2028 Essential Fish Habitat 5-year Review Plan
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Jodi Pirtle, Mason Smith, Mallarie Yeager, Molly Zaleski

NMFS Alaska Region, Juneau, Alaska

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Abstract

The objective of an essential fish habitat (EFH) 5-year review is to evaluate and synthesize new information for each of the ten EFH components, and determine whether changes to the Fishery Management Plans (FMPs) are warranted. The opportunity to advance the science supporting an EFH 5-year review is also an important reason for this endeavor. As an outcome, the science developed in an ecosystem context, reflective of our region's approach to EFH, is available to support fishery management information needs for a variety of Council actions. This document presents the proposed plan for the 2028 EFH 5-year Review, following the Council's EFH Roadmap. The document sections describe the EFH review process, ten EFH components of FMPs, and ongoing work contributing new information for this review. A summary report will be prepared and presented to the Council, tentatively in 2028. The proposed approach for this review cycle is based on direction received from the Council during the 2023 EFH 5-year Review and reflects current priorities of the Council and NMFS. Staff are seeking input from the Council on the proposed plan for the 2028 EFH 5-year Review.

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1 Introduction

The 1996 provisions to the Sustainable Fisheries Act require regional Fishery Management Councils (Councils) to describe and identify essential fish habitat (EFH) for all fisheries and to minimize to the extent practicable the adverse effects of fishing on EFH. The Magnuson-Stevens Fishery Conservation and Management Act (MSA) defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity". 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.

Additionally, section 303(a)(7) of the MSA requires that Fishery Management Plans (FMPs) describe and identify EFH based on the guidelines established by the Secretary under section 305(b)(1)(A) of the MSA, minimize to the extent practicable adverse effects on such habitat caused by fishing, and identify other actions to encourage the conservation and enhancement of such habitat.

NMFS published guidelines to implement the MSA's EFH provisions in Federal regulations at 50 CFR 600 Subpart J - Essential Fish Habitat and Subpart K - EFH Coordination, Consultations, and Recommendations. Federal regulations require that each FMP contains the following ten EFH components:

1. Description and identification of EFH
2. Fishing activities that may adversely affect EFH
3. Non-Magnuson-Stevens Act fishing activities that may adversely affect EFH
4. Non-fishing activities that may adversely affect EFH
5. Cumulative impacts analysis
6. Conservation and enhancement
7. Prey species
8. Identification of habitat areas of particular concern (HAPC)
9. Research and information needs
10. Review and revision of EFH components of FMPs

To guide the review of EFH every 5 years, Federal regulations at 50 CFR 600.815(a)(10) state:

> *Councils and NMFS should periodically review the EFH provisions of FMPs and revise or amend EFH provisions as warranted based on available information. FMPs should outline the procedures the Council will follow to review and update EFH information. The review of information should include, but not be limited to, evaluating published scientific literature and unpublished scientific reports; soliciting information from interested parties; and searching for previously unavailable or inaccessible data. Council should report on their review of EFH information as part of the Annual Stock Assessment and Fishery Evaluation (SAFE) report prepared pursuant to §600.315(e). A complete review of all EFH information should be conducted as recommended by the Secretary, but at least once every 5 years.*

The objective of an EFH 5-year review is to evaluate and synthesize new information for each component, and determine whether changes to the FMPs are warranted. At the conclusion of an EFH 5-year review, a draft summary report is prepared that describes the review process and results for all EFH components the Council elects to review and revise. The Council's role with respect to the EFH review is to receive the summary report and decide whether any of the new information highlighted in the review warrants change to management (i.e., FMP amendments). Any change to the FMP text, no matter how minor, requires an FMP amendment. If, after reviewing the summary report, the Council chooses to update any EFH components in its FMPs, FMP amendments are prepared along with the appropriate analytical documents. The level of analysis (environmental assessment (EA), environmental impact statement (EIS), categorical exclusion (CE)) that is required to support the amendment(s) will vary depending on the impacts of the change. The 2005 EFH EIS (NMFS 2005) provided a comprehensive discussion of EFH in five FMPs. An EA was prepared for the 2012, 2018, and 2023 Omnibus EFH Amendment packages. As with the previous reviews, the 2028 EFH 5-year Review will evaluate the EFH components in the Council FMPs with respect to new information.

The opportunity to advance the science supporting an EFH 5-year review is also an important reason for this endeavor. For example, updating the EFH descriptions and maps, based on the most recent data on species populations and environmental conditions applied to a robust ensemble of species distribution models (SDMs), ensures that this information reflects the current state of Alaska ecosystems. Further, advancing the data and methods to evaluate fishing impacts to EFH, using the most recent and accurate fishing effort data in the fishing effects (FE) model, cumulatively and through time, ensures that we are making a comprehensive and reliable evaluation. Our models (Smeltz et al. 2019, Barnes et al. 2022, Harris et al. 2024, Hart et al. 2025, Ryznar and Litzow *in review*, Smith et al. *in prep*) and applied process studies (Laurel et al. 2016, Copeman et al. 2017, Gibson et al. 2023, Copeman et al. *in prep*) are the leading edge of methods development in these fields, and provide analytical tools available for a variety of Council actions, such as stock assessment (Shotwell et al. 2022, Yeager et al. *in prep*) and spatial management evaluation (Ryznar and Litzow 2024) in an ecosystem context (Harvey et al. 2025).[1, 2, 3]

Staff are seeking input from the Council on the plan for the 2028 EFH 5-year Review. This document presents the proposed plan, describing the review process for the ten EFH components of FMPs (chapter 1), and ongoing work contributing new information for this review (chapter 2). When the review is complete, a summary report will be prepared and presented to the Council, tentatively in 2028 (chapter 3). The strategic roadmap that has guided EFH 5-year reviews for our region and a proposed, general review process and timeline are also included (appendix A, appendix B). The proposed plan for this review is based on direction received from the Council during the 2023 EFH 5-year Review and reflects current priorities of the Council and NMFS.[4]

[1] C1 Joint Groundfish Harvest Specs., December 2024 https://meetings.npfmc.org/Meeting/Details/3066

[2] C2 BBRKC Closures, February 2024 https://meetings.npfmc.org/Meeting/Details/3030

[3] D2 GOA Tanner Crab Protections, April 2025 https://meetings.npfmc.org/Meeting/Details/3080

[4] 2023 EFH Review Final Summary Report, D2 EFH 5-year Review Plan, available on the Council Agenda for this meeting https://meetings.npfmc.org/Meeting/Details/3108

1.1 EFH in Fishery Management Plans

The North Pacific Fishery Management Council (Council) has EFH provisions to address the ten components in each of six FMPs:

- Groundfish of the Bering Sea and Aleutian Islands Management Area (BSAI FMP)
  - Sections 3.4, 3.5, and 4.2; Appendices D, E, F, and H
- Groundfish of the Gulf of Alaska (GOA FMP)
  - Sections 3.4, 3.5, and 4.2; Appendices D, E, F, and H
- Bering Sea/Aleutian Islands King and Tanner Crabs (Crab FMP)
  - Section 8.1.6; Appendix F
- Fish Resources of the Arctic Management Area (Arctic FMP)
  - Chapter 4; Appendices A, B, C, D, E, and F
- Salmon Fisheries in the EEZ off Alaska (Salmon FMP)
  - Chapter 6; Appendix A
- Scallop Fishery off Alaska (Scallop FMP)
  - Section 4.6; Appendix D

1.2 History of EFH in Alaska

The Council described EFH for its FMPs in 1999 with an environmental assessment that also outlined human-induced effects on EFH. In 2000, a legal challenge of the EFH provisions nation-wide resulted in a reevaluation of EFH information by all Councils. In 2005, the NMFS Alaska Region (AKR) and Council completed a more comprehensive EFH description and effects analysis in an environmental impact statement (EIS) (NMFS 2005).

In 2010, the NMFS and the Council conducted the first EFH 5-year review, resulting in amendments to EFH information for all FMPs (77 FR 66564, 11/6/2012 (BSAI, GOA, Crab, and Scallop FMPs), 77 FR 75570, 12/21/2012 (Salmon FMP)). Updates included several species descriptions, changed the HAPC process to coincide with EFH 5-year reviews, and revised EFH priorities. EFH descriptions were updated to include quantitative maps and text descriptions. Earlier descriptions of EFH in Alaska were identified by the Council as the distribution of species life stages and maps based on survey results and observed catch. Based on the results of the review, the Council identified skate nursery sites as a habitat priority and initiated a call for proposals for candidate HAPC locations, with direction that analysis and any amendments resulting from the call for proposals would be implemented through a separate process (NMFS 2012).[5]

In 2015, NMFS and the Council initiated the second EFH 5-year review, resulting in amendments to EFH information for five FMPs (83 FR 31340, 7/5/2018 (BSAI, GOA, Crab, Arctic, Salmon), Simpson et al. 2017). The 2017 Review introduced new data and SDMs to describe and map EFH (Laman et al. 2017, Turner et al. 2017, Laman et al. 2018, Rooney et al. 2018); incorporated a new FE model and evaluation process to evaluate the effects of fishing to

[5] 80 FR 1378, 1/5/2015

EFH cumulatively, over time (Smeltz et al. 2019); and significantly updated the evaluation of non-fishing effects on EFH (Limpinsel et al. 2017) (appendix A). The SDMs developed for the 2017 Review allowed Level 2 descriptions (habitat-related abundance) for some life stages of some species in the BSAI, GOA, and Crab FMPs. Most descriptions, however, remained Level 1 descriptions (distribution), although several previously undescribed life stages of targeted species were described at Level 1 in the 2017 Review.

1.3 2023 EFH 5-year Review

The 2023 EFH 5-year Review was the third review of EFH information in the FMPs by NMFS and the Council, initiated in 2019. NMFS and the Council considered all EFH components for the FMPs following the EFH roadmap (appendix A). The 2023 Review modernized the 2017 Review SDM method to describe and map EFH with a new SDM ensemble and updated species and environmental data, among other significant advancements, such as Arctic species SDMs, mapping EFH Level 3 (habitat-related vital rates) for the first time, and a new method to map EFH for pelagic early life stages using biophysical individual-based models (IBMs) with SDMs. The FE model and evaluation process were also refined and a new evaluation of the effects of fishing to EFH was completed. The evaluation of non-fishing effects on EFH was updated with revised conservation recommendations.

In February 2023, NMFS provided the Council with the draft summary report and supporting documents presenting the new and best available science and information identified in the 2023 EFH 5-year Review.[6] To complete the review and decide if FMP amendments were warranted, the Council considered the following:

- Does the new information and analysis for the EFH geographical distributions for individual species warrant revising in the FMP?
- Should the FMPs be revised to reflect new information on their life history, distribution, biological/habitat/predator-prey associations, or fishery?
- Does the new evaluation of the effects of fishing on EFH provide the necessary information?
- Should additional conservation and enhancement measures be considered to mitigate adverse effects of fishing?
- Should the conservation and enhancement recommendations for non-fishing impacts 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?

The Council initiated an analysis (EA) to incorporate the advancements in EFH information in five of six FMPs.[7]

[6] C4 EFH 5-year Review, February 2023 https://meetings.npfmc.org/Meeting/Details/2975

[7] Council Motion, C4 EFH 5-year Review, February 2023 https://meetings.npfmc.org/Meeting/Details/2975

In December 2023, the Council received the draft 2023 EFH Review EA and Omnibus EFH Amendments package and took final action to recommended that NMFS "[a]mend the Council's FMPs to incorporate the updated EFH information based on the new and best available science and information identified in the 2023 EFH 5-year Review"[8]. The Council recommended the following amendments to the FMPs:

- Amendment 127 to the FMP for Groundfish of the Bering Sea and Aleutian Islands Management Area (BSAI FMP),
- Amendment 115 to the FMP for Groundfish of the Gulf of Alaska (GOA FMP),
- Amendment 56 to the FMP for Bering Sea/Aleutian Islands King and Tanner Crabs (Crab FMP),
- Amendment 3 to the FMP for Fish Resources of the Arctic Management Area (Arctic FMP), and
- Amendment 17 to the FMP for the Salmon Fisheries in the EEZ off Alaska (Salmon FMP).

NMFS finalized the EA for the proposed amendments and issued its Notice of Availability in April 2024, providing additional opportunity for public comment. NMFS published its Notice of Agency Decision in July 2024, responding to comments received and implementing the 2023 EFH 5-year Review by approving the amendments (89 FR 58632, 7/19/2024).

The 2023 EFH 5-year Review Final Summary Report (Pirtle et al. 2025) is a record of the process and information that NMFS and Council staff developed to inform the Council's recommendation to revise the EFH provisions of five FMPs as a result of the 2023 EFH 5-year Review and a summary of the amendments that followed (available on the eAgenda for this meeting).[9] Additional, comprehensive analysis is provided in the following, accompanying NOAA Technical Memoranda that focus on the new analysis conducted for EFH descriptions and identification (component 1), EFH fishing effects evaluation (component 2), and non-fishing impacts to EFH (component 4):

- Synthesis Report: Advancing Model-Based Essential Fish Habitat Descriptions and Maps for North Pacific Species (Pirtle et al. 2025),
- 2022 Evaluation of Fishing Effects on Essential Fish Habitat (Zaleski et al. 2024), and
- Impacts to Essential Fish Habitat from Non-Fishing Activities in Alaska (Limpinsel et al. 2023).

In addition, the Alaska EFH Research Plan was updated following the 2023 EFH 5-year Review. The updated plan, the fourth edition since 2006, was published as a NOAA Technical Memorandum (Pirtle et al. 2024). The plan guides research supporting EFH information development for the 2028 EFH 5-year Review, and future reviews as needed (component 9).

[8] Council Motion, C5 EFH FMP Amendments, December 2023 https://meetings.npfmc.org/Meeting/Details/3019

[9] 2023 EFH Review Final Summary Report, D2 EFH 5-year Review Plan, available on the Council Agenda for this meeting https://meetings.npfmc.org/Meeting/Details/3108

2 Plan for Review and Revision of EFH Components of FMPs

For the 2028 EFH 5-year Review, NMFS has prioritized review of certain EFH components in the Council's FMPs, in order to focus on top priorities in light of capacity constraints for both the Council and NMFS. NMFS has prioritized the EFH components in bold for review:

1. **Description and identification of EFH**
2. **Fishing activities that may adversely affect EFH**
3. Non-Magnuson-Stevens Act fishing activities that may adversely affect EFH
4. Non-fishing activities that may adversely affect EFH
5. Cumulative impacts analysis
6. **Conservation and enhancement**
7. **Prey species**
8. Identification of habitat areas of particular concern (HAPC)
9. Research and information needs
10. **Review and revision of EFH components of FMPs**

The Council may choose to open a call for HAPC nominations coinciding with an EFH 5-year review, or at any time during their regular process, if information and need are available (EFH C&E section 2.6, HAPC section 2.8). Analysis and potential FMP amendments resulting from proposals will occur as a separate process (e.g., NMFS 2012).

2.1 Component 1: EFH descriptions and identification

Component 1 descriptions and identification of EFH consists of written summaries, tables, and maps in the FMPs or appendices. The EFH regulations provide an approach to organize the information necessary to describe and identify EFH (50 CFR 600.815(a)(1)). When designating EFH, the Council should strive to describe and identify EFH information at the highest level possible (50 CFR 600.815(a)(1)(iii)(B))—

> *Level 1*: Distribution data are available for some or all portions of the geographic range of the species.
>
> *Level 2*: Habitat-related densities or relative abundance of the species are available.
>
> *Level 3*: Growth, reproduction, or survival rates within habitats are available.
>
> *Level 4*: Production rates by habitat are available.

2.1.1 2023 EFH 5-year Review

An update to the Alaska EFH Research Plan (Sigler et al. 2017) was published following the 2017 EFH 5-year Review (Simpson et al. 2017). Under this plan, research topics prioritized and funded by NMFS to advance EFH component 1 information for the 2023 EFH 5-year Review, included several studies: a new ensemble SDM method to map EFH (*ensemble study)*, new Arctic species SDMs, new methods to apply vital rates from laboratory studies to map EFH Level 3 (habitat-related vital rates) for the first time, and a new method to map pelagic early life history stage EFH using biophysical individual-based models (IBMs) and SDMs. An example of the new and revised EFH maps in the FMPs is included in Figure 1.

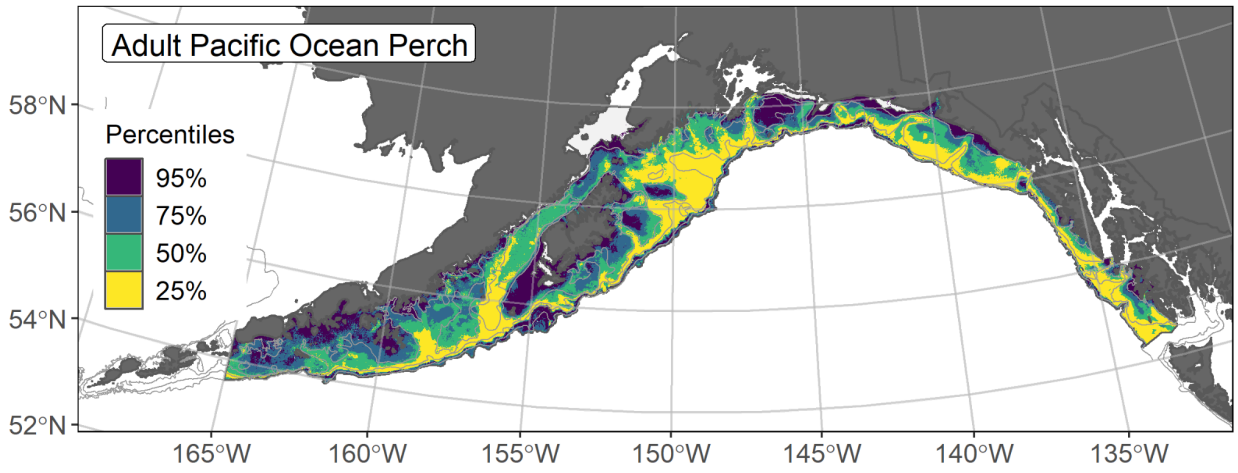

Figure 1. Essential fish habitat (EFH) map for adult Pacific ocean perch in the Gulf of Alaska. EFH is the area containing the top 95% of occupied habitat (defined as model estimated encounter probabilities greater than 5%) from an SDM ensemble fitted to adult Pacific ocean perch distribution and abundance in AFSC RACE-GAP summer bottom trawl surveys (1993–2019) with 50 m, 100 m, and 200 m isobaths indicated. Within the EFH map are the subareas of the top 25% (EFH hot spots), top 50% (core EFH area), and top 75% (principal EFH area) of habitat-related, ensemble-predicted numerical abundance.

For the 2023 Review, new EFH component 1 information provided new and revised EFH maps for the BSAI, GOA, Crab, and Arctic FMPs that included—

- New EFH Level 1, 2, and 3 descriptions and maps for life stages of groundfish in the Gulf of Alaska, Bering Sea, and Aleutian Islands, including settled early juveniles, subadults, and adults, for the GOA and BSAI FMPs.

- New EFH Level 2 and 3 descriptions and maps for up to five pelagic early life history stages of Pacific cod and sablefish in the Gulf of Alaska, including eggs, yolk-sac larvae, feeding larvae, pelagic early juveniles, and settling early juveniles for the GOA FMP.

- New EFH Level 2 descriptions and maps for life stages of crabs in the Bering Sea and Aleutian Islands, including subadults and adults combined for the Crab FMP.

- New EFH Level 1 and 3 descriptions and maps for Arctic cod, saffron cod, and snow crab life history stages, including larvae, settled early juveniles, juveniles, and adults for the Arctic FMP.

The research funded to complete this extensive update is described in the Component 1 Synthesis Report (Pirtle et al. 2025) and Final Summary Report.[10]

[10] 2023 EFH 5-year Review Final Summary Report (chapter 2), D2 EFH 5-year Review Plan, available on the Council Agenda for this meeting https://meetings.npfmc.org/Meeting/Details/3108

As a highlight, the *ensemble study* produced three NOAA Technical Memoranda detailing the regional methods, results, and future research and process recommendations (Harris et al. 2022, Laman et al. 2022, Pirtle et al. 2023). A manuscript, *Ensemble models mitigate bias in area occupied from commonly used species distribution models* (Harris et al. 2024), is a helpful contribution to the rapidly developing field of SDMs with applications to EFH and EBFM. In addition, and so that our methods are transparent, repeatable, and available, we published a repository of the ensemble SDM EFH code used to develop the new summer distribution EFH maps in the 2023 Review.[11] Regular updates to this repository keep the R code (R Core Team 2020) and documentation current, as staff have subsequently developed SDMs using these methods as decision support for other Council actions.[12]

2.1.2 2028 EFH 5-year Review

The proposed scope of review and updates for EFH component 1 descriptions and maps includes a subset of FMP species to focus on top priorities in light of capacity constraints for both the Council and NMFS. The subset includes—

- Sablefish, pollock, Pacific cod, Pacific ocean perch, and arrowtooth flounder in the BSAI and GOA FMPs, and
- All five species of crab in the Crab FMP.

With this proposed scope, EFH component 1 will maintain status quo in the Arctic, Salmon, and Scallop FMPs.

The Alaska EFH Research Plan (Pirtle et al. 2024), updated following the 2023 EFH 5-year Review, provides a research objective with three emphasis areas to advance EFH component 1 information for North Pacific species in the 2028 EFH 5-year Review:

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

- *1.1 Additional field data and alternative data sources*,
- *1.2 Demographic processes driving variation over time, and*
- *1.3 Improved methods to integrate both monitoring and process research.*

The emphasis areas, in particular, were informed from input by Council bodies, reviewing stock assessment scientists, EFH analysts, and the public. For the 2028 EFH 5-year Review, we will advance EFH information for FMP species' life stages under this objective and three emphasis areas with studies described in the following sections.

2.1.2.1 Level 2 EFH Ensemble Species Distribution Models

We will update all current Level 2 EFH descriptions and maps for the subset of species in the BSAI and GOA FMPs, and all five species in the Crab FMP, using our ensemble SDM with five years of new species survey data from the AFSC RACE GAP bottom-trawl surveys of the

[11] https://github.com/alaska-groundfish-efh

[12] SDMs developed for e.g., C2 Bristol Bay red king crab closure areas analysis (appendix 3), February 2024 https://meetings.npfmc.org/Meeting/Details/3029

Bering Sea, Aleutian Islands, Gulf of Alaska. We are also developing new SDM methods to combine RACE GAP bottom-trawl survey data with AFSC Auke Bay Laboratories (ABL) longline survey data to demonstrate a combined data approach to map EFH Level 2 for Alaska sablefish; however, given current capacity constraints, this work is currently paused. For the Crab FMP, we will model crab species by sex and maturity stage for the first time. SDMs by sex and maturity stage were presented for Bristol Bay red king crab (BBRKC) during other Council analysis[13], which demonstrated a preliminary approach to mapping EFH with greater life history resolution for crabs. EFH is mapped by FMP species for the area of the fishery management unit, however, we are exploring an approach to develop what may be considered supplemental EFH maps for a limited subset of BSAI crabs by stock area, such as BBRKC.

We are also updating the environmental covariates applied with species survey data in the ensemble SDMs, including rockiness, bathymetry, all bathymetry-derived terrain variables (slope, aspect, curvature, and bathymetric position index), and structure-forming invertebrate presence-absence that will be used in model fitting. We have been developing new SDM methods to combine new data from underwater image analysis from the Alaska Coral and Sponge Initiative[14] with RACE GAP bottom-trawl survey data to refine covariates of coral, sponge, and sea whip presence-absence. We will also update oceanographic covariates, such as bottom temperature and currents, using recently available Modular Ocean Model (MOM6) data from NOAA CEFI.[15]

Updating Level 2 EFH descriptions and maps using our ensemble SDM with the most recent species survey and environmental data will directly inform Alaska EFH Research Plan *objectives 1.1 (additional field data and alternative data sources)* and *1.3 (improved methods to integrate both monitoring and process research)*. This work plan is also responsive to EFH methods development requests received during the 2023 5-year Review.[16]

2.1.2.2 Level 3 EFH Ensemble Species Distribution Models

We propose to update the subset of BSAI and GOA FMP species with an existing EFH Level 3 map from the 2023 5-year Review, including settled early juvenile life stages of sablefish, pollock, Pacific cod, and Pacific ocean perch, using new Level 2 maps and updated temperature data from MOM6 with vital rates from published laboratory studies. In addition, new Level 3 EFH maps for juvenile snow and Tanner crabs will be developed by a contributing study (Copeman et al. *in prep*). The results of this work will directly inform Alaska EFH Research Plan *objectives 1.1* and *1.3*.

[13] C2 Bristol Bay red king crab closure areas analysis (appendix 3), February 2024 https://meetings.npfmc.org/Meeting/Details/3029

[14] NMFS Deep Sea Coral Research and Technology Program https://deepseacoraldata.noaa.gov/

[15] NOAA Changing Ecosystems and Fisheries Initiative https://www.fisheries.noaa.gov/science-data/changing-ecosystems-and-fisheries-initiative-regional-activities#alaska

[16] 2023 EFH 5-year Review Final Summary Report (chapter 10), D2 EFH 5-year Review Plan, available on the Council Agenda for this meeting https://meetings.npfmc.org/Meeting/Details/3108

2.1.2.3 EFH Species Distribution Models Across Temporal Scales

We are developing methods to apply SDMs at dynamic temporal scales to map EFH for North Pacific species. Current SDM EFH mapping purposefully uses the long-term time series of species survey and environmental data. However, temporal resolution affects mapping species distributions under varying environmental conditions (Smith et al. *in prep*). We will apply this spatial-temporal SDM (STM) method for the subset of species in the BSAI and GOA FMPs and the Crab FMP to demonstrate supplemental EFH Level 2 maps at annual (and other) time steps. We are finding this approach is helpful to understand how species and their EFH can shift in space and time with varying environmental conditions, such as cold pool variation in the eastern Bering Sea and the presence of marine heat waves in Alaska ecosystems. In addition, we are working with AFSC stock assessment scientists to apply the STMs to develop annual stock-specific indicators for the ecosystem and socioeconomic profiles (ESPs). ESP indicators are a meaningful extension of the EFH SDMs to inform stock assessment (Shotwell et al. 2022, Yeager et al. *in prep*). The EFH STMs support Alaska EFH Research Plan *objective 1.2* (*demographic processes driving variation over time*). The STMs will be available as an analytical tool for a variety of other Council actions.

2.1.2.4 Additional BSAI Crab Studies

We are working with AFSC staff at the Kodiak and Newport laboratories to incorporate the results from new crab studies funded by the Alaska EFH Research Plan and others during 2021-2025. These studies support progress under Alaska EFH Research Plan *objectives 1.1*, *1.2*, and *1.3*.

- *Supplemental EFH Level 2 maps for Bristol Bay red king crab (BBRKC) and other BSAI crabs in the fall/winter/spring seasons.* A completed study developed SDMs of mature male BBRKC, using data from the directed fishery collected in the fall and winter seasons (Ryznar and Litzow *in review*). Additional studies are underway, to develop SDMs for crabs, using fishery dependent data such as from cooperative pot surveys, in collaboration with AFSC Kodiak Laboratory, Alaska Department of Fish and Game (ADFG), and Bering Sea Fisheries Research Foundation (BSFRF).

- *EFH Level 2 and Level 3 maps for Chionocetes spp. juvenile life history stages.* A study is investigating juvenile snow and Tanner crab energetics and survival to develop EFH Level 2 and 3 information and maps for juvenile life stages in the Bering Sea (Copeman et al. *in prep*). This study is developing physiology-based SDMs using temperature-dependent laboratory vital rates, field-based energetic condition metrics, and existing SDMs.

- Other studies of BSAI crabs are underway, which may be incorporated to provide additional EFH Level 2 information for BSAI crabs in the 2028 Review.

2.1.2.5 Summary of New EFH Component 1 Information by FMP

A summary of the proposed review and updates this EFH review cycle can be found in Table 1. Under this plan, EFH component 1 will maintain status quo for the Arctic, Salmon, and Scallop FMPs.

Table 1. Summary of proposed updates to EFH descriptions and maps by FMP for the 2028 EFH 5-year Review.

FMP	**Update Level 2 EFH**	**Update Level 3 EFH**	**Analytical Method** (unless specified, developed for all species and life stages)
BSAI Groundfish	sablefish, pollock, Pacific cod, Pacific ocean perch, and arrowtooth flounder settled early juvenile, subadult, and adult life stages	pollock and Pacific cod settled early juvenile life stages	1. ensemble SDMs 2. STMs
GOA Groundfish	sablefish, pollock, Pacific cod, Pacific ocean perch, and arrowtooth flounder settled early juvenile, subadult, and adult life stages	sablefish, pollock, Pacific cod, and Pacific ocean perch early juvenile life stages	1. ensemble SDMs 2. STMs 3. IBMs/STMs (sablefish and Pacific cod pelagic early life stages)
BSAI Crab	all five species of crab by sex and maturity stage	snow crab, and Tanner crab juvenile life stages	1. ensemble SDMs 2. STMs 3. SDMs of the fall/winter/spring distribution of mature male BBRKC (supplemental maps supporting EFH information)

2.2 Component 2: Fishing activities that may adversely affect EFH

Fishing activities that may adversely affect EFH, outlines the evaluation of potential adverse effects of fishing on EFH designated under the FMP (50 CFR 600.815(a)(2)). This evaluation considers the effects of each fishing activity on each type of habitat found within EFH, considers cumulative effects of multiple fishing activities over the same area, and provides conclusions regarding whether and how each fishing activity adversely affects EFH. Councils must act to prevent, mitigate, or minimize any adverse effects from fishing, to the extent

practicable, if there is evidence that a fishing activity adversely affects EFH in a manner that is more than minimal and not temporary in nature, based on the evaluation conducted. Councils should use the best scientific information available, as well as other appropriate information sources, and determine if the management measures are practicable.

2.2.1 2023 EFH 5-year Review

For the 2023 EFH 5-year Review, the evaluation of fishing effects on EFH was performed for species of the groundfish and crab FMPs, including 34 EBS species, 27 AI species, and 42 GOA species. The methods and process for evaluating fishing effects were developed for the 2017 EFH 5-year Review with guidance from an SSC subcommittee,[17] and applied to the 2022 EFH FE evaluation, incorporating recommendations from the SSC during the February 2022 Council meeting. First, we ran the updated fishing effects (FE) model (described below), and applied the resulting estimates of habitat disturbance to the core EFH area (CEA) of the FMP species based on the new SDM ensemble EFH maps (see section 2.1.1). We provided the results to stock assessment authors (SAs) to evaluate and determine if impacts to their species' CEA (or additional areas as requested) were more than minimal and not temporary. The SAs were asked to conduct an assessment if the stock was below MSST, if ≥ 10% of the CEA was disturbed by fishing gear, or, if the SA reported concerns on data limitations, they could choose a qualitative assessment. The 10% disturbance threshold did not preclude stock assessment authors from completing an evaluation if other data suggested impacts to habitat may be affecting the population. To investigate the potential relationships between fishing effects and stock production, stock assessment authors examined trends across life history parameters and the amount of disturbed habitat in the CEA (Zaleski et al. 2024).

The FE model used for the 2023 EFH 5-year Review was updated from the model developed for the 2017 Review. The model estimates habitat disturbance from all fishing events in federal fisheries where gear contacts the ocean bottom (Smeltz et al. 2019). The inputs to the FE model include: fishing effort, gear parameters for all gear types, and susceptibility and recovery of habitat features. The comprehensive evaluation takes into consideration overlapping fishing events and habitat in varying levels of disturbed and recovering states for a cumulative estimate of disturbance. Updates for the 2022 FE evaluation included a code correction from the 2017 model code, incorporating five additional years of vessel track information, using the CEA of the new SDM maps, and a sensitivity analysis (Zaleski et al. 2024). In response to SSC questions, we also provided analysis comparing FE model outputs using observed fishing events only versus using both observed and unobserved data. In 2016, the FE model also incorporated longer recovery times into the model for a deep/rocky habitat category to represent long-lived corals, and we described that model improvement in the 2022 FE evaluation (Zaleski et al. 2024).

After the SAs completed the quantitative or qualitative assessments, they could elevate their species to the Plan Teams and the Council to consider mitigations to reduce fishing effects to habitat as part of the FE evaluation methods. None of the SAs concluded that fishing effects on their species were more than minimal and not temporary during the 2022 FE evaluation, and therefore no SAs recommended elevating their species for mitigation measures. A discussion

[17] D1 EFH Fishing Effects Proposed Methods for Analysis, December 2016 https://meetings.npfmc.org/Meeting/Details/474

paper reporting the results was prepared for the SSC October 2022 meeting and presented to the Crab Plan Team and Joint Groundfish Plan Teams meetings in September 2022. The SSC found that the 2022 FE evaluation supports the continued conclusion that the adverse effects of fishing activity on EFH are minimal and temporary in nature. The discussion paper was updated after the October 2022 SSC meeting and revised in January 2023. Following the completion of the 2023 EFH 5-year Review, the FE evaluation discussion paper was published as a NOAA Technical Memorandum (Zaleski et al. 2024). As a result of the 2023 EFH 5-year Review, the BSAI, GOA, and Crab FMPs were updated where EFH fishing effects information is described.[18]

2.2.2 2028 EFH 5-year Review

The Alaska EFH Research Plan (Pirtle et al. 2024) provides a research objective with an emphasis area to advance EFH component 2 information for North Pacific species in the 2028 EFH 5-year Review:

Objective 2: Improve fishing effects assessment

- *1.1 Methods development to assess fishing impacts to EFH.*

For the 2028 EFH 5-year Review, the FE model will be updated and run using additional years of fishing effort data. Results will be prepared for stock assessment author review using the CEAs for the subset of species with updated ensemble SDM EFH maps, as listed in section 2.1.2. The following analytical updates and process milestones are planned and described in the following sections:

- Incorporate catch-in-areas (CIA) Database updates, including additional years of fishing effort data, and provide retrospective bridging analysis.
- Update the FE model methods, including new data, recovery and susceptibility rates, geological and biological benthic habitat features, and gear parameters table (e.g., bottom-contact gear metrics), and update model outputs.
- Run the FE model with CEAs from updated ensemble SDM EFH maps for the BSAI, GOA, and Crab FMPs.
- Stock assessment authors will conduct evaluations for adverse fishing effects to EFH.

2.2.2.1 Incorporate CIA Database updates

The 2022 EFH FE evaluation used vessel track data from 2003 through 2020. For the next EFH FE evaluation, we will incorporate additional years of fishing effort data. Data updates will include data available from January 2021, until what will be most recently available in order to update the estimates of cumulative habitat disturbance. NMFS AKR is in the process of updating the CIA Database[19], including an update to the underlying application that generates the data set. The application integrates catch data from AKR's Catch Accounting System[20] (which

[18] 2023 EFH 5-year Review Final Summary Report (chapter 3), D2 EFH 5-year Review Plan, available on the Council Agenda for this meeting https://meetings.npfmc.org/Meeting/Details/3108

[19] NMFS Alaska Region Catch in Areas (CIA) Database https://www.fisheries.noaa.gov/inport/item/27363

[20] NMFS Alaska Region Catch Accounting System https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/alaska-catch-accounting-system

has the spatial resolution of NMFS reporting areas) with spatial data from the VMS for each trip. We will run a bridging analysis to identify potential differences in trip data from the update to the CIA Database, to demonstrate where and how those differences may affect the FE model outputs and results.

2.2.2.2 Update the FE Model Methods

Scientists at APU are continually reviewing and updating model inputs and we will incorporate the updates to the FE model for the 2028 Review. Part of this work will also address a separate Council action, pelagic trawl gear innovation, and the Council's motion from June 2025 to update the FE model: "The Council requests the Fishing Effects model be updated with the refined and current information to improve bottom contact estimates. The Council affirms the Fishing Effects model is the peer-reviewed, best available tool to assess the effects of fishing on essential fish habitats in Alaska."[21]

2.2.2.3 Run the FE Model with Updated Ensemble SDM EFH Maps

We will coordinate with NMFS AKR staff developing updated SDM EFH maps for a subset of species in the BSAI and GOA FMPs and crab species in the Crab FMP. The updated CEAs for these species will be applied in an overlay with the updated estimates of habitat disturbance from the FE model for each species. The updated SDM EFH CEAs will be developed using updated data for species and the environment, including updated covariates (e.g., bottom temperature, sediment grain size, and presence-absence of corals, sponges, and sea whips) (section 2.1.2).

2.2.2.4 Conduct the EFH FE Evaluation

The evaluation of fishing effects to EFH is the culmination of the work for component 2 in the 2028 EFH 5-year Review. As in the 2017 and 2023 Reviews, stock assessment scientists will conduct the independent FE evaluations for their assessed species. We will coordinate with Plan Team chairs to develop a list of available stock assessment authors and species experts, and work with the chairs to plan a review timeline (appendix A, appendix B).

An important part of the EFH FE evaluation process is receiving feedback from Council bodies and the review presentations also allow for engagement from the public. We will incorporate recommendations for the next iteration of the EFH FE evaluation methods and analytical steps that may help further inform the discussion of gear impacts to benthic habitat.

2.2.2.5 Additional contributing studies

In addition to advancing information under EFH component 2 described above, two additional studies are in preparation to update the FE model and advance the applications of the FE model outputs. The first is the *Pollock gear project* (Harris et al. *in prep*, APU FAST Lab).[22] This study has research goals to address concerns of seafloor contact by pollock trawl gear and to improve the spatiotemporal resolution of the disturbance estimates from the FE model. It will

[21] June 2025 Council motion on C3b Pelagic Trawl Gear Innovation

[22] June 2025 NPFMC presentation: Pelagic Trawl Gear Innovation Development

include creating a gear catalog or a working database that will allow access to vessel and gear information directly from manufacturers and industry participants to inform gear simulations and the FE gear parameter table. The second is a study *Improving data on fishery gear interactions with Bering Sea crabs: stock-specific analysis to support dynamic management* (Fedewa et al. *in prep*, AFSC Kodiak Laboratory Shellfish Assessment Program). This project advances the use of an FE model mid-run product, bottom contact, and will overlap those estimates with Bering Sea crab stocks to identify potential crab-gear interactions.

2.3 Component 3: Non-MSA fishing activities that may adversely affect EFH

Federal regulations require that FMPs must identify any fishing activities that are not managed under the MSA (Magnuson-Stevens Act) that may adversely affect EFH, including fishing managed by state agencies or other authorities (50 CFR 600.815(a)(3)). The effects of non-MSA fishing activities are covered within the discussion of fishing effects on habitat in the 2005 EFH EIS (NMFS 2005). Non-MSA fishing activities include State-parallel fisheries, State-water fisheries, recreational fisheries, and halibut fisheries managed under the Northern Pacific Halibut Act of 1982. The types of gear used by the non-MSA fisheries in Alaska are discussed in detail in the 2005 EFH EIS, as well as their distribution. Although new data exist to reevaluate other non-MSA fishing impacts, at this time, we are not planning to analyze these changes or new information regarding the impacts of these activities on EFH in the 2028 5-year Review.

2.4 Component 4: Non-fishing activities that may adversely affect EFH

Federal regulations require FMPs to identify activities other than the act of fishing that may adversely affect EFH (50 CFR 600.815(a)(4)). The Non-Fishing Impacts Report was first provided in 2005 EFH EIS, Appendix G (NMFS 2005). During the EFH 5-year reviews, NMFS has re-examined the science surrounding potential impacts from non-fishing (anthropogenic) activities on EFH (component 4). NMFS has previously updated the report in 2011 and 2017 (Limpinsel et al. 2018).

2.4.1 2023 EFH 5-year Review

This most recent review of non-fishing activities that may adversely affect EFH is presented in *Impacts to Essential Fish Habitat from Non-Fishing Activities Report, 2018-2023* (Non-Fishing Impacts Report) published as a NOAA Technical Memorandum (Limpinsel et al. 2023). The report's overall purpose is to inform EFH consultations, provide practical conservation recommendations and reduce adverse impacts to EFH and fish while promoting environmentally responsible development. NMFS AKR uses the report as a reference document when engaging in EFH consultations with action agencies. Other Federal and state action agencies, as well as project proponents, use the report as a reference to better understand EFH, and to design and inform their own EFH assessments in consultation with NMFS. Other organizations, academia, and the public also refer to the report to gain understanding of how anthropogenic impacts influence EFH and species populations. As a result of the 2023 EFH 5-

year Review, the FMP EFH appendices were revised, where conservation recommendations for non-fishing activities are described.[23]

2.4.2 2028 EFH 5-year Review

For the 2028 EFH 5-year Review, NMFS has prioritized review of certain EFH components in the Council's FMPs, in order to focus on top priorities in light of capacity constraints for both the Council and NMFS. As such, EFH component 4 is not prioritized for review and the Non-Fishing Impacts Report (Limpinsel et al. 2023) and FMP sections will maintain status quo. However, conservation recommendations for non-fishing activities that may adversely affect EFH will not be static. NMFS consultation with action agencies regarding non-fishing activities will continue to the extent practicable at this time, including timely recommendations, using best available science reflecting the current state of our ecosystems and considering cumulative impacts of such activities over time in our region (e.g., Limpinsel et al. 2025). NMFS also provides an annual EFH Consultations Report to the Council, traditionally in April, which is an opportunity to update the Council on larger actions in particular.[24]

2.5 Component 5: Cumulative impacts analysis

To the extent feasible and practicable, FMPs should analyze how cumulative impacts of fishing and non-fishing activities influence the function of EFH on an ecosystem or watershed scale (50 CFR 600.815(a)(5)). The cumulative impacts of fishing activities are evaluated in the Supplemental Information Report (SIR) to the Alaska Groundfish Fisheries Programmatic Environmental Impact Statement completed each year.[25] For fishing impacts to EFH, the FE model allows for an assessment of cumulative effects from fishing activities, over time. Output from the FE model has been included as an indicator (habitat disturbed) in the Council's Ecosystem Status Reports since 2017, providing yearly FE output updates. For non-fishing impacts, the revised and updated Non-Fishing Impacts Report (Limpinsel et al. 2023) provides cumulative information on the impacts to EFH from non-fishing activities. At this time, we are not planning to conduct a new stand-alone cumulative impact analysis in the 2028 EFH Review.

2.6 Component 6: Conservation and enhancement

FMPs must identify actions to encourage the conservation and enhancement of EFH, including recommended options to avoid, minimize, or compensate for adverse impacts (50 CFR 600.815(a)(6)). Habitat conservation and enhancement recommendations address fishing and non-fishing threats to EFH and HAPC. The Council and NMFS have implemented several management measures to minimize impacts to EFH since the 2005 EFH EIS (NMFS 2005). These include closure areas to conserve and enhance EFH, to minimize adverse effects of fishing on EFH, and to specifically address concerns about fishing gear impacts to seafloor habitat,

[23] 2023 EFH Review Final Summary Report (chapter 5), D2 EFH 5-year Review Plan, available on the Council Agenda for this meeting https://meetings.npfmc.org/Meeting/Details/3108

[24] B2 NMFS EFH Report, April 2025 https://meetings.npfmc.org/Meeting/Details/3080

[25] https://downloads.regulations.gov/NOAA-NMFS-2023-0124-0010/content.pdf

including coral communities. Area closure maps and information are provided on NMFS AKR's website[26] and in the Council's FMPs[27].

If the Council recommends new priorities for EFH conservation and enhancement measures as a result of an EFH 5-year review, any analysis for those actions and potential FMP amendments will occur as a separate process (e.g., NMFS 2012). At any time, with new information and specific need, the Council can initiate analysis for management measures that would conserve and enhance EFH. For example, the Council is currently considering an action to conserve and enhance Tanner crab habitat in the GOA[28]. Advancements in habitat science and information supporting EFH 5-year reviews contribute to analysis for a variety of Council actions, such as evaluation of potential area closures and other spatial management measures.[29, 30]

2.6.1 2023 EFH 5-year Review

The 2023 EFH 5-year Review Final Summary Report describes the review of conservation and enhancement measures by the Council and NMFS (chapter 7).[31] New information was available from the FE model analysis and EFH FE evaluation to understand fishing effects on EFH and the FMPs were updated with this information under EFH component 2. NMFS revised the EFH conservation recommendations for non-fishing activities in the Non-fishing Impacts Report (Limpinsel et al. 2023) and updated the FMPs under EFH component 4. The Council reviewed the new information for non-fishing and fishing effects to EFH and concluded that no additional measures were required at this time as a result of the 2023 EFH 5-year Review.

2.6.2 2028 EFH 5-year Review

For the 2028 EFH 5-year Review, new information will be available from an updated FE model and analysis and EFH FE evaluation to understand fishing effects on EFH. NMFS and the Council will review the results of the EFH FE evaluation (component 2), and existing conservation and enhancement measures, and decide whether additional priorities should be recommended.

2.7 Component 7: Prey species

Loss of prey is considered an adverse impact to EFH because the availability of prey makes waters and substrate function as feeding habitat, and FMP species need to feed in order to reach maturity. Actions that reduce the availability of a major prey species, either directly or through impacts to habitat that reduces prey populations, may be considered adverse effects to EFH. FMPs should list the major prey species for species in the fishery management unit and

[26] https://www.fisheries.noaa.gov/resource/tool-app/habitat-conservation-area-maps

[27] https://www.npfmc.org/library/fmps-feps/

[28] D2 GOA Tanner Crab Protections, April 2025 https://meetings.npfmc.org/Meeting/Details/3080

[29] C2 Chum Salmon DEIS, February 2025 https://meetings.npfmc.org/Meeting/Details/3071

[30] C2 BBRKC Closures, February 2024 https://meetings.npfmc.org/Meeting/Details/3030

[31] 2023 EFH Review Final Summary Report (chapter 7), D2 EFH 5-year Review Plan, available on the Council Agenda for this meeting https://meetings.npfmc.org/Meeting/Details/3108

discuss the location and associations of prey species' habitat (50 CFR 600.815(a)(7)). Adverse effects on prey species and their habitats may result from fishing and non-fishing activities.

2.7.1 2023 EFH 5-year Review

For the 2023 EFH 5-year Review, stock assessment authors had the opportunity to review and recommend updates to the prey species life history information and tables in the FMPs. As a result of new information for prey of FMP species, the BSAI, GOA, and Crab FMPs were updated with new prey species information for two species of BSAI sharks, BSAI pollock, GOA Pacific cod, and BSAI red king crab.[32]

We also advanced prey information with the following resources: NMFS Nearshore Fish Atlas of Alaska (NFAA) and the 2022 AFSC Forage Species Congress. These two projects are building on information for prey species habitat and ecosystem connections. The NFAA catalogs the distributions and habitat use of nearshore fishes in Alaska, including prey species important to FMP species as well as FMP species in varying life history stages. The NFAA database, information, and link to an interactive mapper is available online.[33] The Forage Species Congress, hosted in 2022, was convened with a goal to improve the state of knowledge regarding forage species in Alaska's large marine ecosystems and integrate research efforts across programs to address data gaps, siloing pitfalls, and identify research priorities. The results of the congress are being prepared as a NOAA Technical Memorandum.

2.7.2 2028 EFH 5-year Review

The Alaska EFH Research Plan (Pirtle et al. 2024) provides a research objective with emphasis areas to advance EFH component 7 information for North Pacific species in the 2028 EFH 5-year Review:

Objective 3: Improve understanding of nearshore habitat and forage species

- *1.1 Improve information on habitat utilization and productivity for EFH species and their prey.*
- *1.2 Improve information on nearshore habitats.*

NMFS has included three priorities for EFH component 7 in the 2028 5-year Review:

1. Review and identify new information for FMP species' prey,
2. Improve nearshore prey and prey habitat information, and
3. Continue to advance applicable prey research to inform EFH consultations and other information needs.

We will engage with stock assessment scientists and prey species experts and provide the opportunity to work with us to review the prey species information provided in the FMP text

[32] 2023 EFH Review Final Summary Report (chapter 8), D2 EFH 5-year Review Plan, available on the Council Agenda for this meeting https://meetings.npfmc.org/Meeting/Details/3108

[33] NMFS NFAA online database at https://www.fisheries.noaa.gov/alaska/habitat-conservation/nearshore-fish-atlas-alaska

descriptions and predator-prey tables. This review would occur concurrently with their review of EFH component 1 maps and text descriptions, as in previous EFH reviews. We highlight the need to identify and evaluate data gaps in prey species information such as predator-prey relationships, prey distribution, and prey habitat associations. Improving prey habitat information in the FMPs will support NMFS to make better informed habitat conservation recommendations in EFH consultations and other fishery management decisions.

Updates to EFH component 7 information in previous reviews have not yet included updates to quantitative maps of the habitat of FMP species' prey, and EFH SDMs have not yet included prey species covariates. Both types of information would advance understanding of the current state of North Pacific ecosystems and the role of prey in what constitutes EFH at different spatial and temporal scales as species respond to a shifting environment. In the 2028 Review, studies are contributing new information to demonstrate these updates for the component 1 SDMs and component 7 in the FMPs. Two studies funded by the Alaska EFH Research Plan and others are in preparation to advance prey information for the 2028 EFH 5-year Review.

Assessing forage fish distributional shifts and lower trophic level dynamics (Siple et al. *in prep*, AFSC RACE GAP). This study is applying SDMs to map the overlap between FMP species' prey fishes (e.g., capelin) and their prey (primary and secondary producers) in the eastern Bering Sea (EBS). This study will apply SDMs to map the habitat-related distribution and abundance of prey species (herring, age-0 pollock, and capelin) in warm, cold, and average temperature years.

Food for thought: using predators as samplers to quantify spatiotemporal variation in prey throughout the Gulf of Alaska (Gerson et al. *in prep*., Oregon State University and AFSC REEM). This study is using "predators as samplers" via diet samples collected during the RACE GAP GOA bottom-trawl surveys and STMs to quantify the forage landscape of the GOA. Relative density estimates from this project will be used to generate temporally dynamic maps of habitat importance for krill (Euphausiidae), shrimps (Caridea), and forage fish (Osmeridae, Ammodytidae, Clupeidae, and *Gadus chalcogrammus*) in the GOA from 1990–2023.

The collection of SDM maps from these studies can be included in the FMPs under component 7. In addition, the SDM outputs will be available to explore as potential covariates for component 1 SDM EFH mapping. These studies will help identify broader patterns in how species distributions in the EBS and GOA may change as the environment and forage landscape shifts in space and time, supporting EFH and other fishery management information needs.

2.8 Component 8: Identification of HAPC

Habitat Areas of Particular Concern (HAPC) are specific areas within EFH that are rare and are either ecologically important, sensitive to disturbance, or may be stressed from fishing or non-fishing activities. Specific to fishery actions, HAPC are an important, site-specific management tool for federally managed species that may require additional habitat protection. EFH provisions provide a means for the Council to identify HAPCs (50 CFR 600.815(a)(8)) within FMPs.

The Council has identified a formalized process for selecting HAPCs. The HAPC process is initiated by Council action to establish priorities for HAPC consideration. Under this process, the

Council periodically considers whether to set a habitat priority. If so, the Council initiates a request for proposals for HAPC candidate areas that meet the specific priority habitat. Proposals that meet the Council's priorities are reviewed for scientific and socioeconomic merit, and enforcement potential. This information is then presented through the regular Council process, and the Council may choose to select HAPC proposals for a full analysis and subsequent implementation. The Council may also modify proposed HAPC sites and management measures during its review, or request additional input and technical review. After review, the Council identifies proposals for further review and potential HAPC designation. Information about the Council's HAPC process and current HAPCs designated off Alaska are available in the FMPs and described in the EFH 5-year Review Final Summary Reports.[34]

The Council may wish to identify priorities for HAPC consideration and request proposals for specific sites for HAPC inclusion, coinciding with the 2028 EFH 5-year Review. The Council can request proposals to conserve and enhance EFH (section 2.6) or open the HAPC process at any time, if the need and information are available. Any analysis and potential FMP amendments resulting from the call for proposals will occur as a separate process from the 2028 EFH 5-year review (e.g., NMFS 2012).

2.9 Component 9: Research and information needs

FMPs should identify recommendations for research that the Council and NMFS view as necessary to improve descriptions and identification of EFH, evaluate impacts to EFH, and develop EFH conservation and enhancement measures (50 CFR 600.815(a)(9)). During each EFH 5-year review, NMFS identifies information gaps and research recommendations. These recommendations inform EFH research priorities in the FMPs, the Alaska EFH Research Plan, in order to guide research to advance information for the next EFH 5-year Review and other, related Council actions.

2.9.1 2023 EFH 5-year Review

During the 2023 EFH 5-year Review, research recommendations were received by Council bodies, stock assessment scientists, EFH analysts, and the public. This information was used to revise the FMP appendices (e.g., GOA FMP Appendix H) and update the Alaska EFH Research Plan.[35]

Following the 2023 EFH 5-year Review, NMFS AKR and AFSC led a process to develop an update to the Alaska EFH Research Plan, which is in its fourth edition since the first plan was published in 2006. The current Alaska EFH Research Plan guides research supporting EFH information development for the 2028 EFH 5-year Review, and future reviews. The plan was published as a NOAA Technical Memorandum (Pirtle et al. 2024).

[34] 2023 EFH Review Final Summary Report (chapters 7 and 9), D2 EFH 5-year Review Plan, available on the Council Agenda for this meeting https://meetings.npfmc.org/Meeting/Details/3108

[35] 2023 EFH 5-year Review Final Summary Report (chapter 10), D2 EFH 5-year Review Plan, available on the Council Agenda for this meeting https://meetings.npfmc.org/Meeting/Details/3108

The Alaska EFH Research Plan has five long-term research goals, described in detail in the plan:

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.

The Alaska EFH Research Plan includes three objectives with recommendations for areas of emphasis in data and methods development, described in detail in the plan:

- *Objective 1: Improve EFH information for targeted species and life stages.*
    - Including, by incorporating additional field data and alternative data sources; identifying demographic processes driving variation over time; and further improving methods to integrate monitoring and process research.
- *Objective 2: Improve fishing effects assessment.*
    - Encouraging, additional methods development to assess fishing impacts to EFH, including by extending the FE model currently applied to the EFH FE evaluation in the 2023 EFH 5-year Review; and new methods development to identify the cumulative effects of fishing and non-fishing human activities to EFH.
- *Objective 3: Improve understanding of nearshore habitat and forage species.*
    - Recommending, expanded efforts to understand habitat utilization and productivity of nearshore environments for EFH species (e.g., early life history stages) and their prey species. Improved understanding of nearshore habitats is also intended to support the EFH non-fishing effects consultations that are done near areas with human development.

2.9.2 2028 EFH 5-year Review

For the 2028 EFH 5-year Review, NMFS has prioritized review of certain EFH components in the Council's FMPs, in order to focus on top priorities in light of capacity constraints for both the Council and NMFS. At this time, EFH component 9 is not prioritized for comprehensive review and the current Alaska EFH Research Plan (Pirtle et al. 2024) will remain status quo, following the conclusion of this 5-year review. However, we anticipate that new EFH research and information needs could be identified from recommendations during this review, in which case, updating this information in the FMPs may be warranted.

2.10 Component 10: Review and revision of EFH components of FMPs

Councils and NMFS should periodically review the EFH provisions of FMPs and revise or amend EFH provisions as warranted based on available information (50 CFR 600.815(a)(10)). At the conclusion of an EFH 5-year review, a draft summary report is prepared that describes the review process and results for all EFH components the Council elects to review and potentially revise, following the EFH 5-year review roadmap (appendix A). The summary report represents the EFH review and meets the requirements for review outlined in MSA. If, after reviewing the

draft summary report, the Council chooses to update any EFH components in its FMPs, FMP amendments will be prepared along with the appropriate analytical documents.

3 Council Action

The proposed plan for the 2028 EFH 5-year Review is based on direction received from the Council during the 2023 Review and current priorities of the Council and NMFS. Here, we have identified which of the EFH components the Council may wish to review and update with a focus on the BSAI, GOA, and Crab FMPs. Staff are seeking input from the Council on specific components and information development currently prioritized for review and revision:

- Develop and present new data, methods, species distribution models (SDMs), EFH maps, and habitat information for a subset of species (Component 1);
- Run the FE model with updated fishing effort data, methods, and the updated EFH maps for the subset of species, and complete the EFH FE evaluation based on this new information (Component 2);
- Review the results of the EFH FE evaluation, existing conservation and enhancement measures, and decide whether additional measures should be recommended (Component 6);
- Present new data and prey habitat information, develop methods, SDMs, and maps for select prey species (Component 7);
- Review recommendations for EFH research priorities and information needs if necessary (Component 9); and
- Review the draft summary report from the 2028 EFH 5-year Review and decide if FMP amendments are warranted (Component 10).

Additionally, the Council may wish to identify priorities for HAPC consideration and request proposals for specific sites for HAPC inclusion. The Council can request EFH conservation and enhancement proposals and open the HAPC process at any time during their regular process, if the need and information are available (sections 2.6 and 2.8).

4 References

Copeman, L.A., Laurel, B.J., Spencer, M., and Sremba, A. 2017. Temperature impacts on lipid allocation among juvenile gadid species at the Pacific Arctic-Boreal interface: an experimental laboratory approach. Mar. Ecol. Prog. Ser, 566: 183–198. https://www.jstor.org/stable/24898305

Copeman, L.A., Ottmar, M., Ryer, C., and Kristiansen, T. *In preparation.* Temperature-dependent survival and growth of early juvenile Bering Sea snow crab (*Chionoecetes opilio*) and Tanner crab (*Chionoecetes bairdi*): implications for optimal crab thermal habitat in a rapidly warming Bering Sea.

Gibson, G.A., Stockhausen, W.T., Shotwell, S.K., Deary, A.L., Pirtle, J.L., Coyle, K.O., *et al.* 2023. Can seamounts in the Gulf of Alaska be a spawning ground for sablefish settling in coastal nursery grounds? Fish. Res. 261: 106625. https://doi.org/10.1016/j.fishres.2023.106625

Harris, J., Laman, E. A., Pirtle, J. L., Siple, M. C., Rooper, C. N., Hurst, T. P., and Conrath, C. L. 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

Harris, J., Pirtle, J. L., Laman, E. A., Siple, M. C., and Thorson, J. T. 2024. An ensemble approach to species distribution modelling reconciles systematic differences in estimates of habitat utilization and range area. J. Appl. Ecol. 61: 351–364. https://doi.org/10.1111/1365-2664.14559

Hart, L.K.G, Cunningham, C.J., Yasumiishi, E.M., Mueter, F.J., Thorson, J.T., Pirtle, J.L., and Dimond, J.A. 2025. Species distribution models estimate time-varying juvenile salmon distributions in the north- and southeastern Bering Sea. Can. J. Fish. Aquat. Sci. 82: 1–13. https://doi.org/10.1139/cjfas-2024-0137

Harvey, C.J., deReynier, Y.L., Morrison, W.E., Cudney, J.L., Dick, D.D., Ford, T., *et al*. 2025. The U.S. Ecosystem-Based Fisheries Management Policy and Road Map: Assessing progress and applying lessons learned. Fish. Fish. 26(5): 957–974. https://doi.org/10.1111/faf.70012

Laman, E.A., Pirtle, J.L., Harris, J., Siple, M.C., Rooper, C.N., Hurst, T.P., and Conrath, C.L. 2022. Advancing Model-Based Essential Fish Habitat Descriptions for North Pacific Species in the Bering Sea. U.S. Department of Commerce, NOAA Tech. Memo. NMFS-AFSC-459, 538 p. https://doi.org/10.25923/y5gc-nk42

Laman, E. A., Rooper, C. N., Turner, K., Rooney, S., Cooper, D. W., and Zimmermann, M. 2018. Using species distribution models to describe essential fish habitat in Alaska. Can. J. Fish. Aquat. Sci. https://doi.org/10.1139/cjfas-2017-0181

Laman, E.A., Rooper, C.N., Rooney, S., Turner, K., Cooper, D., and Zimmerman, M. 2017. Model-based Essential Fish Habitat Definitions for Eastern Bering Sea Groundfish Species. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-357, 265 p.

Laurel, B.J., Spencer, M., Iseri, P., and Copeman, L.A. 2016. Temperature-dependent growth and behavior of juvenile Arctic cod (*Boreogadus saida*) and co-occurring North Pacific gadids. Polar Biology, 39: 1127-1135. https://doi.org/10.1007/s00300-015-1761-5

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. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/AKR-30, 226 p. https://doi.org/10.25923/9z4h-n860

Marsh, J., Pirtle, J.L., Mueter, F.J., and Harris, J. 2023. Model-Based Essential Fish Habitat Descriptions for Fish Resources of the Arctic Management Area. 86 pgs. NPFMC February 2023 meeting, C4 EFH. https://meetings.npfmc.org/Meeting/Details/2975

National Marine Fisheries Service (NMFS). 2005. Final Environmental Impact Statement for Essential Fish Habitat Identification and Conservation in Alaska. March 2005. https://repository.library.noaa.gov/view/noaa/17391; https://repository.library.noaa.gov/view/noaa/17392

NMFS. 2012. Final Environmental Assessment for Essential Fish Habitat (EFH) Omnibus Amendments, October 2012. https://repository.library.noaa.gov/view/noaa/17389

NMFS. 2024. Final Environmental Assessment for Essential Fish Habitat Omnibus Amendments: July 2024. National Marine Fisheries Service, Alaska Region, 62 p. https://www.fisheries.noaa.gov/s3//2024-07/Final-EFH-EA-Omnibus-Amendment-2024.pdf

Pirtle, J.L., Laman, E.A., Harris, J., Siple, M.C., Rooper, C.N., Hurst, T.P., Conrath, C.L., *et al.* 2023. 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., Thorson, J.T., Bayer, S.R., Hurst, T.P., Matta, M.E., and Siple, M.C. 2024. 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

Pirtle, J.L., Laman, E.A., Harris, J., Siple, M.C., Rooper, C.N., Hurst, T.P., Conrath, C.L., *et al.* 2025. 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, 314 p. https://doi.org/10.25923/jvpx-ck45

Rooney, S.C., Rooper, C.N., Laman, E.A., Turner, K.A., Cooper, D.W., and Zimmermann, M. 2018. Model-based essential fish habitat definitions for Gulf of Alaska groundfish species. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-373, 370 p.

Ryznar, E.R., and Litzow, M.A. 2024. Predicting the distribution of red king crab bycatch in Bering Sea flatfish trawl fisheries. Fish. Res. 279: 107158. https://doi.org/10.1016/j.fishres.2024.107158

Ryznar, E.R., and Litzow, M.A. *In revision*. Fisheries-dependent model of Bering Sea red king crab distribution in the data-poor season. Submitted to Can. J. Fish. Aquat. Sci.

Shotwell, S.K., J.L. Pirtle, J.T. Watson, A.L. Deary, M.J. Doyle, S.J. Barbeaux, *et al*. 2022. Synthesizing integrated ecosystem research to create informed stock-specific indicators for next generation stock assessments. Deep-Sea Res. II, GOA SI IV. https://doi.org/10.1016/j.dsr2.2022.105070

Sigler, M.F., Eagleton, M.P., Helser, T.E., Olson, J.V., Pirtle, J.L., Rooper, C.N., *et al.* 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 Rep. 2015-05, 22 p. https://repository.library.noaa.gov/view/noaa/14191

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, 115 p.

Smeltz, T.S., Harris, B.P., Olson, J.V., and Sethi, S.A. 2019. A seascape-scale habitat model to support management of fishing impacts on benthic ecosystems. Can. J. Fish. Aquat. Sci. 76(10): 1836–1844. https://doi.org/10.1139/cjfas-2018-0243

Smith, M., Yeager, M.E., Pirtle J.L., Barnes, C.L., and Thorson, J.T. *In preparation*. Effects of temporal resolution in forecasting species distributions under varying conditions.

Turner, K.A., Rooper, C.N., Laman, E.A., Rooney, S.C., Cooper, D.W., *et al.* 2017. Model-based essential fish habitat definitions for Aleutian Islands groundfish species. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-360, 239 p.

Yeager, M., Shotwell, S.K., Stockhausen, W.T., Gibson, G.A., and Pirtle, J.L. *In preparation*. Individual-based models inform fishery management pathways for two groundfish with contrasting early life history phenologies.

Zaleski, M., Smeltz, T.S., Gardiner, S., Pirtle, J.L., and Harrington, G.A. 2024. 2022 Evaluation of 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

5 Appendix A: EFH 5-year Review Roadmap

The ten EFH components are addressed in each of the Council's six FMPs. A description of the 2028 EFH 5-year Review plan (2025) and prior review plans (2015, 2019) for the ten EFH components is included in Table 2. These plans are the roadmap that the Council and NMFS follow in an EFH 5-year review.

Table 2. 2028 EFH 5-year Review Roadmap for the ten EFH components of FMPs with plans from the last two reviews (launched in 2015, 2019) and the 2025 plan presented in this document.

EFH Component	2015 Plan for EFH Review	2019 Plan for EFH Review	2025 Plan for EFH Review
1. Description and identification of EFH	• Identify and evaluate new scientific literature and other information. • Develop new species distribution models (SDM) to map EFH level 1 and 2 (habitat-related distribution and abundance) for the BSAI, GOA, and Crab FMPs. • Evaluate new model-based maps for Salmon FMP and distribution maps for Arctic FMP from previous work. • Stock assessment authors review and update EFH tables, text descriptions, and literature, and review EFH maps. • SSC review and recommendations. • If warranted, update FMPs with new information. • Publish regional SDM EFH Reports.	• Identify and evaluate new scientific literature and other information. • Modernize the SDMs with new ensemble methods and data to map EFH level 1 and 2 for the BSAI, GOA, Crab, and Arctic FMPs. • Develop new EFH level 3 maps (habitat-related vital rates), using rates from laboratory studies and SDMs for a subset of species in the BSAI, GOA, and Arctic FMPs. • Develop methods to combine biophysical individual-based models (IBMs), SDMs, and vital rates to map EFH level 2 and 3 for pelagic early life stages of Alaska sablefish and Pacific cod in the GOA FMP. • Stock assessment authors have opportunity to review and update EFH tables, text descriptions, and literature, and review SDMs and EFH maps. • SSC review and recommendations. • If warranted, update FMPs with new information. • Publish EFH Component 1 Synthesis Report and regional SDM EFH Reports.	• Identify and evaluate new scientific literature and other information. • Update the ensemble SDMs with new data to map EFH level 2 and 3 for a subset of species in the BSAI and GOA FMPs and all species in the Crab FMP. • Develop new ensemble spatial-temporal SDMs (STMs) to map EFH level 2 for a subset of species in the BSAI, GOA, and Crab FMPs. • Stock assessment authors have opportunity to review and update EFH tables, text descriptions, and literature, and review SDMs and EFH maps. • SSC review recommendations. • If warranted, update FMPs with new information. • Publish EFH Component 1 Synthesis Report and regional SDM EFH Reports. • *Maintain status quo for EFH component 1 for the Arctic, Salmon, and Scallop FMPs.*

EFH Component	2015 Plan for EFH Review	2019 Plan for EFH Review	2025 Plan for EFH Review
2. Fishing activities that may adversely affect EFH	• Review impacts from fishing gears on EFH. • Develop a new fishing effects (FE) model to update the prior long-term fishing effects index (LEI) model to examine impacts of fishing on EFH. • SSC review FE model methods. SSC Subcommittee review and recommend EFH FE evaluation process. • Stock assessment authors conduct EFH FE evaluation. SSC review and recommendations. • If warranted, update FMPs with new information.	• Update the FE model methods and include new data. • Stock assessment authors conduct EFH FE evaluation. SSC review and recommendations. • If warranted, update FMPs with new information. • Publish final EFH FE Evaluation Report.	• Incorporate NMFS AKR Catch in Areas Database updates and provide retrospective bridging analysis • Update the FE model methods; including new data, recovery and susceptibility rates, geological and biological benthic habitat features, and gear parameters table (e.g., bottom-contact gear metrics); and update model outputs. • Run the FE model with the updated ensemble SDM EFH maps for a subset of species in the BSAI and GOA FMPs and all species in the Crab FMP. • Stock assessment authors conduct EFH FE evaluation. SSC review and recommendations. • If warranted, update FMPs with new information. • Publish final EFH FE Evaluation Report.
3. Non-Magnuson-Stevens Act fishing activities that may adversely affect EFH	• Review changes to halibut and State water fisheries. • Identify sources of new information that may shed light on analysis of the impact of these fishing activities. • Review EFH component 3 in the FMPs, and evaluate against new information.	• Review EFH component 3 in the FMPs, and evaluate against new information.	• *Maintain status quo for EFH component 3 in the FMPs.*

EFH Component	2015 Plan for EFH Review	2019 Plan for EFH Review	2025 Plan for EFH Review
4. Non-fishing activities that may adversely affect EFH	• Review changes to non-fishing activities affecting EFH. • Identify sources of new information that may shed light on analysis of the impact of non-fishing activities. • Update EFH conservation recommendations • If warranted, update sections of the FMPs with new information and add new sections on warming trends off Alaska, ocean acidification, and marine traffic, add a more thorough bibliography. • Publish an updated EFH Non-fishing Effects Report.	• Review changes to non-fishing activities affecting EFH in Alaska. • Identify sources of new information that may shed light on analysis of the impact of non-fishing activities. • Update EFH conservation recommendations, including new climate-informed recommendations. • If warranted, update the FMPs with new information. • Publish an updated EFH Non-fishing Effects Report.	• *Maintain status quo for EFH component 4 in the FMPs.*
5. Cumulative impacts analysis	• Review cumulative impacts analysis discussion in FMPs, and evaluate against new information.	• Review cumulative impacts analysis discussion in FMPs, and evaluate against new information.	• *Maintain status quo for EFH component 5 in the FMPs.*
6. Conservation and enhancement	• Review EFH recommendations for fishing and non-fishing activities and evaluate against new information to determine whether updates are warranted.	• Review new information from the EFH FE evaluation under component 2 to understand fishing effects on EFH. • Review and revise the conservation recommendations for non-fishing activities in the non-fishing impacts report under EFH component 4. • Review EFH conservation and enhancement measures currently implemented. • The Council may wish to identify additional EFH conservation and enhancement recommendations.	• Review new information from the EFH FE evaluation under component 2 to understand fishing effects on EFH. • Review EFH conservation and enhancement measures currently implemented. • The Council may wish to identify additional EFH conservation and enhancement recommendations.

EFH Component	2015 Plan for EFH Review	2019 Plan for EFH Review	2025 Plan for EFH Review
7. Prey species	• Review prey species information in the FMPs, and determine whether updates are warranted.	• Review prey species information in the FMPs, and determine whether updates are warranted.	• Review prey species information in the FMPs, and determine whether updates are warranted. • Present new SDM maps of habitat-related distribution and abundance for a subset of EFH species' prey for the BSAI and GOA FMPs. • SSC review and recommendations.
8. Identification of habitat areas of particular concern (HAPC)	• Council determines whether to initiate a new call for HAPC proposals.	• Council determines whether to initiate a new call for HAPC proposals.	• Council determines whether to initiate a new call for HAPC proposals.
9. Research and information needs	• Identify research necessary to fill gaps in EFH knowledge, including recommendations, and determine whether updates to the FMPs are warranted • Review, revise, and publish an update to the Alaska EFH Research Plan.	• Identify research necessary to fill gaps in EFH knowledge, including recommendations, and determine whether updates to the FMPs are warranted. • Review, revise, and publish an update to the Alaska EFH Research Plan.	• Identify recommendations that are necessary to fill gaps in EFH knowledge, and determine whether updates to the FMPs are warranted. • *Maintain status quo for the NMFS Alaska EFH Research Plan.*[36]
10. Review and revision of EFH components of FMPs	• Summary report represents EFH 5-year Review.	• Summary report represents EFH 5-year Review.	• Summary report represents EFH 5-year Review.

[36] NMFS Alaska EFH Research Plan https://doi.org/10.25923/sf79-ym32

6 Appendix B: Proposed Review Process and Timeline

We envision the following proposed, general review process and timeline for the 2028 EFH 5-year Review, provided here to support early planning considerations and communicate anticipated review milestones based on previous reviews. This is a streamlined draft and may not reflect all Council bodies who should be included at each stage of review, or all stages that may occur pending review outcomes along the way from launch to summary.

- December 2025 Meeting
  - Launch 2028 EFH 5-year Review to AP and Council for review and recommendations;
  - Launch discussion paper is provided for review with the 2023 EFH 5-year Review Final Summary Report as supplemental information.

- December 2025 - January/May 2026
  - AKR staff write Component 1 discussion paper of proposed methods to update the ensemble SDM EFH maps and preview draft results examples for SSC review and recommendations;
  - AKR/APU staff write Component 2 discussion paper of proposed methods to update the FE model and EFH FE evaluation process for SSC review and recommendations.

- February 2026 SSC Meeting
  - Present Component 1 proposed methods to update the ensemble SDM EFH maps and preview draft results examples for SSC review and recommendations;
  - Present Component 2 proposed methods to update FE model and FE evaluation for SSC review and recommendations.

- February-December 2026
  - AKR staff run the updated Component 1 ensemble SDMs to update the EFH maps (will be used in FE evaluation);
  - AKR staff run the new Component 1 STMs and make new temporally dynamic EFH maps;
  - APU/AKR staff update Component 2 FE model and complete model runs.

- January-May 2027
  - AKR/AFSC staff host launch meeting for reviewing stock assessment authors conducting EFH component reviews and FE evaluation (January 2027);
  - AFSC/ADFG stock assessment authors conduct the FE evaluation and have the opportunity to review the FMP sections and new EFH maps for their species (January-May 2027).

- May-September 2027
    - AKR staff write reports:
        - Component 1 EFH mapping results and other new EFH component information; stock assessment author review of EFH information; and final Component 2 FE analysis results and stock assessment author FE evaluation results for SSC review and recommendations.

- October 2027 SSC Meeting (T)
    - Present reports to SSC for review and recommendations:
        - Component 1 EFH mapping results and other new EFH component information; stock assessment author review of EFH information; and final Component 2 FE analysis results and stock assessment author FE evaluation results for SSC review and recommendations.

- TBD 2028/2029
    - Present draft Summary Report to AP and Council:
        - If the Council would like to amend the FMPs with the new information from the EFH 5-year review, staff will prepare appropriate analytical documents and draft the FMP amendment package.