



**US Army Corps
of Engineers®**

Alaska District

DRAFT Feasibility Report and Environmental Assessment

Homer Navigation Improvements Homer, Alaska Appendix H: Essential Fish Habitat Assessment



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Executive Summary

The purpose of the United States Army Corps of Engineers (USACE) Alaska District (POA) Feasibility Study, *Homer Navigation Improvements Study, AK*, is to determine the feasibility of, and Federal interest in, constructing navigation improvements at Homer, Alaska, to satisfy current demand and increase operational safety. The Proposed Project would expand the Homer Port and Harbor, to satisfy current demand for moorage and enable larger transient marine vessels to reside within protected moorage at Homer.

Pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (MSA), USACE POA submits this Essential Fish Habitat Assessment (EFHA) to provide an evaluation and determination of Essential Fish Habitat (EFH) impacts from the Proposed Project recommended under this Feasibility Study. The Proposed Project includes construction of a rubble-mound breakwater, new work and maintenance dredging operations, and pile driving operations, which are described to inform the impact analysis provided in the EFHA.

The Proposed Project described is anticipated to have more than negligible but less than substantial adverse impacts to marine EFH that supports 36 groundfish and 5 Pacific salmon species that are managed under the *Fishery Management Plan for the Groundfish Fisheries of the Gulf of Alaska* and *Fishery Management Plan for the Salmon Fisheries in the EEZ off Alaska*. Additionally, proposed mitigation measures and best management practices would be implemented to the extent practicable to offset potential unavoidable Proposed Project impacts to EFH species and species complexes.

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ACRONYMS AND ABBREVIATIONS

ADF&G	Alaska Department of Fish and Game
AS	Alaska Statue
AWC	Anadromous Water Code
BMP	Best Management Practice
CFR	Code of Federal Regulations
CWA	Clean Water Act
CY	Cubic Yards
dB	Decibel
DWDS	Deep Water Disposal Site
EEZ	Economic Exclusion Zone
eDNA	environmental DNA
EFH	Essential Fish Habitat
EFHA	Essential Fish Habitat Assessment
FMP	Fishery Management Plan
FR	Federal Register
GOA	Gulf of Alaska
HAPC	Habitat Area of Particular Concern
HSI	Habitat Suitability Index
HTT	Homer Trawl Transect
IFR/EA	Integrated Feasibility Report and Environmental Analysis
KBCHA	Kachemak Bay Critical Habitat Area
KBRR	Kachemak Bay Research Reserve
MLLW	Mean Lower Low Water
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NCCOS	National Centers for Coastal Ocean Science
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NTU	Nephelometric Turbidity Unit
PED	Preconstruction Engineering and Design
POA	Alaska District
PRD	Protected Resources Division
RBA	Revised Basin Area
SAV	Submerged Aquatic Vegetation
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard

APPENDIX H - ESSENTIAL FISH HABITAT ASSESSMENT

H.1 Introduction

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996, established procedures designed to identify, conserve, and enhance Essential Fish Habitat (EFH) for those species regulated under a Federal Fishery Management Plan (FMP). Section 305(b)(2) of the MSA requires Federal agencies to consult with National Oceanic and Atmospheric Administration's (NOAA's) National Marine Fisheries Service (NMFS) on all actions, or proposed actions, authorized, funded, or undertaken by the Federal agency that may adversely affect EFH. The level of detail in an EFH Assessment (EFHA) should be commensurate with the complexity and magnitude of the potential adverse effects of the action (50 Code of Federal Regulations [CFR] 600.920 (e)(2)). A Feasibility Study is being conducted by United States Army Corps of Engineers (USACE), Alaska District (POA), to evaluate potential modifications to the Homer Port and Harbor (herein Homer Harbor) to accommodate the current and future fleet. The non-Federal sponsor for the study is the City of Homer. The structural alternatives under consideration for the study have the potential to affect EFH. Thus, USACE is required to consult with NMFS on EFH pursuant to the MSA. USACE's EFH evaluation and findings and NMFS conservation recommendations (if any) would be incorporated into the project's Integrated Feasibility Report and Environmental Assessment (IFR/EA).

H.2 Project

H.2.1 Historical Context

Homer Harbor is located on the end of the Homer Spit, southeast of the mainland of the City of Homer in Alaska. Construction of the Homer Harbor in its current location began in the early 1960s. However, it was damaged by the Good Friday Earthquake of 1964 and reconstructed into a 16-acre basin with the assistance of USACE. The harbor fleet exceeded the harbor's capacity by 1984 initiating an expansion that took place over three years. The expansion resulted in the current harbor's 50-acre basin, which has 876 reserve slips and approximately 6,000 linear feet of transient moorage, a 5-lane boat launch and barge loading ramp, two tidal repair grids, a haul out repair facility, two external dock facilities, fuel floats, and a fish dock with cranes. The maximum depth of the current harbor's entrance channel is -22.5 feet Mean Lower Low Water (MLLW) and its basin is -18 feet to -12 feet MLLW. USACE POA maintains the harbor's Federally-authorized depths for the Homer Harbor through annual maintenance dredging to ensure these harbor features remain navigable.

The United States Coast Guard (USCG) berth is located at the entrance of the Homer Harbor. The USCG Berth hosts cutter *Aspen*, a Juniper Class Sea Going Buoy Tender 225 feet (69 meters) long vessel. Homer, Alaska, was named a Coast Guard City on May 22, 2023.

H.2.2 Purpose and Need

Homer Harbor is a regional port serving the needs of commercial vessels operating across southcentral and western Alaska in the commercial fishing, marine transportation, and maritime industrial industries. Over time, the fleet of marine vessels calling on Homer has exceeded the existing harbor's ability to serve this fleet safely and efficiently.

The harbor is overcrowded. Moorage is often at capacity even after rafting large marine vessels three to four deep on moorage floats. In 2019 there were 270 boats on the harbor permanent moorage waitlist; in 2024 there were 379. This number does not fully represent demand, since there is no permanent moorage for vessels over 85 feet in length. It takes several years for users to receive permanent moorage (average wait times vary by vessel size). This lack of permanent moorage increases the number of vessels using transient moorage which in turn increases the amount of rafting in the harbor. Rafting narrows navigation lanes inducing congestion and introduces tidal limits to navigation. Congestion in the harbor contributes to vessel delays and damages. Rafting also causes excess wear on the harbor's float system and increasing maintenance costs and decreasing the usable lifespan of floats. Rafting is a serious safety concern and increases risks of fires, falls, and collisions.

The dredged depth of the harbor basin, the width of the entrance channel, and the channel configuration limit the types of marine vessels that can call on Homer Port & Harbor. Larger marine vessels may require that harbor staff to shut the channel to two-way traffic and assist them through the harbor. This taxes the resources of the harbor and causes delays for other marine vessels. In rare circumstances marine vessels can operate under optimal tidal conditions.

Negative impacts from navigation inefficiencies are not limited to Homer residents. Harbor staff identified 50 communities across Alaska that depend on essential fuel and freight services from marine vessels that moor in Homer Port & Harbor.

USACE's Feasibility Study, *Homer Navigation Improvements Study, AK*, is evaluating the feasibility for solutions that provide safe, reliable, and efficient navigation and mooring for the local and commercial vessels that call on Homer Harbor. Under this study, the Proposed Project would expand the Homer Harbor at Homer, Alaska, as described in Section H.2.5 in order to satisfy current demand for moorage and enable larger transient marine vessels to reside within protected moorage within Kachemak Bay at Homer.

H.2.3 Location

The City of Homer is located in the Kenai Peninsula Borough of Southcentral Alaska, approximately 220 road miles and 118 air miles southwest of Anchorage (Figure H-1). It is the southernmost town on Alaska's contiguous highway system and part of the Alaska Marine Highway, a ferry service that operates along the southcentral coast of Alaska. According to the Census, the population of Homer was 5,522 in 2020.

Figure H-1. Location of Homer, Alaska



H.2.4 Action Area

Due to the nature of navigation improvement projects, in-water work cannot be avoided, and the in-water work for the Proposed Project would occur in Kachemak Bay. Kachemak Bay overlaps with the Federal Cook Inlet Beluga Whale Critical Habitat Area 2 established by Final Rule 76 Federal Register (FR) 20179 and managed by NMFS Protected Resources Division (PRD). The Alaska State Kachemak Bay Critical Habitat Area (KBCHA) established by Alaska Statute 16.20.590 is managed by the Alaska Department of Fish and Game (ADF&G). The majority of the project area would correspond with the area excluded from the KBCHA. The area extending outside the KBCHA exclusion area would depend on the final design of the selected structural alternative.

The Project Area is near the current operating Homer Harbor (Figure H-2). This area is favored due to (1) its proximity to the current harbor's infrastructure, (2) the area's exclusion from the KBCHA, and (3) existing marine anthropogenic activity and disturbance. The Project Area includes the Proposed Project (Alternative 2 of the Feasibility Study) and Deep Water Disposal Site (DWDS) footprints.

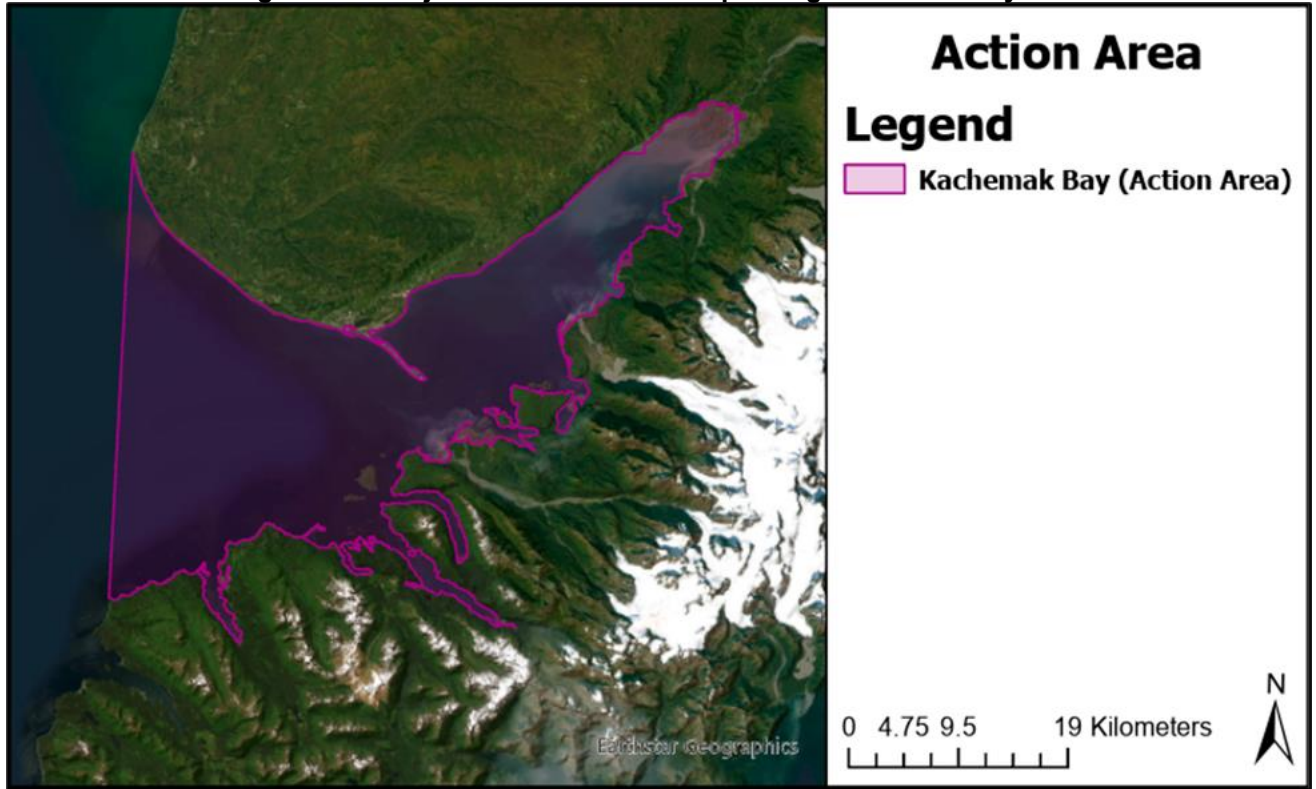
Figure H-2. Project Area along Homer Spit in Homer, Alaska



The Project Area is within the Action Area (Figure H-3), an area within which all direct and indirect effects of a project would occur. The Action Area is distinct from and larger than the Project Area because some elements of the Project may affect environmental resources beyond the Project footprint, and it therefore extends out to a point where no measurable effects from the Project are expected to occur.

USACE defined Kachemak Bay as the Action Area for this EFHA by taking into account the Project Area, Project marine vessel transit between Cook Inlet and Homer Harbor, and the ensonified area associated with construction operations. There would be marine vessels associated with the Project that would travel to and from ports outside the Action Area (e.g., ports of origin and associated with logistics like quarry rock source). These ports would not be specified in the construction contract and are therefore undefined. As the potential routes are undefined and project-dedicated marine vessels are anticipated to utilize standard shipping routes, vessel movement outside Kachemak Bay (i.e., the Action Area) will not be included in this the scope of analysis conducted in this EFHA.

Figure H-3. Project Action Area encompassing Kachemak Bay.



H.2.5 Description

The Proposed Project would be designed to have a project life of 50-years (project life assumed under the study is 2034 to 2084). Alternative 2: Transient and Waitlisted Vessels Harbor, has been selected as the Tentatively Selected Plan for the USACE Feasibility Study and will be the project evaluated under this EFHA. The project is at approximately at 30-35% level of design (Figure H-4). The project would progress to a higher level of design beyond 35% (typical of a feasibility study) during the Preconstruction Engineering and Design (PED) Phase.

Figure H-4. Project Design



The project is scheduled for a four-year phased construction timeline. Work would be conducted during annual construction seasons of six to eight months, with in-water

activities restricted to the summer months to avoid adverse weather conditions associated with winter storms. Thus, March through November will be the season assumed for construction activities for this EFHA.

The project would address the current moorage waitlist in addition to the entire transient fleet (vessels up to 225 feet in length). The project would provide moorage sufficient for 304 vessels with a combination of slips and side-tie.

USACE would manage and contract the construction associated with the project general navigation features (the breakwater and dredge prism). The project would involve the construction of a 37-acre mooring area (-24 feet MLLW) on the northeast side of the current harbor connected to adjoining fairway (-24 feet MLLW) and 90-foot-wide entrance channel (-26 feet MLLW). New work dredging and maintenance dredging across an approximate total of 68-acres would be required with the new harbor dredge prism. This harbor basin would be protected by a new rubble-mound breakwater, with east and west sections totaling approximately 4,500 feet. The breakwater crests would be constructed to an elevation of +30 feet MLLW, matching the height of the existing harbor breakwaters. USACE would install a 10-foot by 10-foot pre-poured concrete pad on each breakwater at the harbor entrance, providing a foundation for Aids to Navigation to be installed by the U.S. Coast Guard. The construction contract for the general navigation features would be performance-based, meaning the specific equipment and operational "means and methods" would not be dictated by the government. The awarded contractor would be responsible for developing their construction plan. This plan must operate entirely within the constraints of all environmental mitigations and commitments, which would be incorporated by USACE as binding specifications in the contract.

The Non-Federal Sponsor would manage the final design and construction for local service facilities for the project. Local service facilities under the project include a new float system for the expanded basin (complete with gangways, finger floats, and electrical utilities), the construction of a new fuel dock in the expanded harbor, and the removal and replacement of the System 5 float in the existing harbor. The replaced System 5 float is anticipated to provide moorage for 40 vessels at 24 feet in length and 132 vessels at 32 feet in length.

The USCG would manage the final design and construction of all Aids to Navigation. For the Integrated Feasibility Report and Environmental Assessment (IFR/EA) associated with this project, the USCG provided a preliminary Aids to Navigation description for planning and analysis. The preliminary description includes the construction of two navigation towers, each positioned at the end of a new breakwater nose and supported by a 10-foot by 10-foot pre-poured concrete pad provided by USACE. Additionally, the entrance channel would be marked by three 5-pile towers, totaling 15 driven piles; two would form a "gated pair" near the channel's end, and one would designate its northeast corner just outside the breakwaters. The Aids to Navigation are expected to include some form of lighting for visibility under night conditions.

USACE cannot mandate but would recommend mitigations and best management practices (BMPs) to the Non-Federal Sponsor and USCG for their actions under the Project.

For this EFHA, the Project activities would be separated into two distinct categories for analysis: marine vessel traffic and construction activities; Sections H.2.5.1. and H.2.5.2., respectively. The assumptions provided in these sections are subject to change during the PED phase, and USACE would reevaluate the need for EFH consultation in response to any significant modifications.

H.2.5.1 *Marine Vessel Traffic*

This section will focus on marine vessel traffic associated with the project. Project marine vessel traffic has potential to occur throughout the Action Area (Figure H-3). The following are marine vessel traffic assumptions that will be the basis of marine vessel traffic effects analysis:

- Vessels associated with construction activities would travel along standard shipping routes;
- Vessels would be used to facilitate construction logistics and activities required to construct the project;
- Vessels would be used to maintain the new project basin and entrance channel to Federally-authorized depths (i.e., maintenance dredging);
- Transient vessels moored in the current harbor would move into the harbor constructed under the project;
- Larger transient vessels (up to 225 feet in length) that could not be accommodated previously by the existing harbor would utilize the new harbor;
- The construction of the new harbor and replacement of System 5 would provide additional moorage for 360 waitlisted vessels a portion of which already operate in Homer (e.g., boats that use the boat launch and transient moorage in lieu of reserve);
- The project is not anticipated to increase cruise activity in Kachemak Bay as it does not provide infrastructure suitable for them;
- Waitlisted marine vessels are smaller and likely to operate more frequently and at faster speeds than the larger vessels that occur within the Action Area;

Marine vessel transits associated with project construction that occur outside the primary Action Area would be limited in number and are expected to follow standard shipping routes. The volume of these transits is not anticipated to exceed normal year-to-year variance along these routes. Given this, and with the implementation of required mitigation measures and BMPs, the effects of project-related vessel traffic outside the Action Area are considered negligible. Therefore, these transits have been excluded from the scope of this EFHA.

H.2.5.2 Construction Activities

This section will focus on construction activities associated with the project. Under construction activities, the following project activities were further separated into subcategories: breakwater construction, dredging operations, pile driving operations, and harbor infrastructure development. The Project Area (Figure H-2) represents where active construction would occur. The basis of assumptions to inform the effects of the construction activities will be informed by:

- Information acquired from ongoing and future project analyses, simulations, and modeling;
- Developed and refined design; and,
- Consultation with NMFS, as applicable.

Assumptions will be provided for each project construction activity.

Breakwater Construction

Breakwater construction includes the placement of rock and two concrete pads. The following are breakwater construction assumptions that will be inform the project construction activity effects analysis:

- Approximately 4,500 feet of rubble-mound breakwater would be constructed;
- Breakwaters would consist of clean approximately 123,100 cubic yards of armored rock, 66,500 cubic yards of B rock, and 310,800 cubic yards of C rock.
- Breakwaters would be built to a 1:5:1 slope;
- Breakwater rock would be placed precisely by the bucketload from an excavator or crane; and,
- A 10-foot by 10-foot pre-poured concrete pad would be constructed on both breakwaters near the harbor entrance to support installation of two navigation towers with lighting by the USCG.

Dredging Operations

Dredging operations would include new work (i.e., first dredging of harbor basin and entrance channel) and maintenance dredging (i.e., dredging to maintain Federally-authorized depths of the project) operation considerations. The following are new work dredging operations assumptions that will be inform the project construction activity effects analysis:

- New work dredged material is anticipated to equate to approximately 1,311,800 cubic yards (CY) of soft silt/clay, loose sand material;
- Mechanical dredging using an excavator or clamshell bucket would be used for new work dredging of a 68-acre dredge prism footprint (includes a 37-acre basin);

- A tugboat and scow would be used to transfer dredged material to an in-water disposal site;
- In-water disposal site would be in deep waters adjacent to the operations that are excluded from the Kachemak Bay Critical Habitat Area; and,
- The activity would have a duty cycle and be categorized as an intermittent sound source.

Maintenance dredging operations are anticipated to be consistent with the current Homer Harbor annual maintenance dredging operations. Thus, the following are maintenance dredging operations assumptions that will be inform the project construction activity effects analysis:

- Very soft silts/clays, loose sands material is anticipated to shoal into the new basin and entrance channel and require maintenance dredging of up to approximately 17,000 CY;
- Hydraulic dredging using a cutterhead suction dredge, categorized as a continuous sound source, would be used to maintain project Federally-authorized depths;
- Dredged material would be dredged directly to the designated dewatering site before being used beneficially (e.g., beach nourishment); and,
- Maintenance dredging frequency is anticipated to remain consistent with existing maintenance dredging of the current harbor and occur annually in the fall (September and October).

Pile Driving Operations

Pile driving operations would be required for installing the harbor float system. The following are pile driving operations assumptions that will inform the project construction activity effects analysis:

- Anticipated piles used for the new float system managed by the Non-Federal Sponsor would be 18- or 24-inch diameter round steel piles;
- Pile driving would include a combination of vibratory and impact pile driving; and,
- The USCG would pile drive three 5-pile towers, totaling 15 driven piles; two would form a "gated pair" near the channel's end, and one would designate its northeast corner just outside the breakwaters.

Local Service Facilities and Aids to Navigation

Harbor infrastructure development of the local service facilities by the Non-Federal Sponsor and Aids to Navigation by the USCG are required to realize the intended project. These are being included in the analysis as part of the Project. However, the Non-Federal Sponsor and USCG are responsible for ensuring compliance under EFH for the activities beyond the coverage provided by this EFHA. Furthermore, this EFH

assumes the Non-Federal Sponsor and USCG adopt the mitigations and BMPs described in this EFHA.

H.3 Essential Fish Habitat

EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate (50 CFR 600.10). Substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities (50 CFR 600.10).

H.3.1 EFH Fish Species

The Action Area is not within the Exclusive Economic Zone (EEZ) or managed under a FMP, but species managed under FMPs do occur in the area. These species are under the governance of the following: (1) *Fishery Management Plan for the Groundfish Fisheries of the Gulf of Alaska* (herein, Gulf of Alaska Groundfish FMP) implemented in 1978 and (2) *Fishery Management Plan for the Salmon Fisheries in the EEZ off Alaska* (herein, Pacific Salmon FMP) implemented in 1979 (Table H-1). The descriptions of EFH for these FMPs were amended through Amendment 127 and Amendment 16, respectively, by 89 FR 58632, on July 15, 2024.

Table H-1. Fish Management Plans with Species Occurring in the Action Area

FMP	Gulf of Alaska Groundfish FMP	Pacific Salmon FMP
Management Area	United States EEZ, exclusive of the Bering Sea, between the eastern Aleutian Islands at 170E W. longitude and Dixon Entrance at 132E40' W longitude	United States EEZ off Alaska, East and West Management Areas divided at Cape Suckling.
Managed Species	Alaska groundfish. All finfish, except salmon, steelhead, halibut, herring, and tuna, which are distributed or exploited in the management area, and are listed in Table 3-1 of the FMP.	Pacific Salmon and Steelhead Trout
EFH Evaluation and Review Frequency	Every 5 years	Every 5 years

The NMFS Alaska Region EFH Mapper was used to inform an initial list of EFH species within the Project Area (Table H-2). The data within this table was supplemented by USACE study-specific fieldwork conducted in 2024 and 2025 and the results from Kachemak Bay Research Reserve (KBRR) 2007 and 2008 fieldwork, as reported in the *Preliminary Biological Assessment of the Proposed Homer Harbor Expansion Project Final Report* (herein, KBRR Report; KBRR 2010). USACE fieldwork included bottom trawl and beach seine surveys conducted on a monthly basis between April through October 2024, and then a monthly basis from January through March 2025. USACE collected environmental DNA (eDNA) samples during these surveys, which also

informed EFH species within the Project Area. These data are reported in Appendix P of the Draft IFR/EA.

Table H-2. Fish and Invertebrate Species with Potential to Occur in Project Area

FMP	Species			Confirmed Via				
	Common Name	Scientific Name	Life Stage(s) ^{1,2,3}	EFH Mapper ₄	KBRR ₅	Beach Seine ₆	Bottom Trawl ₆	eDNA ₆
North Pacific / Pacific Salmon	Chinook salmon	<i>Oncorhynchus tshawytscha</i>	Marine IM / MA	X	X	X		X
	Chum salmon	<i>Oncorhynchus keta</i>	Marine IM / J / MA	X				X
	Coho salmon	<i>Oncorhynchus kisutch</i>	Marine J / MA	X	X			X
	Pink salmon	<i>Oncorhynchus gorbuscha</i>	Marine J / MA	X				X
	Sockeye salmon	<i>Oncorhynchus nerka</i>	Marine IM / J / MA	X	X			X
North Pacific / Gulf of Alaska Groundfish FMP	Alaska plaice	<i>Pleuronectes quadrituberculatus</i>	A (Su), E (Su), L (Su)	X				X
	Alaska skate	<i>Caliraja rhina</i>	A (Sp, Su, Wi), J (Su)	X				
	Aleutian skate	<i>Bathyraja aleutica</i>	A (Sp, Wi)	X				
	Arrowtooth Flounder	<i>Atheresthes stomias</i>	A (Yr), J (Su), L (Su)	X				
	Atka mackerel	<i>Pleurogrammus monopterygius</i>	A (Sp, Fa, Wi)	X				
	Black rockfish	<i>Sebastes melanops</i>	A (Su)	X				
	Blackspotted rockfish	<i>Sebastes melanostictus</i>	A (Su), J (Su)	X				
	Dark rockfish	<i>Sebastes ciliatus</i>	A (Su)	X				
	Dover sole	<i>Solea solea</i>	A (Sp, Wi), E (Su), J (Su), L (Su)	X				
	Dusky rockfish	<i>Sebastes variabilis</i>	A (Sp, Wi), J (Su)	X				
	Flathead sole	<i>Hippoglossoides elassodon</i>	A (Sp, Su, Wi), E (Su), J (Su), L (Su)	X				
	Greenstriped rockfish	<i>Sebastes elongatus</i>	A (Su)	X				
	Harlequin rockfish	<i>Othos dentex</i>	A (Sp), J (Su)	X				
	Longspine thornyhead rockfish	<i>Sebastobus altivelis</i>	A (Sp, Su)	X				
	Northern rock sole	<i>Lepidopsetta polyxystra</i>	A (Yr), J (Su), L (Su)	X		X	X	X
	Northern rockfish	<i>Sebastes polyspinis</i>	A (Sp, Fa, Wi), J (Su)	X				
	Octopus	<i>Octopoda spp.</i>	A (Sp, Su, Wi)	X				
	Pacific cod	<i>Gadus macrocephalus</i>	A (Yr), J (Su), L (Su)	X	X		X	X
	Pacific ocean perch	<i>Sebastes alutus</i>	A (Wi), L (Su)	X				
	Pygmy rockfish	<i>Sebastes wilsoni</i>	A (Su)	X				
Quillback rockfish	<i>Sebastes maliger</i>	A (Su)	X					

FMP	Species			Confirmed Via				
	Common Name	Scientific Name	Life Stage(s) ^{1,2,3}	EFH Mapper ₄	KBRR ₅	Beach Seine ₆	Bottom Trawl ₆	eDNA ₆
	Redbanded rockfish	<i>Sebastes babcocki</i>	A (Sp, Su)	X				
	Redstriped rockfish	<i>Sebastes rubrivinctus</i>	A (Su), J (Su)	X				
	Rex sole	<i>Glyptocephalus zachirus</i>	A (Sp, Wi), E (Su), L (Su)	X				
	Rosethorn rockfish	<i>Sebastes helvomaculatus</i>	A (Su), J (Su)	X				
	Rougheye rockfish	<i>Sebastes aleutianus</i>	A (Sp, Fa, Wi)	X				
	Sablefish	<i>Anoplopoma Fimbria</i>	A (Sp, Wi), J (Su), L (Su)	X				X
	Sand sole	<i>Psetichthys melanostictus</i>	No Data Provided		X			
	Sharpchin rockfish	<i>Sebastes zacentrus</i>	A (Su)	X				
	Shortraker rockfish	<i>Sebastes borealis</i>	A (Sp, Fa), J (Su)	X				
	Shortspine thornyhead rockfish	<i>Sebastolobus alascanus</i>	A (Sp, Fa, Wi)	X				
	Silvergrey rockfish	<i>Sebastes brevispinis</i>	J (Su)	X				
	Starry flounder	<i>Platichthys stellatus</i>	J (Fa)				X	X
	Southern rock sole	<i>Lepidopsetta bilineata</i>	A (Su), J (Su), L (Su), Unk (Fa)	X	X			X
	Walleye pollock	<i>Gadus chalcogrammus</i>	Adult (Yr), E (Su), J (Su), L (Su)	X	X			X
	Yelloweye rockfish	<i>Sebastes ruberrimus</i>	A (Sp, Su, Fa), J (Su)	X				
	Yellowfin sole	<i>Limanda aspera</i>	A (Su), E (Su), J (Su), Unk (Fa)	X	X		X	X
Non-FMP Target Fish Species	Arctic shanny	<i>Stichaeus punctatus</i>	J (Su)			X		
	Bay pipefish	<i>Syngnathus leptorhynchus</i>	Unk (Su*, Fa*)		X			
	Bigmouth sculpin	<i>Hemitripterus bolini</i>	A (Sp, Wi), J (Su)	X				
	Buffalo sculpin	<i>Enophrys bison</i>	J (Fa)			X		
	Capelin	<i>Mallotus villosus</i>	J (Su), Unk (Fa*)		X	X		X
	Crescent gunnel	<i>Pholis laeta</i>	J (Su, Fa)		X	X		X
	Dolly Varden	<i>Salvelinus malma</i>	Unk (Su*, Fa*)		X			X
	Great sculpin	<i>Myoxocephalus polyacanthocephalus</i>	A (Su), J (Su), Unk (Fa)	X	X	X		X
	Kelp greenling	<i>Hexagrammos decagrammus</i>	A (Su), J (Su, Fa)		X	X		X
	Lingcod	<i>Ophiodon elongatus</i>	Unk (Su*, Fa*)		X			
	Masked greenling	<i>Hexagrammos octogrammus</i>	A (Su), J (Su, Fa)			X		X

FMP	Species			Confirmed Via				
	Common Name	Scientific Name	Life Stage(s) ^{1,2,3}	EFH Mapper ₄	KBRR ₅	Beach Seine ₆	Bottom Trawl ₆	eDNA ₆
	Pacific Halibut	<i>Hippoglossus stenolepis</i>	J (Su, Fa, Wi)		X	X		X
	Pacific Herring	<i>Clupea pallasii</i>	J (Fa), Unk (Su*)		X		X	X
	Pacific sandfish	<i>Trichodon trichodon</i>	Unk (Su*, Fa*)		X			X
	Pacific sand lance	<i>Ammodytes hexapterus</i>	Unk (Su*, Fa*)		X			
	Pacific staghorn sculpin	<i>Leptocottus armatus</i>	A (Su) J (Fa)		X	X		X
	Padded sculpin	<i>Artedius fenestralis</i>	J (Fa)			X		X
	Rainbow smelt	<i>Osmerus mordax</i>	Unk (Su*, Fa*)		X			
	Ribbon snailfish	<i>Liparis cyclopus</i>	J (Fa)			X		
	Rock greenling	<i>Hexagrammos lagocephalus</i>	J (Sp, Su, Fa)			X	X	X
	Saffron cod	<i>Eleginus gracilis</i>	J (Su, Fa)		X	X	X	X
	Sailfin sculpin	<i>Nautichthys oculofasciatus</i>	Unk (Fa)					
	Sharpnose sculpin	<i>Clinocottus acuticeps</i>	A (Sp)			X		X
	Silverspotted sculpin	<i>Blepsias cirrhosus</i>	J (Fa), Unk (Su*)		X	X	X	
	Slender eelblenny	<i>Lumpenus fabricii</i>	Unk (Su*, Fa*)		X			X
	Snake prickleback	<i>Lumpenus sagitta</i>	A (Fa), J (Fa)		X	X	X	X
	Sturgeon poacher	<i>Podothecus accipenserinus</i>	J (Su),			X		X
	Surf smelt	<i>Hypomesus pretiosus</i>	J (Fa)			X		
	Three-spine stickleback	<i>Gasterosteus aculeatus</i>	J (Fa)			X		X
	Tidepool snailfish	<i>Liparis florae</i>	Unk (Su*, Fa*)		X			
	Tubenose poacher	<i>Pallasina barbata</i>	A (Fa)			X		
	Whitespotted greenling	<i>Hexagrammos stelleri</i>	A (Su), J (Su), Unk (Fa)		X	X		X
	Yellow Irish lord	<i>Hemilepidotus jordani</i>	A (Sp, Fa, Wi), J (Su)	X	X			

Source(s):

⁴ Data retrieved from EFH Mapper Report generated from the NOAA EFH Mapper using decimal degrees coordinates 59.612, -151.426 (NOAA 2025). This data is provided in Attachment A of this EFHA.

⁵ Data provided from Kachemak Bay Research Reserve 2007 and 2008 fieldwork results (KBRR 2010).

⁶ Data collected through study fieldwork conducted in 2024 and 2025.

Note(s):

There was no spatial data provided through the NOAA EFH Mapper for big skate, longnose skate, and sharks.

¹ EFH Species Life Stages that were identified during fieldwork but not EFH Mapper we annotated based on specimens collected only.

² Life Stage abbreviations: A = Adult, E = Egg, J = Juvenile, L = Larvae, Unk = unknown.

³ Season Abbreviations: Fa = Fall, Sp = Spring, Su = Summer, Wi = Winter, Yr = Year-round. Asterisk (*) indicates uncertainty in seasonality.

In summary, five EFH Pacific salmon species, and 36 EFH groundfish species, one EFH mollusk species, and 33 EFH non-target species (e.g., forage fishes) may range within the Project Area (Table H-2).

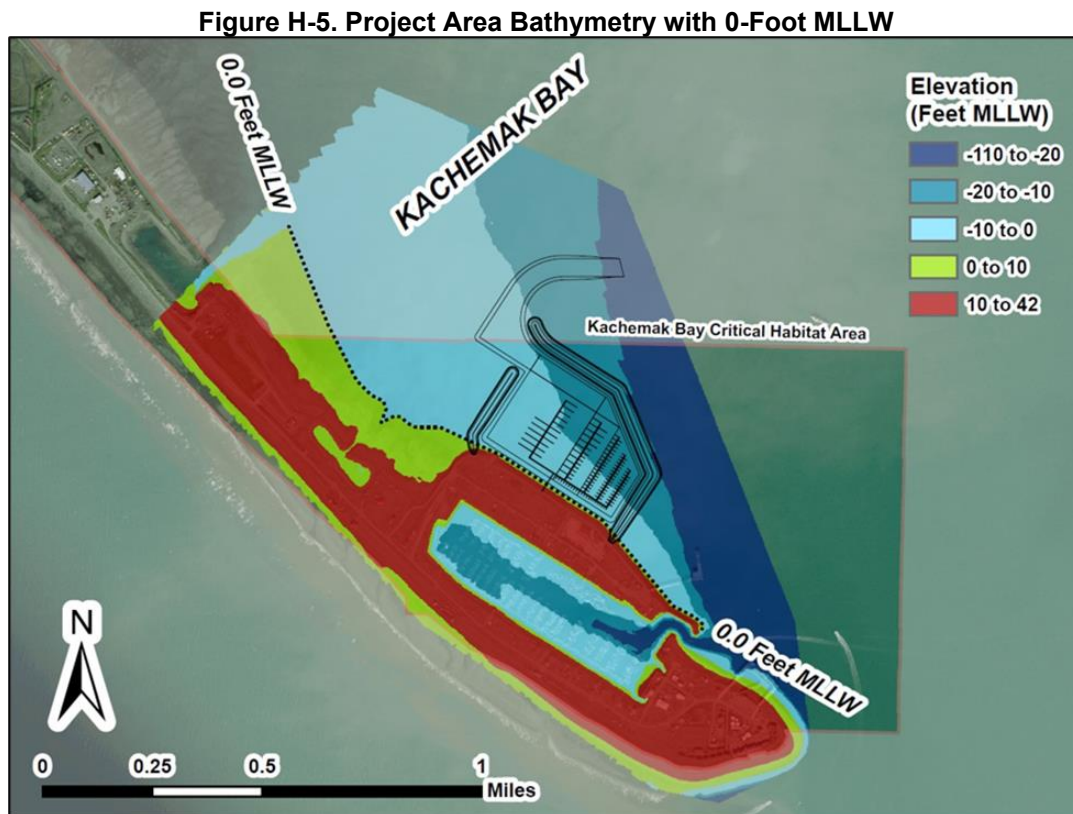
The Gulf of Alaska Groundfish FMP species identified in the Project Area and their life stages are described further in Attachment B of this EFHA.

H.3.2 Marine EFH

The Project Area and Action Area occur in marine EFH within Kachemak Bay. The Project Area specifically occurs in the nearshore, estuarine habitat of Kachemak Bay along the east side of the Homer Spit. Although the Project Area and Action Area occurs in marine EFH, neither overlap with the area managed under a FMP.

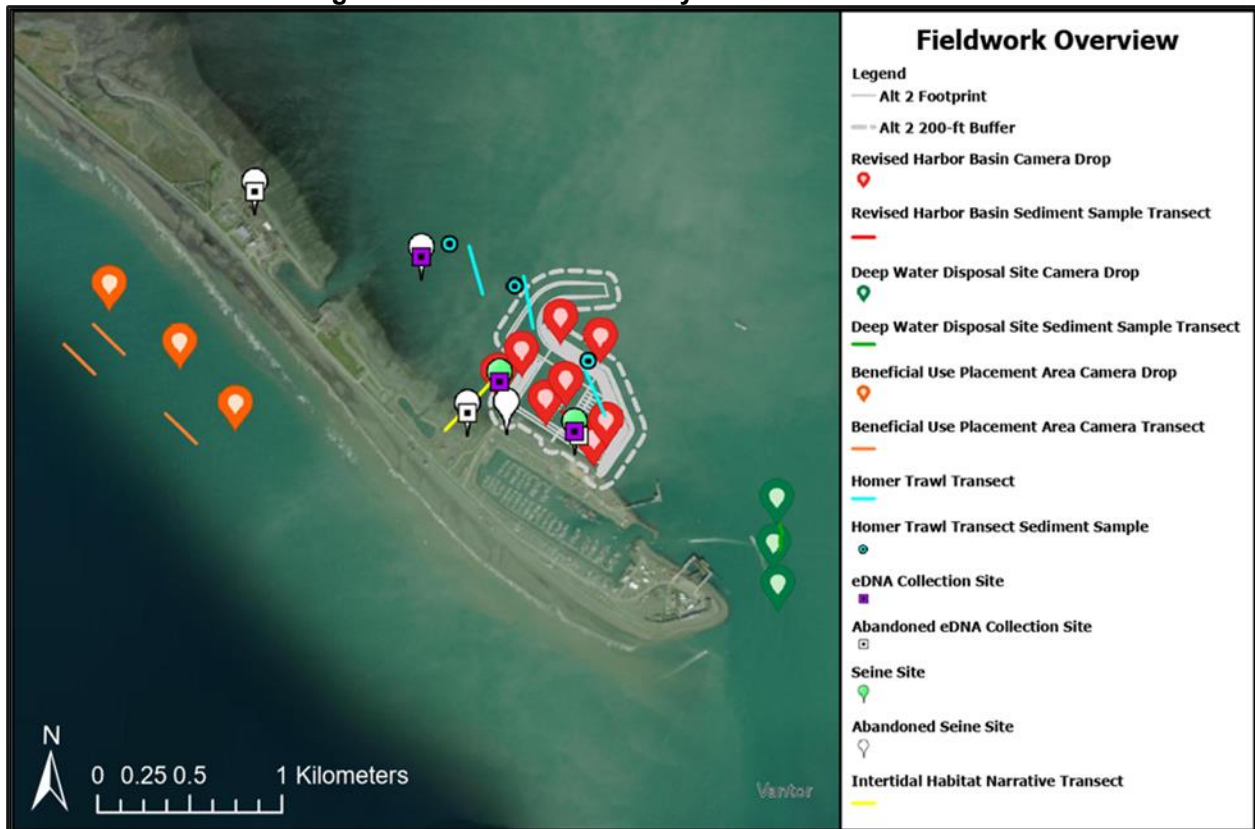
Nearshore coastal habitat is important nursery for early life stages of FMP fish species and their prey. This is due to the physical (e.g., substrate composition, depth, turbidity, and wave action) and biological factors (e.g., marine vegetation) associated with nearshore coastal habitats that provide increased refuge and forage opportunities and decreased predation risk. Mature fish tend to inhabit offshore habitat compared to younger fish. Estuaries and nearshore fish habitat also support the process of osmoregulation in fish transitioning between freshwater and marine habitats (Limpinsel *et al.* 2023 and Hoem Neher *et al.* 2014). Within the nearshore environment, there is a strong seasonality with regards to abundance and species composition that is driven by the arrival of young-of-the-year fish (Ormseth *et al.* 2016).

The Project Area predominately overlaps with subtidal habitat within Kachemak Bay. The intertidal zone that would be directly within the Project footprint is depicted in Figure H-5.



The 0-foot MLLW was used as the boundary between the intertidal and subtidal zones. There is minimal intertidal zone within the direct Project footprint due to the steeper slope and greater depths. The intertidal zone west and northwest of the Project footprint is expected to experience some extent of indirect impacts from Project construction activities and would be the focus on intertidal zone descriptions provided in this EFHA. USACE POA study fieldwork informed habitat descriptions and EFH resources within the Project Area (Figure H-6).

Figure H-6. USACE POA Study Fieldwork Overview



H.3.2.1 Project Footprint

The Project Footprint (Alternative 2 Footprint in Figure H-4) includes the area wherein construction of the harbor infrastructure (e.g., breakwater, dredge prism, float system, and Aids to Navigation) would occur. This area is comprised of various habitats within the intertidal and subtidal zones.

Intertidal Zone Habitat

The intertidal zone habitat described herein was based on observations within the intertidal zone west and northwest of the Project Area. This area is likely to receive indirect impacts from the Project, and it was determined appropriate to focus the intertidal habitat description on this area.

The intertidal zone provides a mix of hard bottom and soft bottom habitat. Figure H-7 consists of images of the intertidal zone adjacent to the Project Area that was exposed during low tide. The figure consists of still images from the Intertidal Habitat Narration Transect video footage taken May 9, 2024. The intertidal zone consisted predominately of coarse-grained sediment composed of a mixture of sand, gravel, and cobbles. However, as the intertidal zone transitioned away from the supratidal (i.e., uplands) towards the subtidal, the coarse-grained sediment transitioned to a finer-grained composition consisting predominately of silty sand with cobbles. Within the intertidal zone, boulders were more frequently observed northward towards the Homer mainland and shell debris was observed scatter throughout the zone during USACE 2024 and 2025 fieldwork.

Figure H-7. Imagery from the May 9, 2024, Intertidal Narrative Transect (59.6089, -151.4353 to 59.6113, -151.4311)



In the intertidal zone, there were patches of submerged aquatic vegetation (SAV) including seagrasses (e.g., eelgrass, *Zostera marina*) and various green (family Ulvaceae), brown (family Fucaeae), and red seaweed (family Palmariaceae). Canopy and understory kelp species were observed and specific species included sugar kelp (*Saccharina latissima*), and other species within the family Laminariaceae. The occurrence and density of marine flora appeared to increase within the intertidal zone as the distance from the shoreline increased and in areas where water inundation endured for longer periods.

Non-flora marine organisms were also observed and identified within the intertidal zone, including, jellyfish, sea star species, anemone species, and clusters of Pacific blue mussels (*Mytilus trossulus*) that were integrated with the sediment. The presence of each species observed was not uniform throughout the intertidal zone. Rather, the sediment type, water inundation period, and other physical and biological features factored into where marine fauna were observed. There was a general increase of marine fauna as distance increased away from the shore and/or where longer water inundation was experienced, e.g., anemones observed in the intertidal zone were predominately observed around the 0-foot MLLW line.

Subtidal Zone Habitat

The subtidal zone was informed through USACE fieldwork sediment grab samples (Figure H-8 and Figure H-9) and underwater video surveys (Figure H-10, Figure H-11, and Figure H-12); the KBRR Report; and USACE geotechnical analysis.

Figure H-8. Sediment sample collection sites from USACE fieldwork activities.

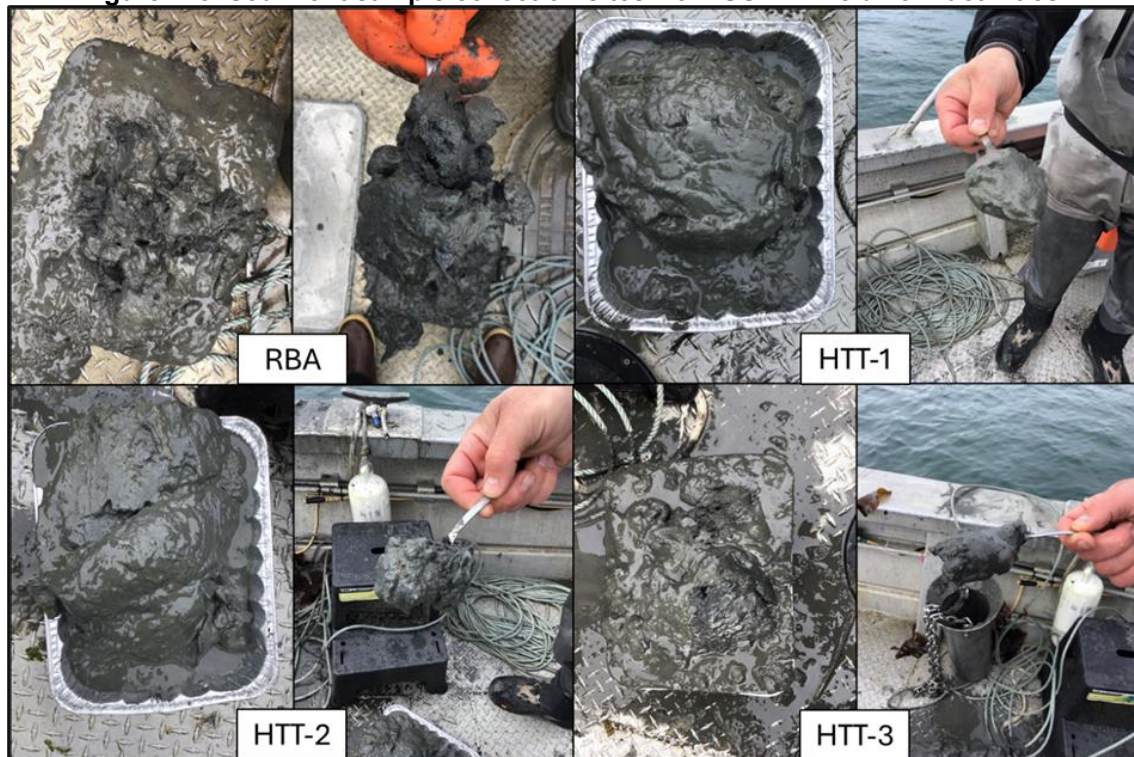


Figure H-9. Revised Basin Area and Homer Trawl Transect 1–3 Sediment Grab Samples

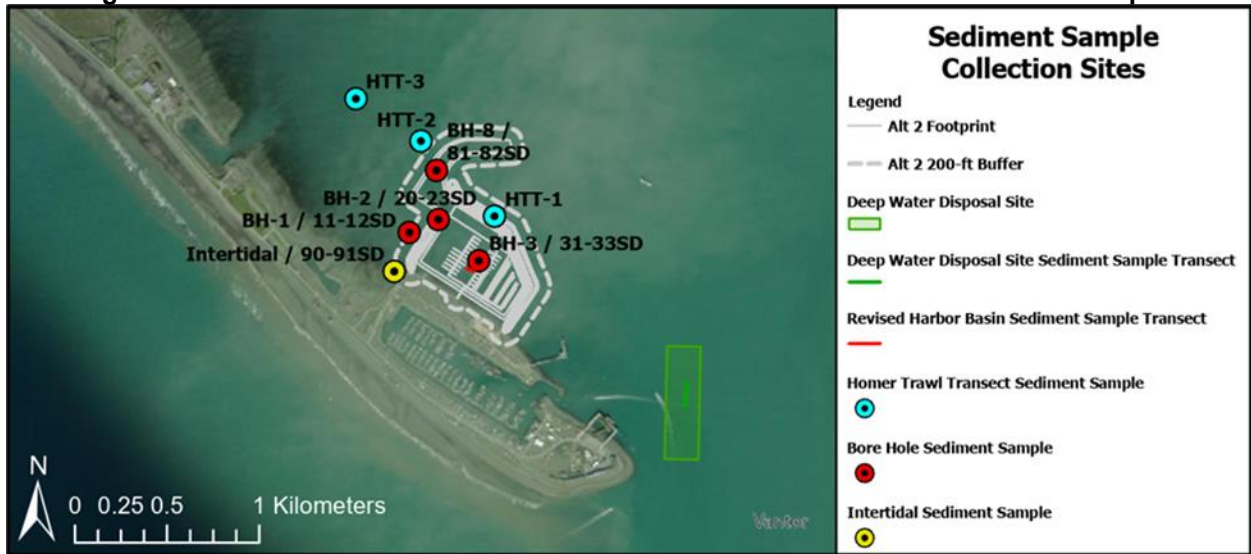


Figure H-10. Project underwater camera survey transect and drop sites.

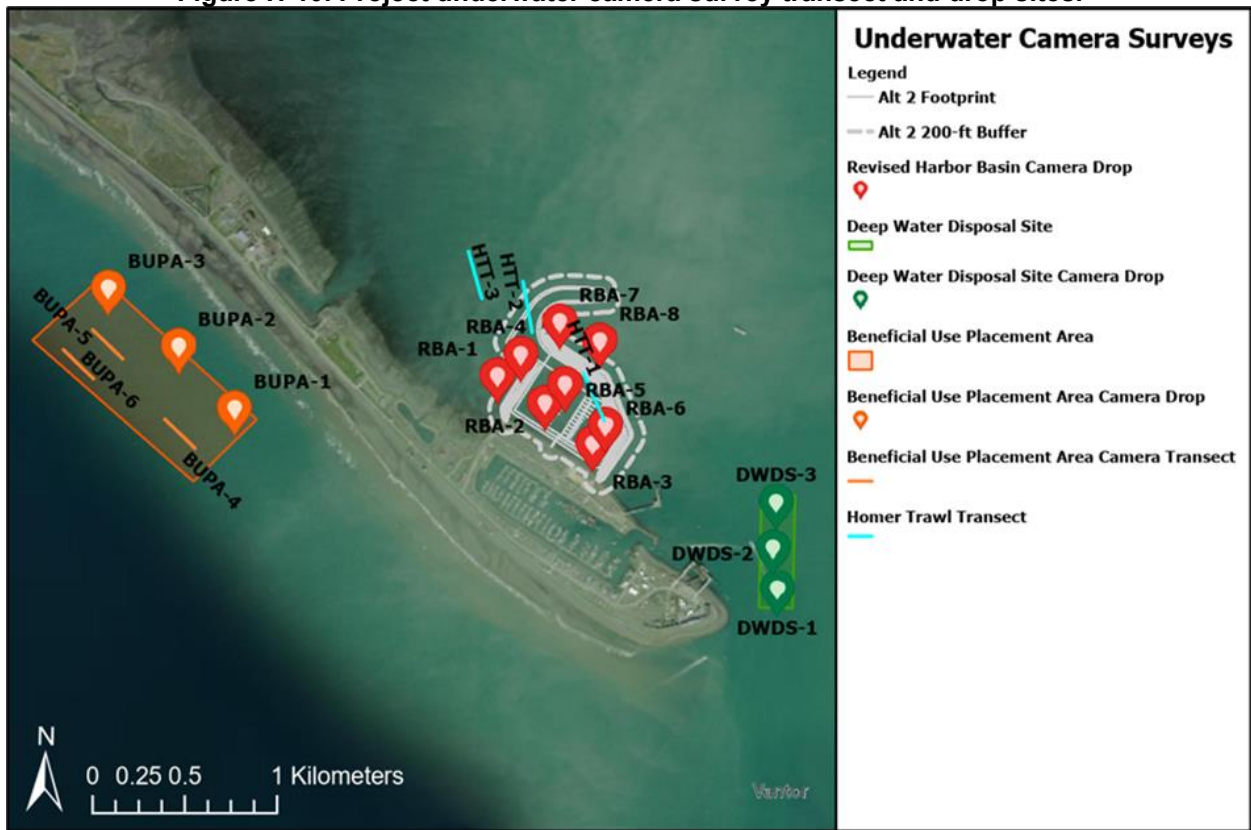


Figure H-11. Homer Trawl Transect Underwater Camera Habitat Footage, June 6, 2024

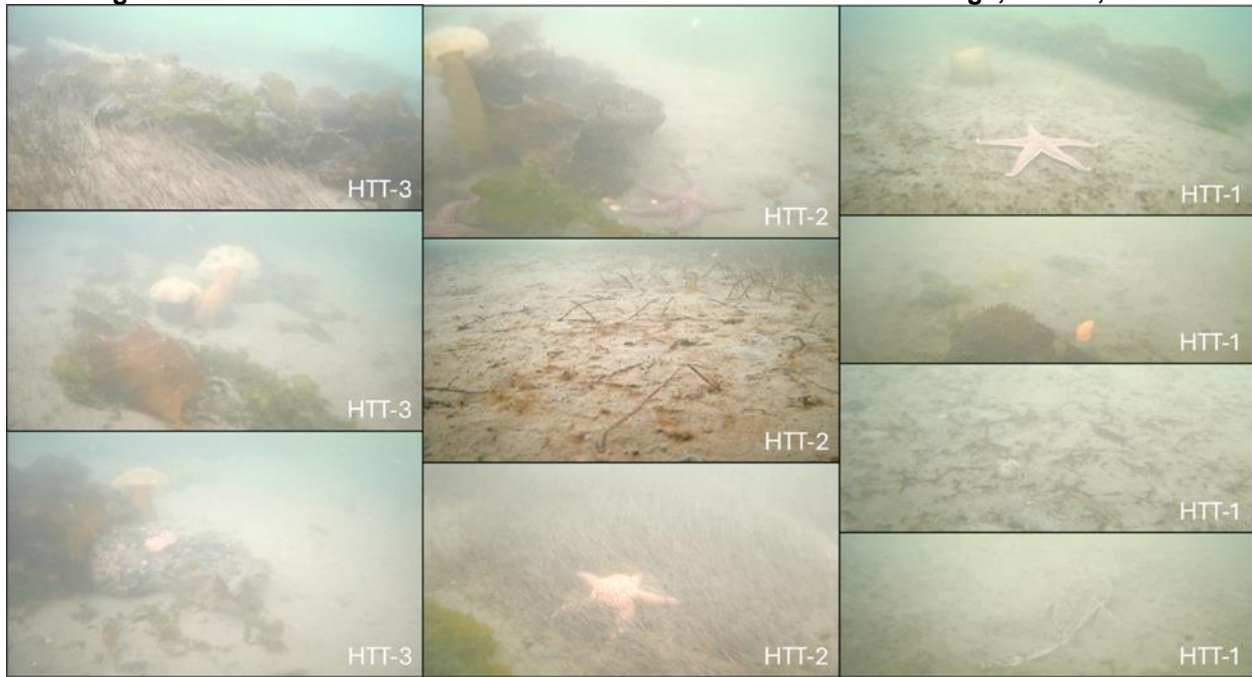


Figure H-12. Project Footprint Underwater Camera Habitat Footage, April 10, 2025



Based on the available data, the subtidal zone habitat provides soft bottom habitat predominately composed fine-grained sediment (silty sand) with cobbles based on Shell hash was observed throughout the sediment matrix of the Project footprint, HTT-2, and HTT-3 sediment grab samples. Numerous marine worms were integrated within the Project footprint sediment matrix as well.

SAV observed within the subtidal were consistent with species identified in the intertidal. Marine fauna observed and identified within the subtidal zone, included flat

fishes, small crab, sea pen (*Ptilosarcus gurneyi*), sea star, and anemone species. The presence and density of marine species observed was not uniform throughout the subtidal zone due to the physical (e.g., water depth, light attenuation, and sediment) and biological (e.g., other organisms occupying the location) features specific to each site and transect analyzed.

Specific observations to note within the project footprint are the locations and depths of observed eelgrass. Within the subtidal zone of the Harbor Area, dense patches of eelgrass were observed at HTT-2 at approximately -6 feet MLLW (1₀ fathoms) and HTT-3 at approximately -10 feet MLLW (1₄ fathoms). No eelgrass was observed at HTT-1 located approximately along the -12 feet MLLW (2₀ fathoms) contour. The underwater camera surveys conducted on April 10, 2025, appeared to show degraded SAV in RBA-2 and RBA-3, both located approximately -7 feet MLLW (11 fathoms). This would be consistent with the underwater camera work that occurred on April 10, 2025, which is outside the typical season expected for established, healthy eelgrass.

H.3.2.2 Deep Water Disposal Site

The DWDS is the proposed area for in-water disposal of new work dredged material. This area is fully within subtidal, soft bottom habitat and was selected based on its location within the area excluded from the KBCCHA, its adjacent proximity to the project footprint, and its depth within the water column. The depth is an important factor for avoiding disposed dredged material from immediately shoaling within the existing Homer Harbor or new harbor built under the project.

The DWDS sediment was predominately composed of a sandy silt and very uniform throughout the site. There were traces of black grained sediment (presumed naturally occurring coal) and organic cellulose material throughout the sediment matrix from the April 10, 2025, USACE fieldwork sediment grab sample collected at the DWDS (Figure H-8 and Figure H-13).

Figure H-13. Deep Water Disposal Site Sediment Grab Sample



There was very little marine vegetation, specifically kelp, observed within the DWDS during underwater camera surveys conducted April 10, 2025 (Figure H-10 and Figure H-14). Additionally, the kelp appeared to simply be remnants of kelp rather than kelp that is integrated within the habitat. The depth differences between DWDS-1, DWDS-2, and DWDS-3, were approximately 178, 169, and 150 feet deep, (respectively, at the time of the underwater surveys). These changes in depth and other factors within this

considerably unstable area, may account for the differences in the type and quantity of marine organisms observed at each site, which were relatively close in proximity (i.e., approximately 0.15 miles separation from DWDS-1 to DWDS-2 and DWDS-2 to DWDS-3). At DWDS-1, sea star species were prevalent throughout the site, but absent from DWDS-2 and DWDS-3. In DWDS-2, only a singular unidentified fish species was observed. In DWDS-3, a number of flat fish, primarily starry flounder (*Platichthys stellatus*), were observed. Other marine organisms observed at DWDS were crab, anemone, and other fish species.

Figure H-14. Deep Water Disposal Site Underwater Camera Habitat Footage, April 10, 2025



H.3.2.3 Submerged Aquatic Vegetation Habitat

Given the high value of SAV as fish habitat, a detailed characterization of SAV resources in Kachemak Bay was conducted for this analysis. USACE collaborated with an Environmental Stakeholder Working Group (composed of community members and representatives from local, State, and Federal agencies) to develop an ecological model as a tool for assessing SAV impacts from the project. This process resulted in a Habitat Suitability Index (HSI) Spreadsheet Model for SAV, which was adapted from a developing model by the National Centers for Coastal Ocean Science (NCCOS; Whippo 2026). The development of USACE's SAV HSI Spreadsheet Model would be documented in Appendix O of the IFR/EA.

As shown in Figure H-15 (Kachemak Bay focus) and Figure H-16 (Project Area focus), the NCCOS SAV HSI model (Whippo 2026) indicates that the project area is dominated by habitat suitable for seagrass and understory kelp, particularly in the nearshore areas, while suitable habitat for canopy kelp is largely absent. Within the project footprint itself, the highest quality habitat is concentrated near the shoreline, becoming unsuitable in the deeper, eastern portions. In contrast, the model showed the proposed Deep Water Disposal Site (DWDS) is located in an area completely lacking suitable SAV habitat. These model results are consistent with field observations made by USACE in 2024 and 2025.

Figure H-15. SAV habitat quality throughout Action Area derived from the NCCOS SAV HSI Model.

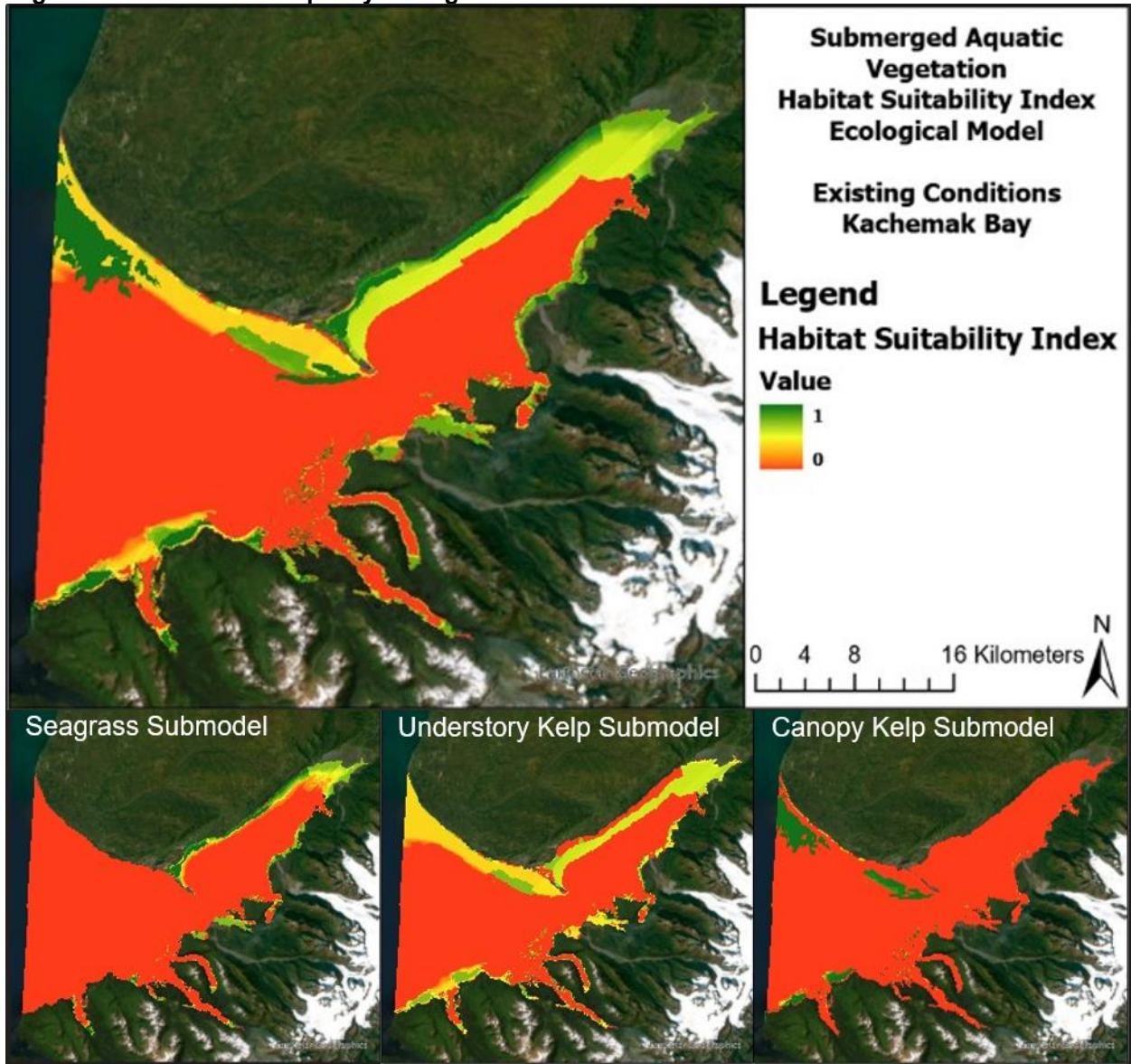
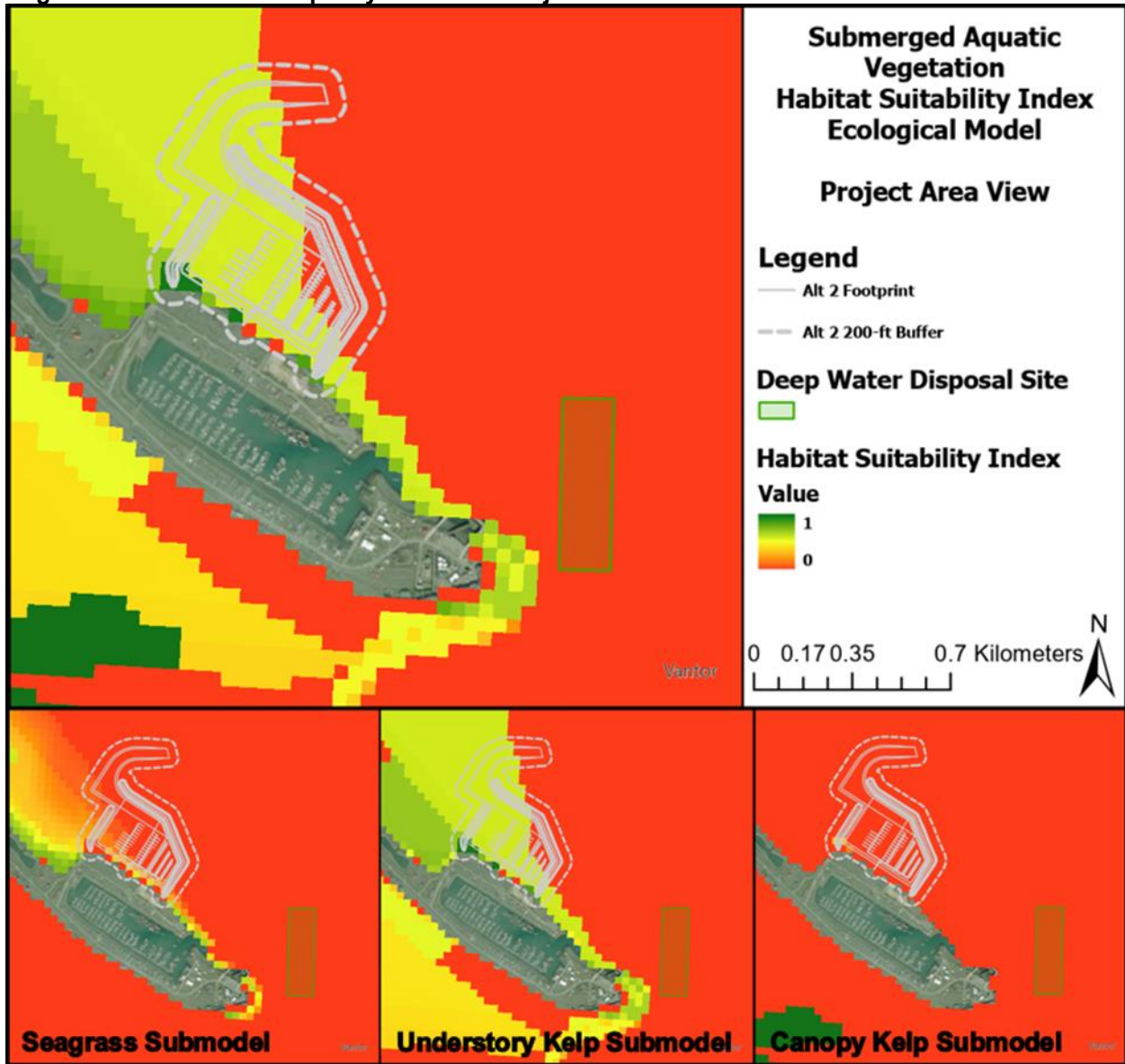


Figure H-16. SAV habitat quality within the Project Area derived from the NCCOS SAV HSI Model.



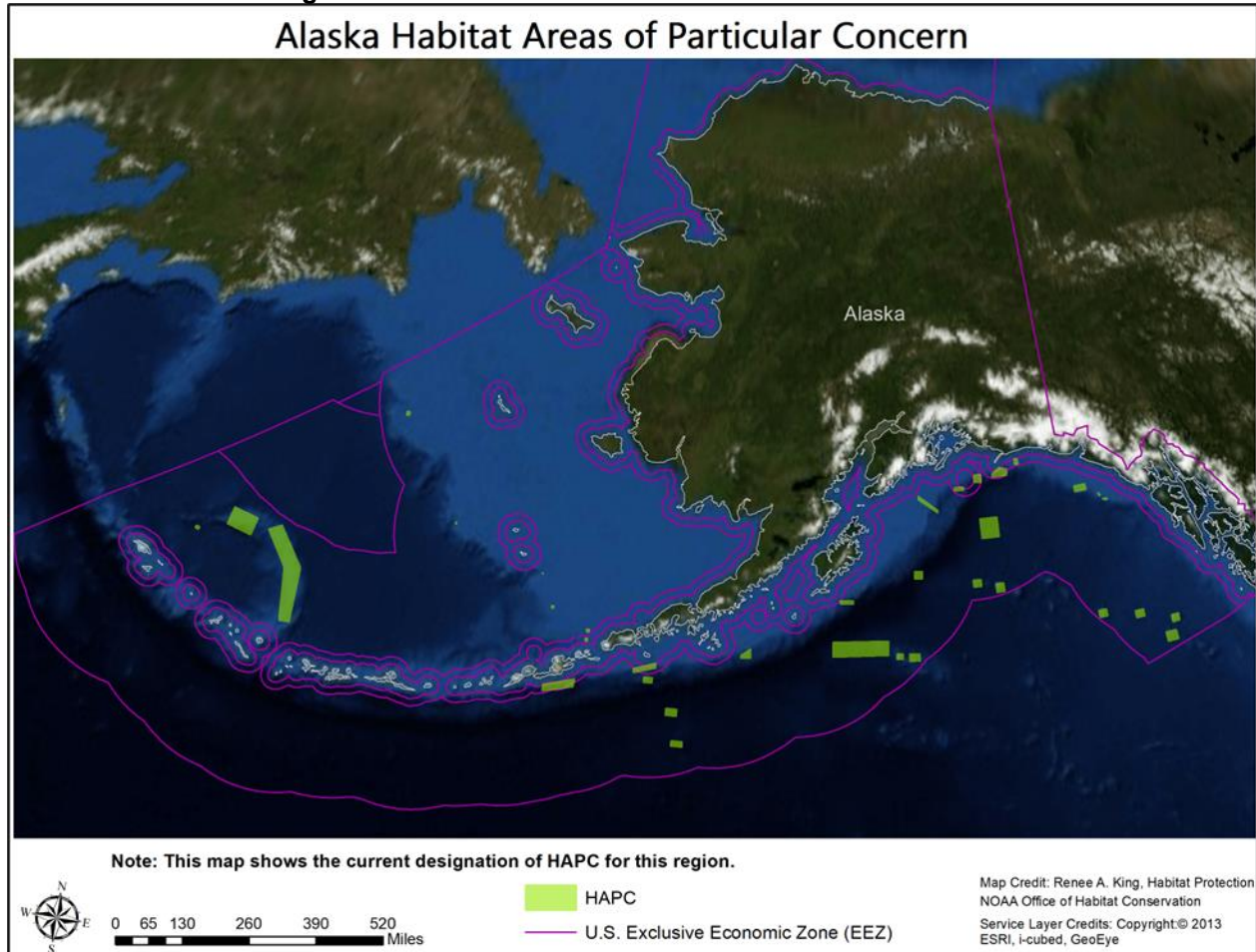
H.4 Freshwater EFH / Anadromous Waters

The potential impacts from the project to EFH would unlikely extend to any Freshwater EFH. In Alaska, anadromous waters are afforded protection under Alaska Statue (AS) 16.05.871. Fritz Creek (ADFG Anadromous Water Code [AWC]: 241-13-10760) is the nearest anadromous water east of the Homer Spit to the Project Area. Specifically, Fritz Creek is over 5 miles northeast from the project footprint. It is relevant to note that the Alaska Department of Fish and Game routinely stocks the Nick Dudiak Fishing Lagoon, in proximity to the project footprint, with salmon smolt typically during the May to June period.

H.4.1 Habitat Areas of Particular Concern

Habitat Areas of Particular Concern (HAPCs) are discrete subsets of EFH that provide extremely important ecological functions or are especially vulnerable to degradation. No NMFS-designated HAPC are within proximity to the Project Area or Action Area. NMFS Designated Alaska Habitat Areas of Particular Concern are shown in Figure H-17.

Figure H-17. Alaska Habitat Areas of Particular Concern



The eelgrass beds within Kachemak Bay are recognized as a high-priority conservation resource under two separate Federal authorities. First, pursuant to the MSA, eelgrass is identified as a HAPC due to its value as fish habitat. Second, the vegetated shallows that support eelgrass beds are classified as a Special Aquatic Site under the Clean Water Act (CWA), acknowledging their special ecological characteristics and importance to the health of the regional ecosystem (40 CFR 230.3(m)).

USACE determined it was appropriate to proactively develop an Eelgrass Mitigation Assessment. This assessment analyzed the potential for unavoidable loss of eelgrass resulting from project construction and evaluated whether further mitigation would be both appropriate and practicable.

H.4.2 Habitat Conservation Areas

The Action Area overlaps with the Alaska State KBCHA established by Alaska Statute 16.20.590 and managed by ADF&G. USACE would minimize the design to the extent practical within the area excluded from the KBCHA. However, portions of the Project Area would occur within the KBCHA and require coordination with ADF&G.

H.5 Assessment of Potential Adverse Effects

Per the amendments to the MSA through the Sustainable Fisheries Act of 1996, USACE is required to consult with the NMFS when a Federal Action may adversely affect EFH. This EFHA constitutes USACE's formal coordination with NMFS regarding the potential effects of the project on marine EFH, which consists predominantly of nearshore coastal habitat, with special consideration given to the eelgrass present within the Project Area.

The Project, Alternative 2: Transient and Waitlisted Vessels Harbor, is a 50-year project (assumed life from 2034 to 2084) currently at a 30-35% design level. Construction would occur over a four-year phased timeline during annual March-November work seasons. The project's marine construction activities, including vessel traffic, discharge of fill (breakwater rock placement), dredging, pile driving, and infrastructure installation, would have short-term, long-term, and cumulative impacts on EFH.

To guide this assessment, this analysis relies on the NMFS Non-Fishing Impacts Report, *Impacts to Essential Fish Habitat from Non-Fishing Activities in Alaska* (Limpinsel *et al.* 2023), which provides a framework for reviewing potential impacts and developing conservation recommendations. The impacts to EFH species and species complexes known or highly likely to occur within the Action Area and Project Area are evaluated as discrete project components and are separated into three categories: short-term, long-term, and cumulative impacts.

H.5.1.1 Short-Term Impacts

Short-term impacts occur during construction and cease shortly after. They are primarily characterized by the potential for direct injury or mortality, temporary water quality degradation (turbidity and contaminant suspension), and elevated underwater noise and activity. The short-term impacts anticipated by activity are as follows:

- **Project Construction Marine Vessels:** Vessels facilitating construction logistics would travel standard shipping routes. The underwater noise from this traffic is expected to have negligible impacts on FMP species. The primary short-term risks are the general disturbance from vessel presence and an increased opportunity for the introduction of non-native vegetation or invasive marine species.
- **Post-Construction Marine Vessel Harbor Use:** This activity has minimal short-term adverse impacts. Substantial use of the harbor would only commence after

construction is complete, and the impacts from additional vessels introduced into Kachemak Bay from the waitlist are primarily long-term.

- **Discharge of Fill (Breakwater Construction):** The construction of an approximately 4,500-foot rubble-mound breakwater would involve the precise bucket-placement of approximately 500,400 CY of clean rock (123,100 CY armor, 66,500 CY B rock, and 310,800 CY C rock). This would directly crush, smother, and kill non-mobile benthic organisms like blue mussels, anemones, and sea stars within the structure's footprint, representing a permanent loss for those organisms (Limpinsel *et al.* 2023). This activity would also temporarily increase turbidity by suspending fine-grained sediments. However, due to the high-energy hydrodynamics of the area, these turbidity plumes are anticipated to disperse rapidly, and the resulting impacts are considered negligible.
- **New Work Dredging:** The mechanical dredging of approximately 1,311,800 CY of material from a 68-acre dredge prism would temporarily increase localized turbidity and suspend sediments. This activity has the potential to entrain, injure, or kill demersal and benthic species, with sessile organisms being most at risk. While juvenile salmonids may avoid highly turbid areas (Servizi 1988), the short duration and localized nature of the plumes, contained by the newly built breakwater, are unlikely to directly affect EFH species. Noise from the intermittent, repetitive sounds of mechanical dredging is expected to be below the 150 decibel (dB) NMFS informal threshold for behavioral disturbance, resulting in negligible noise impacts (NOAA 2024).
- **Maintenance Dredging:** Annual maintenance dredging of up to 17,000 CY using a hydraulic cutterhead suction dredge would generate a continuous sound source. However, sound source verification data indicates the 150 dB isopleth would only extend 1.56 to 2.13 meters from the dredge (Ferguson 2022). Due to this extremely small radius, the impacts from underwater noise are considered negligible.
- **Pile Driving:** The installation of 18- and 24-inch steel piles using a combination of vibratory and impact methods is the most substantial source of short-term underwater noise. Intense underwater sound pressure waves can cause behavioral changes, injury, or death in fish (CalTrans 2001; Hastings and Popper 2005; Limpinsel *et al.* 2023).
 - **Behavioral Disturbance:** Using the NMFS informal threshold of 150 dB (NOAA 2024) for behavioral disturbance of fish, pile driving noise associated with the new float system in the constructed basin would cause temporary displacement. As shown in Table H-3, the largest behavioral disturbance would result from the impact driving of 20 to 24 inch piles, with the largest isopleth reaching 4,641.6 meters without attenuation (Figure 16) and 2,154.4 meters with attenuation (Figure 19). The breakwater would partially contain noise from the main float system and fuel dock,

while noise from the Aids to Navigation piles would radiate further into open water.

- **Physical Injury:** Peak sound levels, which are projected to reach up to 205 dB, are below the 206 dB single-strike threshold for physical injury (NMFS 2024; CalTrans 2015; Table H-3). Therefore, the risk of direct physical injury from impact pile driving is considered unlikely.

Table H-3. Pile Driving Isoleth for Behavioral Disturbance of Fish

Sound Source Type	Pile Material	Pile Size Diameter (Inches) ¹	Peak Sound Level (dB)	Sound Level in Root Mean Square (dB)	Sound Exposure Level (dB)	Behavioral Disturbance Threshold ¹ (dB RMS)	Noise Exposure Radius (Meters) ⁴
Without Attenuation							
Impact (Impulsive)	Steel Pipe	14 – 18	200 ²	185 ²	175 ²	150	2,154.4
		24	205 ³	190 ³	175 ³		4,641.6
Vibratory (Continuous)		18	-	155 ²	-		21.5
		20 – 24	-	163 ²	-		73.6
With Attenuation⁵							
Impact (Impulsive)	Steel Pipe	14 – 18	200 ²	185 ²	175 ²	150	1,000
		24	205 ³	190 ³	175 ³		2,154.4
Vibratory (Continuous)		18	-	155 ²	-		10.0
		20 – 24	-	163 ²	-		34.1

Source(s):

¹ NOAA 2024

² CalTrans 2023

³ Values adopted from the NMFS Multi-Species Pile Driving Calculator “Impact Proxy Sound Levels” Tab.

Note(s):

⁴ Noise exposure radius is the distance at which noise would attenuate to or below the applicable threshold.

⁵ Adopts the NMFS recommended default value of 5 dB.

Figure H-18. Unattenuated Pile Driving Underwater Acoustic Isoleths for Behavioral Disturbance.

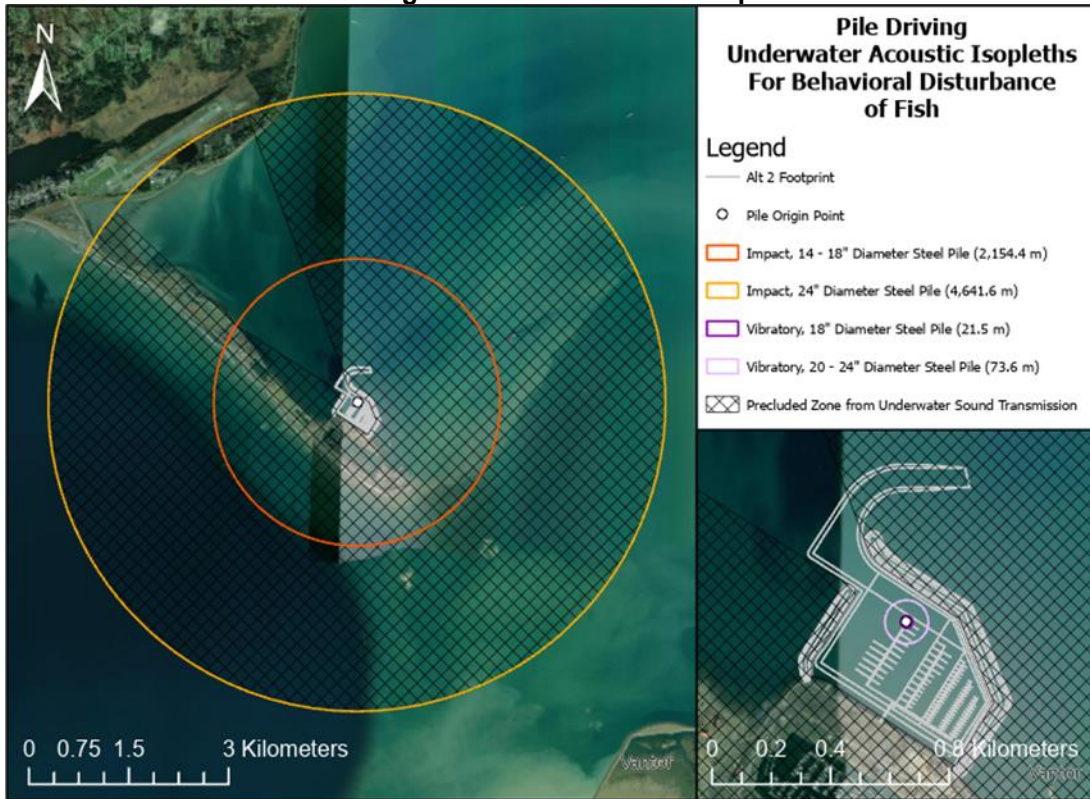
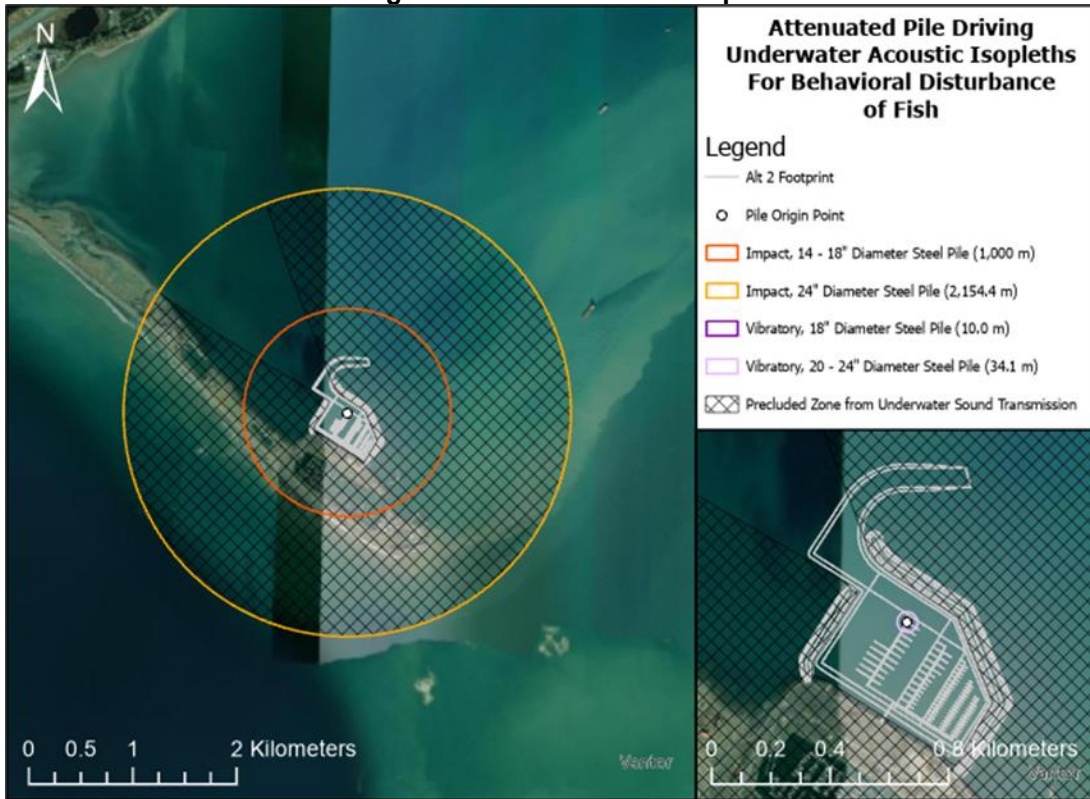


Figure H-19. Attenuated Pile Driving Underwater Acoustic Isoleths for Behavioral Disturbance.



- **Installation of Local Service Facilities and Aids to Navigation:** The installation of the float system, fuel dock, and 15 piles for the Aids to Navigation towers contributes to the short-term impacts described under pile driving (noise) and general construction (disturbance). The removal of the existing System 5 float would also cause localized, temporary seabed disturbance and turbidity.

H.5.1.2 *Long-Term Impacts*

Long-term impacts are permanent changes lasting the 50-year project life, including habitat conversion, recurring disturbances from maintenance, and sustained increases in noise and activity. The long-term impacts anticipated by activity are as follows:

- **Project Construction Marine Vessels:** This activity has no long-term impacts as it ceases post-construction.
- **Post-Construction Marine Vessel Harbor Use:** The new harbor, designed for 304 vessels, would permanently increase anthropogenic activity and ambient noise levels. This sustained activity elevates the long-term risk of introducing invasive species and the potential for fuel, oil, or hazardous material spills. However, this is offset by the reduction in risk from vessels no longer anchoring in exposed waters.
- **Discharge of Fill (Breakwater Construction):** The most substantial long-term impact is the permanent conversion of soft-bottom "sand and gravel EFH" to a rocky, hard-bottom substrate. This results in the permanent loss of the original habitat's ecological functions. However, the breakwater creates a new, complex habitat that provides attachment points for marine algae and kelp and protective cover for juvenile and larval EFH species.
- **New Work Dredging:** The initial dredging permanently alters the depth and topography of the 68-acre harbor basin, converting the existing benthic habitat into a relatively flat, anthropogenically modified sediment surface.
- **Maintenance Dredging:** The annual hydraulic dredging to maintain Federally-authorized depths would create a recurring disturbance. This would prevent the establishment of mature benthic communities within the dredge prism and may favor species that thrive in repeatedly disturbed environments, potentially including non-native species.
- **Pile Driving:** The driven steel piles permanently convert small areas of soft-bottom habitat to vertical hard substrate, providing a surface for encrusting organisms and adding minor structural complexity to the harbor floor.
- **Installation of Local Service Facilities and Aids to Navigation:** The new float systems and fuel dock would create substantial permanent overwater coverage. This shading can reduce the viability of SAV like eelgrass and phytoplankton by

altering light regimes, which in turn reduces prey abundance and habitat complexity for EFH species (NOAA 2024).

H.5.1.3 Cumulative Impacts

Cumulative impacts result from the project's effects combined with other past, present, and future actions. The primary cumulative impact is a trade-off between the loss of natural habitat and a reduction in existing environmental risks. The long-term impacts anticipated by activity are as follows:

- **Post-Construction Marine Vessel Harbor Use:** Displacing vessels from unprotected anchorages into the new harbor provides a substantial positive cumulative impact. It would (1) reduce seafloor damage from anchor drag, (2) lower the likelihood of spills from accidents in congested or exposed waters, and (3) improve the region's environmental response capabilities by providing dedicated moorage for spill response vessels.
- **Discharge of Fill (Breakwater Construction), Dredging, and Pile Driving:** Collectively, these activities contribute to the incremental conversion of natural habitat to hardened infrastructure. The project replaces existing SAV and soft-bottom benthic communities with a new hard-bottom habitat. While this represents a loss of existing habitat functions (spawning, nursery, feeding), it also diversifies the habitat types within Kachemak Bay. This trade-off is considered a minor cumulative impact, as there is an abundance of similar, higher-quality habitat adjacent to the project area and further from existing anthropogenic activities.
- **Installation of Local Service Facilities and Aids to Navigation:** The shading from new floating structures adds to the cumulative reduction of light reaching the benthos in the developed harbor area. This can reduce prey abundance and habitat complexity through the elimination of aquatic vegetation that supports EFH species (NOAA 2024).

Overall, the project is assessed as having minor cumulative impacts. The adverse impacts of habitat conversion are largely offset by the creation of a new, diverse habitat type and the substantial reduction of environmental risks associated with current mooring and anchoring practices.

H.6 Proposed Mitigation

Mitigation is the process used to avoid, minimize, and compensate for the environmental consequences of an action. This section would provide proposed mitigation measures that are recommended for implementation wherein practicable to ensure that no significant adverse impacts would occur to EFH and EFH-managed species/species complexes and other fish and wildlife resources in the Action Area. Mitigation measures discussed in this section are not meant to be exhaustive or applicable to all project construction activities. Proposed mitigations would be described

by general measures applied across the whole of the project activities and specific measures by the following project components; (1) dredging operations, (2) pile driving operations, (3) discharge of fill, and (4) harbor infrastructure, docking facilities, and vessel operations.

H.6.1 General Mitigation Measures

These mitigation measures would be implemented to the greatest extent practicable and are proposed for application across all project activities:

- Implement seasonal restrictions to avoid impacts to ADF&G salmon smolt stocking of the Fishing Lagoon. USACE would coordinate with ADF&G to determine the appropriate fish window through the Special Area Permitting process.
- Require the contractor and on-site protected species observers to immediately notify USACE should an abnormal extent of dead fish be observed during construction activities.
- Require the contractor to develop comprehensive invasive species protocols in an Environmental Protection Plan that would include: biofouling removal, ballast water management, and the use of certified weed-free materials. During construction, visual inspections, designated cleaning stations, and an Early Detection and Rapid Response protocol for suspected sightings would be implemented to prevent invasive species introduction and spread.
- Implement reasonable precautions and controls to prevent incidental and accidental discharge of petroleum products or other hazardous substances, including the preparation of an Oil Spill Prevention and Control Plan by the contractor.
- Site and conduct fuel storage and handling activities for equipment so there is no petroleum contamination of the ground, surface runoff, or waterbodies. The contractor would be required to inspect equipment on a daily basis for leaks. If leaks are found, the equipment would not be used and pulled from service until repaired.
- Require the contractor to make available and use immediately spill response equipment and supplies such as sorbent pads to contain and clean up oil, fuel, hydraulic fluid, antifreeze, or other pollutant spills during construction. Spills would be reported in accordance with Discharge Notification and Reporting Requirements (Alaska Statute 46.03.755 and 18 Alaska Administrative Code 75 Article 3).
- Inform final design decision-based modeling (e.g., sediment transportation and SAV HSI modeling) to avoid and/or minimize adverse impacts to SAV
- Coordinate with the ADF&G for construction activities and infrastructure within the KBCHA and would comply with all conditions of the issued permit.
- Hold a stakeholder workshop to develop a formal Ecological Survey and Monitoring Plan for assessing pre-construction conditions and post-construction (Year 0, 1, 3, and 5) impacts to fish habitat (e.g., SAV).

H.6.2 Dredging Mitigation Measures

Dredging mitigation measures are proposed for implementation to the greatest extent practicable under the project for new work and/or maintenance dredging, including the discharge of dredged material:

- Require the contractor to utilize silt fences/curtains (or similar functioning method) during new work dredging operations to control turbidity and sedimentation.
- Minimize the area and volume of material to be dredged through informed design.
- Utilize a hydraulic dredge for maintenance dredging operations to minimize turbidity and sediment.
- Conduct sediment analyses before commencing dredging operations to assess contaminants of concern against applicable screening levels. The scope and frequency of these analyses would be established in coordination with the Alaska Department of Environmental Conservation and Environmental Protection Agency to sufficiently validate the suitability of the selected dredged material management strategy.

H.6.3 Discharge of Fill Mitigation Measures

Discharge of fill mitigation measures are proposed for implementation to the greatest extent practicable under the project for placement of breakwater rock and fill:

- Minimize the extent (area, height, and volume) of fill material through informed design.
- Require the contractor utilize clean fill materials within the neutral range of 7.5 to 8.4 power of hydrogen.
- Promote post-construction aquatic organism movement and migration through informed design by incorporating aquatic organism passage and appropriate slope considerations into breakwater design. Current design has portions of the breakwater toe that would serve as shallow shelves or “fish benches” (Figure H-20).

Figure H-20. Breakwater toe depths associated with MLLW.



H.6.4 Pile Driving Operations Mitigation Measures

Pile driving operation mitigation measures are recommended by USACE to the Non-Federal Sponsor and USCG for implementation to the greatest extent practicable under the project for installation, adjustment, and removal of piles for the proposed float systems:

- Require the contractor remove the pile completely from the substrate at a minimal rate of speed or the contractor would use silt curtain/fences to reduce resuspended sediment and turbidity increases.
- Require the contractor utilize an air bubble curtain system (or similar functioning method) to attenuate noise during pile driving operations.
- Require the contractor maximize use of vibratory hammer for the installation and removal of pilings before implementing impact hammer methods or direct pull and clamshell methods.
- Require the contractor utilize an impact hammer with adjustable energy level if impact pile driving cannot be avoided.
- Conduct sound source verification and observe for fish kill events at the beginning of pile driving operations to assess the sufficiency of mitigation measures, and implement mitigation measures for remaining work if necessary.
- Require the contractor complete each pass of the clamshell bucket if it is used to remove pile.

H.6.5 Harbor Infrastructure, Docking Facilities, and Marine Vessel Operations Mitigation Measures

Harbor infrastructure, docking facilities, and marine vessel operations mitigation measures are proposed for implementation to the greatest extent practicable under the project for potential future local service facilities and marine vessel harbor access and use:

- Utilize existing Homer Harbor's infrastructure and facilities to reduce the overall shoreline development required to support the project.
- Recommend the NFS increase ambient light transmission under the float system through the use of reflective material on the underside of docks and artificial light and consideration during final alignment decisions.
- Recommend that the NFS incorporate low-wake vessel technology and other wave attenuation structures, establish low speed requirements for vessels in and near the harbor, and designate no-wake zones near sensitive habitats.
- Recommend the NFS develop catchment basins for collecting and storing surface runoff from upland repair facilities, parking lots, and other impervious surfaces adjacent to the project infrastructure to remove contaminants prior to delivery to any receiving waters.

- Recommend the NFS design harbor facilities to include BMPs for reducing, containing, and cleaning up petroleum spills.

H.7 Conclusions and Determinations of Effects

Based on the analysis presented in this Essential Fish Habitat Assessment (EFHA), the U.S. Army Corps of Engineers (USACE) has determined that the project would result in more than negligible but less than substantial adverse impacts to Essential Fish Habitat (EFH) for Gulf of Alaska groundfish and Pacific salmon species. This conclusion is based on the following key findings:

1. **Localized and Temporally Limited Impacts:** The most acute effects, including direct mortality of sessile benthic organisms, area avoidance by mobile fish due to noise and turbidity, and temporary habitat disruption, are primarily confined to the construction phase. These impacts, while adverse, are localized to the project footprint and intermittent. Year-round resident species like flatfish and sculpins are expected to respond by temporarily moving to adjacent habitat in Kachemak Bay during construction activities.
2. **Permanent Habitat Trade-Off:** The project's primary long-term impact is a permanent conversion of approximately 68 acres of soft-bottom habitat to a hardened, structurally complex environment (rubble-mound breakwater, piles, and a dredged basin). While this results in the unavoidable loss of existing habitat functions, it also creates new, diverse hard-bottom habitat that would be colonized by different marine communities, offsetting some of the functional loss.
3. **Minor Overall Effect on the Ecosystem:** The impacts are not expected to reduce the overall value of the abundant EFH within the broader Kachemak Bay or Gulf of Alaska ecosystems. The habitat being altered is adjacent to existing anthropogenic activity, while extensive, higher-quality habitat exists elsewhere in the region.
4. **Mitigation-Based Determination:** This determination is contingent upon the implementation of the comprehensive mitigation measures outlined in Section H.5. The application of BMPs, including the use of silt curtains, noise attenuation systems (e.g., bubble curtains) for pile driving, adherence to seasonal work windows, and robust oil spill and invasive species prevention plans, is critical to ensuring that potential impacts remain minor.

Therefore, after considering the nature of the impacts, the implementation of proposed mitigation measures, and the overall ecological context, USACE concludes that the Federal action would have a minor adverse effect on EFH for the managed fish species in the region.

H.8 References

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H.9 Preparers

This EFHA has been prepared by the Environmental Resources Section of USACE POA. The individuals that contributed to the preparation of this EFHA are listed below in Table H-4.

Table H-4. List of Preparers

Name/Organization	Education	Resource Area	Years of Experience
Kayla Campbell/USACE	B.S., Molecular and Cellular Biology	Primary Author and Document Preparer	4

ATTACHMENT A – Essential Fish Habitat Mapper Report

EFH Mapper Report

EFH Data Notice

Essential Fish Habitat (EFH) is defined by textual descriptions contained in the fishery management plans developed by the regional fishery management councils. In most cases mapping data can not fully represent the complexity of the habitats that make up EFH. This report should be used for general interest queries only and should not be interpreted as a definitive evaluation of EFH at this location. A location-specific evaluation of EFH for any official purposes must be performed by a regional expert. Please refer to the following links for the appropriate regional resources.

[Alaska Regional Office](#)















Query Results

Degrees, Minutes, Seconds: Latitude = 59° 36' 44" N, Longitude = 152° 34' 26" W




















Decimal Degrees: Latitude = 59.612, Longitude = -151.426















The query location intersects with spatial data representing EFH and/or HAPCs for the following species/management units.

EFH

Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
		Alaska plaice (Gulf of Alaska)	Adult (Summer), Egg (Summer), Larvae (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Alaska skate (Gulf of Alaska)	Adult (Spring), Adult (Summer), Adult (Winter), Juvenile (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Aleutian skate (Gulf of Alaska)	Adult (Spring), Adult (Winter)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Arrowtooth Flounder (Gulf of Alaska)	Adult (Fall), Adult (Spring), Adult (Summer), Adult (Winter), Juvenile (Summer), Larvae (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Atka mackerel (Gulf of Alaska)	Adult (Fall), Adult (Spring), Adult (Winter)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Bigmouth sculpin (Gulf of Alaska)	Adult (Spring), Adult (Winter), Juvenile (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Black rockfish (Gulf of Alaska)	Adult (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP

Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
		Blackspotted rockfish (Gulf of Alaska)	Adult (Summer), Juvenile (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Chinook Salmon	Marine Immature Adult, Marine Mature Adult	North Pacific	Amendment 13 to Salmon FMP
		Chum Salmon	Marine Immature Adult, Marine Juvenile, Marine Mature Adult	North Pacific	Amendment 13 to Salmon FMP
		Coho Salmon	Marine Juvenile, Marine Mature Adult	North Pacific	Amendment 13 to Salmon FMP
		Dark rockfish (Gulf of Alaska)	Adult (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Dover sole (Gulf of Alaska)	Adult (Spring), Adult (Winter), Egg (Summer), Juvenile (Summer), Larvae (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Dusky rockfish (Gulf of Alaska)	Adult (Spring), Adult (Winter), Juvenile (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Flathead sole (Gulf of Alaska)	Adult (Spring), Adult (Summer), Adult (Winter), Egg (Summer), Juvenile (Summer), Larvae (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Great sculpin (Gulf of Alaska)	Adult (Summer), Juvenile (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Greenstriped rockfish (Gulf of Alaska)	Adult (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Harlequin rockfish (Gulf of Alaska)	Adult (Spring), Juvenile (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Longspine thornyhead rockfish (Gulf of Alaska)	Adult (Spring), Adult (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Northern rock sole (Gulf of Alaska)	Adult (Fall), Adult (Spring), Adult (Summer), Adult (Winter), Juvenile (Summer), Larvae (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Northern rockfish (Gulf of Alaska)	Adult (Fall), Adult (Spring),	North Pacific	Amendment 105 to GOA Groundfish FMP

Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
			Adult (Winter), Juvenile (Summer)		
		Octopus (Gulf of Alaska)	Adult (Spring), Adult (Summer), Adult (Winter)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Pacific cod (Gulf of Alaska)	Adult (Fall), Adult (Spring), Adult (Summer), Adult (Winter), Juvenile (Summer), Larvae (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Pacific ocean perch (Gulf of Alaska)	Adult (Winter), Larvae (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Pink Salmon	Marine Juvenile, Marine Mature Adult	North Pacific	Amendment 13 to Salmon FMP
		Pygmy rockfish (Gulf of Alaska)	Adult (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Quillback rockfish (Gulf of Alaska)	Adult (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Redbanded rockfish (Gulf of Alaska)	Adult (Spring), Adult (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Redstriped rockfish (Gulf of Alaska)	Adult (Summer), Juvenile (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Rex sole (Gulf of Alaska)	Adult (Spring), Adult (Winter), Egg (Summer), Larvae (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Rosethorn rockfish (Gulf of Alaska)	Adult (Summer), Juvenile (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Rougheye rockfish (Gulf of Alaska)	Adult (Fall), Adult (Spring), Adult (Winter)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Sablefish (Gulf of Alaska)	Adult (Spring), Adult (Winter), Juvenile (Summer), Larvae (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Sharpchin rockfish (Gulf of Alaska)	Adult (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Shortraker rockfish (Gulf of Alaska)	Adult (Fall), Adult (Spring), Juvenile (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Shortspine thornyhead rockfish (Gulf of Alaska)	Adult (Fall), Adult (Spring), Adult (Winter)	North Pacific	Amendment 105 to GOA Groundfish FMP

Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
		Silvergrey rockfish (Gulf of Alaska)	Juvenile (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Sockeye Salmon	Marine Immature Adult, Marine Juvenile, Marine Mature Adult	North Pacific	Amendment 13 to Salmon FMP
		Southern rock sole (Gulf of Alaska)	Adult (Summer), Juvenile (Summer), Larvae (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Walleye pollock (Gulf of Alaska)	Adult (Fall), Adult (Spring), Adult (Summer), Adult (Winter), Egg (Summer), Juvenile (Summer), Larvae (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Yellow Irish lord (Gulf of Alaska)	Adult (Fall), Adult (Spring), Adult (Winter), Juvenile (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Yelloweye rockfish (Gulf of Alaska)	Adult (Fall), Adult (Spring), Adult (Summer), Juvenile (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP
		Yellowfin sole (Gulf of Alaska)	Adult (Summer), Egg (Summer), Juvenile (Summer)	North Pacific	Amendment 105 to GOA Groundfish FMP

Pacific Salmon EFH

No Pacific Salmon Essential Fish Habitat (EFH) were identified at the report location.

Atlantic Salmon

No Atlantic Salmon were identified at the report location.

HAPCs

No Habitat Areas of Particular Concern (HAPC) were identified at the report location.

EFH Areas Protected from Fishing

No EFH Areas Protected from Fishing (EFHA) were identified at the report location.

Spatial data does not currently exist for all the managed species in this area. The following is a list of species or management units for which there is no spatial data.

****For links to all EFH text descriptions see the complete data inventory: [open data inventory -->](#)**

Gulf of Alaska Groundfish EFH,

Big Skate,
Longnose Skate,
Sharks,

Spatial data does not currently exist for all the managed species in this area. The following is a list of species or management units for which there is no spatial data.

****For links to all EFH text descriptions see the complete data inventory: [open data inventory -->](#)**

Bering Sea / Aleutian Islands Groundfish EFH,

Forage Fish Complex,

Sharks (Bering Sea),

Squid Complex

Citations

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**ATTACHMENT B - Descriptions of Essential Fish Habitat (EFH) for Species
Managed Under the Groundfish of the Gulf of Alaska Management Plan**

Descriptions of Essential Fish Habitat (EFH) for Species Managed Under the Groundfish of the Gulf of Alaska Management Plan

Black rockfish (*Sebastes melanops*) and Dark rockfish (*Sebastes ciliatus*): These species were removed from Federal management in and are managed by the State of Alaska in 1998 and 2008 respectively.

Alaska plaice, *Pleuronectes quadrituberculatus*

- **Eggs:** EFH for Alaska plaice eggs is the general distribution area for this life stage, located in pelagic waters along the entire continental shelf (0 to 200 m depth) and upper slope (200 to 500 m depth) throughout the GOA in the spring.
- **Larvae:** EFH for larval Alaska plaice is the general distribution area for this life stage, located in pelagic waters along the entire continental shelf (0 to 200 m depth) and upper slope (200 to 500 m depth) throughout the GOA.
- **Settled Early Juveniles:** EFH for settled early juvenile Alaska plaice is the general distribution area for this life stage, located in the lower portion of the water column along the inner (0 to 50 m depth) and middle (50 to 100 m depth) continental shelf throughout the GOA wherever there are softer substrates consisting of sand and mud.
- **Subadults:** EFH for subadult Alaska plaice is the general distribution area for this life stage, located in the lower portion of the water column along the inner (0 to 50 m depth), middle (50 to 100 m depth), and outer (100 to 200 m depth) continental shelf throughout the GOA wherever there are softer substrates consisting of sand and mud. Subadult EFH is from the Kenai Peninsula to nearshore areas in Kachemak Bay and lower Cook Inlet, and along the Alaska Peninsula and west of Kodiak Island.
- **Adults:** EFH for adult Alaska plaice is the general distribution area for this life stage, located in the lower portion of the water column along the inner (0 to 50 m depth), middle (50 to 100 m depth), and outer (100 to 200 m depth) continental shelf throughout the GOA wherever there are softer substrates consisting of sand and mud. Adult EFH extends to deeper depths along bathymetric rises on the GOA continental shelf compared to subadult EFH.

Alaska skate, *Caliraja rhina*

- **Eggs:** No EFH description determined. Insufficient information is available.
- **Larvae:** Not applicable, skates emerge from egg fully formed.
- **Settled Early Juveniles:** No EFH description determined. Insufficient information is available.
- **Subadults:** EFH for subadult Alaska skates is at depths around 250 m in the central GOA, particularly in Shelikof Strait and the western end of the Alaska Peninsula.

- **Adults:** EFH for adult Alaska skates was similar to subadults and primarily in the Shelikof Strait, along the southwestern coast of Kodiak Island, and near Unimak Pass.

Aleutian skate, *Bathyraja aleutica*

- **Eggs:** No EFH description determined. Insufficient information is available.
- **Larvae:** Not applicable, skates emerge from egg fully formed.
- **Settled Early Juveniles:** No EFH description determined. Insufficient information is available.
- **Subadults:** EFH for subadult Aleutian skates is in depths around 300 m across the GOA continental shelf.
- **Adults:** EFH for adult Aleutian skates is in depths around 250 m and concentrated in Shelikof Strait and the Chirikof region.

Arrowtooth flounder, *Atheresthes stomias*

- **Eggs:** EFH for arrowtooth flounder eggs is the general distribution area for this life stage, located in demersal habitat at depths mostly greater than 400 m.
- **Larvae:** EFH for larval arrowtooth flounder is the general distribution area for this life stage, located in pelagic waters along the entire continental shelf (0 to 200 m depth) and slope (200 to 3,000 m depth) throughout the GOA.
- **Settled Early Juveniles:** EFH for settled early juvenile arrowtooth flounder is the general distribution area for this life stage, located in the lower portion of the water column along the inner (0 to 50 m depth) and middle (50 to 100 m depth) continental shelf throughout the GOA wherever there are softer substrates consisting of sand and mud, extending to inshore areas from the 200 m depth isobaths.
- **Subadults:** EFH for subadult arrowtooth flounder is the general distribution area for this life stage, located in the lower portion of the water column along the inner (0 to 50 m depth), middle (50 to 100 m depth), and outer (100 to 200 m depth) continental shelf and upper slope (200 to 500 m depth) throughout the GOA wherever there are substrates consisting of gravel, sand, and mud. EFH hot spots for this life stages were prominent in Shelikof Strait and in glacial troughs throughout the GOA .
- **Adults:** EFH for adult arrowtooth flounder is the general distribution area for this life stage, located in the lower portion of the water column along the inner (0 to 50 depth), middle (50 to 100 m depth), and outer (100 to 200 m depth) continental shelf and upper slope (200 to 500 m) throughout the GOA wherever there are substrates consisting of gravel, sand, and mud. EFH hot spots for this life stage were prominent in Shelikof Strait and in glacial troughs throughout the GOA.

Atka mackerel, *Pleurogrammus monopterygius*

- **Eggs:** EFH for Atka mackerel eggs is the general distribution area for this life stage, located in demersal habitat along the continental shelf (0 to 200 m depth). Nesting sites in the western GOA have been identified. Historical data from ichthyoplankton tows on the outer shelf and slope off Kodiak Island in the 1970s and 1980s suggest that nesting colonies may have existed at one time in the central GOA. There are general distribution data available; however, observations are not complete for the entire GOA, and recent observations are not available.
- **Larvae:** No EFH description determined. Insufficient information is available.
- **Settled Early Juveniles:** No EFH description determined. Insufficient information is available.
- **Subadults:** EFH for subadult Atka mackerel is the general distribution area for this life stage, located in the entire water column, from sea surface to the sea floor, Generally, subadult Atka mackerel can be found along the inner (0 to 50 m depth), middle (50 to 100 m depth), and outer continental shelf (100 to 200 m depth) throughout the GOA wherever there are substrates of gravel and rock and in vegetated areas of kelp. However, insufficient information is available. EFH hot spots increase moving west in the GOA.
- **Adults:** EFH for adult Atka mackerel is the general distribution area for this life stage, located in the entire water column, from sea surface to the sea floor, along the inner (0 to 50 m depth), middle (50 to 100 m depth), and outer continental shelf (100 to 200 m depth) An Atka mackerel population existed in the GOA primarily in the Kodiak, Chirikof, and Shumagin areas, and supported a large foreign fishery through the early 1980s. By the mid-1980s, this fishery, and presumably the population, had all but disappeared. Recently, Atka mackerel have been detected by the summer trawl surveys primarily in the Shumagin (Western) area of the GOA. The fishery also catches Atka mackerel sporadically in low numbers in the western GOA as bycatch. The core EFH area occurred from Kayak Island west .

Blackspotted rockfish, *Sebastes melanostictus*

- **Eggs:** EFH for rougheye and blackspotted rockfish eggs is the general distribution area for this life stage, located in the lower portion of the water column along the outer continental shelf (100 to 200 m depth) and upper slope (200 to 500 m depth).
- **Larvae:** EFH for larval rougheye and blackspotted rockfish is the general distribution area for this life stage, located in pelagic waters along the middle and outer continental shelf (50 to 200 m depth) and slope (200 to 3,000 m depth) throughout the GOA.
- **Settled Early Juveniles:** EFH for early juvenile rougheye and blackspotted rockfish is the general distribution area for this life stage, located in pelagic waters throughout the middle and outer (50 to 200 m depth) continental shelf and slope (200 to 3,000 m depth).

- **Subadults:** EFH for subadult rougheye and blackspotted rockfish is the general distribution area for this life stage, located in the lower portion of the water column along the inner (0 to 50 m depth), middle (50 to 100 m depth), and outer continental shelf (100 to 200 m depth), and upper slope (200 to 500 m depth). Subadult EFH is extensive throughout the GOA with hot spots in the glacial troughs on the continental shelf and along the upper slope.
- **Adults:** EFH for adult rougheye and blackspotted rockfish is the general distribution area for this life stage, Located in the lower portion of the water column along the outer continental shelf (100 to 200 m depth) and upper slope (200 to 500 m depth) regions throughout the GOA wherever there are substrates consisting of mud, sand, sandy mud, muddy sand, rock, cobble, and gravel. Adult EFH area is found in the glacial troughs, outer shelf, and upper slope of the GOA.

Dover sole, *Solea solea*

- **Eggs:** EFH for Dover sole eggs is the general distribution area for this life stage, located in pelagic waters along the entire continental shelf (0 to 200 m depth) and slope (200 to 3,000 m depth) throughout the GOA.
- **Larvae:** EFH for larval Dover sole is the general distribution area for this life stage, located in pelagic waters along the entire continental shelf (0 to 200 m depth) and slope (200 to 3,000 m depth) throughout the GOA.
- **Settled Early Juveniles:** No EFH description determined. Insufficient information is available.
- **Subadults:** EFH for subadult Dover sole is the general distribution area for this life stage, located in the lower portion of the water column along the middle (50 to 100 m depth), and outer (100 to 200 m depth) continental shelf and upper slope (200 to 500 m depth) throughout the GOA wherever there are substrates consisting of sand and mud. Subadult distribution is widespread across the central GOA and southeast Alaska, and high abundances are associated with glacial troughs near Yakutat and southeast Alaska.
- **Adults:** EFH for adult Dover sole is the general distribution area for this life stage, located in the lower portion of the water column along the middle (50 to 100 m depth), and outer (100 to 200 m depth) continental shelf and upper slope (200 to 500 m depth) throughout the GOA wherever there are substrates consisting of sand and mud. Similar core EFH and EFH hot spots were observed between subadult and adult Dover sole, with primary locations around Kodiak, Yakutat, and southeast Alaska

Dusky rockfish, *Sebastes variabilis*

- **Eggs:** EFH for dusky rockfish eggs is the general distribution area for this life stage, located in the middle and lower portions of the water column along the outer continental shelf (100 to 200 m depth) and upper slope (200 to 500 m depth).

- **Larvae:** EFH for larval dusky rockfish is the general distribution area for this life stage, located in the pelagic waters along the entire continental shelf (0 to 200 m depth) and slope (200 to 3,000 m depth) throughout the GOA.
- **Settled Early Juveniles:** No EFH description determined. Insufficient information is available.
- **Subadults:** EFH for subadult dusky rockfish is the general distribution area for this life stage, located wherever there are substrates of cobble, rock, and gravel. It includes the GOA continental shelf and upper slope from southeast Alaska through the western GOA, with hot spots off the Kenai Peninsula and southeast Alaska.
- **Adults:** EFH for adult dusky rockfish is the general distribution area for this life stage, located in the middle and lower portions of the water column along the outer continental shelf (100 to 200 m depth) and upper slope (200 to 500 m depth) throughout the GOA wherever there are substrates of cobble, rock, and gravel. Adult EFH is more extensive than subadult EFH and includes the glacial troughs west of Kayak Island.

Flathead sole, *Hippoglossoides elassodon*

- **Eggs:** EFH for flathead sole eggs is the general distribution area for this life stage, located in pelagic waters along the entire continental shelf (0 to 200 m depth) and slope (200 to 3,000 m depth) throughout the GOA.
- **Larvae:** EFH for larval flathead sole is described the same as for their egg life history stage.
- **Settled Early Juveniles:** EFH for settled early juvenile flathead sole is the general distribution area for this life stage, located in the lower portion of the water column along the inner (0 to 50 m depth) and middle (50 to 100 m depth) continental shelf throughout the GOA wherever there are softer substrates consisting of sand and mud. Core EFH areas and hot spots are associated with shallower continental shelf habitats and nearshore areas.
- **Subadults:** EFH for subadult flathead sole is the general distribution area for this life stage, located in the lower portion of the water column along the inner (0 to 50 m depth), middle (50 to 100 m depth), and outer (100 to 200 m depth) continental shelf throughout the GOA wherever there are softer substrates consisting of sand and mud. EFH for subadult flathead sole extends from southeast Alaska to the western GOA with hotspots in Shelikof Strait and over the continental shelf and the coast of the Alaska Peninsula.
- **Adults:** EFH for adult flathead sole is the general distribution area for this life stage, located in the lower portion of the water column along the inner (0 to 50 m depth), middle (50 to 100 m depth), and outer (100 to 200 m depth) continental shelf throughout the GOA wherever there are softer substrates consisting of sand and mud. EFH hot spots are similar with subadult flathead sole and in Shelikof Strait,

over the continental shelf, along the coast of the Alaska Peninsula, and nearshore of Kodiak Island

Greenstriped rockfish, *Sebastes elongatus*

- **Eggs:** No EFH description determined. Insufficient information is available.
- **Larvae:** No EFH description determined. Insufficient information is available.
- **Settled Early Juveniles:** No EFH description determined. Insufficient information is available.
- **Subadults:** No EFH description determined. Insufficient information is available.
- **Adults:** Adult greenstripe rockfish occur on the eastern GOA continental shelf off southeast Alaska with peaks at depths < 200 m.

Harlequin rockfish, *Othos dentex*

- **Eggs:** No EFH description determined. Insufficient information is available.
- **Larvae:** No EFH description determined. Insufficient information is available.
- **Settled Early Juveniles:** No EFH description determined. Insufficient information is available.
- **Subadults:** Subadult harlequin rockfish occur in the central and eastern GOA at shallower depths on the continental shelf.
- **Adults:** Adult harlequin rockfish have a more extensive EFH area than subadults and are found at high abundances around 200 m depth with rocky substrates along the outer continental shelf and upper slope in the eastern and central GOA and west of Kodiak Island.

Longspine thornyhead rockfish, *Sebastolobus altivelis*

- **Eggs:** No EFH description determined. Insufficient information is available.
- **Larvae:** No EFH description determined. Insufficient information is available.
- **Settled Early Juveniles:** EFH for early juvenile thornyhead rockfish is the general distribution area for this life stage, located in pelagic waters along the entire continental shelf (0 to 200 m depth) and slope (200 to 3,000 m depth) throughout the GOA.
- **Subadult:** EFH for subadult thornyhead rockfish is the general distribution area for this life stage, located in the lower portion of the water column along the middle and outer continental shelf (50 to 200 m depth) and upper to lower slope (200 to 1,000 m depth) throughout the GOA wherever there are substrates of mud, sand, rock, sandy mud, muddy sand, cobble, and gravel. Subadult EFH occurs within glacial troughs on the continental shelf and along the outer shelf and continental slope of the GOA, with abundances peaking around 375 m depth.

- **Adults:** EFH for adult thornyhead rockfish is the general distribution area for this life stage, located in the lower portion of the water column along the middle and outer continental shelf (50 to 200 m depth) and upper to lower slope (200 to 1,000 m depth) throughout the GOA wherever there are substrates of mud, sand, rock, sandy mud, muddy sand, cobble, and gravel. Adult EFH is similar to subadult EFH, found within glacial troughs on the continental shelf and along the outer shelf and continental slope of the GOA, though adult abundances peak around 300 m depth.

Northern rock sole, *Lepidopsetta polyxystra*

- **Eggs:** EFH for northern rock sole eggs is the general distribution area for this life stage, located in demersal waters along the entire continental shelf (0 to 200 m depth) throughout the GOA.
- **Larvae:** EFH for larval northern rock sole is the general distribution area for this life stage, located in pelagic waters along the entire continental shelf (0 to 200 m depth) and upper slope (200 to 1,000 m depth) throughout the GOA.
- **Settled Early Juveniles:** EFH for settled early juvenile northern rock sole is the general distribution area for this life stage, located in the lower portion of the water column along the inner continental shelf (0 to 50 m depth). When combined and evaluated with GOA southern rock soles, settled early juvenile EFH is in inshore areas of the GOA continental shelf, with EFH hot spots nearshore.
- **Subadults:** EFH for subadult northern rock sole is the general distribution area for this life stage, located in the lower portion of the water column along the inner (0 to 50 m depth), middle (50 to 100 m depth), and outer (100 to 200 m depth) continental shelf throughout the GOA wherever there are substrates consisting of sand, gravel, and cobble. Subadult EFH occurs at bathymetric rises throughout the GOA continental shelf, with core EFH area and EFH hot spots most concentrated west of the Kenai Peninsula.
- **Adults:** EFH for adult rock sole is the general distribution area for this life stage, located in the lower portion of the water column along the inner (0 to 50 m depth), middle (50 to 100 m depth), and outer (100 to 200 m depth) continental shelf throughout the GOA wherever there are substrates consisting of sand, gravel, and cobble. Similar to subadults, adult EFH is found at bathymetric rises throughout the GOA continental shelf, with hot spots identified west of the Kenai Peninsula.

Northern rockfish, *Sebastes polyspinis*

- **Eggs:** EFH for northern rockfish eggs is the general distribution area for this life stage, located in the lower portion of the water column along the outer continental shelf (100 to 200 m depth) and upper slope (200 to 500 m depth).
- **Larvae:** EFH for larval northern rockfish is the general distribution area for this life stage, located in pelagic waters along the middle and outer continental shelf (50 to 200 m depth) and slope (200 to 3,000 m depth) throughout the GOA.

- **Settled Early Juveniles:** EFH for early juvenile northern rockfish is the general distribution area for this life stage, located in pelagic waters along the middle and outer continental shelf (50 to 200 m depth) and slope (200 to 3,000 m depth) throughout the GOA.
- **Subadults:** EFH for subadult northern rockfish is the general distribution area for this life stage, located across the GOA continental shelf west of Kayak Island at depths less than 250 m with rocky substrates.
- **Adults:** EFH for adult northern rockfish is the general distribution area for this life stage, located in the lower portions of the water column along the outer continental shelf (75 to 200 m depth) and upper slope (200 to 300 m depth) in the central and western GOA wherever there are substrates of cobble and rock. Adult EFH includes the eastern GOA with core EFH area and EFH hot spots west of Kayak Island on the continental shelf.

Octopus/Giant Octopus, *Octopoda* spp./*Enteroctopus dofleini*

- **Eggs:** No EFH description determined. Insufficient information is available.
- **Settled Early Juveniles:** No EFH description determined. Insufficient information is available.
- **Subadults:** No EFH description determined. Insufficient information is available.
- **Adults:** EFH for adult octopus is the general distribution area for this life stage, located in demersal habitat throughout the intertidal, subtidal, continental shelf (0 to 200 m depth), and slope (200 to 2,000 m depth). It is most extensive in the central and western GOA and along the outer continental shelf and upper continental slope.

Pacific cod, *Gadus macrocephalus*

- **Eggs:** Pacific cod eggs are demersal that adhere to the bottom. They are highly sensitive to temperature with a thermal hatch success range between 3 to 6 °C.
- **Larvae:** EFH for larval Pacific cod is the general distribution area for this life stage, located in pelagic waters along the inner (0 to 50 m depth) and middle (50 to 100 m depth) continental shelf throughout the GOA.
- **Pelagic Early Juveniles:** EFH for pelagic early juveniles is the general distribution area for this life stage and overlaps with the EFH for feeding larvae (pre- and post flexion). Early life history stages of Pacific cod generally do not disperse far from spawning locations (Hinckley *et al.* 2019).
- **Settled Early Juveniles:** EFH for early juvenile Pacific cod is the general distribution area for this life stage, located in the lower portion of the water column along the inner (0 to 50 m depth), middle (50 to 100 m depth), and outer (100 to 200 m depth) continental shelf throughout the GOA. EFH includes nearshore area and bathymetric rises on the continental shelf in the central and western GOA.

- **Subadults:** EFH for subadult Pacific cod is the general distribution area for this life stage, located in the lower portion of the water column along the inner (0 to 50 m depth), middle (50 to 100 m depth), and outer (100 to 200 m depth) continental shelf throughout the GOA. Subadult EFH extends from southeast Alaska to the western GOA, with the core area more extensive at shallower depths on the continental shelf.
- **Adults:** EFH for adult Pacific cod is the general distribution area for this life stage, located in the lower portion of the water column along the inner (0 to 50 m depth), middle (50 to 100 m depth), and outer (100 to 200 m depth) continental shelf throughout the GOA. EFH hot spots are found on the continental shelf west of the Kenai Peninsula.

Pacific ocean perch, *Sebastes alutus*

- **Eggs:** EFH for Pacific ocean perch eggs is the general distribution area for this life stage, located in the lower portion of the water column along the outer continental shelf (100 to 200 m depth) and upper slope (200 to 500 m depth).
- **Larvae:** EFH for larval Pacific ocean perch is the general distribution area for this life stage, located in the middle to lower portion of the water column along the inner continental shelf (0 to 50 m depth), middle shelf (50 to 100 m depth), outer shelf (100 to 200 m depth), and upper slope (200 to 500 m depth) throughout the GOA. Additionally, Pacific ocean perch larvae have been found as far as 180 km offshore over depths in excess of 1,000 m.
- **Settled Early Juveniles:** EFH for settled early juvenile Pacific ocean perch is the general distribution area for this life stage, located in the middle to lower portion of the water column along the inner continental shelf (0 to 50 m depth), middle shelf (50 to 100 m depth), outer shelf (100 to 200 m depth), and upper slope (200 to 500 m depth) throughout the GOA wherever there are substrates consisting of cobble, gravel, mud, sandy mud, or muddy sand. The highest probabilities of suitable habitat for early juvenile POP were predicted in offshore waters at depths around 250 m and with bottom temperatures around 6°C.
- **Subadults:** EFH for subadult Pacific ocean perch is the general distribution area for this life stage, located in the middle to lower portion of the water column along the inner continental shelf (0 to 50 m depth), middle shelf (50 to 100 m depth), outer shelf (100 to 200 m depth), and upper slope (200 to 500 m depth) throughout the GOA wherever there are substrates consisting of cobble, gravel, mud, sandy mud, or muddy sand. Subadult EFH extends across the GOA with hotspots in the Yakutat and southeast Alaska management areas.
- **Adults:** EFH for adult Pacific ocean perch is the general distribution area for this life stage, located in the lower portion of the water column along the outer continental shelf (100 to 200 m depth) and upper slope (200 to 500 m depth) throughout the GOA wherever there are substrates consisting of cobble, gravel, mud, sandy mud,

or muddy sand. EFH overlaps for settled early juveniles, subadults, and adults, though adult hotspots are identified in the Chirikof management area.

Pygmy rockfish, *Sebastes wilsoni*

- **Eggs:** No EFH description determined. Insufficient information is available.
- **Larvae:** No EFH description determined. Insufficient information is available.
- **Settled Early Juveniles:** No EFH description determined. Insufficient information is available.
- **Subadults:** No EFH description determined. Insufficient information is available to separate subadult and adult pygmy rockfish based on length at maturity.
- **Adults:** Pygmy rockfish occur at depths < 250 m on the continental shelf of the eastern GOA off southeast Alaska and some areas in the central GOA. They associate more with rocky substrates than with sponge presence.

Quillback rockfish, *Sebastes maliger*

- **Eggs:** No EFH description determined. Insufficient information is available.
- **Larvae:** No EFH description determined. Insufficient information is available.
- **Settled Early juveniles:** No EFH description determined. Insufficient information is available.
- **Subadults:** No EFH description determined. Insufficient information is available.
- **Adults:** Quillback rockfish are associated with rocky, high-relief habitats with kelp cover. Adults occur at a higher abundance at shallow depths and mainly on the continental shelf and inshore areas of the southeastern GOA.

Redbanded rockfish, *Sebastes babcocki*

- **Eggs:** No EFH description determined. Insufficient information is available.
- **Larvae:** No EFH description determined. Insufficient information is available.
- **Settled Early Juveniles:** No EFH description determined. Insufficient information is available.
- **Subadults:** Subadult redbanded rockfish have high abundances in the eastern GOA and off southeast Alaska around 250 m depths.
- **Adults:** Adult redbanded rockfish occur from southeast Alaska to the western GOA around 250 m depth with moderate current exposure in the eastern GOA.

Redstriped rockfish, *Sebastes rubrivinctus*

- **Eggs:** No EFH description determined. Insufficient information is available.
- **Larvae:** No EFH description determined. Insufficient information is available.

- **Settled Early Juveniles:** No EFH description determined. Insufficient information is available.
- **Subadults:** Subadult redstripe rockfish occur in high abundances around 200 m depth with rocky substrates on the continental shelf of the southeastern GOA.
- **Adults:** Adult redstripe rockfish also occur in high abundances around 200 m depth with rocky substrates on the continental shelf of the southeastern GOA.

Rex sole, *Glyptocephalus zachirus*

- **Eggs:** EFH for rex sole eggs is the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m) and upper slope (200 to 500 m) throughout the GOA in the spring.
- **Larvae:** EFH for larval rex sole is the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m) and upper slope (200 to 500 m) throughout the GOA.
- **Settled Early Juveniles:** Settled early juvenile rex sole EFH covers the continental shelf with exceptions in shallow water (< 100 m depth) from Cook Inlet around Kodiak Island and into the western GOA.
- **Subadults:** EFH for subadult rex sole is the general distribution area for this life stage, located in the lower portion of the water column along the inner (0 to 50 m depth), middle (50 to 100 m depth), and outer (100 to 200 m depth) continental shelf throughout the GOA wherever there are substrates consisting of gravel, sand, and mud. Subadult EFH extends from southeast Alaska to the western GOA, with hotspots extending from the Kodiak management area into southeast Alaska.
- **Adults:** EFH for adult rex sole is the general distribution area for this life stage, located in the lower portion of the water column along the inner (0 to 50 m depth), middle (50 to 100 m depth), and outer (100 to 200 m depth) continental shelf throughout the GOA wherever there are substrates consisting of gravel, sand, and mud. Adult EFH overlaps the subadult EFH and extends from southeast Alaska to the western GOA, with hotspots extending from the Kodiak management area into southeast Alaska.

Rosethorn rockfish, *Sebastes helvomaculatus*

- **Eggs:** No EFH description determined. Insufficient information is available.
- **Larvae:** No EFH description determined. Insufficient information is available.
- **Settled Early juveniles:** No EFH description determined. Insufficient information is available.
- **Subadults:** Subadult rosethorn rockfish occur along the outer continental shelf of the eastern GOA at around 250 m depth. They are associated with areas of low sponge abundance.

- **Adults:** Rosethorn rockfish are associated with transitional habitat locations between soft, unconsolidated and rocky substrates. The adults occur along the outer continental shelf of the eastern GOA at around 250 m depth.

Rougheye rockfish, *Sebastes aleutianus*

- **Eggs:** EFH for rougheye and blackspotted rockfish eggs is the general distribution area for this life stage, located in the lower portion of the water column along the outer continental shelf (100 to 200 m depth) and upper slope (200 to 500 m depth).
- **Larvae:** EFH for larval rougheye and blackspotted rockfish is the general distribution area for this life stage, located in pelagic waters along the middle and outer continental shelf (50 to 200 m depth) and slope (200 to 3,000 m depth) throughout the GOA.
- **Settled Early Juveniles:** EFH for early juvenile rougheye and blackspotted rockfish is the general distribution area for this life stage, located in pelagic waters throughout the middle and outer (50 to 200 m depth) continental shelf and slope (200 to 3,000 m depth).
- **Subadults:** EFH for subadult rougheye and blackspotted rockfish is the general distribution area for this life stage, located in the lower portion of the water column along the inner (0 to 50 m depth), middle (50 to 100 m depth), and outer continental shelf (100 to 200 m depth), and upper slope (200 to 500 m depth). Subadult EFH is extensive throughout the GOA with hot spots in the glacial troughs on the continental shelf and along the upper slope.
- **Adults:** EFH for adult rougheye and blackspotted rockfish is the general distribution area for this life stage, located in the lower portion of the water column along the outer continental shelf (100 to 200 m depth) and upper slope (200 to 500 m depth) regions throughout the GOA wherever there are substrates consisting of mud, sand, sandy mud, muddy sand, rock, cobble, and gravel. Adult EFH area is found in the glacial troughs, outer shelf, and upper slope of the GOA.

Sablefish, *Anoplopoma Fimbria*

- **Eggs:** Sablefish spawn along the continental slope. Sablefish also use seamounts in the GOA as spawning grounds.
- **Larvae:** EFH for larval sablefish is the general distribution area for this life stage. Larvae are located in epipelagic waters along the middle continental shelf (50 to 100 m depth), outer shelf (100 to 200 m depth), and slope (200 to 3,000 m depth) throughout the GOA.
- **Pelagic Early Juveniles:** EFH for pelagic early juvenile sablefish is the general distribution area for this life stage and extends throughout the GOA from the outer coast of southeast Alaska to the western GOA around Kodiak Island and into Shelikof Strait (Shotwell *et al.* In preparation).

- **Settled Early Juveniles:** EFH for settled early juvenile sablefish is the general distribution area for this life stage. Early juveniles have been observed in inshore water, bays, and passes, and on shallow continental shelf demersal habitat. Core EFH areas are at shallow depths on the continental shelf, and EFH hot spots are found in nearshore areas and along the shelf of the eastern GOA.
- **Subadults:** EFH for subadult sablefish is the general distribution area for this life stage, located in the lower portion of the water column, varied habitats, generally softer substrates, and deep continental shelf gulleys along the slope (400 to 800 m depth) throughout the GOA. Subadult EFH is throughout the GOA from southeast Alaska to the western GOA, with hot spots at deeper depths on the continental shelf and slope.
- **Adults:** EFH for adult sablefish is the general distribution area for this life stage, located in deep shelf gulleys along the continental slope (200 to 1,000 m) throughout the GOA. EFH for adults overlaps with subadults, though they occupy deeper depths offshore with age.

Sand sole, *Psettichthys melanostictus*

- **Eggs:** No EFH description determined. Representative descriptions can be found with Alaska plaice, northern rock sole, southern rock sole, and yellowfin sole.
- **Larvae:** No EFH description determined. Representative descriptions can be found with Alaska plaice, northern rock sole, southern rock sole, and yellowfin sole.
- **Settled Early Juveniles:** No EFH description determined. Representative descriptions can be found with Alaska plaice, northern rock sole, southern rock sole, and yellowfin sole.
- **Subadults:** No EFH description determined. Representative descriptions can be found with Alaska plaice, northern rock sole, southern rock sole, and yellowfin sole.
- **Adults:** EFH of this stock complex extends from southeast Alaska in the eastern GOA through the western GOA. Core EFH areas are found on bathymetric rises and inshore areas of the GOA continental shelf.

Sharpchin rockfish, *Sebastes zacentrus*

- **Eggs:** No EFH description determined. Insufficient information is available.
- **Larvae:** No EFH description determined. Insufficient information is available.
- **Settled Early Juveniles:** No EFH description determined. Insufficient information is available.
- **Subadults:** Subadult sharpchin rockfish are found around 200 m depth on the outer continental shelf of the GOA east of Kodiak Island. They associate with rocky substrates and with areas having low sponge abundance.

- **Adults:** Adult sharpchin rockfish have high abundances around 200 m depth on the outer continental shelf of the GOA east of Kodiak Island .

Shortraker rockfish, *Sebastes borealis*

- **Eggs:** EFH for shortraker rockfish eggs is the general distribution area for this life stage, located in the lower portion of the water column along the outer continental shelf (100 to 200 m depth) and upper slope(200 to 500 m depth).
- **Larvae:** EFH for larval shortraker rockfish is the general distribution area for this life stage, located in pelagic waters along the middle and outer continental shelf (50 to 200 m depth) and slope (200 to 3,000 m depth) throughout the GOA.
- **Settled Early Juveniles:** EFH for early juvenile shortraker rockfish is the general distribution area for this life stage, located in pelagic waters throughout the middle and outer (50 to 200 m depth) continental shelf and slope (200 to 3,000 m depth).
- **Subadults:** EFH for subadult shortraker rockfish is the general distribution area for this life stage, located in the lower portion of the water column along the outer continental shelf (100 to 200 m depth) and upper slope (200 to 500 m depth) regions throughout the GOA wherever there are substrates consisting of mud, sand, sandy mud, muddy sand, rock, cobble, and gravel. Subadult EFH is predicted around 375 m depth, occurring in the outer extent of glacial troughs on the continental shelf and areas along the continental slope of the GOA.
- **Adults:** EFH for adult shortraker rockfish is the general distribution area for this life stage, located in the lower portion of the water column along the upper continental slope (200 to 500 m depth) regions throughout the GOA wherever there are substrates consisting of mud, sand, sandy mud, muddy sand, rock, cobble, and gravel. Adults are especially found on steep slopes with frequent boulders. EFH was also within the glacial troughs on the continental shelf for this life history stage .

Shortspine thornyhead rockfish, *Sebastolobus alascanus*

- **Eggs:** No EFH description determined. Insufficient information is available.
- **Larvae:** No EFH description determined. Insufficient information is available.
- **Settled Early Juveniles:** EFH for early juvenile thornyhead rockfish is the general distribution area for this life stage, located in pelagic waters along the entire continental shelf (0 to 200 m depth) and slope (200 to 3,000 m depth) throughout the GOA.
- **Subadult:** EFH for subadult thornyhead rockfish is the general distribution area for this life stage, located in the lower portion of the water column along the middle and outer continental shelf (50 to 200 m depth) and upper to lower slope (200 to 1,000 m depth) throughout the GOA wherever there are substrates of mud, sand, rock, sandy mud, muddy sand, cobble, and gravel. Subadult EFH occurs within glacial troughs

on the continental shelf and along the outer shelf and continental slope of the GOA, with abundances peaking around 375 m depth.

- **Adults:** EFH for adult thornyhead rockfish is the general distribution area for this life stage, located in the lower portion of the water column along the middle and outer continental shelf (50 to 200 m depth) and upper to lower slope (200 to 1,000 m depth) throughout the GOA wherever there are substrates of mud, sand, rock, sandy mud, muddy sand, cobble, and gravel. Adult EFH is similar to subadult EFH, found within glacial troughs on the continental shelf and along the outer shelf and continental slope of the GOA, though adult abundances peak around 300 m depth.

Silvergrey rockfish, *Sebastes brevispinis*

- **Eggs:** No EFH description determined. Insufficient information is available.
- **Larvae:** No EFH description determined. Insufficient information is available.
- **Settled Early Juveniles:** No EFH description determined. Insufficient information is available.
- **Subadults:** Subadult silvergray rockfish abundance was highest around 200 m depth in areas with rocky substrate present in the eastern GOA off southeast Alaska.
- **Adults:** Adult silvergray rockfish occur around 200 m depth in the eastern GOA off southern southeast Alaska.

Starry Flounder, *Platichthys stellatus*

- **Eggs:** No EFH description determined. Representative descriptions can be found with Alaska plaice, northern rock sole, southern rock sole, and yellowfin sole.
- **Larvae:** No EFH description determined. Representative descriptions can be found with Alaska plaice, northern rock sole, southern rock sole, and yellowfin sole.
- **Settled Early Juveniles:** Settled early juvenile starry flounder are found in nearshore areas of the GOA in locations less than 100 m depth.
- **Subadults:** EFH for subadult starry flounder is nearshore areas at shallow depths of the GOA continental shelf.
- **Adults:** Adult starry flounder EFH is shallow, nearshore areas of the GOA continental shelf.

Southern rock sole, *Lepidopsetta bilineata*

- **Eggs:** EFH for southern rock sole eggs is the general distribution area for this life stage, located in demersal habitat throughout the continental shelf (0 to 200 m depth).

- **Larvae:** EFH for larval southern rock sole is the general distribution area for this life stage, located in pelagic waters along the entire continental shelf (0 to 200 m depth) and upper slope (200 to 1,000 m depth) throughout the GOA.
- **Settled Early Juveniles:** EFH for settled early juvenile southern rock sole is the general distribution area for this life stage, located in the lower portion of the water column along the inner continental shelf (0 to 50 M depth). When combined and evaluated with GOA northern rock soles, settled early juvenile EFH is in inshore areas of the GOA continental shelf, with EFH hot spots nearshore.
- **Subadults:** EFH for subadult southern rock sole is the general distribution area for this life stage, located in the lower portion of the water column along the inner (0 to 50 m depth), middle (50 to 100 m depth), and outer (100 to 200 m depth) continental shelf throughout the GOA wherever there are substrates consisting of sand, gravel, and cobble. Subadult EFH areas occur on bathymetric rises on the continental shelf of the GOA, with hot spots west of the Kenai Peninsula south of Kodiak Island, the Shumagin Islands, along inshore areas of the Alaska Peninsula, and southeast Alaska.
- **Adults:** EFH for adult southern rock sole is the general distribution area for this life stage, located in the lower portion of the water column along the inner (0 to 50 m depth), middle (50 to 100 m depth), and outer(100 to 200 m depth) continental shelf throughout the GOA wherever there are substrates consisting of sand, gravel, and cobble. Adults had similar EFH hotspots to those identified for subadults.

Wallege pollock, *Gadus chalcogrammus*

- **Eggs:** EFH for walleye pollock eggs is the general distribution area for this life stage, located in pelagic waters along the entire continental shelf (0 to 200 m depth), upper slope (200 to 500 m depth), and intermediate slope (500 to 1,000 m depth) throughout the GOA.
- **Larvae:** EFH for larval walleye pollock is the general distribution area for this life stage, located in epipelagic waters along the entire continental shelf (0 to 200 m depth), upper slope (200 to 500 m depth), and intermediate slope (500 to 1,000 m depth) throughout the GOA.
- **Settled Early Juveniles:** EFH for settled early juvenile walleye pollock is the general distribution area for this life stage, located in the lower and middle portion of the water column along the inner (0 to 50 m depth),middle (50 to 100 m depth), and outer (100 to 200 m depth) continental shelf throughout the GOA. Relative abundance of age 1 pollock is used as an early indicator of year class strength and is highly variable(presumably due to survival factors and differential availability between years). EFH hot spots are prevalent in glacial troughs and increase inshore.
- **Subadults:** EFH for subadult walleye pollock is the general distribution area for this life stage, located in the lower and middle portion of the water column along the inner (0 to 50 m depth), middle (50 to 100 m depth),and outer (100 to 200 m depth)

continental shelf throughout the GOA. Substrate preferences, if they exist, are unknown. Subadult EFH is in shallow areas of the GOA from southeast Alaska to the western GOA.

- **Adults:** EFH for adult walleye pollock is the general distribution area for this life stage, located in the lower and middle portion of the water column along the entire continental shelf (approximately 10 to 200 m depth) and slope (200 to 1,000 m depth) throughout the GOA. Substrate preferences, if they exist, are unknown. EFH hot spots are found in glacial troughs and Shelikof Strait.

Yelloweye rockfish, *Sebastes ruberrimus*

- **Eggs:** EFH for yelloweye rockfish eggs is the general distribution area for this life stage, located in the lower portion of the water column within bays and island passages and along the inner continental shelf (0 to 50 m depth), outer shelf (100 to 100 m depth), and upper slope (200 to 500 m depth).
- **Larvae:** EFH for larval yelloweye rockfish is the general distribution area for this life stage, located in pelagic waters along the entire continental shelf (0 to 200 m depth) and slope (200 to 3,000 m depth) throughout the GOA.
- **Settled Early Juveniles:** EFH for settled early juvenile yelloweye rockfish is the general distribution area for this life stage, located in the lower portion of the water column within bays and island passages and along the inner (0 to 50 m depth), middle (50 to 100 m depth), and outer continental shelf (100 to 200 m depth) throughout the GOA wherever there are substrates of rock and in areas of vertical relief, such as crevices, overhangs, vertical walls, coral, and larger sponges.
- **Subadults:** EFH for subadult yelloweye rockfish is the general distribution area for this life stage, located in the lower portion of the water column within bays and island passages and along the inner (0 to 50 m depth), middle (50 to 100 m depth), and outer continental shelf (100 to 200 m depth) throughout the GOA wherever there are substrates of rock and in areas of vertical relief, such as crevices, overhangs, vertical walls, coral, and larger sponges. They have high abundances around 125 m depth on bathymetric rises in areas of low sponge presence on the GOA continental shelf.
- **Adults:** EFH for adult yelloweye rockfish is the general distribution area for this life stage, located in the lower portion of the water column within bays and island passages and along the inner continental shelf (0 to 50 m depth), middle shelf (50 to 100 m depth), outer shelf (100 to 200 m depth) and upper slope (200 to 500 m depth) throughout the GOA wherever there are substrates of rock and in areas of vertical relief, such as crevices, overhangs, vertical walls, coral, and larger sponges. Higher abundance was predicted around 125 depth on bathymetric rises, similar to subadult yelloweye rockfish, with rocky substrate present.

Yellowfin sole, *Limanda aspera*

- **Eggs:** EFH for yellowfin sole eggs is the general distribution area for this life stage, located in pelagic waters along the entire continental shelf (0 to 200 m depth) and upper (200 to 500 m depth) slope throughout the GOA.
- **Larvae:** EFH for larval yellowfin sole is the general distribution area for this life stage, located in pelagic waters along the continental shelf (0 to 200 m depth) and upper slope (200 to 500 m depth) throughout the GOA.
- **Settled Early Juveniles:** EFH for settled early juvenile yellowfin sole is the general distribution area for this life stage, located in the lower portion of the water column along the inner continental shelf (0 to 50 m depth). EFH hot spots are inside Cook Inlet and offshore of the Copper and Bering rivers.
- **Subadults:** EFH for subadult yellowfin sole is the general distribution area for this life stage, located in the lower portion of the water column within nearshore bays and along the inner (0 to 50 m depth), middle (50 to 100 m depth), and outer (100 to 200 m depth) continental shelf throughout the GOA wherever there are soft substrates consisting mainly of sand. Subadult EFH is concentrated west of the Kenai Peninsula and inshore in the eastern GOA.
- **Adults:** EFH for adult yellowfin sole is the general distribution area for this life stage, located in the lower portion of the water column within nearshore bays and along the inner (0 to 50 m depth), middle (50 to 100 m depth), and outer (100 to 200 m depth) continental shelf throughout the GOA wherever there are soft substrates consisting mainly of sand. Adult EFH is similar to subadult EFH with hot spots at shallower depths on the continental shelf and in nearshore areas west of the Kenai Peninsula.

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