



**US Army Corps
of Engineers®**
Alaska District

DRAFT Feasibility Report and Environmental Assessment

Homer Navigation Improvements Homer, Alaska Appendix P: Fieldwork Summary



May 2026

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Attachment 1. Aquatic Resource Permit Documentation
Attachment 2. Sediment Analysis Plan and Chemical Analysis Results

ACRONYMS AND ABBREVIATIONS

°C	Degrees Celsius
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ARP	Aquatic Resource Permit
BUPA	Beneficial Use Placement Area
CPUE	Catch-per-unit-effort
CTD	Conductivity, Temperature, and Depth
DWDS	Deep Water Disposal Site
eDNA	Environmental DNA
GPS	Global Positioning System
HTT	Homer Trawl Transect
IFR/EA	Integrated Feasibility Report and Environmental Assessment
MLLW	Mean Lower Low Water
NCBI	National Center for Biotechnology Information
NMFS	National Marine Fisheries Service
PSS	Practical Salinity Scale
RBA	Revised Harbor Basin
SRA	Sequence Read Archive
USACE	U.S. Army Corps of Engineers

APPENDIX P - FIELDWORK SUMMARY

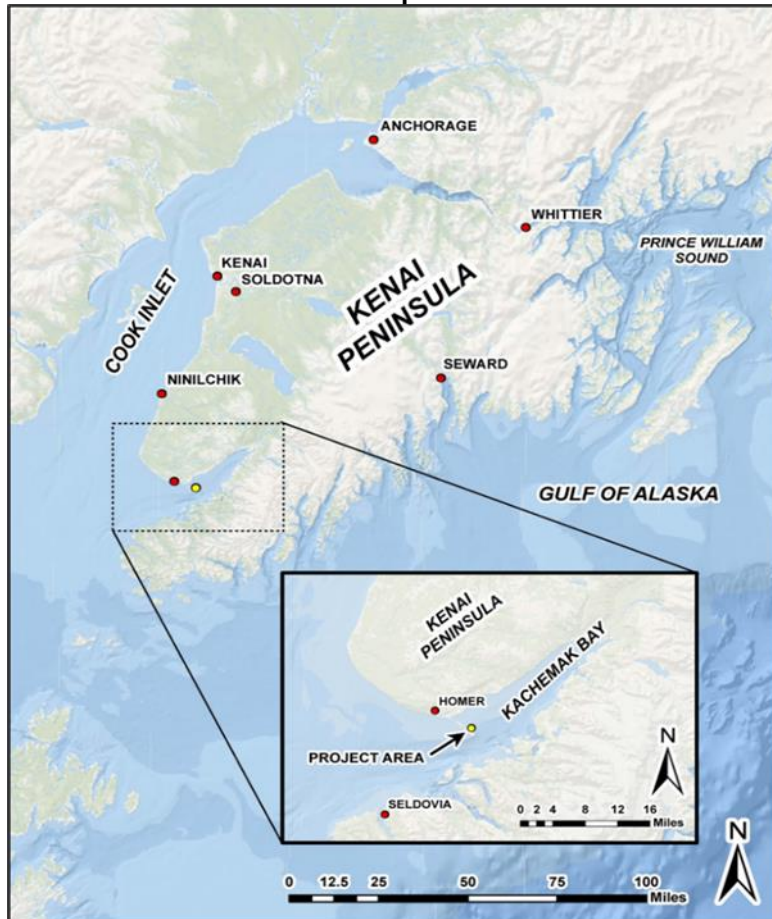
P.1 Introduction

This document is the Fieldwork Summary for fieldwork completed by U.S. Army Corps of Engineers (USACE) in 2024 through 2025 for the Homer Navigation Improvements, AK, Integrated Feasibility Report and Environmental Assessment (IFR/EA), authorized under Section 204 of the Flood Control Act of 1948. This feasibility study was requested by the City of Homer (the non-Federal sponsor), in response to navigation inefficiencies within Homer Port and Harbor (herein Homer Harbor).

P.1.1 Project Location

The Homer Harbor is located in Homer, Alaska at the end of the Homer Spit (Figure P-1). The Homer Spit is a stretch of land that extends into Kachemak Bay, which is located on the southern tip of the Kenai Peninsula and drains into the Gulf of Alaska by way of Cook Inlet.

Figure P-1. Location of Homer with respect to Cook Inlet and Kachemak Bay.



P.2 Environmental Fieldwork

Biologists from USACE Alaska District collected baseline ecological data from areas of interest (Figure P-2) in Kachemak Bay near the Homer Harbor in the years 2024 and 2025. Surveys included the use of both traditional survey techniques and contemporary molecular analysis (Figure P-3). The data collected is intended to supplement the environmental analysis of the Homer Navigation Improvements, AK, IFR/EA.

Figure P-2. Fieldwork area of interest for environmental surveys conducted in 2024 and 2025.

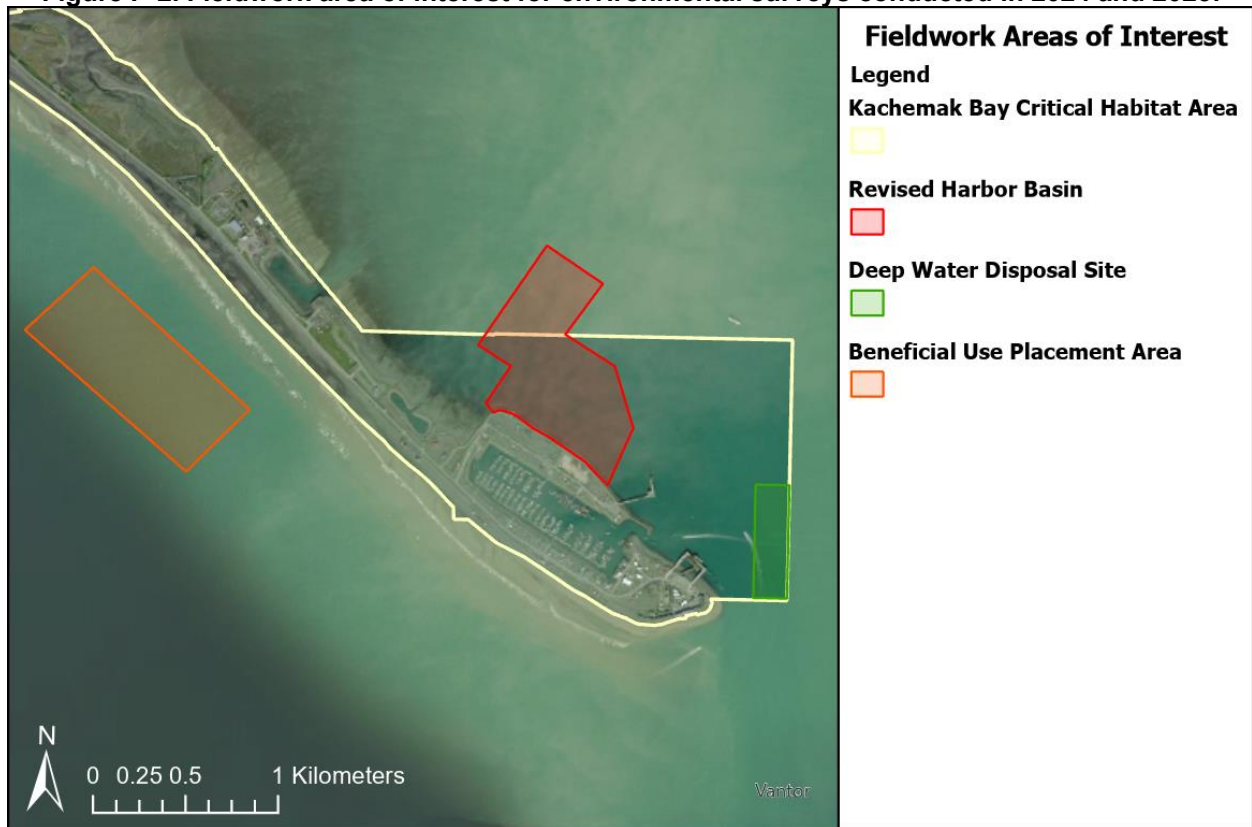
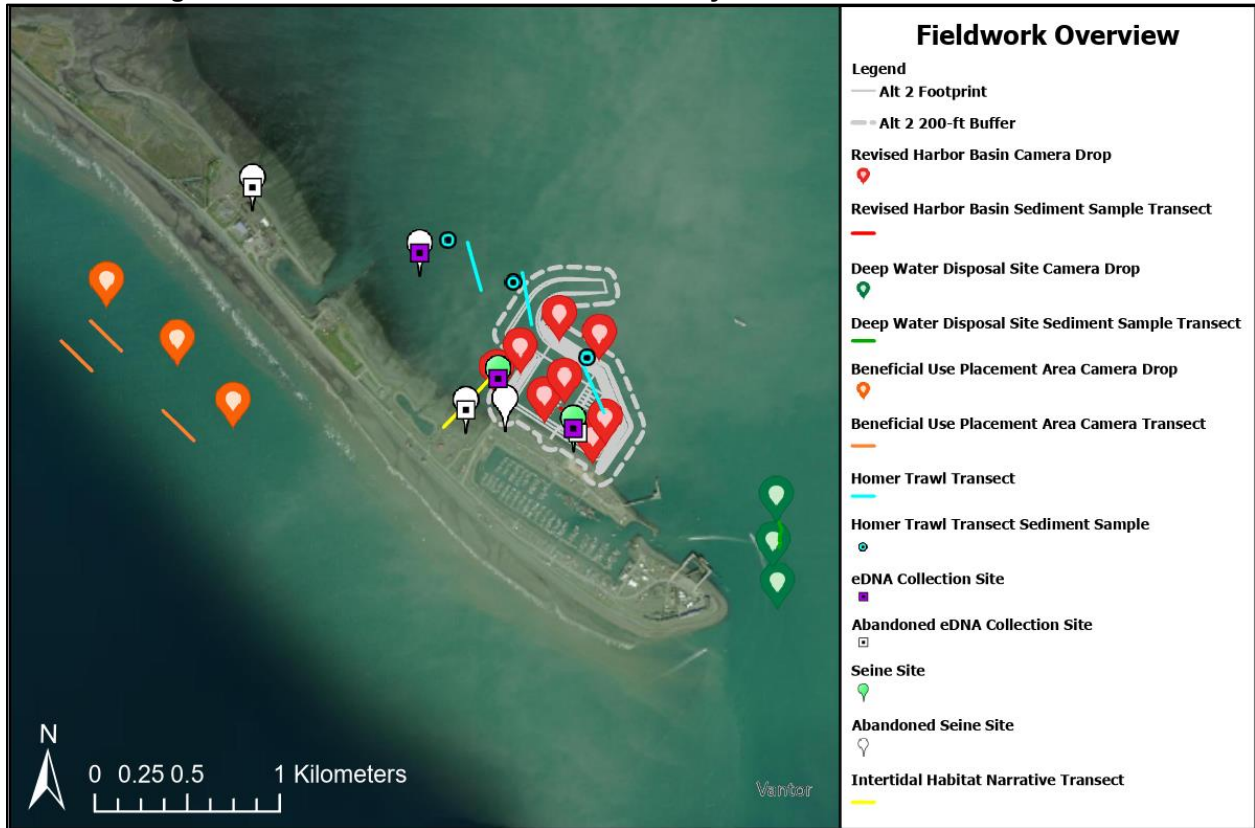


Figure P-3. Overview of environmental surveys conducted in 2024 and 2025.



The Fieldwork Overview figure has been updated to show the Alternative 2 footprint and its buffer for spatial context. It does not, however, include the survey sectors for the Steller's eider surveys mentioned in Section P.2.5.

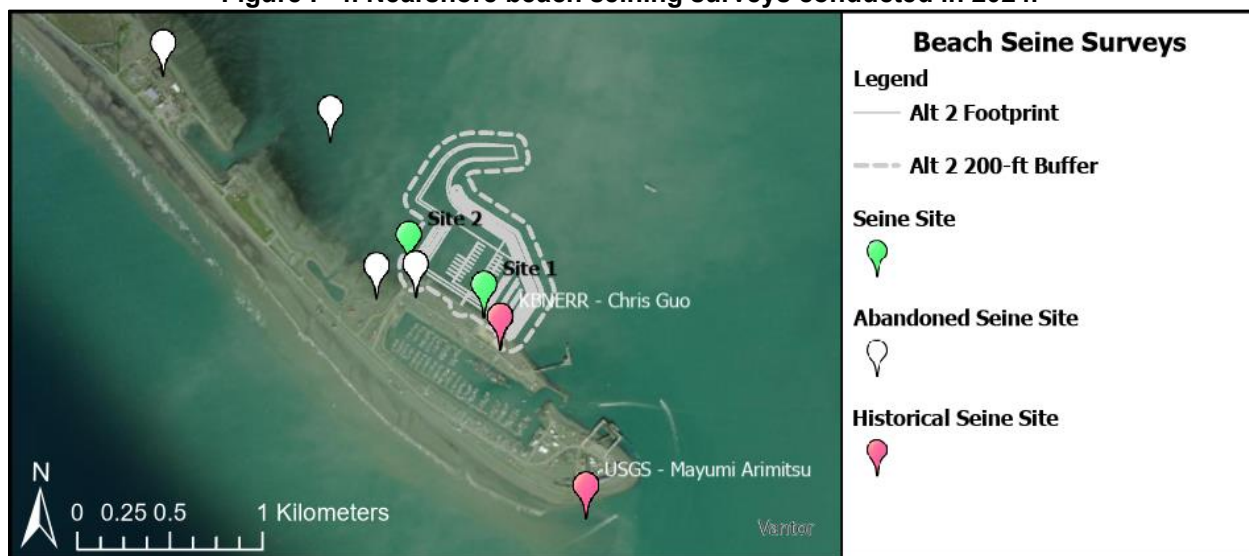
P.2.1 General Data Collection

A Global Positioning System (GPS) tablet was used to collect location data in the field, navigate between stations, take georeferenced photos, import and export geometry from ArcGIS Pro, and take notes during fieldwork for the feasibility study. Maps and charts of the study area were downloaded prior to the start fieldwork efforts in order to project location data in the appropriate spatial reference.

P.2.2 Nearshore Beach Seining Surveys

To assess the nearshore fish and invertebrate community near the Homer Harbor, beach seining was conducted from April 2024 to September 2024 (Figure P-4). Seine sites were resampled on a monthly basis. All beach seining activities were conducted under Alaska Department of Fish and Game (ADF&G) Aquatic Resource Permit (ARP) No. CF-24-005 and ARP No. CF-25-029. The Nearshore Fish Study Plans, ARPs, and Collection Reports for this study are located in Attachment 1. USACE will coordinate with the National Marine Fisheries Service (NMFS) to upload data into the *Nearshore Fish Atlas of Alaska*, to make data publicly available.

Figure P-4. Nearshore beach seining surveys conducted in 2024.



P.2.2.1 Seining Methodology

Beach seines were set during daylight hours within the project area at two sites (Figure P-4). Nearshore fish and invertebrates were sampled at low tide in waters less than 0.5 meters deep. Tidal variation is extreme in Kachemak Bay and Cook Inlet. In areas with a large tide differential, beach seines are typically set at low tide to both standardize the sampling protocol and to sample the richest habitat. Seine hauls were made at two sites for six sampling events, for a total of 12 sets (Table P-1).

Table P-1. Nearshore beach seining site and set information.

Location			Date						# of Sets
Site	Latitude (°N)	Longitude (°W)	9-Apr-24	8-May-24	6-Jun-24	22-Jul-22	20-Aug-24	19-Sep-24	
1	59.6099	-151.4294	X	X	X	X	X	X	6
2	59.6097	-151.4332	X	X	X	X	X	X	6
Number of Sets			2	2	2	2	2	2	12

The seine length was 37 meters long with variable mesh, tapering from 5 meters deep at the center to 1 meter deep at the ends. The two end panels were each 10 meters long with 32-millimeter stretch mesh. The two intermediate panels were each 4 meters long with 6-millimeter square mesh. The bunt was 9 meters long with 3.2-millimeter square mesh. The seine was equipped with a leadline and a floatline so that the bottom edge of the net would maintain contact with the bottom substrate and the top would float on the water surface. Two braided nylon lines, approximately 25–30 meters long, were attached to the seine—one per end. The seine was set as a round haul from the bow of a small jet-powered landing craft boat due to shallow water conditions. One line was held on the beach while the net was paid out from the boat in a semi-circle to a second position on the beach, about 18 meters from the starting point. The net was brought onto shore by pulling on both lines concurrently from shore, trapping fish and other organisms within the net. The captured fish and other organisms were quickly transferred to aerated buckets of brackish site water for identification and measurement.

Beach seining was attempted further north of the project footprint and during high tide at the start of the fieldwork season in 2024. The sites further north and along the high tide shoreline were abandoned due to the presence of boulders and boat operation constraints. The seine net would catch the boulders and prevent a smooth retrieval that increased the potential for catch loss. The area further north and near the high tide shoreline also presented a more gradual slope. Due to safety concerns with the gradual slope, potential for larger rock, and relatively fast changing tide at these initial sites, USACE adjusted site locations for the rest of the nearshore beach seine surveys.

Beach seining was not conducted in 2025 due to the timing of the low tides. The monthly low tides that were required for beach seining occurred at night (e.g., 2:00 a.m.), which was not feasible from a logistical perspective (i.e., working in the dark and processing fish at night without adequate lighting), or from a safety perspective (working in the dark, at night, from a small vessel with no deck lights, in an area that is foul with boulders and rocks).

P.2.2.2 Seining Catch

Catch was sorted and counted, and individuals were identified to the lowest taxon. Data collected included the number of species caught, the average total length to the nearest millimeter of 10 individuals within each age cohort, and any incidental notes. Fish life stages (i.e., young-of-the-year, juvenile, and adult) were assigned in the field based on phenotypic characteristics using Johnson et al. (2015) as a key.

A total of 321 individuals were caught across all sites and dates, representing at least 29 taxa (Table P-2 and Table P-3). Life-stage cohorts were combined to represent a single catch metric in these tables, and the sampling sites correspond with Figure P-4. Total catch of fishes and invertebrates captured in Kachemak Bay near Homer Harbor by site is depicted in Table P-2. Total catch and catch-per-unit-effort (CPUE; unit = set) of fishes and invertebrates captured by trip date is depicted in Table P-3. Variation in catch was observed by site and by sampling date, though species composition was relatively consistent between both sites. The greatest diversity of species occurred at Site 2, with 27 taxa represented in total compared to the 19 taxa that were caught at Site 1 (Table P-2). The greatest number of organisms were caught in August (116 individuals) followed by September (104 individuals; Table P-3). There were only four individuals caught in April, which was the least number of individuals caught across all sampling dates (Table P-3). See Table P-1 for beach seine sit and set information.

Table P-2. Total catch by site for nearshore beach seining.

Common Name	Scientific Name	Site 1	Site 2
Arctic Shanny	<i>Stichaeus punctatus</i>	-	1
Buffalo Sculpin	<i>Enophrys bison</i>	-	2
Capelin	<i>Mallotus villosus</i>		1
Chinook Salmon	<i>Oncorhynchus tshawytscha</i>	-	1
Crescent Gunnel	<i>Pholis laeta</i>	9	8
Graceful Decorator Crab	<i>Oregonia gracilis</i>	9	1
Great Sculpin	<i>Myoxocephalus polyacanthocephalus</i>	12	10
Helmet Crab	<i>Telmessus cheiragonus</i>	5	9
Kelp Greenling	<i>Hexagrammos decagrammus</i>	10	17
Masked Greenling	<i>Hexagrammos yoctograms</i>	28	29
Pacific Halibut	<i>Hippoglossus stenolepis</i>	1	4
Pacific Staghorn Sculpin	<i>Leptocottus armatus</i>	1	1
Padded Sculpin	<i>Artedius fenestralis</i>	2	
Ribbon Snailfish	<i>Liparis cyclopus</i>	1	1
Rock Greenling	<i>Hexagrammos lagocephalus</i>	8	9
Rock Sole	<i>Lepidopsetta bilineata</i>	2	10
Saffron Cod	<i>Eleginus gracilis</i>	2	3
Sharpnose sculpin	<i>Clinocottus acuticeps</i>	1	
Silverspotted Sculpin	<i>Blepsias cirrhosus</i>	8	8
Snake Prickleback	<i>Lumpenus sagitta</i>	-	33
Sturgeon Poacher	<i>Podothecus accipenserinus</i>	-	1
Surf Smelt	<i>Hypomesus pretiosus</i>	-	4
Three-spine Stickleback	<i>Gasterosteus aculeatus</i>	-	1
Tube-nose Poacher	<i>Pallasina barbata</i>	-	1
Unidentified Flatfish	-	-	12
Unidentified Sculpin	-	1	13
Unidentified Shrimp	-	31	3
Unidentified Snailfish	-	1	2
Whitespotted Greenling	<i>Hexagrammos stelleri</i>	1	3
Total Catch By Site		133	188

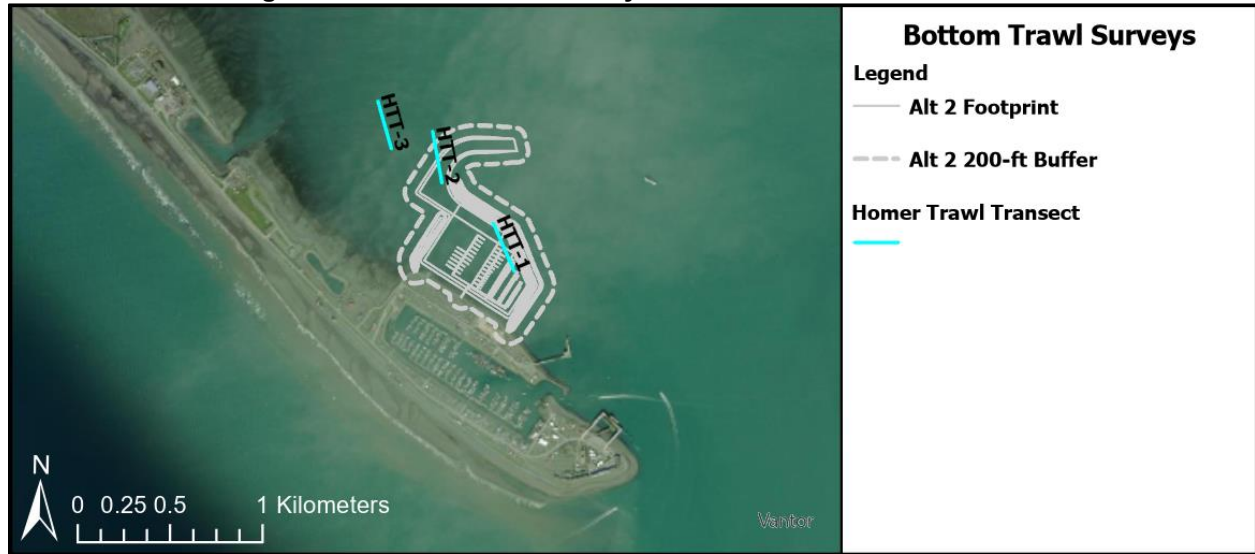
Table P-3. Total catch by date for nearshore beach seining.

Common Name	Scientific Name	9-Apr-24		8-May-24		6-Jun-24		22-Jul-24		20-Aug-24		19-Sep-24	
		Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
Arctic Shanny	<i>Stichaeus punctatus</i>	-	-	-	-	-	-	1	0.5	-	-	-	-
Buffalo Sculpin	<i>Enophrys bison</i>	-	-	-	-	-	-	-	-	2	1	-	-
Capelin	<i>Mallotus villosus</i>	1	0.5	-	-	-	-	-	-	-	-	-	-
Chinook Salmon	<i>Oncorhynchus tshawytscha</i>	-	-	-	-	1	0.5	-	-	-	-	-	-
Crescent Gunnel	<i>Pholis laeta</i>	-	-	1	0.5	1	0.5	-	-	8	4	7	3.5
Graceful Decorator Crab	<i>Oregonia gracilis</i>	-	-	6	3	1	0.5	-	-	1	0.5	2	1
Great Sculpin	<i>Myoxocephalus polyacanthocephalus</i>	1	0.5	-	-	1	0.5	-	-	-	-	20	10
Helmet Crab	<i>Telmessus cheiragonus</i>	-	-	1	0.5	5	2.5	2	1	2	0	4	2
Kelp Greenling	<i>Hexagrammos decagrammus</i>	-	-	1	0.5	6	3	2	1	14	7	4	2
Masked Greenling	<i>Hexagrammos octogrammus</i>	-	-	-	-	-	-	32	16	19	9.5	6	3
Pacific Halibut	<i>Hippoglossus stenolepis</i>	-	-	-	-	-	-	2	1	-	-	3	1.5
Pacific Staghorn Sculpin	<i>Leptocottus armatus</i>	1	0.5	-	-	-	-	-	-	-	-	1	0.5
Padded Sculpin	<i>Artedius fenestralis</i>	-	-	-	-	-	-	-	-	2	-	-	-
Ribbon Snailfish	<i>Liparis cyclopus</i>	-	-	-	-	-	-	-	-	-	-	2	1
Rock Greenling	<i>Hexagrammos lagocephalus</i>	-	-	1	0.5	8	4	4	2	1	0.5	3	1.5
Rock Sole	<i>Lepidopsetta bilineata</i>	-	-	2	1	-	-	5	2.5	3	1.5	2	1
Saffron Cod	<i>Eleginus gracilis</i>	-	-	-	-	-	-	2	1	3	1.5	-	-
Sharpnose sculpin	<i>Clinocottus acuticeps</i>	1	0.5	-	-	-	-	-	-	-	-	-	-
Silverspotted Sculpin	<i>Blepsias cirrhosus</i>	-	-	-	-	-	-	-	-	6	3	10	5
Snake Prickleback	<i>Lumpenus sagitta</i>	-	-	-	-	-	-	-	-	33	16.5	-	-
Sturgeon Poacher	<i>Podothecus accipenserinus</i>	-	-	-	-	-	-	1	0.5	-	-	-	-
Surf Smelt	<i>Hypomesus pretiosus</i>	-	-	-	-	-	-	-	-	-	-	4	2
Three-spine Stickleback	<i>Gasterosteus aculeatus</i>	-	-	-	-	-	-	-	-	1	0.5	-	-
Tubenose Poacher	<i>Pallasina barbata</i>	-	-	-	-	-	-	-	-	-	-	1	0.5
Unidentified Flatfish	-	-	-	-	-	-	-	-	-	12	6	-	-
Unidentified Sculpin	-	-	-	-	-	1	0.5	1	0.5	5	2.5	7	3.5
Unidentified Shrimp	-	-	-	-	-	2	1	2	1	2	1	28	14
Unidentified Snailfish	-	-	-	-	-	-	-	1	0.5	2	1	-	-
Whitespotted Greenling	<i>Hexagrammos stelleri</i>	-	-	2	1	1	0.5	1	0.5	-	-	-	-
Total Catch by Date		4	-	14	-	27	-	56	-	116	-	104	-

P.2.3 Bottom Trawling Surveys

To assess the fish community occupying areas of deep water habitat near the Homer Harbor, bottom trawling was conducted from April 2024 to September 2024, and January 2025 to March 2025 (Figure P-5). Bottom trawl transects were resampled on a monthly basis. All bottom trawl activities were conducted under ADF&G ARP No. CF-24-005 and ARP No. CF-25-029 (Attachment 1).

Figure P-5. Bottom trawl surveys conducted in 2024 and 2025.



P.2.3.1 Trawling Methodology

Bottom trawling occurred during daylight hours along three transects (Figure P-5) for six sampling events in 2024 and three sampling events in 2025 (Table P-4), for a total of 27 hauls. The trawl net was 5.2 meters long, which included a 1.7-meter-long cod end of 3.2-millimeter stretch mesh protected by an outer skirt of 29-millimeter stretch mesh. The mouth of the net was 2.6 meters wide, 1.2 meters deep, and connected to two weighted otter doors (33 centimeters by 61 centimeters) on each end. The doors were attached to a 6.3-meter-long bridle of 1.3-centimeter braided line, which was then attached to the City of Homer Harbormaster’s tugboat with a 1.6-centimeter polypropylene tow line. Minimum scope ratio of the tow line was kept to at least 3 to 4:1. Once on the bottom, the trawl was towed for 5 minutes. Overall, the trawl was fished at speeds ranging from 2 to 3 knots over the seafloor, resulting in an average transect distance of 0.25 km. Tow direction was determined by the tugboat operator based on tide, currents, wind, and sea state. After tows for 5 minutes, the net was hauled back onto the stern of the tugboat by hand. Fish and invertebrates caught in the net were removed and immediately measured before being returned to site waters.

Table P-4. Bottom trawl transect and haul information.

Location			Date									# of Hauls	
Site	Latitude (°N)	Longitude (°W)	2024						2025				
			9-Apr	8-May	6-Jun	22-Jul	20-Aug	19-Sep	15-Jan	12-Feb	26-Mar		
1	59.6110	-151.4211	X	X	X	X	X	X	X	X	X	X	9
2	59.6152	-151.4276	X	X	X	X	X	X	X	X	X	X	9
3	59.6167	-151.4327	X	X	X	X	X	X	X	X	X	X	9
Number of Sets			3	3	3	3	3	3	3	3	3	3	27

P.2.3.2 Trawling Catch

Similar to beach seining, trawl catch was sorted and counted, and individuals were identified to the lowest taxon. Data collected included the number of species caught, the average total length to the nearest millimeter of 10 individuals within each age cohort, and any incidental notes. Fish life stages (i.e., young-of-the-year, juvenile, and adult) were assigned in the field based on phenotypic characteristics using Johnson et al. (2015) as a key.

A total of 213 individuals were caught across all transects and dates, representing at least 26 taxa (Table P-5 and Table P-6). Life-stage cohorts were combined to represent a single catch metric in these tables, and the bottom trawl sites correspond with Figure P-5. Total catch of fishes and invertebrates captured by transect via method of bottom trawling in Kachemak Bay near Homer Harbor is depicted in Table P-5. Total catch and CPUE of fishes and invertebrates captured by trip date is depicted in Table P-6. See Table P-4 for transect and haul information. Transect 2 had the greatest total number of individuals caught between the three transects, with 102 individuals. Transect 1 had the greatest diversity of taxa caught (19 taxa), comprised of 55 individuals (Table P-5). The summer sampling events in July, August, and September had the greatest numbers of catch across all sampling events, while March and April had the fewest number of individuals caught (Table P-5).

Table P-5. Total catch by transect bottom trawling.

Common Name	Scientific Name	Transect 1	Transect 2	Transect 3
Graceful Decorator Crab	<i>Oregonia gracilis</i>	3	10	5
Helmet Crab	<i>Telmessus cheiragonus</i>	1	1	1
Hermit Crab	<i>Paguroidea</i> sp.	-	2	-
Lyre Crab	<i>Hyas coarctatus</i>	1	1	1
Pacific Cod	<i>Gadus macrocephalus</i>	3	-	-
Pacific Halibut	<i>Hippoglossus stenolepis</i>	-	-	1
Pacific Herring	<i>Clupea pallasii</i>	1	-	-
Purple Sea Star	<i>Pisaster ochraceus</i>	3	1	1
Rock Greenling	<i>Hexagrammos lagocephalus</i>	-	1	-
Rock Sole	<i>Lepidopsetta bilineata</i>	4	6	3
Saffron Cod	<i>Eleginus gracilis</i>	1	2	3
Sea Pen	<i>Ptiloisarcus gurneyi</i>	21	4	-
Silverspotted Sculpin	<i>Blepsias cirrhosus</i>	1	-	1
Snake Prickleback	<i>Lumpenus sagitta</i>	4	1	-
Starry Flounder	<i>Platichthys stellatus</i>	1	-	-
Tanner Crab	<i>Chionoecetes bairdi</i>	1	-	1
Unidentified Anemone	-	1	-	-
Unidentified Arthropod	-	1	5	-
Unidentified Crab	-	-	11	1
Unidentified Flatfish	-	1	1	2
Unidentified Greenling	-	-	1	-
Unidentified Sculpin	-	2	-	-
Unidentified Sea Star	-	3	-	-
Unidentified Shrimp	-	-	54	34
Unidentified Snailfish	-	-	1	2
Yellowfin Sole	<i>Limanda aspera</i>	2	-	-
Total Catch by Transect		55	102	56

Table P-6. Total catch by trip date for bottom trawling.

Common Name	Scientific Name	10-Apr-24		8-May-24		6-Jun-24		22-Jul-24		20-Aug-24		19-Sep-24		15-Jan-25		12-Feb-25		26-Mar-25	
		Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	Catch	Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
Graceful Decorator Crab	<i>Oregonia gracilis</i>	-	-	-	-	9	1	-	-	-	-	9	1	-	-	-	-	-	-
Helmet Crab	<i>Telmessus cheiragonus</i>	-	-	1	0.11	1	0.11	2	0.22	-	-	-	-	-	-	-	-	-	-
Hermit Crab	<i>Paguroidea</i> sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.11	-	-
Lyre Crab	<i>Hyas coarctatus</i>	-	-	-	-	1	0.11	-	-	1	0.11	1	0.11	-	-	-	-	-	-
Pacific Cod	<i>Gadus macrocephalus</i>	-	-	-	-	-	-	1	0.11	-	-	-	-	2	0.22	-	-	-	-
Pacific Halibut	<i>Hippoglossus stenolepis</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.11	-	-
Pacific Herring	<i>Hippoglossus stenolepis</i>	-	-	-	-	-	-	-	-	1	0.11	-	-	-	-	-	-	-	-
Purple Sea Star	<i>Clupea pallasii</i>	-	-	-	-	3	0.33	-	-	-	-	1	0.11	-	-	1	0.11	-	-
Rock Greenling	<i>Hexagrammos lagocephalus</i>	-	-	-	-	-	-	-	-	1	0.11	-	-	-	-	-	-	-	-
Rock Sole	<i>Lepidopsetta bilineata</i>	-	-	1	0.11	4	0.44	2	0.22	2	0.22	-	-	2	0.22	1	0.11	1	0.11
Saffron Cod	<i>Eleginus gracilis</i>	-	-	-	-	-	-	1	0.11	5	0.56	-	-	-	-	-	-	-	-
Sea Pen	<i>Ptiloisarcus gurneyi</i>	-	-	-	-	-	-	-	-	-	-	5	0.56	-	-	19	2.11	1	0.11
Silverspotted Sculpin	<i>Blepsias cirrhosus</i>	-	-	-	-	-	-	1	0.11	1	0.11	-	-	-	-	-	-	-	-
Snake Prickleback	<i>Lumpenus sagitta</i>	-	-	-	-	-	-	-	-	4	0.44	1	0.11	-	-	-	-	-	-
Starry Flounder	<i>Platichthys stellatus</i>	-	-	-	-	-	-	-	-	1	0.11	-	-	-	-	-	-	-	-
Tanner Crab	<i>Chionoecetes bairdi</i>	-	-	-	-	-	-	-	-	-	-	2	0.22	-	-	-	-	-	-
Unidentified Anemone	-	-	-	-	-	-	-	-	-	-	-	1	0.11	-	-	-	-	-	-
Unidentified Arthropod	-	5	0.56	-	-	-	-	1	0.11	-	-	-	-	-	-	-	-	-	-
Unidentified Crab	-	1	0.11	5	0.56	-	-	-	-	6	0.67	-	-	-	-	-	-	-	-
Unidentified Flatfish	-	-	-	-	-	-	-	-	-	2	0.22	1	0.11	1	0.11	-	-	-	-
Unidentified Greenling	-	-	-	-	-	-	-	-	-	1	0.11	-	-	-	-	-	-	-	-
Unidentified Sculpin	-	-	-	-	-	-	-	-	-	-	-	-	-	2	0.22	-	-	1	0.11
Unidentified Sea Star	-	-	-	-	-	-	-	-	-	1	0.11	1	0.11	-	-	-	-	-	-
Unidentified Shrimp	-	2	0.22	3	0.33	3	0.33	26	2.89	-	-	52	5.78	2	0.22	-	-	-	-
Unidentified Snailfish	-	-	-	-	-	-	-	-	-	3	0.33	-	-	-	-	-	-	-	-
Yellowfin Sole	<i>Limanda aspera</i>	-	-	2	0.22	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Catch by Date		8	-	12	-	21	-	34	-	29	-	74	-	9	-	23	-	3	-

P.2.4 Environmental DNA Sample Collection and Analysis

An emerging method that improves detection of many aquatic species is environmental DNA (eDNA); which determines the presence of a species based on the collection, extraction, and amplification of DNA from the environment (Ficetola et al. 2008; Laramie et al. 2015). Sources of eDNA can include sloughed cells, feces, and bodily secretions. eDNA can be obtained from various environmental samples and reveals important information about present and past biodiversity within an ecosystem (Shu et al. 2020). For fish species, investigations into their distribution and ecology are often hindered by the challenge and complexity of working in these aquatic ecosystems (Goldberg et al. 2011). However, detection of eDNA within aquatic ecosystems is a reliable and cost-effective method for determining the distribution of various fish species (Jerde et al. 2011; Thomsen et al. 2011; Shu et al. 2020). USACE collected eDNA April through September 2024 and January through February 2025 to supplement data collected from nearshore beach seining and bottom trawling surveys (Figure P-6).

Figure P-6. Environmental DNA 2024 and 2025 sample collection sites.



P.2.4.1 Sample Methodology

For eDNA collection, 1-liter water samples were collected at eDNA collection sites (Figure P-6), two of which overlap with beach seine Site 1 and Site 2 (Figure P-4), i.e., the Deep Water Dock and Fish Lagoon eDNA collection sites, respectively. At each sampling location, three replicate samples were taken to detect any potential inconsistencies in filtering techniques or downstream metagenomic library preparation. Collected water samples were filtered through a sterilized glass Buchner funnel that contained a 47-millimeter diameter cellulose nitrate filter with a 0.45-micrometer pore size. A vacuum pump was used to filter samples following procedures outlined in Protocol #1 of Laramie et al. (2015). Cross-contamination was mitigated by disinfecting surfaces and instruments with 10% bleach solution and then rinsing with distilled water between processing replicates from different field sites. In addition to the three replicate

samples collected at each field site, a negative control containing only distilled water was filtered to ensure our methods were effective in mitigating cross-contamination.

The eDNA collection sites were collocated with USACE beach seine sites. Thus, when the beach seine sites were adjusted, the eDNA collections sites were adjusted as well.

P.2.4.2 Molecular Analysis

Samples were sent to the U.S. Army Engineer Research and Development Center’s Genetics Reconnaissance Team (Environmental Processes Branch, Environmental Laboratory) for DNA extraction, sequencing, and bioinformatic analysis (Table P-7).

Table P-7. Sample matrix for eDNA.

Tag Number	Replicate	Date	Location	Latitude (°N)	Longitude (°W)	Accession Number (MiFish-U)	Accession Number (AKOncCytB)
HOM-1	1	9-Apr-24	Deep Water Dock (Original)	59.6088	-151.4224	SAMN53858102	SAMN53858182
HOM-2	2	9-Apr-24	Deep Water Dock (Original)	59.6088	-151.4224	SAMN53858103	SAMN53858183
HOM-3	3	9-Apr-24	Deep Water Dock (Original)	59.6088	-151.4224	SAMN53858104	-
HOM-4	1	9-Apr-24	Fish Lagoon (Original)	59.6098	-151.4332	SAMN53858105	SAMN53858184
HOM-5	2	9-Apr-24	Fish Lagoon (Original)	59.6098	-151.4332	SAMN53858106	-
HOM-6	3	9-Apr-24	Fish Lagoon (Original)	59.6098	-151.4332	SAMN53858107	-
HOM-7	1	9-Apr-24	Barge Basin (Original)	59.6204	-151.4541	SAMN53858108	SAMN53858185
HOM-8	2	9-Apr-24	Barge Basin (Original)	59.6204	-151.4541	SAMN53858109	-
HOM-9	3	9-Apr-24	Barge Basin (Original)	59.6204	-151.4541	SAMN53858110	SAMN53858186
HOM-10	-	9-Apr-24	N/A: Method Blank	-	-	SAMN53858111	SAMN53858187
HOM-11	1	8-May-24	Deep Water Dock	59.6090	-151.4229	SAMN53858112	SAMN53858188
HOM-12	2	8-May-24	Deep Water Dock	59.6090	-151.4229	SAMN53858113	SAMN53858189
HOM-13	3	8-May-24	Deep Water Dock	59.6090	-151.4229	SAMN53858114	SAMN53858190
HOM-14	1	8-May-24	Fish Lagoon	59.6113	-151.4302	SAMN53858115	-
HOM-15	2	8-May-24	Fish Lagoon	59.6113	-151.4302	SAMN53858116	-
HOM-16	3	8-May-24	Fish Lagoon	59.6113	-151.4302	SAMN53858117	SAMN53858191
HOM-17	1	8-May-24	Barge Basin	59.6174	-151.4380	SAMN53858118	SAMN53858192
HOM-18	2	8-May-24	Barge Basin	59.6174	-151.4380	SAMN53858119	-
HOM-19	3	8-May-24	Barge Basin	59.6174	-151.4380	SAMN53858120	-
HOM-20		8-May-24	N/A: Method Blank	-	-	SAMN53858121	-
HOM-21	1	6-Jun-24	Barge Basin	59.6174	-151.4380	SAMN53858122	-
HOM-22	2	6-Jun-24	Barge Basin	59.6174	-151.4380	SAMN53858123	SAMN53858193
HOM-23	3	6-Jun-24	Barge Basin	59.6174	-151.4380	SAMN53858124	SAMN53858194
HOM-24	1	6-Jun-24	Fish Lagoon	59.6113	-151.4302	SAMN53858125	SAMN53858195
HOM-25	2	6-Jun-24	Fish Lagoon	59.6113	-151.4302	SAMN53858126	SAMN53858196
HOM-26	3	6-Jun-24	Fish Lagoon	59.6113	-151.4302	SAMN53858196	SAMN53858197
HOM-27	1	6-Jun-24	Deep Water Dock	59.6090	-151.4229	SAMN53858127	SAMN53858198
HOM-28	2	6-Jun-24	Deep Water Dock	59.6090	-151.4229	SAMN53858128	SAMN53858199

APPENDIX P: FIELDWORK SUMMARY
HOMER NAVIGATION IMPROVEMENTS

MAY 2026

Tag Number	Replicate	Date	Location	Latitude (°N)	Longitude (°W)	Accession Number (MiFish-U)	Accession Number (AKOncCytB)
HOM-29	3	6-Jun-24	Deep Water Dock	59.6090	-151.4229	SAMN53858129	-
HOM-30	-	6-Jun-24	N/A: Method Blank	-	-	SAMN53858131	-
HOM-31	1	22-Jul-24	Deep Water Dock	59.6090	-151.4229	SAMN53858132	SAMN53858200
HOM-32	2	22-Jul-24	Deep Water Dock	59.6090	-151.4229	SAMN53858133	SAMN53858201
HOM-33	3	22-Jul-24	Deep Water Dock	59.6090	-151.4229	SAMN53858134	-
HOM-34	1	22-Jul-24	Fish Lagoon	59.6113	-151.4302	SAMN53858135	SAMN53858202
HOM-35	2	22-Jul-24	Fish Lagoon	59.6113	-151.4302	SAMN53858136	SAMN53858203
HOM-36	3	22-Jul-24	Fish Lagoon	59.6113	-151.4302	SAMN53858137	SAMN53858204
HOM-37	1	22-Jul-24	Barge Basin	59.6174	-151.4380	SAMN53858138	SAMN53858205
HOM-38	2	22-Jul-24	Barge Basin	59.6174	-151.4380	SAMN53858139	SAMN53858206
HOM-39	3	22-Jul-24	Barge Basin	59.6174	-151.4380	SAMN53858140	SAMN53858207
HOM-40	-	22-Jul-24	N/A: Method Blank	-	-	SAMN53858141	-
HOM-41	1	20-Aug-24	Deep Water Dock	59.6090	-151.4229	SAMN53858142	-
HOM-42	2	20-Aug-24	Deep Water Dock	59.6090	-151.4229	SAMN53858143	SAMN53858208
HOM-43	3	20-Aug-24	Deep Water Dock	59.6090	-151.4229	SAMN53858144	SAMN53858209
HOM-44	1	20-Aug-24	Fish Lagoon	59.6113	-151.4302	SAMN53858145	SAMN53858210
HOM-45	2	20-Aug-24	Fish Lagoon	59.6113	-151.4302	SAMN53858146	SAMN53858211
HOM-46	3	20-Aug-24	Fish Lagoon	59.6113	-151.4302	SAMN53858147	SAMN53858212
HOM-47	1	20-Aug-24	Barge Basin	59.6174	-151.4380	SAMN53858148	-
HOM-48	2	20-Aug-24	Barge Basin	59.6174	-151.4380	SAMN53858149	SAMN53858213
HOM-49	3	20-Aug-24	Barge Basin	59.6174	-151.4380	SAMN53858150	SAMN53858214
HOM-50	-	20-Aug-24	N/A: Method Blank	-	-	SAMN53858151	SAMN53858215
HOM-51	1	19-Sep-24	Deep Water Dock	59.6090	-151.4229	SAMN53858152	SAMN53858216
HOM-52	2	19-Sep-24	Deep Water Dock	59.6090	-151.4229	SAMN53858153	SAMN53858217
HOM-53	3	19-Sep-24	Deep Water Dock	59.6090	-151.4229	SAMN53858154	-
HOM-54	1	19-Sep-24	Fish Lagoon	59.6113	-151.4302	SAMN53858155	SAMN53858218
HOM-55	2	19-Sep-24	Fish Lagoon	59.6113	-151.4302	SAMN53858156	SAMN53858219
HOM-56	3	19-Sep-24	Fish Lagoon	59.6113	-151.4302	SAMN53858157	SAMN53858220
HOM-57	1	19-Sep-24	Barge Basin	59.6174	-151.4380	SAMN53858158	-
HOM-58	2	19-Sep-24	Barge Basin	59.6174	-151.4380	SAMN53858159	-
HOM-59	3	19-Sep-24	Barge Basin	59.6174	-151.4380	SAMN53858160	SAMN53858221
HOM-60	-	19-Sep-24	N/A: Method Blank	-	-	SAMN53858161	-
HOM-61	1	16-Jan-25	Deep Water Dock	59.6090	-151.4229	SAMN53858162	-
HOM-62	2	16-Jan-25	Deep Water Dock	59.6090	-151.4229	SAMN53858163	-
HOM-63	3	16-Jan-25	Deep Water Dock	59.6090	-151.4229	SAMN53858164	-
HOM-64	1	16-Jan-25	Fish Lagoon	59.6113	-151.4302	SAMN53858165	-
HOM-65	2	16-Jan-25	Fish Lagoon	59.6113	-151.4302	SAMN53858166	-
HOM-66	3	16-Jan-25	Fish Lagoon	59.6113	-151.4302	SAMN53858167	SAMN53858222
HOM-67	1	16-Jan-25	Barge Basin	59.6174	-151.4380	SAMN53858168	SAMN53858223
HOM-68	2	16-Jan-25	Barge Basin	59.6174	-151.4380	SAMN53858169	-
HOM-69	3	16-Jan-25	Barge Basin	59.6174	-151.4380	SAMN53858170	SAMN53858224
HOM-70	-	16-Jan-25	N/A: Method Blank	-	-	SAMN53858171	SAMN53858225
HOM-71	1	13-Feb-25	Deep Water Dock	59.6090	-151.4229	SAMN53858172	-
HOM-72	2	13-Feb-25	Deep Water Dock	59.6090	-151.4229	SAMN53858173	-
HOM-73	3	13-Feb-25	Deep Water Dock	59.6090	-151.4229	SAMN53858174	SAMN53858226
HOM-74	1	13-Feb-25	Fishing Lagoon	59.6113	-151.4302	SAMN53858175	SAMN53858227
HOM-75	2	13-Feb-25	Fish Lagoon	59.6113	-151.4302	SAMN53858176	-
HOM-76	3	13-Feb-25	Fish Lagoon	59.6113	-151.4302	SAMN53858177	-

Tag Number	Replicate	Date	Location	Latitude (°N)	Longitude (°W)	Accession Number (MiFish-U)	Accession Number (AKOncCytB)
HOM-77	1	13-Feb-25	Barge Basin	59.6174	-151.4380	SAMN53858178	-
HOM-78	2	13-Feb-25	Barge Basin	59.6174	-151.4380	SAMN53858179	-
HOM-79	3	13-Feb-25	Barge Basin	59.6174	-151.4380	SAMN53858180	-
HOM-80	-	13-Feb-25	N/A: Method Blank	-	-	SAMN53858181	-

Samples HOM-1 through HOM-9 were collected during the first trip in April 2024 and are slightly offset from HOM samples collected after this first reconnaissance trip (thus the denotation with the term “Original” in Table P-7). Two metabarcoding primers were chosen, MiFish-U (Miya et al. 2015) and AKOncCytB (Menning et al. 2020). MiFish-U is a universal primer that targets the 12S-rRNA gene and possesses robust detection potential across numerous freshwater and marine fish taxa. However, MiFish-U exhibits low discriminatory power among salmonid species (Polanco et al. 2021; Miya et al. 2020). Thus, the AKOncCytB metabarcoding primer specifically designed for detection and discrimination of salmonid species in the cytochrome-B gene was used in conjunction with MiFish-U. The combined use of multiple primer pairs targeted for more than one gene marker (e.g., 12S-rRNA and cytochrome-B) is recommended to improve classification, reduce primer bias and false negatives, and better perform community-level analyses (Xiong et al. 2022). For eDNA samples in Table P-7, lack of Sequence Read Archive (SRA) accession numbers for MiFish-U and AKOncCytB primers indicates a lack of eDNA (species DNA is not present in the sample) or poor amplification of eDNA.

P.2.4.3 eDNA Results

The eDNA original sequence data has been deposited on the National Center for Biotechnology Information (NCBI) SRA, a public repository for sequence data. All reads are available under the standalone NCBI BioProject PRJNA1378815.

Table P-8, Table P-9, and Table P-10 summarize the presence of species detected by fish, mammal, and bird, respectively. While the primary analysis focused on fish species, mammal and bird DNA were also incidentally detected. It is important to note that while eDNA detections confirm a species' presence, they do not rule out the presence of other species, nor do they necessarily indicate abundance. However, when used in conjunction with data from other survey methods, such as beach seines and bottom trawls, this information is valuable for understanding the species in an area and the timing of their occurrence. Furthermore, eDNA allows for the detection of elusive species that are less likely to be captured by traditional survey techniques.

Scientific Name	Species	SITE 1: Deep Water Dock							SITE 2: Fishing Lagoon							SITE 3: Barge Basin							Note		
<i>Pholis laeta</i>	Crescent Gunnel				X	X				X			X						X	X	X				
<i>Pholis ornata</i>	Saddleback Gunnel					X													X						
<i>Pholis</i> sp.	Unidentified Gunnel Species					X				X			X						X						
<i>Platichthys stellatus</i>	Starry Flounder																		X						
<i>Pleuronectes quadrituberculatus</i>	Alaska Plaice	X																							
Pleuronectidae Family	Righteye Flounder Family	X	X		X	X	X	X		X	X	X	X	X	X			X	X						
<i>Podothecus accipenserinus</i>	Sturgeon Poacher											X													
<i>Reinhardtius hippoglossoides</i>	Greenland Halibut																		X						
<i>Ronquilus jordani</i>	Northern Ronquil				X																				
<i>Salvelinus malma</i>	Dolly Varden																		X						
<i>Salvelinus</i> sp.	Unidentified Char Species																						X		
Stichaeidae Family	Prickleback Family Species	X																							
<i>Trichodon trichodon</i>	Pacific Sandfish					X	X												X						
		9-Apr-24	8-May-24	6-Jun-24	22-Jul-24	20-Aug-24	19-Sep-24	16-Jan-25	13-Feb-25	9-Apr-24	8-May-24	6-Jun-24	22-Jul-24	20-Aug-24	19-Sep-24	16-Jan-25	13-Feb-25	9-Apr-24	8-May-24	6-Jun-24	22-Jul-24	20-Aug-24	19-Sep-24	16-Jan-25	13-Feb-25

Table P-9. Incidental mammal detection results from eDNA analysis.

Scientific Name	Species	SITE 1: Deep Water Dock							SITE 2: Fishing Lagoon							SITE 3: Barge Basin							Note		
<i>Enhydra lutris</i>	Northern Sea Otter	X		X	X	X	X		X	X	X	X	X	X				X			X	X	X		
<i>Odocoileus hemionus</i>	Mule Deer																		X						Sitka black-tailed deer (<i>Odocoileus hemionus sitkensis</i>) is a subspecies of mule deer native to Alaska.
<i>Phoca vitulina</i>	Harbor Seal		X		X									X				X	X						
		9-Apr-24	8-May-24	6-Jun-24	22-Jul-24	20-Aug-24	19-Sep-24	16-Jan-25	13-Feb-25	9-Apr-24	8-May-24	6-Jun-24	22-Jul-24	20-Aug-24	19-Sep-24	16-Jan-25	13-Feb-25	9-Apr-24	8-May-24	6-Jun-24	22-Jul-24	20-Aug-24	19-Sep-24	16-Jan-25	13-Feb-25

Table P-10. Incidental bird detection results from eDNA analysis.

Scientific Name	Species	SITE 1: Deep Water Dock							SITE 2: Fishing Lagoon							SITE 3: Barge Basin							Note			
<i>Anas</i> sp.	Unidentified Dabbling Duck Species								X								X							X		
<i>Aythya marila</i>	Greater Scaup																X									
<i>Brachyramphus marmoratus</i>	Marbled Murrelet																							X		
<i>Bucephala albeola</i>	Bufflehead								X																	
<i>Clangula hyemalis</i>	Long-tailed Duck																X									
<i>Haliaeetus leucocephalus</i>	Bald Eagle								X																	
<i>Larus hyperboreus/ L. smithsonianus</i>	Glaucous Gull/ American Herring Gull													X					X						Likely a detection of <i>Larus</i> sp.	
<i>Larus smithsonianus</i>	American Herring Gull									X				X					X				X			
<i>Larus</i> sp.	Unidentified Gull Species				X	X								X					X							
<i>Melanitta deglandi</i>	White-winged Scoter			X																						
<i>Melanitta perspicillata</i>	Surf Scoter			X							X								X							
<i>Rissa tridactyla</i>	Black-legged Kittiwake								X																	
		9-Apr-24	8-May-24	6-Jun-24	22-Jul-24	20-Aug-24	19-Sep-24	16-Jan-25	13-Feb-25	9-Apr-24	8-May-24	6-Jun-24	22-Jul-24	20-Aug-24	19-Sep-24	16-Jan-25	13-Feb-25	9-Apr-24	8-May-24	6-Jun-24	22-Jul-24	20-Aug-24	19-Sep-24	16-Jan-25	13-Feb-25	

The eDNA data provides a valuable snapshot of the marine biodiversity at these sites, revealing patterns of species distribution, seasonality, and highlighting the presence of key forage fish, salmon, and marine mammals. This eDNA analysis identified a diverse array of fish and several mammal species across three distinct sites designated for the study, Deep Water Dock, Fishing Lagoon, and Barge Basin, from April to September 2024 and January to February 2025.

Key summary findings from eDNA are as follows:

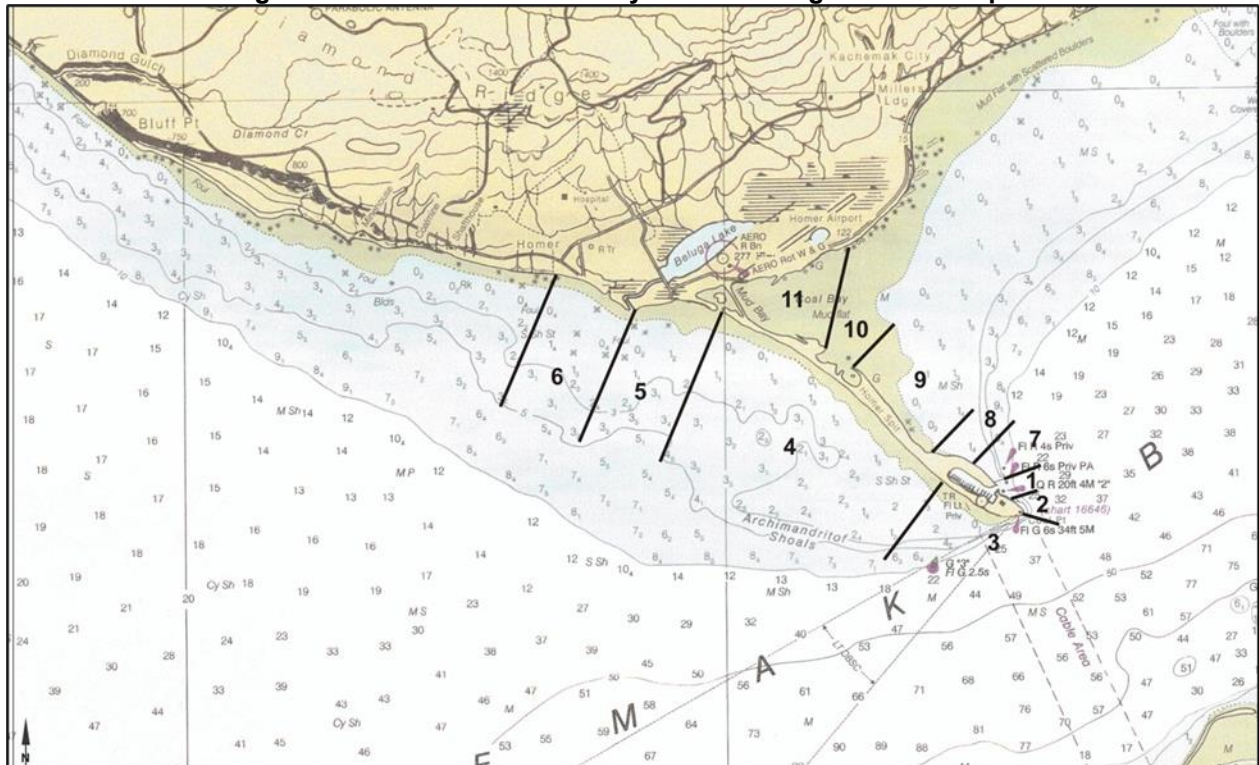
- **High Species Diversity:** A wide range of fin fishes were detected. Species from the herring (*Clupeidae*), cod (*Gadidae*), sculpin (*Cottidae*), and right-eye flounder (*Pleuronectidae*) families being particularly common. The Barge Basin (Site 3) appears to have the highest overall species richness.
- **Abundant Herring and Cod:** Pacific Herring (*Clupea pallasii*) and various cod species (*Gadus* spp.) were detected frequently across all three locations, suggesting they are common in the area.
- **Seasonal Salmon Presence:** Four species of Pacific Salmon, including Chinook (*Oncorhynchus tshawytscha*), Coho (*O. kisutch*), Pink (*O. gorbuscha*), and Sockeye (*O. nerka*), were detected, primarily during the summer and fall months (July–September), which is consistent with their seasonal migration and spawning patterns.
- **Marine Mammal Detections:** The incidental detection of Northern Sea Otters (*Enhydra lutris*) was consistent across most of the year, particularly at the Deep Water Dock and Fishing Lagoon. Harbor Seals (*Phoca vitulina*) were also detected, though less frequently.
- **Detection of Atlantic Species:** A notable pattern is the repeated detection of Atlantic species. These have been noted as likely detections of their closely related Pacific counterparts. This highlights a limitation in the specificity of the eDNA markers used for the analysis.
- **Anomalous Detection:** The detection of mule deer (*Odocoileus hemionus*) DNA at the Barge Basin has potential to be Sitka black-tailed deer (*Odocoileus hemionus sitkensis*), a subspecies of mule deer native to Alaska. Though Sitka black-tailed deer do not have an established population on the Kenai Peninsula, ADFG formally introduced this species to the area in October 2025. This detection could be due to human activities (i.e., processing a deer carcass near the harbor or while onboard a vessel). This practice is common in other areas of Alaska where this species is found (i.e., deboned deer carcasses are often disposed of in deeper waters near harbors in Southeast Alaska).

P.2.5 Steller's Eider Surveys

The Steller's eider (*Polysticta stelleri*) is an Arctic breeding sea duck that is the smallest and rarest of the four eider species. The Alaska-breeding population of Steller's eider was listed as threatened under the Endangered Species Act in 1997, due to concerns over apparent declines in numbers inferred from a reduction of nesting range in western Alaska (62 FR 31748).

The Steller's eider has historically wintered in a few ephemeral areas within Kachemak Bay and lower Cook Inlet. USACE conducted surveys in Kachemak Bay during the late winter and early spring of 2025 to determine the presence and relative location of Steller's eiders near the Homer Harbor and along the Homer Spit. The Homer Spit was broken up into 11 sectors for the surveys in 2025 (Figure P-7). These sectors match the sectors used in historical USACE Steller's eider surveys that occurred in the years 2003, 2004, and 2005. This created consistency between datasets, allowing for a general comparison in changes in Steller's eider abundance in Kachemak Bay across a span of 20 years. The boundaries of these survey sectors were originally selected given the presence of land-based features that were visible from offshore. This minimized potential overlap of species observed and mitigated for accidental recounting of individuals.

Figure P-7. Steller's eider survey sectors along the Homer Spit.



P.2.5.1 Survey Methodology

In 2025, Steller’s eider surveys were conducted both by land and by boat. Point count data was compiled for each survey date, with the number of species observed within each zone recorded along with the date and time. Survey dates include January 15–16, February 12–13, and March 25, in 2025. During each survey, species counts were recorded for each sector. Though the surveys focused on Steller’s eiders, the presence of other avian taxa (e.g., other sea ducks, grebes, and loons) were recorded. Surveys were conducted using a combination of 10x42 binoculars and a 20-60X spotting scope on a tripod. Species that could not be identified in the field were identified to the lowest taxon based on field markings presented in the *Birds of North America Field Guide* (National Geographic Society 1999).

P.2.5.2 Survey Results

Point counts for Steller’s eider for each sector from 2025, and data from historical USACE surveys in 2002–2004 for comparison, are reported in Table P-11. Given that each survey effort was conducted across one to three day(s), Steller’s eider point counts are combined here for simplicity. It is possible that some Steller’s eiders that were observed on the first survey day may have been the same individuals observed in the subsequent survey day(s) and therefore could have been a duplicate count. However, the focus of these surveys was to describe the general areas where this species is most commonly observed along the Homer Spit; not to quantify the patterns observed on the individual level.

Table P-11. Steller eider 2002/2003, 2003/2004, and 2024/2025 winter surveys.

Date	Map Sector										
	1	2	3	4	5	6	7	8	9	10	11
2002/2003 Winter Surveys											
2002, December 14-15	0	0	0	253	150	0	0	0	0	0	0
2003, January 15-16 ¹	0	0	0	596	90	1	0	0	0	0	0
2003, March 5-7	0	0	0	359	8	0	0	0	0	0	0
2004 Winter Surveys											
2004, January 15-17	0	0	0	16	0	0	0	0	0	0	0
2004, March 6-8	0	0	0	140	10	4	0	0	0	3	0
2025 Winter Surveys											
2025, January 15-16 ⁴	0	0	0	0	0	0	0	0	0	0	0
2025, February 12-13 ⁴	0	0	0	19	24	0	0	4	0	0	0
2025, March 25 ⁴	0	0	0	0	0	0	0	0	0	0	0
Sector Totals	0	0	0	1,383	282	5	0	4	0	3	0

Notes:

- ¹ Sector 5 and 6 not surveyed January 17, 2003, due to weather.
- ² Sectors 5 through 11 not surveyed January 16 and 17, 2004, due to ice.
- ³ Sectors 1 through 6 not surveyed March 7, 2004, due to rough seas.
- ⁴ Homer, Alaska, experienced a very mild winter in 2025 that has potential to have impacted the distribution and use of Kachemak Bay in 2025 than if conditions were harsher.

In general, Steller’s eiders were observed in the greatest numbers in Sector 4 and Sector 5. Sector 4 and Sector 5 are located in outer Kachemak Bay, which is outside of the project area near the Homer Harbor in Sector 7 and Sector 8. This trend is apparent

even given the 20-year gap in data. However, no Steller’s eiders were observed during the surveys in January 2025 or the single survey March of 2025. The winter of 2024–2025 was extremely mild across southcentral Alaska, with limited snow and ice cover. These environmental conditions may have altered the distribution of Steller’s eiders in Kachemak Bay and lower Cook Inlet.

P.2.6 Water Temperature and Salinity Data Collection

Conductivity, water temperature (°C) and salinity (Practical Salinity Scale [PSS]) were measured using a YSI Castaway CTD (a conductivity, temperature, and depth profiler) at the beach seine site near the Deep Water Dock during each monthly site visit from April through September 2024 after nearshore beach seining was complete. The beach seine site where CTD measurements were collected varied in depth, since sampling occurred immediately after the low tide once seine catch had been processed. Given the variation, the point measurement mode was used on the CTD. Point measurements are for surface waters and depth is not recorded in point measurement mode.

P.2.6.1 CTD Results

Measurements from the CTD profiler indicate that temperature varied between 7.1°C to 12.6°C during the summer months, while salinity varied between 20.5 PSS to 31.52 PSS (Table P-12). The measurement for the April 2024 site visit is not reported due to it being an invalid reading with no data collected. Two measurements were collected in September 2024 due to uncertainty with data collection on the CTD profiler.

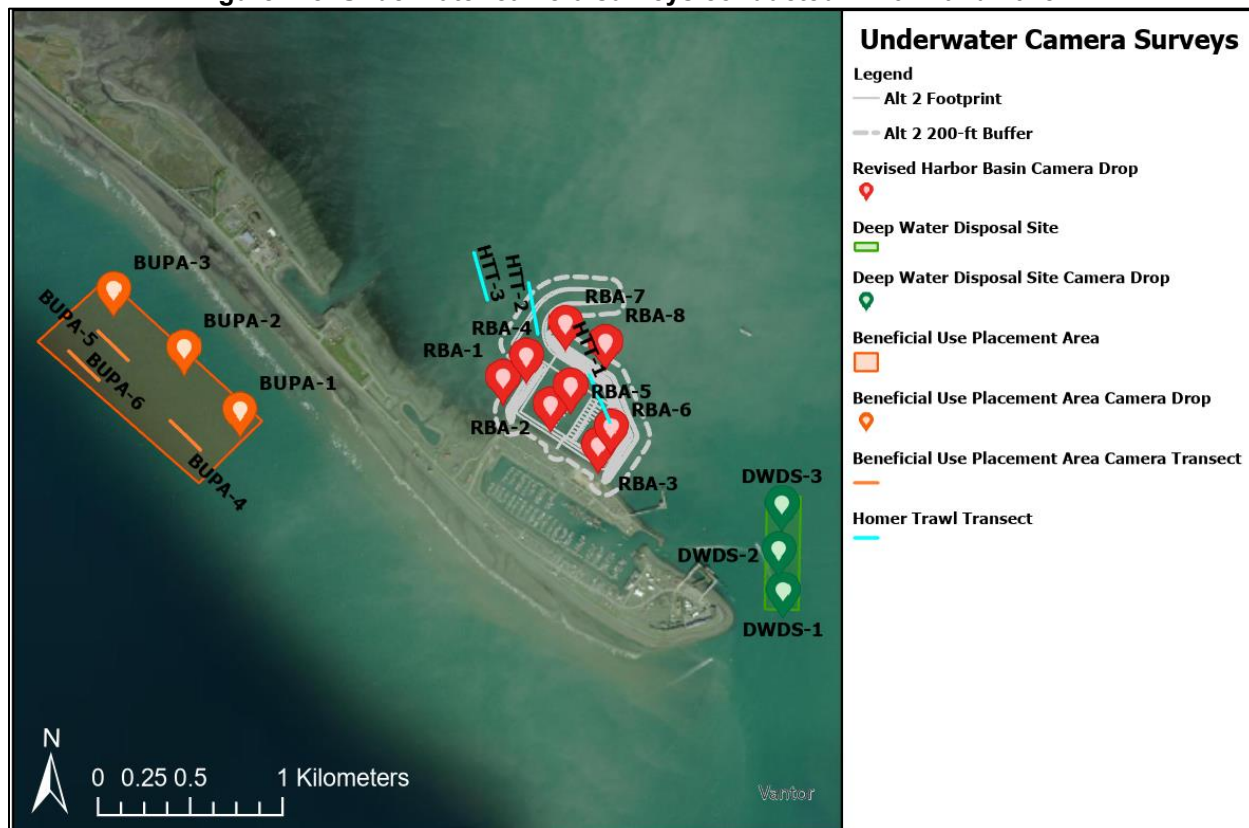
Table P-12. Monthly CTD point measurements from May through September 2024.

Date	Latitude (°N)	Longitude (°W)	Temperature (°C)	Conductivity (Microsiemens/Centimeter)	Salinity (PSS)
8-May-24	59.6113	-151.4305	7.1654	32254.1933	31.5283
6-Jun-24	59.6085	-151.4223	8.6921	31439.0097	29.3381
22-Jul-24	59.6089	-151.4227	12.6858	25226.3867	20.6430
20-Aug-24	59.6119	-151.4293	12.0080	24664.3320	20.5050
19-Sep-24	59.6113	-151.4283	10.8491	31482.0332	27.6757
	59.6112	-151.4285	10.8741	31192.0078	27.3754

P.2.7 Underwater Camera Surveys

To characterize the habitat in potential project areas, USACE conducted underwater surveys of the area in and around the project footprint and potential dredged material discharge sites newly under consideration for this feasibility study. Underwater video surveys were conducted concurrent bottom trawl efforts on June 6, 2024, and in the Proposed Project Footprint, Deep Water Disposal Site (DWDS), and Beneficial Use Placement Area (BUPA) on April 10, 2025.

Figure P-8. Underwater camera surveys conducted in 2024 and 2025.



P.2.7.1 Survey Methodology

Underwater camera surveys were completed using a variety of equipment and methods.

Compact Action Camera

The Homer Trawl Transect footage was recorded June 6, 2024, and provided preliminary data for characterizing the benthic habitat and environmental resources in the deeper water portions of the anticipated Proposed Project Footprint. Homer Trawl Transect underwater camera surveys were conducted by zip-tying a compact action camera encased in waterproof housing onto the center of headline of the bottom trawl netting. The captured footage entailed the full extent of each 5-minute bottom trawl transect.

Benthic Drop Camera

A *Group B Benthic GPH-1750* camera was deployed from the Homer Harbor’s tug on April 10, 2025, and lowered to the bottom of the water column to record benthic footage at designated survey points within the Proposed Project Footprint, DWDS, and BUPA. Videos were approximately 5-minutes in duration for each survey point. The array was deployed from the side of the vessel and held steady manually. The vessel was allowed to drift naturally.

USACE Alaska District developed a benthic camera array to capture a high-definition video of the benthic floor, to enhance the characterization of the habitat and environmental resources within project areas of interest. The array consists of an adjustable frame, flashlight, and camera. It is portable, flexible, and resilient. The flashlight and camera are enclosed in 3-inch aluminum housings and equipped with lithium-ion batteries. The camera records high-definition video on an internal 128 Gigabyte Secure Digital card. The camera and light are both rated to over 5,000-feet deep, can be synchronized to capture time-lapse video, and have sufficient battery life for long-term deployments. The flashlight contains two high output Cree light-emitting diodes providing 3,500 lumens. It includes an 18-mode programmable timer and allows the diodes to be disconnected if necessary to extend battery life.

The frame was constructed from galvanized and stainless steel and can be broken down for transport in about 5 minutes. The lengths of the upper and lower bridles are configured to maintain appropriate geometry for consistently capturing quality video. The camera and light are angled slightly towards each other and at a downward angle to illuminate the seafloor about 3 feet in front of the cannonball, which anchors the system on the bottom. A hardball buoy is tied into the mainline above the bridle.

Live Feed Shallow Water Drop Camera

This camera set-up was deployed from the Homer Harbor's tug on April 10, 2025. USACE intended to utilize a *SplashCam Delta Vision High-Definition* camera to record footage in the BUPA and Proposed Project Footprint but, there were battery issues that lead to only three transects in the BUPA being completed. Other planned transects were converted to drop camera survey points. The camera was deployed manually from the Homer Harbor's tug and lowered to the bottom of the water column. USACE adjusted the camera's depth based on the live-feed footage. Due to the sea state, it was difficult to maintain consistent and good quality visibility of the seafloor.

P.2.7.2 Survey Results

Species identification beyond the genus level was problematic due to inconsistent lighting, viewing angle, dimensional perspective, and other factors of camera footage acquired during underwater camera surveys. Timing is also a consideration that must be accounted for when using the footage to describe the habitat in the areas of interest. For example, April is not an ideal season for delineating the presence of eelgrass. The predominate species composition and habitat features (e.g., sediment) observed will be described by each area of interest in Table P-13.

Table P-13. Underwater camera survey observation results.

Area of Interest	Underwater Camera Observations			
	Water	Sediment	Vegetation	Animals
Homer Trawl Transect (HTT-1 to HTT-3) Figure P-9	The water was visually turbid.	Predominately consisted of material composed of sand and silt with shell hash and fragments throughout site.	Observed algae, seagrass (i.e., eelgrass), seaweed (e.g., sea lettuce), and kelp (e.g., sugar kelp). Vegetation density varied throughout site.	Anemones (e.g., plumose anemone), sea star species (e.g., purple sea star), sea pens, groundfish (e.g., sculpin and flatfish), and crabs (e.g., hermit and tanner).
Proposed Project Footprint (RBA-1 to RBA-8) Figure P-10	There was a green hue to the water likely due to microscopic algae and/or phytoplankton. Visual turbidity may have been masked by green hue.	Predominately consisted of sand and silt. Cobbles were observed within the sediment at RBA-2 and RBA-3. Shell hash and fragments observed.	Observed algae, seagrass (i.e., eelgrass), seaweed (e.g., sea lettuce), and kelp (e.g., sugar kelp). Vegetation density varied throughout site. A rock with coralline encrusted algae was observed at HTT-3.	Anemones (e.g., plumose anemone), sea stars (e.g., purple sea star), and sea pens.
Deep Water Disposal Site (DWDS-1 to DWDS-3) Figure P-11	The water was visually turbid.	Predominately consisted of sandy material throughout site. Shell hash was most evident in sediment at DWDS-1.	Established vegetation appeared absent, but seaweed debris/remnants were observed.	Anemones (e.g., plumose anemone) sea stars, crabs, and groundfish (e.g., starry flounder).
Beneficial Use Placement Area (BUPA-1 to BUPA-3) Figure P-12	There was a green hue to the water likely due to microscopic algae and/or phytoplankton. Visual turbidity may have been masked by green hue.	Predominately consisted of patches of and intermixed areas of sand and cobble with shell hash and fragments throughout site.	Observed algae and unidentified species of seaweed and kelp. The density of this vegetation varied throughout site.	Sea stars.

Note: The content included in this table is solely based on the footage captured during underwater camera surveys. Solely by itself, the observations should not be used as to assume (1) the potential density, abundance, or exclusion of a species at the subject site or (2) the general turbidity and hue of the water, which is subjected to other factors like tide and season.

Figure P-9. Homer Trawl Transect underwater camera screen captures from June 6, 2024.

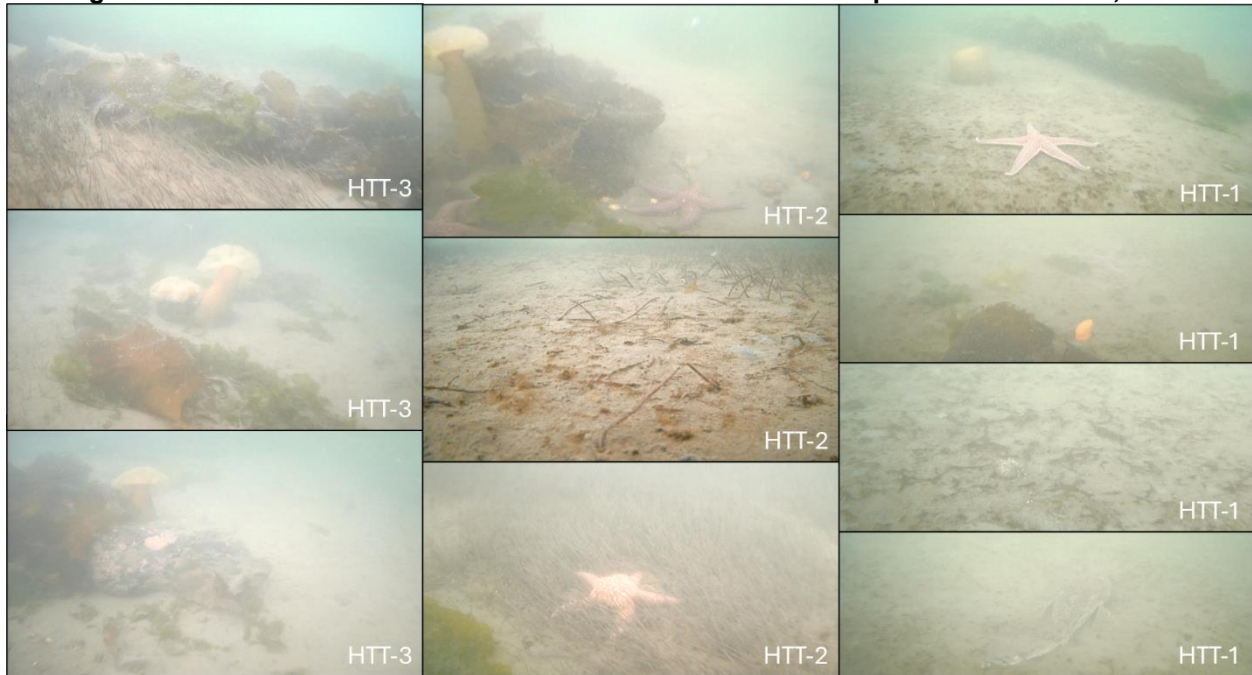


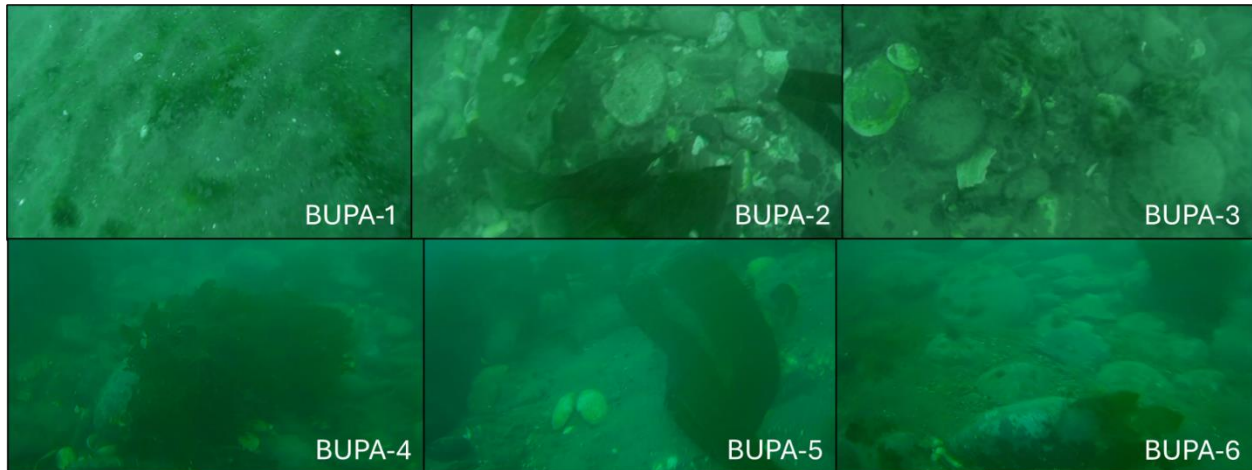
Figure P-10. Proposed Project Footprint underwater camera screen captures from April 10, 2025.



Figure P-11. Deep Water Disposal Site underwater camera screen captures from April 10, 2025.



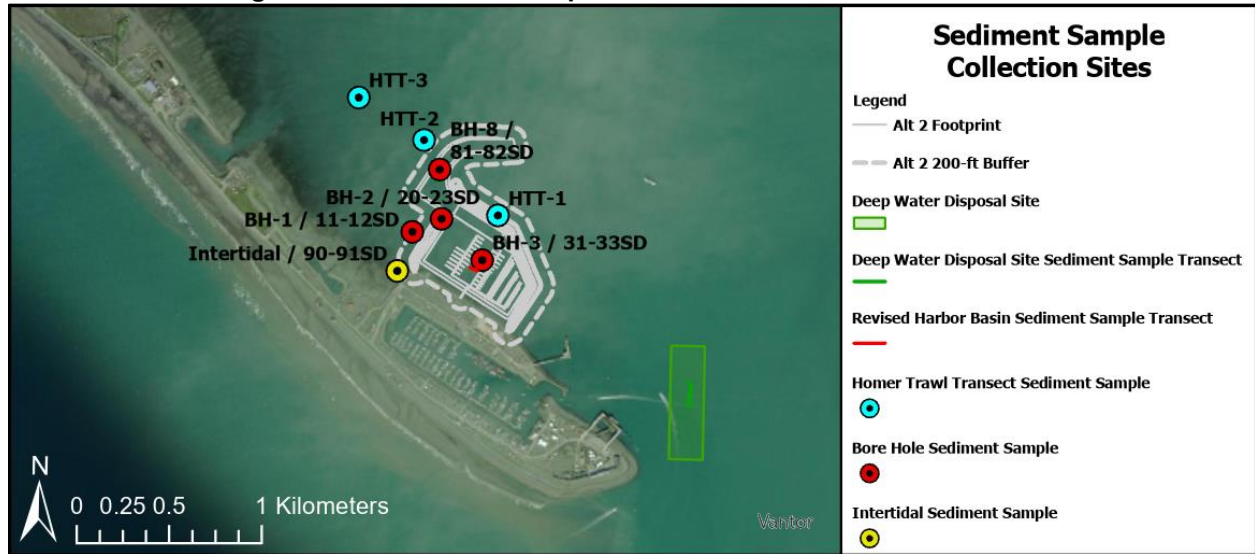
Figure P-12. Beneficial Use Placement Area underwater camera screen captures from April 10, 2025.



P.2.8 Sediment Sample Collection and Analysis

Sediment samples were collected to provide preliminary means to inform the type of surface material within the (1) Proposed Project Footprint on June 6, 2024, and April 10, 2025, and October 7-11, 2025, and (2) the DWDS on April 10, 2025 (Figure P-13). USACE Biologists predominately collected surface sediment samples. However, both surface and subsurface samples were collected during the geotechnical investigation for the study from October 7-11, 2025, to assess material characteristics to inform project design and proper management dredged material.

Figure P-13. Sediment sample collection sites in 2024 and 2025.



P.2.8.1 Sample Methodology

The Sampling and Analysis Plan and fieldnotes (Attachment 2) detail the collection and analysis methodology for samples from the geotechnical investigation for chemical analysis as summarized in Table P-14. Physical composition was not analyzed in the lab, as the data that would be available from the Geotechnical Data Report (S&W 2026) was deemed sufficient for preliminary characterization. For complete details on the geotechnical methodology and its results, refer to the Geotechnical Data Report. This section will now focus on the grab sample collection method and visual characterization of other samples collected during fieldwork.

Table P-14. Sediment samples collect during geotechnical investigations in October 2025.

Sampling Point	Mudline Elevation (Feet MLLW)	Sample ID 26HOM-CW__	Sample Interval (Feet below Mudline)	Sampled Interval (Feet MLLW)	Date (MM/DD/YY)	Time (24-hour)	Notes
BH-1	-7	11SD	0 – 2	-7 to -9	10/11/25	1028	
		12SD	15 - 17	-22 to -24	10/11/25	1050	
BH-2	-9	20SD	0 - 2	-9 to -11	10/8/25	2200	Field Duplicate of -21SD
		21SD	0 - 2	-9 to -11	10/8/25	2215	
		22SD	9 - 10	-18 to -19	10/9/25	0020	-
		23SD	15 - 17	-24 to -26	10/9/25	0040	-
BH-3	-10.5	31SD	0 - 2	-10.5 to -12.5	10/10/25	2013	
		32SD	5.5 - 6	-16 to -16.5	10/10/25	2106	
		33SD	9.5 - 10	-20 to -20.5	10/10/25	2115	-
BH_8	-10	81SD	0 - 2	-10 to -12	10/7/25	1515	
			17.8 - 19.8	-27.8 to -29.8	10/7/25	1615	
Intertidal (-151.431111, 59.609722)	~+0.3	90SD	0 – 0.5	-0.3 to -0.8	10/9/25	1130	Field Duplicate of -91SD
		91SD	0 – 0.5	-0.3 to -0.8	10/9/25	1140	

Sediment grab samples were collected with a stainless-steel barrel sampler. The barrel sampler was custom fabricated to perform surface sediment collection in very deep water. It is approximately 6 inches in diameter and 30 inches long with an inverted cone-shaped collar on the open end to help collect material as the sampler is dragged along the bottom. An adequately long section of crab pot line for the desired scope within the context of the depth was tied into the chain bridle. The barrel sampler was deployed from the Homer Harbor's tug and lowered to the seafloor at the sample locations. The barrel sampler was then towed in an arc until the operator determined that an adequate volume of material was collected, then the sampler was retrieved with tugboat winch. Once the sampler reached the surface, the excess water was decanted and the contents of the sampler was dumped into a plastic barrel for characterization.

The Proposed Project Footprint and DWDS sediment value, hue, and chroma was determined using the 2009 Year Revised version of the Munsell Soil Color Book (Munsell Color 2015):

- Hue: indicates the relation of the sediment's color to red, yellow, green, blue, and purple.
- Value: Indicates lightness of the sediment's color.
- Chroma: indicates the strength of the sediment's color.

All other characterization was judged by field observation.

P.2.8.2 Sample Results

The findings in the Geotechnical Data Report (S&W 2026) support the visual field characterizations previously conducted by USACE biologists (Table P-15; Figure P-14, and Figure P-15). The geotechnical analysis confirmed that the material observed on the surface is consistent with the sediment layer targeted for dredging. This layer, which encompasses the dredge prism, greatest depth design to -26 feet MLLW and -28 feet MLLW with a 2-foot overdepth. The layer consists primarily of fines (e.g., silt).

Table P-15. Sediment grab sample observed characteristics.

Area of Interest	Value, Chroma, and Hue	Texture	Other Notable Characteristics
Homer Trawl Transect (HTT-1 to HTT-3) Figure P-14	Did not compare sediment with Munsell Soil Color Book.	HTT-1: Silt HTT-2: Silty with sand HTT-3: Silty sand	HTT-1: Dark grey color. HTT-2: Dark grey color with trace of shell hash. HTT-3: Dark grey color with trace of shell hash.
Proposed Project Footprint Figure P-14	Hue: GLEY 1 Value: 2.5 Chroma: N	Silt with sand	Traces of shell hash and tube building worms throughout matrix.
Deep Water Disposal Site Figure P-15	Hue: 5Y Value: 2.5 Chroma: 2	Sandy silt	Trace organic material (cellulose) and black grain (potentially due to coal).

Source: (Munsell Color 2015)

Note: The content included in this table is solely based on visual observation during fieldwork to provide a preliminary understanding of the characteristics of the surface material within project areas of interest prior to the completion of geotechnical and chemical analyses.

Figure P-14. Proposed Project Footprint (April 10, 2025) and Homer Trawl Transect (June 6, 2024) sediment grab samples.

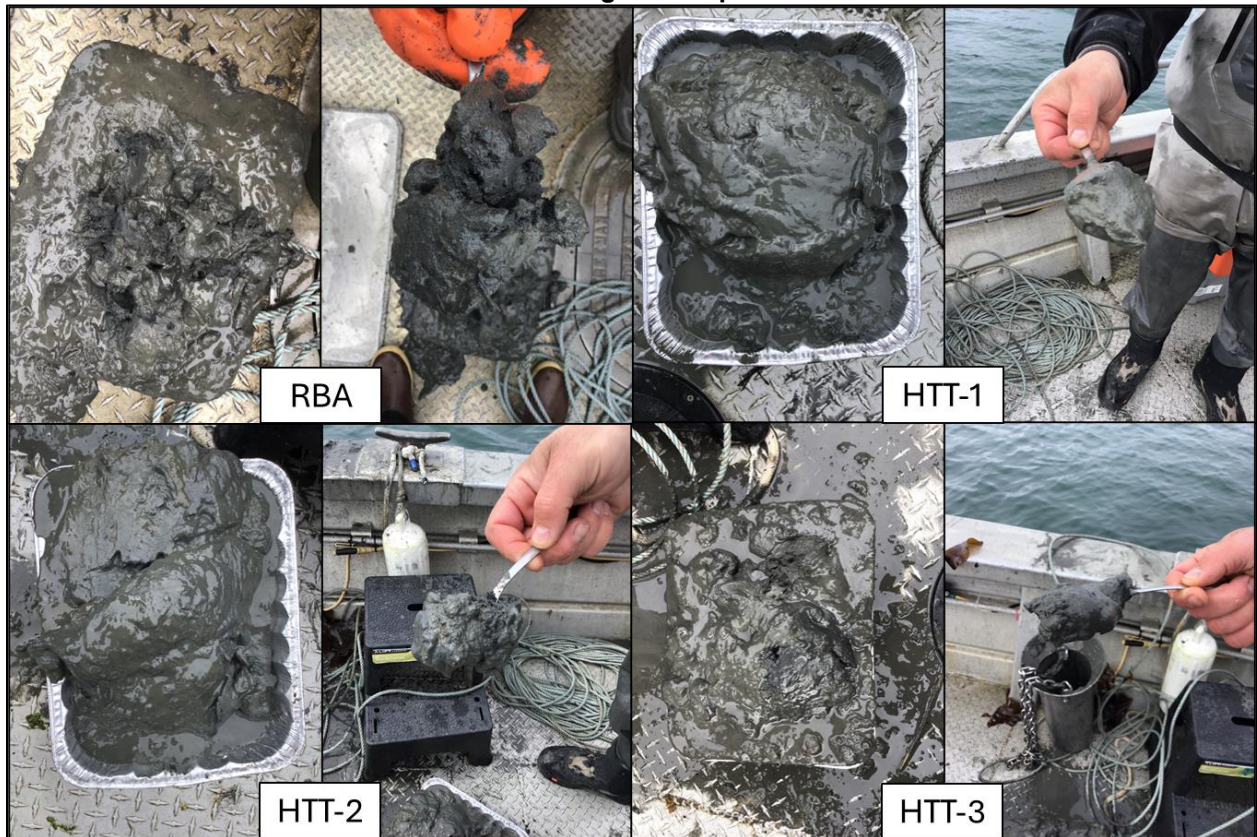
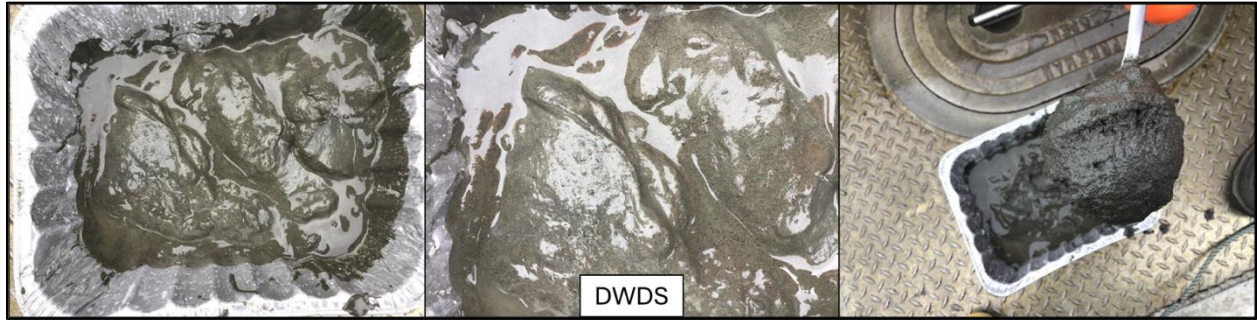


Figure P-15. Deep Water Disposal Site (April 10, 2025) sediment grab sample.



Based on the chemical data quality review (Attachment 2), the dredged material from Homer Harbor is suitable for unconfined aquatic placement. The analysis confirmed that no contaminants exceeded the Dredged Material Management Program marine screening levels. Although levels of naturally occurring arsenic and an isolated detection of naphthalene surpassed the more conservative Alaska Department of Environmental Conservation (ADEC) cleanup levels for informing potential upland placement of dredged material, the overall data quality was deemed acceptable.

P.2.9 Intertidal Narrative Transect

An intertidal narrative transect was conducted on May 9, 2024, to characterize the intertidal habitat based on visual observation. The transect was in the original potential project footprint but now lies northwest of the Proposed Project Footprint (Figure P-16).

Figure P-16. Transect for intertidal habitat narration recorded on May 9, 2024.



P.2.9.1 Survey Methodology

Surveyor measuring tape was laid from the high tide line out towards the waterline in 100-foot increments on May 9, 2024, starting at 9:02 AM and ending at 9:45 AM. Low tide was scheduled to occur at approximately 10:05 AM. A cellular device was used to capture visual and audio narration by a USACE biologist for each 100-foot increment,

while another USACE biologist recorded additional observations and notes and took georeferenced photos on a GPS tablet.

P.2.9.2 Survey Results

Table P-16 summarizes the narrated observations of USACE biologists, and Figure P-17 depicts the transect for the narration in relation to the Homer Spit. This information will support characterization of the intertidal zone in and around the Proposed Project Footprint.

Table P-16. Intertidal observation summary by 100-foot increment.

Transect Increment	Description of Habitat and Resources
High Tide Line– 100 Feet	Surface sediment consisted of large gravel and small cobble. There was some organic debris at the high tide line, and the sediment was dry to about 12 feet. Between the high tide line to about 26 feet there was no established vegetation observed. The steepest down slope occurs between high tide to 26 feet. After 26 feet, more sand exposed in surface sediment consisting of small and large and small cobble. After 40 feet the area flattened and stayed relatively flat with a minimal slope. Increment included scattered large rocks and sand patches. The first large rock encounter along the transect occurred at 62 feet. The first sand patch along the transect occurred at 73 feet.
100–200 Feet	Surface sediment consisted of large gravel and medium sized cobble on top of sand. Sand patches and scour pools were scattered throughout increment. Scour pools likely held invertebrates during low tide. This increment was a low energy beach due to minimal slope gradient. At about 125 feet, small periwinkles (<i>Littorina littorea</i>), sediment embedded small blue mussels (<i>Mytilus edulis</i>), and very small barnacles (<i>balanus glandula</i>) on rocks were observed.
200–300 Feet	Similar surface sediment and intertidal life observed. However, at 235 feet the density and size of blue mussels increased. A small scour pool encountered along the transect was observed with green algae and observed brown algae in a scour pool further away. Sand patches continue to be observed along transect as well. At 251 feet, seagrass (eelgrass [<i>Zostera marina</i>]) was observed in a scour pool with algae.
300–400 Feet	Surface sediment remained similar. Blue mussels continued to increase in density along transect. At 328 feet a slight relief area was encountered with brown algae and sea lettuce (<i>Ulva</i> sp.). Small, scattered patches of sea lettuce appeared to account for approximately 5% coverage in increment. At 380 feet an outflow area of slow flowing water was encountered. In the outflow area, there was a dense eelgrass bed with ribbon kelp (<i>Alaria marginata</i>) and brown algae. The higher areas were absent of seagrass and kelp but occupied by blue mussels.
400–500 Feet	Surface sediment remained similar. The eelgrass bed that begun at 380 feet ended at 468 feet. Blue mussels observed continue to increase in size and density further along the transect. This is presumed partly due to the area being less exposed during low tide. The observation of very small barnacles was noted again.
500–600 Feet	Surface sediment remained similar until approximately midway through the increment. At 533 feet, in addition to the sediment that had been occurring in prior increments, a silt component was observed for the first time along the transect. Silt was observed covering algae and blue mussels. Silt layer was more apparent starting at 585 feet. At 518 feet there was a small patch of green algae. Blue mussels were also observed less embedded and established more on top of sediment. A dense blue mussel patch extended to around 590 feet, beyond which the presence of blue muscles was absent.

Transect Increment	Description of Habitat and Resources
600–700 Feet	Surface sediment consists of large gravel and small cobble on a silty sediment layer. There were large rocks scattered throughout increment. Blue mussels continued to be absent. Sea lettuce patches and filamentous green algae (<i>Spirogyra</i> sp.) were observed. The first sea star observed along the transect was at 648 feet and continued to be observed in increment. Ribbon kelp and green, brown, and red algae were present. At 687 feet, larger ribbon kelp attached to rocks were observed. First encounter of rockweed (<i>Fucus distichus</i>) at 697 feet.
700–800 Feet	Continue to observe similar surface sediment and life as that observed in prior increment. At 742 feet, there were more areas of standing water (approximately 1–2 inches deep). The primary vegetation was ribbon kelp and sea stars were frequently sighted. At 783 feet, old snail egg casings were observed.
800–900 Feet	Surface sediment consisted of a silt layer with embedded large gravel and small to medium cobble with the occasional small rock. Water in increment was flowing slowly otop of sediment. Snail egg casing continued to be observed and. There were longer stretches of ribbon kelp and larger bladed kelp that began in this increment.
900–1,000 Feet ¹	Surface sediment was similar to prior increment but silt content was notably increasing as the distance from the high tide line increased. Scattered rocks and boulders were observed throughout area. The density of kelp was high and relatively uniform. Kelp consisted predominately of wider bladed kelp than prior increments. Some holes were sighted in increments that may have indicated otter digging and potential sea star predation. At 992 feet patchy eelgrass in low density and abundance was observed.
1,000–1,100 Feet ¹	Surface sediment remained similar to prior increment with increasing silt content and scattered rocks and boulders. Empty clamshells and snail egg casings were observed. At 1,029 feet, small polychaete patches began to occur.
1,100–1,200 Feet ¹	At 1,105 feet there was standing water. Surface sediment became very silty and life observed relatively remained consistent between 900 to 1,200 feet. At 1,185 feet, plumose anemones (<i>Metridium farcimen</i>) were observed.
Observing beyond 1,200 Feet ¹	Surface sediment was very silty. Vegetation began to visibility become less dense and water was ankle deep. Water clarity began to deteriorate due to the outgoing tide suspending the silty sediment. Anemone density was increasing, and a rock was observed with coralline encrusted algae.

¹ USACE biologists identified species of aquatic vegetation observed after the narration was completed. The species included: sugar kelp (*Saccharina latissimi*), stiff red ribbon kelp (*Nereocystis luetkeana*), filament green algae, ribbon kelp, eelgrass, and sea lettuce.

Figure P-17. Intertidal environmental captured on May 9, 2024.



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