

Environmental Assessment for:

Amendment to the Fishery Management Plan for the Groundfish Fishery of the Bering Sea and Aleutian Islands Area

Amendment to the Fishery Management Plan for Groundfish of the Gulf of Alaska

Amendment to the Fishery Management Plan for Bering Sea/Aleutian Islands King and Tanner Crabs

Amendment to the Fishery Management Plan for Fish Resources of the Arctic Management Area

Amendment to the Fishery Management Plan for the Salmon Fisheries in the Exclusive Economic Zone off Alaska

Essential Fish Habitat (EFH) Omnibus Amendments

Responsible Official: Jon Kurland
Administrator, Alaska Region
National Marine Fisheries Service

For Further Information Contact:

Sarah Rheinsmith, NPFMC
1007 W 3rd Ave #400,
Anchorage, AK 99501
Or

Megan Mackey, NMFS
NMFS Alaska Region
PO Box 21668
Juneau, AK 99801
(907) 586-7228

Abstract: A review of Essential Fish Habitat (EFH) components in the North Pacific Fishery Management Council's (Council's) fishery management plans (FMPs) should be completed every 5 years, and the EFH provisions should be revised or amended, as warranted, based on the best available information. The 2023 EFH 5-year Review that concluded in February 2023 evaluated new information on EFH, assessed information gaps and research needs, and identified whether any revisions to EFH were needed. Based on the EFH 5-year Review, the Council determined that new habitat and life history information is available to revise many of the EFH descriptions and maps in the FMPs. The proposed amendments to the EFH provisions in the Council's FMPs would not substantively change the impacts of EFH as analyzed in the 2005 EFH environmental impact statement. The 2023 EFH 5-year Review concluded that no change to the conclusions of the evaluation of fishing effects on EFH is warranted based on new information. None of the FMP amendments require regulatory action.

Accessibility of this Document: Every effort has been made to make this document accessible to individuals of all abilities and compliant with Section 508 of the Rehabilitation Act. The complexity of this document may make access difficult for some. If you encounter information that you cannot access or use, please email us at Alaska.webmaster@noaa.gov or call us at 907-586-7228 so that we may assist you.

Table of Contents

Executive Summary	5
1 Introduction	7
1.1 2023 EFH 5-year Review.....	7
1.2 Purpose and Need Statement.....	9
1.3 History of this Action	9
1.4 Documents Incorporated by Reference in this Analysis.....	11
2 Description of Actions and Alternatives.....	13
2.1 Component 1 – BSAI Groundfish.....	13
2.2 Component 1 – GOA Groundfish.....	13
2.3 Component 1 - BSAI King and Tanner Crab.....	14
2.4 Component 1 – Arctic Management Area	14
2.5 Component 1 – Salmon	14
2.6 Component 2 – Fishing Effects.....	14
2.7 Component 4 – Non-Fishing Activities	14
2.8 Component 9 – EFH Research Priorities	14
2.9 Rationale for changes to EFH descriptions and maps	14
3 Methodology	16
3.1 Revisions to EFH Text Descriptions and Maps.....	16
3.2 Modeling Methods for EFH Maps	16
3.3 EFH Text Description and Map Review by Stock Assessment Authors.....	17
3.4 Impacts Assessment Incorporated by Reference from 2005 EFH EIS	17
4 Environmental Impacts	19
4.1 Effects of Aggregate Past, Present, and Reasonably Foreseeably Future Actions	19
4.2 Habitat	20
4.2.1 Effects of the Alternatives	20
4.2.2 Effects of Aggregate Past, Present, and Reasonably Foreseeable Actions on Habitat.....	21
4.2.3 Cumulative Impacts.....	21
5 Component 1 – BSAI Groundfish FMP Amendments	22
5.1 Description of Alternatives	23
5.2 Recommended Revisions for Individual Species	23
5.3 Expected Effects of Alternatives	29
6 Component 1 – GOA Groundfish FMP Amendments	31
6.1 Description of Alternatives	33
6.2 Recommended revisions for individual species	33
6.3 Expected effects of Alternatives.....	40
7 Component 1 – BSAI King and Tanner Crab FMP Amendments.....	41
7.1 Description of Alternatives	41
7.2 Recommended revisions for individual species	41
7.3 Expected effects of Alternatives.....	42
8 Component 1 – Arctic Management Area FMP Amendments.....	43
8.1 Description of Alternatives	43
8.2 Recommended revisions for all species.....	43
8.3 Expected effects of Alternatives.....	44
9 Component 1 – Salmon FMP Amendments.....	45
9.1 Description of Alternatives	45
9.2 Recommended revisions for salmon species.....	45
9.3 Expected effects of Alternatives.....	45
10 Component 2 – Fishing Effects	46
10.1 Fishing Effects Evaluation Methods.....	46
10.2 Description of Alternatives	47
10.3 Expected Effects of Alternatives	47
11 Component 4 – Non-fishing activities that may adversely affect EFH.....	48
11.1 Description of Alternatives – New EFH Conservation Recommendations for Non-Fishing Activities.....	49
11.2 Expected effects of Alternatives.....	49

11.3	Outreach efforts for informing stakeholders of changes to the EFH conservation recommendations for non-fishing activities.....	50
12	Component 9 – Revision of EFH Research Priorities	51
12.1	Description of Alternatives	51
12.2	Expected effects of Alternatives.....	59
13	Preparers and Persons Consulted	60
14	References	62
	Appendix A- BSAI Groundfish FMP proposed EFH amendment text	
	Appendix B- GOA Groundfish FMP proposed EFH amendment text	
	Appendix C- BSAI KTC FMP proposed EFH amendment text	
	Appendix D- Arctic FMP proposed EFH amendment text	
	Appendix E- Salmon FMP proposed EFH and housekeeping amendment text	

List of Tables

Table 1	Council action to amend FMPs based on the 2023 EFH 5-year Review.....	10
Table 2	Resources potentially affected by the proposed action and alternatives.....	19
Table 3	The levels of EFH information available as a result of the 2023 EFH 5-year Review for species and species complexes in the BSAI Groundfish FMP.	22
Table 4	The levels of EFH information available as a result of the 2023 EFH 5-year Review, for species' life stages and species complexes for target species in the GOA Groundfish FMP.....	31
Table 5	EFH information levels available by species and life history stage for crabs in the BSAI Crab FMP based on the 2023 EFH 5-year Review.....	41
Table 6	EFH information levels available by species and life history stage for Arctic species in the Arctic FMP based on the 2023 EFH 5-year Review.	43
Table 7	Stock assessment author research recommendations for Bering Sea/Aleutian Island groundfish species. These include focus areas of research and identify data sources for future EFH map iterations.	55
Table 8	Stock assessment author research recommendations for Gulf of Alaska groundfish species. These include focus areas of research and identify data sources for future EFH map iterations.	57
Table 9	Stock assessment author research recommendations for Bering Sea/Aleutian Island crab species. These include focus areas of research and identify data sources for future EFH map iterations.	58

Executive Summary

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) includes provisions concerning the identification and conservation of Essential Fish Habitat (EFH). The MSA defines EFH as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” Federal regulations require Fishery Management Councils to review and revise EFH components every 5 years, and amend EFH provisions in the FMPs, as warranted, based on available information.

In February 2023, the Council reviewed the 2023 EFH 5-year review summary report which evaluated new environmental and habitat data, improved the models to map EFH, updated the model to evaluate fishery impacts on EFH, updated the assessment of non-fishing impacts on EFH for BSAI Groundfish, GOA Groundfish, BSAI crab and Arctic species, and assessed information gaps and research needs for BSAI Groundfish, GOA Groundfish, BSAI crab and Arctic species. The summary report discussed each of the 10 EFH components in detail and provide recommendations for possible revisions to the EFH provisions in the FMPs. At the February 2023 Council meeting, the Council put forth a motion to update EFH text descriptions and maps (component 1), fishing activities that may adversely affect EFH (component 2), Non-fishing activities that may adversely affect EFH (component 4), prey species (component 7), and EFH research and information needs (component 9), as seen in ES Table 1 in its FMPs ([motion](#)). There is no new information being brought forth for Council review at this time.

Staff want to clarify that EFH conservation recommendations for non-fishing activities (component 4) and EFH research and information needs (component 9) were not assessed for the 5 salmon species in the Salmon FMP during the 2023 5-year review. The Council requested in the original motion that updates to non-fishing activities that may adversely affect EFH and EFH research and information needs for the Salmon FMP be included in conjunction with the proposed amendment package. It is staff’s recommendation that updates to the Salmon FMP do not include updates to non-fishing activities that may adversely affect EFH (component 4) and EFH research and information needs (component 9) at this juncture given it was not assessed during this review cycle. Absent further Council direction, staff’s understanding of Council’s intent is not include updates to EFH conservation recommendations for non-fishing activities and EFH research and information needs for the Salmon FMP. As such, the proposed FMP amendment text for the Salmon FMP as seen in Appendix E does not include changes to Non-fishing activities that may adversely affect EFH and EFH research and information needs given it was not adequately assessed for this 5-year review. The Council may wish to amend their proposed alternatives to best reflect the comprehensive work completed in the 2023 EFH 5-year Review.

This EA is a comprehensive analysis of the proposed FMP changes to components 1,2,4,7 and 9. Chapters 1 and 2 provide an overview and history of this action and details the actions and alternatives, respectively. Chapter 3 summarizes the methodology used in the 2023 EFH 5-year review for context. Chapter 4 is the environmental analysis (EA) providing an overview of the effects of each alternative and the effects of past, present, and reasonably foreseeable future actions (RFFA) on the sole resource component effected, habitat. This chapter also details the proposed direct and indirect impacts of implementing updated EFH information into the suggested FMPs. In brief, A change in the designation of EFH has no direct impact, as there are no management measures or regulations associated with the designation of EFH, nor are such conservation measures required. There may, however, be indirect impacts arising from the changes to the designation of EFH, as those text and map descriptions represent the legal description of EFH that are used by NMFS to provide EFH consultations for fishing and non-fishing effects on EFH as directed by the MSA.

Chapters 5-12 summarize the proposed FMP changes to the respective FMPs for EFH text descriptions and maps (component 1), fishing activities that may adversely affect EFH (component 2), Non-fishing activities that may adversely affect EFH (component 4), prey species (component 7), and EFH research

and information needs (component 9), and expected effects of action alternative (Alternative 2) for the BSAI Groundfish, GOA Groundfish, BSAI Crab, Arctic and Salmon FMPs. Appendices A-E contain the detailed proposed amendment text for the BSAI Groundfish, GOA Groundfish, BSAI King and Tanner Crab, Arctic, and Salmon FMPs.

ES Table 1 Council action to amend FMPs based on the 2023 EFH 5-year Review.

EFH component	Council FMP	Recommended change
Component 1: EFH descriptions and identification for individual species	BSAI Groundfish	Initiate amendments for all 41 species or complexes in the FMP, to revise the EFH text descriptions and maps.
	GOA Groundfish	Initiate amendments for all 46 species or complexes in the FMP, to revise the EFH text descriptions and maps.
	BSAI Crab	Initiate amendments for all 5 species in the FMP, to revise the EFH text descriptions and maps.
	Arctic	Initiate amendments for all 3 species in the FMP , in the FMP, to revise the EFH text descriptions and maps.
	Salmon	Initiate amendments for all 5 species in the FMP, to correct the EFH maps by replacing the distribution maps with the EFH maps.
Component 2: Fishing activities that may adversely affect EFH	BSAI Groundfish, GOA Groundfish and BSAI Crab FMP	Update FE information in the FMPs to reflect updates to the FE model, analysis, and evaluation for the 2023 EFH 5 year Review.
Component 4: Non-fishing activities that may adversely affect EFH	All FMPs except the Scallop FMP ¹	Initiate amendments in the FMPs to revise EFH appendices where conservation recommendations for non-fishing activities are described.
Component 7: Prey of EFH species	BSAI Groundfish	Revise text or habitat description table information for 2 species of BSAI sharks, BSAI Pollock.
	GOA Groundfish	Revise text or habitat description table information for GOA Pacific cod.
	BSAI Crab	Revise text or habitat description table information for red king crab.
Component 9: Research and information needs	BSAI Groundfish, GOA Groundfish, BSAI Crab, Salmon, and Arctic FMPs ¹	Initiate amendments to update the section on research and information needs.

¹ Absent further Council clarification, it is staff's interpretation that the Council's intent was to exclude the Salmon FMP from non-fishing activities that may adversely affect EFH (component 4) and research and information needs (component 9) updates, given the information was not included in the 2023 Summary report. As such, the proposed FMP amendment text for the Salmon FMP as seen in Appendix E does not include changes to EFH conservation recommendations for non-fishing activities given it was not adequately assessed for this 5-year review. Appendix E does, however, contain updates to the EFH maps based on Echave et al (2012).

1 Introduction

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) includes provisions concerning the identification and conservation of Essential Fish Habitat (EFH). The MSA defines EFH as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” The National Marine Fisheries Service (NMFS) and regional Fishery Management Councils (Councils) must describe and identify EFH in fishery management plans (FMPs), minimize to the extent practicable the adverse effects of fishing on EFH, and identify other actions to encourage the conservation and enhancement of EFH. Federal agencies that authorize, fund, or undertake actions that may adversely affect EFH must consult with NMFS, and NMFS must provide conservation recommendations to federal and state agencies regarding actions that would adversely affect EFH. Councils also have the authority to comment on federal or state agency actions that would adversely affect the habitat, including EFH, of managed species.

In 2005, the Council amended five of its FMPs to address MSA requirements for EFH. The Council and NMFS developed a comprehensive environmental impact statement (NMFS 2005, EFH EIS) evaluating alternatives and environmental consequences for three actions: (1) describing and identifying EFH for fisheries managed by the Council; (2) adopting an approach for the Council to identify Habitat Areas of Particular Concern within EFH; and (3) minimizing to the extent practicable the adverse effects of Council-managed fishing on EFH. With respect to the description and identification of EFH, the EFH EIS identified that the action could have indirect negative effects for the industries and other entities that may face requirements (for federally managed fishing activities) or recommendations (for non-fishing activities) that are designed to protect fish habitats. The EFH EIS also identified that there could be indirect positive effects for the habitats and species that could be protected by measures resulting indirectly from EFH description and identification, including measures to minimize adverse effects of fishing on EFH and to minimize effects of non-fishing activities on EFH.

Each of North Pacific Fishery Management Council’s (Council) FMPs contains the following EFH components:

1. EFH Descriptions and Identification;
2. Fishing activities that may adversely affect EFH;
3. Non-MSA fishing activities that may adversely affect EFH;
4. Non-Fishing activities that may adversely affect EFH;
5. Cumulative impacts analysis;
6. EFH Conservation and Enhancement Recommendations;
7. Prey species list and any locations;
8. Habitat Areas of Particular Concern (HAPC) identification;
9. Research and Information needs; and
10. Recommendation to review EFH every 5 years.

As clarification for component 10, the Final Rule implementing the EFH provisions of the MSA (EFH final rule) (67 FR 2343, 2002) states that Councils and NMFS should review EFH components every 5 years, and revise or amend, as warranted, based on available information. The EFH final rule notes that the review should also evaluate:

published scientific literature,
unpublished scientific reports,
information solicited from interested parties, and
previously unavailable or inaccessible data.

1.1 2023 EFH 5-year Review

The 2023 EFH 5-year Review assessed EFH descriptions in four out of six of the Council’s FMPs—

the FMP for Groundfish of the Bering Sea and Aleutian Islands Management Area (BSAI Groundfish FMP),
the FMP for Groundfish of the Gulf of Alaska (GOA Groundfish FMP),
the FMP for Bering Sea/Aleutian Islands King and Tanner Crabs (BSAI crab FMP), and
the FMP for Fish Resources of the Arctic Management Area (Arctic FMP).

The FMPs for the Salmon Fisheries in the EEZ off Alaska (Salmon FMP) and Scallop Fishery off Alaska (Scallop FMP) were not reviewed during this iteration. However, the analysts recommended amending the Salmon FMP to update the EFH maps based on Echave et al (2012), as described in Chapter 9 of this document, and more extensively in the [2023 EFH 5-year Review Summary Report](#), presented to the Council in February 2023 (Harrington et al. 2023). This is the Council's fourth review of EFH in the FMPs. Prior reviews were conducted in 2005, 2010, and 2017. The 2023 EFH 5-year Review, completed in February 2023, describes new information and analysis, and the Council decisions on EFH revisions, since the 2017 EFH 5-year Review.

The EFH 5-year Review is primarily conducted by NMFS and Council staff using new information available since the completion of the previous review. Staff use information from published or unpublished scientific literature or scientific data that meets acceptable standards of scientific review, as directed in the EFH Final Rule. Staff have also noted, as part of this review, unpublished studies that are currently underway or whose results are under review, which may provide further insight on EFH in the future.

The Council's role with respect to the EFH 5-year Review is to receive a report on the review and determine whether any of the new information from the last 5 years, highlighted in the review, warrants change to management (i.e., amendments to the FMPs). The Council considers all 10 EFH components for each FMP, including individual species EFH descriptions, EFH conservation and enhancement recommendations for fishing and non-fishing effects on EFH, and potential identification of HAPCs. Any change to the FMP text, no matter how minor, requires an FMP amendment.

The 2023 EFH 5-year Review builds on the work from the previous EFH Reviews, including the EFH roadmap, review process, and using species distribution models to map EFH and the Fishing Effects (FE) model in the evaluation of FE to EFH. The 2023 EFH 5-year review evaluated new environmental and habitat data, improved the models to map EFH, updated the model to evaluate fishery impacts on EFH, updated the assessment of non-fishing impacts on EFH, and assessed information gaps and research needs. Iterative review of the EFH supporting documents was conducted by the Council's Ecosystem Committee (ECO), the Scientific and Statistical Committee (SSC), the Advisory Panel (AP), and the Council in February 2022, October 2022, and February 2023. The final EFH 5-year Review Summary Report, presented to the Council in February 2023, incorporates suggestions from the Council and its advisory bodies.

The 2023 EFH 5-year Review fulfills the recommendation to complete a 5-year Review of EFH. Based on this review, the Council recommended updates to the EFH descriptions and maps in five FMPs, except the Scallop FMP. The Council should note that the Salmon FMP is being updated with EFH maps from Echave et al. (2012), and that EFH maps and text descriptions for the Salmon FMP were not produced for the 2023 EFH 5-year Review. Staff have prepared an Omnibus Amendment Environmental Assessment (EA) package, as seen below.

The National Environmental Policy Act (NEPA) requires four components for an EA. The need for the proposed action is described in Chapter 1.2, and the alternatives in Chapter 2. The probable environmental impacts of the proposed action and alternatives are addressed in Chapter 4, but in detail in Chapters 5-12. The direct, indirect, and cumulative impacts of the alternatives and options are evaluated as appropriate. A list of agencies and persons consulted is included in Chapter 13.

The analysis identifies the potential impacts of each alternative, if any, and indicates whether the impacts are significant. If significant impacts are likely to occur, preparation of an environmental impact statement (EIS) is required. NEPA also requires an analysis of the potential cumulative effects of a proposed action and its alternatives. An EA must consider cumulative effects when determining whether an action significantly affects environmental quality. The Council on Environmental Quality (CEQ) regulations for implementing NEPA define cumulative effects as:

“effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.

Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.” (40 CFR 1508.1).

The concept behind cumulative effects analysis is to capture the total effects of many actions over time that would be missed if evaluating each action individually. Concurrently, the CEQ guidelines recognize that it is most practical to focus cumulative effects analysis on only those effects that are truly meaningful.

1.2 Purpose and Need Statement

At the February 2023 Council meeting, the Council adopted the following purpose and need statement for this action:

“The purpose of the proposed action is to comply with the Final Rule implementing the EFH provisions of the Magnuson-Stevens Act (MSA) (50 CFR Part 600, Subpart J). The EFH Final Rule states that a review of the EFH components of the Council’s FMPs should be completed at least every five years and the EFH provisions should be revised or amended, as warranted, based on the best available science contributing new information. Based on the 2023 EFH 5-year Review, substantial new information is available to revise many of the EFH components of five FMPs (BSAI Groundfish, GOA Groundfish, BSAI King and Tanner Crab, Arctic, and Salmon) to incorporate this new information.”

1.3 History of this Action

The 2023 EFH 5-year Review is documented in the 2023 EFH 5-year Review Summary Report (Harrington et al. 2023) and this EA. The final recommendations contained within the review are summarized in Table 1. At the February 2023 Council meeting, the Council voted to recommend FMP amendments to incorporate new information found in the 2023 EFH 5-year Review. This motion passed unanimously in support of modifications to the EFH text and maps in the FMPs.

The Council considered the following during the 2023 EFH 5-year Review:

Do the EFH descriptions and geographical distributions for individual species warrant revising in the FMP?

Should the FMPs be revised to reflect new information on their life history, biological/ habitat/ predator-prey associations, or fishery?

Is a new evaluation of the adverse effects of fishing on EFH needed?

Should any new conservation measures be considered to mitigate adverse effects of fishing?

Should the conservation and enhancement recommendations for non-fishing threats to EFH be revised in the FMPs?

Is there a need to identify new HAPC priorities, and thus initiate a call for proposals for candidate sites to be considered for special management as HAPCs?

Does the Council want to identify new directions for EFH research for the next 5 years?

Based on the review of the report and associated materials, the Council initiated an analysis to revise EFH components in five of the Council FMPs. Information relevant to maintaining and restoring EFH is now published annually in the Ecosystem Status Reports (ESRs) (e.g., Siddon 2022). At this time, the Council elected to not initiate a call for HAPC proposals, resulting in no changes to the current HAPCs in conjunction with the 2023 EFH 5-year Review.

The FMP amendments would make the following changes to the FMPs:

1. BSAI Groundfish FMP, GOA Groundfish FMP, BSAI crab FMP, and Arctic FMP: update EFH text descriptions and replace existing maps in the FMPs with maps that represent the 95th percentile EFH for each species and life stage, as available.
2. Salmon FMP: replace the distribution maps with EFH maps based on Echave et al. (2012).
3. BSAI Groundfish FMP, GOA Groundfish FMP, BSAI Crab FMP: updates based on the updated information for FE to reflect updates to the FE model, analysis and evaluation.
4. BSAI Groundfish FMP, GOA Groundfish FMP, BSAI Crab FMP, Arctic FMP, and Salmon FMP: update EFH conservation recommendations for non-fishing activities.
5. BSAI Groundfish FMP, GOA Groundfish FMP, and BSAI Crab FMP: revise text of prey species descriptions for two species of BSAI sharks, BSAI pollock, GOA Pacific cod, and BSAI red king crab.
6. BSAI Groundfish FMP, GOA Groundfish FMP, BSAI Crab FMP, Arctic FMP, and Salmon FMP: revise EFH appendices with updated research and information needs,

Table 1 Council action to amend FMPs based on the 2023 EFH 5-year Review.

EFH component	Council FMP	Recommended change
Component 1: EFH descriptions and identification for individual species	BSAI Groundfish	Initiate amendments for all 41 species or complexes in the FMP, to revise the EFH text descriptions and maps.
	GOA Groundfish	Initiate amendments for all 46 species or complexes in the FMP, to revise the EFH text descriptions and maps.
	BSAI Crab	Initiate amendments for all 5 species in the FMP, to revise the EFH text descriptions and maps.
	Arctic	Initiate amendments for all 3 species in the FMP , in the FMP, to revise the EFH text descriptions and maps.
	Salmon	Initiate amendments for all 5 species in the FMP, to correct the EFH maps by replacing the distribution maps with the EFH maps.
Component 2: Fishing activities that may adversely affect EFH	BSAI Groundfish, GOA Groundfish and BSAI Crab FMP	Update FE information in the FMPs to reflect updates to the FE model, analysis, and evaluation for the 2023 EFH 5 year Review.
Component 4: Non-fishing activities that may adversely affect EFH	All FMPs except the Scallop FMP ¹	Initiate amendments in the FMPs to revise EFH appendices where conservation recommendations for non-fishing activities are described.

EFH component	Council FMP	Recommended change
Component 7: Prey of EFH species	BSAI Groundfish	Revise text or habitat description table information for 2 species of BSAI sharks, BSAI Pollock.
	GOA Groundfish	Revise text or habitat description table information for GOA Pacific cod.
	BSAI Crab	Revise text or habitat description table information for red king crab.
Component 9: Research and information needs	BSAI Groundfish, GOA Groundfish, BSAI Crab, Salmon and Artic FMPs ¹	Initiate amendments to update the section on research and information needs.

1.4 Documents Incorporated by Reference in this Analysis

This analysis relies heavily on the information and evaluation contained in EFH 5-year Review documents previously reviewed by the Council, and the BSAI Groundfish, GOA Groundfish, BSAI KTC, Arctic and Salmon FMPs. The documents listed below contain information about the EFH 5-year review component evaluations, and the fishery management areas, fisheries, marine resources, ecosystem, social, and economic elements of the fisheries off Alaska.

EFH 5-year Review Summary Report ([Harrington et.al, 2023](#))

The EFH 5-year Review summary report contains the updates to new environmental and habitat data, improving the models to map EFH, updating the model to evaluate fishery impacts on EFH, updating the assessment of non-fishing impacts on EFH, and assessing information gaps and research needs.

Fishing Effects Evaluation Discussion Paper ([Zaleski et. al, 2023](#))

This discussion paper reports the methods and results of the FE model and the evaluation of fishing effects on EFH for species of groundfish and crabs, including 27 AI species, 34 EBS species, and 42 GOA Groundfish species.

EFH Descriptions and Maps Discussion Paper ([Pirtle et. al, 2023](#))

This discussion paper provides updated maps and text descriptions for EFH, and includes a description of the new methodology used in the 2023 EFH 5-year Review.

Final Environmental Impact Statement (EIS) for EFH Identification and Conservation (NMFS, 2005)

The EFH EIS evaluates the long-term effects of fishing on benthic habitat features, as well as the likely consequences of those habitat changes for each managed stock, based on the best available scientific information.

Bering Sea and Aleutian Islands Groundfish Fishery Management Plan ([BSAI Groundfish FMP-NPFMC](#))

This Fishery Management Plan (FMP) governs groundfish fisheries of the Bering Sea and Aleutian Islands Management Area (BSAI). The FMP covers fisheries for all stocks of finfish and marine

invertebrates except salmonids, shrimps, scallops, snails, king crab, Tanner crab, Dungeness crab, corals, surf clams, horsehair crab, lyre crab, Pacific halibut, and Pacific herring.

Gulf of Alaska Groundfish Fishery Management Plan ([GOA Groundfish FMP- NPFMC](#))

This Fishery Management Plan (FMP) governs groundfish fisheries of the Gulf of Alaska (GOA). The FMP covers fisheries for all stocks of finfish except salmon, steelhead, Pacific halibut, Pacific herring, and tuna.

Bering Sea and Aleutian Islands King and Tanner Crab Fishery Management Plan ([BSAI KTC FMP- NPFMC](#))

This Fishery Management Plan (FMP) governs crab fisheries of the Bering Sea and Aleutian Islands Management Area (BSAI). The FMP covers 10 stocks of King and Tanner crab including: Eastern Bering sea tanner crab, Bristol Bay red king crab, Bering Sea Tanner crab, Pribilof Islands red king crab, Pribilof Islands blue king crab, Saint Matthew Island blue king crab, Norton Sound red king crab, Aleutian Islands golden king crab, Pribilof Islands golden king crab, and Western Aleutian Islands red king crab.

Arctic Fishery Management Plan ([Arctic FMP- NPFMC](#))

This Fishery Management Plan (FMP) governs commercial fishing for most species of fish within the Arctic Management Area.¹ The FMP governs commercial fishing for all stocks of fish, including all finfish, shellfish, or other marine living resources, except commercial fishing for Pacific salmon and Pacific halibut, which is managed under other authorities.

Salmon Fishery Management Plan ([Salmon FMP- NPFMC](#))

This Fishery management plan (FMP) established the Council's authority over the salmon fisheries in the federal waters off Alaska, from 3 to 200 miles offshore, then known as the U.S. Fishery Conservation Zone.

2 Description of Actions and Alternatives

This amendment package includes a series of actions for the Council's FMPs. The 2023 EFH 5-year Review addressed all of the Council's FMPs with the exception of the Scallop FMP. The Council put forth the following alternatives for analysis at the February 2023 meeting.

Alternative 1: No action/status quo – Do not amend the EFH sections of the FMPs with new EFH information identified in the 2023 5-year Review.

Alternative 2: PREFERRED – Amend the Council's FMPs to incorporate the updated EFH information based on the new and best available science information identified in the 2023 EFH 5-year Review.

- EFH component 1 (descriptions and identification). Amend 4 FMPs to update EFH descriptions and maps, including up to EFH Level 3 information on habitat-related vital rates. Add or revise the EFH text descriptions and add or replace the maps for—
 - 41 species or complexes in the BSAI Groundfish FMP,
 - 46 species or complexes in the GOA Groundfish FMP,
 - all five species in the BSAI Crab FMP, and
 - all three species in the Arctic FMP.
- For all five species in the Salmon FMP, amend the Salmon FMP by replacing the distribution maps with the EFH maps.
- EFH component 2 (fishing effects). Update the fishing effects (FE) information in the BSAI Groundfish, GOA Groundfish, and BSAI Crab FMPs to reflect updates to the FE model, analysis, and evaluation for the 2023 EFH 5-year Review.
- EFH component 4 (non-fishing effects). Revise the EFH appendices in the BSAI Groundfish, GOA Groundfish, BSAI Crab, Arctic, and Salmon FMPs where conservation recommendations for non-fishing activities are described.
- EFH component 7 (prey of EFH species). Revise text or habitat description table information for two species of BSAI sharks, BSAI pollock, GOA Pacific cod, and BSAI red king crab in the BSAI Groundfish, GOA Groundfish, and BSAI Crab FMPs.
- EFH component 9 (research and information needs). Revise the EFH appendices with updated research and information needs in the BSAI Groundfish, GOA Groundfish, BSAI Crab, and Arctic, and Salmon FMPs.

More detail on the specific revisions proposed under Alternative 2 is included in the sections that follow.

2.1 Component 1 – BSAI Groundfish

Alternative 1 – No Action; status quo

Alternative 2 – PREFERRED – Update EFH descriptions in the FMP consistent with the proposed amendment to the BSAI Groundfish FMP. Replace the existing EFH maps in the FMP with maps that represent the 95th percentile EFH maps for each species and life stage, as available.

2.2 Component 1 – GOA Groundfish

Alternative 1 – No Action; status quo

Alternative 2 – PREFERRED – Update EFH descriptions in the FMP consistent with the proposed amendment to the GOA Groundfish FMP. Replace the existing EFH maps in the FMP with maps that represent the 95th percentile EFH for each species and life stage, as available.

2.3 Component 1 - BSAI King and Tanner Crab

Alternative 1 – No Action; status quo

Alternative 2 – PREFERRED – Update EFH descriptions in the FMP consistent with the proposed amendment to the BSAI Crab FMP. Replace the existing EFH maps in the FMP with maps that represent the 95th percentile EFH for each species and life stage, as available.

2.4 Component 1 – Arctic Management Area

Alternative 1 – No Action; status quo

Alternative 2 – PREFERRED – Update EFH descriptions for all species in the FMP consistent with proposed amendment to the Arctic FMP. Replace the existing EFH maps in the FMP with maps that represent the 95th percentile EFH for each species and life stage, as available.

2.5 Component 1 – Salmon

Alternative 1 – No Action; status quo

Alternative 2 – PREFERRED – Update only marine EFH maps in the FMP consistent with the proposed amendment to the Salmon FMP. Replace the existing distribution maps with the EFH maps.

2.6 Component 2 – Fishing Effects

Alternative 1 – No Action; status quo

Alternative 2 – PREFERRED – Update the fishing effects (FE) information in the BSAI Groundfish, GOA Groundfish, and BSAI Crab FMPs to reflect updates to the FE model, analysis, and evaluation for the 2023 EFH 5-year Review.

2.7 Component 4 – Non-Fishing Activities

Alternative 1 – No Action; status quo

Alternative 2 – PREFERRED – Revise the EFH appendices in the BSAI Groundfish, GOA Groundfish, Crab, Arctic, and Salmon FMPs where conservation recommendations for non-fishing activities are described^{Error! Bookmark not defined.}.

2.8 Component 9 – EFH Research Priorities

Alternative 1 – No Action; status quo

Alternative 2 – PREFERRED – Revise the EFH appendices with updated research and information needs in the BSAI Groundfish, GOA Groundfish, BSAI Crab, Arctic, and Salmon FMPs^{Error! Bookmark not defined.}.

2.9 Rationale for changes to EFH descriptions and maps

The EFH Regulatory Guidelines (50 CFR 600.759 Subpart J) direct the Council to define EFH with the best scientific information available, including peer-reviewed literature, unpublished scientific reports, data files of government resource agencies, fisheries landing reports, and other sources of information. For the 2023 EFH 5-year Review, the Council relied on the assessment of topical experts to review the data and methods used to review and, if necessary, revise descriptions of EFH in waters of the United

States and assess the impacts of fishing and non-fishing activities on EFH. The preferred action alternatives identified are consistent with the recommendations from Federal and State agency experts with access to the best available scientific and other data and using peer-reviewed models and tools.

3 Methodology

3.1 Revisions to EFH Text Descriptions and Maps

EFH descriptions and identification consist of text descriptions and maps, all of which were re-evaluated in the 2023 EFH 5-year Review.

The EFH description by life history stage, in text and in maps, is included in the FMP, as well as an indicator for how much habitat information is known about each life history stage. This is the legal description of EFH, which NMFS uses for EFH consultations for fishing and non-fishing effects on EFH, as directed by the MSA. It is on the basis of these descriptions that evaluations are made by NMFS about whether an activity is likely to adversely impact EFH.

3.2 Modeling Methods for EFH Maps

The focus for EFH component 1, EFH maps and text descriptions, in the 2023 EFH 5-year Review was to modernize the 2017 single species distribution model (SDM) EFH mapping approach to an SDM ensemble approach as a new foundation to map EFH for the summer distribution of groundfishes and crabs using AFSC RACE-GAP summer bottom trawl survey data. Additionally, the FMP contains EFH maps for fall, winter, and spring as available from the 2017 Review; EFH mapping efforts for the 2023 EFH 5-year Review did not revise these other seasonal maps and they will remain in the FMP. This study is guided by the Alaska EFH Research Plan (Sigler et al. 2017) research priority 1 to characterize habitat utilization and productivity using the best available scientific information to accomplish the specific research objectives of the revised plan. In addition to defining EFH for groundfishes and crab, the 2023 5-year review was also able to map EFH for pelagic early life stages (PELS) of Pacific cod and sablefish, and provide EFH maps for Arctic FMP species for the first time.

Three primary modeling strategies were used in this EFH 5 year review to define EFH:

1. SDM ensemble EFH mapping approach (BSAI Groundfish, GOA Groundfish, and BSAI Crab FMPs) (Pirtle et al. 2023a, Pirtle et al. 2023b, Harris et al. 2022, Laman et al. 2022) resulting in EFH Level 1, 2, and 3 maps.
2. Individual based models (IBMs) were developed for pelagic early life stages of Pacific cod and sablefish in the GOA (Shotwell et al. In preparation, Gibson et al. 2023) resulting in EFH Level 2, and 3 maps.
3. Single (MaxEnt) SDM EFH maps using combined survey data for Arctic FMP species life stages resulting in EFH Level 1 and 3 maps (Marsh et al. In review).

This EFH 5 year review utilized various mapping and modeling strategies to best understand EFH for federally managed species in the FMP. The SDM ensemble EFH approach for the 2023 EFH 5-year Review described and mapped 31 North Pacific groundfish species in the Bering Sea (BS), 24 in the Aleutian Islands (AI), 41 in the GOA across up to three life stages. In addition, EFH is described and mapped for four crabs in the BS, two crabs in the AI, and one octopus in all three regions. The ensembles describing and mapping EFH in this study advance EFH information levels and refine EFH area maps for North Pacific species' life stages from none to Level 1 and from none or Level 1 to Level 2. This study also applies habitat-related vital rates from other studies to the SDMs to describe and map EFH Level 3 for the first time for eight species. The EFH descriptions and maps from this study comprise the bulk of new EFH component 1 information available for the 2023 EFH 5-year Review and also support the [EFH component 2 fishing effects evaluation](#) (Harris et al. In preparation, Pirtle et al. 2023a, Pirtle et al. 2023b, Harris et al. 2022, Laman et al. 2022).

Additionally, during this 5-year Review, EFH information was developed for the PELS of North Pacific groundfish species for GOA Pacific cod and sablefish. Shotwell et al. has developed a novel application of biophysical life-stage integrated IBMs to map EFH for PELS at Level 2 and Level 3, through case studies of Pacific cod and sablefish in the GOA Management Area, informed by spawning locations and a settled early juvenile stage SDM. This study has ultimately provided survival rate EFH maps for the PELS of these two species to demonstrate that IBM output can be used within the context of EFH. Once established, this new methodology may be explicitly applied to other groundfish and crab species in Alaska where IBMs have been developed (e.g., walleye pollock, POP, red king crab, snow crab), including as a starting reference for other co-occurring species with similar early life history strategies.

Due to the accelerated rate of climate change in the Arctic, there have been increased efforts to understand this dynamic region with many surveys occurring in recent years. This study developed SDM EFH maps for Arctic FMP species life stages, including Level 1 and Level 3 maps, concurrently with the Laman et al. study, to advance Arctic species EFH descriptions and maps current with the state of science for the region. Arctic FMP EFH descriptions consist of text descriptions and maps for the three target species, Arctic cod, saffron cod, and snow crab. New SDM EFH maps were developed for several life stages of each Arctic FMP species by the University of Alaska Fairbanks (UAF) and NMFS AKR ([Marsh et al. In review](#)).

3.3 EFH Text Description and Map Review by Stock Assessment Authors

An integral part of an EFH Review is stock assessment author review of EFH text descriptions, map delineations, and habitat information, including habitat association and prey species tables. For the EFH 5-year Review, each stock assessment author was asked to review the current FMP text and maps describing EFH for species or species complexes for the stocks they assess. Authors were asked to review EFH text descriptions, level of EFH information, habitat and prey information, and habitat disturbance information as a result of the FE evaluation. Authors were also asked to recommend any habitat areas of particular concern for their stock. Authors suggested necessary changes and updates, if appropriate, for each life history stage and any information or literature available since the 2017 revision that should be included in the EFH description. Finally, authors were asked to review the current maps of EFH in the FMP and compare them to the new maps produced from the models, and conclude whether existing maps adequately depict EFH for their species, or whether updated maps better represented EFH. In some cases, information is not sufficient to describe and map EFH. Stock assessment authors recommended updates to EFH text descriptions for all FMPs and updated maps were recommended for all FMPs. Most often, text recommendations were editorial and updated basic life history information and literature. As a note, Salmon and Scallop EFH definitions were not revised for this review; therefore, no formal stock assessment author review was conducted for these species. The final recommendations were presented in the EFH Summary Report that the Council reviewed in February 2023 (Harrington et al. 2023). The comprehensive EFH revisions are included in Appendices A–E of this document. These appendices represent the changes that would be made to the FMPs under Alternative 2. The changes to the species' text and map descriptions are addressed in more detail under each specific action.

3.4 Impacts Assessment Incorporated by Reference from 2005 EFH EIS

These amendments to the EFH provisions in the Council's FMPs would not substantively change the impacts of EFH as analyzed in the 2005 EFH EIS (NMFS 2005) and in the 2012 Environmental Assessment (EA) for the 2010 5-year Review (NMFS 2012). While EFH text and map descriptions have changed for the species' life stages in the four FMPs under review, other management measures will not change. The total extent of EFH proposed in these amendments is unchanged compared to previous definitions because almost all waters are identified as EFH for at least one species. This is due to broad fish distribution patterns, diverse habitat requirements, and the large number of species managed. Further,

EFH is described for each species' life stage. The number of EFH species assessed exceeds 75 species covered by the six Council FMPs.

The Council and NMFS developed a comprehensive EFH EIS (NMFS 2005) evaluating alternatives and environmental consequences for three actions: (1) describing and identifying EFH for fisheries managed by the Council, (2) adopting an approach for the Council to identify HAPC within EFH, and (3) minimizing to the extent practicable the adverse effects of Council-managed fishing on EFH.

The Council used an extensive public process to develop the alternatives for the EIS, including numerous public meetings of the Council and its EFH Committee. With respect to the description and identification of EFH, it was identified that the action could have indirect negative effects for the industries and other entities that may face requirements (for federally managed fishing activities) or recommendations (for non-fishing activities) that are designed to protect fish habitats. Such negative effects could be short-term for the fishing industry; longer-term effects are less certain, especially for sectors that may benefit from enhanced habitat productivity resulting from EFH description and identification. The action identified that there would likely be indirect positive effects for the habitats and species that could be protected by measures resulting indirectly from EFH description and identification. Such measures would include either required measures to minimize adverse effects of fishing on EFH or recommended measures to minimize effects of non-fishing activities on EFH.

With respect to the effects of fishing on EFH, the analysis indicated that there are long-term effects of fishing on benthic habitat features off Alaska, and acknowledged that considerable scientific uncertainty remains regarding the consequences of such habitat changes for the sustained productivity of managed species. Nevertheless, based on the best available scientific information, the EIS concluded that the effects on EFH are minimal because the analysis found no indication that continued fishing activities at the current rate and intensity would alter the capacity of EFH to support healthy populations of managed species over the long term. The analysis concluded that no Council-managed fishing activities have more than minimal and temporary adverse effects on EFH, which is the regulatory standard requiring action to minimize adverse effects under the MSA. Importantly, the Council initiated a variety of practicable management actions and precautionary measures to conserve and protect EFH.

FE on EFH were reconsidered in the 2010 and 2017 EFH 5-year Reviews and again more comprehensively in the 2023 EFH 5-year Review. For the 2023 5-year Review, the Council re-evaluated the effects of fishing activities on EFH, including updating the FE model used in the 2017 EFH 5-year Review. The impact of fishing and changes in habitat disturbance from fishing since 2003 were evaluated by each of the stock assessment authors to determine whether there would be any change in impact for their assessed species. None of the stock assessment authors elevated their species for mitigation measures against the impacts of fishing gear to EFH.

The affected environment, fishing impacts, and cumulative effects analyses from the 2005 EFH EIS (NMFS 2005) is incorporated by reference into this analysis. The amendments that would result should Alternative 2 be adopted in Actions 1 through 5 would result in changes to the existing EFH descriptions and identification, to incorporate more recent information, improve mapping, and identify new EFH descriptions and maps for species' life stages without an EFH description or map since the existing descriptions and identifications were compiled. None of the proposed changes would require regulatory action, and the 2023 EFH 5-year Review concluded that no change to the 2005 conclusions on the evaluation of FE on EFH was warranted based on new information.

4 Environmental Impacts

This chapter evaluates the potentially affected environment and the degree of the impacts of the alternatives and options on habitat, together with relevant past, present, and reasonably foreseeable actions (RFFAs). Specific analysis of expected effects of the proposed action alternative for components 1,2,4, and 9 of the 2023 EFH 5-year review can be found in Chapters 5-12.

Recent and relevant information, necessary to understand the affected environment for each resource component, is summarized in the relevant section below. For each resource component, the analysis identifies the potential impacts of each alternative, and evaluates these impacts. If significant impacts are likely to occur, preparation of an EIS is required. Although an EA should evaluate economic and socioeconomic impacts that are interrelated with natural and physical environmental effects, economic and social impacts by themselves are not sufficient to require the preparation of an EIS (see 40 CFR 1508.14). Resource Components Addressed in the Analysis

Table 2 shows the components of the human environment and whether the proposed action and its alternatives have the potential to impact that resource component and thus require further analysis. Extensive environmental analysis on all resource components is not needed in this document because the proposed action is not anticipated to have environmental impacts on all resource components. The effects of the alternatives on the resource components would be caused by an update to the habitat information in the proposed FMPs based on the information provided in the 2023 EFH 5-year review. Given that the 2023 EFH 5-year Review findings were consistent with the 2005 EFH EIS (Section 3.4), and no Council-managed fishing activities have more than minimal and temporary adverse effects on EFH there are no expected effects on groundfish, prohibited species, ecosystem component species, marine mammals, seabirds, ecosystem, or social and economic component resources. Additionally, the proposed FMP amendments are informational updates based on the best scientific information available for habitat only as a result of the 2023 EFH 5-year review. Consequently, further analysis in this chapter is included only for the habitat resource component, the only resource component which the proposed action may impact.

Table 2 Resources potentially affected by the proposed action and alternatives.

Potentially affected resource component							
Groundfish	Prohibited Species	Ecosystem Component Species	Marine Mammals	Seabirds	Habitat	Ecosystem	Social and economic
N	N	N	N	N	Y	N	N

N = no impact anticipated by each alternative on the component.
 Y = an impact is possible if each alternative is implemented.

4.1 Effects of Aggregate Past, Present, and Reasonably Foreseeably Future Actions

This EA analyzes the effects of each alternative and the effects of past, present, and RFFA in this section. Based on Table 2, the resource with potentially meaningful effects is habitat. The aggregate effects on the other resources have been analyzed in numerous documents and the impacts of this proposed action and alternatives on those resources is minimal, therefore there is no need to conduct an additional aggregate impacts analysis.

Chapter 4.2 provides a review of the relevant past, present, and RFFA that may result in aggregate effects on habitat analyzed in this document.

Actions are understood to be human actions (e.g., a designation of northern right whale critical habitat in the Pacific Ocean), as distinguished from natural events (e.g., an ecological regime shift). CEQ regulations require consideration of actions, whether taken by a government or by private persons, which are reasonably foreseeable. This requirement is interpreted to indicate actions that are more than merely

possible or speculative. In addition to these actions, this aggregate effects analysis includes the effects of climate change.

Actions are considered reasonably foreseeable if some concrete step has been taken toward implementation, such as a Council recommendation or NMFS's publication of a proposed rule. Actions only "under consideration" have not generally been included, because they may change substantially or may not be adopted, and so cannot be reasonably described, predicted, or foreseen. Identification of actions likely to impact a resource component within this action's area and time frame will allow the public and Council to make a reasoned choice among alternatives.

4.2 Habitat

Fishing operations may change the abundance or availability of certain habitat features used by managed fish species to spawn, breed, feed, and grow to maturity. These changes may reduce or alter the abundance, distribution, or productivity of species. The effects of fishing on habitat depend on the intensity of fishing, the distribution of fishing with different gears across habitats, and the sensitivity and recovery rates of specific habitat features.

In 2005, NMFS and the Council completed the EIS for EFH Identification and Conservation in Alaska (NMFS 2005b). The EFH EIS evaluated the long-term effects of fishing on benthic habitat features, as well as the likely consequences of those habitat changes for each managed stock, based on the best available scientific information. The EFH EIS also described the importance of benthic habitat to different groundfish species and the past and present effects of different types of fishing gear on EFH. Based on the best available scientific information, the EIS analysis concluded that despite persistent disturbance to certain habitats, the effects on EFH are minimal because the analysis finds no indication that continued fishing activities at the current rate and intensity would alter the capacity of EFH to support healthy populations of managed species over the long term. The EIS concluded that no Council managed fishing activities have more than minimal and temporary adverse effects on EFH for any FMP species, which is the regulatory standard requiring action to minimize adverse effects under the MSA (50 CFR 600.815(a)(2)(ii)). Additionally, the analysis indicated that all fishing activities combined have minimal, but not necessarily temporary, effects on EFH.

The Council and NMFS have updated available habitat information, and their understanding of the impacts of fishing on habitat, in periodic 5-year reviews of the EFH components in the Council fishery management plans (NPFMC and NMFS 2010) and (NPFMC and NMFS 2016). These 5-year reviews, including the 2023 EFH 5-year Review have not indicated findings different from those in the 2005 EFH EIS with respect to fishing effects on habitat, although new and more recent information has led to the refinement of EFH for a subset of Council-managed species.

4.2.1 Effects of the Alternatives

The effects of the alternatives on habitat would be updating the EFH information in the BSAI groundfish, GOA Groundfish, BSAI KTC, Arctic, and Salmon FMPs (Table 1) based on the best available scientific information produced in the 2023 EFH 5-year Review. As a note, updates to the Salmon FMP are housekeeping consistent with updating EFH to include the best available science; however, maps and text descriptions of EFH were not produced in the 2023 EFH 5-year review for the Salmon FMP. The potential change in habitat impacts as a result of the alternatives are minimal because no changes to fishery operations or fishing activity would occur based on the information provided in the EFH 2023 5-year review. The 2023 EFH 5-year Review concluded that no Council managed fishing activities have more than minimal and temporary adverse effects on EFH for any FMP species, which is the regulatory standard requiring action to minimize adverse effects under the MSA (50 CFR 600.815(a)(2)(ii)).

4.2.2 Effects of Aggregate Past, Present, and Reasonably Foreseeable Actions on Habitat

There are no RFFAs that are identified as likely to have an impact on habitat based on updating the EFH information for FMP species as a result of the 2023 EFH 5-year review.

4.2.3 Cumulative Impacts

Considering the direct impacts of the proposed action, which are limited to updating EFH information for BSAI and GOA Groundfish, BSAI Crab, Arctic and Salmon FMP species, when added to the impacts of past and present actions previously analyzed in other documents that are incorporated by reference, and the impacts of the RFFAs actions listed above, the aggregate impacts of the proposed action are determined to be not significant.

The proposed actions contemplated in this amendment package differ very little from the actions that were comprehensively analyzed in the 2005 EFH EIS. In many cases, the proposed revisions to the EFH description are solely to update new information, and as such are largely technical or housekeeping changes. For those species for which an EFH text or map description has been proposed for a particular life history stage, the amendment would provide the best available information for these text and map descriptions, ensuring the most accurate information possible based on best available science is used to describe and map EFH for these species. Providing more accurate EFH information could be beneficial to species as EFH is considered in the management of those species. A change in the designation of EFH has no direct impact, as there are no management measures or regulations associated with the designation of EFH, nor are such conservation measures required. There may, however, be indirect impacts arising from the changes to the designation of EFH, as those text and map descriptions represent the legal description of EFH that are used by NMFS to provide EFH consultations for fishing and non-fishing effects on EFH as directed by the MSA.

In all cases, the refinement to the text and maps improves the identification of EFH, and any new area that is identified has already been designated as EFH for one of the other Alaska marine species. The total aggregated area of EFH description and identification for all managed species is unchanged as a result of this amendment. As such, federal agencies that conduct both fishing and non-fishing actions in that area are already required to consult with NMFS on EFH in that area.

Chapters 5-12 detail the proposed FMP amendment changes, and reiterate that the effects under the proposed action are deemed to not be significant.

5 Component 1 – BSAI Groundfish FMP Amendments

Table 3 lists the levels of EFH information available as a result of the 2023 EFH 5-year Review for species and species complexes for which EFH is currently identified in the BSAI Groundfish FMP. Level 2 is habitat-related density or abundance information is available to determine EFH for the life stage, Level 1 is information is available to determine the general distribution area of EFH, and “0” indicates that insufficient information is available. EFH has not been described for grenadiers, sculpin, and the forage fish complex because they are ecosystem component species. Shark EFH was not updated during the 2023 review.

Table 3 The levels of EFH information available as a result of the 2023 EFH 5-year Review for species and species complexes in the BSAI Groundfish FMP.

Species/Complex	Life Stage					
	Egg	Larvae	Early Juvenile pelagic	Early Juvenile settled	Subadult	Adult
Alaska plaice	1	1	0	2	2	2
Arrowtooth flounder	1	1	1	2	2	2
Atka mackerel	1	1	1	0	2	2
Blackspotted/Rougheye rockfish complex	1	1	1	0	2	2
Flathead sole/Bering flounder complex	0	0	0	0	2	
Bering flounder	0	0	0	0	2	2
Flathead sole	1	1	1	2	2	2
Greenland turbot	1	1	1	0	2	2
Kamchatka flounder	1	1	1	0	2	2
Northern rock sole	0	1	1	2	2	2
Northern rockfish	1	1	1	0	2	2
Octopus	0	0	--	0	0	
Giant octopus	0	0	--	0	2	
Other flatfish complex	1	1	1	0	2	
Butter sole	0	0	0	0	2	
Deepsea sole	0	0	0	0	2	
Dover sole	0	0	0	0	2	2
English sole	0	0	0	1	1	2
Longhead dab	0	0	0	0	2	
Rex sole	0	0	0	2	2	2
Sakhalin sole	0	0	0	0	2	2
Southern rock sole	0	0	0	1	2	2
Starry flounder	0	0	0	1	2	2
Other rockfish complex	1	1	1	0	2	
Dusky rockfish	1	1	1	0	2	2
Harlequin rockfish	1	1	1	0	2	2
Shortspine thornyhead	0	0	0	0	2	2
Pacific cod	0	1	1	3	2	2
Pacific ocean perch	1	1	1	2	2	2
Sablefish	0	0	0	2	2	2
Shortraker rockfish	1	1	1	0	2	2
Skate complex	1	1	--	1	2	
Alaska skate	0	0	--	0	2	2
Aleutian skate	0	0	--	0	2	2
Bering skate	0	0	--	0	2	2

Species/Complex	Life Stage					
	Egg	Larvae	Early Juvenile pelagic	Early Juvenile settled	Subadult	Adult
Big skate	0	0	--	0	2	0
Mud skate	0	0	--	0	2	2
Whiteblotched skate	0	0	--	0	2	2
Walleye pollock	1	1	1	3	2	2
Yellowfin sole	1	1	1	2	2	2

5.1 Description of Alternatives

Alternative 1 – No Action; status quo

Alternative 2 – Update EFH descriptions in the FMP consistent with the proposed amendment to the BSAI Groundfish FMP. Replace the existing EFH maps in the FMP with maps that represent the 95th percentile EFH maps for each species and life stage, as available.

5.2 Recommended Revisions for Individual Species

A summary of the recommendations is provided below for each individual species or species complex for which EFH is defined in the BSAI Groundfish FMP. The suggested EFH description for each species, including maps, may be found in Appendix A for the proposed amendment to the BSAI Groundfish FMP.

Alaska plaice

- Expand EFH text description and provide editorial changes
- Add SDM top contributing covariates informing habitat-related distribution and abundance
- Update summer distribution maps for subadults and adults
- Add summer distribution map for settled early juveniles and subadults in the Bering Sea
- Increase settled early juveniles and subadults in the Bering Sea to Level 2

Arrowtooth flounder

- Expand EFH text description and provide editorial changes
- Add SDM top contributing covariates informing habitat-related distribution and abundance
- Update life history and general distribution
- Update literature
- Updates to habitat associations table
- Update summer distribution maps for subadults and adults
- Add summer distribution maps for settled early juveniles
- Increase settled early juveniles to Level 2

Atka mackerel

- Expand EFH text description and provide editorial changes
- Add SDM top contributing covariates informing habitat-related distribution and abundance
- Update literature
- Update life history and general distribution
- Update summer distribution maps for subadults and adults
- Increase Bering Sea adults to Level 2

Blackspotted/Rougheye rockfish complex

- Combine species in SDM ensemble EFH map by request of stock assessment author
- Expand EFH text description and provide editorial changes

Add SDM top contributing covariates informing habitat-related distribution and abundance
Update life history and general distribution
Update literature
Updates to habitat associations table
Update summer distribution maps for subadults and adults with combined species maps
Increase subadults and adults to Level 2

Flathead sole/Bering flounder complex

Bering flounder

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update life history and general distribution
Update literature
Add summer distribution map for subadults and adults in the Bering Sea
Add subadult/adult species complex map and increase to Level 2 in the Bering Sea
Increase subadults and adults in the Bering Sea to Level 2

Flathead sole

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update life history and general distribution
Update literature
Update summer distribution maps for subadults and adults
Add summer distribution map for settled early juveniles
Increase settled early juveniles to Level 2
Correct pelagic early juvenile to Level 1

Forage fish

Remove; forage fish are in the ecosystem component

Giant octopus

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Add summer distribution maps for subadult/adult
Increase Bering Sea subadults/adults to Level 2

Greenland turbot

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update summer distribution maps for subadults and adults
Increase adults in the Aleutian Islands to Level 2

Grenadier

Remove; grenadier are in the ecosystem component

Kamchatka flounder

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update summer distribution maps for subadults and adults

Correct subadults and adults to Level 2

Northern rock sole

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update summer distribution maps for subadults and adults
Add summer distribution maps for settled early juveniles
Increase settled early juveniles to Level 2
Correct subadults and adults to Level 2

Northern rockfish

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update literature
Update summer distribution maps for subadults and adults
Increase Aleutian Islands subadults to Level 2
Increase Bering Sea adults to Level 2

Octopus

Giant octopus is a single species representing the complex (see above)

Other flatfish complex

Expand EFH text description and provide editorial changes
Add AI and BS subadult/adult complex maps, a compilation of SDM EFH maps for species in the complex, to account for EFH of unmapped species
Increase species complex to Level 2

Butter sole

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Add summer distribution map for subadults/adults in the Bering Sea
Increase Bering Sea subadult/adult to Level 2

Deepsea sole

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update literature
Add summer distribution map for subadults/adults in the Bering Sea
Increase Bering Sea subadult/adult to Level 2

Dover sole

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update summer distribution maps for subadults and adults
Increase subadults and adults to Level 2

English sole

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Add summer distribution map for adults in the Aleutian Islands

Increase adults in the Aleutian Islands to Level 2

Longhead dab

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Add summer distribution map for subadults/adults in the Bering Sea
Increase Bering Sea subadult/adult to Level 2

Rex sole

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Add summer distribution map for Bering Sea settled early juveniles
Update summer distribution maps for subadults and adults
Increase settled early juveniles to Level 2

Sakhalin sole

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Add summer distribution map for Bering Sea subadults and adults
Increase subadults and adults to Level 2

Southern rock sole

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
No new EFH map for Bering Sea subadults and adults due to data limitations (no map change)
Increase Aleutian Islands subadult and adult to Level 2

Starry flounder

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Add summer distribution map for Bering Sea subadults and adults
Increase subadults and adults to Level 2

Other rockfish complex

Expand EFH text description and provide editorial changes
Add EFH map for the complex in the Aleutian Islands, a compilation of SDM EFH maps for species in the complex, to account for EFH of unmapped species
Increase species complex to Level 2

Dusky rockfish

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update summer distribution maps for subadults and adults
No new SDM EFH map for Bering Sea adults due to data limitations (no map change)
Increase Aleutian Islands subadults and adults to Level 2

Harlequin rockfish

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update summer distribution maps for subadults and adults

No new SDM EFH map for Aleutian Islands subadults due to data limitations (no map change)
Increase Aleutian Islands adults to Level 2

Shortspine thornyhead rockfish

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update literature
Update summer distribution maps for subadults and adults
Increase subadults to Level 2
Increase Bering Sea adults to Level 2
Correct pelagic early juveniles to 0 (insufficient information)

Pacific cod

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update life history and general distribution
Update literature
Update summer distribution maps for subadults and adults
Add summer distribution maps for settled early juveniles in the Bering Sea
Correct pelagic early juveniles to Level 1
Increase settled early juveniles to Level 3 in the Bering Sea

Pacific ocean perch

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update life history and general distribution
Update literature
Update summer distribution maps for subadults and adults
Add summer distribution map for settled early juveniles
Increase Bering Sea subadult and adult to Level 2
Increase settled early juveniles to Level 2

Sablefish

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update life history and general distribution
Update literature
Update summer distribution maps for subadults and adults
Add summer distribution maps for settled early juveniles in the Bering Sea
Increase settled early juveniles in the Bering Sea to Level 2
Increase subadults and adults to Level 2

Sculpin

Remove; sculpin are in the ecosystem component

Sharks

Update prey species description table text

Shortraker rockfish

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update life history
Update summer distribution maps for subadults and adults
Increase subadults to Level 2
Increase Bering Sea adults to Level 2

Skate Complex

Expand EFH text description and provide editorial changes
Add EFH maps for the complex, a compilation of SDM EFH maps for species in the complex, to account for EFH of unmapped species
Increase species complex to Level 2

Alaska skate

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update summer distribution maps for subadults and adults
Increase Aleutian Islands subadults and adults to Level 2

Aleutian skate

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update summer distribution maps for subadults and adults
Increase Aleutian Islands subadults to Level 2
Increase adults to Level 2

Bering skate

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update summer distribution maps for Aleutian Islands subadults and adults
No new SDM EFH map for Bering Sea subadults and adults due to data limitations (no map change)
Increase Aleutian Islands subadults and adults to Level 2

Big skate

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Add summer distribution map for Bering Sea subadults
Increase Bering Sea subadults to Level 2

Mud skate

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update summer distribution maps for subadults and adults
Increase Bering Sea subadults to Level 2
Increase adults to Level 2

Whiteblotched skate

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance

Add summer distribution maps for subadults and adults
Increase subadults and adults to Level 2

Squid

Remove; squid are in the ecosystem component

Walleye pollock

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update life history and general distribution
Add summer distribution map for settled early juveniles
Update summer distribution maps for subadults and adults
Correct pelagic early juveniles to Level 1
Increase settled early juveniles to Level 2 in the Bering Sea and Level 3 in the Aleutian Islands
Update prey species description table text

Yellowfin sole

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update summer distribution maps for subadults and adults
Add summer distribution maps for settled early juveniles in the Bering Sea
Increase settled early juveniles in the Bering Sea to Level 2

At the February 2023 meeting, the Council recommended updating EFH descriptions in the FMP consistent with the findings detailed in the Summary Report (Harrington et al. 2023). The proposed FMP amendment text descriptions and accompanying maps can be found in Appendix A. The Council also moved to replace the existing EFH maps in the FMP with the summer 95th percentile maps for each species and life stage in the BSAI Groundfish FMP.

5.3 Expected Effects of Alternatives

Alternative 1 – No action; status quo

In 2018, the Council and NMFS updated EFH for all species or complexes in the BSAI Groundfish FMP ([83 FR 31340](#), July 5, 2018). The impacts analysis from the 2017 EA is incorporated here by reference ([NMFS 2018](#)). The no action alternative would result in no changes to EFH for any species or complexes in the Bering Sea (BS) and Aleutian Islands (AI). Federal agencies authorizing or funding activities in the BS that may affect EFH would remain required to consult with NMFS Habitat Conservation Division (HCD) to identify recommended measures, if necessary, to mitigate impacts to EFH that are more than minimal or not temporary. Therefore, the overall direct impacts of the no action alternative are not significant.

Alternative 2 – PREFERRED – Amend the FMP to update EFH descriptions in the FMP consistent with the proposed amendment to the BSAI Groundfish FMP. Replace the existing EFH maps in the FMP with maps that represent the 95th percentile EFH maps for each species and life stage, as available.

Alternative 2 will result in improvements to the EFH text descriptions and maps for all BSAI groundfish stocks to incorporate new data and new models to identify EFH based on habitat characteristics. Application of new models and new data will, for some species, result in reclassification from Level 1 to Level 2 or Level 3 data, consistent with the intent of the EFH Guidelines. No changes to management

would be required to address the impacts of commercial fishing on EFH. None of the proposed changes would require regulatory action. Therefore, the overall direct impacts of alternative 2 are not significant.

6 Component 1 – GOA Groundfish FMP Amendments

Table 4 lists the levels of EFH information available as a result of the 2023 EFH 5-year Review, for species and species complexes for which EFH is currently identified in the GOA Groundfish FMP. Level 2 is habitat-related density or abundance information is available to determine EFH for the life stage, Level 1 is information is available to determine the general distribution area of EFH, and “0” indicates that insufficient information is available. EFH has not been described for grenadiers, sculpin, and the forage fish complex because they are ecosystem component species.

Table 4 The levels of EFH information available as a result of the 2023 EFH 5-year Review, for species’ life stages and species complexes for target species in the GOA Groundfish FMP.

Species/Complex	Life Stage					
	Egg	Larvae	Early Juvenile pelagic	Early Juvenile settled	Subadult	Adult
Arrowtooth flounder	1	1	1	1	2	2
Atka mackerel	1	0	0	0	2	2
Blackspotted/Rougeye rockfish complex	1	1	1	0	2	2
<i>Deep water flatfish complex</i>	1	1	0	0	0	0
Dover sole	1	1	0	0	2	2
Dusky rockfish	1	1	1	0	2	2
Flathead sole	1	1	1	1	2	2
Northern rockfish	1	1	1	0	2	2
<i>Octopus</i>	0	0	--	0	0	
Giant octopus	0	0	--	0	2	
<i>Other rockfish complex demersal subgroup</i>	0	1	1	0	2	
Quillback rockfish	0	0	0	0	0	2
Rosethorn rockfish	0	0	0	0	2	2
Yelloweye rockfish	0	0	0	0	2	2
<i>Other rockfish complex slope subgroup</i>	0	1	1	0	2	
Greenstriped rockfish	0	0	0	0	0	2
Harlequin rockfish	0	0	0	0	2	2
Pygmy rockfish	0	0	0	0	2	

Species/Complex	Life Stage					
	Egg	Larvae	Early Juvenile pelagic	Early Juvenile settled	Subadult	Adult
Redbanded rockfish	0	0	0	0	2	2
Redstripe rockfish	0	0	0	0	2	2
Sharpchin rockfish	0	0	0	0	2	2
Silvergray rockfish	0	0	0	0	2	2
Pacific cod	3	3	3	3	2	2
Pacific ocean perch	1	1	1	3	2	2
Rex sole	1	1	0	1	2	2
Sablefish	3	3	3	3	2	2
<i>Shallow water flatfish complex</i>	1	1	1	1	2	
Alaska plaice	1	1	1	0	2	2
Butter sole	0	0	0	0	2	
English sole	0	0	0	1	2	2
Pacific sanddab	0	0	0	0	2	
Petrable sole	0	0	0	0	2	2
Northern rock sole	1	1	1	3	2	2
Sand sole	0	0	0	0	0	2
Slender sole	0	0	0	0	2	
Southern rock sole	1	1	1	3	2	2
Starry flounder	0	0	0	1	2	2
Yellowfin sole	1	1	1	3	2	2
<i>Shark Complex</i>	0	0	--	0	0	
Spiny dogfish	0	0	--	0	2	
Shortraker rockfish	1	1	1	0	2	2
<i>Skate complex</i>	1	1	--	1	2	
Alaska skate	0	0	--	0	2	2
Aleutian skate	0	0	--	0	2	2

Species/Complex	Life Stage					
	Egg	Larvae	Early Juvenile pelagic	Early Juvenile settled	Subadult	Adult
Bering skate	0	0	--	0	2	2
Big skate	0	0	--	0	2	2
Longnose skate	0	0	--	0	2	2
<i>Thornyhead rockfish</i>	0	0	1	0	2	2
Longspine thornyhead	0	0	0	0	0	1
Shortspine thornyhead	0	0	1	0	2	2
Walleye pollock	1	1	1	3	2	2

6.1 Description of Alternatives

Alternative 1 – No Action; status quo

Alternative 2 – Update EFH descriptions in the FMP consistent with the proposed amendment to the GOA Groundfish FMP. Replace the existing EFH maps in the FMP with maps that represent the 95th percentile EFH for each species and life stage, as available.

6.2 Recommended revisions for individual species

A summary of the recommendations is provided below for each individual species or species complex for which EFH is defined in the GOA Groundfish FMP.

Arrowtooth flounder

- Expand EFH text description and provide editorial changes
- Add SDM top contributing covariates informing habitat-related distribution and abundance
- Update life history and general distribution
- Update literature
- Update habitat association tables
- Add summer distribution map for settled early juveniles
- Update summer distribution maps for subadults and adults
- Increase settled early juveniles to Level 1

Atka mackerel

- Expand EFH text description and provide editorial changes
- Add SDM top contributing covariates informing habitat-related distribution and abundance
- Update literature
- Update life history and general distribution
- Add summer distribution map for subadults and adults, as previously subadults and adults were combined
- Increase subadult and adult to Level 2 as previously subadult/adult were combined

Blackspotted/Rougheye rockfish complex

Combine species in SDM ensemble EFH map by request of stock assessment author
Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update literature
Update summer distribution maps for subadults and adults with combined species maps
Increase subadults and adults to Level 2

Deep water flatfish complex

Dover sole is a single species representing the complex

Dover sole

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update summer distribution maps for subadults and adults

Dusky rockfish

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update summer distribution maps for subadults and adults
Increase subadults to Level 2

Flathead sole

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update life history and general distribution
Update literature
Add summer distribution map for settled early juveniles
Update summer distribution maps for subadults and adults
Increase settled early juveniles to Level 1

Forage fish

Remove; forage fish are in the ecosystem component

Grenadier

Remove; grenadier are in the ecosystem component

Northern rockfish

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update summer distribution maps for subadults and adults
Increase subadults to Level 2

Octopus

Giant octopus is a single species representing the complex

Giant octopus

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Add summer distribution map for subadult/adult

Increase subadults/adults to Level 2

Other rockfish complex demersal subgroup

Expand EFH text description and provide editorial changes
Add EFH map for the complex, a compilation of SDM EFH maps for species in the complex, to account for EFH of unmapped species
Increase species complex to Level 2

Quillback rockfish

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Add summer distribution map for adults, as previously subadults and adults were combined at Level 1
Increase adults to Level 2

Rosethorn rockfish

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update summer distribution maps for subadults and adults
Increase subadults and adults to Level 2

Yelloweye rockfish

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update summer distribution maps for subadults and adults
Increase subadults and adults to Level 2

Other rockfish complex slope subgroup

Expand EFH text description and provide editorial changes
Add EFH map for the complex, a compilation of SDM EFH maps for species in the complex, to account for EFH of unmapped species
Increase species complex to Level 2

Greenstriped rockfish

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Add summer distribution map for adults, as previously subadults and adults were combined at Level 1
Increase adults to Level 2

Harlequin rockfish

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update literature
Update summer distribution maps for subadults and adults
Increase subadults to Level 2

Pygmy rockfish

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance

Update summer distribution map for subadults/adults
Increase subadults and adults to Level 2

Redbanded rockfish

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update summer distribution maps for subadults and adults
Increase adults to Level 2

Redstripe rockfish

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update summer distribution map for subadults and adults
Increase subadults and adults to Level 2

Sharpchin rockfish

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update summer distribution map for subadults and adults
Increase subadults and adults to Level 2

Silvergray rockfish

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update summer distribution map for subadults and adults
Increase subadults and adults to Level 2

Pacific cod

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update life history and general distribution
Update literature
Update habitat association tables
Add summer distribution maps for eggs, pelagic early juveniles, and settled early juveniles
Update summer distribution maps for larvae, subadults, and adults
Increase eggs and larvae to Level 3
Increase pelagic and settled early juveniles to Level 3
Update prey species description table text

Pacific ocean perch

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Add summer distribution map for settled early juveniles
Update summer distribution maps for subadults and adults
Increase settled early juveniles to Level 3

Rex sole

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update literature

Add summer distribution map for settled early juveniles
Update summer distribution maps for subadults and adults
Increase settled early juveniles to Level 1

Sablefish

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update life history and general distribution
Update literature
Add summer distribution maps for eggs, pelagic early juveniles, and settled early juveniles
Update summer distribution maps for larvae, subadults, and adults
Increase eggs and larvae to Level 3
Increase pelagic and settled early juveniles to Level 3

Sculpin

Remove; sculpin are in the ecosystem component

Shallow water flatfish complex

Expand EFH text description and provide editorial changes
Add EFH map for the complex, a compilation of SDM EFH maps for species in the complex, to account for EFH of unmapped species
Increase species complex to Level 2

Alaska plaice

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Add summer distribution map for subadults
Increase subadults to Level 2
Correct pelagic early juveniles to Level 1

Butter sole

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Add summer distribution maps for subadults and adults
Increase subadults and adults to Level 2

English sole

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Add summer distribution maps for settled early juveniles, subadults, and adults
Increase settled early juveniles to Level 1
Increase subadults and adults to Level 2

Pacific sanddab

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Add summer distribution map for subadults/adults
Increase subadults/adults to Level 2

Petrale sole

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Add summer distribution maps for subadults and adults
Increase subadults and adults to Level 2

Northern rock sole

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Add summer distribution maps for settled early juveniles (northern and southern rock soles combined)
Update summer distribution maps for subadults and adults
Increase settled early juveniles to Level 3
Correct pelagic early juveniles to Level 1

Sand sole

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Add summer distribution map for adults
Increase adults to Level 2

Slender sole

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Add summer distribution map for subadults/adults
Increase subadults and adults to Level 2

Southern rock sole

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Add summer distribution maps for settled early juveniles (northern and southern rock soles combined)
Update summer distribution maps for subadults and adults
Increase settled early juveniles to Level 3
Correct pelagic early juveniles to Level 1

Starry flounder

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Add summer distribution maps for settled early juveniles, subadults, and adults
Increase settled early juveniles to Level 1
Increase subadults and adults to Level 2

Yellowfin sole

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Add summer distribution map for settled early juveniles
Update summer distribution maps for subadults and adults
Increase settled early juveniles to Level 3
Increase subadults to Level 2
Correct pelagic early juveniles to Level 1

Shorthead rockfish

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update summer distribution maps for subadults and adults
Increase subadults to Level 2

Skate Complex

Expand EFH text description and provide editorial changes
Add EFH maps for the complex, a compilation of SDM EFH maps for species in the complex, to account for EFH of unmapped species
Increase species complex to Level 2

Alaska skate

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update summer distribution maps for subadults and adults
Increase subadults and adults to Level 2

Aleutian skate

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update summer distribution maps for subadults and adults
Increase adults to Level 2

Bering skate

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update summer distribution maps for subadults and adults
Increase subadults and adults to Level 2

Big skate

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Add summer distribution maps for subadults and adults
Increase subadults and adults to Level 2

Longnose skate

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Add summer distribution maps for subadults and adults
Increase subadults and adults to Level 2

Shark Complex

Spiny dogfish is a single species representing the complex

Spiny dogfish

Combine species in SDM ensemble EFH map by request of stock assessment author
Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update literature

Update summer distribution maps for subadults and adults with combined species maps
Increase subadults and adults to Level 2

Squid

Remove; squid are in the ecosystem component

Thornyhead rockfish complex

Shortspine thornyhead rockfish

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update summer distribution maps for subadults and adults
Correct pelagic early juveniles to Level 1

Walleye Pollock

Expand EFH text description and provide editorial changes
Add SDM top contributing covariates informing habitat-related distribution and abundance
Update life history
Add summer distribution map for settled early juveniles
Update summer distribution maps for subadults and adults
Correct pelagic early juveniles to Level 1
Increase settled early juveniles to Level 3

At the February 2023 meeting, the Council recommended updating EFH descriptions and maps in the FMP consistent with the findings detailed in the 2023 Summary Report (Harrington et al. 2023). The proposed FMP amendment text descriptions can be found in Appendix B. The Council also moved to replace the existing EFH maps in the FMP with the summer 95th percentile maps for each species and life stage in the GOA Groundfish FMP.

6.3 Expected effects of Alternatives

Alternative 1 – No action; status quo

In 2018, the Council and NMFS updated EFH for all species or complexes in the BSAI Groundfish FMP ([83 FR 31340](#), July 5, 2018). The impacts analysis from the 2017 EA is incorporated here by reference ([NMFS 2018](#)). The no action alternative would result in no changes to EFH for any species or complexes in the GOA. Federal agencies authorizing or funding activities in the GOA that may affect EFH would remain required to consult with NMFS to identify recommended measures, if necessary, to mitigate impacts to EFH that are more than minimal or not temporary. Therefore, the overall impacts of the no action alternative are not significant.

Alternative 2 – PREFERRED – Amend the FMP for all groundfish species of the Gulf of Alaska to update EFH descriptions and replace maps.

Alternative 2 will result in improvements to the EFH text descriptions and maps for all GOA groundfish stocks to incorporate new data, and new models to identify EFH based on habitat characteristics. Application of new models and new data will, for some species, result in reclassification from Level 1 to Level 2 or Level 3 data, consistent with the intent of the EFH Guidelines. No changes to management would be required to address the impacts of commercial fishing on EFH. None of the proposed changes would require regulatory action. Therefore, the overall direct impacts of alternative 2 are not significant.

7 Component 1 – BSAI King and Tanner Crab FMP Amendments

The managed species currently identified in the BSAI Crab FMP, and which were reviewed as part of this process, are the following:

- Blue king crab
- Golden king crab
- Red king crab
- Snow crab
- Tanner crab

Table 5 lists the levels of EFH information available as a result of the 2023 EFH 5-year Review for species in which EFH is currently identified in the BSAI Crab FMP. Level 2 is habitat-related density or abundance information is available to determine EFH for the life stage, Level 1 is information is available to determine the general distribution area of EFH, and “0” indicates that insufficient information is available. The information level reported is based on the highest level available from the text description or map. Revised EFH maps for BSAI crabs in the 2023 EFH 5-year Review are Level 2 where subadult and adult life history stages were combined based on available species data. EFH was not mapped for other crab life stages at this time, although this may be possible for the next 5-year Review.

Table 5 EFH information levels available by species and life history stage for crabs in the BSAI Crab FMP based on the 2023 EFH 5-year Review.

Species	Life Stage					
	Egg	Larvae	Early Juvenile pelagic	Early Juvenile settled	Subadult	Adult
Blue king crab	inferred	0	1	0	2	
Golden king crab	inferred	0	0	0	2	
Red king crab	inferred	0	1	0	2	
Snow crab	inferred	0	0	0	2	
Tanner crab	inferred	0	0	0	2	

7.1 Description of Alternatives

Alternative 1 – No Action; status quo

Alternative 2 – Update EFH descriptions in the FMP consistent with the proposed amendment to the BSAI Crab FMP. Replace the existing EFH maps in the FMP with maps that represent the 95th percentile EFH for each species and life stage, as available.

7.2 Recommended revisions for individual species

Changes are listed comprehensively for all crab species, with an additional recommendation for red king crab, as differences in the recommended changes among species were minimal.

BSAI King and Tanner Crab

- Expand EFH text description and provide editorial changes
- Add SDM top contributing covariates informing habitat-related distribution and abundance
- Update life history
- Update summer distribution maps for subadults/adults
- Add Level 2 map for red king crab subadult/adult in Aleutian Islands
- Increase Aleutian Islands red king crab subadults/adults to Level 2
- Correct pelagic early juveniles to Level 1
- Correct subadults and adults to Level 2

Red King Crab

- Update prey species description table text

At the February 2023 meeting, the Council recommended updating EFH descriptions in the FMP consistent with the findings detailed in the 2023 Summary Report (Harrington et al. 2023). The proposed FMP amendment text descriptions can be found in Appendix C. The Council also moved to replace the existing EFH maps in the FMP with the summer 95th percentile maps for each species and life stage in the BSAI King and Tanner Crab FMP.

7.3 Expected effects of Alternatives

Alternative 1 – No action; status quo

In 2018, the Council and NMFS updated EFH for all species or complexes in the BSAI Groundfish FMP ([83 FR 31340](#), July 5, 2018). The impacts analysis from the 2017 EA is incorporated here by reference ([NMFS 2018](#)). The no action alternative would result in no changes to EFH for any species or complexes in the BS. Federal agencies authorizing or funding activities in the BSAI that may affect EFH would remain required to consult with NMFS to identify recommended measures, if necessary, to mitigate impacts to EFH that are more than minimal or not temporary. Therefore, the overall impacts of the no action alternative are not significant.

Alternative 2 – PREFERRED – Amend the FMP for BSAI King and Tanner Crabs to update EFH descriptions and replace maps

Alternative 2 will result in improvements to the EFH text descriptions and maps for all BSAI King and Tanner crab stocks to incorporate new data, and new models to identify EFH based on habitat characteristics. Application of new models and new data will, for some species, result in reclassification from Level 1 to Level 2 data, consistent with the intent of the EFH Guidelines. No changes to management would be required to address the impacts of commercial fishing on EFH. None of the proposed changes would require regulatory action. Therefore, the overall direct impacts of alternative 2 are not significant.

8 Component 1 – Arctic Management Area FMP Amendments

The managed species identified in the Arctic FMP are the following:

- Arctic cod
- Saffron cod
- Snow crab

NMFS reviewed the current Arctic FMP EFH text descriptions and maps. Changes and updates to the text descriptions, maps, and information levels are recommended, as new information is available for several life stages of each species, including individual species life stage maps. There is currently no commercial fishing in the Arctic, so FE were not evaluated.

Table 6 lists the levels of EFH information available as a result of the 2023 EFH 5-year Review, for species for which EFH is currently identified in the Arctic FMP.

Table 6 EFH information levels available by species and life history stage for Arctic species in the Arctic FMP based on the 2023 EFH 5-year Review.

Species	Life Stage				
	Egg	Larvae	Early Juvenile (age-0, immature)	Juvenile (adolescent female, adolescent male)	Adult (mature female, mature male)
Arctic cod	1	1	3	1	1
Saffron cod	1	1	3	1	1
Snow crab	1	0	1	1	1

8.1 Description of Alternatives

Alternative 1 – No Action; status quo

Alternative 2 – Update EFH descriptions for all species in the FMP consistent with proposed amendment to the Arctic FMP. Replace the existing EFH maps in the FMP with maps that represent the 95th percentile EFH for each species and life stage, as available.

8.2 Recommended revisions for all species

A description of the recommendations is provided below for each individual species or species complex in the Arctic FMP.

Arctic cod

- Expand EFH text description and provide editorial changes
- Add SDM top contributing covariates informing habitat-related distribution and abundance
- Update life history and general distribution
- Update literature

- Update habitat association tables
- Add summer distribution maps for larvae, age-0, juvenile, and mature
- Increase eggs, larvae, and mature to Level 1
- Increase age-0 to Level 3

Saffron cod

- Expand EFH text description and provide editorial changes
- Add SDM top contributing covariates informing habitat-related distribution and abundance
- Update life history and general distribution
- Update literature
- Update habitat association tables
- Add summer distribution maps for larvae, age-0, juvenile, and mature
- Increase eggs, larvae, and mature to Level 1
- Increase age-0 to Level 3

Snow crab

- Expand EFH text description and provide editorial changes
- Add SDM top contributing covariates informing habitat-related distribution and abundance
- Update life history and general distribution
- Update literature
- Update habitat association tables
- Add summer distribution maps for immature, adolescent female, adolescent male, mature female, and mature male
- Increase immature, adolescent female, adolescent male, mature female, and mature male to Level 1

At the February 2023 meeting, the Council recommended updating EFH descriptions and maps, including up to EFH Level 3 information on habitat-related vital rates. Add or revise the EFH text description and add or replace the maps for all three species in the Arctic FMP. The suggested EFH description for each species, including maps, may be found in Appendix D.

8.3 Expected effects of Alternatives

Alternative 1 – No action; status quo

EFH for species in the Arctic was designated in 2009 when the Arctic FMP was approved. The no action alternative would result in no changes to EFH for any arctic species. No changes to management would be necessary to minimize the adverse effects of fishing on EFH. Federal agencies authorizing or funding activities in the area that may affect EFH would remain required to consult with NMFS to identify recommended measures, if necessary, to mitigate impacts to EFH that are more than minimal or not temporary. Therefore, the overall impacts of the no action alternative are not significant.

Alternative 2 – PREFERRED – Update the FMP for Fish Resources in the Arctic Management Area to update EFH descriptions and replace map for snow crab.

Alternative 2 will result in improvements to the EFH descriptions for some Arctic stocks to incorporate new data to describe and identify EFH. None of the proposed changes would require regulatory action. Therefore, the overall direct impacts of alternative 2 are not significant.

9 Component 1 – Salmon FMP Amendments

The managed species identified in the Salmon FMP are the following:

- Chinook salmon
- Chum salmon
- Coho salmon
- Pink salmon
- Sockeye salmon

Salmon marine EFH refinements were not addressed in the 2023 EFH 5-year Review. However, staff recommend amending the Salmon FMP to update the EFH maps based on Echave et al. (2012). The proposed FMP amendment text descriptions and maps can be found in Appendix E. We recommend that refining salmon marine EFH is a priority for the next 5-year Review. Resources will be required to support this research.

9.1 Description of Alternatives

Alternative 1 – No Action; status quo

Alternative 2 – Update only marine EFH maps in the FMP consistent with the proposed amendment to the Salmon FMP. Replace the existing distribution maps with the EFH maps.

9.2 Recommended revisions for salmon species

- Replace the Echave et al. (2012) marine habitat distribution maps with the Echave et al. (2012) EFH maps
- Correct formatting as included in the proposed FMP text

At the February 2023 meeting, the Council recommended updating EFH distribution maps in the FMP consistent with the findings detailed in the 2023 Summary Report (Harrington et al. 2023).

9.3 Expected effects of Alternatives

Alternative 1 – No action; status quo

In 2018, the Council and NMFS updated EFH for all species or complexes in the Salmon FMP ([83 FR 31340](#), July 5, 2018). The impacts analysis from the 2017 EA is incorporated here by reference ([NMFS 2018](#)). The no action alternative would result in no changes to EFH for any species. Federal agencies authorizing or funding activities that may affect EFH would remain required to consult with NMFS HCD to identify recommended measures, if necessary, to mitigate impacts to EFH that are more than minimal or not temporary. Therefore, the overall impacts of the no action alternative are not significant

Alternative 2 – PREFERRED – Amend the FMP for the Salmon Fisheries in the EEZ off Alaska to replace the marine EFH maps.

Alternative 2 will result in replacing the distribution maps with EFH maps (Echave et al, 2012) for all five salmon species in the Salmon FMP. Work on salmon EFH is ongoing, and will continue in the next EFH 5-year Review. No changes to management would be required to address the impacts of commercial fishing on EFH. None of the proposed changes would require regulatory action. Therefore, the overall direct impacts of the action alternative are not significant.

10 Component 2 – Fishing Effects

The Council is required to minimize adverse effects of fishing on EFH that are more than minimal and not temporary in nature. The 2005 EIS concluded that no Council-managed fishing activities have more than minimal and temporary adverse effects on EFH. In 2005, the Council initiated a variety of practicable and precautionary measures to conserve and protect EFH.

The 2023 evaluation of FE on EFH followed similar methodology as the prior EFH review in 2010 and 2017, and findings were consistent with the conclusions of the 2005 EIS. The 2005 impacts analysis was incorporated by reference, including the discussions of uncertainty that were fully disclosed and analyzed in that document. During the 2017 EFH Review, the Council requested updates to the model to predict the impacts of fishing on EFH. In April 2016, the SSC recommended that new methods and criteria be developed to evaluate whether the effects of fishing on EFH are more than minimal and not temporary. In April 2017, based on the analysis with the FE model, the Council concurred with the Plan Team consensus that the effects of fishing on EFH did not meet the threshold of more than minimal and not temporary, and that mitigation action was not needed. The 2023 FE evaluation built upon the framework that was designed in 2017, and found that the effects of fishing were not more than minimal and temporary in nature, consistent with the findings of 2005, 2010 and 2017 reviews.

10.1 Fishing Effects Evaluation Methods

For the 2017 EFH Review, the FE model was developed by the NMFS Alaska Regional Office – HCD and scientists at Alaska Pacific University to make input parameters more intuitive and to draw on the best available data. Updates to the FE model were made in 2022 and were presented at the February 2022 SSC meeting. Updates included: correction to the FE model, adding a new habitat feature to incorporate longer recovery times, and the comparison of VMS data from observed trips or from all trips. The third topic did not result in changes to the model, but it had sparked interest in a potential change and was discussed by the SSC during the February 2022 meeting. The full FE model description can be found in 2022 Evaluation of Fishing Effects on Essential Fish Habitat (Zaleski et al. 2023).

To aid in evaluating the impacts of fishing on species, stock assessment authors were requested to review the results of the FE model for their respective stocks. The upper 50th percentile core EFH area (CEA) from the summer distribution SDM ensemble EFH maps for adults or combined life stages, representing EFH Level 2 information of habitat-related abundance at the population level, was overlaid on the 2022 FE model results to estimate species-specific habitat disturbance. Stock assessment authors conducted additional analyses for their stocks in three situations: if their stock is below the minimum stock size threshold (MSST), if the estimated habitat disturbed by fishing in the CEA was $\geq 10\%$, and/or if they preferred a qualitative analysis of the effects of fishing on their species' habitat rather than the quantitative assessment. The third option was prompted by the SSC during the February 2022 meeting to address stock assessment author concerns on species with data limitations. The SSC subcommittee noted that the 10% threshold does not preclude stock assessment authors from completing the evaluation for levels of habitat disturbance less than 10%, so stock assessment authors were not limited to these situations to perform additional analyses if other data suggested that impacts may be affecting the population. Reports from the stock assessment authors were collated and presented to representatives of the GOA and BSAI Groundfish Plan Teams and the Crab Plan Team. None of the stock assessment authors concluded that habitat reduction within the CEA for their species was affecting their stocks in ways that were more than minimal or not temporary. A full compilation of stock author responses can be found in the [FE discussion paper](#) from October 2022.

10.2 Description of Alternatives

Alternative 1 – No Action; status quo

Alternative 2 – Update the fishing effects (FE) information in the BSAI groundfish, GOA groundfish, and BSAI Crab FMPs to reflect updates to the FE model, analysis, and evaluation for the 2023 EFH 5-year Review.

In February 2023, based on the analysis with the FE model, the Council concurred with the Plan Team and SSC consensus that the effects of fishing on EFH do not currently meet the threshold of more than minimal and not temporary, and that mitigation action is not needed at this time. This conclusion is consistent with the conclusions of the 2005 EFH EIS, the 2010 EFH Review, and the 2017 EFH Review.

While these analyses found no indication that continued fishing activities at the current rate and intensity would alter the capacity of EFH to support healthy populations of managed species over the long term, the Council acknowledges that scientific uncertainty remains regarding the consequences of habitat alteration for the sustained productivity of managed species. Consequently, the Council has historically adopted, and NMFS has implemented, a number of management measures designed to reduce adverse impacts to habitat.

10.3 Expected Effects of Alternatives

Alternative 1 – No action; status quo

In 2018, the Council and NMFS updated EFH for all species or complexes in the BSAI Groundfish FMP ([83 FR 31340](#), July 5, 2018). The impacts analysis from the 2017 EA is incorporated here by reference ([NMFS 2018](#)). The no action alternative would result in no changes to the 2017 FE model, evaluation, or analysis results for any species or complexes in the BSAI groundfish, GOA groundfish, or BSAI crab FMP. Therefore, the overall impacts of the no action alternative are not significant

Alternative 2 – PREFERRED – Amend the BSAI Groundfish FMP, GOA Groundfish FMP, and BSAI crab FMP to reflect updates to the FE model, analysis, and evaluation for the 2023 EFH 5-year Review.

Alternative 2 will result in updating the improvements made to the FE model in this review period, incorporating new results of habitat disturbance for species, and maintaining the determination that the effects of fishing are minimal and temporary in nature for all species evaluated. No changes to management would be required to address the impacts of commercial fishing on EFH. None of the proposed changes would require regulatory action. Therefore, the overall direct impacts of the action alternative are not significant.

11 Component 4 – Non-fishing activities that may adversely affect EFH

The EFH regulations at 50 CFR 600.815(a)(4) specify that “FMPs must identify activities other than fishing that may adversely affect EFH.” In 2005, Appendix G of the EFH EIS fulfilled the requirement to describe non-fishing activities that may have adverse effects on EFH and identify actions to encourage the conservation and enhancement of EFH. In 2010, NMFS HCD staff reviewed the original non-fishing activities evaluation in Appendix G of the EFH EIS and as abbreviated in the FMPs, and updated the analysis of each activity’s potential to result in adverse impacts on EFH and recommended conservation measures to avoid, minimize, or compensate for adverse effects on EFH, as needed. The non-fishing effects report was updated during the 2017 EFH 5-year Review, to include the best available scientific information, and incorporate updated literature.

Similarly, for the 2023 EFH 5-year Review, updated information based on more recent scientific literature specific to Alaska was included for Chapters 1–6 to encapsulate the best available scientific information that has progressed during this review cycle. Key additions to highlight include:

Chapter 1, Introduction: The introduction provides a discussion of the report’s purpose – to guide understanding of the potential adverse effects of non-fishing activities on EFH and provide conservation recommendations to avoid and minimize those effects; a brief history of MSA; EFH; a description of EFH attributes; a review of the EFH consultations process; the role of the NPFMC in the consultation process; tools to support EFH consultations; and an overview of Ecosystem-based Fisheries Management.

Chapter 2, Climate Change: Climate change is now recognized as an anthropogenic impact and a principle influence that exacerbates all other types of impacts. This chapter discusses how changing atmospheric and oceanic conditions alter EFH across riverine, estuarine, and marine systems, and offers conservation recommendations targeting the reduction of methane emissions from petroleum extraction facilities.

Chapter 3, Watersheds: Previous versions of the report presented wetlands and forests, and streams and rivers in two separate chapters. For 2023, the two chapters are combined into one to capture the full ecosystem functions supporting EFH for Pacific salmon and associated downstream habitat. An often unrecognized characteristic of watersheds is the relationship between landscape geology and ground and surface water regimes. Chapter updates for 2023 better represent the connection between ground and surface water regimes and how those processes support Pacific salmon overwinter and rearing survival.

Chapter 4, Estuaries and Nearshore: Sources of potential impacts to EFH in estuarine and nearshore habitat are identified and updated in this version. Impacts are associated with activities such as dredging, the discharge of dredged and fill material, onshore seafood processing waste, infrastructure development and utilities, invasive species, flood control and shoreline stabilization, log transfer facilities, water intake and discharge, aquaculture, energy development, and habitat restoration projects. Recommended conservation measures for each potential source of impact inform project development and proactively mitigate project effects.

Chapter 5, Offshore: The current science and technology of oil spill response strategies, mechanisms and toxicology of fishes is expanded, cited and relevant recommendations are included.

Chapters 3-5, Physical, Chemical and Biological Properties Sections: Ecosystem processes from headwater streams to the continental shelf influence the characteristics of EFH attributes. Each of the chapters now includes better updated descriptions of the more widely understood processes and properties across watersheds, nearshore and estuaries, and offshore marine systems.

The full report can be found in the technical memorandum Impacts to Essential Fish Habitat from Non-Fishing Activities in Alaska: EFH 5-year review from 2018–2023 (Limpinsel et al. 2023).

Non-fishing activities are already subject to a variety of regulations and restrictions under federal, state and local laws that would help minimize and avoid adverse effects of non-fishing activities on EFH. Therefore, the recommendations are general in nature and may overlap with certain existing standards for specific development activities. They are meant to highlight options to avoid, minimize, or compensate for adverse impacts and promote the conservation and enhancement of EFH. All of the suggested measures are not necessarily applicable to any one project or activity and are not binding on any action agency or permit applicant. Subject-specific recommendations are advisory and serve as proactive conservation measures that would help minimize and avoid adverse effects of these non-fishing activities on EFH. Site-specific EFH Conservation Recommendations will be prepared per activity and as necessary during EFH Consultation [see: CFR 50 Part 600 Subpart K].

11.1 Description of Alternatives – New EFH Conservation Recommendations for Non-Fishing Activities

Alternative 1 – No Action; status quo

Alternative 2 – Revise the EFH appendices in the BSAI groundfish, GOA groundfish, BSAI Crab, and Arctic, and Salmon FMPs where conservation recommendations for non-fishing activities are described.

For each of the non-fishing activities, staff reviewed each activity’s potential to result in adverse impacts on EFH for the BSAI groundfish, GOA groundfish, BSAI crab and Arctic FMPs. Conservation measures are recommended to avoid, minimize, or compensate for adverse effects on EFH, if needed. For the 2023 EFH 5-year Review, EFH conservation recommendations for non-fishing activities were not assessed for the 5 salmon species in the Salmon FMP. The Council may wish to amend their proposed alternatives to best reflect the comprehensive work completed in the 2023 EFH 5-year Review.

11.2 Expected effects of Alternatives

Alternative 1 – No action; status quo

The no action alternative would result in no updates to the conservation recommendations for non-fishing activities. Federal agencies that conduct, authorize, or fund activities in the area would still be required to consult with NMFS to identify recommended measures, if necessary, to mitigate impacts to EFH that are more than minimal or not temporary. The expected impacts of the no action alternative are not significant.

Alternative 2 – PREFERRED – Update the EFH conservation recommendations for non-fishing activities in all Council FMPs except the Scallop FMPs.

Under Alternative 2, all FMPs except for the Scallop FMP would be amended to update the non-fishing related activities that may adversely affect EFH and describe known and potential adverse effects to EFH based in the new report of impacts of non-fishing activities to EFH (Limpinsel et al. 2023). The 2023 EFH 5 year Review did not comprehensively review EFH conservation recommendations for non-fishing activities in the Salmon FMP. At this juncture, the Council may wish to amend the proposed alternatives under Action 7 to best reflect the work conducted in the 2023 EFH 5-year Review process. Absent further Council clarification, it is staff’s interpretation that the Council’s intent was to exclude the Salmon FMP from non-fishing activities updates, given the information was not included in the 2023 Summary report.

As such, the proposed FMP amendment text for the Salmon FMP as seen in Appendix E does not include changes to non-fishing activities affecting EFH given it was not adequately assessed for this 5-year review.

There are no changes to regulations that will result from this alternative. The proposed action contemplated under Alternative 2 differs very little from the status quo, which was comprehensively analyzed in the EFH EIS (NMFS 2005), the 2010 EFH 5-year Review (NMFS 2012), and the 2017 EFH 5-year review (NMFS, 2017). Federal agencies that conduct, authorize, or fund activities in the area would still be required to consult with NMFS to identify recommended measures, if necessary, to mitigate impacts to EFH that are more than minimal or not temporary. The expected impacts of Alternative 2 are not significant.

11.3 Outreach efforts for informing stakeholders of changes to the EFH conservation recommendations for non-fishing activities

NMFS HCD staff routinely informs stakeholders and the public of EFH consultation requirements through EFH consultation training sessions, posting of NMFS official comment letters, and by making information readily accessible on the NMFS Alaska Region website². Continuing outreach activities provides up-to-date science and any changes in suggested conservation measures within the Non-Fishing Impacts Report.

1. EFH Training: NMFS regularly invites federal, state, tribal, academic, and any interested nongovernmental organizations to attend EFH workshops. These are targeted to the audience and address how the MSA and associated EFH provisions are applied when actions may adversely affect EFH. Training may also detail what is required of a federal action agency should they determine their activity may adversely affect EFH resources.
2. NMFS posts correspondence for actions where NMFS has offered comments and conservation recommendations to conserve EFH. These letters give action agencies, project proponents, and the public examples as to what NMFS may specifically offer as EFH conservation recommendations. Posting occurs on the Environmental Consultation Organizer (ECO) platform at: <https://www.fisheries.noaa.gov/resource/tool-app/environmental-consultation-organizer-eco>.
3. NMFS plans to present their updates to the Non-Fishing Impacts Report. Recipients of these updates will include Alaska region stakeholders U. S. Army Corps of Engineers, NPFMC and advisory bodies, tribes, and the general public. Outreach will include web meetings and summarized publications.

² <https://alaskafisheries.noaa.gov/habitat/efh>

12 Component 9 – Revision of EFH Research Priorities

One of the required components of the EFH provisions of each FMP is to include research and information needs. Each FMP should contain recommendations, preferably in priority order, for research efforts that the Councils and NMFS view as necessary to improve upon the description and identification of EFH, the identification of threats to EFH from fishing and other activities, and the development of conservation and enhancement measures for EFH.

The Council's six FMPs include EFH research objectives, questions, activities, and a time frame. The Council considers revising or updating these research priorities during the 5-year Review process, as well as during the research priorities process. During the 2010 5-year Review of EFH, the Council's SSC provided a restated research objective and updated and expanded research activities. In 2017, the Council reviewed the proposed research priorities and decided that they did not need to be revised for the 2017 EFH Review. However, the three proposed Council-related EFH Priorities were listed in the Council's recent review of 2017–2022 Research Priorities ([NPFMC Research Priorities 2017–2021](#)).

The four research objectives that are defined below have largely been met by the Council in the time period since the 2005 EFH FEIS. With respect to the research questions, many of these are still valid, and remain to be investigated.

EFH research recommendations were informed during the 2023 EFH 5-year Review by contributing researchers, stock assessment scientists, and Council advisory bodies. These recommendations were summarized as three objectives for the revised Alaska EFH Research Plan (Pirtle et al. 2023c), which provides guidance for recommended research advancements leading up to the next and future EFH 5-year Reviews. The Alaska EFH Research Plans have also included five long term research goals that remain consistent with minor, meaningful updates since 2005.

As part of the 2023 EFH 5-year Review, each stock assessment author provided a stock-specific evaluation of EFH research needs. Table 7, Table 8, and Table 9 identify these needs by species and FMP. These research needs also contributed to the research objectives in the revised Alaska EFH Research Plan.

These long term research goals, timely objectives, and species specific recommendations are informative as updates to the EFH research recommendations in the BSAI, GOA, BSAI Crab, and Arctic FMPs.

12.1 Description of Alternatives

Alternative 1 – No Action; status quo

Alternative 2 – Revise the EFH appendices with updated research and information needs in the BSAI groundfish, GOA groundfish, BSAI Crab, and Arctic, and Salmon FMPs.

The following is currently included as the research approach in the Council's FMPs.

Objective

Establish a scientific research and monitoring program to understand the degree to which impacts have been reduced within habitat closure areas, and to understand how benthic habitat recovery of key species is occurring.

Research Questions

Reduce impacts. Does the closure effectively restrict higher-impact trawl fisheries from a portion of the GOA slope? Is there increased use of alternative gears in the GOA closed areas? Does total bottom trawl effort in adjacent open areas increase as a result of effort displaced from closed

areas? Do bottom trawls affect these benthic habitats more than the alternative gear types? What are the research priorities? Are fragile habitats in the AI affected by any fisheries that are not covered by the new EFH closures? Are sponge and coral essential components of the habitat supporting FMP species?

Benthic habitat recovery. Did the habitat within closed areas recover or remain unfished because of these closures? Do recovered habitats support more abundant and healthier FMP species? If FMP species are more abundant in the EFH protection areas, is there any benefit in yield for areas that are still unfished without EFH protection?

Research Activities

Fishing effort data from observers and remote sensing would be used to study changes in bottom trawl and other fishing gear activity in the closed (and open) areas. Effects of displaced fishing effort would have to be considered. The basis of comparison would be changes in the structure and function of benthic communities and populations, as well as important physical features of the seabed, after comparable harvests of target species are taken with each gear type.

Monitor the structure and function of benthic communities and populations in the newly closed areas, as well as important physical features of the seabed, for changes that may indicate recovery of benthic habitat. Whether these changes constitute recovery from fishing or just natural variability/shifts requires comparison with an area that is undisturbed by fishing and otherwise comparable.

Validate the LEI model and improve estimates of recovery rates, particularly for the more sensitive habitats, including coral and sponge habitats in the Aleutian Islands region, possibly addressed through comparisons of benthic communities in trawled and untrawled areas. Obtain high resolution mapping of benthic habitats, particularly in the on-shelf regions of the Aleutian Islands.

Time series of maturity at age should be collected to facilitate the assessment of whether habitat conditions are suitable for growth to maturity. In the case of red king crab spawning habitat in southern Bristol Bay, research the current impacts of trawling on habitat in spawning areas and the relationship of female crab distribution with respect to bottom temperature.

Research Time Frame

Changes in fishing effort and gear types should be readily detectable. Biological recovery monitoring may require an extended period if undisturbed habitats of this type typically include large or long-lived organisms and/or high species diversity. Recovery of smaller, shorter-lived components should be apparent much sooner.

Research priorities were comprehensively reviewed for the BSAI groundfish, GOA groundfish, BSAI BSAI Crab and Artic FMPs for the 2023 EFH 5-year Review. However, the 2023 EFH 5-year Review did not assess or update research priorities for the 5 salmon species in the Salmon FMP. Given the in-depth review process to improve research and information needs for species in each FMP, the Council may wish to amend their proposed alternatives under Action 8 to remove updating the Salmon FMP research and information needs to best reflect the comprehensive work completed in the 2023 EFH 5-year Review. Absent further Council clarification, it is staff's interpretation that the Council's intent was to exclude the

Salmon FMP from research and information updates, given the information was not included in the 2023 Summary report. As such, the proposed FMP amendment text for the Salmon FMP as seen in Appendix E does not include changes to research and information needs given it was not adequately assessed for this 5-year review.

Five long-term research goals have been included in Alaska EFH Research Plans since 2005 (e.g., Sigler et al. 2017, Pirtle et al. 2023c)—

1. Characterize habitat utilization and productivity at regional scales;
2. Assess sensitivity, impact, and recovery of disturbed benthic habitat;
3. Improve modeling and validation of human impacts on marine habitat;
4. Improve information regarding habitat and seafloor characteristics; and
5. Assess coastal and marine habitats facing human development.

These goals represent the need to understand habitat characteristics and their influence on observed habitat utilization and productivity for fishes and invertebrates. These goals also emphasize the importance of understanding human impacts on habitat (e.g., fishing, coastal development, and ongoing climate change), how these impacts in turn affect habitat utilization and productivity, and assessing the consequences of these impacts at regional scales.

To achieve these goals the complementary role and equal importance of targeted field and laboratory experiments, long-term monitoring, and analytical work should be emphasized to model and map the progressive levels of EFH information (EFH component 1) and impacts at a regional scale (EFH components 2, 4, and 5). In particular:

Field and laboratory experiments are necessary to understand ecological mechanisms that underlie habitat association, vital rates and productivity, and how human activities (including fishing, development, and climate change) cause changes in habitat conditions and resulting utilization and productivity. In particular, understanding causality is not possible without experimental support. Understanding ecological mechanisms (i.e., causality) is also necessary to predict the likely impact of human impacts that have not previously been observed;

Long-term monitoring is necessary to understand habitat utilization and productivity at regional scales;

Analysis including statistical and mathematical modeling is needed to map the geographic distribution of the area of occupied habitat (EFH) for life stages of targeted FMP species and their prey and is also necessary to identify changes in habitat utilization likely resulting from human activities and climate change.

Without these three elements, applied habitat research cannot be successful.

In addition to the five long term research goals, three objectives are emphasized as important for research progress and preparation for future EFH 5-year Reviews and are described in the revised Alaska EFH Research Plan (Pirtle et al. 2023c). These objectives were informed by recommendations from contributing researchers, stock assessment scientists, and Council advisory bodies during the 2023 EFH 5-year Review.

Objective 1: Improve EFH information for targeted species and life stages

The first objective seeks to improve EFH information for species and life stages that were identified as requiring further research during the 2023 EFH 5-year Review, as well as other targeted FMP species that were not updated in 2023 (i.e., salmon ocean life stages and scallops) under EFH component 1. Studies should focus on methods development with practical application to improve EFH information for a select set of species life stages, where the following pathways are recommended:

1. **Additional field data:** Collecting and incorporating additional field data in the models used to identify and describe EFH, beyond the large-mesh bottom trawl summer survey data that were used primarily during the 2017 and 2023 EFH 5-year Reviews. The importance of including alternative gear types to the extent practicable is emphasized, including longlines, pots, small-mesh and pelagic trawls, focusing on under-sampled life stages and habitats. The application of alternative data sources such as predator stomach contents and fishery-dependent catch and effort data is also encouraged. Sampling may also be used to improve understanding of seasonal variation in habitat use. This will presumably involve measuring (via paired experiments) or estimating a fishing-power correction between multiple sampling gears. When analyzed properly, these additional data sources can provide complementary information to characterize habitat profiles for life stages of targeted FMP species.
2. **Demographic processes driving variation over time:** Research focused on identifying processes that drive shifts in habitat use and productivity is recommended. This may involve hindcasting and forecasting methods, including (but not limited to) fitting models with covariates that vary over time, conditioning predictions upon spatio-temporal residuals, incorporating information about trophic interactions, and separately analyzing numerical density and size information. This might also involve process research, e.g., incorporating information about individual movement from tags, behavioral and eco-physiological experiments, or other process research. This likely requires methodological development and testing and could be focused on a few case-study species or species' life stages that are likely to be shifting substantially, for consideration during the future 5-year Reviews.
3. **Improved methods to integrate both monitoring and process research:** Continued development of new analytical methods to integrate process research is recommended when identifying species habitat utilization, vital rates, and productivity. Analytical methods might include individual- and agent-based models (IBMs) that “scale up” laboratory measurements, particularly when IBM output is used as a covariate or otherwise combined with survey and other species sampling information. This process research might include juvenile survival, growth, and movement experiments and habitat-specific observations. Ideally, these new methods would include process information and monitoring data simultaneously, rather than either a. seeking to validate an IBM via comparison with monitoring data without explicitly incorporating these data, or b. fitting to monitoring data without incorporating field or laboratory experimental data.

Objective 2: Improve fishing effects assessment

The second objective addresses the ongoing need to develop and improve methods to assess fishing impacts on habitat utilization and productivity (EFH component 2). Research pathways might include:

1. **Advance methods to assess fishing impacts:** It is often helpful to compare results from a variety of analytical methods and approaches. Advancing the existing Fishing Effects model (Smeltz et al. 2019) is recommended as well as developing new analytical approaches to address potential impacts of fishing to EFH.
2. **Cumulative effects:** Methods development is recommended to identify the cumulative effect of fishing and non-fishing human activities to EFH, including ongoing climate change (EFH component 5).

Objective 3: Improve understanding of nearshore habitat and forage species

The third objective acknowledges that additional research is needed regarding critical nearshore life stages and for the prey species that represent an important component of habitat suitability and EFH. Research may include the following pathways:

1. **Nearshore habitat:** Ongoing and expanded scientific efforts to understand habitat utilization and productivity into nearshore environments (EFH component 1). This nearshore habitat is critical for juvenile life stages of many targeted FMP species (e.g., Pacific cod, flatfishes, salmonids) and prey species (EFH component 7) and is also subject to substantial impacts from human development. Improved understanding of nearshore habitat is intended to support the EFH consultations that are done near areas with human development (urban areas as well as shipping activities) (EFH components 4 and 5). Understanding nearshore habitat may also support improved understanding of recruitment processes and population connectivity. Data are available in the Nearshore Fish Atlas of Alaska and ShoreZone, and analytical methods have already been demonstrated (Grüss et al. 2021), but there remains substantial work to scale these methods to more species and within geographic areas of specific interest.
2. **Prey species:** Increased efforts are recommended to understand habitat utilization and productivity for those species that represent the primary prey for targeted FMP species (EFH component 7). This can include pelagic forage fishes (e.g., herring, eulachon, sand lance, etc.), juvenile stages of numerically abundant species (e.g., pollock, Pacific cod, salmonids), as well as invertebrates (e.g., Euphausiids, snow crab). Improved understanding of habitat-specific densities (i.e., Level-2 EFH information) can then be used as a covariate for understanding habitat suitability for their predators (i.e., targeted FMP species).

As part of the 2023 EFH 5-year Review, each stock assessment author provided a stock-specific evaluation of EFH research needs. Table 7, Table 8, and identify these needs by species and FMP. These research needs also contributed to the research objectives in the revised Alaska EFH Research Plan (Pirtle et al. 2023).

Table 7 Stock assessment author research recommendations for Bering Sea/Aleutian Island groundfish species. These include focus areas of research and identify data sources for future EFH map iterations.

Bering Sea / Aleutian Island Species	Research Notes from Stock Assessment Authors
arrowtooth flounder	Incorporate other data sources like longline survey and IPHC survey data to supplement the slope bottom trawl survey. When evaluating FE, referencing habitat specificity variables in the climate vulnerability assessment and the habitat assessment prioritization for Alaska stocks could allow for a more targeted approach.
Atka mackerel	Further stratification of data in time and space may allow for patterns to become apparent at local scales.
blackspotted/rougheye rockfish complex	Continue research on observing and modeling stock densities in untrawlable grounds, particularly in the Aleutian Islands and Bering Sea slope.
flathead sole-Bering flounder complex	Investigate impacts to the habitat/environment on early life history and recruitment distribution.
Greenland turbot	Incorporate AFSC longline survey data in addition to the bottom trawl survey data. They also suggested forming a small team to reevaluate life stage breaks and look at spatially varying growth differences.

Bering Sea / Aleutian Island Species	Research Notes from Stock Assessment Authors
Kamchatka flounder	Incorporate AFSC longline survey data in addition to the bottom trawl survey data.
northern rock sole	Northern rock sole have exhibited changes in growth over time, so length-based categories may need to be addressed.
northern rockfish	Continue research on observing and modeling stock densities in untrawlable grounds, particularly in the Aleutian Islands and Bering Sea slope.
other flatfish complex	Group life history stages by age rather than length where possible.
other rockfish complex	Incorporate AFSC longline survey data.
Pacific ocean perch	Continue research on observing and modeling stock densities in untrawlable grounds, particularly in the Aleutian Islands and Bering Sea slope.
sablefish	Incorporate longline survey data in future EFH analyses. Gather more data on life history patterns and habitat utilization: spawning locations, larval dispersal, juvenile nursery areas, and/or ontogenetic movement patterns. Utilize FE model outputs for areas aside from the regional requirements.
shortraker rockfish	Incorporate other data sources like longline survey and IPHC survey data to supplement the slope bottom trawl survey. When evaluating FE, referencing habitat specificity variables in the climate vulnerability assessment and the habitat assessment prioritization for Alaska stocks could allow for a more targeted approach.

Table 8 Stock assessment author research recommendations for Gulf of Alaska groundfish species. These include focus areas of research and identify data sources for future EFH map iterations.

Gulf of Alaska Species	Research notes from Stock Assessment Authors
arrowtooth flounder	Incorporate other data sources like longline survey and IPHC survey data to supplement the slope bottom trawl survey. When evaluating FE, referencing habitat specificity variables in the climate vulnerability assessment and the habitat assessment prioritization for Alaska stocks could allow for a more targeted approach.
Atka mackerel	Explore EFH over different time blocks representing different environmental conditions, and also regulations in place over the time series.
blackspotted/rougeye rockfish complex	Incorporate AFSC longline survey data as additional species distribution data.
Dover sole	The length-stage definitions should be revisited and future maps and descriptions should try to account for subregional growth and size-at-age differences.
dusky rockfish	Prioritize research into fishery location data and early life history information. Include fishery observer data for additional species distribution data.
flathead sole	Research impacts of environmental indicators such as temperature on growth and/or distribution of recruits, since we don't see these in the surveys.
northern rockfish	Research early life history. Incorporate stakeholder/fleet understanding of fish locations.
other rockfish complex, demersal subgroup	ADF&G currently uses their ROV surveys to assess and manage this stock in the EGOA and recommend incorporating data from those surveys into the SDM ensemble framework.
other rockfish complex, slope subgroup	Research should include data from the AFSC and IPHC longline surveys, the GOA rockfish fishery data, and underwater images from untrawlable habitats in future EFH mapping efforts for these rockfish species.
greenstriped rockfish	Incorporate AFSC longline survey data and IPHC survey data as additional species distribution data.
harlequin rockfish	Incorporate GOA fishery data to more accurately represent the spatial extent of the population.
pygmy rockfish	Incorporate GOA fishery data for additional distribution data.
silvergray rockfish	Incorporate AFSC longline survey data and IPHC survey data as additional species distribution data.
redbanded rockfish	Incorporate both longline survey indices and length data when available.
rex sole	Reevaluate the length categories for subadults and adults with regard to regional and temporal growth differences.
sablefish	Incorporate longline survey data into the SDM. Collect data to better understand spawning areas (requires winter sampling) and ELH [early life history] habitat preferences. Develop a better understanding of connectivity among management units

Gulf of Alaska Species	Research notes from Stock Assessment Authors
	within the Alaska-wide sablefish population, particularly the dynamics of juvenile fish and how they utilize the EBS shelf.
Shark complex	(Note: only spiny dogfish maps were advanced by EFH analysts, however Pacific sleeper shark maps were reviewed and the stock assessment author provided the research recommendation below.)
Pacific sleeper shark	Research the spatial distribution of length data collected during surveys.
spiny dogfish	Incorporate the AFSC and IPHC longline surveys, with their length data, as additional data sources.
shortraker rockfish	Incorporate AFSC longline survey data as additional species distribution data.

Table 9 Stock assessment author research recommendations for Bering Sea/Aleutian Island crab species. These include focus areas of research and identify data sources for future EFH map iterations.

Bering Sea & Aleutian Island Crab	Research Notes from Stock Assessment Authors
blue king crab	Explore using FE model outputs for smaller areas within the EFH regions such as known nursery habitats where blue king [crab] utilize cobble and shell hash. Map early benthic life stages. Research female spawning and juvenile habitat needs.
golden king crab	Incorporate observer data from the fishery and pot survey in the eastern portions of the grounds.
red king crab	Model immature and mature crab separately. Model FE for different seasons. Explore using FE model outputs in smaller areas of interest within the EFH regions such as important spawning areas and molting areas. Research female distributions, critical spawning habitat, and movement outside of the summer months.
snow crab	Model immature and mature crab separately. Explore using FE model outputs in smaller spatial and temporal results.
Tanner crab	Research immediate and longer term responses to nearby FE (effects of increased sediment load in the water column on respiration, fishing effects on prey abundance and quality, FE on predator distributions).

12.2 Expected effects of Alternatives

Alternative 1 – No action; status quo

Under Alternative 1, the research priorities related to EFH in the Council's FMPs would not be updated. The research priorities identified in the 2010 EFH 5-year Review would remain, although some of the activities identified in the 2010 EFH 5-year Review have already been completed. The expected effects of Alternative 1 are not significant.

Alternative 2 – PREFERRED – Revise the EFH appendices with updated research and information needs in the BSAI groundfish, GOA groundfish, BSAI Crab, Arctic, and Salmon FMPs.

Under Alternative 2, the research priorities related to EFH in the Council's FMPs, except the Scallop FMP would be updated. However, the 2023 EFH 5-year Review did not assess or update research priorities for the 5 salmon species in the Salmon FMP. The Council may wish to amend their proposed alternatives under Action 8 to remove updating the Salmon FMP to best reflect the comprehensive work completed in the 2023 EFH 5-year Review. Absent further Council clarification, it is staff's interpretation that the Council's intent was to exclude the Salmon FMP from non-fishing effects updates, given the information was not included in the 2023 Summary report. As such, the proposed FMP amendment text for the Salmon FMP as seen in Appendix E does not include changes to EFH conservation recommendations for non-fishing activities given it was not adequately assessed for this 5-year review.

Allowing for additional time to appropriately review the research and information needs for the species in the salmon FMP, may result in a more comprehensive research approach tailored to the specific conservation needs of the five salmon species within the FMP.

Under the proposed action, no changes to management would be required. None of the proposed changes would require regulatory action. The expected direct impacts of Alternative 2 are not significant.

13 Preparers and Persons Consulted

Preparation

Sarah Rheinsmith (North Pacific Fishery Management Council (NPFMC))
Molly Zaleski (NMFS Alaska Region (AKR), Habitat Conservation Division (HCD))
Megan Mackey (NMFS AKR, Sustainable fisheries (SF) Division)
Jodi Pirtle (NMFS AKR HCD)
Gretchen Harrington (NMFS AKR SF)

Review of groundfish species EFH descriptions, maps, and fishing effects evaluation

Coordinated by Sandra Lowe and Chris Lunsford (NMFS Alaska Fisheries Science Center)
Coordinated by Molly Zaleski, Jodi Pirtle (NMFS AKR HCD), and Gretchen Harrington (NMFS AKR SF)
Coordinated by Sarah Rheinsmith (NPFMC)
Reviews by Steve Barbeaux, Meaghan Bryan, Martin Dorn, Katie Echave, Kari Fenske, Daniel Goethel, Pete Hulson, Jim Ianelli, Sandra Lowe, Carey McGilliard, Cole Monnahan, Olav Ormseth, Kalei Shotwell, Paul Spencer, Ingrid Spies, Jane Sullivan, Grant Thompson, Cindy Tribuzio, Ben Williams, and Kellii Wood (NMFS AFSC and Alaska Department of Fish and Game (ADFG))
BSAI and GOA Groundfish Plan Teams

Review of crab species EFH descriptions, maps, and fishing effects evaluation

Coordinated by Katie Palof (ADFG)
Reviews by Bill Bechtol, Ben Daly, Jennifer Gardner, Chris Long, Katie Palof, Shareef Siddeek, William (Buck) Stockhausen, Cody Szuwalski, Miranda Westphal, and Leah Zacher (NMFS AFSC and Alaska Department of Fish and Game (ADFG))
BSAI Crab Plan Team

Preparers of EFH Species Distribution Models for Arctic Species

Jen Marsh and Franz Mueter, University of Alaska, Fairbanks (UAF)
Jodi Pirtle (NMFS AKR HCD)
with contributions by Allison Deary, Janet Duffy-Anderson, and Libby Logerwell (NMFS AFSC) and Jeremy Harris (Lynker)

Review of Arctic species EFH in Arctic FMP

Jen Marsh (UAF)
Jodi Pirtle (NMFS)

Preparers of EFH Species Distribution Models for Groundfish and Crabs

Ned Laman, Margaret Siple, Tom Hurst, and Christina Conrath, S. Kalei Shotwell, William Stockhausen, Alison Deary (NMFS AFSC)
Jodi Pirtle (NMFS AKR HCD)
Jeremy Harris (Lynker)
Chris Rooper (Department of Fisheries and Oceans (DFO) Canada)
Georgina Gibson (UAF)

with contributions by Cheryl Barnes, Christina Conrath, Louise Copeman, Al Hermann, Kelly Kearny, Ben Laurel, Jim Thorson (NMFS AFSC), and Ken Coyle (UAF)

Preparers of the FE Model

T. Scott Smeltz, Bradley Harris, and Suresh Sethi (Alaska Pacific University)

Review of non-fishing effects

Doug Limpinsel, Charlene Felkley, Sean McDermott, Jodi Pirtle, Seanbob Kelly, Stefanie Coxe, Linda Shaw, Molly Zaleski, Gretchen Harrington, Ellen Ward, Sean Eagan, John Olson, Matt Eagleton (NMFS AKR HCD)

Note: A much deserved *Thank You* to the active and prior members of the Council public process, including many staff, academia, industry, and informed public; all have played a role to identify and conserve EFH to maintain our robust, sustainable fisheries throughout Alaska.

14 References

- Echave, K., M. Eagleton, E. Farley, and J. Orsi. 2012. A refined description of essential fish habitat for Pacific salmon within the U.S. Exclusive Economic Zone in Alaska. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-236, 104 p.
- Gibson, G.A., W.T. Stockhausen, S.K. Shotwell, A.L. Deary, J.L. Pirtle, K.O. Coyle, and A.J. Hermann. 2023. Can seamounts in the Gulf of Alaska be a spawning ground for sablefish settling in coastal nursery grounds? *Fisheries Research*. 261: 106625. <https://doi.org/10.1016/j.fishres.2023.106625>
- Grüss, A., J.L. Pirtle, J.T. Thorson, M.R. Lindeberg, A.D. Neff, S.G. Lewis, and T.E. Essington. 2021. Modeling nearshore fish habitats using Alaska as a regional case study. *Fisheries Research* 238: 105905 <https://doi.org/10.1016/j.fishres.2021.105905>
- Harrington, G. A., J. L. Pirtle, M. Zaleski, C. Felkley, S. Rheinsmith, and J. T. Thorson. Essential Fish Habitat 2023 5-year Review Summary Report. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/AKR-31, 135 p. <https://doi.org/10.25923/ve1v-ns96>.
- Harris, B., J. V. Olson, S. Smeltz, C. Rose, S. Sethi. 2017. Assessment of the effects of fishing on Essential Fish Habitat in Alaska. Prepared for the North Pacific Fishery Management Council, April 2017. <http://npfmc.legistar.com/gateway.aspx?M=F&ID=178dc37e-afa9-4df6-a6d5-56f6d065e61c.pdf>
- Harris, J., J. L. Pirtle, E. A. Laman, M. C. Siple, and J. T. Thorson. *In review*. Ensemble models mitigate bias in area occupied from commonly used species distribution models. (*Revision re-submitted to Journal of Applied Ecology, July 2023*)
- Harris, J., E. A. Laman, J. L. Pirtle, M. C. Siple, C. N. Rooper, T. P. Hurst, and C. L. Conrath. 2022. Advancing model-based essential fish habitat descriptions for North Pacific species in the Aleutian Islands. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-458, 406 p. <https://doi.org/10.25923/ffnc-cg42>
- Laman, E. A., J. L. Pirtle, J. Harris, M. C. Siple, C. N. Rooper, T. P. Hurst, and C. L. Conrath. 2022. Advancing model-based essential fish habitat descriptions for North Pacific species in the Bering Sea. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-459, 538 p. <https://doi.org/10.25923/y5gc-nk42>
- Laman, E. A., C. N. Rooper, S. Rooney, K. Turner, D. Cooper, and M. Zimmerman. 2017. Model-based Essential Fish Habitat Definitions for Eastern Bering Sea Groundfish Species. U.S. Dep. Commer., NOAA Tech Memo. NMFS-AFSC-357, 265p.
- Laman, E. A., C. N. Rooper, K. Turner, S. Rooney, D. W. Cooper, and M. Zimmermann. 2018. Using species distribution models to describe essential fish habitat in Alaska. *Can. J. Fish. Aquat. Sci.* 75(8): 1230–1255. <https://doi.org/10.1139/cjfas-2017-0181>.
- Limpinsel, D., S. McDermott, C. Felkley, E. Ammann, S. Coxe, G. A. Harrington, S. Kelly, J. L. Pirtle, L. Shaw, and M. Zaleski. 2023. Impacts to Essential Fish Habitat from Non-Fishing Activities in Alaska: EFH 5-year review from 2018–2023. National Marine Fisheries Service, Alaska Region, Juneau, Alaska. U.S. Dep. Commerce, NOAA Tech. Memo. NMFS-F/AKR-30. doi: 10.25923/9z4h-n860
- Marsh, J., Pirtle, J. L., Mueter, F. J, and Harris, J.. In review. Model-Based Essential Fish Habitat Descriptions for Fish Resources of the Arctic Management Area. U.S. Dep. Commer., NOAA Tech. Memo.
- National Marine Fisheries Service (NMFS). 2005. Final Environmental Impact Statement for Essential Fish Habitat Identification and Conservation in Alaska. March 2005. NMFS PO Box 21668, Juneau, AK 99801

- NMFS. 2023. Draft Essential Fish Habitat 5 year Review Summary Report, January 2023. National Marine Fisheries Service, Alaska Region, 135 p.
- NMFS. 2023. Impacts to Essential Fish Habitat from Non-Fishing Activities in Alaska. EFH 5 Year Review: 2017 through 2023.
- NMFS. 2022. Discussion Paper on the Assessment of the Effect of Fishing on Essential Fish Habitat in Alaska for the 2022 5-year Review, January 2022. National Marine Fisheries Service, Alaska Region, 70 p.
- NMFS. 2017. Final Environmental Assessment for Essential Fish Habitat (EFH) Omnibus Amendments, April 2017. NMFS PO Box 21668, Juneau, AK 99801
- NMFS. 2012. Final Environmental Assessment for Essential Fish Habitat (EFH) Omnibus Amendments. October 2012. NMFS PO Box 21668, Juneau, AK 99801
- North Pacific Fishery Management Council (NPFMC). 2016. Methods to evaluate the effects of fishing on Essential Fish Habitat. December 2016. Anchorage, AK.
- Pirtle, J. L., E. A. Laman, J. Harris, M. C. Siple, C. N. Rooper, T. P. Hurst, C. L. Conrath, J. T. Thorson, M. Zaleski, S. Rheinsmith, and G. A. Harrington. 2023a. Synthesis Report: Advancing Model-Based Essential Fish Habitat Descriptions and Maps for North Pacific Species. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/AKR-28, 295 p. <https://doi.org/10.25923/jvpx-ck45>
- Pirtle, J. L., Laman, E. A., Harris, J., Siple, M. C., Rooper, C. N., Hurst, T. P., Conrath, C. L., and Gibson, G. A. 2023b. Advancing model-based essential fish habitat descriptions for North Pacific species in the Gulf of Alaska. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-468, 541 p. <https://doi.org/10.25923/ygdf-5f65>
- Pirtle, J. L., J. T. Thorson, S. R. Bayer, T. P. Hurst, M. E. Matta, and M. C. Siple. 2023. Alaska Essential Fish Habitat Research Plan: A Research Plan for the National Marine Fisheries Service's Alaska Fisheries Science Center and Alaska Regional Office. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/AKR-33, 17 p. <https://doi.org/10.25923/sf79-ym32>
- Shotwell, S.K., Gibson, G.A., Stockhausen, W.T., Pirtle, J.L., Rooper, C.N., Deary, A.L., Coyle, K.O., and Hermann, A.J. In preparation. Developing a novel approach to estimate habitat-related survival rates for early life history stages using individual-based models.
- Siddon, E. 2022. Ecosystem Status Report 2022: Eastern Bering Sea, Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council, 1007 West 3rd Ave., Suite 400, Anchorage, Alaska 99501.
- Sigler, M. F., M. P. Eagleton, T. E. Helser, J. V. Olson, J. L. Pirtle, C. N. Rooper, S. C. Simpson, and R. P. Stone. 2017. Alaska Essential Fish Habitat Research Plan: A research plan for the National Marine Fisheries Service's Alaska Fisheries Science Center and Alaska Regional Office. AFSC Processed Report 2015-05, 22 p. Alaska Fish. Sci. Cent., NOAA, Natl. Mar. Fish. Serv., 7600 Sand Point Way NE, Seattle WA 98115. <https://apps-afsc.fisheries.noaa.gov/Publications/ProcRpt/PR2017-05.pdf>
- Simpson, S. C., Eagleton, M. P., Olson, J. V., Harrington, G. A., and Kelly, S. R. 2017. Final Essential Fish Habitat (EFH) 5-year Review, Summary Report: 2010 through 2015. U.S. Dep. Commer., NOAA Tech Memo. NMFS-F/AKR-15, 115p.
- Smeltz, T.S., Harris, B., Olson, J., and Sethi, S. 2019. A seascape-scale habitat model to support management of fishing impacts on benthic ecosystems. *Canadian Journal of Fisheries and Aquatic Sciences* 76(10): 1836-1844 <https://doi.org/10.1139/cjfas-2018-0243>
- Zaleski, M., T. S. Smeltz, S. Rheinsmith, J. L. Pirtle, and G. A. Harrington. 2023. 2022 Evaluation of the Fishing Effects on Essential Fish Habitat. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/AKR-29, 205 p. <https://doi.org/10.25923/c2gh-0w03>