and less than $1,000,000. Twenty-two commercial affiliates (25% of the 86 identified) had average annual revenues from commercial fishing of at least

[25] Affiliate database for 2015-2017 was provided by the NMFS NEFSC Social Science Branch.

$1,000,000. During 2015-2017, chub mackerel accounted for greater than 1% of total revenues for fewer than three of the 86 commercial affiliates identified.

The 86 commercial affiliates were not all exclusively engaged in commercial fishing. On average across all 86 commercial affiliates, 96% of their total annual revenues came from commercial fishing. Ten of these 86 affiliates reported no revenues from commercial fishing in one or two of the three years during 2015-2017. Three of the 86 commercial affiliates reported greater revenues from recreational fishing than from commercial fishing during 2015-2017.

Seventy seven affiliates were identified as for-hire businesses potentially impacted by this action. All 77 for-hire affiliates were classified as small businesses based on their average receipts in 2015-2017. These 77 affiliates had average annual revenues from for-hire fishing of $316,860 during 2015-2017. Almost half of these 77 affiliates (34) had average annual revenues from for-hire fishing of less than $50,000. Six recreational affiliates (8% of the 77 identified) had average annual revenues from for-hire fishing of at least $1,000,000.

The 77 for-hire affiliates were not all exclusively engaged in for-hire fishing. On average across all 77 affiliates, 91% of their total annual revenues came from for-hire fishing. Sixteen of these affiliates reported no revenues from for-hire fishing in at least one year during 2015-2017. Seven of the 77 for-hire affiliates reported greater revenues from commercial fishing than from recreational fishing during 2015-2017.

Revenues generated from individual species are not available for for-hire fisheries. Based on the available information and public comments received to date (section 6.2.2), it is assumed that there targeted for-hire chub mackerel fishing effort in the proposed management unit is low. Therefore, it can be assumed that chub mackerel was a minor contributor to the annual revenues of the 77 for-hire affiliates potentially impacted by this action.

8.10.2.2. ECONOMIC IMPACTS ON REGULATED ENTITIES

The preferred alternatives for management unit, ABC, OY, expected SC-FL catch, management uncertainty, expected discards, in-season closure and associated possession limits, ACL overage paybacks, and permit requirements are expected to have direct economic impacts. The other preferred alternatives (EFH, SDCs, MSY, sector ACLs/ACTs, specifications, ABC control rule and risk policy, and SBRM) are not expected to have direct economic impacts; therefore, they are not addressed in this section. The alternatives are described in detail in section 5. The economic impacts of all alternatives are described in section 7.2.

The impacts of the preferred alternatives for management unit and permit requirements will likely be minor compared to the alternatives which directly impact landings. The management unit alternative defines which fishermen are subject to the proposed management measures (i.e., all commercial and recreational fishermen who retain chub mackerel caught in federal waters off Maine through North Carolina). The preferred permit requirement alternatives specify that all commercial and for-hire vessels which retain chub mackerel caught in the management unit must have a commercial or for-hire MSB permit through GARFO. As described in section 7.2.2.7, these alternatives could impact around 4 commercial vessels and at least 52 for-hire vessels. Vessels could obtain an open access permit to meet this requirement. There is no monetary charge for obtaining a permit; however, there are minor time costs associated with the permit application.

The preferred alternatives for ABC, OY, expected SC-FL catch, management uncertainty, and expected discards result in a TAL of about 4.50 million pounds, which applies to both commercial and recreational fisheries. Over the past 20 years (through 2018), commercial and recreational landings from Maine through Florida exceeded 4.50 million pounds in only one year (Table 5). In 2013, total landings were about 5.25 million pounds, 17% greater than the proposed TAL. Thus, the preferred alternatives are expected to allow the fisheries to achieve the same level of economic benefits as they have in every past year except 2013. This is expected to result in generally slight positive socioeconomic impacts for all potentially impacted entities. These impacts are expected to be slight because, as described in the previous section, chub mackerel accounts for a very low percentage of total revenues for almost all potentially impacted affiliates. Although the economic importance of chub mackerel is generally low, it can be high for a small number of vessels and affiliates in certain years. For example, some captains have described chub mackerel as a "bailout" in years when *Illex* squid availability is low (section 6.2.1).

The proposed commercial possession limits will come into effect once 90% and 100% of the TAL is projected to be landed. Commercial fishing operations should not experience notable economic impacts from the preferred alternatives until these possession limits come into effect. Under the preferred alternatives, a 40,000 pound possession limit will come into effect once 4.05 million pounds of chub mackerel (i.e., 90% of the TAL) are projected to be landed in the management unit. A 10,000 pound possession limit will come into effect once 4.50 million pounds (i.e., 100% of the TAL) are projected to be landed. If these measures had been in effect in the past, these possession limits would have only been triggered in 2013 and six trips would have been limited to either a 40,000 pound or 10,000 pound possession limit. These six trips were associated with fewer than three affiliates (based on the 2015-2017 affiliate database). This suggests that these measures will likely have very minor economic impacts when considering the fishery as a whole; however, impacts may be greater for those few vessels and affiliates which may have otherwise landed higher amounts.

Under the preferred alternatives for ACL overage paybacks, the ACT in a future year will be reduced by the exact amount in pounds of the ACL overage. If all the proposed measures had been in place in the past, and assuming no changes to fishing behavior except that the six trips noted above would have been limited to 40,000 and 10,000 pound possession limits, then the proposed ACL of 4.99 million pounds would have been exceeded only in 2013. Landings would have been 4.88 million pounds if the proposed possession limits had been in place. Assuming a 3% discard rate based on observer data (Table 4), catch would have been about 5.03 million pounds, which would require a future year's ACT to be reduced by 150,000 pounds (worth about $27,000, assuming the average 2013 price per pound of $0.18; Table 6). This would not be expected to have a notable impact when considering the fishery as a whole because, based on public comments, this is likely equivalent to three or fewer directed fishing trips (section 5.2.4.2.4). In addition, some of these negative impacts in a future year may be outweighed by benefits in the current year from landing more than the TAL. If the ACT deduction in a future year requires changes to possession limits or other measures to prevent an additional overage, this could have slight negative economic impacts.

Although both commercial and recreational landings count towards the TAL, no recreational management measures beyond a permit requirement are proposed. There are no proposed recreational possession limits, fish size limits, gear restrictions, or open and closed seasons. As such, the only impacts to recreational fishermen from the preferred alternatives will result from

the cost of obtaining an open access permit for those for-hire vessels which do not already have a party/charter MSB permit. As previously stated, these impacts are expected to be very minor as there is no monetary cost to the permit and the time costs associated with obtaining the permit are minor. None of the preferred alternatives are expected to directly or indirectly impact revenues from for-hire fishing.

In summary, the preferred alternatives are not expected to have substantial impacts on landings and commercial and for-hire revenues as they are not expected to constrain landings compared to all other past years except 2013. As previously stated, 86 commercial affiliates and 77 recreational affiliates were identified as potentially impacted by this action. With the exception of one commercial affiliate, all these affiliates likely relied on chub mackerel for a very small proportion of their annual income and the preferred alternatives are expected to have minor impacts on their business practices. For these reasons, the preferred alternatives are not expected to have a significant economic impact on a substantial number of small entities. Specifically, as described above, they are expected to impact fewer than three affiliates based on the proposed possession limits and past performance of the fishery. They are also not expected to have distributional economic effects as all but one of the potentially impacted affiliates are small businesses.

8.10.3. Regulatory Impact Review

Executive Order 12866 requires a Regulatory Impact Review in order to enhance planning and coordination with respect to new and existing regulations. This Executive Order requires the Office of Management and Budget to review regulatory programs that are considered to be "significant."

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:

- Have an annual effect on the economy of $100 million or more,
- 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,
- Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency,
- Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof, or
- Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

Commercial chub mackerel ex-vessel revenues ranged from $101 to $945,145 over the past 10 years (through 2018, adjusted to 2017 values; Table 6). Assuming average 2009-2018 price per pound ($0.45, adjusted to 2017 values), the preferred alternatives, which result in a TAL of 4,575,739 pounds, could allow for total commercial revenues of $2,059,083 per year. As shown in Table 6, the average price per pound was lower than this average during years when at least 1 million pounds were landed; therefore, actual revenues under fully-landed 4.5 million pound TAL could be lower.

Data on for-hire revenues by species are not available. The affiliate database described in section 8.10.2.1 suggests that during 2015-2017, total for-hire revenues for all 77 potentially impacted

for-hire affiliates combined averaged $24.40 million per year from all species. As described in section 8.10.2.2, chub mackerel likely accounted for a very small proportion of these revenues.

Based on this information, it is extremely unlikely that the preferred alternatives would have an annual impact on the economy of $100 million or more.

This action is consistent with previous actions by the Council and NMFS, and there is no known conflict with other agencies. There are no known impacts on any entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof. There are no known conflicts with other legal mandates, the President's priorities, or the principles set forth in Executive Order 12866. The preferred alternatives are largely based on measures previously implemented for other Council managed species and are not precedent-setting or novel.

8.10.4. Analysis of Non-Preferred Alternatives

When considering the economic impacts of the alternatives under the Regulatory Flexibility Act and Executive Order 12866, consideration should also be given to those non-preferred alternatives which would result in higher net benefits or lower costs to small entities while still achieving the stated objective of the action.

The economic impacts of these non-preferred alternatives are considered based on expected differences in landings compared to the preferred alternatives. Rough approximations of the potential ex-value of those landings are also included. The approximate nature of the value estimates should be emphasized. Ex-vessel value is influenced by a variety of factors including market demand, product quality, costs, and other factors. It cannot be assumed that revenues will increase in a proportional or predictable manner with increases in landings.

As described in section 6.1.2, an analysis of directed chub mackerel trips has not been performed. Based on public comments, a directed commercial trip for vessels responsible for most past landings likely exceeds 40,000 pounds (section 5.2.4.2.4). For the purposes of considering the economic impacts of the non-preferred alternatives in comparison to the preferred alternatives, a directed fishery trip is defined as a trip with at least 40,000 pounds of chub mackerel landings.

The preferred alternatives are listed in section 8.10.1 and described in detail in section 5. The non-preferred alternatives which could result in higher net benefits or lower costs than the preferred alternatives are listed below and described in more detail in section 5.

- Alternative 2.C.II.b: Overfishing SDC based on the refined ORCs approach. Under this alternative, the threshold catch level to define overfishing would be higher than under the preferred alternative. Neither of the SDC alternatives are expected to have notable socioeconomic impacts as the fishery has never exceeded the overfishing levels under either alternative. The fishery is not expected to grow notably compared to historic levels due to the management measures proposed in this action and due to other existing constraints on the fishery which are independent of the measures proposed in this action (e.g., market demand; section 6.2.1).
- Alternatives 2.C.IV.a and 2.C.IV.b include lower values of expected South Atlantic catch and thus would result in a slightly higher TAL than the preferred alternative. Assuming all other preferred alternatives are unchanged, this results in a 64,883 pound difference in the TAL. This could be considered equivalent to one or two directed fishery trips based on the assumptions described above. Assuming average price per pound during 2009-

2018 ($0.45, Table 6), this could result in an additional $29,197 compared to the preferred TAL.

- Alternative 2.C.VI.a (no management uncertainty buffer) would result in a TAL that is 187,479 pounds higher than under the preferred alternative for a 4% management uncertainty buffer (assuming all other preferred alternatives are used). This could be considered equivalent to 5 directed fishery trips based on the assumptions described above. Assuming average price per pound during 2009-2018 ($0.45, Table 6), this could result in an additional $84,365 compared to the preferred TAL.
- Alternatives 2.C.VII.a (no discards buffer) and 2.C.VII.b (3% discards buffer) would result in a TAL that is 143,601 pounds higher than under the preferred alternative for a 6% management uncertainty buffer (assuming all other preferred alternatives are used). This could be considered equivalent to 4 directed fishery trips based on the assumptions described above. Assuming average price per pound during 2009-2018 ($0.45, Table 6), this could result in an additional $64,620 compared to the preferred TAL.
- Under alternative 2.D.I.a, the commercial fishery would not close in-season if landings are projected to exceed the TAL.
- The combination of alternatives 2.D.II.d (40,000 pound commercial possession limit) and 2.D.I.d (when 100% of the TAL is projected to be landed) would be less restrictive than the preferred alternatives for in-season closure.
- Under alternative 2.D.III.a, an ACT deduction in a future year would not be required when the ACL is exceeded.
- Alternatives 2.E.I.a and 2.E.II.a would not require commercial or recreational vessels to have any federal fishing permits in order to possess chub mackerel in the management unit. Alternatives 2.E.I.b and 2.E.II.b would require vessels to have any of the existing federal commercial or recreational permits (depending on the fishing activity of the vessel in question). Under all these alternatives, it is expected that fewer vessels would need to obtain a new fishing permit, compared to the preferred alternatives. Although this would be less burdensome for fishermen, none of the permit alternatives are expected to have notable economic impacts. Therefore, the different socioeconomic impacts of the preferred and non-preferred permit alternatives are not expected to be notable.

When considered independently, none of these non-preferred alternatives are expected to have major economic benefits compared to the preferred alternatives as they would be expected to allow up to 5 additional directed fishery trips compared to the suite of preferred alternatives, with an additional ex-vessel value of up to $84,365 (equivalent to about 5% of potential ex-vessel value under the preferred TAL of 4.50 million pounds).

If all the non-preferred alternatives listed above were implemented, this would result in up to a 571,147 pound increase in the TAL (i.e., with no expected SC-FL catch, no management uncertainty buffer, and no expected discards), compared to the preferred alternatives. Assuming average price per pound during 2009-2018 ($0.45, Table 6), these additional 571,147 pounds could generate an additional $257,016 in ex-vessel value, or an increase of about 13%, compared to the preferred alternatives.

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10. List of Agencies And Persons Consulted

In preparing this document, the Council consulted with NMFS, the New England and South Atlantic Fishery Management Councils, USFWS, and the states of Maine through North Carolina through their membership on the Mid-Atlantic and New England Fishery Management Councils. The advice of NMFS GARFO personnel was sought to ensure compliance with NMFS formatting requirements.

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