Mackerel Rebuilding, Version 2

Amendment to the

MACKEREL, SQUID, AND BUTTERFISH

FISHERY MANAGEMENT PLAN

Measures to Rebuild the Atlantic Mackerel Stock, Including 2023 Specifications and the River Herring and Shad (RH/S) Cap

Environmental Assessment (EA)

Atlantic Mackerel
Scomber scrombus

Prepared by the

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

National Marine Fisheries Service (NMFS)

Council Address

Mid-Atlantic Fishery Management Council
800 North State Street, Suite 201
Dover, DE 19901

NMFS Address

NMFS Greater Atlantic Regional Fisheries Office
55 Great Republic Drive
Gloucester, MA 01930

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Quick Overview – Atlantic Mackerel Rebuilding, Version 2

A 2021 peer-reviewed stock assessment found that Atlantic mackerel was still overfished and that overfishing was still occurring, with negligible chance of rebuilding under the original rebuilding plan. In response, the Council developed this new rebuilding plan, which will also set specifications for 2023. The Council considered five rebuilding alternatives, all of which were endorsed by the Council's Scientific and Statistical Committee (SSC) as consistent with the best available science to rebuild the Atlantic mackerel stock within ten years, but vary in their probability of rebuilding. The Council selected Rebuilding Alternative 4 as the preferred rebuilding alternative (see table below) for Version 2 of mackerel rebuilding. While less or zero catch would rebuild faster, the Council decided that Alternative 4 was as short a time as possible given the stock's status, biology, needs of fishing communities, and the interaction of the stock within the marine ecosystem.

Recruitment Assumptions	**Rebuilding Alternative**	**10-Yr Rebuilding Probability**
Poor recruitment for all 10 years	**ALTERNATIVE 1:** Eliminate most catch to rebuild as much as possible in 10 years. Because poor recruitment is assumed for all 10 years, the 10-year rebuilding probability for this alternative is not directly comparable to the others. It may be useful to think of it as: Alternative 1 has a 57% chance of rebuilding in 10 years even if recruitment stays poor, while the others' probabilities are contingent on recruitment slowly improving.	57%
Recruitment starts low (similar to 2009+) and then increases toward long term (1975+) typical recruitment	**ALTERNATIVE 2:** Use a risk buffer from a rebuilding fishing mortality rate of 0.14.	62%
	ALTERNATIVE 3: Use the standard Council risk policy to rebuild.	52%
	ALTERNATIVE 4 (PREFERRED): Use a fishing mortality rate of 0.12 to rebuild.	61%
	ALTERNATIVE 5: Use a fishing mortality rate of 0.14. to rebuild.	53%

The action also proposes commercial closures and trip limits to hold the commercial fishery near the target catches, as well as a 2023 river herring and shad cap for the commercial mackerel fishery. A recreational possession limit of 20 fish was also recommended by the Council so that all sectors equitably share in the rebuilding process.

1.0 EXECUTIVE SUMMARY AND TABLE OF CONTENTS

This action considers measures to rebuild the Atlantic mackerel ("mackerel" refers to Atlantic mackerel hereafter in this document) stock via an Amendment to the Mackerel, Squid, and Butterfish Fishery Management Plan (MSB FMP). This action includes 2023 mackerel specifications and related management measures, including the mackerel fishery's river herring and shad (RH/S) cap. A new Mackerel Management Track Assessment (MTA) is expected in 2023 which will be used to set 2024-2025 specifications.

The purpose of this action is to rebuild the mackerel stock with appropriate measures so that Optimum Yield (OY) can be achieved on an ongoing basis. The action is needed because the recent 2021 Mackerel Management Track Assessment (MTA) found the mackerel stock to still be overfished, with overfishing still occurring through 2019 (NEFSC 2021). The 2021 Mackerel MTA determined that when implemented (11/29/2019), the original rebuilding plan (MAFMC 2019) was already out of date and did not provide a realistic rebuilding approach. The stock is estimated to have nearly tripled in size from 2014 to 2019 (from about 8% to 24% of rebuilt), but full rebuilding on the original schedule (by 2023) now appears impossible – the stock is now expected to be less than half rebuilt by 2023. This action incorporates the 2021 Mackerel MTA findings to continue rebuilding the mackerel stock, and to fully rebuild the mackerel stock within ten years.

Because none of the preferred alternatives are anticipated to be associated with significant impacts to the biological, social, economic, or physical environment, an Environmental Assessment (EA) documenting a "Finding of No Significant Impact" (FONSI) is anticipated, but this finding could change based on public comments or new analyses.

Summary of the Alternatives

The alternatives are based on rebuilding plans that all have at least a 50% chance of rebuilding mackerel within ten years, which is the maximum time typically allowed under the Magnuson–Stevens Fishery Conservation and Management Act (MSA). The alternatives focus on the probability of rebuilding by 2032 (ten years) due to the Scientific and Statistical Committee's (SSC) July 2021 Meeting advice that "Preliminary rebuilding scenarios indicate long-term rebuilding will be required for this stock" and that higher rebuilding probabilities "are associated with shorter rebuilding time and greater catch stability" (MAFMC SSC 2021). Final rebuilding scenarios did not differ substantially from the preliminary analyses (MAFMC SSC 2022). Additional management measures support the rebuilding plan and control RH/S catch in the mackerel fishery.

Summary of Impacts

Target Species Impact Summary

The preferred rebuilding alternatives should allow the mackerel stock to rebuild within 10 years, and are best characterized as moderately positive. Changes in mackerel fishing should not impact other FMP species due to low catch of those species in the mackerel fishery, and separate management measures control catch of those species. While Atlantic herring and mackerel are often caught together, separate management measures in the Atlantic herring fishery should ensure that overfishing does not occur on the Atlantic herring stock. Separate measures are being developed by the New England Fishery Management Council (NEFMC) to continue rebuilding the Atlantic herring stock.

Non-Target Species Impact Summary

Non-target interactions are relatively low in the mackerel fishery, and all of the action alternatives would reduce catch from the status quo, thereby limiting effort and slightly reducing negative impacts on non-target species. The RH/S cap should continue to limit interactions between the mackerel fishery and RH/S, which have been the primary non-target species of concern for the mackerel fishery.

Habitat Impact Summary

All of the alternatives would reduce catch from the status quo thereby limiting effort, so no additional negative habitat impacts would be expected.

Protected Resources Impact Summary

All of the alternatives would reduce catch from the status quo, thereby limiting effort, so no additional negative protected resource impacts would be expected.

Human Communities Impact Summary

Human communities may have negative impacts in the short term due to lower catches/revenues from mackerel during the beginning of the rebuilding period, but in the long-term, rebuilding should lead to higher sustainable catches/revenues and associated socioeconomic benefits for fishing communities.

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2.0 LIST OF COMMON ACRONYMS AND ABBREVIATIONS

ABC	**Acceptable Biological Catch**
ACL	**Annual Catch Limit**
ACT	**Annual Catch Target**
ASMFC	**Atlantic States Marine Fisheries Commission or Commission**
B	**Biomass**
CFR	**Code of Federal Regulations**
CPH	**Confirmation of Permit History**
CV	**coefficient of variation**
DAH	**Domestic Annual Harvest**
DAP	**Domestic Annual Processing**
EA	**Environmental Assessment**
EEZ	**Exclusive Economic Zone**
EFH	**Essential Fish Habitat**
EIS	**Environmental Impact Statement**
ESA	**Endangered Species Act of 1973**
F	**Fishing Mortality Rate**
FMAT	**Fishery Management Action Team**
FMP	**Fishery Management Plan**
FR	**Federal Register**
GB	**Georges Bank**
GOM	**Gulf of Maine**
M	**Natural Mortality Rate**
MAFMC	**Mid-Atlantic Fishery Management Council**
MMPA	**Marine Mammal Protection Act**
MSA	**Magnuson-Stevens Fishery Conservation and Management Act**
MSB	**Atlantic Mackerel, Squid, Butterfish**
MTA	**Management Track Assessment**
MSY	**Maximum Sustainable Yield**
MT (or mt)	**Metric Tons (1 mt equals about 2,204.62 pounds)**
NE	**Northeast**
NEFMC	**New England Fishery Management Council**
NEFSC	**Northeast Fisheries Science Center**
NEPA	**National Environmental Policy Act**
NMFS	**National Marine Fisheries Service (NOAA Fisheries)**
NOAA	**National Oceanic and Atmospheric Administration**
OFL	**Overfishing Level**
OY	**Optimum Yield**
PBR	**Potential Biological Removal**
SNE	**Southern New England**
SSB	**Spawning Stock Biomass**
SSC	**Scientific and Statistical Committee**
U.S.	**United States**
VTR	**Vessel Trip Report**

Notes: "Mackerel" refers to "Atlantic mackerel" unless otherwise noted. Likewise “herring” alone refers to Atlantic herring.

3.0 LISTS OF TABLES, AND FIGURES

3.1 List of Tables

3.2 List of Figures

4.0 INTRODUCTION, BACKGROUND, AND PROCESS

4.1 Introduction and Background

Section 4.1 reviews several critical background topics including the 2021 Mackerel Management Track Assessment (MTA), the 2021 Canadian Mackerel Assessment, Current Management and Recent Catches, Rules on Rebuilding, the Council's Ecosystem Approach to Fisheries Management (EAFM), and the Council's P* Risk Policy.

The 2021 Mackerel Management Track Assessment (MTA) (NEFSC 2021)

Reference Points

"F" refers to fishing mortality, i.e. the rate at which fish die from fishing, expressed as the portion of the stock dying within a small amount of time. The rebuilding goal is based on F40% as the proxy for FMSY (MSY = "maximum sustainable yield") and was estimated to be F = 0.22[1], (dashed line in Figure 1) down from 0.26 in the previous mackerel assessment. Mackerel stock productivity has apparently declined. F40% was selected as a proxy for FMSY due to consistency with the Canadian reference point and ability to prevent stock collapse for stocks with similar life histories. F40% produces 40% of the "spawning stock biomass (SSB) per recruit" (equivalent to lifetime egg production) relative to that produced by an unfished stock. F in 2019 was estimated to be 0.46[2], so overfishing was occurring in 2019 and has been for 30 years (but 2019 was the lowest F in 15 years – see Figure 1). Past assessments (which used different methods and data) appear to have been overly optimistic about the stock's productivity, and too many fish were caught over a long period of time, resulting in the current overfished condition. The rebuilding biomass target is the SSB associated with the FMSY proxy or "SSBmsyproxy," and is estimated to be 181,090 MT. The 2019 spawning stock biomass (SSB) was estimated to be 42,862 metric tons (MT), or 24% of the SSB target. Once rebuilt, the MSYproxy (i.e. the proxy for maximum sustainable yield) is estimated to be 34,103 MT (total catch, U.S. plus Canada), which is about 17% lower than estimated in the previous assessment, reflecting apparent reduced productivity of the stock.

[1] F = 0.22 equates to removing about 1/5 of the stock in a given year.
[2] F = 0.46 equates to removing slightly over 1/3 of the stock in a given year.

Projection Performance

Based on the recent 2021 Mackerel Management Track Assessment (MTA) (NEFSC 2021), the mackerel stock (measured by Spawning Stock Biomass - "SSB") will not rebuild as quickly as previously projected. The 2021 MTA found the mackerel stock to be overfished, with overfishing occurring through 2019 (NEFSC 2021) (see Figures 1 and 2 next pages). While the stock is estimated to have nearly tripled in size from 2014 to 2019 (from about 8% to 24% of rebuilt), rebuilding on the original schedule (by 2023) appears impossible – the stock is now expected to be less than half rebuilt by 2023. In addition, while both the 2018 and 2021 assessments concluded the stock reached a low point around 2011-2014 before starting to recover, the current assessment found that the stock was about 10% smaller at the lowest point. In the terminal year of the previous assessment (2016 – NEFSC 2018) the stock, while still recovering, is now estimated to have been 29% smaller in 2016 than originally estimated for that same year, so rebuilding started at a lower point than previously estimated. While nearly all of the data in the 2021 assessment (data through 2019) represents the time period before the initial rebuilding plan took effect, the current assessment indicates we started official rebuilding in 2019 at a stock size about 74% lower than anticipated (just 42,862 MT estimated in 2019 vs 162,796 MT projected). While not completely understood, factors contributing to this over-projection for 2019 include:

-a lower low point in 2014 (retrospective pattern apparent but not strong enough to adjust for).
-summed 2014-2018 recruitment was 24% lower than anticipated (2017 year class lowest in time series).
-overfishing persisted.
-decreased maturity-at-age and SSB weight-at-age for some ages.

The scale of error observed in the previous three-year projection (2016 to 2019) described in the preceding paragraph provides some perspective for the four-year projection required to now set specifications for 2023 as the first year of the new rebuilding plan. This was part of the reason why the MSB Monitoring Committee recommended setting only a one year specification at this time, until the 2023 Mackerel MTA can be used to set 2024 specifications. The 2023 Mackerel MTA should include data through 2022, requiring only a two year projection for 2024 at that time (2022 to 2024). The lower recruitment inputs now being used in short term projections should help avoid repeating as large of an over-projection, but any potential improvement in projections will not be known until mid-2023 when then the 2023 Mackerel MTA is completed.

All projections assume that 12,055 MT of mackerel are caught stock-wide in 2022. Given the Canadians closed their fishery in 2022, and U.S. commercial landings have been low to date, 2022 catch appears unlikely to exceed 6,000 MT. If this lower catch occurs, the stock could be slightly ahead of our rebuilding projections, but given the general uncertainty and low stock size, these likely lower 2022 catches would not substantially change the rebuilding trajectories.

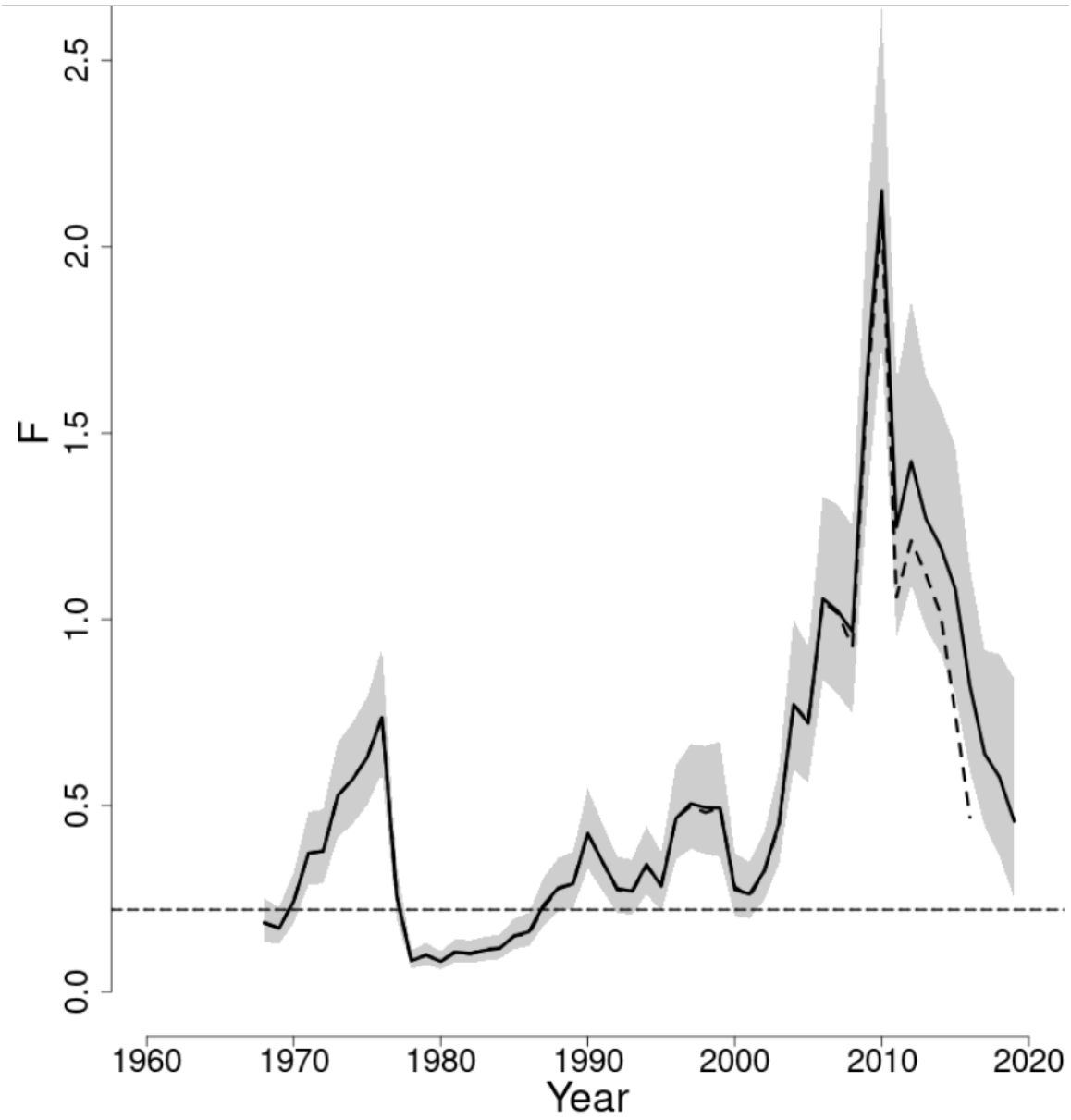

Figure 1. Trends in the fully selected fishing mortality (F) of northwest Atlantic mackerel between 1968 and 2019 from the current (solid line) and previous (dashed line) assessment and the corresponding FThreshold (FMSY proxy=0.22; horizontal dashed line). The approximate 90% lognormal confidence intervals are shown.

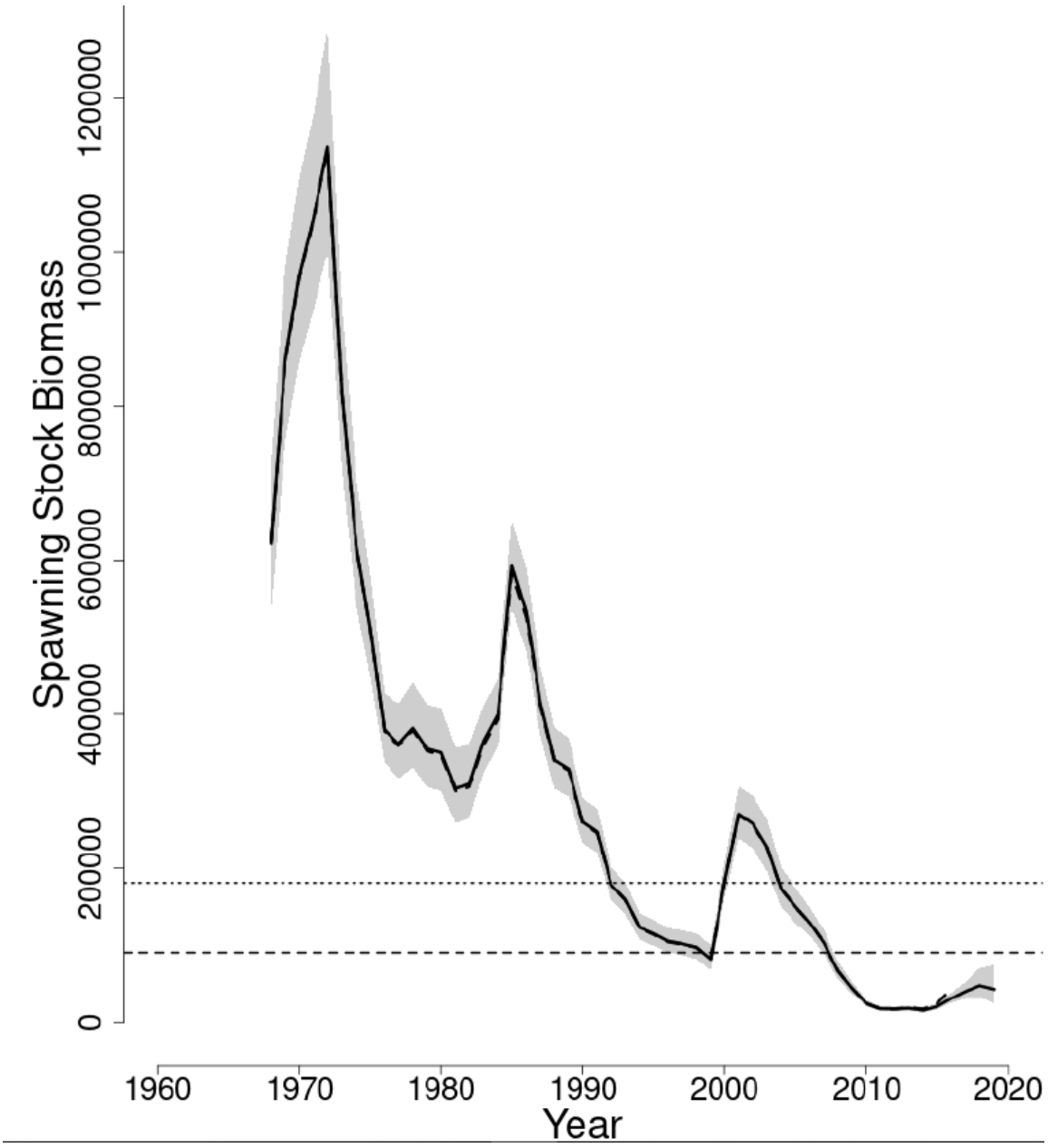

Figure 2. Trends in spawning stock biomass (MT) of northwest Atlantic mackerel between 1968 and 2019 from the 2021 MTA (solid line) and previous (dashed line, mostly the same) assessment and the corresponding SSBThreshold (1/2 SSBMSY proxy; horizontal dashed line) as well as SSBTarget (SSBMSY proxy; higher horizontal dotted line). The approximate 90% lognormal confidence intervals are shown.

The 2021 Canadian Mackerel Assessment and Recent Canadian Quotas

The Canadian stock assessment only assesses the northern mackerel contingent, unlike the stock-wide U.S. assessment. Excerpting from their summary and assessment:

- 2017-2020 Canadian landings occurred primarily in the Gulf of Saint Lawrence and off the northeast coast of Newfoundland.
- Recent genetic analyses confirmed previous studies that the Northwest Atlantic mackerel stock is distinct from the Northeast Atlantic (European) stock. These analyses also supported the previously established distinction between the northern and southern spawning contingents of our Northwest Atlantic stock. Genetic results showed some mixing of southern contingent mackerel in Canadian waters as well as northern contingent mackerel in U.S. waters.
- A fine-scale analysis of recruitment variability showed recruitment benefits from a spatial-temporal match between mackerel larvae and their preferred food as well as optimal population structure and dynamics (maternal condition, SSB, age-structure).
- The annual egg survey did not occur in 2020 due to restrictions incurred by Covid. The stock assessment model was still run (without a 2020 data point for the egg survey) to estimate stock status.
- The last notable recruitment event was in 2015. There has been no sign of any notable recruitment event in recent years. There are currently very few fish older than 5 years old (<1%) - The age structure of the population in 2020 was relatively evenly spread among individuals between 1 and 5 years, old with no single dominant cohort (the 2015 cohort represented about 7% of the SSB in 2020).
- The estimated fully selected exploitation rate (fish aged 5-10+) in 2020 was 74%, above the reference level of 51% (F40%). The fishery was concentrated on fish aged 2-5 (exploitation rate of 56%).
- The SSB in 2020 was the lowest ever estimated (58% of the Limit Reference Point - LRP). and has been in or near the Critical Zone for over 10 years. Rebuilding the stock will also require rebuilding the age structure of the stock which has been eroded by overexploitation.

The 2021 Canadian mackerel quota was set at 4,000 MT – landings at this level were estimated to have between a 2 in 3 chance and a 3 in 4 chance of facilitating at least some stock growth from 2021 to 2023. 2021 Canadian landings (preliminary) were 4,395 MT. Canada closed its fishery for 2022 so may have minimal landings in 2022. If Canada keeps its fishery closed for 2022 and 2023, their stock assessment indicates they have about a coin flip's chance (i.e. 50-50) of reaching at least 40% of their biomass target. With a 2023 Canadian assessment pending, 2023 Canadian landings are still challenging to predict. The Council decided to deduct 2,197 MT for Canada for 2023, i.e. half of their 2021 landings. Given the uncertainty of Canada's 2023 management actions this may under predict or over predict 2023 Canadian landings, but was considered by the MSB Monitoring Committee to be a reasonable middle of the road approach.

Current Management and Recent Catches

The commercial mackerel fishery is currently managed with an annual quota, in-season proactive accountability measures, and reactive accountability measures requiring paybacks if catches exceed the Annual Catch Limit (ACL). Canadian landings, U.S. recreational catch, and U.S. commercial discards are deducted off the total Acceptable Biological Catch (ABC) to derive the commercial quota. There are currently no recreational management measures. In 2022, based on an emergency rule by NMFS, total catch is expected to be 12,055 MT or less. The 2022 emergency measures were designed to approximately mirror 2021 catches while this new rebuilding plan was developed.

When 90% of the quota is projected to be landed, trip limits of 40,000 pounds are implemented for Tier 1-3 directed permits and 5,000 pounds for incidental/open access permits[3]. When 100% of the quota is projected to be landed, a 5,000 pound trip limit is implemented for all permits for the rest of the fishing year to cover remaining incidental catches. The emergency rule will expire in January 13, 2023, at which point the previous specifications, with a much higher quota, would apply (see Alternatives Section below for details) if not for this rebuilding action.

The mackerel fishery also operates under a river herring and shad catch cap (RH/S), which closes the directed mackerel fishery and implements a 20,000 pound trip limit for all permits once 129 MT of RH/S has been projected to be caught in the directed mackerel fishery. 129 MT was the amount of RH/S if the ratio of cap to all catch on mackerel trips (accounting for mostly Atlantic herring) was about 0.53% and the mackerel quota was 17,371 MT (or 0.74% applied to just the mackerel quota). Given the challenges with monitoring a very small cap, including potentially closing the fishery based on a few (or zero) observed trips, the Council has kept the cap at 129 MT at the current lower mackerel quotas. This action considers either scaling the RH/S cap with the mackerel quota or keeping the RH/S cap at 129 MT – the Council recommended keeping the RH/S cap at 129 MT for 2023.

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[3] When the fishery starts each year, the various commercial mackerel permit categories start with different trip limits. Tier 1 has an unlimited trip limit, Tier 2 has a 135,000 pound trip limit, and Tier 3 has a 100,000 pound trip limit.

Rebuilding Requirements

Section 304(e)(4) of the Magnuson–Stevens Fishery Conservation and Management Act (MSA) states:

> "For a fishery that is overfished, any fishery management plan, amendment, or proposed regulations…shall…specify a time period for rebuilding the fishery that shall--
>
> (i) be as short as possible, taking into account the status and biology of any overfished stocks of fish, the needs of fishing communities,…and the interaction of the overfished stock of fish within the marine ecosystem; and
>
> (ii) not exceed 10 years, except in cases where the biology of the stock of fish, other environmental conditions…dictate otherwise;
>
> …allocate both overfishing restrictions and recovery benefits fairly and equitably among sectors of the fishery…"

The Council's SSC advised the Council that "Preliminary rebuilding scenarios indicate long-term rebuilding will be required for this stock" and that higher rebuilding probabilities "are associated with shorter rebuilding time and greater catch stability." (MAFMC SSC 2021)

All options currently under consideration are projected to rebuild mackerel in 10 or less years so (ii) is addressed. Recreational catches have been relatively low in this fishery historically, but will be a higher percentage of total catch especially in the early part of the new rebuilding timeline, which is why recreational measures were considered in this action.

The primary rebuilding considerations are to rebuild in a time period as short as possible, taking into account 1) the status and biology of any overfished stocks, 2) the needs of fishing communities, and 3) the interaction of mackerel within the marine ecosystem. Additional information on the status and biology of mackerel and interactions within the marine ecosystem (e.g. predation) is provided in Section 6.1.

Council's Ecosystem Approach to Fisheries Management (EAFM)

The alternatives in this document seek to rebuild mackerel to the SSBmsyproxy as defined in the recent mackerel MTA, i.e. to 181,090 MT of spawning stock biomass (SSB). The Council's Ecosystem Approach to Fisheries Management (EAFM) Guidance Document (https://www.mafmc.org/eafm) 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" and "the Council could adopt biological reference points (overfishing levels or OFL) for forage stocks that are more conservative than the required MSA standard of F_{MSY}." Acknowledging that the science to evaluate the biological and socioeconomic tradeoffs of more precautionary management is lacking, the Council has adopted a policy that it would promote data collection and development of analyses to get to the point where the Council could evaluate the relevant tradeoffs and "establish an optimal forage fish harvest policy."

Views vary on the precaution inherent in using the recommended F40% as a proxy for FMSY (and for the resulting SSBmsyproxy target). Clark 1993, Mace 1994, Gabriel and Mace 1999, and Legault and Brooks 2013 generally recommended F40% for typical stocks. Clark 2002 notes that for typical stocks, fishing at F40% would be expected to result in a target biomass that is 20%-35% of an unfished biomass. Pikitch et al 2012 recommended more conservative approaches for forage species to support predators, and this has spawned ongoing debate (e.g. Hilborn et al 2017 to the contrary). The Council's P* risk policy, by reducing catch to account for scientific uncertainty, should lead to biomass being maintained above the reference point target in the long run.

While not a complete picture of forage, the 2021 State of the Ecosystem reports for New England and the Mid-Atlantic indicate that for the Planktivore group that includes mackerel, long term (30-year) trends in the Mid-Atlantic Bight, Georges Bank, and Gulf of Maine are all either steady or increasing for both the Spring and Fall survey aggregate biomasses[4] (NEFSC 2022a, NEFSC 2022b). The 2018 mackerel assessment examined predator consumption and determined that the presence of mackerel in fish stomachs collected during the NEFSC bottom trawl surveys was generally low from 1973-2016, with spiny dogfish being responsible for 67% of all mackerel as prey occurrences in the NEFSC Food Habits Database. Mackerel were found in only 1% of sampled spiny dogfish however. Additional potentially important predators of mackerel are not sampled in the NEFSC trawl surveys, including highly migratory species, marine mammals, and seabirds. For the 17 analyzed mackerel predators from the NEFSC Food Habits Database, while mackerel did not appear to be an important contribution to their diet, there was a marked decline in consumption from 2000-2016, the terminal year of that analysis, matching the trend in mackerel abundance for that time period. The 2021 Mackerel MTA found that from 2014 to 2019 mackerel biomass had nearly tripled, so substantially more mackerel should already be available as forage by 2019. The mackerel assessment uses a constant natural mortality rate, so as mackerel biomass grows, more predation on mackerel is also assumed to occur.

Council's P* Risk Policy

The Council's standard risk policy states that the Scientific and Statistical Committee (SSC) should provide Acceptable Biological Catches (ABCs) that are the lesser of rebuilding ABCs or standard risk policy (P*) ABCs. The P* risk policy requires higher confidence that overfishing will be avoided when biomass is lower, which results in lower catches. At the projected 2023 biomass, because it would only be 32% of rebuilt, the Council's risk policy requires an 85.5% confidence in avoiding overfishing in 2023. For a stock 100% rebuild, the P* risk policy requires a 55% chance of avoiding overfishing. Some alternatives being considered by the Council would result in a 2023 rebuilding catch higher than what would be the standard P*-adjusted ABC. In these cases, the alternatives note this fact, and represent a temporary adjustment of the Council's standard risk policy that apply to this particular decision – future decisions would need to re-evaluate any diversion from the Council's standard P* approach (Alternative 3 uses the current,

[4] Planktivore Group includes Atlantic mackerel, butterfish, Atlantic herring, alewife, American shad, blackbelly rosefsh, blueback herring, cusk, longhorn sculpin, lumpfsh, menhaden, northern sand lance, northern searobin, and unclassified sculpin.

unmodified P* risk policy). The risk policy adjustment would only apply to this instance of initiating rebuilding for mackerel to consider the effects of different rebuilding timelines and would not apply to management decisions regarding future ABCs once the stock is rebuilt. This is similar to the approach utilized in the first mackerel rebuilding decision.

General SSC Input (MAFMC SSC 2022)

Mackerel recruitment has been low in recent years and various assessments have debated the underlying causes. Environmental conditions may be resulting in low recruitment. Alternatively low recruitment may be due to reduced spawning stock biomass. If stock size is low due to long-term environmental conditions, then severe reductions in ABC are required to achieve the rebuilding target. Alternatively, if stock size is responsible, then increases in recruitment could occur in response to lower rates of fishing.

Owing to the varying starting conditions and random effects of time varying recruitment, the population trajectories under the rebuilding scenarios result in a broad distribution of values. Measures of central tendency (i.e., median) were used to describe the expected rebuild times, the probability of rebuilding by 2032 and the expected catch trajectories. It was noted that not all of the realizations would successfully rebuild, even under the most aggressive reductions in fishing mortality.

In addition to recommending ABCs that are consistent with each rebuilding approach, the Council also requested that the SSC "Provide any guidance regarding the relative risks associated with the different rebuilding alternatives and identify the most significant sources of scientific uncertainty associated with rebuilding…" The SSC's response to that request is excerpted below (this page and next):

> The SSC reviewed all alternatives and recommends the P * approach with the maximum fishing mortality threshold (MFMT) equal to the Fmsy proxy (Alternative 2). This alternative, (1) fulfills rebuilding plan requirements; (2) is the most responsive to new information on changes in stock status; (3) produces the highest rebuilding plan 10-year catch yield); (4) is fully consistent with the Council's P * risk policy; and (5) would avoid "break points" in catch limit advice, which would reduce year-to-year changes in the ABC.
>
> Risks and scientific uncertainties pertain to the two classes of alternatives: Alternative 1, which considers projections on the basis of only recent recruitment (2009+) and the remainder (Alternatives 2-5) that use the recent recruitment period under the condition of SSB<0.5 SSBMSY, and use the entire recruitment series (1975+) when SSB≥0.5 SSBMSY (Alternatives 2-5).

Alternative 1 - Risks:

• ABC/Catch levels are quite low indicating risk of a depleted industry and foregone catch once SSB recovers.
• At low to nil catch levels, fishery-dependent data will become unavailable to support stock assessment.

• High discard potential if recruitment recovers under low catch

Alternative 1 - Scientific Uncertainties:

• Predictions of which recruitment regime exists is highly uncertain owing to lack of understanding on how recruitment is controlled (i.e., role of SSB, the environment, and the food web).
• Recreational catch/unreported removals may exceed low ABCs under this Alternative; knowledge about catch will needs to become more precise at low ABCs.
• Uncertainty accumulates with length of projections.

Alternatives 2-5 - Risks

• Stock may not recover without the low F specified in Alternative 1.
• The SSB trigger implies a sudden change in recruitment state, which is not supported by current understanding of what drives recruitment
• The two recruitment stanza approach applies uses an SSB trigger for which there is limited analytical support (SSC Chairman's September 22, 2021 Report to MAFMC)
• An immediate shift towards a higher recruitment regime is assumed at SSB≥0.5 SSBMSY, whereas an unknown lag may occur between increased SSB and recruitment.
• Because a stock-recruitment relationship is unknown for this stock, it is uncertain whether SSB changes will be driven by increased recruitment or vice versa. This approach implies a S-R relationship, which may be arbitrary given that it has not been parameterized in the assessment
• The approach of shifting recruitment regimes can have unexpected effects later on with respect to stock rebuilding. The threshold is sensitive to the timing of a pulse of strong recruitment and may not reflect longer-term SSB rebuilding.
• Approaches rely on a SSB-based boost to recruitment that has not been observed recently (since 2007).
• The lack of strong precedence of this approach (but see Brodziak et al. 2001) conveys risk in predicting its performance in rebuilding.

Alternatives 2-5 - Scientific Uncertainties:

• We do not know the form of the underlying stock-recruitment relationship.
• Knowledge about catch will needs to become more precise at low ABCs.
• The trigger SSB for using one or the other recruitment series is deterministic, without consideration of error.
• Uncertainty in small amplitude changes in SSB
• Uncertainty in long projections

4.2 Process

The Council initiated a framework adjustment action in 2021 upon receiving the 2021 Mackerel MTA results. This action was later converted into an amendment due to the potential consideration of recreational bag/possession limits and/or closures, which had not been previously considered in detail, and it was uncertain whether such measures could be considered via a framework adjustment action. Recreational closures are not being considered in this action.

The Council took final action at its June 2022 meeting, after public hearings in late April 2022. An emergency rule currently limiting mackerel landings expires January 13, 2023.

4.3 Purpose and Need

The purposes and needs addressed by this action are described in the table below.

Table 1. Purposes and Needs

Need	Corresponding Purpose
Prevent overfishing, rebuild the Atlantic mackerel stock, and achieve optimum yield in the mackerel fishery.	Implement measures to specify levels of catch of Atlantic mackerel consistent with the MSA and the objectives of the FMP, including ending overfishing and rebuilding the stock.
Achieve the Domestic Annual Harvest ("quota") allocation in the mackerel fishery without exceeding it or closing the fishery in a manner that creates avoidable discarding issues.	Implement in-season management measures, including management uncertainty buffers, triggers, and post-closure trip limits.
Minimize bycatch of river herring and shad in the mackerel fishery to the extent practicable.	Implement catch caps for river herring and shad.

4.4 Regulatory Authority

The MSA states that Fishery Management Plans (FMPs) shall "contain the conservation and management measures… necessary and appropriate for the conservation and management of the fishery to prevent overfishing and rebuild overfished stocks, and to protect, restore, and promote the long-term health and stability of the fishery." As discretionary provisions of Fishery Management Plans (FMPs), the MSA also allows restriction of fishing by gear/area/time/season. Seasonal management based on attainment of quotas has been previously incorporated into the MSB FMP and this action could modify the existing provisions regarding how the fishery closes due to attainment of the DAH or a portion of the DAH. The RH/S cap was previously implemented under the discretionary MSA provisions providing for conservation of non-target species.

The Council's risk policy was initially implemented via Amendment 13 to the MSB FMP (http://www.mafmc.org/msb/), which stated that the system would need to be "adaptive" and that "Flexibility is imperative and must allow for timely modifications given the dynamic nature of fisheries and the environment." Changing the desired probabilities of overfishing was contemplated as something that could be accomplished through even the annual specifications process. Major departures from the original risk policy were contemplated as needing to go through either an FMP framework adjustment or FMP amendment. Risk policy adjustments were explicitly provided for and anticipated by Amendment 13. See also implementing regulations at Title 50, Chapter VI, Part 648, Subpart B, §648.25(a)(1)(ii).

4.5 FMP History and Management Objectives

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

The MSA defines Optimum Yield (OY) generally 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." The Omnibus ACL/AM Amendment (Amendment 13 to the MSB FMP) defined OY specifically for mackerel as: "The long-term average amount of desired yield from a stock or fishery. OY cannot exceed MSY. For Atlantic Mackerel, OY is the quantity of catch that is less than or equal to the ABC in U.S. waters."

The Council recently updated the goals (1-3 below) and objectives of the FMP:

The updated MSB FMP objectives are:

Goal 1: Maintain sustainable MSB stocks.

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

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

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

recreational) as well as other fisheries or concerns that may be ecologically linked to MSB fisheries.

Objective 2.4: Investigate opportunities to access international/shared resources of MSB species.

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

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

Objective 3.2: Promote opportunities for industry collaboration on research.

Objective 3.3: Encourage research that may lead to practicable opportunities to further reduce bycatch in the MSB fisheries.

4.6 Management Unit and Geographic Scope

The management unit (fish stock definition) in the MSB FMP for Atlantic mackerel (*Scomber scombrus*) includes all mackerel under U.S. jurisdiction in the Northwest Atlantic, with a core fishery management area from Maine to North Carolina. The FMP also includes a deduction for mackerel caught by Canada - the U.S. assessment provides catch advice for the entire mackerel stock in the Northwest Atlantic (including Canadian waters), which is considered one unit stock.

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5.0 WHAT ALTERNATIVES ARE CONSIDERED IN THIS DOCUMENT?

There are four groups of alternatives considered in this action: the overall rebuilding plan, recreational possession limits, specification set-asides & closure approaches, and the river herring and shad set aside. The rebuilding plan can be thought of as the overall umbrella under which other decisions must be made. The recreational possession limit affects how much must be set aside for recreational catch (no allocation exists), which affects the specification set-asides and closure approaches. The river herring and shad cap for the mackerel fishery exists as an additional potential constraint on the mackerel fishery, and is dependent on the commercial quota, which is dependent on the specification set-asides, so the river herring and shad cap is described last.

This action would only set specifications for 2023 given an MTA is expected in 2023, which should use data through 2022. If the assessment or subsequent specifications were delayed, then the 2023 specifications would roll-over into 2024 until new specifications were published. The MSB Monitoring Committee recommended this approach given the high degree of uncertainty involved in setting 2024 specifications based on 2019 data - Setting 2024 specifications now would have conveyed more anticipated stability about 2024 relative to 2023 than warranted.

All of the rebuilding alternatives in this document utilize the peer reviewed and accepted 2021 Management Track Assessment (MTA) and associated projection methods to rebuild the mackerel stock.

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5.1 CURRENT 2022 SPECIFICATIONS

For the remainder of 2022 and until January 13, 2023 (or until implementation of this action if earlier), an emergency rule will be in place that restricts total mackerel catch to no more than 12,170 MT, generally based on not exceeding the 2021 estimated mackerel catch, per the table below. The 129 MT river herring and shad (RH/S) cap originally set for 2022 was not changed[5]. There are currently no recreational measures in place for mackerel.

Table 2. Current 2022 Mackerel Specifications

Specification	Mackerel 2022 (mt)	Rationale Summary
(a) Overfishing Limit (OFL)	NA	NA
(b) Total Catch	12,170	equals estimated 2021 Catch
(c) Canadian Deduction	4,200	4,200 MT Expected 2021 catch
(d) U.S. ABC=ACL (Canadian Catch deducted)	7,970	b-c
(e) Recreational Deduction	2,608	2017-2021 Average
(f) Commercial Allocation (d-e)	5,362	d-e
(g) 3% uncertainty buffer	161	
(h) Remaining Commercial Catch	5,202	f-h
(i) Expected Discards	239	recent 3-year average
(j)DAH	4,963	h-i
River Herring and Shad Cap	129	Same as existing

Since these measures expire January 13, 2023, they are not the "no action" alternative, but are included in this document for reference. If maintained for 2023 (but note they cannot be) catch would be higher with the current emergency measures than all alternatives except no action. Thus the theoretical impacts of maintaining the current specifications, while not directly addressed further in this document, would be similar in direction to the no action relative to all the other rebuilding plans.

[5] The mackerel fishery operates under a river herring and shad catch cap (RH/S), which closes the directed mackerel fishery and implements a 20,000 pound trip limit for all permits once 129 MT of RH/S has been projected to be caught in the directed mackerel fishery. 129 MT was the amount of RH/S if the ratio of cap to all catch on mackerel trips (i.e. accounting for other species as well, mostly Atlantic herring) was about 0.53% and the mackerel quota was 17,371 MT (or 0.74% applied to just the mackerel quota). Given the challenges with monitoring a very small cap, including potentially closing the fishery based on a few observed trips, the Council and NMFS kept the cap at 129 MT with the emergency action.

5.2 NO ACTION ALTERNATIVE SPECIFICATIONS – WHAT WOULD HAPPEN IN 2023 WITH NO ACTION

For comparison purposes, "no action" would result in a return to the 2021 published specifications in 2023 given the roll-over provisions in the FMP regulations. Reverting to the 2021 specifications would mean no new rebuilding plan would be implemented, technically retaining the original and now inadequate rebuilding plan. For NEPA, later in this document, the action alternatives' impacts are compared to no action, which would be this set of specifications. Tied to the original rebuilding plan, these specifications would have a total catch of 29,184 MT, which would now likely result in overfishing in 2023 and fail to rebuild the mackerel stock in 10 years if maintained. Due to the January 13, 2023 expiration of the current emergency rule, this is a relatively rare case for MSB fisheries where "no action" does not equal "status quo." The rollover specifications that would re-commence in January 13, 2023 under no action are detailed in the table below. The RH/S cap would continue to be 129 MT. There would continue to be no recreational measures in place for mackerel. 10,000 MT would be set aside for Canada (an old quota) and 1,270 MT would be set aside for U.S. recreational catch (old pre-calibrated MRIP data). After additional deductions for a management uncertainty buffer and discards, the commercial quota would be 17,312 MT.

Table 3. No Action Specifications

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

When the fishery starts, the various commercial mackerel permit categories start with different trip limits. Tier 1 has an unlimited trip limit, Tier 2 has a 135,000 pound trip limit, and Tier 3 has a 100,000 pound trip limit. There is a 20,000 pound open access/incidental permit trip limit. When 90% of the DAH is projected to be landed, trip limits of 40,000 pounds would be implemented for Tier 1-3 directed permits and 5,000 pounds for incidental/open access permits. When 98% of the DAH is projected to be landed, a 5,000 pound trip limit would be implemented for all permits for the rest of the fishing year to cover remaining incidental catches. There would be no recreational restrictions.

5.3. Action Alternative Set 1: Rebuilding Plans

The Council's SSC reviewed these specific projections in March 2022 and endorsed them as constituting the best available scientific information (see https://www.mafmc.org/ssc-meetings/2022/march-15-16). An MTA should be available in 2023 to set 2024-2025 specifications. Rebuilding Plan Alternative 1 uses only 2009-2019 recruitments so it requires very low catches to rebuild. Rebuilding plans 2-5 utilize recruitment draws constrained to lower 2009-2019 estimates unless spawning stock biomass is above 50% of the target (then 1975-2019 recruitments, which the reference points are based on, are used). The SSC identified these two recruitment approaches as "defensible and supported by the data" at its September 2021 SSC Meeting (MAFMC SSC 2021b). The results of each rebuilding scenario are contingent on the assumed recruitment dynamics for the projection time period, which makes it difficult to directly compare Rebuilding Plan Alternative 1 to the other rebuilding plans. All alternatives assume less recruitment than the original mackerel rebuilding plan.

There will be Mackerel MTAs in 2023 and 2025 that both could result in revised rebuilding plans (they will become the new best available scientific information pending their own peer reviews). Because the 2025 Mackerel MTA should consider catch through 2024, one way to compare across all alternatives in terms of relative probability of leading to stock growth by the 2025 Mackerel MTA is to just consider 2023-2024 combined catch. The higher the combined 2023 and 2024 combined catch, the relatively less likely stock growth will occur. The Rebuilding Plans 1-5 have been ordered from least to most 2023- 2024 combined catch to facilitate comparison ("no-action" would result in the highest catch however, as described below). Conversely, the near-term negative socioeconomic effects would be most severe with Rebuilding Plan Alternative 1 and least severe with Rebuilding Plan Alternative 5. Longer term considerations are also discussed in the impacts section.

5.3.1 Rebuilding Plan Alternative 1 – 10-year Rebuilding with Persistent Low Recruitment.

Alternative 1 assumes lower, post-2009 recruitment persists, which makes it nearly impossible to rebuild because the reference point "goal" rebuilding target is based on higher, typical recruitment (post-1975). The SSC identified this as one of two recruitment approaches that are "defensible and supported by the data" at its September 2021 SSC Meeting. With the low recruitment entering the population for the entire rebuilding period, only minimal catches allow rebuilding, based on a fishing mortality rate ("F") of 0.01 (Table 4). While one could argue this Alternative could be outright rejected given Canadian catches, incidental U.S. commercial catches, and state-waters recreational catches will easily exceed the proposed rebuilding catches, it usefully illustrates the dependence on actually getting typical recruitment when trying to rebuild to a target that is based on typical recruitment. With the catches in this projection, and if lower recruitment persists, the probability of rebuilding by 2032 would be 57%, and the median probability is for rebuilding to occur in 2031. Because the 57% probability is conditional on

recruitment being similar to 2009+ recruitment, it is not directly comparable to the other alternatives. Of the action alternatives, this alternative would have the highest probability of increasing stock size by the 2025 Mackerel MTA because it leads to the lowest 2023-2024 catches.

This alternative would choose the overall rebuilding plan and set the ABC ("catch") specified in the following table for 2023, and the rest of the numbers provided in the table are projections that would be revisited during future spec setting.

Table 4. Rebuilding Alternative 1 ABCs and Biomass

	Catch (MT)	Biomass (MT)
2023	703	83,692
2024	865	101,492
2025	1,025	118,979
2026	1,169	133,914
2027	1,296	146,932
2028	1,406	158,172
2029	1,497	167,354
2030	1,574	175,260
2031	1,639	181,670
2032	1,692	187,093

In terms of setting specifications for 2023, a complete EEZ closure (recreational and commercial) would come closest to holding to the ABC, but might still result in ABC overages due to Canadian landings, U.S. incidental catch/discards in federal waters, and state-waters landings and discards.

5.3.2 Rebuilding Plan Alternative 2 – P* deduction applied to 50% Rebuilding Probability

Alternatives 2-5 utilize recruitment draws constrained to lower 2009-2019 estimates unless spawning stock biomass during the rebuilding period is above 50% of the target (then the higher 1975-2019 recruitments, which the rebuilding goal is based on, are used). The SSC identified this as one of two recruitment approaches that are "defensible and supported by the data" at its September 2021 SSC Meeting (see Alternative 1 for the other approach). Because the projection model selects the lower or higher recruitment stanza based on biomass in each year of each projection run, there is a relatively slow transition toward higher median recruitment through the rebuilding period, depending on the exact trajectory of each run.

Alternative 2 uses the Council's standard P* risk policy deduction applied to the 0.14 rebuilding F from Alternative 5, effectively treating a rebuilding F of 0.14 as an overfishing mortality rate (and then imposing a risk-policy deduction). For example in 2023 the P* risk policy requires an 85.5% probability of not overfishing (or in this case of not exceeding F = 0.14) due to the low

projected 2023 stock size, and catch is lowered accordingly (Table 5). Higher certainty about avoiding exceeding even the rebuilding F means lower catches, which allows rebuilding by 2029 in this alternative. F starts at 0.04 and as biomass nears the rebuilding target, higher fishing mortality is allowed, but never rises above F = 0.13. The 10-year rebuilding probability for Alternative 2 given all 10 years of catches is 62.3% given the recruitments used. Of the action alternatives, this alternative would also have the 2nd highest probability of increasing stock size by the 2025 Mackerel MTA because it leads to the 2nd lowest 2023-2024 catches.

This alternative would choose the overall rebuilding plan and set the ABC ("catch") specified in the following table for 2023, and the rest of the numbers provided in the table are projections that would be revisited during future spec setting.

Table 5. Rebuilding Alternative 2 ABCs and Biomass

	Catch (MT)	Biomass (MT)
2023	2,976	82,832
2024	4,168	98,752
2025	5,879	116,414
2026	8,127	134,870
2027	10,978	154,147
2028	14,519	172,753
2029	18,487	188,964
2030	21,394	202,302
2031	23,034	213,674
2032	24,459	222,817

In terms of setting specifications for 2023, a complete EEZ closure (recreational and commercial) would come closest to holding to the ABC, but might still result in ABC overages due to Canadian landings, U.S. incidental catch/discards in federal waters, and state-waters landings and discards.

5.3.3 Rebuilding Plan Alternative 3 – P* approach with return to normal recruitment.

Alternatives 2-5 utilize recruitment draws constrained to lower 2009-2019 estimates unless spawning stock biomass during the rebuilding period is above 50% of the target (then the higher 1975-2019 recruitments, which the rebuilding goal is based on, are used). The SSC identified this as one of two recruitment approaches that are "defensible and supported by the data" at its September 2021 SSC Meeting (see Alternative 1 for the other approach). Because the projection model selects the lower or higher recruitment stanza based on biomass in each year of each projection run, there is a relatively slow transition toward higher median recruitment through the rebuilding period, depending on the exact trajectory of each run.

Alternative 3 uses the Council's standard P* risk policy as a rebuilding plan. The P* risk policy requires higher certainty in avoiding overfishing at lower biomasses. For example in 2023 the P* risk policy requires an 85.5% probability of not overfishing due to the low projected 2023 stock size, and catch is lowered accordingly. For a fully rebuilt stock, the risk policy requires a 55%

probability of not overfishing, which causes the stock size to stabilize above the rebuilding target. Higher certainty about avoiding overfishing means lower catches, especially initially, which allows rebuilding by 2031 in this alternative (Table 6). As biomass nears the rebuilding target, higher fishing mortality is allowed (slowing stock growth). The 10-year rebuilding probability given all 10 years of catches for Alternative 3 is 51.5% given the recruitments used. Of the action alternatives, this alternative would have the 3rd highest probability of increasing stock size by the 2025 Mackerel MTA because it leads to the 3rd lowest 2023-2024 catches.

This alternative would choose the overall rebuilding plan and set the ABC ("catch") specified in the following table for 2023, and the rest of the numbers provided in the table are projections that would be revisited during future spec setting.

Table 6. Rebuilding Alternative 3 ABCs and Biomass

	Catch (MT)	Biomass (MT)
2023	4,539	82,205
2024	6,207	96,378
2025	8,455	111,512
2026	11,245	126,811
2027	14,558	142,214
2028	18,391	156,433
2029	22,337	168,344
2030	25,981	177,517
2031	29,014	183,446
2032	30,564	186,886

In terms of setting specifications for 2023, a complete commercial EEZ closure would come closest to holding to the ABC, but might still result in ABC overages due to Canadian landings, U.S. incidental catch/discards in federal waters, and state-waters landings and discards.

5.3.4 Rebuilding Plan Alternative 4 – 61% Rebuilding Probability in 10 Years (PREFERRED)

Alternatives 2-5 utilize recruitment draws constrained to lower 2009-2019 estimates unless spawning stock biomass during the rebuilding period is above 50% of the target (then the higher 1975-2019 recruitments, which the rebuilding goal is based on, are used). The SSC identified this as one of two recruitment approaches that are "defensible and supported by the data" at its September 2021 SSC Meeting (see Alternative 1 for the other approach). Because the projection model selects the lower or higher recruitment stanza based on biomass in each year of each projection run, there is a relatively slow transition toward higher median recruitment through the rebuilding period, depending on the exact trajectory of each run.

Alternative 4 uses an F of 0.12, which would be predicted to have a 61% probability of rebuilding the mackerel stock in 10 years given the recruitments used. The median rebuilt year is 2031. F stays the same for all 10 years, and as biomass increases, so does catch. Of the action alternatives, this alternative would have the 4th highest probability of increasing stock size by the 2025 Mackerel MTA because it leads to the 4th lowest 2023-2024 catches (Table 7).

This alternative would choose the overall rebuilding plan and set the ABC ("catch") specified in the following table for 2023, and the rest of the numbers provided in the table are projections that would be revisited during future spec setting.

Table 7. Rebuilding Alternative 4 ABCs and Biomass

	Catch (MT)	Biomass (MT)
2023	8,094	80,745
2024	9,274	91,738
2025	10,540	103,756
2026	11,906	116,857
2027	13,408	131,291
2028	15,004	146,553
2029	16,631	162,239
2030	18,261	177,731
2031	19,814	192,045
2032	21,215	204,796

As detailed above, this action would only set specifications for 2023 given a Mackerel MTA is expected in 2023, which can inform 2024-2025 specifications. Selecting this alternative would also modify the Council's risk policy for the purposes of beginning this rebuilding plan. The existing risk policy would otherwise cap the 2023 ABC at the standard P* catch calculation (4,539 MT).

This approach was preferred because it balances the practicalities of landings and discards in U.S. fisheries with a high probability of rebuilding in recognition that Atlantic mackerel play an important role in the ocean food web.

5.3.5 Rebuilding Plan Alternative 5 – 53% Rebuilding Probability in 10 Years

Alternatives 2-5 utilize recruitment draws constrained to lower 2009-2019 estimates unless spawning stock biomass during the rebuilding period is above 50% of the target (then the higher 1975-2019 recruitments, which the rebuilding goal is based on, are used). The SSC identified this as one of two recruitment approaches that are "defensible and supported by the data" at its September 2021 SSC Meeting (see Alternative 1 for the other approach). Because the projection model selects the lower or higher recruitment stanza based on biomass in each year of each

projection run, there is a relatively slow transition toward higher median recruitment through the rebuilding period, depending on the exact trajectory of each run.

Alternative 5 uses an F of 0.14, which would be predicted to have a 53.4 % probability of rebuilding the mackerel stock in 10 years given the recruitments used. The median rebuilt year is 2032. F stays the same for all 10 years, and as biomass increases, so does catch. Of the action alternatives, this alternative would also have the lowest probability of increasing stock size by the 2025 Mackerel MTA Because it leads to the highest 2023-2024 catches (Table 8).

This alternative would choose the overall rebuilding plan and set the ABC ("catch") specified in the following table for 2023, and the rest of the numbers provided in the table are projections that would be revisited during future spec setting.

Table 8. Rebuilding Alternative 5 ABCs and Biomass

	Catch (MT)	Biomass (MT)
2023	9,371	80,215
2024	10,591	89,949
2025	11,883	100,486
2026	13,252	111,737
2027	14,764	124,305
2028	16,365	137,457
2029	18,001	151,050
2030	19,665	164,694
2031	21,257	177,355
2032	22,672	188,731

As detailed above, this action would only set specifications for 2023 given a Mackerel MTA is expected in 2023, which can inform 2024-2025 specifications. Selecting this alternative would also modify the Council's risk policy for the purposes of beginning this rebuilding plan. The existing risk policy would otherwise cap the 2023 ABC at the standard P* catch calculation (4,539 MT).

5.4 Action Alternative Set 2: Recreational Possession Limits

Because of the low ABCs needed at least in the beginning of the rebuilding period, the Council deemed it necessary to consider alternatives to restrict recreational catch.

5.4.1 Recreational Possession Limits Alternative 1 – No limits

This is the no action and status quo regarding recreational possession limits. There are currently no federal or state possession limits (or seasons or size limits) for Atlantic mackerel. If this alternative was chosen, a reasonable deduction for expected recreational catch in 2023 would be 2,582 MT, the 2017-2021 average.

5.4.2 Recreational Possession Limits Alternative 2 – 10 fish

In federal waters, individuals would be limited to 10 fish per person (including for-hire crew).

2018-2021 Marine Recreational Information Program (MRIP) and Vessel Trip Report (VTR) data were analyzed to predict effects on catches from this alternative. A 10-fish limit appears likely to approximately reduce private boat catch by 39%, shore catch by 27%, and for-hire catch by 35%. Accounting for the proportion of each mode's harvest (77% private, 20% shore, 3% for hire), and that harvest is 83% of catch, then if discards remain the same proportion of catch, the overall calculated reduction in recreational catch would be about 31%, if Maine, New Hampshire, and Massachusetts mirrored the Federal regulations (there has been minimal mackerel catch south of Massachusetts in recent years). If Maine, New Hampshire, and Massachusetts did not mirror the federal regulations, there may be minimal catch reduction given most catch occurs in state waters. The Council has coordinated with these states in the development of the recreational measures, and it appears likely that these states will mirror the preferred federal limit (Alternative 4).

If this alternative was chosen, a reasonable deduction for expected recreational catch in 2023 would be 2,582 MT, the 2017-2021 average, because it is less likely that the relevant states will match these federal regulations.

5.4.3 Recreational Possession Limits Alternative 3 – 15 fish

In federal waters, individuals would be limited to 15 fish per person (including for-hire crew).

2018-2021 Marine Recreational Information Program (MRIP) and Vessel Trip Report (VTR) data were analyzed to predict effects on catches from this alternative. A 10-fish limit appears likely to approximately reduce private boat catch by 28%, shore catch by 19%, and for-hire catch by 22%. Accounting for the proportion of each mode's harvest (77% private, 20% shore, 3% for hire), and that harvest is 83% of catch, then if discards remain the same proportion of catch, the overall calculated reduction in recreational catch would be about 22%, if Maine, New Hampshire, and Massachusetts mirrored the Federal regulations (there has been minimal mackerel catch south of Massachusetts in recent years). If Maine, New Hampshire, and Massachusetts did not mirror the federal regulations, there may be minimal catch reduction given most catch occurs in state waters. The Council has coordinated with these states in the development of the recreational measures, and it appears likely that these states will mirror the preferred federal limit (Alternative 4).

If this alternative was chosen, a reasonable deduction for expected recreational catch in 2023 would be 2,582 MT, the 2017-2021 average, because it is less likely that the relevant states will match these federal regulations.

5.4.4 Recreational Possession Limits Alternative 4 – 20 fish (PREFERRED)

In federal waters, individuals would be limited to 20 fish per person (including for-hire crew).

2018-2021 Marine Recreational Information Program (MRIP) and Vessel Trip Report (VTR) data were analyzed to predict effects on catches from this alternative. A 10-fish limit appears likely to approximately reduce private boat catch by 22%, shore catch by 14%, and for-hire catch by 13%. Accounting for the proportion of each mode's harvest (77% private, 20% shore, 3% for hire), and that harvest is 83% of catch, then if discards remain the same proportion of catch, the overall calculated reduction in recreational catch would be about 17%, if Maine, New Hampshire, and Massachusetts mirrored the Federal regulations (there has been minimal mackerel catch south of Massachusetts in recent years). If Maine, New Hampshire, and Massachusetts did not mirror the federal regulations, there may be minimal catch reduction given most catch occurs in state waters. The Council has coordinated with these states in the development of the recreational measures, and it appears likely that these states will mirror the preferred federal limit (Alternative 4).

If this alternative was chosen, a reasonable deduction for expected recreational catch in 2023 would be 2,143 MT, the 2017-2021 average minus 17%.

This Alternative was preferred to support ongoing rebuilding because while smaller limits may achieve greater reductions on paper, they could cause substantial economic impacts that would ripple through tuna and other fisheries as a result of a drastic possession limit change from the current lack of any limits. Lower limits also might not be practicable from a compliance and enforcement perspective especially if states do not mirror federal limits, which they have communicated is likely for lower limits. A 20 fish limit benefits from more likely buy-in of the regulated community and is a meaningful first step for 2023. Additionally, this limit likely will improve the reliability of MRIP catch estimates (by reducing high catch outliers) and would be consistent with the Canadian recreational limit.

5.5 Action Alternative Set 3: Specification Set-Asides and Closure Approaches

To calculate the commercial quota in each year, other sources of catch must be accounted for to ensure that the ABC is not exceeded. To manage the commercial quota, a process for quota monitoring and accountability measures must be specified.

5.5.1 Specification Set-Asides and Closure Approaches No Action

These set-asides and closure approaches were tailored to the no action specifications, so would only be paired with no action.

Under no action, the previous set-asides and closure approaches would re-commence in January 2023. 10,000 MT would be deducted for Canada, an earlier 2018 quota. 1,270 MT would be deducted for expected recreational catch, which was based on pre-calibrated MRIP data that is no longer used. A 3% management uncertainty buffer would be applied, which has never been utilized. 0.37% (65 MT) would be set aside for discards based on older data.

When the fishery starts each year, the various commercial mackerel permit categories start with different trip limits. Tier 1 has an unlimited trip limit, Tier 2 has a 135,000 pound trip limit, and Tier 3 has a 100,000 pound trip limit. There is a 20,000 pound open access/incidental permit trip limit. When 90% of the quota is projected to be landed, trip limits of 40,000 pounds are implemented for Tier 1-3 directed permits and 5,000 pounds for incidental/open access permits. When 98% of the DAH is projected to be landed, a 5,000 pound trip limit would be implemented for all permits for the rest of the fishing year to cover remaining incidental catches.

The issues with these approaches should be apparent, in that the Canadian deduction would not match expected catch and be more than all of the possible total 2023 rebuilding ABCs, insufficient recreational catch would be set aside, the Council did not set a management uncertainty buffer for 2023, and updated information on discards is now available. Updated approaches are discussed in the only action alternative for this set next.

5.5.2 Specification Set-Asides and Closure Approaches – Modified based on new information (PREFERRED)

These closure approaches could only apply to rebuilding plan alternatives 4 and 5, because they are the only rebuilding plans that have enough commercial quota to have a fishery that would need to be closed.

Because the closure approach is contingent on there being sufficient commercial quota, and the commercial quota is contingent on the set-asides, and there is also a potential feedback loop from the closure provisions and some of the set-asides, especially the discard set aside, the set-asides and closure provisions are treated as a package.

Under the proposed approach, several changes would occur. They are treated as a bundle because they work in a complementary manner to ensure orderly operation of the fishery and avoidance of ABC/ACL overages.

a. Canadian deduction

2021 Canadian landings (preliminary) were 4,395 MT. Canada closed its fishery for 2022 so may have minimal landings in 2022. If Canada keeps its fishery closed for 2022 and 2023, their stock assessment indicates they have about a coin flip's chance (i.e. 50-50) of reaching at least 40% of their biomass target. With a 2023 Canadian assessment pending, 2023 Canadian landings are still challenging to predict. The Council decided to deduct **2,197 MT** for Canada for 2023, i.e. half of their 2021 landings. Given the uncertainty of Canada's 2023 management actions this may under predict or over predict 2023 Canadian landings, but was considered to be a reasonable middle of the road approach by the Council

b. Recreational deduction

2,143 MT, the 2017-2021 average minus 17% would be deducted for expected recreational catch. This deduction is based on the 20-fish recreational possession limit recommended by the Council. Given the uncertainty of the effects of a new possession limit and the general variability in recreational catch estimates, this may under predict or over predict 2023 recreational catch, but was considered to be a reasonable middle of the road approach by the Council.

c. Management uncertainty buffer

There have been no ABC overages in the mackerel fishery, so it was determined that a management uncertainty buffer is not necessary at this time. While there are changes to the specifications, none are expected to result in substantial overages of the specifications.

d. Discards

115 MT for discards would be set aside based on updated data, the average discard rate from 2017-2019.

e. Initial Trip Limits

No changes are proposed. When the fishery starts each year, the various commercial mackerel permit categories start with different trip limits. Tier 1 has an unlimited trip limit, Tier 2 has a 135,000 pound trip limit, and Tier 3 has a 100,000 pound trip limit. There is a 20,000 pound open access/incidental permit trip limit.

f. Closure Provisions

To address the lower quota available to the U.S. commercial fishery, a modified closure approach was recommended by the Council. Averaging 2018-2021, the fishery landed 805 MT after April 1, and these were times when the directed limited access fishery was not active (range was 618 MT to 1,037 MT). As such, this time period should represent landings rates that could occur during a closure of the directed fishery. The proposed "first" closure approach is to buffer this performance by 10% and one month, so that before May 1 the directed fishery would close with 886 MT left in the quota, and from May 1 on, the directed fishery would close with 443 MT left in the quota. NMFS would also have the discretion to not close the fishery in November and December if performance suggests that a quota overage is unlikely. While it is possible that an early closure in January could result in more than 886 MT in additional landings, and it is possible that a closure in late April could result in unused quota remaining, this proposed system likely strikes a reasonable balance between achieving OY and regulatory simplicity. At this threshold for the "first" closure, additional trip limits would be implemented: 40,000 pounds for Tier 1-3 directed permits and 5,000 pounds for incidental/open access permits. There would be a final closure with 100 MT left in the quota where all permits become subject to a 5,000 pound trip limit to minimize any potential overages. With these trip limits any possible landings overages should be minimal, and would be deducted from subsequent years' quotas if an overall ABC/ACL overage occurs.

Table 9. The proposed new specifications and closure provisions for the preferred rebuilding alternative

ABC/ACL	8,094	a
Canadian Catch Deduection	2,197	b
Rec Catch Deduction	2143	c
Commercial Discards	115	d
Commercial Quota	3,639	e=a-b-c-d
Before May 1 First Closure Threshold (-886 MT)	2,753	f=e-886
May 1/after First Closure Threshold (-443 MT)	3,196	g=e-443
Final Closure Threshold (-100 MT)	3,539	h=e-100

These approaches are preferred because they should facilitate orderly operation of the mackerel fishery without leading to overages of the ABC/ACL.

5.5.3 Specification Set-Asides and Closure Approaches – Low ABC Option 1

The 2023 ABCs resulting from rebuilding plans 1 or 2 are so low that the only measures that could reasonably be paired with them are closures of the EEZ for both commercial and recreational fishing. Thus under this option, which would only be paired with rebuilding plans 1 or 2, there would be no possession of mackerel in the EEZ for the whole year.

5.5.4 Specification Set-Asides and Closure Approaches – Low ABC Option 2

The 2023 ABC resulting from rebuilding plan 3 is so low that the only measures that could reasonably be paired with rebuilding plan alternative 3 is closure of the EEZ for commercial fishing. Most of the mackerel caught is from state waters, so a recreational EEZ closure is unlikely to reduce catch enough to allow some commercial catch. Thus under this option, which would only be paired with rebuilding plan 3, there would be no possession of mackerel in the EEZ for the whole year for the commercial fishery.

5.6 Action Alternative Set 4: River Herring and Shad (RH/S) Cap

5.6.1 River Herring and Shad (RH/S) Cap: No Action (PREFERRED)

The no action and status quo RH/S cap is 129 MT. 129 MT was the amount of RH/S if the ratio of cap to all catch on mackerel trips was about 0.53% and the 2019 mackerel quota was 17,371 MT (or 0.74% applied to just the mackerel quota). With the minimally-changed mackerel quota of 17,312 initially in 2021, a 129 MT RH/S cap was maintained, and is what the RH/S cap would default to as roll-over specifications in the event no action was taken before the current emergency rule for mackerel expires January 13, 2023.

This RH/S cap was preferred because lower caps may be impracticable to monitor and forced to utilize the previous year's data to enact a closure. The small scale of the mackerel fishery at current quotas should lead to small incidental RH/S catches regardless of the cap amount.

5.6.2 River Herring and Shad (RH/S) Cap: Scale with Quota

If the RH/S cap was scaled (0.74%) with the preferred mackerel quota of 3,639 MT, the resulting cap would be 27 MT. 0.74% is based on the years 2005-2012, such that if the fishery had an interaction rate of better than half of the years from 2005-2012 (i.e. 0.74%) then it would not close early. Higher interaction rates could cause closures to the degree that the interaction rate was higher.

5.6.3 River Herring and Shad (RH/S) Cap: 89 MT

89 MT was the median RH/S catch from the bast 2005-2012 years. The Council has used 89 MT as an initial RH/S cap in the past when landings have been low in order to provide another option to create incentive for the mackerel fishery to avoid RH/S.

5.7 Considered but Rejected Alternatives

1. Given the extremely low catches required for even a 50% probability of rebuilding when lower recruitment is assumed for the whole rebuilding period (i.e. #1 above), higher rebuilding probability options combined with the persistent low recruitment assumption appeared redundant, and were thus "Considered but Rejected."

2. Even with the two phase recruitment scenario, achieving a 75% probability of rebuilding would require very low catches, and appeared redundant with remaining options that also required very low catches, and were thus "Considered but Rejected."

3. Given the unknown discard mortality, and potential enforcement issues related to chub mackerel mis-identification, minimum Atlantic mackerel size options were "Considered but Rejected."

4. A 3-inch minimum mesh requirement that mirrors a similar requirement in the butterfish fishery was "Considered but Rejected." Unfortunately there are not gear selectivity studies for Atlantic mackerel that allow quantitative analysis of this measure. There was also minimal public comment on this issue, suggesting that the public was not particularly aware of this potential measure. Additional investigation of the effects of a minimum mesh may be evaluated in the future.

5. New permitting requirements for for-hire and commercial vessels to possess mackerel as bait were "Considered but Rejected." Instead, the Council requested that NMFS conduct additional outreach and compliance assistance regarding the appropriate existing permitting and catch reporting for commercial and for-hire vessels possessing mackerel, clarifying that the Council's understanding is that such requirements apply only to commercial and for-hire vessels, and would not include previously-purchased fish with a bill of sale.

6.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT AND FISHERIES

6.1 Description of the Managed Resource and Non-Target Species

Mackerel

Unless otherwise indicated, the information in this section is taken from the mackerel EFH source document at http://www.nefsc.noaa.gov/nefsc/habitat/efh/ and the recent mackerel MTA.

Atlantic mackerel is a semi-pelagic/semi-demersal (may be found near the bottom or higher in the water column) schooling fish species primarily distributed between Labrador (Newfoundland, Canada) and North Carolina. Based on the work of Sette (1943, 1950) and confirmed in the recent assessment, the stock is considered to comprise two spawning contingents: a northern contingent spawning primarily in the southern Gulf of St. Lawrence and a southern contingent spawning in the Mid-Atlantic Bight, Southern New England and the western Gulf of Maine. The two contingents mix during winter months on the Northeast U.S. shelf; however, the degree of mixing and natal homing is unknown. Mackerel in the northwest

Atlantic were modeled as one stock for the recent assessment. The Canadian fishery likely primarily catches the northern contingent while the U.S. fishery likely catches both contingents.

Mackerel spawning occurs during spring and summer and progresses from south to north as the surface waters warm. Atlantic mackerel are serial, or batch spawners. Eggs are pelagic. Post-larvae gradually transform from planktonic to swimming and schooling behavior at about 30-50 mm. Approximately 50% of fish are mature at age 2 and about 99% were mature at age 3 from 2007-2016 according to the 2018 Benchmark Assessment (NSFSC 2018).

Atlantic mackerel are opportunistic feeders that can ingest prey either by individual selection of organisms or by filter feeding.

A wide variety of fish and other animals are predators of mackerel. Predator food habits on the Northeast US Shelf have been systematically sampled during the NEFSC bottom trawl surveys since 1973. In the recent benchmark assessment, these food habits data were evaluated for the top 17 mackerel predators based on the percent occurrence of mackerel in predator diets (NEFSC 2018, Appendix A4). The presence of Atlantic mackerel in fish stomachs was generally low from 1973-2016. A total of 1,284 out of 619,637 stomachs (~0.2%) contained mackerel, including unidentified mackerel Scombridae and Scomber spp. Spiny dogfish was the most dominant mackerel predator sampled by the trawl surveys, but the frequency of occurrence for mackerel in spiny dogfish diets only average 1%.

Additional potentially important predators of mackerel are not sampled in the NEFSC trawl surveys, including highly migratory species, marine mammals, and seabirds. Consumption from these predators is more difficult to estimate due to incomplete information on population levels and annual diet information. Furthermore, predator food habits were not available for the months the northern contingent was outside of the area sampled by the NEFSC trawl survey. Given this incomplete sampling, the low occurrence of mackerel in predator stomachs, and the resulting interannual variability in consumption estimates, the final model did not incorporate predator diets as an index of abundance. The temporal trends in consumption were consistent with trends from the range-wide egg index as well as abundance estimates.

Additional life history information is detailed in the Essential Fish Habitat (EFH) document for the species, located at: http://www.nefsc.noaa.gov/nefsc/habitat/efh/.

The 2021 Mackerel MTA found mackerel continue to be overfished with overfishing occurring, as described previously.

The other species in the FMP (butterfish, longfin squid, *Illex* squid, and chub mackerel) are not expected to be impacted by this action, but recent specifications actions and supporting documents for those species can be consulted for those wanting more information about those species/fisheries. See https://www.mafmc.org/msb. No other species in the FMP are known to be overfished or subject to overfishing.

Mackerel Non-Target Species

There have been very few recent observed directed mackerel trips due to the low directed effort toward mackerel in recent years. Various species will be caught incidentally to any mackerel fishing and will be impacted to some degree by the prosecution of the fishery. On the mackerel trips identified in this analysis, the 2017-2019 overall discard rate was 1%. For non-target species that are managed under their own FMP, incidental catch/discards are also considered as part of the management of that fishery. Data beyond 2019 was not analyzed due to potential Covid-19 impacts and ongoing reorganization of observer data by NMFS within the transition to a new Catch Accounting and Monitoring System (CAMS). Past discard analyses, for example for the 2016 mackerel specifications, found very similar discarding patterns, so utilizing data through 2019 for discard characterization should be sufficient for characterizing discards in the mackerel fishery.

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

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

Table 10. Incidental Catch and Discards in the Mackerel Fishery

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

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

6.2 Human Communities and Economic Environment

This section describes the performance of the mackerel fishery to allow the reader to understand the socio-economic importance of the mackerel fishery. The recent squid and butterfish specifications EA (MAFMC 2021) can be consulted for information on those species, but those fisheries are not expected to be impacted by this action. Recent Amendments to the MSB FMP contain additional information about the MSB fisheries, especially demographic information on ports that land MSB species. See Amendments 11 and 14 at http://www.mafmc.org/msb/ for more information or visit NMFS' communities page at: http://www.nefsc.noaa.gov/read/socialsci/community_profiles/. In general, the MSB fisheries saw high foreign landings in the 1970s followed by a domestication of the fishery, and domestic landings have been variable, but lower than the peak foreign landings. The current regulations for the MSB fisheries are summarized by NMFS at https://www.fisheries.noaa.gov/species/atlantic-mackerel#commercial, and detailed in the Federal Register at https://www.ecfr.gov/current/title-50/chapter-VI/part-648.

The most obvious way that human communities are affected by the MSB fisheries are from the revenues generated by the fisheries, and the jobs created. The affected communities include both individuals directly involved in harvesting and processing as well as indirect support services (e.g. vessel maintenance, insurance, ice, etc.). While the direct data points that are most available are landings and revenues, it is important to keep in mind that by contributing to the overall functioning of and employment in coastal communities, the MSB fisheries have indirect social impacts as well. Social impacts are strongly aligned with changes to fishing opportunities and while difficult to measure can include impacts to families from income changes/volatility, safety-at-sea (related to changes in fishery operations due to regulation changes), job satisfaction, and general frustration by individuals due to management's impacts especially if they perceive management actions to be unreasonable or ill-informed.

Descriptive information on the fisheries is included, and where possible, quantitative commercial fishery and economic information is presented. This section establishes a descriptive baseline for the fishery with which to compare actual and predicted future socio-economic changes that result from management actions.

Commercial Fishery Measures and Total Catches

There are four categories of mackerel permits. When the fishery starts each year, the various commercial mackerel permit categories start with different trip limits. Tier 1 has an unlimited trip limit, Tier 2 has a 135,000 pound trip limit, and Tier 3 has a 100,000 pound trip limit. An open access/incidental permit has a 20,000 pound trip limit. When 90% of the DAH is projected to be landed, trip limits of 40,000 pounds are implemented for Tier 1-3 directed permits and 5,000 pounds for incidental/open access permits. When 100% of the DAH is projected to be landed, a 5,000 pound trip limit would be implemented for all permits for the rest of the fishing year to cover remaining incidental catches.

Foreign catches dominated the fishery during the 1960s and 1970s, with total catch peaking at over 432,000 MT in 1973. Foreign catches declined and then were eliminated by the MSA, though there was also some joint venture activity from the mid-1980s through 1991. From 1992 through 2001, total catches (including Canada) averaged just under 36,000 MT before increasing to peaks over 112,000 MT in 2004 and 2006. Total catch then declined from 2011-2021 averaging just under 17,000 MT per year. It has been estimated by Canadian DFO staff that there could be between 2,000 and 5,000 metric tons of unreported historical catches per year[6] (not included in US assessments or catch accounting), which includes fishing mortality from various sources, notably recreational and some unreported commercial (including bait) harvests, discards, and other mortalities. Unreported Canadian commercial harvest may be lower in the most recent years due to stock concerns and additional focus on catch reporting.

2019-2021 landings averaged 6,187 MT, which is a useful reference point for comparing the effects of future quotas. The associated average revenues were $3.62 million

[6] https://www.gazette.gc.ca/rp-pr/p2/2021/2021-05-26/html/sor-dors100-eng.html

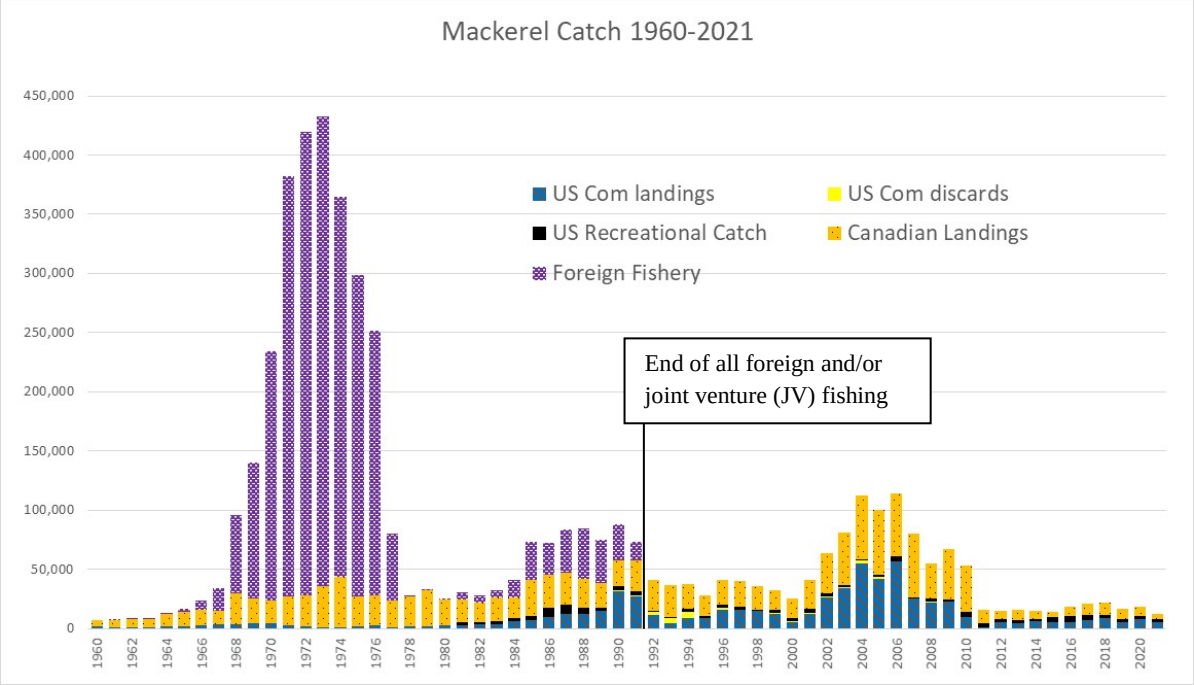

Figure 3. Recorded NW Atlantic mackerel catch (mt) 1960-2021.

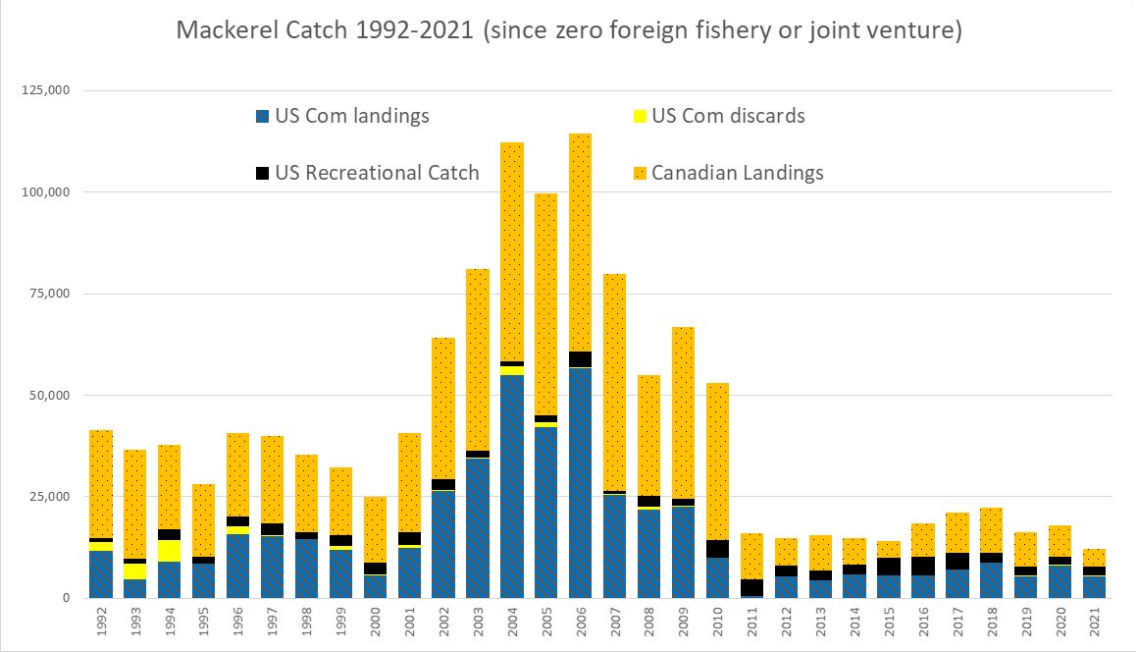

Figure 4. Recorded NW Atlantic mackerel catch (mt) 1992-2021.
(foreign fishery ended fully - note different scale and time period from Figure 3)

The figures below provides more detail on U.S. Commercial landings, ex-vessel revenues (in 2021 inflation-adjusted dollars), and prices per MT since 1996, when reporting was improved.

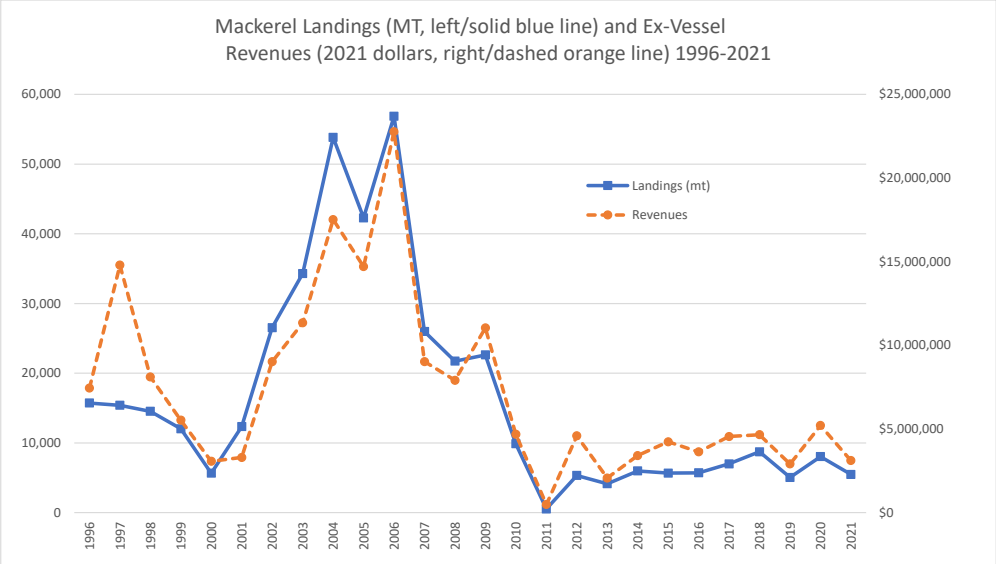

Figure 5. U.S. Commercial Landings and Ex-Vessel Revenues 1996-2021 Adjusted to 2021 Dollars Source: NMFS unpublished dealer data.

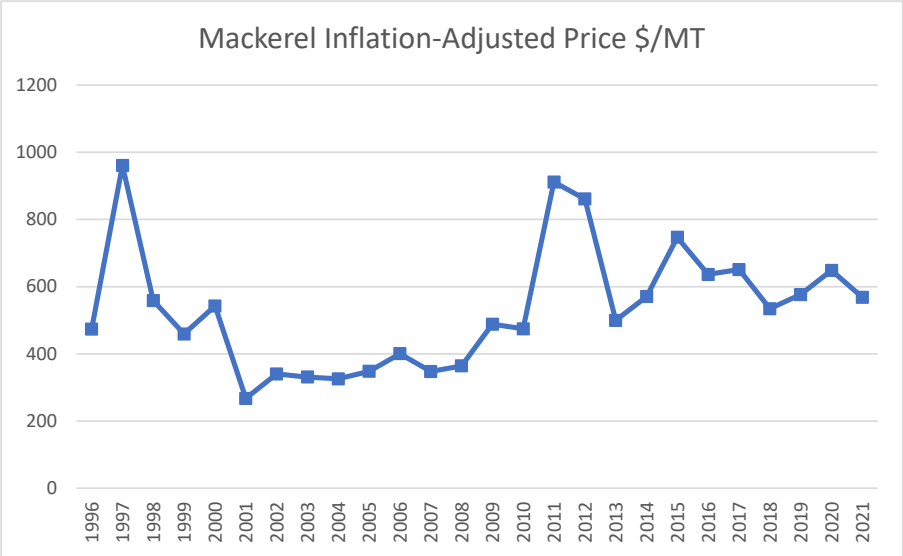

Figure 6. Ex-Vessel Mackerel Prices 1996-2021 Adjusted to 2021 Dollars Source: NMFS unpublished dealer data. [PRELIMINARY]

The U.S. mackerel fishery occurs in shelf and shelf break waters primarily north of the entrance to the Chesapeake Bay, Virginia and into the Gulf of Maine. There is also a Canadian fishery, primarily in the Gulf of St. Lawrence and off the northeast coast of Newfoundland. NMFS Statistical Areas with substantial U.S. catch in 2020 and 2021 are provided in the tables below. The public hearing document (available at https://www.mafmc.org/actions/atlantic-mackerel-rebuilding-amendment) for this action has additional detail on historical catch locations.

Table 11. Commercial mackerel landings by statistical area in 2020. Source: NMFS unpublished VTR data.

Stat Area	Metric Tons
613	2,900
521	1,164
612	1,152
616	806
615	738
514	705
Other/CI	580
Total	8,045

Table 12. Commercial mackerel landings by statistical area in 2021. Source: NMFS unpublished VTR data.

Stat Area	Metric Tons
522	2,023
521	1,854
612	992
514	450
Other/CI	332
Total	5,652

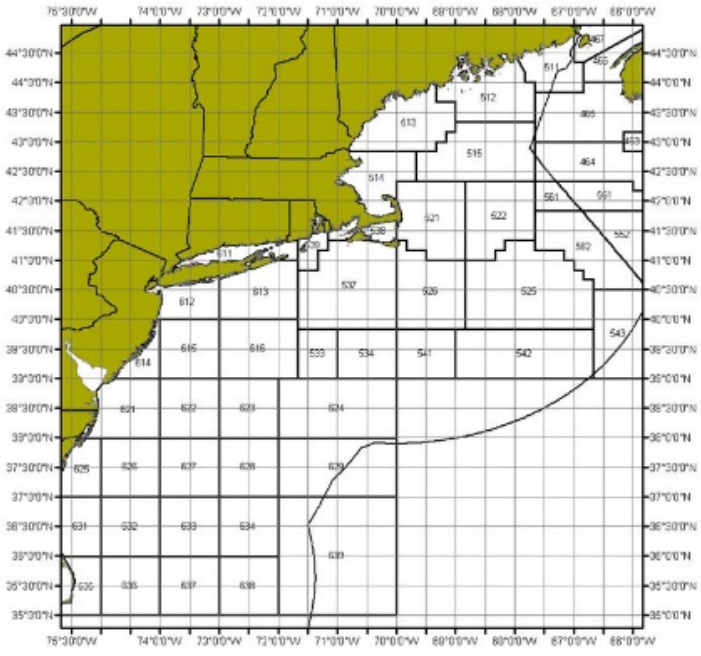

Figure 7. NMFS Statistical Areas

In recent years (2017-2021) most mackerel landings have occurred in Massachusetts and New Jersey (see table below). There is more confidential information at the port level, but aggregate 2017-2021 landings and nominal revenues are also provided for major ports where possible.

Table 13. 2017-2021 Total Mackerel Landings by State

State	MT
MA	18,043
NJ	9,931
RI	3,979
ME	2,066
Other	254

Table 14. 2017-2021 Total Mackerel Landings by Port

PORT	MT
Cape May, NJ	9,849
Gloucester, MA	7,702
New Bedford, MA	7,108
Portland, ME	2,018
Point Judith, RI	1,703
Marshfield, MA	1,311
Chatham, MA	972
Other/CI	3,610

Table 15. 2017-2021 Total Mackerel Revenues by Port

Port	$ (Millions)
Cape May, NJ	4.3
Gloucester, MA	3.6
New Bedford, MA	3.5
Marshfield, MA	1.5
Portland, ME	1.3
Point Judith, RI	1.0
Chatham, MA	0.7
Other/CI	3.4

Table 16. Numbers of vessels that actively fished for mackerel, by landings (lbs) category, 1982-2021.

YEAR	Vessels 1 mil +	Vessels 100,000 - 1mil	Vessels 50,000 - 100,000	Vessels 10,000 - 50,000	Total
1982	0	10	10	43	63
1983	0	10	5	26	41
1984	0	11	14	29	54
1985	0	12	10	28	50
1986	1	10	5	37	53
1987	1	15	8	31	55
1988	2	20	8	40	70
1989	6	17	8	27	58
1990	6	16	7	39	68
1991	13	18	1	38	70
1992	9	17	13	48	87
1993	0	16	11	55	82
1994	2	27	14	44	87
1995	4	24	11	50	89
1996	7	45	15	53	120
1997	6	30	20	46	102
1998	9	16	6	39	70
1999	6	15	9	37	67
2000	5	3	0	26	34
2001	5	3	2	20	30
2002	12	3	1	22	38
2003	14	6	5	23	48
2004	18	6	1	14	39
2005	15	11	4	17	47
2006	20	12	5	10	47
2007	16	12	2	20	50
2008	15	5	1	17	38
2009	15	6	6	18	45
2010	10	9	2	14	35
2011	0	3	3	17	23
2012	3	9	1	9	22
2013	4	3	3	13	23
2014	6	5	1	13	25
2015	5	9	10	12	36
2016	3	16	7	26	52
2017	6	7	14	27	54
2018	8	6	3	24	41
2019	3	11	4	38	56
2020	7	9	1	10	27
2021	4	9	3	6	22

Note: The above bins were established in the past in consultation with the MSB Advisory Panel as representing various representative levels of activity in the mackerel fishery.

Recreational Fishery

The figure below describes total Atlantic mackerel recreational catch (numbers of fish) from 1981 to 2021 (2021 preliminary). Estimates before 2018 use calibration factors to account for substantial survey changes that were fully implemented by 2018, including the mail-based fishing effort survey and changes to the MRIP site-intercept survey (APAIS). Catch since 2018 has been remarkably stable, but the time series includes substantial year to year variability.

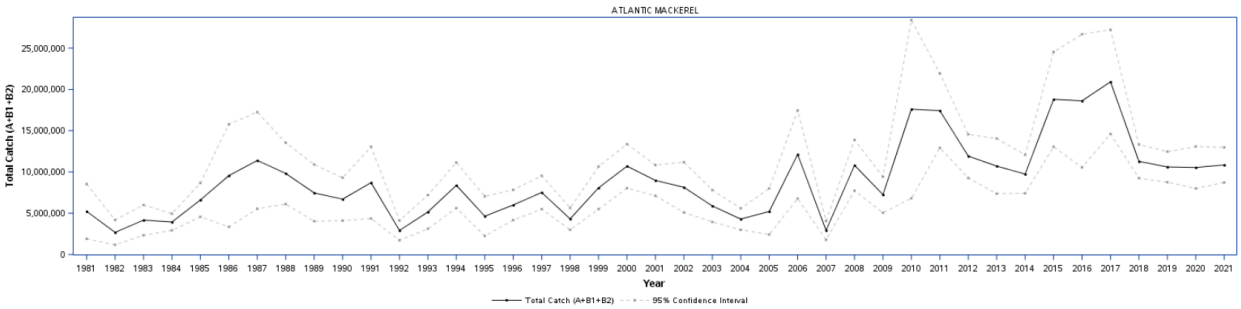

Figure 8. MRIP mackerel time series 1981-2021, total catch, numbers of fish.

The following more detailed discussion of recent catch focuses on data since 2018 to avoid any concerns about the effects of the calibration for pre-2018 data. Earlier discussions have highlighted that for-hire operators are not interviewed about trip catches but their anglers/customers could be, if they are at a site that is included on the MRIP site register. Anglers are to be asked about all fish caught and their disposition (available to be measured, harvested but not available, and/or released). PSE, or proportional standard error, expresses the standard error of an estimate as a percentage of the estimate and is a measure of precision.

Table 17. 2018-2021 MRIP Mackerel Estimates (#s) by Catch Type

Estimate Status	Year	Common Name	Observed Harvest (A)	PSE	Reported Harvest (B1)	PSE	Released Alive (B2)	PSE
FINAL	2018	ATLANTIC MACKEREL	2,330,587	23.3	7,164,214	11.3	1,805,421	19.7
FINAL	2019	ATLANTIC MACKEREL	2,646,784	16.3	5,913,593	12.6	2,041,877	18.8
FINAL	2020	ATLANTIC MACKEREL	3,136,063	19.6	6,439,192	17.6	964,581	15.2
FINAL	2021	ATLANTIC MACKEREL	710,167	17.9	8,483,391	11.8	1,480,637	19.4

Table 18. 2018-2021 MRIP Mackerel Estimates (#s) by State

Estimate Status	Year	State	Common Name	Total Catch (A+B1+B2)	PSE	** Contribution of Imputed Data to Total Catch Rate
FINAL	2018	CONNECTICUT	ATLANTIC MACKEREL	63	71.6	0%
FINAL	2018	MAINE	ATLANTIC MACKEREL	2,851,922	21	0%
FINAL	2018	MASSACHUSETTS	ATLANTIC MACKEREL	6,396,674	11.9	0%
FINAL	2018	NEW HAMPSHIRE	ATLANTIC MACKEREL	1,961,169	18.9	0%
FINAL	2018	RHODE ISLAND	ATLANTIC MACKEREL	21,119	71.5	0%
FINAL	2019	MAINE	ATLANTIC MACKEREL	3,275,535	20.8	0%
FINAL	2019	MASSACHUSETTS	ATLANTIC MACKEREL	5,647,588	10.5	0%
FINAL	2019	NEW HAMPSHIRE	ATLANTIC MACKEREL	1,637,111	16.9	0%
FINAL	2019	RHODE ISLAND	ATLANTIC MACKEREL	11,262	79.5	0%
FINAL	2020	CONNECTICUT	ATLANTIC MACKEREL	11,283	69.1	0%
FINAL	2020	MAINE	ATLANTIC MACKEREL	3,628,454	18.5	1%
FINAL	2020	MASSACHUSETTS	ATLANTIC MACKEREL	5,318,596	20.1	1%
FINAL	2020	NEW HAMPSHIRE	ATLANTIC MACKEREL	1,525,643	19.3	10%
FINAL	2020	RHODE ISLAND	ATLANTIC MACKEREL	1,420	62.5	77%
FINAL	2021	CONNECTICUT	ATLANTIC MACKEREL	1,310	92.3	0%
FINAL	2021	MAINE	ATLANTIC MACKEREL	3,914,755	17.6	1%
FINAL	2021	MASSACHUSETTS	ATLANTIC MACKEREL	5,237,979	14.1	0%
FINAL	2021	NEW HAMPSHIRE	ATLANTIC MACKEREL	1,323,662	13	0%
FINAL	2021	RHODE ISLAND	ATLANTIC MACKEREL	188,921	113.3	0%

PSE, or proportional standard error, expresses the standard error of an estimate as a percentage of the estimate and is a measure of precision. A PSE value greater than 50 indicates a very imprecise estimate and occurrences are highlighted in pink.

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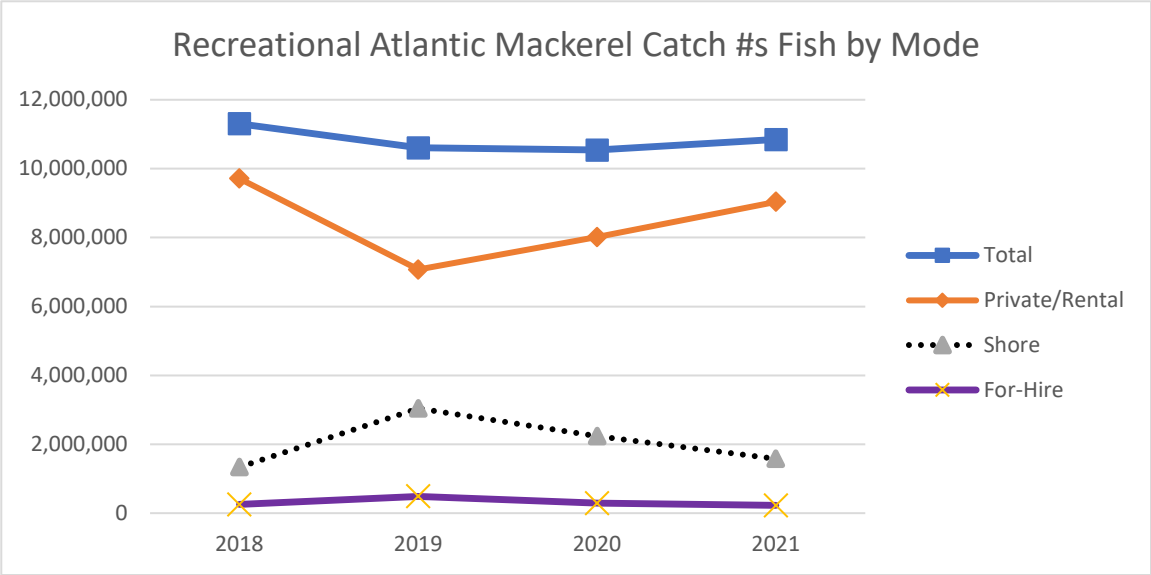

Figure 9. 2018-2021 MRIP Mackerel Estimates (#s) by Mode

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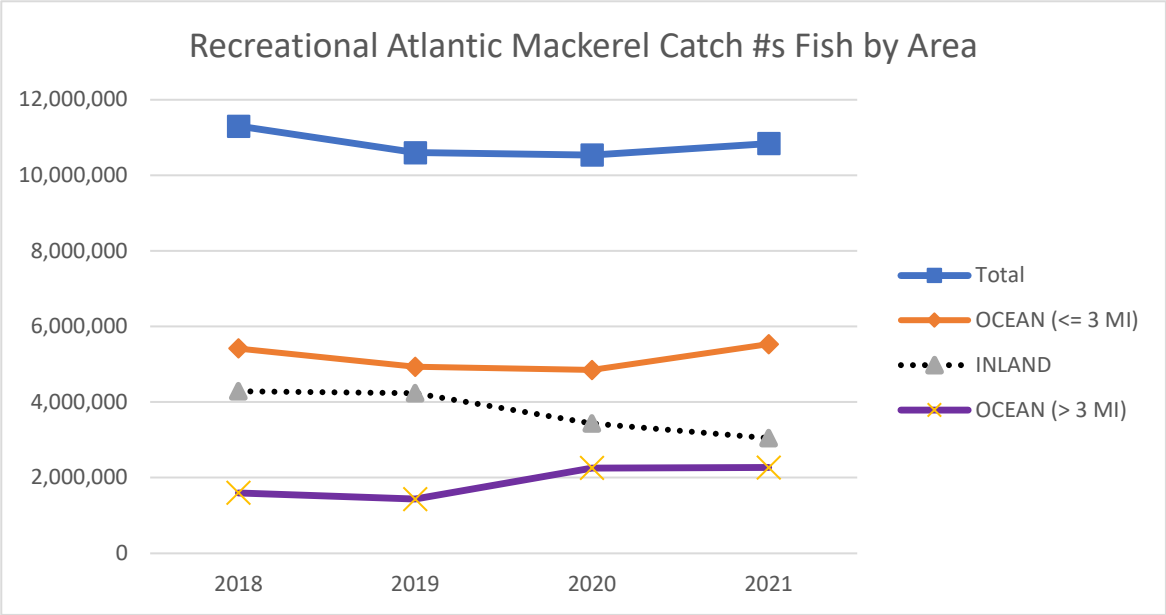

Figure 10. 2018-2021 MRIP Mackerel Estimates (#s) by Area

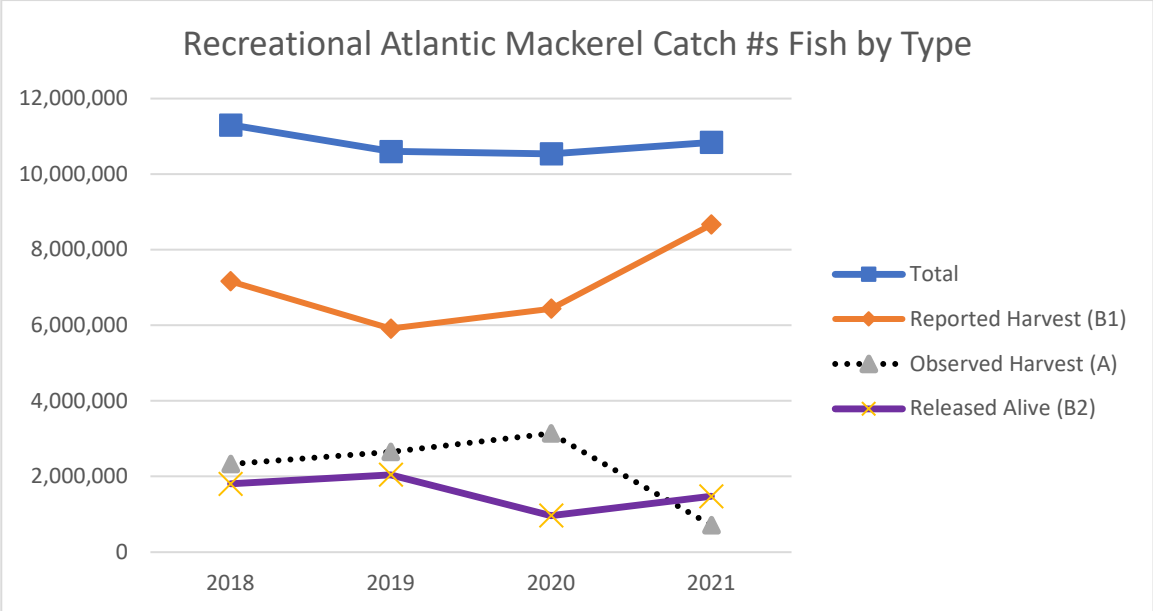

Figure 11. 2018-2021 MRIP Mackerel Estimates (#s) by Catch Type

6.3 Habitat, Including Essential Fish Habitat (EFH)

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

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

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Table 19. EFH descriptions for species vulnerable to trawl gear

Species	Life Stage	Geographic Area	Depth (meters)	Habitat Type and Description
Acadian redfish	Juveniles	Gulf of Maine and the continental slope north of 37°38'N	50-200 in Gulf of Maine, to 600 on slope	Sub-tidal coastal and offshore rocky reef substrates with associated structure-forming epifauna (e.g., sponges, corals) , and soft sediments with cerianthid anemones
Acadian redfish	Adults	Gulf of Maine and the continental slope north of 37°38'N	140-300 in Gulf of Maine, to 600 on slope	Offshore benthic habitats on finer grained sediments and on variable deposits of gravel, silt, clay, and boulders
American plaice	Juveniles	Gulf of Maine and bays and estuaries from Passamaquoddy Bay to Saco Bay, Maine and from Massachusetts Bay to Cape Cod Bay, Massachusetts Bay	40-180	Sub-tidal benthic habitats on mud and sand, also found on gravel and sandy substrates bordering bedrock
American plaice	Adults	Gulf of Maine, Georges Bank and bays and estuaries from Passamaquoddy Bay to Saco Bay, Maine and from Massachusetts Bay to Cape Cod Bay, Massachusetts Bay	40-300	Sub-tidal benthic habitats on mud and sand, also gravel and sandy substrates bordering bedrock
Atlantic cod	Juveniles	Gulf of Maine, Georges Bank, and Southern New England, including nearshore waters from eastern Maine to Rhode Island and the following estuaries: Passamaquoddy Bay to Saco Bay; Massachusetts Bay, Boston Harbor, Cape Cod Bay, and Buzzards Bay	Mean high water-120	Structurally-complex intertidal and sub-tidal habitats, including eelgrass, mixed sand and gravel, and rocky habitats (gravel pavements, cobble, and boulder) with and without attached macroalgae and emergent epifauna
Atlantic cod	Adults	Gulf of Maine, Georges Bank, Southern New England, and the Mid-Atlantic to Delaware Bay, including the following estuaries: Passamaquoddy Bay to Saco Bay; Massachusetts Bay, Boston Harbor, Cape Cod Bay, and Buzzards Bay	30-160	Structurally complex sub-tidal hard bottom habitats with gravel, cobble, and boulder substrates with and without emergent epifauna and macroalgae, also sandy substrates and along deeper slopes of ledges
Atlantic halibut	Juveniles & Adults	Gulf of Maine, Georges Bank, and continental slope south of Georges Bank	60-140 and 400-700 on slope	Benthic habitats on sand, gravel, or clay substrates
Atlantic herring	Eggs	Coastal Gulf of Maine, Georges Bank, and Southern New England	5-90	Sub-tidal benthic habitats on coarse sand, pebbles, cobbles, and boulders and/or macroalgae
Atlantic sea scallop	Eggs	Gulf of Maine coastal waters and offshore banks, Georges Bank, and the Mid-Atlantic, including the following estuaries: Passamaquoddy Bay to Sheepscot River; Casco Bay, Massachusetts Bay, and Cape Cod Bay	18-110	Inshore and offshore benthic habitats (see adults)
Atlantic sea scallop	Larvae	Gulf of Maine coastal waters and offshore banks, Georges Bank, and the Mid-Atlantic, including the following estuaries: Passamaquoddy Bay to Sheepscot	No information	Inshore and offshore pelagic and benthic habitats: pelagic larvae ("spat"), settle on variety of hard surfaces, including shells, pebbles, and gravel and to macroalgae and

Species	Life Stage	Geographic Area	Depth (meters)	Habitat Type and Description
		River; Casco Bay, Massachusetts Bay, and Cape Cod Bay		other benthic organisms such as hydroids
Atlantic sea scallop	Juveniles	Gulf of Maine coastal waters and offshore banks, Georges Bank, and the Mid-Atlantic, including the following estuaries: Passamaquoddy Bay to Sheepscot River; Casco Bay, Great Bay, Massachusetts Bay, and Cape Cod Bay	18-110	Benthic habitats initially attached to shells, gravel, and small rocks (pebble, cobble), later free-swimming juveniles found in same habitats as adults
Atlantic sea scallop	Adults	Gulf of Maine coastal waters and offshore banks, Georges Bank, and the Mid-Atlantic, including the following estuaries: Passamaquoddy Bay to Sheepscot River; Casco Bay, Great Bay, Massachusetts Bay, and Cape Cod Bay	18-110	Benthic habitats with sand and gravel substrates
Atlantic surfclams	Juveniles and adults	Continental shelf from southwestern Gulf of Maine to Cape Hatteras, North Carolina	Surf zone to about 61, abundance low >38	In substrate to depth of 3 ft
Atlantic wolffish	Eggs	U.S. waters north of 41˚N latitude and east of 71˚W longitude	<100	Sub-tidal benthic habitats under rocks and boulders in nests
Atlantic wolffish	Juveniles	U.S. waters north of 41˚N latitude and east of 71˚W longitude	70-184	Sub-tidal benthic habitats
Atlantic wolffish	Adults	U.S. waters north of 41˚N latitude and east of 71˚W longitude	<173	A wide variety of sub-tidal sand and gravel substrates once they leave rocky spawning habitats, but not on muddy bottom
Barndoor skate	Juveniles and adults	Primarily on Georges Bank and in Southern New England and on the continental slope	40-400 on shelf and to 750 on slope	Sub-tidal benthic habitats on mud, sand, and gravel substrates
Black sea bass	Juveniles and adults	Continental shelf and estuarine waters from the southwestern Gulf of Maine and Cape Hatteras, North Carolina	Inshore in summer and spring	Benthic habitats with rough bottom, shellfish and eelgrass beds, man-made structures in sandy-shelly areas, also offshore clam beds and shell patches in winter
Chub Mackerel	Eggs	Pelagic waters throughout the exclusive economic zone (EEZ) from North Carolina to Texas, including intertidal and subtidal areas, at temperatures of 15-25 °C		
	Larvae	Pelagic waters throughout the EEZ from North Carolina to Texas, including intertidal and subtidal areas, at temperatures of 15-30 °C		
	Juveniles and Adults	Pelagic waters throughout the EEZ from Maine to Texas, including intertidal and subtidal areas, at temperatures of 15-30 °C		
Clearnose skate	Juveniles	Inner continental shelf from New Jersey to the St. Johns River in Florida and certain bays and certain estuaries including Raritan Bay, inland New Jersey bays, Chesapeake Bay, and Delaware Bays	0-30	Sub-tidal benthic habitats on mud and sand, but also on gravelly and rocky bottom
Clearnose skate	Adults	Inner continental shelf from New Jersey to the St. Johns River in Florida and certain bays and certain estuaries including Raritan Bay, inland New Jersey bays,	0-40	Sub-tidal benthic habitats on mud and sand, but also on gravelly and rocky bottom

Species	Life Stage	Geographic Area	Depth (meters)	Habitat Type and Description
		Chesapeake Bay, and Delaware Bays		
Deep-sea red crab	Eggs	Outer continental shelf and slope throughout the region, including two seamounts	320-640	Benthic habitats attached to female crabs
Deep-sea red crab	Juveniles	Outer continental shelf and slope throughout the region, including two seamounts	320-1300 on slope and to 2000 on seamounts	Benthic habitats with unconsolidated and consolidated silt-clay sediments
Deep-sea red crab	Adults	Outer continental shelf and slope throughout the region, including two seamounts	320-900 on slope and up to 2000 on seamounts	Benthic habitats with unconsolidated and consolidated silt-clay sediments
Golden tilefish	Juveniles and adults	Outer continental shelf and slope from U.S.-Canada boundary to the Virginia-North Carolina boundary	100-300	Burrows in semi-lithified clay substrate, may also utilize rocks, boulders, scour depressions beneath boulders, and exposed rock ledges as shelter
Haddock	Juveniles	Inshore and offshore waters in the Gulf of Maine, on Georges Bank, and on the continental shelf in the Mid-Atlantic region	40-140 and as shallow as 20 in coastal Gulf of Maine	Sub-tidal benthic habitats on hard sand (particularly smooth patches between rocks), mixed sand and shell, gravelly sand, and gravel
Haddock	Adults	Offshore waters in the Gulf of Maine, on Georges Bank, and on the continental shelf in Southern New England	50-160	Sub-tidal benthic habitats on hard sand (particularly smooth patches between rocks), mixed sand and shell, gravelly sand, and gravel and adjacent to boulders and cobbles along the margins of rocky reefs
Little skate	Juveniles	Coastal waters in the Gulf of Maine, Georges Bank, and the continental shelf in the Mid-Atlantic region as far south as Delaware Bay, including certain bays and estuaries in the Gulf of Maine	Mean high water-80	Intertidal and sub-tidal benthic habitats on sand and gravel, also found on mud
Little skate	Adults	Coastal waters in the Gulf of Maine, Georges Bank, and the continental shelf in the Mid-Atlantic region as far south as Delaware Bay, including certain bays and estuaries in the Gulf of Maine	Mean high water-100	Intertidal and sub-tidal benthic habitats on sand and gravel, also found on mud
Longfin inshore squid	Eggs	Inshore and offshore waters from Georges Bank southward to Cape Hatteras	Generally <50	Bottom habitats attached to variety of hard bottom types, macroalgae, sand, and mud
Monkfish	Juveniles	Gulf of Maine, outer continental shelf in the Mid-Atlantic, and the continental slope	50-400 in the Mid-Atlantic, 20-400 in the Gulf of Maine, and to 1000 on the slope	Sub-tidal benthic habitats on a variety of habitats, including hard sand, pebbles, gravel, broken shells, and soft mud, also seek shelter among rocks with attached algae
Monkfish	Adults	Gulf of Maine, outer continental shelf in the Mid-Atlantic, and the continental slope	50-400 in the Mid-Atlantic, 20-400 in the Gulf of Maine, and to 1000 on the slope	Sub-tidal benthic habitats on hard sand, pebbles, gravel, broken shells, and soft mud, but seem to prefer soft sediments, and, like juveniles, utilize the edges of rocky areas for feeding

Species	Life Stage	Geographic Area	Depth (meters)	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
Ocean quahogs	Juveniles and adults	Continental shelf from southern New England and Georges Bank to Virginia	9-244	In substrate to depth of 3 ft
Offshore hake	Juveniles	Outer continental shelf and slope from Georges Bank to 34° 40'N	160-750	Pelagic and benthic habitats
Offshore hake	Adults	Outer continental shelf and slope from Georges Bank to 34° 40'N	200-750	Pelagic and benthic habitats
Pollock	Juveniles	Inshore and offshore waters in the Gulf of Maine (including bays and estuaries in the Gulf of Maine), the Great South Channel, Long Island Sound, and Narragansett Bay, Rhode Island	Mean high water-180 in Gulf of Maine, Long Island Sound, and Narragansett Bay; 40-180 on Georges Bank	Intertidal and sub-tidal pelagic and benthic rocky bottom habitats with attached macroalgae, small juveniles in eelgrass beds, older juveniles move into deeper water habitats also occupied by adults
Pollock	Adults	Offshore Gulf of Maine waters, Massachusetts Bay and Cape Cod Bay, on the southern edge of Georges Bank, and in Long Island Sound	80-300 in Gulf of Maine and on Georges Bank; <80 in Long Island Sound, Cape Cod Bay, and Narragansett Bay	Pelagic and benthic habitats on the tops and edges of offshore banks and shoals with mixed rocky substrates, often with attached macro algae
Red hake	Juveniles	Gulf of Maine, Georges Bank, and the Mid-Atlantic, including Passamaquoddy Bay to Cape Cod Bay in the Gulf of Maine, Buzzards Bay and Narragansett Bay, Long Island Sound, Raritan Bay and the Hudson River, and lower Chesapeake Bay	Mean high water-80	Intertidal and sub-tidal soft bottom habitats, esp those that that provide shelter, such as depressions in muddy substrates, eelgrass, macroalgae, shells, anemone and polychaete tubes, on artificial reefs, and in live bivalves (e.g., scallops)
Red hake	Adults	In the Gulf of Maine, the Great South Channel, and on the outer continental shelf and slope from Georges Bank to North Carolina , including inshore bays and estuaries as far south as Chesapeake Bay	50-750 on shelf and slope, as shallow as 20 inshore	Sub-tidal benthic habitats in shell beds, on soft sediments (usually in depressions), also found on gravel and hard bottom and artificial reefs
Rosette skate	Juveniles and adults	Outer continental shelf from approximately 40˚N to Cape Hatteras, North Carolina	80-400	Benthic habitats with mud and sand substrates
Scup	Juveniles	Continental shelf between southwestern Gulf of Maine and Cape Hatteras, North Carolina and in nearshore and estuarine	No information	Benthic habitats, in association with inshore sand and mud substrates, mussel and eelgrass beds

Species	Life Stage	Geographic Area	Depth (meters)	Habitat Type and Description
		waters between Massachusetts and Virginia		
Scup	Adults	Continental shelf and nearshore and estuarine waters between southwestern Gulf of Maine and Cape Hatteras, North Carolina	No information, generally overwinter offshore	Benthic habitats
Silver hake	Juveniles	Gulf of Maine, including certain bays and estuaries, and on the continental shelf as far south as Cape May, New Jersey	40-400 in Gulf of Maine, >10 in Mid-Atlantic	Pelagic and sandy sub-tidal benthic habitats in association with sand-waves, flat sand with amphipod tubes, shells, and in biogenic depressions
Silver hake	Adults	Gulf of Maine, including certain bays and estuaries, the southern portion of Georges Bank, and the outer continental shelf and some shallower coastal locations in the Mid-Atlantic	>35 in Gulf of Maine, 70-400 on Georges Bank and in the Mid-Atlantic	Pelagic and sandy sub-tidal benthic habitats, often in bottom depressions or in association with sand waves and shell fragments, also in mud habitats bordering deep boulder reefs, on over deep boulder reefs in the southwest Gulf of Maine
Smooth skate	Juveniles	Offshore Gulf of Maine, some coastal bays in Maine and New Hampshire, and on the continental slope from Georges Bank to North Carolina	100-400 offshore Gulf of Maine, <100 inshore Gulf of Maine, to 900 on slope	Benthic habitats, mostly on soft mud in deeper areas, but also on sand, broken shells, gravel, and pebbles on offshore banks in the Gulf of Maine
Smooth skate	Adults	Offshore Gulf of Maine and the continental slope from Georges Bank to North Carolina	100-400 offshore Gulf of Maine, to 900 on slope	Benthic habitats, mostly on soft mud in deeper areas, but also on sand, broken shells, gravel, and pebbles on offshore banks in the Gulf of Maine
Summer flounder	Juveniles	Continental shelf and estuaries from Cape Cod, Massachusetts, to Cape Canaveral, Florida	To maximum 152	Benthic habitats, including inshore estuaries, salt marsh creeks, seagrass beds, mudflats, and open bay areas
Summer flounder	Adults	Continental shelf from Cape Cod, Massachusetts, to Cape Canaveral, Florida, including shallow coastal and estuarine waters during warmer months	To maximum 152 in colder months	Benthic habitats
Spiny dogfish	Juveniles	Primarily the outer continental shelf and slope between Cape Hatteras and Georges Bank and in the Gulf of Maine	Deep water	Pelagic and epibenthic habitats
Spiny dogfish	Female sub-adults	Throughout the region	Wide depth range	Pelagic and epibenthic habitats
Spiny dogfish	Male sub-adults	Primarily in the Gulf of Maine and on the outer continental shelf from Georges Bank to Cape Hatteras	Wide depth range	Pelagic and epibenthic habitats
Spiny dogfish	Female adults	Throughout the region	Wide depth range	Pelagic and epibenthic habitats
Spiny dogfish	Male adults	Throughout the region	Wide depth range	Pelagic and epibenthic habitats
Thorny skate	Juveniles	Offshore Gulf of Maine, some coastal bays in the Gulf of Maine, and on the continental slope from Georges Bank to North Carolina	35-400 offshore Gulf of Maine, <35 inshore Gulf of Maine, to 900 om slope	Benthic habitats on a wide variety of bottom types, including sand, gravel, broken shells, pebbles, and soft mud

Species	Life Stage	Geographic Area	Depth (meters)	Habitat Type and Description
Thorny skate	Adults	Offshore Gulf of Maine and on the continental slope from Georges Bank to North Carolina	35-400 offshore Gulf of Maine, <35 inshore Gulf of Maine, to 900 om slope	Benthic habitats on a wide variety of bottom types, including sand, gravel, broken shells, pebbles, and soft mud
White hake	Juveniles	Gulf of Maine, Georges Bank, and Southern New England, including bays and estuaries in the Gulf of Maine	Mean high water - 300	Intertidal and sub-tidal estuarine and marine habitats on fine-grained, sandy substrates in eelgrass, macroalgae, and un-vegetated habitats
White hake	Adults	Gulf of Maine, including coastal bays and estuaries, and the outer continental shelf and slope	100-400 offshore Gulf of Maine, >25 inshore Gulf of Maine, to 900 on slope	Sub-tidal benthic habitats on fine-grained, muddy substrates and in mixed soft and rocky habitats
Windowpane flounder	Juveniles	Estuarine, coastal, and continental shelf waters from the Gulf of Maine to northern Florida, including bays and estuaries from Maine to Maryland	Mean high water - 60	Intertidal and sub-tidal benthic habitats on mud and sand substrates
Windowpane flounder	Adults	Estuarine, coastal, and continental shelf waters from the Gulf of Maine to Cape Hatteras, North Carolina, including bays and estuaries from Maine to Maryland	Mean high water - 70	Intertidal and sub-tidal benthic habitats on mud and sand substrates
Winter flounder	Eggs	Eastern Maine to Absecon Inlet, New Jersey (39° 22´N) and Georges Bank	0-5 south of Cape Cod, 0-70 Gulf of Maine and Georges Bank	Sub-tidal estuarine and coastal benthic habitats on mud, muddy sand, sand, gravel, submerged aquatic vegetation, and macroalgae
Winter flounder	Juveniles	Coastal Gulf of Maine, Georges Bank, and continental shelf in Southern New England and Mid-Atlantic to Absecon Inlet, New Jersey, including bays and estuaries from eastern Maine to northern New Jersey	Mean high water - 60	Intertidal and sub-tidal benthic habitats on a variety of bottom types, such as mud, sand, rocky substrates with attached macro algae, tidal wetlands, and eelgrass; young-of-the-year juveniles on muddy and sandy sediments in and adjacent to eelgrass and macroalgae, in bottom debris, and in marsh creeks
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	0-80	Sub-tidal benthic habitats on sand and gravel substrates, are also found on mud

Species	Life Stage	Geographic Area	Depth (meters)	Habitat Type and Description
		Southern New England and the Mid-Atlantic		
Witch flounder	Juveniles	Gulf of Maine and outer continental shelf and slope	50-400 and to 1500 on slope	Sub-tidal benthic habitats with mud and muddy sand substrates
Witch flounder	Adults	Gulf of Maine and outer continental shelf and slope	35-400 and to 1500 on slope	Sub-tidal benthic habitats with mud and muddy sand substrates
Yellowtail flounder	Juveniles	Gulf of Maine, Georges Bank, and the Mid-Atlantic, including certain bays and estuaries in the Gulf of Maine	20-80	Sub-tidal benthic habitats on sand and muddy sand
Yellowtail flounder	Adults	Gulf of Maine, Georges Bank, and the Mid-Atlantic, including certain bays and estuaries in the Gulf of Maine	25-90	Sub-tidal benthic habitats on sand and sand with mud, shell hash, gravel, and rocks

Fishery Impact Considerations

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

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

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

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

6.4 Protected Species

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

Table 20. Species Protected Under the ESA and/or MMPA that May Occur in the Affected Environment of the MSB FMP

Species	**Status**[2]	***Potential to interact with MSB fishing gear?***
Cetaceans		
North Atlantic right whale (Eubalaena glacialis)	***Endangered***	***No***
Humpback whale, West Indies DPS, (*Megaptera novaeangliae*)	Protected (MMPA)	No
Fin whale (Balaenoptera physalus)	***Endangered***	***No***
Sei whale (Balaenoptera borealis)	***Endangered***	***No***
Blue whale (Balaenoptera musculus)	***Endangered***	***No***
Sperm whale (Physeter macrocephalus	***Endangered***	***No***
Minke whale (*Balaenoptera acutorostrata*)	Protected (MMPA)	Yes
Pilot whale (Globicephala spp.)[3]	Protected (MMPA)	Yes
Pygmy sperm whale (*Kogia breviceps*)	Protected (MMPA)	No
Dwarf sperm whale (*Kogia sima*)	Protected (MMPA)	No
Risso's dolphin (*Grampus griseus*)	Protected (MMPA)	Yes
Atlantic white-sided dolphin (*Lagenorhynchus acutus*)	Protected (MMPA)	Yes
Short Beaked Common dolphin (*Delphinus delphis*)	Protected (MMPA)	Yes
Atlantic Spotted dolphin (*Stenella frontalis*)	Protected (MMPA)	No
Striped dolphin (*Stenella coeruleoalba*)	Protected (MMPA)	No
Beaked whales (*Ziphius and Mesoplodon spp*)[4]	Protected (MMPA)	No
Bottlenose dolphin (Tursiops truncatus)[5]	***Protected (MMPA)***	***Yes***
Harbor porpoise (*Phocoena phocoena*)	Protected (MMPA)	Yes
Pinnipeds		
Harbor seal (*Phoca vitulina*)	Protected (MMPA)	Yes

Species	**Status**[2]	***Potential to interact with MSB fishing gear?***
Gray seal (*Halichoerus grypus*)	Protected (MMPA)	Yes
Harp seal (*Phoca groenlandicus*)	Protected (MMPA)	Yes
Hooded seal (*Cystophora cristata*)	Protected (MMPA)	No
Sea Turtles		
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered	Yes
Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered	Yes
Green sea turtle, North Atlantic DPS (*Chelonia mydas*)	Threatened	Yes
Loggerhead sea turtle (*Caretta caretta*), Northwest Atlantic Ocean DPS	Threatened	Yes
Hawksbill sea turtle (*Eretmochelys imbricate*)	Endangered	No
Fish		
Atlantic salmon (*Salmo salar*)	Endangered	Yes
Atlantic sturgeon *(Acipenser oxyrinchus)*	See DPSs below	See DPSs below
Gulf of Maine DPS	Threatened	Yes
New York Bight DPS, Chesapeake Bay DPS, Carolina DPS & South Atlantic DPS	Endangered	Yes
Cusk *(Brosme brosme)*	Candidate[6]	Yes
Shortfin Mako Shark (*Isurus oxyrinchus*)	Candidate[6]	Yes
Giant manta ray (*Manta birostris*)	Threatened	Yes
Critical Habitat		
Northwest Atlantic DPS of Loggerhead Sea Turtle	ESA (Protected)	No
North Atlantic Right Whale Critical Habitat	ESA (Protected)	No

(See notes next page)

Species	**Status[2]**	***Potential to interact with MSB fishing gear?***
Notes: Marine mammal species (cetaceans and pinnipeds) italicized and in bold are considered MMPA strategic stocks. Shaded rows indicate species who prefer continental shelf edge/slope waters (i.e., >200 meters). [1] A strategic stock is defined under the MMPA as a marine mammal stock for which: (1) the level of direct human-caused mortality exceeds the potential biological removal level; (2) based on the best available scientific information, is declining and is likely to be listed as a threatened species under the ESA within the foreseeable future; and/or (3) is listed as a threatened or endangered species under the ESA, or is designated as depleted under the MMPA (Section 3 of the MMPA of 1972). [2] Status is defined by whether the species is listed under the ESA as endangered (i.e. at risk of extinction) or threatened (i.e. at risk of endangerment), or protected under the MMPA. Marine mammals listed under the ESA are also protected under the MMPA. Candidate species are those species for which ESA listing may be warranted. [3] There are 2 species of pilot whales: short finned (*G. melas melas*) and long finned (*G. macrorhynchus*). Due to the difficulties in identifying the species at sea, they are often referred to as *Globicephala spp*. [4] There are multiple species of beaked whales in the Northwest Atlantic. They include the cuvier's (*Ziphius cavirostris*), blainville's (*Mesoplodon densirostris*), gervais' (*Mesoplodon europaeus*), sowerbys' (*Mesoplodon bidens*), and trues' (*Mesoplodon mirus*) beaked whales. Species of *Mesoplodon* are difficult to identify at sea, therefore, much of the available characterization for beaked whales is to the genus level only. [5] This includes the Western North Atlantic Offshore, Northern Migratory Coastal, and Southern Migratory Coastal Stocks of Bottlenose Dolphins. [6] Candidate species are those petitioned species for which NMFS has determined that listing may be warranted under the ESA and those species for which NMFS has initiated an ESA status review through an announcement in the Federal Register. If a species is proposed for listing the conference provisions under Section 7 of the ESA apply (see 50 CFR 402.10); however, candidate species receive no substantive or procedural protection under the ESA. NMFS recommends that project proponents consider implementing conservation actions to limit the potential for adverse effects on candidate species from any proposed action. See: https://www.fisheries.noaa.gov/endangered-species-conservation/candidate-species-under-endangered-species-act. .		

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

Based on available information, it has been determined that this action is not likely to affect (via interactions with gear or destruction of essential features of critical habitat) multiple ESA listed and/or marine mammal protected species or any designated critical habitat (see Table 16). This determination has been made because either the occurrence of the species is not known to overlap with the area primarily affected by the action and/or, based on the most recent 10 years of observer, stranding, and/or marine mammal serious injury and mortality reports, there have been no observed or documented interactions between the species and the primary gear type (i.e., bottom otter and mid-water trawls) used to prosecute the MSB fisheries (Greater Atlantic Region Marine Animal Incident Database, unpublished data; Marine Mammal Stock Assessment Reports (SARS) for the Atlantic Region: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; MMPA List of Fisheries (LOF): https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries NEFSC observer/sea sampling database, unpublished data; NMFS NEFSC reference documents (marine mammal serious injury and mortality reports): https://apps-nefsc.fisheries.noaa.gov/rcb/publications/center-reference-documents.html[7]. In the case of critical habitat, this determination has been made because operation of the MSB fisheries will not affect the essential physical and biological features of North Atlantic right whale or loggerhead (NWA DPS) critical habitat and therefore, will not result in the destruction or adverse modification of any species critical habitat (NMFS 2014; NMFS 2015a,b).

6.4.2. Statuses/trends and occurrence of Potentially Affected Protected Species

The table above provides a list of protected species of sea turtle, marine mammal, and fish species present in the affected environment of the MSB fishery, and that may also be affected by the operation of this fishery; that is, have the potential to become entangled or bycaught in the fishing gear used to prosecute the fishery. To aid in the identification of MMPA protected species potentially affected by the action, the MMPA LOF, and marine mammal stock assessment and serious injury and mortality reports were referenced (see Marine Mammal SARS for the Atlantic Region: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; MMPA LOF: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries; NEFSC observer/sea sampling database, unpublished data; NMFS NEFSC

[7] For marine mammals protected under the MMPA the most recent 10 years of observer, stranding, and/or marine mammal serious injury and mortality reports are from 2007-2016; however, entanglement data is available through 2019. For ESA listed species, information on observer or documented interactions with fishing gear is from 2010-2019.

reference documents (marine mammal serious injury and mortality reports): https://apps-nefsc.fisheries.noaa.gov/rcb/publications/center-reference-documents.html.

To help identify ESA listed species potentially impacted by the action, we queried the Northeast Fisheries Observer Program (2010-2019), Sea Turtle Disentanglement Network (2010-2019), and the Marine Animal Incident (2010-2018) databases for interactions, and reviewed the May 27, 2021, Biological Opinion (Opinion) issued by NMFS. The 2021 Opinion considered the effects of the NMFS' authorization of ten fishery management plans (FMP), NMFS' North Atlantic Right Whale Conservation Framework, and the New England Fishery Management Council's Omnibus Essential Fish Habitat Amendment 2, on ESA-listed species and designated critical habitat. The Opinion determined that the proposed action may adversely affect, but is not likely to jeopardize, the continued existence of North Atlantic right, fin, sei, or sperm whales; the Northwest Atlantic Ocean distinct population segment (DPS) of loggerhead, leatherback, Kemp's ridley, or North Atlantic DPS of green sea turtles; any of the five DPSs of Atlantic sturgeon; Gulf of Maine DPS Atlantic salmon; or giant manta rays. The Opinion also concluded that the proposed action is not likely to adversely affect designated critical habitat for North Atlantic right whales, the Northwest Atlantic Ocean DPS of loggerhead sea turtles, U.S. DPS of smalltooth sawfish, Johnson's seagrass, or elkhorn and staghorn corals. An Incidental Take Statement (ITS) was issued in the Opinion. The ITS includes reasonable and prudent measures and their implementing terms and conditions, which NMFS determined are necessary or appropriate to minimize impacts of the incidental take in the fisheries assessed in this Opinion.

Statuses/trends

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

Four sea turtle species have the potential to be impacted by the proposed action: Northwest Atlantic Ocean DPS of loggerhead, Kemp's ridley, North Atlantic DPS of green, and leatherback sea turtles (Table 16). Nest counts inform population trends for sea turtle species. For the Northwest Atlantic Ocean DPS of loggerhead sea turtles, there are five unique recovery units that comprise the DPS. Nesting trends for each of these recovery units are variable; however, recent data from Florida index nesting beaches, which comprise most of the nesting in the DPS, indicate a 19% increase in nesting from 1989 to 2018 (https://myfwc.com/research/wildlife/sea-turtles/nesting/loggerhead-trends/). Overall, short-term trends for loggerhead sea turtles (Northwest Atlantic Ocean DPS) have shown increases; however, over the long-term the DPS is considered stable. For Kemp's ridley sea turtles, from 1980 through 2003, the number of nests at three primary nesting beaches (Rancho Nuevo, Tepehuajes, and Playa Dos) increased 15 percent annually (Heppell et al. 2005); however, due to recent declines in nest counts, decreased survival

of immature and adult sea turtles, and updated population modeling, this rate is not expected to continue and therefore, the overall trend is unclear (NMFS and USFWS 2015; Caillouett et al. 2018). The North Atlantic DPS of green sea turtle is showing a positive trend in nesting; however, increases in nester abundance for the North Atlantic DPS in recent years must be viewed cautiously as the datasets represent a fraction of a green sea turtle generation which is between 30 and 40 years (Seminoff et al. 2015). Leatherback turtle nesting in the Northwest Atlantic is showing an overall negative trend, with the most notable decrease occurring during the most recent time frame of 2008 to 2017 (NW Atlantic Leatherback Working Group 2018).

Large Whales Statuses/trends

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

Small Cetaceans Statuses/trends

Risso's, Atlantic white-sided, short beaked common, and bottlenose dolphins (Western North Atlantic Offshore, Northern Migratory Coastal, and Southern Migratory Coastal stocks); long and short –finned pilot whales; and, harbor porpoise are identified as having the potential to be impacted by the proposed action (Table 16). Review of the most recent stock assessment (Hayes et al. 2020) indicates that as a trend analysis has not been conducted for Risso's, Atlantic white-sided, short-beaked common dolphins; long-finned pilot whales; or harbor porpoise, the population trajectory for these species is unknown. For short-finned pilot whales, a generalized linear model indicated no significant trend in these abundance estimates (Hayes et al 2020). For the the Western North Atlantic Offshore stock of bottlenose dolphins, review of the most recent information on the stock shows no statistically significant trend in population size for this species; however, the high level of uncertainty in the estimates limits the ability to detect a statistically significant trend (Hayes et al. 2020). In regards to the Northern and Southern Migratory Coastal stocks of bottlenose dolphins (both considered a strategic stock under the MMPA), the most recent analysis of trends in abundance suggests a probable decline in stock size between 2010– 2011 and 2016, concurrent with a large UME in the area; however, there is limited power to evaluate trends given uncertainty in stock distribution, lack of precision in abundance estimates, and a limited number of surveys (Hayes et al. 2018).

Pinnipeds Statuses/trends

Harbor, gray, and harp seals are identified as having the potential to be impacted by the proposed action (Table 16). Review of the most recent stock assessment (Hayes et al. 2020) indicates that as a trend analysis has not been conducted for harbor seals, the population trajectory for this species is unknown. The status of the gray and harp seal population relative to optimum sustainable population (OSP) in U.S. Atlantic EEZ waters is unknown; however, gray seal stock's abundance appears to be increasing in Canadian and U.S. waters and harp seal stock abundance appears to have stabilized (Hayes et al. 2019; Hayes et al. 2020).

Atlantic Sturgeon Statuses/trends

Atlantic sturgeon, from any DPS, are identified as having the potential to be impacted by the proposed action (Table 16). The ASMFC released a new benchmark stock assessment for Atlantic sturgeon in October 2017 (ASMFC 2017). Based on historic removals and estimated effective population size, the 2017 stock assessment concluded that all five Atlantic sturgeon DPSs are depleted relative to historical levels. However, the 2017 stock assessment does provide some evidence of population recovery at the coastwide scale, and mixed population recovery at the DPS scale (ASMFC 2017). The 2017 stock assessment also concluded that a variety of factors (i.e., bycatch, habitat loss, and ship strikes) continue to impede the recovery rate of Atlantic sturgeon (ASMFC 2017).

Atlantic Salmon (GOM DPS) Statuses/trends

Atlantic salmon (GOM DPS) are identified as having the potential to be impacted by the proposed action (Table 16). The GOM DPS of Atlantic salmon currently exhibits critically low spawner abundance and poor marine survival (USASAC 2020). The abundance of GOM DPS Atlantic salmon has been low and either stable or declining over the past several decades and the proportion of fish that are of natural origin is small and displays no sign of growth (USASAC 2020).

Giant Manta Rays Statuses/trends

Giant Manta Rays may be impacted by the proposed action (Table 16). While there is considerable uncertainty regarding the species' current abundance throughout its range, the best available information indicates that the species has experienced population declines of potentially significant magnitude within areas of the Indo-Pacific and eastern Pacific portions of its range (Miller and Klimovich 2017). While it's assumed that declining populations within the

Indo-Pacific and eastern Pacific will likely translate to overall declines in the species throughout its entire range, there is very little information on the abundance, and thus, population trends in the Atlantic portion of its range (Miller and Klimovich 2017).

Occurrences

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

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

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

Hard-shelled sea turtles: In U.S. Northwest Atlantic waters, hard-shelled turtles commonly occur throughout the continental shelf from Florida to Cape Cod, MA, although their presence varies with the seasons due to changes in water temperature (Braun-McNeill et al. 2008; Braun & Epperly 1996; Epperly et al. 1995a,b; Mitchell et al. 2003; Shoop & Kenney 1992; TEWG 2009; Blumenthal et al. 2006; Braun-McNeill & Epperly 2004; Griffin et al. 2013; Hawkes et al. 2006; Hawkes et al. 2011; Mansfield et al. 2009; McClellan & Read 2007; Mitchell et al. 2003; Morreale & Standora 2005). As coastal water temperatures warm in the spring, loggerheads begin to migrate to inshore waters of the southeast United States and also move up the Atlantic

Coast (Braun-McNeill & Epperly 2004; Epperly et al. 1995a,b,c; Griffin et al. 2013; Morreale & Standora 2005), occurring in Virginia foraging areas as early as late April and on the most northern foraging grounds in the Gulf of Maine (GOM) in June (Shoop & Kenney 1992). The trend is reversed in the fall as water temperatures cool. The majority leave the Gulf of Maine by September, but some remain in Mid-Atlantic and Northeast areas until November. By December, sea turtles have migrated south to waters offshore of North Carolina, particularly south of Cape Hatteras, and further south, although hard-shelled sea turtles can occur year-round in waters off Cape Hatteras and south (Epperly et al. 1995b; Griffin et al. 2013; Hawkes et al 2011; Shoop & Kenney 1992).

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

Large Whales Occurrences

Multiple species of whales occur in the Northwest Atlantic, with the minke whale being the only whale species potentially impacted by the proposed action (Table 13). Minke whales are widely distributed throughout the U.S. EEZ. From spring to the fall, minke whales are most abundant in New England continental shelf waters; however, from late fall through the winter, there is high occurrence in deep-ocean waters throughout most of the western North Atlantic (Hayes et al. 2020). In addition, like many other species of large whales in the Northwest Atlantic, minke whales can undertake seasonal migrations. Generally speaking, large whales follow an annual pattern of migration between low latitude (south of 35^{o}N) wintering/calving grounds and high latitude spring/summer foraging grounds (primarily north of 41^{o}N;see marine mammal SARs: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region). This, however, is a simplification of whale movements, particularly as it relates to winter movements. It remains unknown if all individuals of a population migrate to low latitudes in the winter, although, increasing evidence suggests that for some species, some portion of the population remains in higher latitudes throughout the winter (Hayes et al. 2020; Davis et al. 2017; Davis et al. 2020; Clapham *et al*. 1993; Swingle *et al*. 1993; Vu *et al*. 2012). Although further research is needed to provide a clearer understanding of large whale movements and distribution in the winter, the distribution and movements of large whales to

foraging grounds in the spring/summer is well understood. Movements of whales into higher latitudes coincide with peak productivity in these waters. As a result, the distribution of large whales in higher latitudes is strongly governed by prey availability and distribution, with large numbers of whales coinciding with dense patches of preferred forage (Payne *et al*.1986, 1990; Schilling *et al.* 1992; Hayes et al. 2020, Davis et al. 2017; Davis et al. 2020). For additional information on the biology, status, and range wide distribution of minke whales, refer to the marine mammal SARs provided at: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments).

Small Cetaceans and Pinnipeds Occurrences

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

https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments

Atlantic Sturgeon Occurrences

The marine range of U.S. Atlantic sturgeon extends from Labrador, Canada, to Cape Canaveral, Florida. All five DPSs of Atlantic sturgeon have the potential to be located anywhere in this marine range (ASMFC 2017; ASSRT 2007; Dovel and Berggren 1983; Dadswell et al. 1984; Kynard et al. 2000; Stein et al. 2004a; Dadswell 2006; Laney et al. 2007; Dunton et al. 2010, 2015; Erickson et al. 2011; Wirgin et al. 2012; Waldman et al. 2013; O'Leary et al. 2014; Wirgin et al. 2015a,b). Based on fishery-independent and dependent data, as well as data collected from tracking and tagging studies, in the marine environment, Atlantic sturgeon appear to primarily occur inshore of the 50 meter depth contour (Stein et al. 2004 a,b; Erickson et al. 2011; Dunton et al. 2010); however, Atlantic sturgeon are not restricted to these depths, as excursions into deeper continental shelf waters have been documented (Timoshkin 1968; Collins and Smith 1997; Stein et al. 2004a,b; Dunton et al. 2010; Erickson et al. 2011). Data from fishery-independent surveys and tagging and tracking studies also indicate that Atlantic sturgeon may undertake seasonal movements along the coast (Dunton et al. 2010; Erickson et al. 2011; Wipplehauser 2012); however, there is no evidence to date that all Atlantic sturgeon make these seasonal movements and therefore, may be present throughout the marine environment

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

Atlantic Salmon (GOM DPS) Occurrences

The wild populations of Atlantic salmon are listed as endangered under the ESA. Their freshwater range occurs in the watersheds from the Androscoggin River northward along the Maine coast to the Dennys River, while the marine range of the Gulf of Maine DPS extends from the Gulf of Maine (primarily northern portion of the Gulf of Maine) to the coast of Greenland (NMFS and USFWS 2005, 2016; Fay *et al*. 2006). In general, smolts, post-smolts, and adult Atlantic salmon may be present in the Gulf of Maine and coastal waters of Maine in the spring (beginning in April), and adults may be present throughout the summer and fall months (Baum 1997; Fay *et al*. 2006; USASAC 2004; Hyvarinen *et al.* 2006; Lacroix and McCurdy 1996; Lacroix *et al.* 2004, 2005; Reddin 1985; Reddin and Short 1991; Reddin and Friedland 1993, Sheehan *et al.* 2012; NMFS and USFWS 2005, 2016; Fay *et al*. 2006). For additional information on the on the biology, status, and range-wide distribution of the Gulf of Maine DPS of Atlantic salmon, refer to NMFS and USFWS (2005, 2016); and Fay *et al*. (2006).

Giant Manta Rays Occurrences

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

6.4.3. Gear Interactions with Protected Species

Protected species are at risk of interacting with various types of fishing gear, with interaction risks associated with gear type, quantity, soak or tow duration, and degree of overlap between gear and protected species. Information on observed or documented interactions between gear and protected species is available from as early as 1989 (Marine Mammal SARs: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; NEFSC observer/sea sampling database, unpublished data). As the distribution and occurrence of protected species and the operation of fisheries (and, thus, risk to protected species) have changed over the last 30 years, we use the most recent 10 years of available information to best capture the current risk to protected species from fishing gear. For marine mammals protected under the MMPA, this primarily covers the period from 2008-2017[8]; however, the Greater Atlantic Region (GAR) Marine Animal Incident Database (unpublished data) contains large whale entanglement reports through 2019. For ESA listed species, the most recent 10 years of data on observed or documented interactions is available from 2010-2019[9]. Available information on gear interactions with a given species (or species group) is provided in the sections below. The sections to follow are not a comprehensive review of all fishing gear types known to interact with a given species; emphasis is only being placed on the primary gear types used to prosecute MSB fishery (i.e., mid-water trawl and bottom trawl gear).

6.4.3.1. Gear Interactions with Sea Turtles

Bottom Otter Trawl

Sea turtle interactions with trawl gear have been observed in the Gulf of Maine, Georges Bank, and/or the Mid-Atlantic; however, most of the observed interactions have been observed south of the Gulf of Maine (Murray 2015; Murray 2020; NEFSC observer/sea sampling database, unpublished data). As few sea turtle interactions have been observed in the Gulf of Maine, there is insufficient data available to conduct a robust model-based analysis and bycatch estimate of

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

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

sea turtle interactions with trawl gear in this region . As a result, the bycatch estimates and discussion below are for trawl gear in the Mid-Atlantic and Georges Bank.

Most recently, Murray (2020) provided information on sea turtle interaction rates from 2014-2018.[10] Interaction rates were stratified by region, latitude zone, season, and depth. The highest loggerhead interaction rate (0.43 turtles/day fished) was in waters south of 37º N during November to June in waters greater than 50 meters deep. The greatest number of estimated interactions occurred in the Mid-Atlantic region north of 39º N, during July to October in waters less than 50 meters deep, due to a greater amount of commercial effort in this stratum compared to those farther south. Within each stratum, interaction rates for non-loggerhead species were lower than rates for loggerheads.

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

Mid-Water Trawl

NEFOP and ASM observer data from 1989 to 2015 show five leatherback sea turtle interactions with mid-water trawl gear; the primary species landed during these interactions was tuna (NEFSC observer/sea sampling database, unpublished data). These takes were in the early 1990s in an experimental HMS fishery that no longer operates. Review of observer data over the last 30 years (i.e., between 1989 and 2019) shows that there have been no observed takes in other mid-

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

water trawl fisheries (e.g., MSB fishery) operating in the Greater Atlantic Region (NEFSC observer/sea sampling database, unpublished data). Based on this and the best available information, sea turtle interactions in mid-water trawl gear in the Greater Atlantic Region are expected to be rare.

6.4.3.2. Gear Interactions with Atlantic Sturgeon

Bottom Otter Trawl

The ASMFC (2017) Atlantic sturgeon benchmark stock assessment represents the most accurate predictor of annual Atlantic sturgeon interactions in fishing gear (e.g., bottom otter trawl). The stock assessment analyzes fishery observer and VTR data to estimate Atlantic sturgeon interactions in fishing gear in the Mid-Atlantic and New England regions from 2000-2015, the timeframe which included the most recent, complete data at the time of the report. Focusing on the most recent five-year period of data provided in the stock assessment report[11], the estimated average annual bycatch during 2011-2015 of Atlantic sturgeon in bottom otter trawl gear is 777.4 individuals. Atlantic sturgeon were encountered primarily at depths less than 20 meters (ASMFC 2017).

Mid-Water Trawl

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

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

6.4.3.3. Gear Interaction with Atlantic Salmon

Bottom Otter Trawl

Atlantic salmon are at risk of interacting with bottom trawl gear (NEFSC observer/sea sampling database, unpublished data; Kocik *et al*. 2014). NEFOP data from 1989 to 2019 show records of incidental bycatch of Atlantic salmon in seven of the 31 years, with a total of 15 individuals caught, nearly half of which (seven) occurred in 1992 (NEFSC observer/sea sampling database, unpublished data).[12] Of the observed incidentally caught Atlantic salmon, ten were listed as "discarded," which is assumed to be a live discard (Kocik, pers comm.; February 11, 2013). Five of the 15 were documented as lethal interactions. The incidental takes of Atlantic salmon occurred in bottom otter trawls (4) and gillnets (11). Observed captures occurred in March (2), April (2), May (1), June (3), August (1), and November (6). Given the very low number of observed Atlantic salmon interactions in gillnet and bottom trawl gear, interactions with these gear types are believed to be rare in the Greater Atlantic Region.

Mid-Water Trawl

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

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

6.4.3.4. Gear Interactions with Marine Mammals

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

Large Whales

Bottom Otter and Mid-Water Trawls

Review of the most recent 10 years of observer, stranding, and/or marine mammal serious injury and mortality or entanglement reports (i.e., 2008-2017), as well as marine mammal incident reports (i.e., data through 2019), minke whales are the only large whale species in which an interaction with midwater trawl gear has been observed or documented.[13] There has been only one observed minke whale incidentally taken in MWT gear. The incident occurred in 2009 and was a result of a minke whale becoming entangled in NOAA research MWT gear (whale was released alive, but seriously injured; Henry *et al.* 2015). Since this incident, there have been no observed or reported interactions between minke whales and MWT gear (Cole, et al. 2013; Henry et al. 2017; Henry et al. 2015; 2016; Henry et al. 2019; Henry et al. 2020; GAR Marine Animal Incident Database, unpublished data; Marine Mammal SARs: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region). In fact, the most recent marine mammal stock assessment report estimates the annual average minke whale mortality and serious injury from the Northeast MWT fishery to be zero (Hayes, et al. 2020). Thus, although interactions between MWT gear and minke whales are possible, the interaction risk is low.

With the exception of minke whales, there have been no observed interactions with large whales and bottom trawl gear.[14] In 2008, several minke whales were observed dead in bottom trawl gear

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

[14] Refer to Greater Atlantic Region Marine Animal Incident Database (unpublished data); Marine Mammal SARs: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; NEFSC observer/sea sampling database, unpublished data ; MMPA LOF: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-

attributed to the northeast bottom trawl fishery; estimated annual mortality attributed to this fishery in 2008 was 7.8 minke whales (Waring et al. 2015). Since 2008, serious injury and mortality records for minke whales in U.S. waters have shown zero interactions with bottom trawl (northeast or Mid-Atlantic) gear.[15] Based on this information, large whale interactions with bottom trawl gear are expected to be rare to nonexistent.

Small Cetaceans and Pinnipeds

Bottom and Mid-Water Trawl Gear

Small cetaceans and pinnipeds are at risk of interacting with midwater trawl or bottom trawl gear (Marine Mammal SARs: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; MMPA LOF: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries; NEFSC observer/sea sampling database, unpublished data; NMFS NEFSC reference documents (marine mammal serious injury and mortality reports): https://apps-nefsc.fisheries.noaa.gov/rcb/publications/center-reference-documents.html). For marine mammals protected under the MMPA, the most recent 10 years (i.e., 2008-2017) of observer, stranding, and/or marine mammal serious injury and mortality, as well as the MMPA LOF's covering this timeframe (i.e., issued between 2016 and 2021), were reviewed to provide a list of species that have been observed (incidentally) seriously injured and/or killed between 2008 and 2017 by List of Fisheries Category II Bottom Trawl and Mid-Water Trawl fisheries that operate in the affected environment of the MSB fishery.

act-list-fisheries; NMFS NEFSC reference documents (marine mammal serious injury and mortality reports): https://apps-nefsc.fisheries.noaa.gov/rcb/publications/center-reference-documents.html

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

Table 21. Small cetacean and pinniped species observed seriously injured and/or killed by Category II Mid-Water and Bottom Trawl fisheries in the affected environment of the MSB fisheries.

Fishery	Category	Species Observed or reported Injured/Killed
Mid-Atlantic Mid-Water Trawl-Including Pair Trawl	II	Bottlenose dolphin (offshore)
		Harbor seals
Northeast Mid-Water Trawl-Including Pair Trawl	II	Common dolphin
		Long-finned pilot whales
		Gray and Harbor seals
Northeast Bottom Trawl	II	Harp, Gray, and Harbor seals
		Long-finned pilot whales
		White-sided and Risso's dolphins
		Common dolphin
		Harbor porpoise
		Bottlenose dolphin (offshore)
Mid-Atlantic Bottom Trawl	II	White-sided and Risso's dolphins
		Common dolphin
		Bottlenose dolphin (offshore)
		Gray and Harbor seals
Sources: MMPA 2022 LOFs at: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries		

In 2006, based on observed mid-water trawl interactions with long-finned pilot whales, short - finned pilot whales, common dolphins, and white sided dolphins, the Atlantic Trawl Gear Take Reduction Team (ATGTRT) was convened to address the incidental mortality and serious injury of these species incidental to bottom and mid-water trawl fisheries operating in both the New England and Mid-Atlantic regions. Because none of the marine mammal stocks of concern to the

ATGTRT are classified as a "strategic stock", nor do they currently interact with a Category I fishery,[16] it was determined that development of a take reduction plan was not necessary. In lieu of a take reduction plan, the ATGTRT agreed to develop an Atlantic Trawl Gear Take Reduction Strategy (ATGTRS). The ATGTRS identifies informational and research tasks, as well as education and outreach needs the ATGTRT believes are necessary to provide the basis for decreasing mortalities and serious injuries of marine mammals to insignificant levels approaching zero. The ATGTRS also identifies several voluntary measures that can be adopted by certain trawl fishing sectors to potentially reduce the incidental capture of marine mammals.[17]

6.4.3.5 Giant Manta Ray

Bottom Trawl

Giant manta rays are potentially susceptible to capture by bottom trawl gear based on records of their capture in fisheries using this gear types (NEFSC observer/sea sampling database, unpublished data). Review of the most recent 10 years of NEFOP data showed that between 2010-2019, two (unidentified) Giant Manta Rays were observed in bottom trawl gear. Additionally, all of the giant manta ray interactions in trawl gear recorded in the NEFOP database indicate the animals were encountered alive and released alive. However, details about specific conditions such as injuries, damage, time out of water, how the animal was moved or released, or behavior on release is not always recorded.

Mid-Water Trawl

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

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

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

7.0 WHAT ARE THE IMPACTS (Biological and Human Community) FROM THE ALTERNATIVES CONSIDERED IN THIS DOCUMENT? .[18]

Overview

The other species in the FMP (butterfish, longfin squid, *Illex* squid, and chub mackerel) are not expected to be substantially impacted by this action and are not further discussed in terms of impacts, but recent specifications actions and supporting documents for those species can be consulted for those wanting more information about those species/fisheries. See https://www.mafmc.org/msb. No other species in the FMP are known to be overfished or subject to overfishing. Related to this action and its alternatives (see Section 5 for details on alternatives), the key determinant of biological impacts on mackerel is how much fish are caught, and how that catch impacts stock status. Lower catches will have more positive impacts.

For habitat and non-target species impacts, the key determinant is the amount and character of the related effort, and the impact of that effort on the non-target's stock status and the quality/quantity of habitat. The availability of the target species can drive effort as much as any quota change, and as effort changes so would impacts on habitat, protected resources, and non-target species. Since limits on catch do cap effort however, measures that limit catch to varying degrees are a factor related to effort. For protected resources listed under the ESA or have catch above potential biological removal (PBR), the situation is slightly more complex. While lower effort will reduce impacts, any interactions on ESA-listed species or species above PBR is still a negative effect even if lower than no action.

While one could theoretically come up with thousands of combinations of alternatives, the overall rebuilding plan will have more impact than the other groups of alternatives (recreational limits, specification set asides and closure approaches, and the RH/S cap), which primarily support the operation of the overall rebuilding plan. The kinds of impacts also vary by group, and are similar within each group. Therefore, comparisons are made within each alternative group so the meaningful consequences of each alternative can be considered in the context of the overall rebuilding effort. Environmental impacts are described both in terms of their direction (negative, positive, or no impact) and their magnitude (slight, moderate, or high). The table below summarizes the guidelines used for each VEC to determine the magnitude and direction of the impacts described in this section.

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

Table 22. General definitions for impacts and qualifiers relative to resource condition (i.e., baselines)

General Definitions				
VEC	**Resource Condition**	**Impact of Action**		
		Positive (+)	Negative (-)	No Impact (0)
Target and non-target Species	Overfished status defined by the MSA	Alternatives that maintain or are projected to result in a stock status above an overfished condition*	Alternatives that maintain or are projected to result in a stock status below an overfished condition*	Alternatives that do not impact stock / populations
ESA-listed protected species (endangered or threatened)	Populations at risk of extinction (endangered) or endangerment (threatened)	Alternatives that contain specific measures to ensure no interactions with protected species (i.e., no take)	Alternatives that result in interactions/take of listed species, including actions that reduce interactions	Alternatives that do not impact ESA listed species
MMPA protected species (not also ESA listed)	Stock health may vary but populations remain impacted	Alternatives that maintain takes below PBR and approaching the Zero Mortality Rate Goal	Alternatives that result in interactions with/take of marine mammals that could result in takes above PBR	Alternatives that do not impact MMPA protected species
Physical environment / habitat / EFH	Many habitats degraded from historical effort	Alternatives that improve the quality or quantity of habitat	Alternatives that degrade the quality/quantity or increase disturbance of habitat	Alternatives that do not impact habitat quality
Human communities (socioeconomic)	Highly variable but generally stable in recent years (see condition of the resources table for details)	Alternatives that increase revenue and social well-being of fishermen and/or communities	Alternatives that decrease revenue and social well-being of fishermen and/or communities	Alternatives that do not impact revenue and social well-being of fishermen and/or communities
	Impact Qualifiers			
A range of impact qualifiers is used to indicate any existing uncertainty	Negligible	To such a small degree to be indistinguishable from no impact		
	Slight (sl), as in slight positive or slight negative	To a lesser degree / minor		
	Moderate (M) positive or negative	To an average degree (i.e., more than "slight", but not "high")		
	High (H), as in high positive or high negative	To a substantial degree (not significant unless stated)		
	Significant (in the case of an EIS)	Affecting the resource condition to a great degree, see 40 CFR 1508.27.		
	Likely	Some degree of uncertainty associated with the impact		

*Actions that will substantially increase or decrease stock size, but do not change a stock status may have different impacts depending on the particular action and stock. Meaningful differences between alternatives may be illustrated by using another resource attribute aside from the MSA status, but this must be justified within the impact analysis.

7.1 Biological Impacts on the Managed Resource - Mackerel

A Management Track Assessment (MTA) will occur in 2023 (using data through 2022) and will generate information that will be used to set specifications for 2024 and beyond. So we know that specifications will change compared to what is predicted for the years beyond 2023. Therefore even though the rebuilding plans are multi-year in nature, only 2023 will be impacted by this action and the best measure of impacts is just what happens in 2023. The last MTA (2021) showed that projections for mackerel are uncertain, and comparing whether one alternative rebuilds in for example 8 or 9 years may not be meaningful. The amount of catch being set for the upcoming specifications is meaningful however, and in this case that means focusing on 2023.

Baseline condition: The most recent assessment found Mackerel to be overfished with overfishing occurring through 2019.

Rebuilding Alternatives Group

No action (revert to initial 2021 Specifications)

No action would facilitate more catch than can be allowed to avoid overfishing or to help the stock rebuild. The higher catches possible under this alternative (higher than all others) could have a moderate negative impact on the mackerel stock by potentially causing overfishing on an already overfished stock. Given the relative catch constraints, impacts would be moderately more negative relative to all rebuilding plan alternatives (see rebuilding plan alternatives 1-5 below).

Rebuilding Plan Alternative 1 (RPA1) – 10-year Rebuilding with Persistent Low Recruitment.

This alternative would facilitate rebuilding, and thus have a positive impact on the mackerel stock. The stock would be predicted to be 46% rebuilt in 2023. The impact is moderate because of the relatively slow expected growth of the mackerel stock. Also, other factors outside of our control, primarily recruitment, will have substantial effects on potential stock growth. This alternative would lead to the lowest possible catch in 2023, so compared to no action or all the other rebuilding plan alternatives (RPAs 2-5), this alternative would have the most positive impact on the mackerel stock because it leads to the least possible amount of fish removed from the population through fishing. Given the similar biomasses in 2023, the differences among all RPAs are slight.

Rebuilding Plan Alternative 2 (RPA2) – P* deduction applied to 50% Rebuilding Probability

This alternative would facilitate rebuilding, and thus have a positive impact on the mackerel stock. The stock would be predicted to be 46% rebuilt in 2023. The impact is moderate because of the relatively slow expected growth of the mackerel stock. Also, other factors outside of our control, primarily recruitment, have substantial effects on potential stock growth. Compared to other alternatives, this alternative would lead to an intermediate level of possible catch (i.e. fish removed from the population) in 2023 (more catch than RPA1, less catch than no action or RPAs 3-5). Accordingly, this alternative would lead to an intermediate level of impact on mackerel in 2023 (less positive than RPA1, more positive than no action or RPAs 3-5). Given the similar biomasses in 2023, the differences among all RPAs are slight.

Rebuilding Plan Alternative 3 (RPA3) – P* approach with return to normal recruitment.

This alternative would facilitate rebuilding, and thus have a positive impact on the mackerel stock. The stock would be predicted to be 45% rebuilt in 2023. The impact is moderate because of the relatively slow expected growth of the mackerel stock. Also, other factors outside of our control, primarily recruitment, have substantial effects on potential stock growth. Compared to other alternatives, this alternative would lead to an intermediate level of possible catch (i.e. fish removed from the population) in 2023 (more catch than RPA1 or RPA2, less catch than no action or RPAs 4-5). Accordingly, this alternative would lead to an intermediate level of impact on mackerel in 2023 (less positive than RPA1 or RPA2, more positive than no action or RPA4 or RPA 5). Given the similar biomasses in 2023, the differences among all RPAs are slight.

Rebuilding Plan Alternative 4 (RPA4) – 61% Rebuilding Probability in 10 Years (PREFERRED)

This alternative would facilitate rebuilding, and thus have a positive impact on the mackerel stock. The stock would be predicted to be 45% rebuilt in 2023. The impact is moderate because of the relatively slow expected growth of the mackerel stock. Also, other factors outside of our control, primarily recruitment, have substantial effects on potential stock growth. Compared to other alternatives, this alternative would lead to an intermediate level of possible catch (i.e. fish removed from the population) in 2023 (more catch than RPAs 1-3, less catch than no action or RPA 5). Accordingly, this alternative would lead to an intermediate level of impact on mackerel in 2023 (less positive than RPAs 1-3, more positive than no action or RPA 5). Given the similar biomasses in 2023, the differences among all RPAs are slight.

Rebuilding Plan Alternative 5 (RPA5) – 53% Rebuilding Probability in 10 Years

This alternative would facilitate rebuilding, and thus have a positive impact on the mackerel stock. The stock would be predicted to be 44% rebuilt in 2023. The impact is moderate because of the relatively slow expected growth of the mackerel stock. Also, other factors outside of our control, primarily recruitment, have substantial effects on potential stock growth. Compared to other alternatives, this alternative would lead to an intermediate level of possible catch (i.e. fish removed from the population) in 2023 (more catch than RPAs 1-4, less catch than no action). Accordingly, this alternative would lead to an intermediate level of impact on mackerel in 2023 (less positive than RPAs 1-4, more positive than no action). Given the similar biomasses in 2023, the differences among all RPAs are slight.

Recreational Possession Limits Alternatives Group

In the mackerel plan, the expected recreational catch is set aside, i.e. deducted from the ABC as part of calculating the commercial quota. If a bit less recreational catch is expected, a bit more is added to the commercial quota in equal amounts, and vice-versa if a bit more recreational catch is expected. Since the total catch would thus remain the same, there is no direct or differential impact on the mackerel stock among any of the mackerel recreational possession limit options. Potential complete EEZ closures due to overall low ABC are discussed in the Specification Set-Asides and Closure Approaches Alternatives Group, but the Recreational Possession Limits Alternatives Group was really about addressing equity toward both the recreational sector and commercial sector making contributions toward rebuilding.

Specification Set-Asides and Closure Approaches Alternatives Group

Specification Set-Asides and Closure Approaches No Action

The no action set-asides and closure approaches were tailored to the no action specifications, so would only be paired with no action. They have no direct impact on mackerel, they only serve to operationalize the relevant specifications, i.e. they reinforce the impacts from the no action specifications. See above for the no-action specifications for related mackerel impacts.

Specification Set-Asides and Closure Approaches – Modified based on new information (PREFERRED)

The preferred set-asides and closure approaches based on new information were tailored to the preferred rebuilding RPA4 option, though they could also be utilized for RPA5. They have no direct impact on mackerel, they only serve to operationalize the relevant specifications, i.e. they

reinforce the impacts from the preferred rebuilding RPA4 option. See the preferred rebuilding RPA4 or RPA5 specifications for related mackerel impacts.

Specification Set-Asides and Closure Approaches – Low ABC Option 1

This alternative was tailored to RPA1 and RPA2. It has no direct impact on mackerel, it only serves to operationalize the relevant specifications, i.e. the measures reinforce the impacts from the RPA1 and RPA2 approaches. See the RPA1 and RPA2 specifications for related mackerel impacts.

Specification Set-Asides and Closure Approaches – Low ABC Option 2

This alternative was tailored to RPA3. It has no direct impact on mackerel, it only serves to operationalize the relevant specifications, i.e. the measures reinforce the impacts from RPA3. See the RPA3 specifications for related mackerel impacts.

River Herring and Shad (RH/S) Cap Alternatives Group

River Herring and Shad (RH/S) Cap: No Action 129 MT (PREFERRED)

Like the 89 MT alternative, this cap amount appears unlikely to cause closures of the mackerel fishery at recent RH/S encounter rates and the quotas under any of the rebuilding alternatives. As such it should not have an impact on the mackerel stock, similarly to the 89 MT alternative. Since the scaling RH/S cap alternative (see below) is more likely to cause mackerel closures, the scaling alternative is likely to have more positive impacts for mackerel than this alternative.

River Herring and Shad (RH/S) Cap: Scale with Quota

Depending on the RH/S encounter rates in a given year, the scaling approach has the potential to close the mackerel fishery early. Based on this, this alternative could have a moderately positive impact on mackerel. The impact is moderate because this scaling approach may not cause early closures of the mackerel fishery, and even with minimal mackerel catch the mackerel stock may increase slowly year to year, primarily depending on recruitment. At the quota levels associated with the rebuilding alternatives, this alternative would be expected to have moderately more positive impacts for mackerel than the other RH/S alternatives due to the higher probability of causing mackerel fishery closures and lowering mackerel catch.

River Herring and Shad (RH/S) Cap: 89 MT

Like the 129 MT alternative, this cap amount appears unlikely to cause closures of the mackerel fishery at recent RH/S encounter rates and the quotas under any of the rebuilding alternatives. As such it should not have an impact on the mackerel stock, similarly to the 129 MT alternative. Since the scaling RH/S cap alternative (see above) is more likely to cause mackerel closures, the scaling alternative is likely to have more positive impacts for mackerel than this alternative.

7.2 Habitat Impacts

Impacts on the habitat for the managed species (7.2.1) and other species (7.2.2) are addressed separately. The word "habitat" encompasses essential fish habitat (EFH) for the purposes of this analysis. The Council has already minimized to the extent practicable impacts to habitat from the MSB fisheries through closure of several canyon areas in MSB Amendment 9 (http://www.mafmc.org/fmp/history/smb-hist.htm) and Tilefish Amendment 1 (http://www.mafmc.org/fmp/history/tilefish.htm), and protections for Deep Sea Corals via Amendment 16 (http://www.mafmc.org/fmp/history/smb-hist.htm). As a baseline, many habitats in the area of operation of the MSB fisheries are degraded from historical fishing effort (both MSB and other) and from non-fishing activities (Stevenson et al. 2004). All of the rebuilding alternatives would decrease quotas and/or potential effort compared to no action, and there is nothing in this action that would change the character of MSB fishing effort, so there should not be any additional adverse habitat impacts beyond continuing existing habitat disturbance as described in section 6.3.

7.2.1 Impacts on Managed Species Habitat

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

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

Mackerel fishing takes place mostly with either bottom otter trawling or mid-water trawling. Mid-water trawling should not impact bottom habitat or negatively impact the water column. Potential impacts of the alternatives on other federally-managed species EFH are discussed below related to the bottom trawl fishing that may occur for mackerel in any given year.

Rebuilding Alternatives Group Habitat Impacts

No action (revert to initial 2021 Specifications)

No action would facilitate the most catch and potential effort of any alternative. As described in section 6.3 above, the bottom trawling that is used for some of this fishery can adversely impact some habitat types. However, since the Council has considered habitat impacts in the past and has already restricted MSB fishing to protect sensitive habitats (e.g. Tilefish habitat canyon closures and coral protections), the impact of no action is best characterized as overall slight negative, similar to past years. Given the impacts of no action and the other relative catch constraints (and therefore effort constraints), impacts would be slightly more negative for no action relative to all rebuilding plan alternatives, which would have lower quotas and constrain effort more (see rebuilding plan alternatives 1-5 below).

Rebuilding Plan Alternative 1 (RPA1) – 10-year Rebuilding with Persistent Low Recruitment.

As long as some effort persists, some negative impacts on habitat could persist, but with lower quotas and more restraint on effort, negative impacts should continue to be slight. This alternative would lead to the lowest possible catch in 2023, so compared to no action or all the other rebuilding plan alternatives (RPAs 2-5), this alternative would have the most positive, if slight, impact on habitat because effort would be most constrained.

Rebuilding Plan Alternative 2 (RPA2) – P* deduction applied to 50% Rebuilding Probability

As long as some effort persists, some negative impacts on habitat could persist, but with lower quotas and more restraint on effort, negative impacts should continue to be slight. Compared to other alternatives, this alternative would lead to an intermediate level of possible catch and effort in 2023 (more catch/effort than RPA1, less catch/effort than no action or RPAs 3-5). Accordingly, this alternative would lead to an intermediate level of relative impacts on habitat in 2023 (slightly, but less positive than RPA1 and more positive than no action or RPAs 3-5).

Rebuilding Plan Alternative 3 (RPA3) – P* approach with return to normal recruitment.

As long as some effort persists, some negative impacts on habitat could persist, but with lower quotas and more restraint on effort, negative impacts should continue to be slight. Compared to other alternatives, this alternative would lead to an intermediate level of possible catch and effort in 2023 (more catch/effort than RPA1 or RPA2, less catch/effort than no action or RPAs 4-5). Accordingly, this alternative would lead to an intermediate level of relative impacts on habitat in 2023 (slightly, but less positive than RPA1 or RPA2 and more positive than no action or RPAs 4-5).

Rebuilding Plan Alternative 4 (RPA4) – 61% Rebuilding Probability in 10 Years (PREFERRED)

As long as some effort persists, some negative impacts on habitat could persist, but with lower quotas and more restraint on effort, negative impacts should continue to be slight. Compared to other alternatives, this alternative would lead to an intermediate level of possible catch and effort in 2023 (more catch/effort than RPAs 1-3, less catch/effort than no action or RPA 5). Accordingly, this alternative would lead to an intermediate level of relative impacts on habitat in 2023 (slightly, but less positive than RPAs 1-3 and more positive than no action or RPA 5).

Rebuilding Plan Alternative 5 (RPA5) – 53% Rebuilding Probability in 10 Years

As long as some effort persists, some negative impacts on habitat could persist, but with lower quotas and more restraint on effort, negative impacts should continue to be slight. Compared to other alternatives, this alternative would lead to an intermediate level of possible catch and effort in 2023 (more catch/effort than RPAs 1-4, less catch/effort than no action). Accordingly, this alternative would lead to an intermediate level of relative impacts on habitat in 2023 (slightly, but less positive than RPAs 1-4 and more positive than no action).

Recreational Possession Limits Alternatives Group Habitat Impacts

In the mackerel plan, the expected recreational catch is set aside, i.e. deducted from the ABC as part of calculating the commercial quota. If a bit less recreational catch is expected, a bit more is added to the commercial quota in equal amounts, and vice-versa if a bit more recreational catch is expected. The differences in likely needed recreational deductions for the varied possession limits (see Section 5.4) are not sufficiently different from each other to more than negligibly affect commercial fishing/trawling effort, and therefore do not have bearing on habitat impacts, which stem from commercial fishing/trawling effort.

Specification Set-Asides and Closure Approaches Alternatives Group Habitat Impacts

Specification Set-Asides and Closure Approaches No Action

The no action set-asides and closure approaches were tailored to the no action specifications, so would only be paired with no action. They have no direct impact on effort, they only serve to operationalize the relevant specifications, i.e. they reinforce the impacts from the no action specifications. See above for the no-action specifications for related habitat impacts.

Specification Set-Asides and Closure Approaches – Modified based on new information (PREFERRED)

The preferred set-asides and closure approaches based on new information were tailored to the preferred rebuilding RPA4 option, though they could also be utilized for RPA5. They have no direct impact on effort, they only serve to operationalize the relevant specifications, i.e. they reinforce the impacts from the preferred rebuilding RPA4 option. See the preferred rebuilding RPA4 or RPA5 specifications for related habitat impacts.

Specification Set-Asides and Closure Approaches – Low ABC Option 1

This alternative was tailored to RPA1 and RPA2. It has no direct impact on effort, it only serves to operationalize the relevant specifications, i.e. the measures reinforce the impacts from the RPA1 and RPA2 options. See the RPA1 and RPA2 specifications for related habitat impacts.

Specification Set-Asides and Closure Approaches – Low ABC Option 2

This alternative was tailored to RPA3. It has no direct impact on effort, it only serves to operationalize the relevant specifications, i.e. the measures reinforce the impacts from RPA3. See the RPA3 specifications for related habitat impacts.

River Herring and Shad (RH/S) Cap Alternatives Group Habitat Impacts

River Herring and Shad (RH/S) Cap: No Action 129 MT (PREFERRED)

Like the 89 MT alternative, this cap amount appears unlikely to cause closures of the mackerel fishery at recent RH/S encounter rates and the quotas under any of the rebuilding alternatives. As such it should not have an impact on effort or habitat, similarly to the 89 MT alternative. Since the scaling RH/S cap alternative (see below) is more likely to cause mackerel closures, the scaling alternative is likely to have more positive impacts for habitat than this alternative.

River Herring and Shad (RH/S) Cap: Scale with Quota

Depending on the RH/S encounter rates in a given year, the scaling approach has the potential to close the mackerel fishery early. Based on this, this alternative could have a slight positive impact on habitat. The impact is slight because habitat impacts are slight overall and because this scaling approach may not cause early closures of the mackerel fishery. At the quota levels associated with the rebuilding alternatives, this alternative would be expected to have more positive impacts for habitat than the other RH/S alternatives due to the higher probability of causing mackerel fishery closures and lowering fishing effort.

River Herring and Shad (RH/S) Cap: 89 MT

Like the 129 MT alternative, this cap amount appears unlikely to cause closures of the mackerel fishery at recent RH/S encounter rates and the quotas under any of the rebuilding alternatives. As such it should not have an impact on effort or habitat, similarly to the 129 MT alternative. Since the scaling RH/S cap alternative (see above) is more likely to cause mackerel closures, the scaling alternative is likely to have more positive impacts for habitat than this alternative.

7.3 Protected Resources Impacts

The impacts of the alternatives on protected species take into account impacts to ESA-listed species, as well as impacts to MMPA protected species in good condition (i.e., marine mammal stocks whose PBR level have not been exceeded) or poor condition (i.e., marine mammal stocks that have exceeded or are near exceeding their PBR level). For ESA-listed species, any action that results in interactions or take is expected to have negative impacts, including actions that reduce interactions. Actions expected to result in positive impacts on ESA-listed species include only those that contain specific measures to ensure no interactions (i.e., no take). By definition, all ESA-listed species are in poor condition and any take can negatively impact that species' recovery (impacts are negligible for species without interactions and not repeated for every alternative – the focus here is on species where there are interactions as described in Section 6.4). The stock conditions for marine mammals not listed under the ESA varies by species; however, all are in need of protection. For marine mammal stocks that have their PBR level reached or exceeded, negative impacts would be expected from alternatives that result in the potential for interactions between fisheries and those stocks. For species that are at more sustainable levels (i.e., PBR levels have not been exceeded), alternatives not expected to change fishing behavior or effort may have positive impacts by maintaining takes below the PBR level and approaching the zero mortality rate goal.

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

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

Aside from several stocks of bottlenose dolphin, there has been no indication that takes of non-ESA listed marine mammals in commercial fisheries have gone beyond levels which would result in the inability of the populations to sustain themselves. Specifically, aside from several stocks of bottlenose dolphin, the PBR level has not been exceeded for any of the non-ESA listed marine mammal species in the affected environment (section 6.4). Although several stocks of bottlenose dolphin have experienced levels of take that resulted in the exceedance of their PBR level, take reduction strategies and/or plans have been implemented to reduce bycatch in the fisheries affecting these species.

Taking into consideration the above information, and the fact that there are non-listed marine mammal stocks/species whose populations may or may not be at optimum sustainable levels, impacts of the No Action Alternatives on non-ESA listed species of marine mammals are likely to range from slight negative to slight positive. As noted above, there are some bottlenose dolphin stocks experiencing levels of interactions that have resulted in exceedance of their PBR levels. These stocks/populations are not at an optimum sustainable level and therefore, the continued existence of these stocks/species is at risk. As a result, any potential for an interaction is a detriment to the species/stocks ability to recover from this condition. As provided above, the risk of an interaction is strongly associated with the amount of gear in the water, the time the gear is in the water (e.g., tow time), and the presence of protected species in the same area and time as the gear, with risk of an interaction increasing with increases in of any of these factors. The No Action Alternatives are not expected to introduce new or elevated interaction risks to these non-ESA listed marine mammal stocks in poor condition. Specifically, the amount of gear in the water, gear tow duration, and the overlap between protected species and fishing gear (i.e., bottom trawl or mid-water trawl), in space and time, is not expected to change relative to current conditions. Given this information, and the information provided in section 6.4.3, the No Action Alternatives are likely to result in slight negative impacts to non-ESA listed marine mammal stocks/species in poor condition (i.e., bottlenose dolphin stocks).

Alternatively, there are also many non-ESA listed marine mammals that, even with continued fishery interactions, are maintaining an optimum sustainable level (i.e., PBR levels have not been exceeded) over the last several years. For these stocks/species, it appears that the fishery management measures that have been in place over this timeframe have resulted in levels of effort that result in interaction levels that are not expected to impair the stocks/species ability to remain at an optimum sustainable level. These fishery management measures, therefore, have resulted in indirect slight positive impacts to these non-ESA listed marine mammal species/stocks. Should future fishery management actions maintain similar operating condition as they have over the past several years, it is expected that these slight positive impacts would remain. Given this, and the fact that the potential risk of interacting with gear types used in the fishery varies between non-ESA listed marine mammal species in good condition (e.g., minke whale interactions with bottom trawl gear are expected to be rare; see section 6.4.3), the impacts of no action on these non-ESA listed species of marine mammals in good condition are expected to be negligible to slight positive (i.e., continuation of current operating conditions is not expected to result in exceedance of any of these stocks/species PBR level).

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

General No-action: ESA Listed Species Impacts

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

Under the No Action, the amount of trawl gear, tow times, and area fished are not expected change significantly from current operating conditions. As interactions risks with protected species are strongly associated with amount, time, and location of gear in the water, continuation of "status quo" fishing behavior/effort is not expected to change any of these operating conditions. Based on this, and the fact that the potential risk of interacting with gear types used in fishery varies between ESA listed species (e.g., listed species of large whales have never been documented/observed in bottom trawl gear; no observed or documented interactions between listed species and mid-water trawl gear, see section 6.4.3) the impacts of the No Action Alternatives on ESA listed species is expected to be slight negative.

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Rebuilding Alternatives Group Protected resources Impacts

No action (revert to initial 2021 Specifications)

No action would revert to recent quota levels, and therefore, relative to current operating conditions, changes in fishing behavior (e.g., area fished) or effort (e.g., amount of gear in the water, tow duration) are not expected. Given this, and the information provided in the general impacts discussions above, impacts of no action on protected species are expected to range from slight negative (for ESA-listed species and marine mammals above PBR) to slight positive (for marine mammals below PBR).

Given the impacts of no action and the other alternatives' relative catch constraints (and therefore effort constraints), impacts would be slightly more negative for no action relative to all rebuilding plan alternatives, which would have lower quotas and constrain effort more (see rebuilding plan alternatives 1-5 below). Given the individual alternatives have similar impacts on their own, the differences between all alternatives is likely slight, especially since other factors (availability/markets) may drive effort as much as the quotas.

Rebuilding Plan Alternatives 1-3 (RPAs 1-3)

All of these alternatives would require a commercial EEZ closure for mackerel in 2023, so they all have the same impacts on protected resources.

As described above, interaction risks with protected species (ESA-listed and/or MMPA protected) are strongly associated with the amount of gear in the water, the time the gear is in the water (e.g., tow time), and the presence of listed species in the same area and time as the gear, with risk of an interaction increasing with increases in of any of these factors. There is no information to suggest that decreased mackerel quota would lead to effort that would be substantially different in character from the status quo, but if allowed catch is lower and mackerel are available, there could be a general scaling down of effort. If mackerel are available, such effort may consist of some fewer vessels participating in the fishery (which already varies substantially from year to year), and some vessels decreasing the days they participate in the fishery, but the types of vessels and the types of gears are not expected to substantially differ from previous years. Also, since the fishery is limited access, any permit which would participate substantially has also previously participated in the fishery. The year to year changes in availability and market conditions in the MSB and other alternative fishery opportunities that drive effort (quotas are often not fully utilized in all MSB fisheries) preclude speculation as to exactly what might change year to year due to a catch limit change in terms of vessel participation, gear used, and tow times.

The impacts of a change in effort due to the considered quota may be evaluated within the context of the individual fishery, FMP, or regional fishery operations to fully understand the impacts of potential changes.

These alternatives involve approximately 17,312 mt of less quota than no action. Since vessels in this fishery routinely land more than 250 mt per trip when directing on this species, this change could amount to around 69 fewer directed trips. If mackerel are available, these larger trips will be the kinds of trips that would have utilized the extra quota (the quota has not been constraining in recent years). Over 2017-2019, there were on average approximately 3,086 trips each year that landed mackerel and can be identified in NMFS' dealer weighout database. However, many of these trips are landing small amounts of mackerel, and may still take trips if they cannot land mackerel from the EEZ. It is the 69 larger trips that are most likely to not occur if mackerel is closed in the EEZ. Additional trips also land mackerel only at the state level but cannot be identified at the trip level. The trips that might not occur due to an decrease in quota under RPAs 1-3 thus likely represent a small number of trips.

From an FMP perspective, from 2017-2019 there were on average approximately 13,305 trips each year that landed at least one MSB species and can be identified in NMFS' dealer weighout database. From a regional perspective, compared to the tens of thousands of trips occurring annually just in federally-permitted fisheries off New England and the mid-Atlantic that require VTRs (more than 80,000 from July 2018 through June 2019 – NEFSC 2020d), the potential effort reduction represented by this potential catch change represents a slight change to the total amount of effort that may impact protected resources in the region.

As effort under these alternatives has the potential to decrease, the risk of an interaction between fishing gear and protected species also has the potential to decrease. Accordingly, these alternatives impacts on protected species are expected to range from slight negative (for ESA-listed species and marine mammals above PBR as their status is unlikely to change) to slight positive for marine mammals below PBR (as the change could further reduce removals below PBR), all in a similar fashion.

These alternatives would lead to the lowest possible commercial catches in 2023, so compared to no action or all the other rebuilding plan alternatives (RPAs 4-5), RPAs 1-3 would have, in a similar fashion among them, the most positive, if slight, impact on protected resources because effort would be most constrained.

Rebuilding Plan Alternative 4 (RPA4) – 61% Rebuilding Probability in 10 Years (PREFERRED)

As described above, interaction risks with protected species (ESA-listed and/or MMPA protected) are strongly associated with the amount of gear in the water, the time the gear is in the water (e.g., tow time), and the presence of listed species in the same area and time as the gear, with risk of an interaction increasing with increases in of any of these factors. There is no information to suggest that decreased mackerel quota would lead to effort that would be substantially different in character from the status quo, but if allowed catch is lower and mackerel are available, there could be a general scaling down of effort. If mackerel are available, such effort may consist of some fewer vessels participating in the fishery (which already varies substantially from year to year), and some vessels decreasing the days they participate in the fishery, but the types of vessels and the types of gears are not expected to substantially differ from previous years. Also, since the fishery is limited access, any permit which would participate substantially has also previously participated in the fishery. The year to year changes in availability and market conditions in the MSB and other alternative fishery opportunities that drive effort (quotas are often not fully utilized in all MSB fisheries) preclude speculation as to exactly what might change year to year due to a catch limit change in terms of vessel participation, gear used, and tow times.

The impacts of a change in effort due to the considered quota may be evaluated within the context of the individual fishery, FMP, or regional fishery operations to fully understand the impacts of potential changes.

This alternative involves approximately 13,673 mt of less quota than no action. Since vessels in this fishery routinely land more than 250 mt per trip when directing on this species, this change could amount to around 55 fewer directed trips. If mackerel are available, these larger trips will be the kinds of trips that would have utilized the extra quota (the quota has not been constraining in recent years). Over 2017-2019, there were on average approximately 3,086 trips each year that landed mackerel and can be identified in NMFS' dealer weighout database. However, many of these trips are landing small amounts of mackerel, and may still take trips if they cannot land mackerel from the EEZ. It is the 55 larger trips that are most likely to not occur if mackerel is closed in the EEZ. Additional trips also land mackerel only at the state level but cannot be identified at the trip level. The trips that might not occur due to a decrease in quota under RPA 4 represent a small number of trips.

From an FMP perspective, from 2017-2019 there were on average approximately 13,305 trips each year that landed at least one MSB species and can be identified in NMFS' dealer weighout database. From a regional perspective, compared to the tens of thousands of trips occurring annually just in federally-permitted fisheries off New England and the mid-Atlantic that require VTRs (more than 80,000 from July 2018 through June 2019 – NEFSC 2020d), the potential effort reduction represented by this potential catch change represents a slight change to the total amount of effort that may impact protected resources in the region.

As effort under these alternatives has the potential to decrease, the risk of an interaction between fishing gear and protected species also has the potential to decrease. While this could provide some benefits to protected species, as interactions with protected species are still possible, even under reduced fishing scenarios, some level of interaction risk is likely. Accordingly, this alternative's impact on protected species is expected to range from slight negative (for ESA-listed species and marine mammals above PBR as their status is unlikely to change) to slight positive for marine mammals below PBR (as the change could further reduce removals below PBR), all in a similar fashion.

Relative to other alternatives, this alternative would lead to an intermediate level of possible catch and effort in 2023 (more catch/effort than RPAs 1-3, less catch/effort than no action or RPA 5). Accordingly, this alternative would lead to an intermediate level of relative impacts on protected resources in 2023 (slightly, but less positive than RPAs 1-3 and more positive than no action or RPA 5).

Rebuilding Plan Alternative 5 (RPA5) – 53% Rebuilding Probability in 10 Years

As described above, interaction risks with protected species (ESA-listed and/or MMPA protected) are strongly associated with the amount of gear in the water, the time the gear is in the water (e.g., tow time), and the presence of listed species in the same area and time as the gear, with risk of an interaction increasing with increases in of any of these factors. There is no information to suggest that decreased mackerel quota would lead to effort that would be substantially different in character from the status quo, but if allowed catch is lower and mackerel are available, there could be a general scaling down of effort. If mackerel are available, such effort may consist of some fewer vessels participating in the fishery (which already varies substantially from year to year), and some vessels decreasing the days they participate in the fishery, but the types of vessels and the types of gears are not expected to substantially differ from previous years. Also, since the fishery is limited access, any permit which would participate substantially has also previously participated in the fishery. The year to year changes in availability and market conditions in the MSB and other alternative fishery opportunities that drive effort (quotas are often not fully utilized in all MSB fisheries) preclude speculation as to exactly what might change year to year due to a catch limit change in terms of vessel participation, gear used, and tow times.

The impacts of a change in effort due to the considered quota may be evaluated within the context of the individual fishery, FMP, or regional fishery operations to fully understand the impacts of potential changes.

This alternative involves approximately 12,396 mt of less quota than no action. Since vessels in this fishery routinely land more than 250 mt per trip when directing on this species, this change could amount to around 50 fewer directed trips. If mackerel are available, these larger trips will

be the kinds of trips that would have utilized the extra quota (the quota has not been constraining in recent years). Over 2017-2019, there were on average approximately 3,086 trips each year that landed mackerel and can be identified in NMFS' dealer weighout database. However, many of these trips are landing small amounts of mackerel, and may still take trips if they cannot land mackerel from the EEZ. It is the 50 larger trips that are most likely to not occur if mackerel is closed in the EEZ. Additional trips also land mackerel only at the state level but cannot be identified at the trip level. The trips that might not occur due to a decrease in quota under RPA 4 represent a small number of trips.

From an FMP perspective, from 2017-2019 there were on average approximately 13,305 trips each year that landed at least one MSB species and can be identified in NMFS' dealer weighout database. From a regional perspective, compared to the tens of thousands of trips occurring annually just in federally-permitted fisheries off New England and the mid-Atlantic that require VTRs (more than 80,000 from July 2018 through June 2019 – NEFSC 2020d), the potential effort reduction represented by this potential catch change represents a slight change to the total amount of effort that may impact protected resources in the region.

As effort under these alternatives has the potential to decrease, the risk of an interaction between fishing gear and protected species also has the potential to decrease. While this could provide some benefits to protected species, as interactions with protected species are still possible, even under reduced fishing scenarios, some level of interaction risk is likely. Accordingly, this alternative's impact on protected species is expected to range from slight negative (for ESA-listed species and marine mammals above PBR as their status is unlikely to change) to slight positive for marine mammals below PBR (as the change could further reduce removals below PBR), all in a similar fashion.

Relative to other alternatives, this alternative would lead to an intermediate level of possible catch and effort in 2023 (more catch/effort than RPAs 1-4, and less catch than no action). Accordingly, this alternative would lead to an intermediate level of relative impacts on protected resources in 2023 (slightly, but less positive than RPAs 1-4 and more positive than no action).

Recreational Possession Limits Alternatives Group Protected resources Impacts

In the mackerel plan, the expected recreational catch is set aside, i.e. deducted from the ABC as part of calculating the commercial quota. If a bit less recreational catch is expected, a bit more is added to the commercial quota in equal amounts, and vice-versa if a bit more recreational catch is expected. The differences in likely needed recreational deductions for the varied possession limits (see Section 5.4) are not sufficiently different from each other to more than negligibly affect commercial fishing effort levels, and therefore do not have bearing on protected resources impacts, which stem from commercial fishing effort.

Specification Set-Asides and Closure Approaches Alternatives Group Protected resources Impacts

Specification Set-Asides and Closure Approaches No Action

The no action set-asides and closure approaches were tailored to the no action specifications, so would only be paired with no action. They have no direct impact on effort, they only serve to operationalize the relevant specifications, i.e. they reinforce the impacts from the no action specifications. See above for the no-action specifications for related protected resources impacts.

Specification Set-Asides and Closure Approaches – Modified based on new information (PREFERRED)

The preferred set-asides and closure approaches based on new information were tailored to the preferred rebuilding RPA4 option, though they could also be utilized for RPA5. They have no direct impact on effort, they only serve to operationalize the relevant specifications, i.e. they reinforce the impacts from the preferred rebuilding RPA4 option. See the preferred rebuilding RPA4 or RPA5 specifications for related protected resources impacts.

Specification Set-Asides and Closure Approaches – Low ABC Option 1

This alternative was tailored to RPA1 and RPA2. It has no direct impact on effort, it only serves to operationalize the relevant specifications, i.e. the measures reinforce the impacts from the RPA1 and RPA2 options. See the RPA1 and RPA2 specifications for related protected resources impacts.

Specification Set-Asides and Closure Approaches – Low ABC Option 2

This alternative was tailored to RPA3. It has no direct impact on effort, it only serves to operationalize the relevant specifications, i.e. the measures reinforce the impacts from RPA3. See the RPA3 specifications for related protected resources impacts.

River Herring and Shad (RH/S) Cap Alternatives Group Protected resources Impacts

River Herring and Shad (RH/S) Cap: No Action 129 MT (PREFERRED)

Like the 89 MT alternative, this cap amount appears unlikely to cause closures of the mackerel fishery at recent RH/S encounter rates and the quotas under any of the rebuilding alternatives. As such it should not have an impact on effort or protected resources, similarly to the 89 MT alternative. The protected resource impacts would thus be as described for the various rebuilding alternatives. Since the scaling RH/S cap alternative (see below) is more likely to cause mackerel closures, the scaling alternative is likely to have slightly more positive impacts for protected resources than this alternative.

River Herring and Shad (RH/S) Cap: Scale with Quota

Depending on the RH/S encounter rates in a given year, the scaling approach has the potential to close the mackerel fishery early and reduce effort.

As described above, interaction risks with protected species (ESA-listed and/or MMPA protected) are strongly associated with the amount of gear in the water, the time the gear is in the water (e.g., tow time), and the presence of listed species in the same area and time as the gear, with risk of an interaction increasing with increases in of any of these factors. If allowed catch is lower, there could be a reduction in effort. If mackerel are available, such effort may consist of some fewer vessels participating in the fishery (which already varies substantially from year to year), and some vessels decreasing the days they participate in the fishery, but the types of vessels and the types of gears are not expected to substantially differ from previous years. Also, since the fishery is limited access, any permit which would participate substantially has also previously participated in the fishery. The year to year changes in availability and market conditions in the MSB and other alternative fishery opportunities that drive effort (quotas are often not fully utilized in all MSB fisheries) preclude speculation as to exactly what might change year to year in terms of vessel participation, gear used, and tow times.

The impacts of a change in effort due to the RH/S cap would focus on larger directed trips, since once the RH/S closes the fishery a 20,000 pound trip limit is implemented. Depending on the RH/S ratio, this could eliminate a few or most of the trips that may otherwise have occurred, which under even the highest rebuilding quota for 2023 might be at many as 20 trips total.

Over 2017-2019, there were on average approximately 3,086 trips each year that landed mackerel and can be identified in NMFS' dealer weighout database. However, many of these trips are landing small amounts of mackerel, and may still take trips if they cannot land mackerel from the EEZ. It is the 20 potential larger trips that are most likely to not occur if mackerel is closed by the RH/S cap. Additional trips also land mackerel only at the state level but cannot be

identified at the trip level. The trips that might not occur due to a decrease in quota under RPA 4 represent a small number of trips.

From an FMP perspective, from 2017-2019 there were on average approximately 13,305 trips each year that landed at least one MSB species and can be identified in NMFS' dealer weighout database. From a regional perspective, compared to the tens of thousands of trips occurring annually just in federally-permitted fisheries off New England and the mid-Atlantic that require VTRs (more than 80,000 from July 2018 through June 2019 – NEFSC 2020d), the potential effort reduction represents a slight change to the total amount of effort that may impact protected resources in the region.

As effort under these alternatives has the potential to decrease, the risk of an interaction between fishing gear and protected species also has the potential to decrease. While this could provide some benefits to protected species, as interactions with protected species are still possible, even under reduced fishing scenarios, some level of interaction risk is likely. Accordingly, this alternative's impact on protected species is expected to range from slight negative (for ESA-listed species and marine mammals above PBR as their status is unlikely to change) to slight positive for marine mammals below PBR (as the change could further reduce removals below PBR), all in a similar fashion.

Since the scaling RH/S cap alternative is more likely to cause mackerel closures that the other RH/S alternatives, the scaling alternative is likely to have more slightly positive impacts for protected resources than the other two RH/S alternatives.

River Herring and Shad (RH/S) Cap: 89 MT

Like the 129 MT alternative, this cap amount appears unlikely to cause closures of the mackerel fishery at recent RH/S encounter rates and the quotas under any of the rebuilding alternatives. As such it should not have an impact on effort or protected resources, similarly to the 129 MT alternative. Since the scaling RH/S cap alternative (see above) is more likely to cause mackerel closures, the scaling alternative is likely to have more slightly positive impacts for protected resources than this alternative.

7.4 Socioeconomic Impacts

This action would primarily affect the mackerel fishery, both commercial and recreational. As discussed above, the availability of the targeted species, market conditions, and input costs (especially fuel and labor) may drive effort (and catch and revenues) as much as any regulations. Commercial and recreational impacts are addressed separately.

Mackerel Commercial Fishery Current Condition:

Given the overfished status of mackerel and reduced productivity, the socioeconomic contributions of mackerel are reduced compared to historical levels. Due to the year-to-year variation in catch and effort in the fishery, it is difficult to fully quantify human community impacts but the current fishery supports a number of vessels, as described in Section 6.3, and provides a variety of jobs related directly to fishing and also in associated support services. 22 vessels landed over 10,000 pounds of mackerel in 2021, with total mackerel landings valued at $3.1 million. From 2019-2021 mackerel ex-vessel revenues varied from $2.8-$5.0 million, averaging $3.6 million. The Council has received input from commercial tuna fishermen that commercial tuna fishing could be impacted by limitations on mackerel, but commercial vessels can get open access commercial incidental mackerel permits that would allow retention of at least to 5,000 pounds of mackerel as bait under the preferred alternative (catch would need to be reported on Vessel Trip Reporting linked to that permit).

Socioeconomic Mackerel Commercial Fishery Impacts

Note: where possible, effects on ex-vessel revenues are described. Although ex-vessel revenues are a useful indicator of relative importance for various fisheries, we note that the true economic importance of these fisheries comes from the overall economic activity, jobs, and community vitality that are supported by the ex-vessel revenues. In fact, when related impact multipliers are considered, the actual economic impact is several times larger. This concept applies to each alternative, and is not repeated for each alternative. The Net Present Value (NPV) of landings revenues during the full rebuilding period is presented to allow broader consideration of the long term implications of different rebuilding approaches. However, the focus on impacts in on 2023 since a new assessment in 2023 will set quotas beyond 2023.

Rebuilding Alternatives Group

No action (revert to initial 2021 Specifications)

No action would facilitate more catch than can be allowed to avoid overfishing or to help the stock rebuild. While 2023 quotas/revenues might be highest with this alternative, the reduction in productivity from continued overfishing would likely lead to the worst long term socioeconomic outcome of any alternative. The stock is unlikely to support such a quota so calculating a stream

of revenues is not actually meaningful. However, according to the 2021 MTA and the Council's P* risk policy, a rebuilt mackerel stock would be expected to yield about 30,000 MT of catch annually. If Canada caught half, that would leave 15,000 MT for the US, and after accounting for recreational catch (around 2,500 MT), the U.S. quota might be around 12,500 MT annually. At 2021 prices, that could be worth about $7.1 million annually at 2021 prices. One risk of not rebuilding is forgoing these sustainable revenues.

Rebuilding Plan Alternative 1 (RPA1) – 10-year Rebuilding with Persistent Low Recruitment.

This alternative would facilitate rebuilding, and thus have a positive impact on the mackerel stock. No commercial fishery in federal waters could occur with RPA1 during the rebuilding period (including 2023) due to the low associated ABCs. 2019-2021 landings averaged 6,187 MT and averaged $3.6 million annually in ex-vessel revenues, which serves as a useful reference point for impacts of future quotas. RPAs 1-3 could all result in a loss of most mackerel landings/revenues for 2023 and so have equally moderate more negative impacts compared to RPAs 4-5. Given the relatively few vessels participating in the mackerel fishery in recent years and relatively low landings, the impact would be moderately negative in the short run. Some commercial catch would likely continue in state waters, but it is not possible to predict those trends over the rebuilding period.

From a long-term perspective, As discussed above, a rebuilt mackerel stock could return about $7.1 million annually. This alternative likely has the lowest commercial landings Net Present Value (NPV) over 2023-2032 (near zero), but there would be some investment-type benefit as the mackerel stock would grow more with this alternative than other alternatives. Long term impacts should by moderately positive associated with the sustainable landings associated with a rebuilt stock.

Rebuilding Plan Alternative 2 (RPA2) – P* deduction applied to 50% Rebuilding Probability

This alternative would facilitate rebuilding, and thus have a positive impact on the mackerel stock. No commercial fishery in federal waters could occur with RPA2 for several years (including 2023) during the rebuilding period due to the low associated ABCs. 2019-2021 landings averaged 6,187 MT and averaged $3.62 million annually in ex-vessel revenues, which serves as a useful reference point for impacts of future quotas. RPAs 1-3 could all result in a loss of most mackerel landings/revenues for 2023 and so have equally moderate more negative impacts compared to RPAs 4-5. Given the relatively few vessels participating in the mackerel fishery in recent years and relatively low landings, the impact would be moderately negative in the short run. Some commercial catch would likely continue in state waters, but it is not possible to predict those trends over the rebuilding period.

From a long-term perspective, As discussed above, a rebuilt mackerel stock could return about $7.1 million annually. If half of the predicted ABCs are assigned to Canada each year, and 2,500 MT is set aside for recreational catch each year, the 2023-2032 net present value of the remaining U.S. catch at 2021 prices (2021 used as year zero in Net Present Value (NPV) calculations with a 3% discount rate) for RPA2 would be estimated at $19.0 million. This alternative has the fourth highest NPV compared to the other rebuilding alternatives (more than RPA1, and less than RPAs 3-5). Long term impacts should by moderately positive associated with the sustainable landings associated with a rebuilt stock.

Rebuilding Plan Alternative 3 (RPA3) – P* approach with return to normal recruitment.

This alternative would facilitate rebuilding, and thus have a positive impact on the mackerel stock. No commercial fishery in federal waters could occur with RPA3 for 2023 due to the low associated ABC. 2019-2021 landings averaged 6,187 MT and averaged $3.62 million annually in ex-vessel revenues, which serves as a useful reference point for impacts of future quotas RPAs 1-3 could all result in a loss of most mackerel landings/revenues for 2023 and so have equally moderate more negative impacts compared to RPAs 4-5. Given the relatively few vessels participating in the mackerel fishery in recent years and relatively low landings, the impact would be moderately negative in the short run. Some commercial catch would likely continue in state waters, but it is not possible to predict those trends over the rebuilding period.

From a long-term perspective, As discussed above, a rebuilt mackerel stock could return about $7.1 million annually. If half of the predicted ABCs are assigned to Canada each year, and 2,500 MT is set aside for recreational catch each year, the 2023-2032 net present value of the remaining U.S. catch at 2021 prices (2021 used as year zero in NPV calculations with a 3% discount rate) for RPA4 would be estimated at $26.9 million. RPA3 has the highest expected NPV of any rebuilding alternative, but a relatively low probability of fully rebuilding and requires very low commercial landing initially. Long term impacts should by moderately positive associated with the sustainable landings associated with a rebuilt stock.

Rebuilding Plan Alternative 4 (RPA4) – 61% Rebuilding Probability in 10 Years (PREFERRED)

This alternative would facilitate rebuilding, and thus have a positive impact on the mackerel stock. 2019-2021 landings averaged 6,187 MT and averaged $3.62 million annually in ex-vessel revenues, which serves as a useful reference point for impacts of future quotas. Given the relatively few vessels participating in the mackerel fishery in recent years, the relatively low landings, and the small reduction in quota from recent landings, the impact would be slightly negative in the short run. The 2023 quota would be 3,639 MT, 41% less than the 2019-2021 average landings. Impacts would be moderately less negative than RPAs 1-3 and slightly more negative than RPA 5.

From a long-term perspective, As discussed above, a rebuilt mackerel stock could return about $7.1 million annually. If half of the predicted ABCs are assigned to Canada each year, and 2,500 MT is set aside for recreational catch each year, the 2023-2032 net present value of the remaining U.S. catch at 2021 prices (2021 used as year zero in NPV calculations with a 3% discount rate) for RPA4 would be estimated at $21.3 million. While the total NPV is lower for RPA 4 than RPA 3 or RPA 5, part of that is due to the higher probability of rebuilding associated with RPA 3, requiring lower catches. RPA 4 also makes the tradeoff of having some more catch earlier to allow some landings in 2023 with resulting less catch later in the rebuilding plan. This alternative has the third highest NPV compared to the other rebuilding alternatives (more than RPA1 or RPA2, and less than RPA3 and RPA5). Long term impacts should by moderately positive associated with the sustainable landings associated with a rebuilt stock.

Rebuilding Plan Alternative 5 (RPA5) – 53% Rebuilding Probability in 10 Years

This alternative would facilitate rebuilding, and thus have a positive impact on the mackerel stock. 2019-2021 landings averaged 6,187 MT and averaged $3.62 million annually in ex-vessel revenues, which serves as a useful reference point for impacts of future quotas. Given the relatively few vessels participating in the mackerel fishery in recent years, the relatively low landings, and the small reduction in quota from recent landings, the impact would be slightly negative in the short run. The 2023 quota would be 4,916 MT, 21% less than the 2019-2021 average landings. Impacts would be moderately less negative than RPAs 1-3 and slightly less negative than RPA 4.

From a long-term perspective, As discussed above, a rebuilt mackerel stock could return about $7.1 million annually.. If half of the predicted ABCs are assigned to Canada each year, and 2,500 MT is set aside for recreational catch each year, the 2023-2032 net present value of the remaining U.S. catch at 2021 prices (2021 used as year zero in NPV calculations with a 3% discount rate) for RPA5 would be estimated at $24.5 million. This alternative has the second highest NPV compared to the other rebuilding alternatives (more than RPA 1, RPA2, or RPA 4, and less than RPA3). Long term impacts should by moderately positive associated with the sustainable landings associated with a rebuilt stock.

Recreational Possession Limits Alternatives Group

In the mackerel plan, the expected recreational catch is set aside, i.e. deducted from the ABC as part of calculating the commercial quota. If a bit less recreational catch is expected, a bit more is added to the commercial quota in equal amounts, and vice-versa if a bit more recreational catch is expected. For any given mackerel ABC, the recreational catch is a zero sum situation, and the possession limit shifts expected catch between the commercial and recreational sector. However,

because most recreational mackerel catch occurs in state waters, any deduction from a stricter possession limit is only anticipated to occur if the relevant states (ME, NH, MA) match the federal limit. The Council coordinated with the states and a 20-fish bag limit is anticipated. If another federal bag limit is imposed and the coordination breaks down, then a reasonable deduction for recreational catch would be 2,582 MT, the 2017-2021 average – this would apply to the no action, and Recreational Possession Limits Alternatives 2-3, i.e. all but Recreational Possession Limits Alternative 4 (20 fish). If 20 fish was chosen, a reasonable deduction for expected recreational catch in 2023 would be 2,143 MT, the 2017-2021 average minus 17%, which is the expected reduction from a 20-fish possession limit based on MRIP and VTR data. Therefore, the no action, and Recreational Possession Limits Alternatives 2-3 all lead to a maintenance of the status quo in practice. Recreational Possession Limits Alternative 4 (20 fish), by reducing anticipated recreational catch by 439 MT, could increase commercial revenues by about $0.25 million per year compared to all the other Recreational Possession Limits Alternatives. The Council decided that this reduction for recreational catch would meet the MSA requirement for each sector to share in the burden of rebuilding, considering the relative economic impacts.

Specification Set-Asides and Closure Approaches Alternatives Group

Specification Set-Asides and Closure Approaches No Action

The no action set-asides and closure approaches were tailored to the no action specifications, so would only be paired with no action. They have no direct impact on mackerel landings and revenues, they only serve to operationalize the relevant specifications, i.e. they reinforce the impacts from the no action specifications. See above for the no-action specifications for related socioeconomic impacts.

Specification Set-Asides and Closure Approaches – Modified based on new information (PREFERRED)

The preferred set-asides and closure approaches based on new information were tailored to the preferred rebuilding RPA4 option, though they could also be utilized for RPA5. They have no direct impact on mackerel landings and revenues, they only serve to operationalize the relevant specifications, i.e. they reinforce the impacts from the preferred rebuilding RPA4 option. See the preferred rebuilding RPA4 or RPA5 specifications for related socioeconomic impacts.

Specification Set-Asides and Closure Approaches – Low ABC Option 1

This alternative was tailored to RPA1 and RPA2. It has no direct impact on mackerel landings and revenues, it only serves to operationalize the relevant specifications, i.e. the measures reinforce the impacts from the RPA1 and RPA2 options. See the RPA1 and RPA2 specifications for related socioeconomic impacts.

Specification Set-Asides and Closure Approaches – Low ABC Option 2

This alternative was tailored to RPA3. It has no direct impact on mackerel landings and revenues, it only serves to operationalize the relevant specifications, i.e. the measures reinforce the impacts from RPA3. See the RPA3 specifications for related socioeconomic impacts.

River Herring and Shad (RH/S) Cap Alternatives Group

River Herring and Shad (RH/S) Cap: No Action 129 MT (PREFERRED)

Like the 89 MT alternative, this cap amount appears unlikely to cause closures of the mackerel fishery at recent RH/S encounter rates and the quotas under any of the rebuilding alternatives. As such it should not have an impact on the mackerel fishery, similarly to the 89 MT alternative. Since the scaling RH/S cap alternative (see below) is more likely to cause mackerel closures, the scaling alternative is likely to have more negative socioeconomic impacts than this alternative.

River Herring and Shad (RH/S) Cap: Scale with Quota

Depending on the RH/S encounter rates in a given year, the scaling approach has the potential to close the mackerel fishery early. Based on this, this alternative could have a moderately negative socioeconomic impact. The impact is moderate because this scaling approach may not cause early closures of the mackerel fishery. At the quota levels associated with the rebuilding alternatives, this alternative would be expected to have more negative socioeconomic impacts for mackerel than the other RH/S alternatives due to the higher probability of causing mackerel fishery closures and lowering mackerel catch. It is not possible to determine what portion of the fishery might be closed and what portion of revenues might be lost ahead of time, but it could be a minor or substantial portion of the annual quota depending on the RH/S encounter rate.

River Herring and Shad (RH/S) Cap: 89 MT

Like the 129 MT alternative, this cap amount appears unlikely to cause closures of the mackerel fishery at recent RH/S encounter rates and the quotas under any of the rebuilding alternatives. As such it should not have an impact on the mackerel stock, similarly to the 129 MT alternative.

Since the scaling RH/S cap alternative (see above) is more likely to cause mackerel closures, the scaling alternative is likely to have more negative socioeconomic impacts than this alternative.

Mackerel Recreational Fishery Current Condition:

Mackerel catch was relatively stable from 2019-2021, very close to the average of 10.7 million fish. The majority of fish are harvested, but are not made available to MRIP dockside interviewers – rather the majority of catch estimates result from "reported harvest" by interviewees. These fish may have been used for bait or the interviewee just doesn't want to show the fish to the MRIP interviewer. MRIP interviews are conducted with anglers by state staff, who also ask about fish that are discarded/released. These reported discards represented on average 14% of catch from 2019-2021. Almost all catch in recent years has been in Maine, New Hampshire, and Massachusetts. Private (and rental) boat catch is responsible for most catch, with about 20% from shore and a very small amount (5% or less) from the for-hire sector.

NMFS estimated the 2017 economic effects of recreational fishing in states including Maine, New Hampshire, and Massachusetts (Lovell et al 2020). The following describes their findings. Mackerel is not a frequent directed target, for example in 2021 only 5% of the 17.1 million marine fishing trips in New England targeted mackerel as a primary or secondary species, but mackerel has been reported as an important bait component for other fisheries, including striped bass and tuna.
Marine recreational fishing trips in Maine supported 714 full or part-time jobs, and contributed $75 million in sales, $27 million in income, and $45 million in gross domestic product (GDP) to the state's economy.

Table 23. Maine Marine Recreational Fishing Trips Economics

Fishing Mode	Expense ($1,000's)	# Jobs	Sales ($1,000's)	Income ($1,000's)	Value Added ($1,000's)
For-Hire	$2,863	52	$4,725	$1,644	$2,747
Private Boat	$15,322	138	$15,957	$5,353	$9,009
Shore	$40,223	524	$54,603	$20,012	$32,799
Total Trip	$58,408	714	$75,285	$27,009	$44,555

Marine recreational fishing trips in New Hampshire supported 378 full or part-time jobs, and contributed $37 million in sales, $15 million in income, and $25 million in gross domestic product (GDP) to the state's economy.

Table 24. New Hampshire Marine Recreational Fishing Trips Economics

Fishing Mode	Expense ($1,000's)	# Jobs	Sales ($1,000's)	Income ($1,000's)	Value Added ($1,000's)
For-Hire	$6,168	100	$9,393	$3,593	$5,680
Private Boat	$12,176	93	$9,555	$4,371	$6,376
Shore	$14,107	185	$18,166	$7,249	$12,569
Total Trip	$32,451	378	$37,114	$15,213	$24,625

Marine recreational fishing trips in Massachusetts supported 2,784 full or part-time jobs, and contributed $326 million in sales, $156 million in income, and $225 million in gross domestic product (GDP) to the state's economy.

Table 25. Massachusetts Marine Recreational Fishing Trips Economics

Fishing Mode	Expense ($1,000's)	# Jobs	Sales ($1,000's)	Income ($1,000's)	Value Added ($1,000's)
For-Hire	$30,563	463	$49,737	$19,342	$31,838
Private Boat	$181,933	1,118	$139,187	$68,344	$95,335
Shore	$100,756	1,203	$136,898	$68,646	$97,822
Total Trip	$313,252	2,784	$325,822	$156,332	$224,995

While there is some overlap with the above for-hire estimates, NMFS has also separately estimated the economic impacts of fishing for Highly Migratory Species (HMS) like tunas (Hutt and Silva 2019). These trips could be indirectly affected by limits on mackerel fishing due to use of mackerel as bait. Non-tournament HMS Angling Trips (Tournament trips were only estimated from Maine through Texas) in 2016 were estimated to have the following impacts:

Table 26. Total expenditures and economic contributions generated by New England non-tournament Atlantic HMS Angling trips, registered HMS tournament operations, and HMS tournament participating teams from Maine to Texas in 2016. Non-tournament trip expenditures are reported by region and nationally, while tournament-related expenditures are only reported nationally.

Type and Region	Total Expenditures	Employment (jobs)	Income	Value Added	Total Sales Output
Non-tournament Angling Trips					
New England	$5,172,293	37	$2,061,493	$3,056,170	$4,867,047
Tournament Angling[1]	$37,544,910	532	$26,153,290	$46,180,928	$84,671,666
Tournament Operation[2]	$20,170,466	295	$15,120,988	$26,099,884	$43,970,942

Socioeconomic Mackerel Recreational Fishery Impacts

Rebuilding Alternatives Group

No action (revert to initial 2021 Specifications)

No action would facilitate more catch than can be allowed to avoid overfishing or to help the stock rebuild. This could indirectly limit angler opportunities due to poor abundance, but the effect is not possible to quantify at this time, but would be likely to be a poor outcome, possible similar to RPA1 and worse than all other alternatives.

Rebuilding Plan Alternative 1 (RPA1) – 10-year Rebuilding with Persistent Low Recruitment.

RPA1 would require a closure of recreational mackerel in federal waters for the whole rebuilding period. While this would help rebuild mackerel, there could be substantial economic costs associated with the economic activity described in Section 6 and above in the baseline condition. Especially considering the use of mackerel as bait, and the unquantifiable secondary effects on other fisheries liked striped bass and tuna if mackerel cannot be caught and/or used as bait, it is not possible to estimate the negative socioeconomic effects. However, multiple public comments highlighted the substantial impact that such a mackerel closure would have on relevant fishing communities. This is likely the worst option for recreational socioeconomics, possibly similar to no action, and worse than all other alternatives.

Rebuilding Plan Alternative 2 (RPA2) – P* deduction applied to 50% Rebuilding Probability

RPA2 would require a closure of recreational mackerel in federal waters for at least 2023. While this would help rebuild mackerel, there could be substantial economic costs associated with the economic activity described in Section 6 and above in the baseline condition. Especially considering the use of mackerel as bait, and the unquantifiable secondary effects on other fisheries liked striped bass and tuna if mackerel cannot be caught and/or used as bait, it is not possible to estimate the negative socioeconomic effects. However, multiple public comments highlighted the substantial impact that such a closure would have on relevant fishing communities. Compared to other alternatives, RPA2 is likely better than No Action or RPA1 and worse than RPAs3-5 for recreational anglers.

Rebuilding Plan Alternatives 3-5 (RPAs3-5) – P* approach with return to normal recruitment.

These alternatives should rebuild mackerel without federal waters closures such as with RPA1 and RPA2. This could indirectly improve angler opportunities due to better abundance, but the effect is not possible to quantify at this time. Given the uncertainty in stock projections, the impacts for recreational fishing in terms of improving angler opportunities are likely similar among RPAs3-5. However, RPAs3-5 achieve the rebuilding without the negative impacts described above for RPAs 1-2, and thus are similarly expected to have better socioeconomic outcomes for recreational fishing versus RPAs 1-2.

Recreational Possession Limits Alternatives Group

The recreational possession limits alternatives directly affect the quality of the recreational experience for those anglers who retain mackerel, either for consumption or bait. Quantitative information is not available on the socioeconomic effects of the various alternatives under consideration, but we do have information on the likely catch reductions that could occur under various possession if states matched a federal limit. MRIP and VTR data were used to estimate the reductions in catches under each alternative.

Recreational Possession Limits Alternative 1 (Poss1) – No Action, No limits

With no action, there would be no recreational possession limits, which is the current situation. The overall rebuilding requirements of the MSA will dictate that the stock is rebuilt, so anglers will benefit under any possession limit related to improved abundance, even under no action. The Council does not have quantitative information about socioeconomic changes due to various possession limits. However, the Council received substantial input that recreational catch of mackerel provides substantial recreational utility, either for consumption or bait. Since recreational catch would not be affected by no action, this would be the most positive

Recreational Possession Limits Alternative for recreational anglers compared to other alternatives.

Recreational Possession Limits Alternative 2 (Poss2) – 10 fish

2018-2021 Marine Recreational Information Program (MRIP) and Vessel Trip Report (VTR) data were analyzed to predict effects on catches from this alternative. A 10-fish limit appears likely to approximately reduce private boat catch by 39%, shore catch by 27%, and for-hire catch by 35%. Accounting for the proportion of each mode's harvest (77% private, 20% shore, 3% for hire), and that harvest is 83% of catch, then if discards remain the same proportion of catch, the overall calculated reduction in recreational catch would be about 31%. This reduction assumes that Maine, New Hampshire, and Massachusetts mirrored the Federal regulations (there has been minimal mackerel catch south of Massachusetts in recent years). If Maine, New Hampshire, and Massachusetts did not mirror the federal regulations, there may be minimal catch reduction given most catch occurs in state waters.

The overall rebuilding requirements of the MSA will dictate that the stock is rebuilt, so anglers will benefit under any possession limit related to improved abundance. The Council does not have quantitative information about socioeconomic changes due to various possession limits. However, the Council received substantial input that recreational catch of mackerel provides substantial recreational utility, either for consumption or bait. Since recreational catch would be most affected/reduced by this alternative, it would have the most negative effects on recreational anglers among the possession limit alternatives.

Recreational Possession Limits Alternative 3 (Poss3) – 15 fish

2018-2021 Marine Recreational Information Program (MRIP) and Vessel Trip Report (VTR) data were analyzed to predict effects on catches from this alternative. A 10-fish limit appears likely to approximately reduce private boat catch by 28%, shore catch by 19%, and for-hire catch by 22%. Accounting for the proportion of each mode's harvest (77% private, 20% shore, 3% for hire), and that harvest is 83% of catch, then if discards remain the same proportion of catch, the overall calculated reduction in recreational catch would be about 22%. This reduction assumes that Maine, New Hampshire, and Massachusetts mirrored the Federal regulations (there has been minimal mackerel catch south of Massachusetts in recent years). If Maine, New Hampshire, and Massachusetts did not mirror the federal regulations, there may be minimal catch reduction given most catch occurs in state waters.

The overall rebuilding requirements of the MSA will dictate that the stock is rebuilt, so anglers will benefit under any possession limit related to improved abundance. The Council does not

have quantitative information about socioeconomic changes due to various possession limits. However, the Council received substantial input that recreational catch of mackerel provides substantial recreational utility, either for consumption or bait. Since recreational catch would be affected/reduced in an intermediate fashion by this alternative, it would have intermediate negative effects on recreational anglers (more negative than no action or Recreational Possession Limits Alternative 4, but less negative than Recreational Possession Limits Alternative 2.

Recreational Possession Limits Alternative 4 (Poss4) – 20 fish (PREFERRED)

2018-2021 Marine Recreational Information Program (MRIP) and Vessel Trip Report (VTR) data were analyzed to predict effects on catches from this alternative. A 10-fish limit appears likely to approximately reduce private boat catch by 22%, shore catch by 14%, and for-hire catch by 13%. Accounting for the proportion of each mode's harvest (77% private, 20% shore, 3% for hire), and that harvest is 83% of catch, then if discards remain the same proportion of catch, the overall calculated reduction in recreational catch would be about 17%. This reduction assumes that Maine, New Hampshire, and Massachusetts mirrored the Federal regulations (there has been minimal mackerel catch south of Massachusetts in recent years). If Maine, New Hampshire, and Massachusetts did not mirror the federal regulations, there may be minimal catch reduction given most catch occurs in state waters.

The overall rebuilding requirements of the MSA will dictate that the stock is rebuilt, so anglers will benefit under any possession limit related to improved abundance. The Council does not have quantitative information about socioeconomic changes due to various possession limits. However, the Council received substantial input that recreational catch of mackerel provides substantial recreational utility, either for consumption or bait. Since recreational catch would be least affected/reduced by this alternative other than no action, it would have the least negative effects on recreational anglers compared to other alternatives, except for no action.

Specification Set-Asides and Closure Approaches Alternatives Group

Specification Set-Asides and Closure Approaches No Action

The no action set-asides and closure approaches were tailored to the no action specifications, so would only be paired with no action. They have no direct impact on mackerel landings and revenues, they only serve to operationalize the relevant specifications, i.e. they reinforce the impacts from the no action specifications. See above for the no-action specifications for related socioeconomic impacts.

Specification Set-Asides and Closure Approaches – Modified based on new information (PREFERRED)

The preferred set-asides and closure approaches based on new information were tailored to the preferred rebuilding RPA4 option, though they could also be utilized for RPA5. They have no direct impact on mackerel landings and revenues, they only serve to operationalize the relevant specifications, i.e. they reinforce the impacts from the preferred rebuilding RPA4 option. See the preferred rebuilding RPA4 or RPA5 specifications for related socioeconomic impacts.

Specification Set-Asides and Closure Approaches – Low ABC Option 1

This alternative was tailored to RPA1 and RPA2. It has no direct impact on mackerel landings and revenues, it only serves to operationalize the relevant specifications, i.e. the measures reinforce the impacts from the RPA1 and RPA2 options. See the RPA1 and RPA2 specifications for related socioeconomic impacts.

Specification Set-Asides and Closure Approaches – Low ABC Option 2

This alternative was tailored to RPA3. It has no direct impact on mackerel landings and revenues, it only serves to operationalize the relevant specifications, i.e. the measures reinforce the impacts from RPA3. See the RPA3 specifications for related socioeconomic impacts.

River Herring and Shad (RH/S) Cap Alternatives Group

The RH/S cap alternatives should not impact the socioeconomics of recreational fishing.

7.5 Non-Target Fish Species Impacts

Baseline: As described in Section 6.5, the Atlantic mackerel fishery has relatively low discarding. RH/S species are caught in the Mackerel fishery, and while the impacts of incidental RH/S catch in the mackerel fishery is unknown due to complex RH/S stock dynamics, RH/S species are generally depleted throughout their ranges and they also have a negative baseline condition potentially partially associated with impacts from the Mackerel fishery. Previous actions (e.g. Amendments 10 and 14 to the MSB FMP) have reduced discards and non-target catch to the extent practicable, but changes to quotas/effort may have non-target impacts and are described below. For non-target species that are managed under their own FMP, incidental catch/discards are also considered as part of the management of that fishery. While Atlantic herring (overfished) and mackerel are often caught together, separate management measures in the Atlantic herring fishery should ensure that ongoing overfishing does not occur on the Atlantic herring stock and rebuilding occurs. Negative stock effects are also mitigated by consideration of and accounting for discards when quotas for those other species are being developed. For the many non-target species that are not in some depleted condition (see tables in Section 6.5), it is unlikely that the mackerel fishery is a substantial contributor to their positive stock status (since some incidental catch and mortality is occurring), rather it is more likely that direct management of those stocks by whatever entity manages them has the predominant impact on those stocks. Therefore, these species would be expected maintain their current (positive) stock status under any of the following alternatives, and thus continue to experience similar negligible to slight positive impacts under any of these measures. The impacts analysis below focuses on those species currently in a negative condition.

Rebuilding Alternatives Group Non-target species Impacts

No action (revert to initial 2021 Specifications)

No action would facilitate the most catch and potential effort of any alternative. As described in section 6.1 above, this fishery can impact some Non-Target Species, especially those in an overfished or depleted condition. However, since the Council has considered Non-Target Species impacts in the past and has already restricted mackerel fishing to minimize Non-Target Species impacts to the extent practicable (e.g. RH/S caps), the impact of no action specifications is best characterized as overall slight negative, similar to past years, because reverting to recent measures would generally be expected to maintain the current stock status of the relevant non-target species. Also, incidental catch is relatively low in the mackerel fishery. Given the relative catch constraints (and therefore effort constraints), impacts would be most negative with no action compared to any of the rebuilding alternatives.

Rebuilding Plan Alternative 1 (RPA1) – 10-year Rebuilding with Persistent Low Recruitment.

As long as some effort persists, some negative impacts on non-target species could persist, but with lower quotas and more restraint on effort, negative impacts should continue to be slight. This alternative would lead to the lowest possible catch in 2023, so compared to no action or all the other rebuilding plan alternatives (RPAs 2-5), this alternative would have the most positive, if slight, impact on non-target species because effort would be most constrained.

Rebuilding Plan Alternative 2 (RPA2) – P* deduction applied to 50% Rebuilding Probability

As long as some effort persists, some negative impacts on non-target species could persist, but with lower quotas and more restraint on effort, negative impacts should continue to be slight. Compared to other alternatives, this alternative would lead to an intermediate level of possible catch and effort in 2023 (more catch/effort than RPA1, less catch/effort than no action or RPAs 3-5). Accordingly, this alternative would lead to an intermediate level of relative impacts on non-target species in 2023 (slightly, but less positive than RPA1 and more positive than no action or RPAs 3-5).

Rebuilding Plan Alternative 3 (RPA3) – P* approach with return to normal recruitment.

As long as some effort persists, some negative impacts on non-target species could persist, but with lower quotas and more restraint on effort, negative impacts should continue to be slight. Compared to other alternatives, this alternative would lead to an intermediate level of possible catch and effort in 2023 (more catch/effort than RPA1 or RPA2, less catch/effort than no action or RPAs 4-5). Accordingly, this alternative would lead to an intermediate level of relative impacts on non-target species in 2023 (slightly, but less positive than RPA1 or RPA2 and more positive than no action or RPAs 4-5).

Rebuilding Plan Alternative 4 (RPA4) – 61% Rebuilding Probability in 10 Years (PREFERRED)

As long as some effort persists, some negative impacts on non-target species could persist, but with lower quotas and more restraint on effort, negative impacts should continue to be slight. Compared to other alternatives, this alternative would lead to an intermediate level of possible catch and effort in 2023 (more catch/effort than RPAs 1-3, less catch/effort than no action or RPA 5). Accordingly, this alternative would lead to an intermediate level of relative impacts on

non-target species in 2023 (slightly, but less positive than RPAs 1-3 and more positive than no action or RPA 5).

Rebuilding Plan Alternative 5 (RPA5) – 53% Rebuilding Probability in 10 Years

As long as some effort persists, some negative impacts on non-target species could persist, but with lower quotas and more restraint on effort, negative impacts should continue to be slight. Compared to other alternatives, this alternative would lead to an intermediate level of possible catch and effort in 2023 (more catch/effort than RPAs 1-4, less catch/effort than no action). Accordingly, this alternative would lead to an intermediate level of relative impacts on non-target species in 2023 (slightly, but less positive than RPAs 1-4 and more positive than no action).

Recreational Possession Limits Alternatives Group Non-target species Impacts

The recreational possession limits are not expected to substantially affect non-target species.

Specification Set-Asides and Closure Approaches Alternatives Group Non-target species Impacts

Specification Set-Asides and Closure Approaches No Action

The no action set-asides and closure approaches were tailored to the no action specifications, so would only be paired with no action. They have no direct impact on effort, they only serve to operationalize the relevant specifications, i.e. they reinforce the impacts from the no action specifications. See above for the no-action specifications for related non-target species impacts.

Specification Set-Asides and Closure Approaches – Modified based on new information (PREFERRED)

The preferred set-asides and closure approaches based on new information were tailored to the preferred rebuilding RPA4 option, though they could also be utilized for RPA5. They have no direct impact on effort, they only serve to operationalize the relevant specifications, i.e. they reinforce the impacts from the preferred rebuilding RPA4 option. See the preferred rebuilding RPA4 or RPA5 specifications for related non-target species impacts.

Specification Set-Asides and Closure Approaches – Low ABC Option 1

This alternative was tailored to RPA1 and RPA2. It has no direct impact on effort, it only serves to operationalize the relevant specifications, i.e. the measures reinforce the impacts from the RPA1 and RPA2 options. See the RPA1 and RPA2 specifications for related non-target species impacts.

Specification Set-Asides and Closure Approaches – Low ABC Option 2

This alternative was tailored to RPA3. It has no direct impact on effort, it only serves to operationalize the relevant specifications, i.e. the measures reinforce the impacts from RPA3. See the RPA3 specifications for related non-target species impacts.

River Herring and Shad (RH/S) Cap Alternatives Group Non-target species Impacts

River Herring and Shad (RH/S) Cap: No Action 129 MT (PREFERRED)

Like the 89 MT alternative, this cap amount appears unlikely to cause closures of the mackerel fishery at recent RH/S encounter rates and the quotas under any of the rebuilding alternatives. As such it should not have an impact on effort or non-target species, similarly to the 89 MT alternative. Since the scaling RH/S cap alternative (see below) is more likely to cause mackerel closures, the scaling alternative is likely to have more positive impacts for non-target species than this alternative.

River Herring and Shad (RH/S) Cap: Scale with Quota

Depending on the RH/S encounter rates in a given year, the scaling approach has the potential to close the mackerel fishery early. Based on this, this alternative could have a slight positive impact on non-target species, especially RH/S. The impact is slight because non-target species impacts are slight overall and because this scaling approach may not cause early closures of the mackerel fishery. At the quota levels associated with the rebuilding alternatives, this alternative would be expected to have more positive impacts for non-target species than the other RH/S alternatives due to the higher probability of causing mackerel fishery closures and lowering fishing effort.

River Herring and Shad (RH/S) Cap: 89 MT

Like the 129 MT alternative, this cap amount appears unlikely to cause closures of the mackerel fishery at recent RH/S encounter rates and the quotas under any of the rebuilding alternatives. As

such it should not have an impact on effort or non-target species, similarly to the 129 MT alternative. Since the scaling RH/S cap alternative (see above) is more likely to cause mackerel closures, the scaling alternative is likely to have more positive impacts for non-target species than this alternative.

7.6 Cumulative Effects

7.6.1 Introduction

A cumulative effects analysis (CEA) is required by the Council on Environmental Quality (CEQ; 40 CFR part 1508.7) and NOAA policy and procedures for NEPA, found in NOAA Administrative Order 216-6A (Companion Manual, January 13, 2017). The purpose of the CEA is to consider the combined effects of many actions on the human environment over time that would be missed if each action were evaluated separately. CEQ guidelines recognize that it is not practical to analyze the cumulative effects of an action from every conceivable perspective. Rather, the focus on those effects that are truly meaningful.

A cumulative effects assessment ideally makes effect determinations based on a combination of: 1) impacts from past, present, and reasonably foreseeable future actions; 2) the baseline conditions of the VECs (the combined effects from past, present, and reasonably foreseeable future actions plus the present condition of the VEC); and 3) impacts of the alternatives under consideration for this action.

7.6.1.1 Consideration of Valued Ecosystem Components (VECs)

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

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

The CEA identifies and characterizes the impacts on the VECs by the alternatives under consideration when analyzed in the context of other past, present, and reasonably foreseeable future actions.

7.6.1.2 Geographic Boundaries

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

7.6.1.3 Temporal Boundaries

The temporal scope of this analysis is focused on actions that have taken place since 1976, when these fisheries began to be managed under the MSA. For endangered and other protected species, the context is largely focused since the 1980s and 1990s, when NMFS began generating stock assessments for marine mammals and turtles that inhabit waters of the U.S. EEZ. The temporal scope of this analysis does not extend beyond 2023 because another assessment will be produced in 2023 to set specifications for 2024 and beyond, which can evaluate actions further into the future. Also, the quotas and effort in the mackerel fishery could change substantially based on the new assessment. As such, the FMP and the issues facing these fisheries may change in ways that can't be effectively predicted beyond 2023. An assessment using this timeframe demonstrates the changes to resources and the human environment that have resulted through management under the Council process and through U.S. prosecution of the fishery. The impacts discussed herein are focused on the cumulative effects of the proposed action (i.e., the suite of preferred alternatives) in combination with the relevant other past, present, and reasonably foreseeable future actions over these time scales.

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7.6.2 Relevant Actions Other Than Those Proposed in this Document

This section summarizes the past, present, and reasonably foreseeable future actions and effects that are relevant for this cumulative effects assessment.

7.6.2.1 Fishery Management Actions

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

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

Specific actions from this FMP (http://www.mafmc.org/msb/) which had substantial impacts on the fishery included: the implementation of a limited access program in Amendment 5 to control capacity in the squid and butterfish fisheries; revision of overfishing definitions in Amendment 6; modification of vessel upgrade rules in Amendment 7; and implementation of overfishing and rebuilding control rules and other measures in Amendment 8. Amendment 9 allowed multi-year

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

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

In addition to the managed resource FMPs, there are many other FMPs and associated fishery management actions for other species that impacted these VECs over the temporal scale described in Section 7.6.1.3. These include FMPs managed by the Mid-Atlantic Fishery Management Council, New England Fishery Management Council, Atlantic States Marine Fisheries Commission, and to a lesser extent the South Atlantic Fishery Management Council. Omnibus amendments are also frequently developed to amend multiple FMPs at once. Actions associated with other FMPs and omnibus amendments have generally included (but are not limited to) measures to regulate fishing effort for other species, measures to protect habitat and forage species, and fishery monitoring and reporting requirements.

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

As with all the managed resource FMP actions described above, other FMP actions have had positive long-term cumulative impacts on managed and non-target species because they constrain fishing effort and manage stocks at sustainable levels (or rebuild when necessary). As previously stated, constraining fishing effort can have negative short-term socioeconomic impacts and long-term positive impacts. These actions have typically had slight negative impacts

on habitat, due to continued fishing operations preventing impacted habitats from recovering; however, some actions had long-term positive impacts through designating or protecting important habitats. FMP actions have also had a range of impacts on protected species, including generally slight negative impacts on ESA-listed species, and slight negative to slight positive impacts on non ESA-listed marine mammals, depending on the species and interaction levels as detailed elsewhere in this document.

7.6.2.2 Non-Fishing Impacts

7.6.2.2.1 Other Human Activities

Non-fishing activities that occur in the marine nearshore and offshore environments and connected watersheds can cause the loss or degradation of habitat and/or affect the fish and protected species that utilize those areas. The impacts of most nearshore, human-induced, non-fishing activities tend to be localized in the areas where they occur, although effects on species could be felt throughout their populations since many marine organisms are highly mobile. For offshore projects, some impacts may be localized while others may have regional influence, especially for larger projects. The following discussion of impacts is based on past assessments of activities and assumes these activities will continue as projects are proposed. Examples of non-fishing activities include point source and non-point source pollution, shipping, dredging/deepening, wind energy development, oil and gas development, construction, and other activities. Specific examples include at-sea disposal areas, oil and mineral resource exploration, aquaculture, construction of offshore wind farms, and bulk transportation of petrochemicals. Episodic storm events and the restoration activities that follow can also cause impacts. The impacts from these activities primarily stem from habitat loss due to human interaction and alteration or natural disturbances. These activities are widespread and can have localized impacts on habitat related to accretion of sediments, pollutants, habitat conversion, and shifting currents and thermoclines. For protected species, primary concerns associated with non-fishing activities include vessel strikes, dredge interactions (especially for sea turtles and sturgeon), and underwater noise. These activities have both direct and indirect impacts on protected species. Wherever these activities co-occur, they are likely to work additively or synergistically to decrease habitat quality and as such may indirectly constrain the productivity of managed species, non-target species, and protected species. Decreased habitat suitability tends to reduce the tolerance of these VECs to the impacts of fishing effort. Non-fishing activities can cause target, non-target, and protected species to shift their distributions away from preferred areas,

and may also lead to decreased reproductive ability and success (from current changes, spawning disruptions, and behavior changes), disrupted or modified food web interactions, and increased disease. While localized impacts may be more severe, the overall impact on the affected species and their habitats on a population level is unknown, but likely to have impacts that mostly range from no impact to slight negative, depending on the species and activity.

Non-fishing activities permitted by other Federal agencies (e.g. beach nourishment, offshore wind facilities) require examinations of potential impacts on the VECs. The MSA imposes an obligation on other Federal agencies to consult with the Secretary of Commerce on actions that may adversely affect EFH (50 CFR 600.930). NMFS and the eight regional fishery management councils engage in this review process by making comments and recommendations on federal or state actions that may affect habitat for their managed species. Agencies need to respond to, but do not necessarily need to adopt these recommendations. Habitat conservation measures serve to potentially minimize the extent and magnitude of indirect negative impacts federally-permitted activities could have on resources under NMFS' jurisdiction. In addition to guidelines mandated by the MSA, NMFS evaluates non-fishing effects during the review processes required by Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act for certain activities that are regulated by Federal, state, and local authorities. Non-fishing activities must also meet the mandates under the ESA, specifically Section 7(a)(2)[19], which ensures that agency actions do not jeopardize the continued existence of endangered species and their critical habitat.

In recent years, offshore wind energy and oil and gas exploration have become more relevant activities in the Greater Atlantic region. They are expected to impact all VECs, as described below.

Impacts of offshore wind energy development on Biological Resources (Target species, Non-target species, Protected Species) and the Physical Environment

[19] "Each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency (hereinafter in this section referred to as an "agency action") is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of critical habitat."

Construction activities may have both direct and indirect impacts on marine resources, ranging from temporary changes in distribution to injury and mortality. Impacts could occur from changes to habitat in the areas of wind turbines and cable corridors and increased vessel traffic to and from these areas. Species that reside in affected wind farms year round may experience different impacts than species that seasonally reside in or migrate through these areas. Species that typically reside in areas where wind turbines are installed may return to the area and adapt to habitat changes after construction is complete. Inter-array and electricity export cables will generate electromagnetic fields, which can affect patterns of movement, spawning, and recruitment success for various species. Effects will depend on cable type, transmission capacity, burial depth, and proximity to other cables. Substantial structural changes in habitats associated with cables are not expected unless cables are left unburied (see below). However, the cable burial process may alter sediment composition along the corridor, thereby affecting infauna and emergent biota. Taormina et al. (2018) provide a recent review of various cable impacts, and Hutchinson et al. (2020) and Taormina et al. (2020) examine the effects of electromagnetic fields in particular.

The full build out of offshore wind farms will result in broad habitat alteration. The wind turbines will alter hydrodynamics of the area, which may affect primary productivity and physically change the distribution of prey and larvae. It is not clear how these changes will affect the reproductive success of marine resources. Scour and sedimentation could have negative effects on egg masses that attach to the bottom. Benthic habitat will be altered due to the placement of scour protection at wind turbine foundations, and over cables that are not buried to target depth in the sediment, converting soft substrates into hard substrates. This could alter species composition and predator/prey relationships by increasing favorable habitat for some species and decreasing habitat for others. The placement of wind turbines will also establish new vertical structure in the water column, which could serve as reefs for bottom species, fish aggregating devices for pelagic species, and substrate for the colonization of other species, e.g. mussels. Various authors have studied these types of effects (e.g. Bergström et al. 2013, Dannheim et al. 2019, Degraer et al. 2019, Langhamer 2012, Methratta and Dardick 2019, Stenberg et al. 2015).

Elevated levels of sound produced during site assessment activities, construction, and operation of offshore wind facilities will impact the soundscape[20]. Temporary, acute, noise impacts from construction activity could impact reproductive behavior and migration patterns; the long-term impact of operational noise from turbines may also affect behavior of fish and prey species, through both vibrations in the immediate area surrounding them in the water column, and through the foundation into the substrate. Depending on the sound frequency and source level,

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

noise impacts to species may be direct or indirect (Finneran 2015; Finneran 2016; Nowacek et al. 2007; NRC 2000; NRC 2003; NRC 2005; Madsen et al. 2006; Piniak 2012; Popper et al. 2014; Richardson et al. 1995; Thomsen et al. 2006). Exposure to underwater noise can directly affect species via behavioral modification (avoidance, startle, spawning) or injury (sound exposure resulting in internal damage to hearing structures or internal organs) (Bailey et al. 2010; Bailey et al. 2014; Bergström et al. 2014; Ellison et al. 2011; Ellison et al. 2018; Forney et al. 2017; Madsen et al. 2006; Nowacek et al. 2007; NRC 2003; NRC 2005; Richardson et al. 1995; Romano et al. 2004; Slabbekoorn et al. 2010; Thomsen et al. 2006; Wright et al. 2007). Indirect effects are likely to result from changes to the acoustic environment of the species, which may affect the completion of essential life functions (e.g., migrating, breeding, communicating, resting, foraging)[21] (Forney et al. 2017; Richardson et al. 1995; Slabbekoorn et al. 2010;Thomsen et al. 2006).

Wind farm survey and construction activities and turbine/cable placement will substantially affect NMFS scientific research surveys, including stock assessment surveys for fisheries and protected species[22] and ecological monitoring surveys. Disruption of such scientific surveys could increase scientific uncertainty in survey results and may affect NMFS' ability to monitor the health, status, and behavior of marine resources and protected species and their habitat use within this region. Based on existing regional Fishery Management Councils' acceptable biological catch control rule processes and risk policies (e.g., 50 CFR §§ 648.20 and 21), increased assessment uncertainty could result in lower commercial quotas and recreational harvest limits that may reduce the likelihood of overharvesting and mitigate associated biological impacts on fish stocks. However, this would also result in lower associated fishing revenue and reduced recreational fishing opportunities, which could result in indirect negative impacts on fishing communities.

Impacts of Offshore Wind Energy Development on Socioeconomic Resources

As the number of wind farms increases, so too would the level and scope of impacts to affected habitats, marine resources, and human communities. Offshore wind energy development is being considered in parts of the outer continental shelf that overlap with nearly all Council-managed

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

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

resources. Recent habitat modeling work by the NEFSC and presented as part of the 2020 Mid-Atlantic State of the Ecosystem Report found that summer flounder, butterfish, longfin squid, and spiny dogfish are highly likely to occupy wind lease areas throughout the region (NEFSC 2020). Habitat conditions for those species are projected to become more favorable over time within the lease areas, potentially leading to increased interactions and impacts over time. Fisheries for the managed resources have been active in many of the lease areas at present and are expected to be for the near future (section 6.0). The social and economic impacts of offshore wind energy on fisheries could be generally negative due to the substantial overlap of wind energy areas with productive fishing grounds for many Council-managed fisheries. Impacts may vary by species and by year depending upon habitat overlap, species availability, and any area-based regulations that define the amount and type of fishing access with the lease area. In some cases, effort could be displaced to another area, which could compensate for potential economic losses if vessel operators choose not to operate in the wind energy areas.

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

It's also worth noting, that turbine structures could increase the presence of and fishing for structure affiliated Council-managed species, such as black sea bass. Many recreational fishing trips in this region target a combination of species. For example, recreational trips which catch black sea bass often also catch tautog, scup, summer flounder, and Atlantic croaker (NEFSC 2017). For this reason, increased recreational fishing effort focusing on species such as black sea bass in wind farms could also lead to increased recreational catches of other species. This could lead to socioeconomic benefits in terms of increased for-hire fishing revenues and angler satisfaction in certain wind development areas.

There could also be social and economic benefits in the form of jobs associated with construction and maintenance, and replacement of some electricity generated using fossil fuels with renewable sources (AWEA 2020).

It remains unclear how fishing or transiting to and from fishing grounds (whether or not those grounds are within a wind farm) might be affected by the presence of a wind farm. While no offshore wind developers have expressed an intent to exclude fishing vessels from wind turbine arrays once construction is complete, it could be difficult for operators to tow bottom-tending mobile gear or transit amongst the wind turbines, depending on the spacing and orientation of the array and weather conditions.[23] If vessel operators choose to avoid fishing or transiting within wind farms, effort displacement and additional steaming time could result in negative socioeconomic impacts to affected communities, including increased user conflicts, decreased catch and associated revenue, safety concerns, and increased fuel costs. If vessels elect to fish within wind farms, effects could be both positive and negative for various managed resources. Fishing within wind farms could lead to increased catch rates, decreased steaming searching for concentrations of fish and different size availability (e.g., larger fish found within a wind farm) which would result in positive effects. However negative effects could occur due to the potential for reduced catch and associated revenue, user conflicts, gear damage/loss, and increased risk of allision or collision.

Impacts of Oil and Gas Development on Biological and Socioeconomic Resources

For oil and gas, this timeframe could include leasing and possible surveys, depending on the direction of BOEM's 5-year planning process in the North and Mid-Atlantic regions. (Note that there are fewer oil and gas development activities in the region than offshore wind; therefore, the non-fishing impacts focus more heavily on offshore wind.) Seismic surveys to detect and quantify mineral resources in the seabed impact marine species and the acoustic environment within which marine species live. These surveys have uncertain impacts on fish behaviors that could cumulatively lead to negative population level impacts. For protected species (sea turtle,

[23] The United States Coast Guard has considered transit and safety issues related to the Massachusetts and Rhode Island lease areas in a recent port access route study, and has recommended uniform 1 mile spacing in east-west and north-south directions between turbines to facilitate access for fishing, transit, and search and rescue operations. Future studies in other regions could result in different spacing recommendations (UCSG 2020).

fish, small cetacean, pinniped, large whale), the severity of these behavioral or physiological impacts is based on the species' hearing threshold , the overlap of this threshold with the frequencies emitted by the survey, as well as the duration of time the surveys would operate, as these factors influence exposure rate (Ellison et al. 2011; Ellison et al. 2018; Finneran 2015; Finneran 2016; Madsen et al. 2006; Nelms et al. 2016; Nowacek et al. 2007; Nowacek et al. 2015; NRC 2000; NRC 2003; NRC 2005; Piniak 2012; Popper et al. 2014; Richardson et al. 1995; Thomsen et al. 2006; Weilgart 2013). If fishery resources are affected by seismic surveys, then so in turn the fishermen targeting these resources would be affected. However, such surveys could increase jobs, which may provide some positive effects on human communities (BOEM 2020b). It is important to understand that seismic surveys for mineral resources are different from surveys used to characterize submarine geology for offshore wind installations, and thus these two types of activities are expected to have different impacts on marine species.

Offshore Energy Summary

The overall impact of offshore wind energy and oil and gas exploration on the affected species and their habitats at a population level is unknown, but likely to range from no impact to moderate negative, depending on the number and locations of projects that occur. The individual project phases (site assessment, construction, operation, and decommissioning) as well as different aspects of the technology (foundations, cables/pipelines, turbines) will have varying impacts on resources. Mitigation efforts, such as habitat conservation measures, time of year construction restrictions, layout modifications, and fishery compensation funds could lessen the magnitude of negative impacts as well. The overall impact on socioeconomic resources is likely slight positive to moderate negative; potentially positive due to a potential increase in jobs and recreational fishing opportunities, but negative due to displacement and disruption of commercial fishing effort.

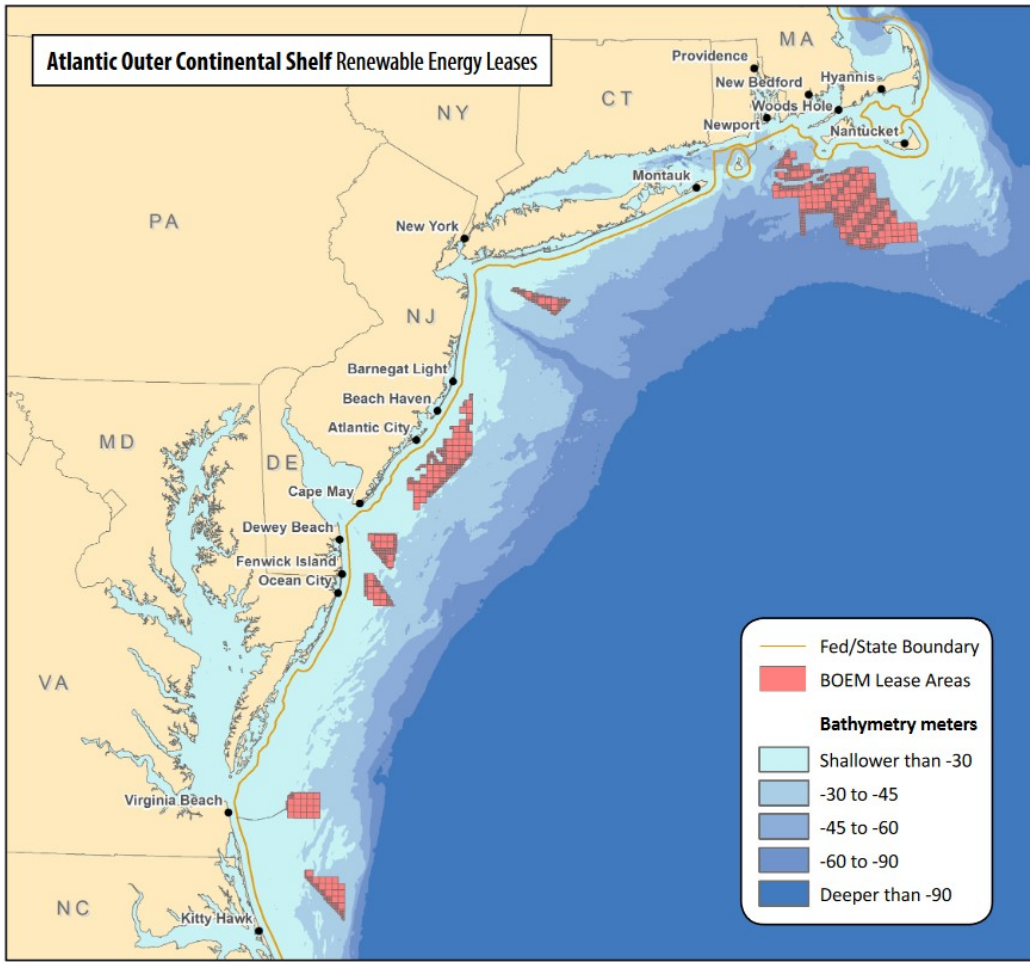

Figure 12: BOEM approved renewable energy lease areas in federal waters in the Atlantic Ocean off the Mid-Atlantic and New England

(source: BOEM Map Book of Outer Continental Shelf Renewable Energy Lease Areas, https://www.boem.gov/sites/default/files/renewable-energy-program/Mapping-and-Data/Renewable_Energy_Leases_Map_Book_March_2019.pdf)

7.6.2.2.2 Global Climate Change

Global climate change affects all components of marine ecosystems, including human communities. Physical changes that are occurring and will continue to occur to these systems include sea-level rise, changes in sediment deposition; changes in ocean circulation; increased frequency, intensity and duration of extreme climate events; changing ocean chemistry; and warming ocean temperatures. The rates of physical and chemical changes in marine ecosystems have been most rapid in recent decades (Johnson et al. 2019). Emerging evidence demonstrates that these physical changes are resulting in direct and indirect ecological responses within marine ecosystems, which may alter the fundamental production characteristics of marine systems (Stenseth et al. 2002). The general trend of changes can be explained by warming causing increased ocean stratification, which reduces primary production, lowering energy supply for higher trophic levels and changing metabolic rates. Different responses to warming can lead to altered food-web structures and ecosystem-level changes. Shifts in spatial distribution are generally to higher latitudes (i.e., poleward) and to deeper waters as species seek cooler waters within their normal temperature preferences. Climate change will also potentially exacerbate the stresses imposed by fishing and other non-fishing human activities and stressors. Survival of marine resources under a changing climate depends on their ability to adapt to change, but also how and to what degree those other human activities influence their natural adaptive capacity.

Results from the Northeast Fisheries Climate Vulnerability Assessment indicate that climate change could have impacts on Council-managed species that range from negative to positive, depending on the adaptability of each Council-managed species to the changing environment (Hare et al. 2016).

Based on this assessment, all Council-managed species have a high or very high exposure to climate change (Figure 29). For Council-managed species, ocean quahog was identified as being very highly sensitive to climate change, and three species (tilefish, Atlantic surfclam, and black sea bass) were highly sensitive to climate change. The remaining species had moderate or low sensitivity to a change in abundance and productivity due to climate change. A vast majority of Council-managed species had a high or very high potential for changes in distribution (12 of 13 species managed at time of analysis); only golden tilefish had a low potential for a change in distribution. Overall, the impacts of climate change are expected to be negative for three Council-managed species (Atlantic mackerel, Atlantic surfclam, and ocean quahog), whereas the impacts are expected to be positive for six species (black sea bass, scup, butterfish, longfin

inshore squid, Northern shortfin squid (*Illex*), and bluefish; Figure 30). The effects of climate change are expected to be neutral for the remainder of Council-managed species

Overall vulnerability results for additional Greater Atlantic species, including many non-target species identified in this action, are shown in Figure 29 (Hare et al. 2016). While the effects of climate change may benefit some habitats and the populations of species through increased availability of food and nutrients, reduced energetic costs, or decreased competition and predation, a shift in environmental conditions outside the normal range can result in negative impacts for those habitats and species unable to adapt. This, in turn, may lead to higher mortality, reduced growth, smaller size, and reduced reproduction or populations. Thus, already stressed populations are expected to be less resilient and more vulnerable to climate impacts. Climate change is expected to have impacts that range from positive to negative depending on the species. However, future mitigation and adaptation strategies to climate change may mitigate some of these impacts. The science of predicting, evaluating, monitoring and categorizing these changes continues to evolve. The social and economic impacts of climate change will depend on stakeholder and community dependence on fisheries, and their capacity to adapt to change. Commercial and recreational fisheries may adapt in different ways, and methods of adaptation will differ among regions. In addition to added scientific uncertainty, climate change will introduce implementation uncertainty and other challenges to effective conservation and management.

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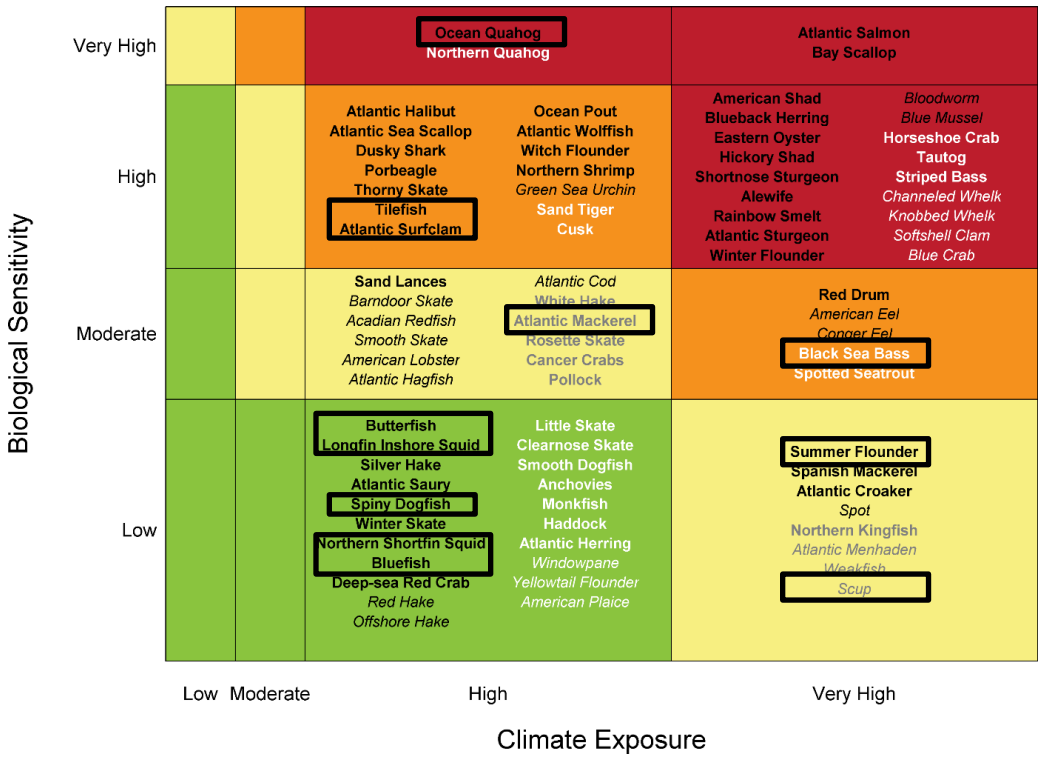

Figure 13: Overall climate vulnerability score for Greater Atlantic species, with Mid-Atlantic Council managed species highlighted with black boxes.

Overall climate vulnerability is denoted by color: low (green), moderate (yellow), high (orange), and very high (red). Certainty in score is denoted by text font and text color: very high certainty (>95%, black, bold font), high certainty (90–95%, black, italic font), moderate certainty (66–90%, white or gray, bold font), low certainty (<66%, white or gray, italic font). Figure source: Hare et al. 2016.

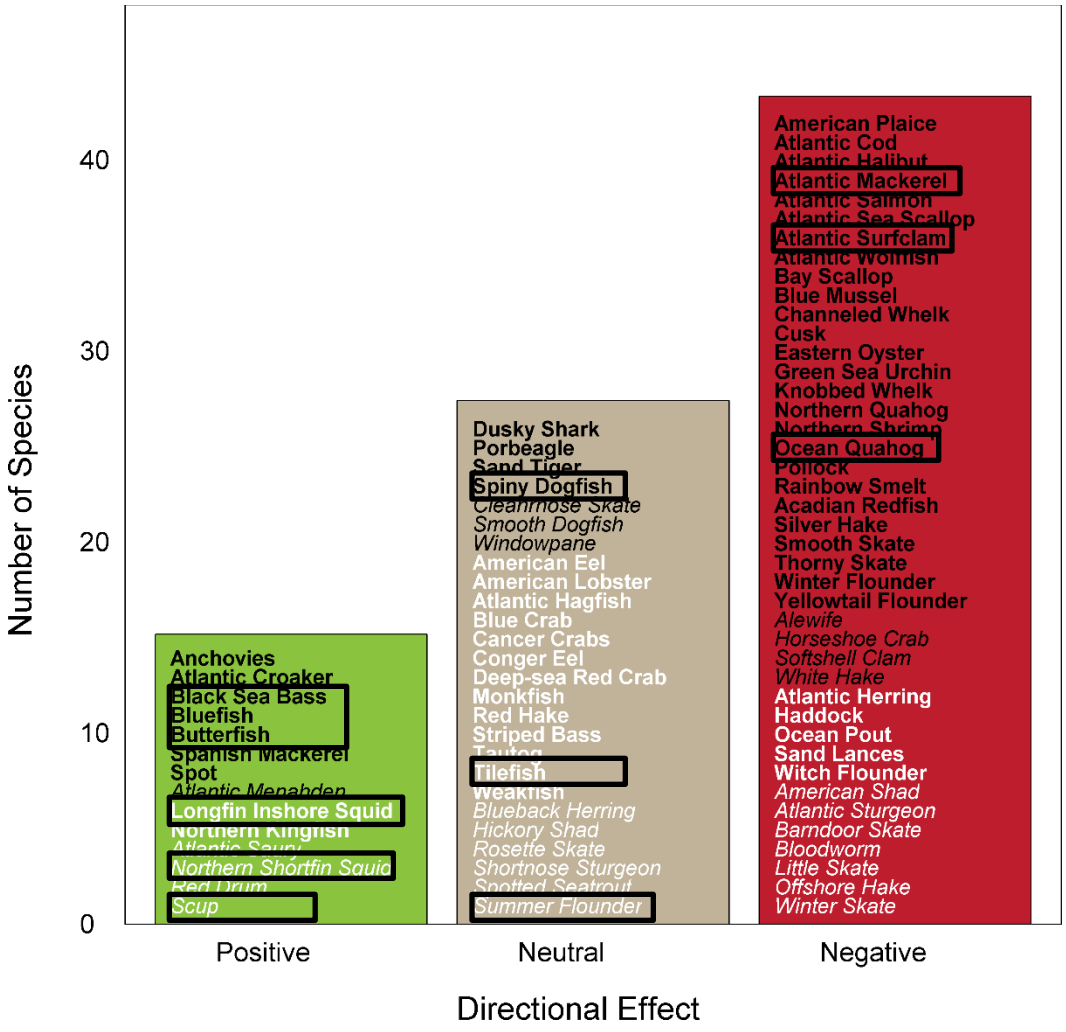

Figure 14: Directional effect of climate change for Council-managed species highlighted with black boxes. Colors represent expected negative (red), neutral (tan), and positive (green) effects. Certainty in score is denoted by text font and text color: very high certainty (>95%, black, bold font), high certainty (90-95%, black, italic font), moderate certainty (66-90%, white or gray, bold font), low certainty (<66%, white or gray, italic font). Figure source: Hare et al. 2016.

7.6.3 Magnitude and Significance of Cumulative Effects

In determining the magnitude and significance of the cumulative impacts of the preferred alternatives, the incremental impacts of the direct and indirect impacts should be considered, on a VEC-by-VEC basis, in addition to the effects of all actions (those identified and discussed relative to the past, present, and reasonably foreseeable future actions of both fishing and non-fishing actions. Those past, present, and reasonably foreseeable future actions which may impact the VECs, and the direction of those potential impacts, are summarized in section 7.6.2. When an

alternative has a positive impact on the VEC, for example, reduced fishing mortality on a managed species, it has a positive cumulative effect on the stock size of the species when combined with “other” actions that were also designed to increase stock size. In contrast, when an alternative has negative effects on a VEC, such as increased mortality, the cumulative effect on the VEC would be negative and tend to reduce the positive effects of the other actions. The resultant positive and negative cumulative effects are described below for each VEC. As seen above in section 7.6.2, non-fishing impacts on the VECs generally range from slight positive to slight negative.

7.6.3.1 Magnitude and Significance of Cumulative Effects on Managed Resources

Past fishery management actions taken through all Council-managed resource FMPs and the annual specifications process such as catch limits and commercial quotas for the managed resource ensure that stocks are managed sustainably and that measures are consistent with the objectives of the FMP under the guidance of the MSA. While species have been designated as overfished, including mackerel recently in this FMP, rebuilding measures have been subsequently implemented. The impacts of annual specification of management measures are largely dependent on how effective those measures are in meeting the objectives of preventing overfishing and achieving optimum yield, and on the extent to which mitigating measures (e.g., gear restricted areas, limited access, minimum mesh sizes etc.) are effective; however, these actions have generally had a positive cumulative effect on the managed resources. It is anticipated that future management actions will have additional indirect positive effects on the target species through actions which reduce and monitor bycatch, protect habitat, and protect the ecosystem services on which the productivity of the target species depends.

As noted above, the preferred alternatives are expected to rebuild the mackerel stock and have a moderately positive impact. Therefore, impacts of Council-managed fisheries on target species are not expected to change relative to current conditions under the preferred alternatives. The proposed actions described in this document would positively reinforce the past and anticipated positive cumulative effects on all managed resources by achieving the objectives specified in the FMP.

When the effects of the preferred alternatives are considered in combination with all other actions (i.e., past, present, and reasonably foreseeable future actions), *the cumulative effects are expected to yield non-significant positive impacts on the Council-managed resources.*

7.6.3.2 Magnitude and Significance of Cumulative Effects on Physical Environment

Past fishery management actions taken through the federal fisheries management process have had positive cumulative effects on habitat but fishery activities still likely have slight negative habitat impacts. Actions have constrained fishing effort both at a large scale and locally which may reduce impacts on habitat. As required under these FMP actions, EFH was designated for the managed stocks. It is anticipated that future management actions will result in additional direct or indirect positive effects on habitat through actions which protect EFH and protect ecosystem services on which these species' productivity depends. Many additional non-fishing activities, as described above in section 7.6.2, are concentrated near-shore and likely work either additively or synergistically to decrease habitat quality. The effects of these actions, combined with impacts resulting from years of commercial fishing activity, have negatively affected habitat. These impacts could be broad in scope. All the VECs are interrelated; therefore, the linkages among habitat quality, managed and non-target species productivity, and associated fishery yields should be considered. For habitat, there are direct and indirect negative effects from actions which may be localized or broad in scope; however, positive actions that have broad implications have been, and will likely continue to be, taken to improve the condition of habitat. Some actions, such as coastal population growth and climate change may impact habitat and ecosystem productivity; however, these actions are beyond the scope of NMFS and Council management.

As noted above, the preferred alternative is not expected to result in substantially changed levels of fishing effort or changes to the character of that effort relative to current conditions. The preferred actions are thus expected to have no significant impact (direct or indirect) on habitat. The impacted areas have been fished for many years with many different gear types and therefore will not likely be further impacted by these measures.

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

7.6.3.3 Magnitude and Significance of Cumulative Effects on Protected Resources

Given their life history, large changes in protected species abundance over long time periods, and the multiple and wide-ranging fisheries management actions that have occurred, the cumulative impacts on protected species were evaluated over a long time frame (i.e., from the early 1970s when the MMPA and ESA were implemented through the present).

Numerous protected species (ESA listed and/or MMPA protected) occur in the Northwest Atlantic (see section 6.4). The distribution and status of those species in the region are described in section 6.4.2. Depending on species and status, the population trends for these protected resources are variable, and as follows:

Sea Turtles

Nest counts inform population trends for sea turtle species. In the affected environment (section 6.4.2), four sea turtle species were identified in the region: Northwest Atlantic Ocean DPS of loggerhead, Kemp's ridley, North Atlantic DPS of green, and leatherback sea turtles. For the Northwest Atlantic Ocean DPS of loggerhead sea turtles, there are five unique recovery units that comprise the DPS. Nesting trends for each of these recovery units are variable; however, recent data from Florida index nesting beaches, which comprise most of the nesting in the DPS, indicate a 19% increase in nesting from 1989 to 2018 (https://myfwc.com/research/wildlife/sea-turtles/nesting/loggerhead-trends/). For Kemp's ridley sea turtles, from 1980 through 2003, the number of nests at three primary nesting beaches (Rancho Nuevo, Tepehuajes, and Playa Dos) increased 15 percent annually (Heppell et al. 2005); however, due to recent declines in nest counts, decreased survival of immature and adult sea turtles, and updated population modeling, this rate is not expected to continue and the overall trend is unclear (NMFS and USFWS 2015; Caillouett et al. 2018). The North Atlantic DPS of green sea turtle is showing a positive trend in nesting (Seminoff et al. 2015). Leatherback turtle nesting in the Northwest Atlantic is showing an overall negative trend, with the most notable decrease occurring during the most recent time frame of 2008 to 2017 (NW Atlantic Leatherback Working Group 2018).

Large Whales

Large whale assessment indicate that for some species there is decreasing (i.e., North Atlantic right whales) trend in the population, while for other species, as a trend analysis has not been conducted, it is unknown what the population trajectory is.

Small cetaceans and Pinnipeds

For most small cetaceans and pinniped populations, it is unknown what the population trajectory is as a trend analysis has not been conducted for these populations. However, in the most recent stock assessment reports, population trends were provided for common bottlenose dolphin stocks and gray seals; the analysis indicated a declining trend in population size for all common bottlenose dolphin stocks and an increasing trend for the gray seal population (Hayes et al. 2018; Hayes et al. 2019).

Atlantic Sturgeon

Population trends for Atlantic sturgeon are difficult to discern; however, the most recent stock assessment report concludes that Atlantic sturgeon, at both coastwide and DPS level, are depleted relative to historical levels (ASSRT 2007; ASMFC 2017).

Atlantic Salmon

There is no population growth rate available for Gulf of Maine DPS Atlantic salmon; however, the consensus is that the DPS exhibits a continuing declining trend (NOAA 2016; USFWS and NMFS 2018).

Taking into consideration the above information, past fishery management actions taken through the respective FMPs and annual specifications process have had slight indirect positive cumulative effects on protected species. The actions have constrained fishing effort both at a large scale and locally, and have implemented, pursuant to the ESA, MMPA, or MSA, gear modifications, requirements, and management areas. These measures and/or actions have served to reduce interactions between protected species and fishing gear. It is anticipated that future management actions, described in Section 7.6 will result in additional indirect positive effects on protected species. These impacts could be broad in scope.

The preferred alternatives would not substantially modify current levels of fishing effort in terms of the overall amount of effort, timing, and location. They would generally allow existing fishing effort to continue, with a small reduction in effort. As described in section 7.3, the proposed action is expected to have slight negative to slight positive impacts on protected resources depending on the species.

When the direct and indirect effects of the proposed action alternatives are considered in combination with all other actions (i.e., past, present, and reasonably foreseeable future actions), the cumulative effects are expected to yield non-significant impacts on protected resources that range from slight negative (for ESA species and MMPA species above PBR) to slight positive for other MMPA species that are not above PBR.

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

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

When the effects of the preferred alternatives are considered in combination with all other actions (i.e., past, present, and reasonably foreseeable future actions), *the cumulative effects are expected to yield ongoing slight negative impacts to non-target species overall.*

7.6.3.5 Magnitude and Significance of Cumulative Effects on Human Communities

Past fishery management actions taken through the respective FMPs and annual specifications process such as catch limits and commercial quotas have had both positive and negative cumulative effects on human communities. They have benefitted domestic fisheries through

sustainable fishery management and/or rebuilding, but can also reduce participation in fisheries. The impacts from annual specification of management measures are largely dependent on how effective those measures are in meeting their intended objectives and the extent to which mitigating measures such as seasons and trip/possession limits are effective.

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

The first cumulative human community effect of the FMP has been to guide the development of the domestic harvest and processing fishery infrastructure. Part of this fishery rationalization process included the development of limited access programs to control capitalization while maintaining harvest levels that are sustainable. In addition, by meeting the National Standards prescribed in the MSA, the Council has strived to meet one of the primary objectives of the act - to achieve optimum yield in each fishery. The preferred measures would force lower harvests than have occurred in recent years and they are unlikely to result in significant changes to levels of effort or the character of that effort relative to the status quo. The preferred measures should also lead to higher sustainable landings as the stock rebuilds.

The indirectly affecting actions and activities described above have both positive and negative human community affects. For example agricultural pollution may negatively impact marine resources negatively affecting human communities, but there are also benefits to human communities from the food and jobs created during agricultural operations. The same tradeoff

will exist for each of the indirectly affecting activities, resulting on overall indirect negative impacts on human communities by reducing marine resource availability; however, this effect is not quantifiable. NMFS has several means under which it can review non-fishing actions of other Federal or state agencies prior to permitting or implementation of those projects. This serves to minimize the extent and magnitude of indirect negative impacts those actions could have on human communities.

It is anticipated that future management actions will result in positive effects for human communities due to sustainable management practices, although additional indirect negative effects on some human communities could occur if management actions result in reduced revenues, if temporarily.

By providing revenues and contributing to the overall functioning of and employment in coastal communities, Council-managed fisheries have both direct and indirect positive social impacts. As previously described in this section, the preferred alternatives are unlikely to result in significant changes to levels of fishing effort or the character of that effort relative to current conditions, though a temporary reduction relative to recent revenues from the mackerel fishery is likely as the stock begins to rebuild.

Overall, the relevant past, present, and reasonably foreseeable future actions, including the proposed action, *the cumulative effects are expected to yield non-significant positive impacts.*

7.6.4 Proposed Action on all the VECs

The Council's preferred alternatives (i.e. the proposed actions) are described in section 5.0. The direct and indirect impacts of the proposed action on the VECs are described in sections 7.6.3.1 – 7.6.3.5. The magnitude and significance of the cumulative effects, including additive and synergistic effects of the proposed actions, as well as past, present, and future actions, have been taken into account (section 7.6.3).

When considered in conjunction with all other pressures placed on the fisheries by past, present, and reasonably foreseeable future actions, the preferred alternatives are not expected to result in any significant impacts, positive or negative. They should generally reinforce existing impacts.

The magnitudes and directions of impacts on each VEC from the proposed alternatives are summarized below and detailed in Sections 7.1-7.5 and the non-significant cumulative effects are described in Section 7.6. The proposed action is anticipated to generally maintain the current status of the VECs

Summary of Impacts

Target Species Impact Summary

The preferred rebuilding alternatives should allow the mackerel stock to rebuild within 10 years, and are best characterized as moderately positive. Changes in mackerel fishing should not impact other FMP species due to low catch of those species in the mackerel fishery, and separate management measures control catch of those species. While Atlantic herring and mackerel are often caught together, separate management measures in the Atlantic herring fishery should ensure that overfishing does not occur on the Atlantic herring stock. Separate measures are being developed by the New England Fishery Management Council (NEFMC) to continue rebuilding the Atlantic herring stock.

Non-Target Species Impact Summary

Non-target interactions are relatively low in the mackerel fishery, and all of the action alternatives would reduce catch from the status quo, thereby limiting effort and slightly reducing negative impacts on non-target species. The RH/S cap should continue to limit interactions between the mackerel fishery and RH/S, which have been the primary non-target species of concern for the mackerel fishery.

Habitat Impact Summary

All of the alternatives would reduce catch from the status quo thereby limiting effort, so no additional negative habitat impacts would be expected.

Protected Resources Impact Summary

All of the alternatives would reduce catch from the status quo, thereby limiting effort, so no additional negative protected resource impacts would be expected.

Human Communities Impact Summary

Human communities may have negative impacts in the short term due to lower catches/revenues from mackerel during the beginning of the rebuilding period, but in the long-term, rebuilding should lead to higher sustainable catches/revenues and associated socioeconomic benefits for fishing communities.

The preferred alternatives are consistent with other management measures that have been implemented in the past for Council-managed resources. These measures are part of a broader management scheme for all Council-managed fisheries. This management scheme has helped to rebuild stocks and ensure long-term sustainability, while minimizing environmental impacts.

The regulatory atmosphere within which federal fishery management operates requires that management actions be taken in a manner that will optimize the conditions of managed species, habitat, and human communities. Consistent with NEPA, the MSA requires that management actions be taken only after consideration of impacts to the biological, physical, economic, and social dimensions of the human environment. Given this regulatory environment, and because fishery management actions must strive to create and maintain sustainable resources, impacts on all VECs from past, present and reasonably foreseeable future actions have generally been positive in trend and are expected to continue in that manner for the foreseeable future. This is not to say that some aspects of the VECs are not experiencing negative impacts, but rather that when considered as a whole and as a result of the management measures implemented in these fisheries, the overall long-term trend is positive, though there are no significant cumulative effects associated with the preferred alternatives based on the information and analyses presented in this document and in past FMP documents. Cumulatively, through 2023, it is anticipated that the preferred alternatives will result in non-significant impacts on all VECs, ranging from slight negative to moderate positive.

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

8.1 Magnuson-Stevens Fishery Conservation and Management Act

8.1.1 National Standards

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

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

(1) Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.

The proposed measures would facilitate rebuilding while preventing overfishing, in order to achieve a rebuilt stock and optimum yield.

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

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

(3) To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.

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

(4) Conservation and management measures shall not discriminate between residents of different States. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.

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

(5) Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.

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

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

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

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

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

(8) Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to

(A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.

The human community impacts of the action are described above in Section 7.5 (the proposed measures would likely increase yield and revenues to human communities during the rebuilding plan with a relatively minor initial reduction compared to recent performance).

(9) Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.

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

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

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

8.1.2 Other Required Provisions of the Magnuson-Stevens Act

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

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

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

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

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

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

Full assessment reports are available at: https://www.fisheries.noaa.gov/about/resource-evaluation-and-assessment-northeast or by contacting Council staff. The preferred measures use

the most recent assessments, which combine biological, fishery, and other data to estimate resource productivity.

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

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

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

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

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

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

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

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

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

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

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

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

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

Previous actions have provided for automatic incorporation of new overfished/overfishing reference points once accepted through a peer-review process.

(11) establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery, and include conservation and management measures that, to the extent practicable and in the following priority-- (A) minimize bycatch; and (B) minimize the mortality of bycatch which cannot be avoided

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

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

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

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

This document updates this information as appropriate in Section 6.

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

The preferred measures are designed to allocate harvest restrictions fairly and equitably among the sectors, considering the relevant economic impacts. As the stock rebuilds, the Council will make the same considerations for recovery benefits.

(15) establish a mechanism for specifying annual catch limits in the plan (including a multiyear plan), implementing regulations, or annual specifications, at a level such that overfishing does not occur in the fishery, including measures to ensure accountability.

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

8.1.3 Discretionary Provisions of the Magnuson-Stevens Act

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

8.1.4 Essential Fish Habitat Assessment

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

8.2 NEPA

8.2.1 Finding of No Significant Impact (FONSI)

The Council on Environmental Quality (CEQ) Regulations state that the determination of significance using an analysis of effects requires examination of both context and intensity, and lists ten criteria for intensity (40 CFR 1508.27). In addition, the Companion Manual for National Oceanic and Atmospheric Administration Administrative Order 216-6A provides sixteen criteria, the same ten as the CEQ Regulations and six additional, for determining whether the impacts of a proposed action are significant. Each criterion is discussed below with respect to the proposed action and considered individually as well as in combination with the others.

1. Can the proposed action reasonably be expected to cause both beneficial and adverse impacts that overall may result in a significant effect, even if the effect will be beneficial?

No significant impacts are expected to any VEC. The impacts are detailed in Sections 7.1-7.5 and the non-significant cumulative effects are described in Section 7.6. In summary:

Insert summary from Exec Summary once complete

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

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

3. Can the proposed action reasonably be expected to result in significant impacts to unique characteristics of the geographic area, such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas?

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

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

The proposed action modifies existing measures contained in the FMP or other Council FMPs in a similar fashion as previous years, so are not likely to be highly controversial.

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

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

6. Can the proposed action reasonably be expected to establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration?

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

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

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

8. Can the proposed action reasonably be expected to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources?

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

9. Can the proposed action reasonably be expected to have a significant impact on endangered or threatened species, or their critical habitat as defined under the Endangered Species Act of 1973?

Pursuant to section 7 of the Endangered Species Act (ESA), NOAA's National Marine Fisheries Service (NMFS) issued a Biological Opinion (Opinion) on May 27, 2021, that considered the effects of the NMFS' authorization of ten fishery management plans (FMP), NMFS' North Atlantic Right Whale Conservation Framework, and the New England Fishery Management Council's Omnibus Essential Fish Habitat Amendment 2, on ESA-listed species and designated critical habitat. The ten FMPs considered in the Opinion include the: (1) American lobster; (2) Atlantic bluefish; (3) Atlantic deep-sea red crab; (4) mackerel/squid/butterfish; (5) monkfish; (6) Northeast multispecies; (7) Northeast skate complex; (8) spiny dogfish; (9) summer flounder/scup/black sea bass; and (10) Jonah crab FMPs. The American lobster and Jonah crab FMPs are permitted and operated through implementing regulations compatible with the interstate fishery management plans (ISFMP) issued under the authority of the Atlantic Coastal Fisheries Cooperative Management Act (ACA), the other eight FMPs are issued under the authority of the Magnuson-Stevens Fishery Conservation and Management Act (MSA).

The 2021 Opinion determined that the proposed action may adversely affect, but is not likely to jeopardize, the continued existence of North Atlantic right, fin, sei, or sperm whales; the Northwest Atlantic Ocean distinct population segment (DPS) of loggerhead, leatherback, Kemp's ridley, or North Atlantic DPS of green sea turtles; any of the five DPSs of Atlantic sturgeon; Gulf of Maine DPS Atlantic salmon; or giant manta rays. The Opinion also concluded that the proposed action is not likely to adversely affect designated critical habitat for North Atlantic right whales, the Northwest Atlantic Ocean DPS of loggerhead sea turtles, U.S. DPS of smalltooth sawfish, Johnson's seagrass, or elkhorn and staghorn corals. An Incidental Take Statement (ITS) was issued in the Opinion. The ITS includes reasonable and prudent measures

and their implementing terms and conditions, which NMFS determined are necessary or appropriate to minimize impacts of the incidental take in the fisheries assessed in this Opinion.

The proposed action is not expected to alter overall fishing operations, lead to a substantial increase of fishing effort, or alter the spatial and/or temporal distribution of current fishing effort in a manner that would increase interaction risks with ESA-listed species or cause adverse effects to critical habitat. Based on this, it has been determined that fishing activities pursuant to this action will not affect endangered and threatened species or critical habitat in any manner not considered in the 2021 Opinion on this fishery. Ongoing legal action on the 2021 Opinion are focused on right whales.

10. Can the proposed action reasonably be expected to threaten a violation of Federal, state, or local law or requirements imposed for environmental protection?

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

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

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

12. Can the proposed action reasonably be expected to adversely affect managed fish species?

As described in Section 7 of this document, none of the proposed measures are expected to jeopardize the sustainability of any target species affected by the action. The preferred alternatives are consistent with the FMP and best available scientific information and are designed to rebuild the mackerel stock. As such, the proposed action is expected to ensure the long term sustainability of harvests from the MSB stocks. The proposed action is not expected to jeopardize the sustainability of any non-target species (see section 7 of this document) because the proposed measures are not expected to result in substantial increases in overall fishing effort. In addition, none of the measures are expected to substantially alter fishing methods or the temporal and/or spatial distribution of fishing activities. While Atlantic herring and mackerel are often caught together, separate management measures in the Atlantic herring fishery should ensure that overfishing does not occur on the Atlantic herring stock. Separate measures are being developed by the New England Fishery Management Council (NEFMC) to continue rebuilding the Atlantic herring stock. Therefore, none of the proposed actions are expected to jeopardize the sustainability of managed or other non-target species.

13. Can the proposed action reasonably be expected to adversely affect essential fish habitat as defined under the Magnuson-Stevens Fishery Conservation and Management Act?

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

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

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

15. Can the proposed action reasonably be expected to adversely affect biodiversity or ecosystem functioning (e.g., benthic productivity, predator-prey relationships, etc.)?

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

16. Can the proposed action reasonably be expected to result in the introduction or spread of a nonindigenous species?

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

DETERMINATION

In view of the information presented in this document and the analysis contained in the supporting Environmental Assessment prepared for this action, it is hereby determined that these proposed MSB FMP measures will not significantly impact the quality of the human environment as described above and in the supporting Environmental Assessment. In addition, all beneficial and adverse impacts of the proposed action have been addressed to reach the conclusion of no significant impacts. Accordingly, preparation of an environmental impact statement for this action is not necessary.

_____ _____

Michael Pentony Date

Greater Atlantic Regional Administrator, NOAA

8.3 Marine Mammal Protection Act

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

8.4 Endangered Species Act

Pursuant to section 7 of the Endangered Species Act (ESA), NOAA's National Marine Fisheries Service (NMFS) issued a Biological Opinion (Opinion) on May 27, 2021, that considered the effects of the NMFS' authorization of ten fishery management plans (FMP), NMFS' North Atlantic Right Whale Conservation Framework, and the New England Fishery Management Council's Omnibus Essential Fish Habitat Amendment 2, on ESA-listed species and designated critical habitat. The ten FMPs considered in the Opinion include the: (1) American lobster; (2) Atlantic bluefish; (3) Atlantic deep-sea red crab; (4) mackerel/squid/butterfish; (5) monkfish; (6) Northeast multispecies; (7) Northeast skate complex; (8) spiny dogfish; (9) summer flounder/scup/black sea bass; and (10) Jonah crab FMPs. The American lobster and Jonah crab FMPs are permitted and operated through implementing regulations compatible with the interstate fishery management plans (ISFMP) issued under the authority of the Atlantic Coastal Fisheries Cooperative Management Act (ACA), the other eight FMPs are issued under the authority of the Magnuson-Stevens Fishery Conservation and Management Act (MSA).

The 2021 Opinion determined that the proposed action may adversely affect, but is not likely to jeopardize, the continued existence of North Atlantic right, fin, sei, or sperm whales; the Northwest Atlantic Ocean distinct population segment (DPS) of loggerhead, leatherback, Kemp's ridley, or North Atlantic DPS of green sea turtles; any of the five DPSs of Atlantic sturgeon; Gulf of Maine DPS Atlantic salmon; or giant manta rays. The Opinion also concluded that the proposed action is not likely to adversely affect designated critical habitat for North

Atlantic right whales, the Northwest Atlantic Ocean DPS of loggerhead sea turtles, U.S. DPS of smalltooth sawfish, Johnson's seagrass, or elkhorn and staghorn corals. An Incidental Take Statement (ITS) was issued in the Opinion. The ITS includes reasonable and prudent measures and their implementing terms and conditions, which NMFS determined are necessary or appropriate to minimize impacts of the incidental take in the fisheries assessed in this Opinion.

Recent legal action around the 2021 Opinion is focused on right whales, which are not expected to interact with the mackerel fishery.

8.5 Administrative Procedures Act

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

8.6 Paperwork Reduction Act

The purpose of the Paperwork Reduction Act (PRA) is to control and, to the extent possible, minimize the paperwork burden for individuals, small businesses, nonprofit institutions, and other persons resulting from the collection of information by or for the Federal Government. No required paperwork or reporting changes should occur as a result of this action.

8.7 Coastal Zone Management Act

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

8.8 Section 515 (Data Quality Act)

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

Utility

The information presented in this document should be helpful to the intended users (the affected public) by presenting a clear description of the purpose and need of the proposed action, the measures proposed, and the impacts of those measures. A discussion of the reasons for selecting the proposed action is included in Section 5 so that intended users may have a full understanding of the proposed action, its implications, and the Council's rationale.

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

The Federal Register notice that announces the proposed rule and the final rule and implementing regulations will be made available in printed publication, on the website for the Greater Atlantic Regional Fisheries Office, and through the Regulations.gov website. The Federal Register documents will provide metric conversions for all measurements.

Integrity

Prior to dissemination, information associated with this action, independent of the specific intended distribution mechanism, is safeguarded from improper access, modification, or destruction, to a degree commensurate with the risk and magnitude of harm that could result from the loss, misuse, or unauthorized access to or modification of such information. All electronic information disseminated by NOAA Fisheries adheres to the standards set out in Appendix III, Security of Automated Information Resources,@ of OMB Circular A-130; the Computer Security Act; and the Government Information Security Act. All confidential information (e.g., dealer purchase reports) is safeguarded pursuant to the Privacy Act; Titles 13, 15, and 22 of the U.S. Code (confidentiality of census, business, and financial information); the Confidentiality of Statistics provisions of the MSA; and NOAA Administrative Order 216-100, Protection of Confidential Fisheries Statistics.

Objectivity

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

This information product uses information of known quality from sources acceptable to the relevant scientific and technical communities. Stock status (including estimates of biomass and fishing mortality) reported in this product are based on either assessments subject to peer-review through the Stock Assessment Review Committee or on updates of those assessments prepared by scientists of the Northeast Fisheries Science Center. Landing and revenue information is based on information collected through the Vessel Trip Report and Commercial Dealer databases. Information on catch composition, by tow, is based on reports collected by the NOAA Fisheries observer program and incorporated into the sea sampling or observer database systems. These reports are developed using an approved, scientifically valid sampling process. In addition to these sources, additional information is presented that has been accepted and published in peer-reviewed journals or by scientific organizations. Original analyses in this document were prepared using data from accepted sources, and the analyses have been reviewed by members of the Mackerel, Squid and Butterfish Monitoring Committee or other NMFS staff with expertise on the subject matter.

Despite current data limitations, the conservation and management measures proposed for this action were selected based upon the best scientific information available. The analyses conducted in support of the proposed action were conducted using information from the most recent complete calendar years, generally through 2021 except as noted and explained. The data used in the analyses provide the best available information on the number of seafood dealers operating in the northeast, the number, amount, and value of fish purchases made by these dealers. Specialists (including professional members of plan development teams, technical teams, committees, and Council staff) who worked with these data are familiar with the most current analytical techniques and with the available data and information relevant to these fisheries.

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

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

8.9 Regulatory Flexibility Analysis

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

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

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

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

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

8.12 Executive Order (E.O.) 12898 (Environmental Justice)

Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations provides guidelines to ensure that potential impacts on these populations are identified and mitigated, and that these populations can participate effectively in the NEPA process (EO 12898 1994). NOAA guidance NAO 216-6A, Companion Manual, Section 10(A) requires the consideration of EO 12898 in NEPA documents. Agencies should also encourage public participation, especially by affected communities, during scoping, as part of a broader strategy to address environmental justice issues. Minority and low-income individuals or populations must not be excluded from participation in, denied the benefits of, or subjected to discrimination because of their race, color, or national origin. Although the impacts of this action may affect communities with environmental justice concerns, the proposed actions should not have disproportionately high effects on low income or minority populations. The

proposed actions would apply to all participants in the affected area, regardless of minority status or income level. The public comment process is an opportunity to identify issues that may be related to environmental justice, but none have been raised relative to this action. The public has never requested translations of documents pertinent to the MSB fisheries. With respect to subsistence consumption of fish and wildlife, federal agencies are required to collect, maintain, and analyze information on the consumption patterns of populations who principally rely on fish and(or) wildlife for subsistence. GARFO tracks these issues, but there are no federally recognized tribal agreements for subsistence fishing of the species relevant for this action.

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9.0 LITERATURE CITED AND SELECTED BACKGROUND DOCUMENTS

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10.0 LIST OF AGENCIES AND PERSONS CONSULTED

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

11.0 LIST OF PREPARERS AND POINT OF CONTACT

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

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

12.1 Initial Regulatory Flexibility Analysis

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

their regulations on small business; 2) to require that agencies communicate and explain their findings to the public; and 3) to encourage agencies to use flexibility and to provide regulatory relief to small entities.

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

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

A. A statement of basis and purpose of the rule

B. A description and estimate of the number of small entities to which the rule applies

C. Description and estimate of economic impacts on small entities, by entity size and industry

D. An explanation of the criteria used to evaluate whether the rule would impose significant economic impacts

E. An explanation of the criteria used to evaluate whether the rule would impose impacts on a substantial number of small entities

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

A – Basis and purpose of the rule

The basis of the rules proposed in this action are the provisions of the MSA for federal fishery management to rebuild fisheries and avoid overfishing by control catches. As discretionary provisions of FMPs the MSA also allows restriction of fishing by time/season and allows measures to reduce incidental catch of non-target species (i.e. the RH/S cap).

This action is needed to rebuild the mackerel stock, effectively manage the fishery, and control

RH/S bycatch in the mackerel fishery. The purpose and need for this action is further detailed in Section 4, while a full description of all alternatives is provided in Section 5. To assist with further evaluation of the measures proposed in this document, the following is a brief summary of the preferred alternative selected by the Council for this action:

The preferred rebuilding alternative, Rebuilding Plan Alternative 4 (RPA4) – has a 61% chance of rebuilding the mackerel stock in 10 years, i.e. by 2032. The Council also voted to implement a federal waters recreational possession limit for Atlantic mackerel for 2023. Recreational catches of Atlantic mackerel have been relatively low historically, but recreational restrictions were deemed appropriate to achieve the total catch limits required under the rebuilding plan. The Council had initially considered possession limits in the range of 10 to 15 fish per person, but ultimately recommended a 20-fish per person limit based on the limited historical recreational catch and the importance of mackerel for recreational fishermen (including as bait). This limit is expected to reduce recreational catch by about 17%. Substantial coordination with states that have substantial recreational mackerel catches (MA, NH, and ME) occurred during development of the plan, and it is anticipated that these states will mirror the 20-fish federal rule for their state waters in 2023.

Under the selected rebuilding plan, the acceptable biological catch (ABC) will be 8,094 metric tons (MT) for 2023. After accounting for expected Canadian catch, recreational catch, and commercial discards, the Council recommended setting the 2023 commercial quota at 3,639 MT.

The Council also discussed potentially scaling down the river herring and shad cap, currently set at 129 MT, in response to the reduced commercial quota. However, given the challenges associated with monitoring a very small cap, including potential closures based on a few observed trips, the Council voted to maintain the cap at 129 MT for 2023.

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

The measures proposed in this action apply to vessels that hold any for hire or commercial permits for Atlantic mackerel. Some small entities own multiple vessels with mackerel permits. Staff queried ownership data provided by the Social Science Branch of NMFS' Northeast Fisheries Science Center. Results are broken down by for hire and commercial.

For Hire

The analysis found that in 2021, there were 630 vessels with for hire permits allowing catch of mackerel in federal waters. 315 had revenues that classified them as for-hire operations. These 315 permits were owned by 265 entities, all of which qualified as small businesses under SBA definitions. The preferred rebuilding plan and recreational possession limit were chosen considering the impacts on fishing businesses, and the Council chose the 20-fish possession limit

specifically to limit impacts on recreational fishing including for-hire fishing. The anticipated 17% catch reduction expected with the preferred alternative should not have a significant adverse impact on a substantial number of small entities due its limited impact.

Commercial

The analysis found that in 2021, there were 1,535 vessels with commercial mackerel permits allowing catch of mackerel in federal waters. 1,433 vessels were listed as commercial fishing operations or had no revenue in 2021. These 1,433 vessels were owned by 1,037 entities, 1,026 of which qualified as small businesses under SBA definitions.

C – Description and estimate of economic impacts on small entities

Given the limited catch reduction expected with the recreational measures, only slight impacts are expected.

Overall, the 1026 relevant small commercial entities derived only 0.2% to 0.3% of their revenues from mackerel 2019-2022 (annual totals). The preferred rebuilding plan would reduce the quota from 2019-2021 landings to some degree for a few years before potentially increasing beyond 2019-2021 landings, so there would be some short term impacts on these entities, but because mackerel makes up such a small proportion of revenues the preferred alternative should not have a significant adverse impact on a substantial number of small entities. Also, only 12 individual entities had total 2019-2021 mackerel revenues that represented at least 5% of total revenues. Rebuilding mackerel to a more productive stock size should also help these entities in the long run.

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

The criteria used to evaluate whether the rule would impose significant economic impacts was whether the landings (and therefore ex-vessel revenues) from the preferred alternatives would be constraining beyond recent landings history, and the relative importance of mackerel for those entities.

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

Other than those described directly in the above analyses, the primary assumption utilized in the above analyses is that comparing upcoming fishery operation to how the fishery operated over 2019-2021 is appropriate. Using the most recent three years of fishery operation is standard practice for Regulatory Flexibility Analysis and there is no indication that such an approach is contraindicated in this case since doing so captures what the industry has recently experienced versus potential impacts going forward from implementation of the proposed specifications.

12.2 Regulatory Impact Review

INTRODUCTION

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

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

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

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

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

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

OBJECTIVES

The objectives of the MSB FMP are described above as is the purpose of the action

PROBLEM STATEMENT

The purpose of the measures proposed in this action are described in Section 4 of this document but is generally to set specifications for the mackerel fishery as needed to rebuild the mackerel stock and eventually achieve optimum yield from a rebuilt stock. Measures also constrain RH/S catch in the mackerel fishery.

ANALYSIS OF ALTERNATIVES

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

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

DETERMINATION OF EXECUTIVE ORDER 12866 SIGNIFICANCE

Given the analysis in Section 7 and summary information above, the action overall should have slight negative short term impacts and positive long term impacts on participants in the MSB fisheries that are well below the $100 million threshold for a significance determination. In addition, there should be no interactions with activities of other agencies and no impacts on entitlements, grants, user fees, or loan programs. The proposed action is also similar to actions taken previously that set specifications to rebuild Council-managed fisheries, and as such does not raise novel legal or policy issues. As such, the Proposed Action is not considered significant as defined by Executive Order 12866.

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