US Army Corps of Engineers
Alaska District

Environmental Assessment and Finding of No Significant Impact

Maintenance Dredging
St. Paul and St. Herman's Harbors
Kodiak, Alaska

May 2012

FINDING OF NO SIGNIFICANT IMPACT

Maintenance Dredging
St. Paul and St. Herman Harbors
Kodiak, Alaska

The U.S. Army Corps of Engineers will conduct maintenance dredging of 10,265 cubic yards of bedrock substrate in six locations in Kodiak's St. Paul and St. Herman harbors as shown in figure 1. Drilling and rock fracturing with a hydraulically driven rock hammer will likely be necessary to fracture bedrock in all areas except Area 1 in St. Paul Harbor and Area 2 in South Herman's Harbor. Excavated dredged materials will be loaded into a transport barge via crane mounted clamshell bucket or excavator and disposed of in water in the southern end of St. Herman's Harbor at an elevation of -50 feet Mean Lower Low Water (MLLW).

Incorporating the following mitigation measures into the recommended plan will help to minimize adverse impacts on local fish and wildlife resources, including Endangered Species Act (ESA)-listed species, marine mammals and Essential Fish Habitat (EFH).

- The proposed action shall cease in-water construction between April 1 and September 30 during peak herring spawn activities, juvenile salmon outmigration, and rearing activities. All marine mammals, except for humpback whales, are likely to occur in the project area year round, so avoidance with timing windows is not possible. Kittlitz's murrelets could be in the project area at any time of the year and other listed and candidate waterfowl species are likely to be in the area during late fall and winter. However, safety radii, shut down distances, and other protective measures will be coordinated with the endangered species staff at the U.S. Fish and Wildlife Services (USFWS) and National Marine Fisheries Service (NMFS) through a biological assessment and follow-on coordination.

- To minimize the danger to marine mammals from project-related vessels, speed limits (e.g. less than 8 knots) shall be imposed on contractor vessels moving in and around the project area.

- A construction oil spill prevention plan shall be prepared.

- Project-related vessels shall not travel within 3,000 feet of federally designated Steller sea lion critical habitat (haul-outs or rookeries). The sea lion float in St. Herman's Harbor is not a federally designated haul-out.

- The Corps will conduct post-dredging bathymetry surveys to ensure that authorized depth was achieved and that dredging was completed within the specified boundaries.

- A dump barge will be loaded so that enough freeboard remains to allow for safe movement (without material loss) of the barge and its dredged material en route to the disposal area in south St. Herman's Harbor.

The Corps believes maintenance dredging of St. Paul and St. Herman harbors is consistent with State and local management programs to the maximum extent practicable.

This Finding of No Significant Impact's associated environmental assessment supports the Corps' conclusion that the maintenance dredging project in Kodiak, Alaska does not constitute a major Federal action significantly affecting the quality of the human environment. Therefore, the preparation of an environmental impact statement is not necessary.

_____ Date: _____

Reinhard W. Koenig
Colonel, Corps of Engineers
Commander

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ABBREVIATIONS AND ACRONYMS

ADEC - Department of Environmental Conservation, State of Alaska
ADFG - Alaska Department of Fish and Game
AHRS - Alaska Heritage Resources Survey
APE - Area of Potential Effect
BMPs - Best Management Practice(s)
CO - Carbon monoxide
Corps - U.S. Army Corps of Engineers
cy - cubic yards
CWA - Clean Water Act
EA - Environmental Assessment
EFH - Essential Fish Habitat
EPA - U.S. Environmental Protection Agency
ESA - Endangered Species Act
FONSI - Finding of No Significant Impact
FR - Federal Register
HAPC - Habitat Area of Particular Concern
MHHW - Mean Higher High Water
MLLW - Meal Lower low Water
MSFCMA - Marine Sanctuaries Fishery Conservation and management Act
NMFS - National Marine Fisheries Service
NOAA - National Ocean and Atmospheric Administration
NO_x - Nitric Oxide
PAH - Polycyclic Aromatic Hydrocarbon(s)
PM - Particulate Matter
PSDDA- Puget Sound Dredge Disposal Analysis
SHPO - State Historic Preservation Office
USDOT - U.S. Department of Transportation
USFWS - U.S. Fish and Wildlife Service
USACE - U.S Army Corps of Engineers
VOC - Volatile Organic Carbons

Environmental Assessment
Maintenance Dredging
St. Paul and St. Herman's Harbor
Kodiak, Alaska

1.0 INTRODUCTION

1.1 Purpose and Need

The U.S. Army Corps of Engineers (Corps) is proposing to maintenance dredge portions of St. Paul and St. Herman's harbors depicted in figures 1, 3, 4, and 5. The purpose of the proposed action is as stated in Section 5033 of the Water Resource Development Act of 2007:

> "The Secretary shall carry out, on an emergency basis, the necessary removal of rubble, sediment and rock impeding the entrance to the St. Herman and St. Paul harbors, Kodiak, Alaska….."

The proposed action would dredge to design depth the entrance and exit channel to St. Paul and St. Herman's harbors. If the proposed action is not implemented, full (design level) access to the harbors' only entrance and exit channels would remain restricted. Vessel operators would continue to experience grounding and channel constrictions due to vessels being forced to use a limited portion of the entrance/exit channel depending on tidal elevation.

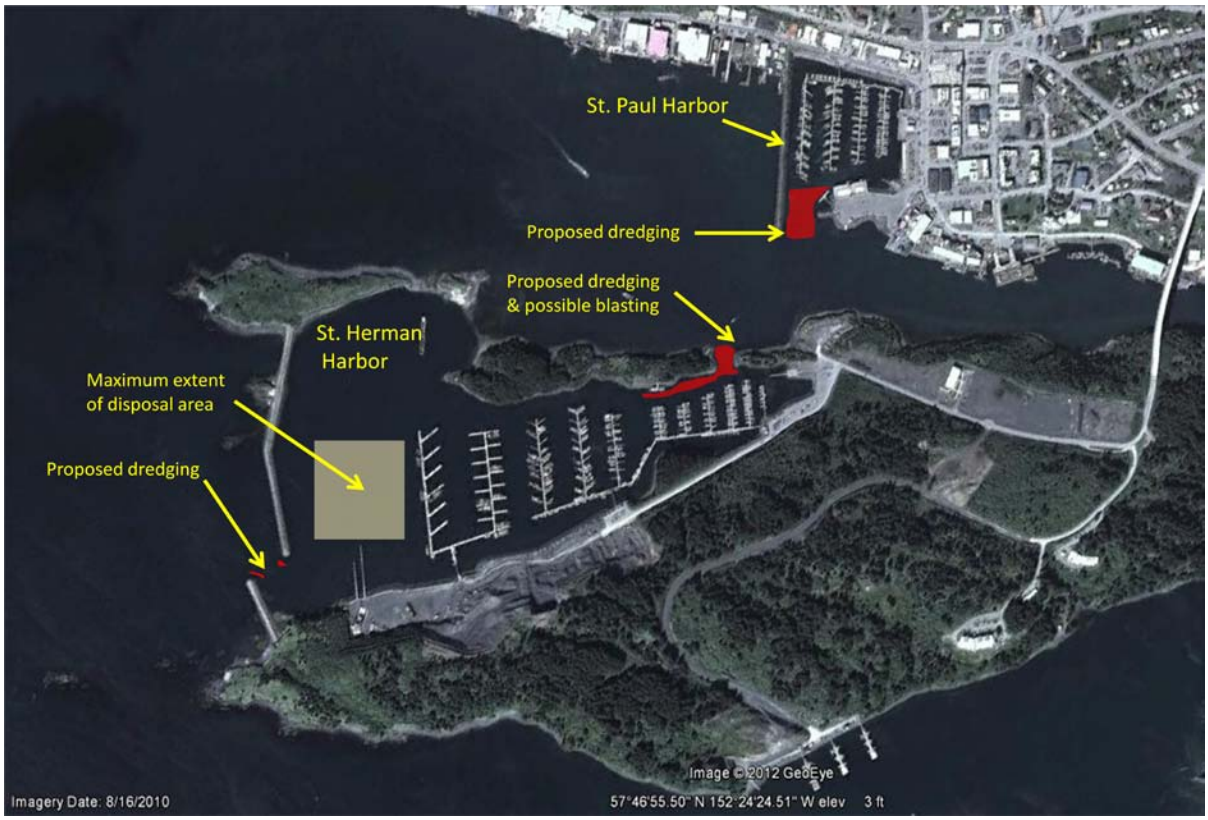

Figure 1. Proposed dredging areas in St. Paul and St. Herman's harbors and proposed dredged material disposal site.

1.2 Project Authority

St. Paul Harbor at Kodiak was authorized by the Rivers and Harbors Act of 3 September 1954 (House Doc. 465, 83rd Congress, 2nd Session) as adopted. St. Herman's Harbor at Kodiak was authorized on 17 November 1986, in the Water Resources Development Act of 1986, Public Law 99-662. Authorization for the proposed action is contained in Section 5033 of the Water Resource Development Act of 2007.

1.3 Project Area Description

The Kodiak Island group, consisting of nine major islands, spans a 10,500-square-mile area on the western edge of the Gulf of Alaska. The island group is approximately 50 miles south of the southern tip of the Kenai Peninsula and about 40 miles east of the Alaska Peninsula. St. Paul and St. Herman's harbors are on the northeastern corner of Kodiak Island (figure 2). The cities of Homer and Anchorage, Alaska, are approximately 137 and 251 miles north, respectively. Near Island, the largest island in St. Paul Harbor (an arm of Chiniak Bay), is within 300 feet of the Kodiak Island shore. It is approximately 1.5 miles long and .5 mile wide, oblong in shape, and oriented northeast by southwest. On the west shore of the island, the St. Herman's area is formed by Gull and Uski islands. On the east shore, Trident Basin is formed by Crooked and Holiday islands. A highway bridge was constructed to Near Island from Kodiak in 1985 to gain access to St. Herman's boat harbor.

Figure 2. Location of St. Paul and St. Herman's harbors.

Past dredging history , engineering analysis, coordination with dredging contractors , and on-site surveys have led Corps staff to expect that dredging the bedrock may require blasting followed by dredging with a barge mounted, clamshell bucket equipped crane and hopper style barge. Blasting would be part of a separate project and require additional analysis and is therefore not covered in this document.

2.0 ALTERNATIVES

2.1 No Action Alternative

The No Action alternative would involve no Federal action to address the lack of adequate draft at the entrances of St. Paul and St. Herman's harbors. This alternative would provide no change to the lack of authorized and design depth, resulting in groundings and channel constrictions. The No Action alternative does not meet the Corp's Navigation Mission objective defined by statutory requirements and Corps Regulations.

2.2. Proposed Action

The Corps proposes to maintenance dredge portions of St. Paul and St. Herman's harbors in Kodiak, Alaska. A post dredging survey would determine the extent of dredging (if any) that was still required to obtain design depth by means of blasting to remove rock impediments at a later date.

The St. Paul portion of the harbor complex consists of weathered and fractured rock that would be mechanically dredged to a design depth of -22 feet Mean Lower Low Water (MLLW). Should mechanical dredging not succeed at obtaining design depths, blasting may have to be considered at a later date. The St. Herman's portion of the harbor complex to be dredged is made up of more competent rock. As a result, the Corps would likely have to use a variety of methods to accomplish design depths of -12 feet MLLW. These different methods are discussed in further detail below. All dredged materials removed would be placed in-water at a depth of -50 feet MLLW northeast of St. Herman's Harbor's southern main breakwater as depicted in figure 1. The total benthic surface acreage to be dredged is 2.56 acres. The total cubic yardage dredged to achieve design depth is 6,570; however, as dredging via a clamshell bucket (after mechanical fracturing) from a vertically and horizontally mobile platform (water's surface) effects precision, the contractor may dredge and dispose of up to 10,265 cubic yards of benthic substrate. Therefore, the NEPA and related analyses will analyze the effects of a maximum pay dredging effort (maximum dredging effort authorized) consisting of 10,265 cubic yards of dredged benthic substrate and related disposal.

Table 1. Dredge and Disposal Volume Quantities

LOCATION	Required Depth*	Max Pay Line**	Loose Disposal Quantity***	Surface Area Dredged
Area 1 St. Paul	1,550 cy	3,050 cy	7,100 cy	0.91 ac
Area 2 St. Herman's****	50 cy	90 cy	90 cy	0.03 ac
Area 3 St. Herman's	2,700 cy	3,525 cy	6,075 cy	0.68 ac
Area 4 St. Herman's	460 cy	1,350 cy	2,175 cy	0.54 ac
Area 5 St. Herman's	1,450 cy	1775 cy	3,150 cy	0.30 ac
Area 6 St. Herman's	360 cy	475 cy	900 cy	0.10 ac
Total	6,570 cy	10,265 cy	19,400 cy	2.56 ac

(Note: The minimum in water footprint disposal of 19,400 cy's of rock rubble would occupy is 1.5 acres. This is a best case scenario consolidated pile that includes a substantial quantity of interstitial space resulting from the fact that the pile is not compacted. The largest footprint the rubble pile is expected to occupy is 6.4 acres if all rubble were disposed of in a uniform 2-foot layer.)

*Required Depth includes the quantity of material (cubic yards) needing to be dredged to reach the bathymetric contour that achieves the design depth.

**Max Pay Line includes the maximum quantity (cubic yards) of material the Corps would pay the contractor to dredge. This additional cubic yardage represents the total cubic yardage of dredge material contained in the next one foot of depth below the design depth over the entire area to be dredged. This additional cubic yardage is included because of the depth tolerances dredgers operate within while dredging from the water's surface which may be moving vertically and horizontally while the dredge action is taking place. As a result it is necessary to recognize that the dredger may not be able to maintain a specific depth at all times over the entire area to be dredged.

***Loose Disposal Quantity includes the volume of dredged material and empty interstitial space within an un-compacted pile of disposed dredge material.

**** The St. Herman's harbor rubblemound breakwaters at the south entrance channel were constructed in the late 1990's. Survey data indicate that the breakwaters toes may have been overbuilt with "B" rock or "Sub-core" rock, therefore, necessitating removal of overbuilt areas. It is also possible that several armor stones were placed or dislodged at the toes of the breakwaters, encroaching on the entrance channel limits.

The Corps proposes in-water placement of the material in the southern end of St. Herman's Harbor at a depth of -50 feet MLLW. Dredging would comply with all terms of the Water Quality Certificate and would not take place between April 1 and September 30 in accordance with the in-water work windows for this operation. Any exceptions to these agreements would require the concurrence of the appropriate regulating agency. This dredging method and placement option takes into consideration the required economic, engineering, and environmental requirements. Because this alternative minimized negative water quality impacts to the degree reasonably possible, it was carried forward for detailed analysis.

2.2.1 St. Paul Harbor

Survey results showed that the portion (Area 1) of St. Paul Harbor (figures 1 and 3) to be dredged consists of weathered rock. Design depth would be reached by excavating with a large excavator with a rock bucket, ripping with use of a tooth attachment on the excavator, and/or a hydraulic hammer. There is 2 to 4 feet of weathered rock below mud line, and below that is rock that is more competent. Rock rubble would be dredged via a barge mounted crane equipped with a clamshell bucket and deposited into a transport barge. All dredged materials removed would be placed in-water at a depth of -50 feet MLLW northeast of St. Herman's Harbor's southern main breakwater as depicted in figure 1.

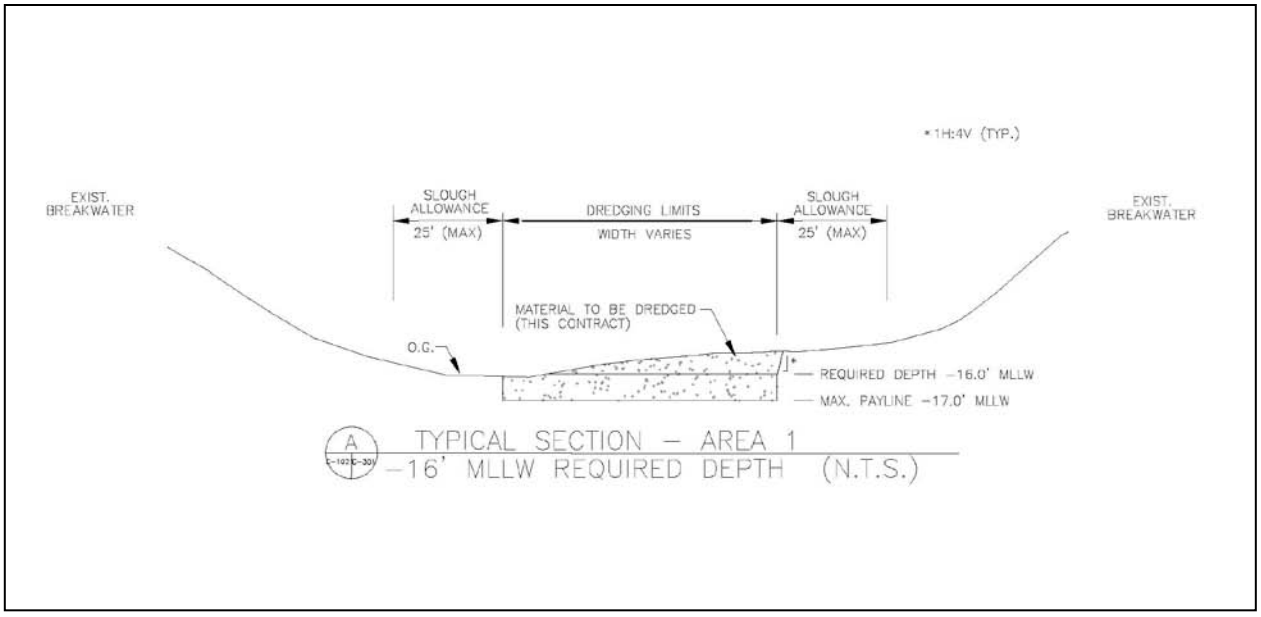

Figure 3. Cross section of dredging limits at St. Paul Harbor

2.2.2 St. Herman's Harbor

Surveys show that the portions of St. Herman's Harbor to be dredged consists of more competent rock and probably could not be mechanically dredged alone (figures 4 and 5). A hydraulic hammer would likely have to be used to assist with obtaining design depth. After using a hydraulic hammer, rock rubble would be dredged via a barge mounted crane equipped with a clamshell bucket and deposited into a transport barge. Area 2 would be dredged without blasting via mechanical fracturing of bedrock substrate and picking up errant breakwater riprap with a clamshell bucket. All dredged materials removed would be placed in-water at a depth of -50 feet MLLW northeast of St. Herman's Harbor's southern main breakwater. The total benthic surface acreage to be dredged is 2.56 acres. The total cubic yardage dredged to achieve design depth is 6,570; however, as dredging via a clamshell bucket (after mechanical fracturing) from a vertically and horizontally mobile platform (water's surface) effects precision, the contractor may dredge and dispose of up to 10,265 cubic yards of benthic substrate.

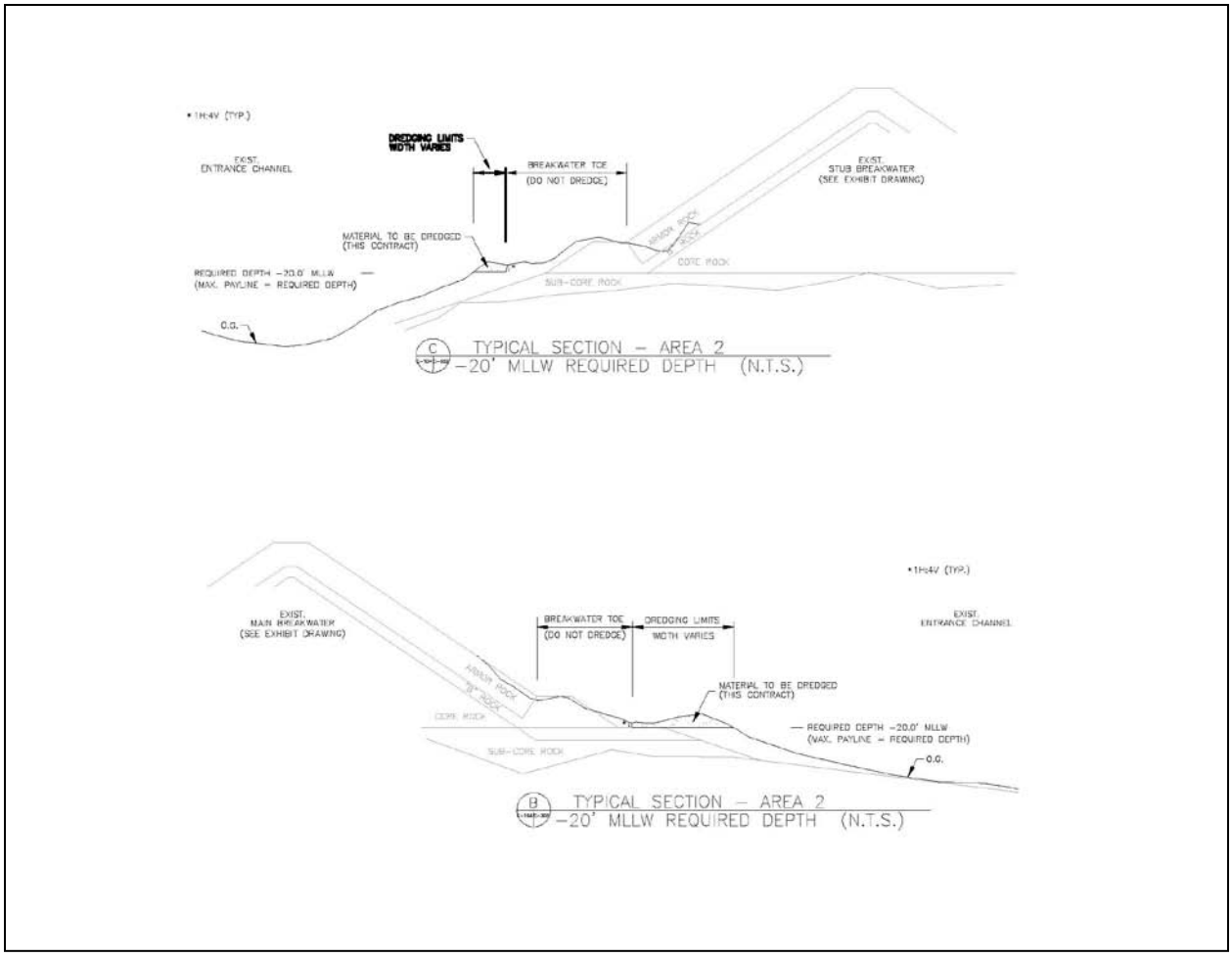

Figure 4. Cross section of St. Herman Harbor south entrance dredging.

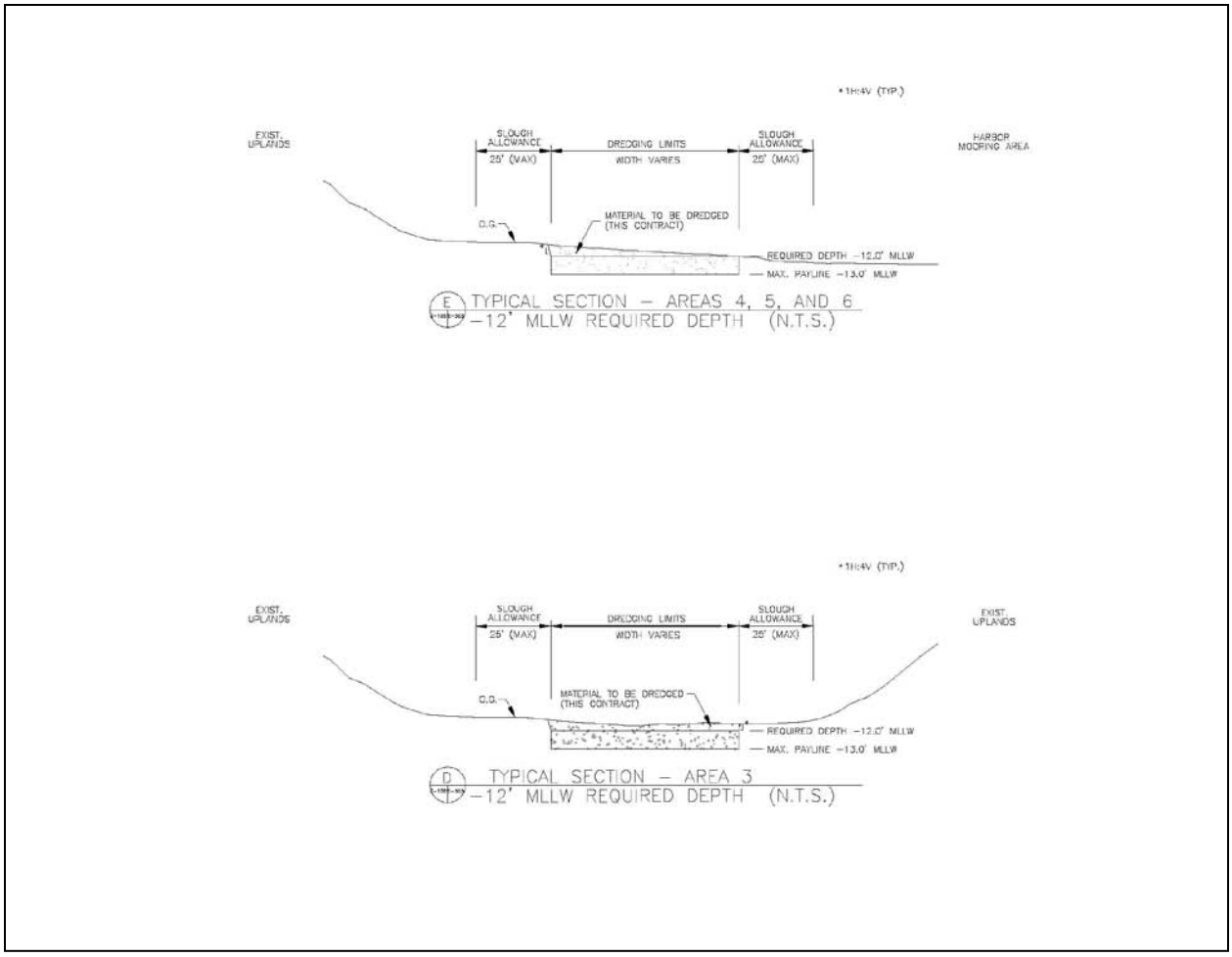

Figure 5. Cross section of St. Herman Harbor north entrance dredging.

2.3 Dredging Options

The Corps considered several alternative methods for conducting the dredging options described in this section. The Corps expects a clamshell bucket to be used to dredge (excavate) fractured rock because it is the only reasonably functional means to pick up sub-surface fractured rock.

2.3.1 Hopper Dredge

A hopper dredge operates by use of suction "drag heads" that extend from the hull of the dredge down into the substrate to be dredged. Through suction, materials are brought up into the open hull of the dredge until the hopper is full and the material can then be moved to a dredged material placement site. Use of a hopper dredge works best in sandy environments. The suction of material also brings in huge volumes of water. The excess water (return water) is allowed to overflow the hopper and flow back into the water body. The overflow water can increase turbidity and not meet water quality standards. The substrate to be dredged is rock, which can, at smaller sizes, be lifted hydraulically but at larger sizes might plug suction lines.

2.3.2 Pipeline Dredge

A pipeline dredge, like the hopper dredge, uses suction and a cutter head to bring dredged material from the bottom of the harbor. However, a pipeline dredge does not have a hopper to contain the dredged material. Instead, the dredged material is moved directly to the placement site. As with a hopper dredge, excess water is removed with the dredged material. The excess water helps to keep the dredged material "fluid" so that it can be pumped to the dredged material disposal site. The pipeline dredge must have a disposal location within pumping range of the dredged disposal site. No dredged material disposal site is within pumping range of the harbor dredging location.

Regardless of whether a suction or cutterhead dredge is used to excavate dredged material, that material would then be sluiced into a hopper style barge for transport to a disposal site. However, as surveys and engineering and geotechnical analyses have determined that virtually all material to be dredged is bedrock of such density that hydro-hammering would likely be required to fracture it before it can be removed, and because fractured rock rubble can vary widely, hydraulic dredging technology is not considered a practicable alternative to remove bedrock rubble.

2.3.3 Clamshell Dredge

Clamshell dredging for the proposed project requires the use of a barge-mounted crane with a clamshell bucket that would be used to remove dredged material from the harbor bottom. The clamshell dredge is often used in marine environments due to an increased rate of efficiency for moving dredged material. The captured dredged material is primarily what is lifted to the surface, and there is little entrained water that is moved to the dredged material placement site. Furthermore, in comparison to the other dredging methods (hydraulic), less turbidity can be expected, thus minimizing the spread of contaminants to adjacent areas or to the water column. A comparable method to the clamshell dredge is a barge mounted excavator with an extended reach arm, which is sometimes referred to as a dipper dredge. It is possible that both a dipper and clamshell could be used for this project.

2.4 Bedrock Fracturing Options

Based on past dredging efforts in both harbors, the Corps expects the contractor to have to use a hydraulic hammer on the bedrock to be dredged prior to excavating (dredging) it with a crane-mounted clamshell bucket or excavator. The Corps considered several methods by which rock could be fractured to permit dredging (excavation). Those methods were the use of explosives, the use of an excavator mounted rock or hydro hammer, and an excavator mounted ripper. For this maintenance dredging action, the use of a hydro hammer and an excavator are analyzed. Should design depths not be obtained, further analysis and coordination will be undertaken for use of blasting as a means of obtaining design depth.

2.5 Dredged Material Placement Options

The Corps considered several options for placement of the dredged material. The options considered were: in-water disposal, several upland disposal options, disposal adjacent to the St. Herman's Harbor's ramp, and disposal on the south of St. Herman's Harbor's breakwater. These options were deemed not practicable. The only practicable disposal option would be the

placement of dredged material in-water at a depth of -50 feet MLLW northeast of St. Herman Harbor's southern main breakwater as depicted in figure 1.

2.6 Conservation Measures

Incorporating the following mitigation measures into the recommended plan would help to ensure that no adverse impacts would occur on local fish and wildlife resources, including ESA-listed species, marine mammals, and EFH.

- The proposed action shall cease in-water construction between April 1 and September 30 during peak herring spawn activities, juvenile salmon outmigration, and rearing activities. All marine mammals, except for humpback whales, are likely to occur in the project area year round, so avoidance with timing windows is not possible. Kittlitz's murrelets could be in the project area at any time of the year, and other listed and candidate waterfowl species are likely to be in the area during late fall and winter. However, safety radii, shut down distances, and other protective measures will be coordinated with the endangered species staff at the U.S. Fish and Wildlife Services (USFWS) and National Marine Fisheries Service (NMFS) through a biological assessment and follow-on coordination.
- To minimize the danger to marine mammals from project-related vessels, speed limits (e.g. less than 8 knots) shall be imposed on contractor vessels moving in and around the project area.
- A construction oil spill prevention plan shall be prepared.
- Project-related vessels shall not travel within 3,000 feet of federally designated Steller sea lion critical habitat (haul-outs or rookeries). The sea lion float in St. Herman's Harbor is not a federally designated haul-out.
- The Corps will conduct post-dredging bathymetry surveys to ensure that authorized depth was achieved and that dredging was completed within the specified boundaries.
- A dump barge will be loaded so that enough freeboard remains to allow for safe movement (without material loss) of the barge and its dredged material en route to the disposal area in south St. Herman's Harbor.

3.0 AFFECTED ENVIRONMENT

3.1 Marine Environment

St. Herman's Harbor consists of steep coastlines in the intertidal zone, which limits the amount and complexity of intertidal habitat. As noted in USACE, March 1991, "…The intertidal zone of the outer bay is almost entirely large rock, with few tidal pools. The upper tidal zone is inundated by spray and extreme high tides. This zone is mainly rock with a sparse growth of green algae. Inhabitants of this zone include periwinkle snails, limpets, and a few barnacles."

The high intertidal zone occurs above mean sea level and below the upper zone. The steep slope limits this zone to a relatively narrow band. Rockweed is the dominant floral species; however, it is not abundant. Abundant invertebrates in this zone include those animals with the ability to cling to the larger rocks (snails, chitons, mussels, barnacles, etc.).

The middle intertidal zone is below mean sea level. It is uncovered by most low tides and covered by most high tides. The steepness of the slopes and the lack of tide pools, rock

crevasses, sheltering lower rocks, and burrowing habitats limit species diversity. Rockweed, and to some extent, sea lettuce protect the more mobile species such as hermit crabs, sea urchins, amphipods, isopods, etc. Two species of anemone, several species of chitons and limpets, mussels, barnacles, and several species of sea stars are also present.

The low intertidal zone is that area exposed only by minus tides. The estimated extreme low tide at St. Herman's Harbor is -4 feet MLLW, with -2.5 feet occurring several times a year. This is the smallest zone because of the steep slopes. At these low tides, there are some small tide pools at the shore of Gull Island. Rockweed is the major alga present in the intertidal zone. Animals found on rock habitat include sea stars, barnacles, mussels, snails, anemones, amphipods, and isopods. The small tide pools provide habitat for tide pool sculpins, blennies, and gunnels.

The St. Herman's area is average to sub-average intertidal habitat compared with the surrounding area. This is due to the steep slopes and the lack of smaller rocks that furnish varied habitats. The subtidal substrate of St. Herman's Harbor remains rocky until a depth of about 25 feet. Because of the steep slopes, the 25-foot contour is within 75 horizontal feet from the shore at the outer bay. The substrate from 30 to 35 feet deep is characterized as rocky and covered with silt. The substrate at depths of more than 40 feet is silty. At depths of 15 feet, rockweed gives way to sea lettuce, wrack, wing kelp, and some sea colander. Sea stars, snails, and urchins are the most abundant invertebrate species. The silty substrate does not support macro algal species. Species diversity is lower in the silty substrate, although dense aggregations of tube worms are found throughout this habitat.

The St. Paul Harbor perimeter is almost entirely man-made or modified and consists of a breakwater, two concrete walls, and a partially developed rock outcropping abutting Near Channel. These structures and development limit natural habitat down to a sub-tidal elevation. The sub-tidal environment in St. Paul Harbor largely mimics St. Herman's Harbor with interspersed layers or patches of silty/sandy sediment over-lying a bedrock substrate.

3.2 Water Quality and Circulation

3.2.1 Tides

St. Paul's diurnal tidal range is 8.65 feet. St. Herman's diurnal tidal range is 8.76 feet. (http://co-ops.nos.noaa.gov/tides06/tab2wc2b.html) The estimated extreme tidal range for both is 13.0 feet MLLW to -4.0 feet MLLW. Tides typify the standard Pacific inequality; one of each of the high and low tides in a 24-hour period exceeds the other by several feet. Kodiak's annual tide curve follows an 18.6-year cycle (USACE November 1990).

3.2.2 Currents

Prior to construction of the split breakwater on the southwest end of Dog Bay, now St. Herman's Harbor, the maximum currents within Dog Bay were 1 knot or less. The north entrance to what is now St. Herman's Harbor experienced a 2 to 3 knot current during larger tides. Within Chiniak Bay, which encompasses both St. Paul and St. Herman's harbors, the flood current sets northeast and the ebb current southwest (USACE, November 1990).

3.2.3 Circulation

Post construction of the split breakwater on the southwestern end of St. Herman's Harbor, circulation is as shown in USACE November 1990, Draft General Design Memorandum, Kodiak Harbor, Appendix A, Figure A-26, page A-50.

3.2.4 Sediment Transport/Quality

The result of surveys conducted for St. Herman's Harbor's breakwater construction and underwater videography taken on April 18, 2011, have determined that the substrate of St. Paul and St. Herman's harbors in areas 1 and 3 through 6 are bedrock with occasional thin layers of sediments. Sediments in area 2 (figure 4) are expected to be similar in nature to those at the proposed disposal site, albeit their profile has likely been disturbed by construction of the breakwater and subsequent erosion of disturbed sediments remaining in the entrance channel post construction. Sediments at the proposed disposal site are characterized in USACE March 1991 as consisting of seven layers of primarily terrigenic (terrestrially) derived sediments that are on average at least 75 feet thick in the middle of the harbor and thinning out as the islands on either side are approached. These layers consist of organic and inorganic silts, ash, clay, probable glacial till and outwash, and rock. Sediments are a combination of terrigenic derived, biologically derived (biogenic) or air or water borne sediments that have precipitated out or have been carried in by currents from the surrounding seafloor. Terrigenic sources are the primary source of sediments in both harbors overall and abutting Chiniak Bay. The sediment transport environment in both areas is not considered to be highly active (DOT 2009). The thin layer of sediment overlying the bedrock in the harbor entrances has not been tested to determine if it contains contaminants. Testing has not been done because of a lack of any known spill events or contamination sources that are out of the ordinary for Alaska harbors. Neither EPA's Superfund website nor Alaska ADEC's contaminated sites website show any record of spills in or within the vicinity of either harbor. The Kodiak harbormaster (per comm. M. Owen March 2012) notes no known major spills of hydrocarbons or man-made chemicals occurring within either harbor. Minor leaks and small spills that routinely occur within harbors have occurred and have been reported to the USCG and National Spill Hotline.

3.2.5 Water Quality

Water quality within St Paul and St. Herman's harbors is suspect due to decades of routine hydrocarbon contamination, primarily from vessel operations in the harbors and runoff from developments in Kodiak surrounding St. Paul Harbor, and to a substantially lesser extent, roads, ramps, and rock pit/dry dock adjacent to St. Herman's Harbor. Marine based developments along the overall St. Paul Harbor waterfront and operations of ocean going vessels transiting the area in addition to discharges from the wastewater treatment plants serving the USCG base and the City of Kodiak also affect local water quality.

3.3 Marine Mammals

The following NMFS-managed marine mammals have been observed in the nearby Chiniak Bay area and/or in the harbors themselves: harbor seal, harbor porpoise, Dall's porpoise, killer whale, Cuvier's beaked whale, Pacific white-sided dolphin, minke whale, Steller sea lion, gray whale, fin whale, and humpback whale. The only USFWS-managed marine mammal known to occur in the Kodiak area is the northern sea otter. All marine mammals are protected under the Federal Marine Mammal Protection Act (MMPA), and selected marine mammals are also protected

under the Endangered Species Act (ESA). A brief synopsis of these species is provided below. DOT 2009 contains a more detailed description of each species' use of the Chiniak Bay and/or Kodiak area.

Harbor Seal. Resident harbor seals at Kodiak are part of the Gulf of Alaska stock. Harbor seals use the project area throughout the year. Their nearest haul out to any work area is a haul out 3 miles south southwest of Area 2. Their June to July breeding period is when the highest aggregations of seals are expected to be found in the Chiniak Bay area overall. While they could be found in either harbor, they are more likely to be found in St. Herman's Harbor due to a higher probability of forage species occurring in adequate numbers. .

Harbor Porpoise. Harbor porpoise found in the Chiniak Bay area are part of the Gulf of Alaska stock. They also use the overall area year round and could be found in either harbor, though harbors are not commonly considered suitable habitat for porpoises.

Dall's Porpoise. While Dall's porpoise occur within the Gulf of Alaska, they are not expected to be found in the Chiniak Bay area or either harbor due to the shallow waters in these areas.

Killer Whale. Two pods of resident killer whales occur in Chiniak Bay, with their numbers peaking between late February and early April. While they are not expected to be found in St. Paul Harbor due to its small size, shallow depths, anthropogenic activity, and limited prey availability, they are known to frequent St. Herman's Harbor to prey on sea lions, fish, and aquatic invertebrates.

Cuvier's Beaked Whale. While there are is no documentation of Cuvier's beaked whale in Chiniak Bay, two strandings have been recorded northeast of Chiniak Bay. Therefore, it is possible, though unlikely, they might be found in the area during dredging and disposal activities.

Pacific White-sided Dolphin. Pacific white-sided dolphins have not been recorded in Chiniak Bay and likely have a low probability of being found there. However, their probability of presence cannot be definitively determined.

Minke Whale. While not expected to be found in the shallow waters of the project area, minke whales have been sighted several miles to the east around the perimeter of Woody Island. Their probability of presence in the project area is unlikely but cannot be definitively determined.

Steller Sea Lion. Steller sea lions frequent all areas within the overall project area but are most prevalent in south St. Herman's Harbor due primarily to the haul out float placed in that area for them and because of a higher probability of prey items in that portion of the two harbors. They utilize the project area year round, may be attracted to bubble curtains if used, and are largely habituated to human activity. The project area is within Steller sea lion critical habitat. The south St. Herman's Harbor (Dog Bay) haul out float is not a federally recognized haul out.

Gray Whale. Gray whales found in the Kodiak area are a portion of the eastern North Pacific stock. While migratory, some gray whales have been documented as residents of Kodiak Island

waters. Therefore, there is the potential that these whales could be found in the vicinity of the project area although probably not in either harbor year round.

Fin Whale. While fin whale species do occur around Kodiak Island, they are typically found in waters 660 feet or more in depth. Their presence has not been documented and is not expected within the general vicinity of the overall project area.

Humpback Whale. Kodiak Island lies in a zone of overlap between the Western and Central North Pacific stocks of the humpback whale. Their presence in Chiniak Bay is routinely documented in summer and fall with peak numbers occurring in June and July. Due to southerly migrations, use of Chiniak Bay by Humpbacks is expected to be light in winter and spring and therefore they may be present in at least low numbers year round.

Northern Sea Otter. The Northern Sea Otter is present in Chiniak Bay year round. While surveys suggest they are most numerous in Women's Bay just west of Chiniak Bay, they can be found in any portion of the project area. St. Paul Harbor and St. Herman's Harbor are part of designated critical habitat, which extends from portions lower Cook Inlet all the way to Attu Island at western tip of the Aleutian Islands.

3.4 Fishery Resources and Essential Fish Habitat

3.4.1 Fish and Shellfish

The following fish species occur at or within the immediate Kodiak area: king salmon, sockeye salmon, coho salmon, pink, salmon, chum salmon, Dolly Varden, steelhead trout, rainbow trout, cutthroat trout, brook trout, grayling, halibut, lingcod, Pacific cod, greenling, herring, rockfish (sps). Shell fish species include Dungeness crab, king crab, and shrimp.

As noted in The Supplemental Environmental Impact Statement, Final, Kodiak Harbor, Alaska, March 1991 (USACE, March 1991) "…Adult king crab migrate annually from deep water to shallower areas along the Kodiak Island coast, as well as along offshore banks. King crab move along submarine valleys that usually lead them to embayments such as Chiniak Bay and to some extent, St. Herman's basin. The southern side of St. Herman's Harbor is an area of documented king crab mating. The area extends from the rock outcroppings southwest of Near Island to the seafloor opposite Uski Island. The present extent of king crab mating in this area is not known, but is presumed to have decreased proportionally with the decrease of the fishery."

USACE, March 1991, discussed the value of the St. Herman's area to king crab nursery habitat and concluded that it did not contribute significantly to the commercial king crab fishery. The number of crabs using the area was estimated at 10,000. The decline in the king crab fishery has affected the entire Kodiak area; crab numbers would now be a fraction of this estimate. Several investigations of both the outer and inner bays have indicated that juvenile king crab use is very low.

As noted in USACE, March 1991, "…The St. Herman's area does not appear to support many adult fishes. Neither the size nor the productivity of the bay is sufficient to support even a sport fishery. The following fish species are probably vagrants in the St. Herman's Harbor: yellowfin sole, rock sole, rock greenling, kelp greenling, whitespotted greenling, yellow Irish lord, red Irish

lord, other sculpins, and juveniles of Pacific sand lance, Pacific cod, Pacific halibut, and Pacific herring and salmon."

Marine littoral areas are used by Pacific salmon for rearing, refuge, and migration. Juvenile coho, Chinook, pink, and chum salmon depend on littoral habitats for rearing and refuge prior to seaward migration. The manner and degree of littoral utilization vary with the species. Chum and pink salmon differ from the other Pacific salmonid species by migrating to sea immediately upon emergence.

Salmonid timing and use of fresh, intertidal, and marine habitats in Chiniak Bay (and the project area) overall is thoroughly defined in DOT 2009 Section 4.5. Salmonid juvenile initial size enhances their vulnerability to predation, for which they compensate by schooling and rearing in the shallows of the littoral zone. This also occurs with herring juveniles. The enhanced vulnerability of the juvenile life stage warrants mitigation in the form of avoidance of activities that would further diminish survival during this life stage.

3.4.2 Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 et seq.) mandates that Federal agencies consult with the NMFS regarding any action they authorize, fund, or undertake that may adversely affect Essential Fish Habitat (EFH), and NMFS must provide conservation recommendations to Federal and State agencies regarding any action that would adversely affect EFH. Specific information about the act and its requirements and related processes can be found at: http://alaskafisheries.noaa.gov/habitat/efh.htm.

EFH for species occurring within this project's affected environment includes Alaska stocks of Pacific salmon, groundfish resources of the Gulf of Alaska Region, and groundfish resources of the Bering Sea/Aleutian Islands Region. Individual's species comprising each of these groupings are listed in the attached EFH Assessment (Appendix 2).

3.5 Avifauna Kodiak

DOT 2009, Section 4.6 Waterbirds and its "Technical Report of Terrestrial Vegetation and Wildlife, and Marine Mammals and Seabirds" addresses in detail the various avian taxonomic groups and individual species that are expected to be found in greater Chiniak Bay overall and therefore potentially the project area.

3.6 Threatened and Endangered Species

Species listed and that potentially might occur or whose historic range included the Kodiak area are:

- Steller's Eider (Polysticta stelleri) (Threatened) – The species life history range, occurrence, feeding and mating habits and habitat use can be found at the following web site: http://alaska.fws.gov/media/PDF/stellerseiderpublicdraft.pdf. Steller's eiders could be present in the project area between November and early April each year.

- Kittlitz's Murrelet (Brachyramphus brevirostris) (Candidate) – A profile of the life history of this species can be found at:

http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0AP. Kittlitz's murrelets could be present year around in the project area.

- Yellow-billed Loon (Gavia adamsii) (Candidate) – A profile of the life history of this species can be found at: http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0DQ. Yellow-billed loons are present in small numbers in the project area in late fall, winter, and early spring.

- Northern Sea Otter (Enhydra lutris kenyoni) (Threatened) – The species life history range, occurrence, feeding and mating habits and habitat use can be found at the following web site: http://alaska.fws.gov/fisheries/mmm/seaotters/pdf/draft_sea_otter_recovery_plan_small_file.pdf.

- Steller Sea Lion (Eumetopias jubatus) (Endangered) – The species life history range, occurrence, feeding and mating habits and habitat use can be found at the following web site: http://www.nmfs.noaa.gov/pr/pdfs/recovery/stellersealion.pdf.

- Finback Whale (Balaenoptera physalus) (Endangered) – The species life history range, occurrence, feeding and mating habits and habitat use can be found at the following web site:http//www.nmfs.noaa.gov/pr/pdfs/recovery/draft_finwhale.pdf.

- Humpback Whale (Megaptera novaeangliae) (Endangered) – The species life history range, occurrence, feeding and mating habits and habitat use can be found at the following web site:http://www.nmfs.noaa.gov/pr/pdfs/recovery/whale_humpback.pdf.

A detailed analysis of potential impacts on Threatened, Endangered, and Candidate species is presented in a biological assessment prepared for this project. Specific mitigation measures for protected species will be developed during consultations with the USFWS and NMFS.

3.7 Subsistence Resources

3.7.1 Subsistence Fishing

For season dates, species, locations applicable to the Kodiak area see ADF&G 2010-2011 Subsistence and Personal Use Statewide Fisheries Regulations, Southeastern Alaska Area, pages 79-82 and related State laws applicable to Native Corporation and Native allotment lands, and USFWS, Subsistence Management Regulations for the Harvest of Wildlife on Federal Public Lands in Alaska, July 1, 2010-June 30, 2012. DOT 2009 Section 4.11 contains a thorough breakdown of subsistence use for City of Kodiak residents by percentage of households participating and subsistence resource type. A summary of their results concludes that 93.3 percent harvest salmon, 95.2 percent harvest non-salmonid fish, and 79 percent harvest marine invertebrates.

3.7.2 Subsistence Hunting

State laws applicable to Native Corporation and Native allotment lands, and USFWS, Subsistence Management Regulations for the Harvest of Wildlife on Federal Public Lands in Alaska, July 1, 2010-June 30, 2012 can be found at: http://www.adfg.alaska.gov/index.cfm?adfg=subsistence.main.
Federal subsistence harvesting regulations can be found at http://alaska.fws.gov/asm/osm.cfml. DOT 2009 Section 4.11 contains a thorough breakdown of subsistence use for City of Kodiak residents by percentage of households participating and subsistence resource type. A summary of their results shows that 77.1 percent of homes hunt/harvest land mammals, 1.9 percent hunt/harvest marine mammals, and 20 percent hunt/harvest birds and/or their eggs.

3.8 Cultural and Historic Resources

Section 106 of the National Historic Preservation Act of 1966 requires identification of any historic properties, cultural resources, and/or traditional cultural places that would be affected by the proposed project (e.g. within the area of potential effect [APE]). Corps site visits and review of the Alaska Heritage Resources Survey (AHRS) database has found no such resources within the APE, nor has the Corps received information from consulting entities prior to the public notice being issued that such resources exist within the APE.

3.9 Air and Noise Quality

Kodiak's air quality is considered to be good. The maritime environment and limited level of development are the primary factors affecting air quality. The island's location in the North Pacific Ocean results in cool humid air masses acting as major drivers of climate overall and therefore air quality. The prevailing wind direction is northwesterly 9 months out of the year except for May, June, and July. Despite the consistency of overall wind direction, the island experiences extreme variability in wind direction and speed. While the annual average wind speed averages 10 knots, wind gusts as high as 90 knots have been reported and williwaw wind gusts off mountains west of Kodiak have been reported to reach 120 knots. Gusts of over 50 knots have occurred during each month of the year but are more likely in winter (DOT 2009). The vast majority of emission sources in both harbors are marine or marine related internal combustion engines. Kodiak is not classified as a non-attainment area. Neither EPA's "My Environment" webpage nor the State of Alaska's DEC air quality webpage document any record of air quality issues at Kodiak.

The majority of noise in Kodiak is generated by wind, followed in developed areas by human generated noise from cars, machinery or other equipment. Outside developed areas but within the immediate vicinity of Kodiak, noise comes primarily from aircraft engines.

3.10 Socioeconomic Resources

3.10.1 Population

The Kodiak Borough demographic profile breaks down as follows (Kodiak COC 2010): estimated population 13,889 people of whom 60 percent are Caucasian, 14 percent are Native American, 1 percent is African American, 1 percent is Pacific Islander, 0.16 percent is Asian, 3 percent are Other, and 5 percent are of multiple races. In the last 2 decades, the population has vacillated between approximately 13,750 and 15,000 people. A population was first recorded by

the Census for Kodiak in1890, reporting 495 inhabitants at that time. Until 1930 the population remained relatively stable, doubling in 1940 to 864 inhabitants, and then continuing to grow substantially. There is a large seasonal population in the community, which was most likely not recorded by the Census.

3.10.2 Employment and Income

The U.S. Coast Guard and governmental entities are the dominant employers (35 percent). The seafood industry comprising harvesting and processing employs 27 percent of workers. Retail trade/transportation/utilities accounted for 11 percent, education/health 7 percent, financial/information/professional and business 6 percent, leisure and hospitality 6 percent, natural resources/construction 4 percent and other services 3 percent (Kodiak COC 2010). The borough can experience large monthly/seasonal swings in unemployment due to the seasonal nature of fishing and therefore related employment. Kodiak's economy is based on fishing, seafood processing, retail, and government employment.

3.10.3 Marine Economic Activity

There are two city operated boat harbors (marinas) in Kodiak with 575 slips. St. Paul Harbor contains 250 slips between 24 to 60 feet in length. A tidal grid for vessels up to 350 tons is available in St. Paul Harbor. St. Herman's Harbor contains 325 slips between 17 and 150 feet in length. Electricity and water are available at most slips. Large vessels, including the State ferry, cruise ships, and cargo vessels are moored at the three deepwater piers outside the harbors. Two inner-harbor docks are available for vessels up to 120 feet and may be used for loading/unloading and maintenance of vessels. One dock serves vessels up to 70 feet, and the other serves vessels up to 120 feet. Boat launch ramps and vessel haul-outs are available as well. Sewage tanks and bilges are emptied using vac-trucks with disposal off-site. A double wall used oil tank is located at the harbormasters office in St. Paul Harbor. Adjacent to the breakwater is a boat yard with a 660-ton, 600-horsepower mobile lift. Fuel is available at the North Pacific fuel dock in Near Island Channel. Overall Kodiak's harbors and related facilities and businesses provide the requirements of a full service harbor. Major freight terminals are available along Near Island channel on the Kodiak Island side. St Paul Harbor as it is defined in this document refers only to the protected harbor depicted in figure 1 versus the larger unprotected harbor that abuts Shelikof Street and Rezanof Drive west.

The Corps maintains a Federal channel between Near Island and Kodiak Island called Near Island Channel. The maintained portion of the channel is 200 feet wide and is maintained to a depth of -22 feet MLLW. A road bridge crosses the channel and provides 101 feet of clearance. Kodiak is the third largest commercial fishing port in the United States and also serves as a receiving and trans-shipment port for freight bound for Kodiak Island and some other destinations in Alaska. As noted, the primary navigational use is related to commercial harvesting, processing, and transportation of fish and shellfish. Kodiak is one of many stops on the Alaska Marine Highway system that facilitates the movement of passengers and vehicle cargos. Seaplanes utilize the harbor facilities for commercial and recreational purposes as do smaller recreational and charter fishing and sight-seeing vessels. The USCG utilizes a portion of Kodiak Island and surrounding waters for a major Pacific Ocean base to facilitate their national security, enforcement, and public safety missions.

3.10.4 Commercial Fishing

Kodiak is the State's largest fishing port where many diverse species of fish are harvested and delivered by almost every possible gear group.

3.10.5 Public Safety

Kodiak's public safety entities comprise all the normal State and local entities found in larger coastal Alaska communities as well as local USCG and U.S. Navy facilities. As a marine based community, it is intimately versed in the effects of and dangers related to operating in a marine environment including response requirements to accidents in the marine environment. The City of Kodiak also has the requisite regulations in place and experience in regulating the importation of, handling, transportation, and storage of explosives. The community also possesses the required communications infrastructure and multi-media formats to facilitate communication of activities affecting navigation and navigational access to local harbors. To date, the Corps has coordinated the proposed dredging project with the city's administrative and public safety staffs. Coordination with the public and potentially affected harbor users, area residents, and workers would continue throughout the life of the project.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Marine Environment

The proposed dredging action in St. Paul and St. Herman's harbors and the in-water placement of dredged material would not alter the hydrologic conditions or sediment transport in either harbor or the abutting portion of Near Channel.

4.1.1 Water Quality and Circulation

Sediments overlying bedrock are expected to be lofted into the water column to an unknown degree. However, given the primarily gravel and sand composition of the overlying sediments, they are expected to rapidly precipitate out to the harbor floors. Silts and organic materials are expected to remain in the water column for a longer timeframe and travel down-current a greater distance. Given the intermittent frequency with which sediments occur on the harbor side slopes and floors and the overall thin layer they represent, no modeling of the dispersion pattern of lofted sediments is justified. Modeling would be of limited value if completed because, while the dredge actions can be scheduled for a given timeframe within the year in which it would be accomplished, specifically forecasting current and tidal effects on re-suspended sediments would require substantial assumptions of conditions at that time.

Fracturing bedrock with a rock or hydro hammer (hydraulic ram) is expected to have substantially less effect in relation to the quantity of sediment re-suspended because the force imparted into the bedrock and transmitted into surrounding sediments occurs only at the point the bit impacts with each blow versus the force applied via blasting that affects a much larger area nearly simultaneously. Water quality effects of the proposed dredging action is addressed in greater detail in the attached 404(b)(1) analysis.

Dredging operations (the mechanical dredge action) would be conducted to minimize turbidity and reduce sediment movement through the use of a clamshell dredge or excavator. All material dredged would be placed in a barge, transported to south St. Herman's Harbor, and dumped.

The proposed action would reduce water quality during and immediately following using the hydro hammer and dredging. The re-suspension and waterborne transport of sediments is a direct result of dredging activities. The resulting increase in turbidity and re-suspended sediments is expected to be localized, short-term, and is expected to dissipate within several hours.

The highly localized dredging and disposal actions would have no effect on tides in or outside the harbors. Any potential effects to currents due to the widened harbor entrances is expected to be of a negligible nature as only a few feet of rock is being removed at each location to be dredged.

4.1.2 Marine Mammals

Maintenance dredging would temporarily and indirectly disturb marine mammals in proximity to the site due to construction noise and construction-generated turbidity. Airborne noise would be generated by the operation of heavy equipment, and waterborne noise and vibration would be generated by tug boats, a hydraulic hammer, and the clamshell dredge or excavator. The primary reaction of marine mammals to the hydro-hammer is to move away from the work area during the construction period. Given an appropriate shutdown radius developed in consultation with NMFS and USFWS, marine mammal mortality, injury, or hearing threshold shifts are not predicted. The noise generated by vessels conducting the dredging and disposal operation generate the highest decibel levels for the proposed action, though they would be similar to underwater noises generated by routine vessel traffic in both harbors and the overall Chiniak Bay area. Low levels of turbidity would be generated by dredging and placement of the material on the barge in the marine environment, possibly causing marine mammals to temporarily avoid the area until such time that the construction-generated plume dissipates to background levels.

Overall, the Corps' project would likely cause marine mammals that would otherwise be present in the vicinity to move away from the area temporarily during construction but would not likely produce significant long-term harm to any species.

4.1.3 Fishery Resources and Essential Fish Habitat

Maintenance dredging would typically have little direct affect on mature fish inhabiting the project area, as their mobility allows them to avoid construction activities (e.g. drilling, use of hydraulically driven hydro or rock hammers, clamshell dredging, turbidity, vessel movements, and underwater construction noise). No substantial long-shore movements of juvenile fish, whether it is routine movements or salmonid out-migration, would be disrupted by maintenance dredging if dredging was completed within the applicable work window and silt curtains are utilized.

The only long term effect to EFH (in this case EFH currently existing on the rock/sediment substrate within the dredging footprints and immediately surrounding it) would be a change to the character, landscape position, and depth of that EFH. As depicted in figures 1, 3, and 5, the elevation of rock and overlying sediment would change as this material and rock below it was removed. The rock remaining would change from a largely smooth rock surface to angular rock rubble, overlying a fractured rock face, with interspersed sediment. The perimeter of the dredging areas would likely gain random pieces of rock rubble that are not dredged, and would

lose some of its overlying sediment as currents erode remaining sediments from outside the dredging footprint into the newly created hole resulting from the dredging. Effects to EFH are further defined in the attached EFH assessment in Appendix 2.

Per the 1996 amendments to the MSFCMA, the Corps has initiated consultation and coordination with the NMFS regarding the potential effects of the recommended corrective action on EFH. Impacts due to implementation of project alternatives would result in short-term alterations of EFH for marine species and species such as rockfish, flatfish, gadids, salmonids, and forage fish such as capelin and sand lance as well as for species such as Pacific herring that are important prey for species with designated EFH. The Corps concludes that its Federal action may affect, but is not likely to adversely affect, EFH and EFH-managed species/species complexes for Gulf of Alaska groundfish, Bering Sea/Aleutian Islands groundfish, and Alaska stocks of Pacific salmon. See Appendix 2 for the Corps' EFH assessment.

4.2 Avifauna

The primary activities possibly affecting local avian populations within and in proximity to the project site are vessel traffic, dredging, and disposal. Vessels moving through the area to access the harbor could displace waterfowl and sea ducks within their intended course. Vessel lights could become an attractive nuisance causing bird collisions and subsequent injury or death if work was done after sundown. Overall, the highest potential for environmental impacts associated with vessels would be the effects of petroleum compounds and other hazardous materials spills. The effects of fuel spills on avian populations are well documented, as direct contact and mortality is caused by ingestion during preening as well as hypothermia from matted feathers. The displacement of local avian populations from the project area during construction would be short-term. Overall, the Corps believes that the recommended corrective action would not have a long-term effect on local avian populations. No significant adverse impacts are expected.

4.3 Threatened and Endangered Species

The proposed determinations of effect for federal Endangered Species Act (ESA) listed, proposed, or candidate species are summarized below.

Proposed Determination of Effect for ESA Listed, Proposed and Candidate Species

Species	Listing Status	Determination
Short-tailed albatross	Endangered	Not likely to adversely affect
Short-tailed albatross Critical Habitat	"Not prudent to designate"	Not applicable
Steller's eider	Threatened	Not likely to adversely affect
Steller's eider Critical Habitat	Designated	No effect
Kittlitz's murrelet	Candidate	Not likely to significantly impact populations, individuals, or suitable habitat
Yellow-billed loon	Candidate	Not likely to significantly impact populations, individuals, or suitable habitat
Steller sea lion	Threatened	Not likely to adversely affect
Steller sea lion Critical Habitat	Designated	Not likely to adversely modify
Northern sea otter	Threatened	Not likely to adversely affect
Northern sea otter Critical Habitat	Designated	Not likely to adversely modify
Humpbacked Whale	Endangered	Not likely to adversely affect

Endangered Species Act consultation with NMFS and USFWS will ensure that all required mitigation measures are in place and appropriate determinations are agreed upon to protect listed species. A Biological Assessment has been prepared and submitted for the species listed above.

4.4 Subsistence Resources

The Alaska Native Interest Lands Conservation Act identifies three factors related to subsistence uses as items affected by changes in management activities or land uses: (1) resource distribution and abundance; (2) access to resources; and (3) competition for the use of resources. Subsistence resources, such as marine plants and animals primarily affected by the various alternatives are predominantly food resources collected for primary diet, customary and traditional practices, or to supplement other existing food resources.

Maintenance dredging on the sea floor within the harbor would temporarily affect local fishing within the harbor. Short-term impacts to fish occurring within the harbor would be minimal, as dredging temporarily increased turbidity within the harbor. However, due to existing current patterns and tidal forces, water conditions would likely return to normal within several hours following dredging activities.

The Corps is unaware of any herring-spawn harvesting within the harbors at Kodiak; however, should it occur, the impacts on that activity would be short term. In conclusion, the Corps believes that there would be no anticipated significant impacts to marine-related subsistence resources or access to and competition for subsistence resources from the corrective action.

4.6 Cultural and Historic Resources

On January 13, 2012 the Alaska State Historic Preservation Officer (ASHPO) concurred with the Corps' initial determination that the maintenance dredging would have no effect on any historic or prehistoric resources in the area. The Corps believes that no historic properties are present in the dredging area and therefore the maintenance dredging is not expected to have an impact on any cultural resources.

4.7 Air and Noise Quality

The proposed dredging action would not increase airborne particulate matter in the project area above acceptable threshold levels. Operation of dredging machinery and other equipment would cause a minor, temporary increase in air emissions because of exhaust, which would cease once dredging is completed. There also would be localized increases in noise levels from dredging and disposal. Noise levels would not likely be noticeable over ambient conditions at either the dredging or offloading site as both are adjacent to or near industrial areas, port facilities, boat operations, and other sources of noise and artificial light. To be considered 'regionally significant,' emissions associated with the project must exceed 10 percent or more of the region's emissions for a particular pollutant (http://www.dec.state.ak.us/air/index.htm). Although no analysis was done, due to the very limited number of emission sources involved, the short duration of the dredging action, the requirement that all emissions sources meet applicable Federal and State standards, and the scale of emissions in the region versus the scale of the dredging action, it is clear that this short-term and relatively minor dredging project would contribute far less than 10 percent for the area of pollutants such as Carbon Monoxide (CO), volatile organic carbon (VOC), Particulate Matter (10 micrometers or less, PM_{10}), and NOx (nitric oxide and nitrogen dioxide). National ambient air quality standards are not expected to be exceeded.

4.8 Socioeconomic Resources

Waterborne commerce would remain the primary component of the local and regional economy. The proposed action would not change the type or quantity of goods and services at the harbor. Some short-term interference to commercial and recreational vessel traffic could occur during dredging and transportation of dredged material to the in-water disposal site. However, these conflicts are expected to be an inconvenience rather than an impact to commercial and recreational activity. Alaska Marine Highway ferry traffic would not be affected. In addition, the proposed action would not cause changes to the population or other indicators of social well being, and would not result in disproportionately high or adverse effects to minority populations or low-income populations.

4.9 Environmental Justice and Protection of Children

On February 11, 1994, Executive Order 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations was issued. The purpose of the order is to avoid the disproportionate placement of Federal actions and policies having adverse environmental, economic, social, or health effects on minority and low-income populations. Construction of the proposed corrective action would have beneficial effects on the Kodiak community. No racial, ethnic, age, economic or other population group would be disproportionately adversely affected.

On April 21, 1997, Executive Order 13045, Protection of Children from Environmental Health and Safety Risks was issued to identify and assess environmental health and safety risks that may disproportionately affect children. The proposed action would affect the community as a whole, and there would be no environmental health or safety risks associated with the action that would disproportionately affect children. The proposed action would take place offshore, in proximity to commercially developed areas, and away from homes, schools, and playgrounds. Children would not be put at risk by the proposed corrective action.

4.10 Cumulative Effects

Cumulative effects are defined as, "The impact on the environment which results from the incremental impact on an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 Code of Federal Regulations, Section 1508.7). Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time. The past and present actions that have occurred within and adjacent to the harbor project area are identified below. Together, these actions have resulted in the existing conditions of the project area.

- 1955 – Near Island Channel is completed.
- 1958 – St. Paul Harbor small boat basin and related breakwaters are completed.
- 1964– Earthquake damage to both St. Paul Harbor breakwaters is repaired.
- 1973– Repairs to the St. Paul Harbor southwest breakwater are completed.
- 1997– Construction of three breakwaters protecting St. Herman's Harbor float system is completed.

The known reasonably foreseeable future actions under consideration in this analysis are identified below. The list includes relevant foreseeable actions within and adjacent to the harbor, including those by the Corps, other Federal agencies, State and local agencies, and private and commercial entities.

- Continued operation and maintenance of the harbors to the various design depths plus 1 foot of overdepth.
- Continued use and development of the project area, including areas adjacent to the harbors for commercial, recreational, governmental, industrial, and residential uses in proportion to any future increases in population within the Kodiak area.
- Continued operation and maintenance of berths, docks, boatyard, and ramps associated with the harbor.
- Reconfiguration of the harbor's finger and float systems as needed by the City of Kodiak.

4.10.1 Marine Environment

Future development, construction activities, and other foreseeable future projects, in combination with population growth within and adjacent to the project area, increases in moored and transiting vessel impacts/use, would produce changes in the amount of impervious surfaces and associated runoff in and around the harbor and adjacent watersheds as well as additional hydrocarbon inputs from vessel use. However, all projects are required to adhere to local, State, and Federal stormwater control regulations and best management practices, which are designed to limit surface water inputs.

4.10.2 Biological Resources

Biological resources include fish and wildlife, vegetation, wetlands, tidelands, Federal threatened and endangered species, other protected species and natural resources management. The legacy contamination, development, and industrial use in the harbor would continue to impede aquatic systems from returning to natural species richness, community structure, and ecological function. While historic development within and adjacent to the project area has caused some loss of

aquatic habitat, these actions occurred in a regulatory landscape that is different from today. While future development would likely have localized impacts on these resources, under the current regulatory regime, these resources are unlikely to suffer significant losses. Any future Federal actions would require additional evaluation under the National Environmental Policy Act at the time of their development.

4.10.3 Cultural and Historic Resources

The harbor has been dredged in the past. No cultural or historic resources are expected to be impacted by the proposed dredging action. The proposed disposal area is not known to contain cultural or historic resources. No cultural and historic resources are expected to be impacted by the proposed dredged material placement action. Reasonably foreseeable future actions within and adjacent to the developed project area are subject to review and approval by the State Historic Preservation Officer and would have minor, if any, impacts on cultural resources.

4.10.4 Air and Noise Quality

The proposed action and the past, present, and reasonably foreseeable actions identified above are not anticipated to result in cumulatively significant air quality deterioration as defined by the state of Alaska. Noise associated with the proposed action also would occur. These noise impacts would be localized, short-term, and of an intermittent nature and are not expected to be cumulatively significant.

4.10.5 Socio-economic Resources

The proposed action and future Corps' maintenance dredging activities would alleviate grounding impacts to navigation and would not change the type or quantity of goods shipped or the type or size of commercial vessels transiting the harbor. Waterborne commerce would remain an important component of the local and regional economy. Some short-term interference to recreational and commercial traffic could occur during proposed and future dredging and material placement activities, including Corps' maintenance dredging of the harbor and any future dredging that may be recommended. However, these conflicts are expected to be an inconvenience rather than a direct impact to commercial and recreational activity. The proposed action, when added to other past, present, and reasonably foreseeable future actions is not expected to cause a cumulative adverse change to population or other indicators of social well being and should not result in an adverse effect. As a result, there would be no disproportionately high or adverse effect on minority populations or low-income populations.

4.10.6 Cumulative Effects Summary

The cumulative impacts analysis evaluated the effects of implementing the proposed action in association with past, present, and reasonably foreseeable future Corps' and other parties' actions within and adjacent to the project area. Past and present actions have resulted in the present conditions in the harbor. Reasonably foreseeable future actions considered included relevant foreseeable actions within and adjacent to the project area, including those of the Corps, other Federal agencies, State and local agencies, and private and commercial entities. The cumulative impacts associated with implementation of the proposed action were evaluated with respect to each of the resource evaluation categories, and no cumulatively significant adverse impacts were identified.

5.0 PUBLIC INVOLVEMENT, FEDERAL COMPLIANCE AND AGENCY COORDINATION

5.1 Compliance With laws and Regulations

This EA and unsigned Finding of No Significant Impact (FONSI) have been prepared relying on previous NEPA-related scoping efforts, public input associated with the Kodiak harbors, and the most recent correspondence with State and Federal resource agencies. Per the NEPA process and Corps regulations and guidance, the EA and FONSI are subject to a 30-day public review. If requested, a public meeting would be held to discuss the proposed plan and solicit public views and opinions.

5.2 Compliance with Laws and Regulations

The development and preparation of this EA and unsigned FONSI is being coordinated with a variety of State and Federal agencies. An evaluation to determine consistency with Section 404(b)(1) of the Clean Water Act, which governs discharge of dredged or fill material, has been completed and is attached (Appendix 1).

Both the Corps and ASHPO determined that the project would have no effect on known historic or prehistoric resources within the project area.

The ADEC determines compliance with State of Alaska water quality standards under Section 401 of the Clean Water Act. The Corps determined that the proposed corrective action would not violate State water quality standards. The Corps is coordinating their determination with the ADEC, and if they concur, they would issue a water quality certification if there is reasonable assurance that the proposed corrective action would meet and maintain the standards.

A non-inclusive checklist of project compliance as it exists prior to completion of the NEPA and other related legal processes/requirements with relevant Federal, State, and local statutes and regulations is shown in table 2.

Table 2. Environmental Compliance Checklist

FEDERAL	Compliance
Archeological & Historical Preservation Act of 1974	FC
Clean Air Act	FC
Clean Water Act	PC
Coastal Zone Management Act of 1972	FC
Endangered Species Act of 1973*	PC
Estuary Protection Act	FC
Federal Water Project Recreation Act	FC
Fish and Wildlife Coordination Act	FC
National Environmental Policy Act *	PC
Land and Water Conservation Fund Act	FC
Marine Protection, Research & Sanctuaries Act of 1972	FC
National Historic Preservation Act of 1972	FC
River and Harbors Act of 1899	FC
Magnuson-Stevens Fishery Conservation & Management Act *	PC
Marine Mammal Protection Act	PC
Bald Eagle Protection Act	FC
Watershed Protection and Flood Preservation Act	FC
Wild & Scenic Rivers Act	N/A
Executive Order 11593, Protection of Cultural Environment	FC
Executive Order 11988, Flood Plain Management	FC
Executive Order 11990, Protection of Wetlands	FC
Executive Order 12898, Environmental Justice	FC
Executive Order 13045, Protection of Children	FC
STATE AND LOCAL	
State Water Quality Certification *	PC
Alaska Coastal Management Program *	PC

PC = Partial compliance, FC = Full compliance
*Full compliance will be attained upon completion of the Public Review process and/or coordination with the responsible agency.

6.0 CONCLUSIONS AND MITIGATION RECOMMENDATIONS

The Corps concludes that the recommended maintenance dredging of St. Paul and St. Herman's harbors at Kodiak, Alaska, is consistent with State and local coastal zone management programs to the maximum extent practicable. The Corps also concludes that the EA supports the conclusion that the navigation improvements do not constitute a major Federal action significantly affecting the quality of the human environment. Therefore, preparing an environmental impact statement is not necessary and signing a FONSI is appropriate.

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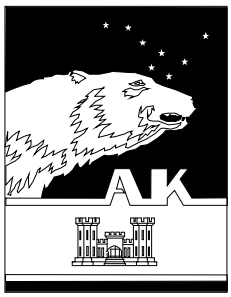
APPENDIX 1
404(b)(1) Analysis
ASSESSMENT



St. Paul & St. Herman Harbor's
Maintenance Dredging
Kodiak, Alaska

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MARCH 2012

Evaluation under Section 404(b)(1) of the Clean Water Act
St. Paul & St. Herman Harbor's
Operations and Maintenance Dredging
Kodiak, Alaska

This is the factual documentation of evaluations conducted under Section 404 of the Clean Water Act of 1977. This particular report covers the removal of material from the entrance channels of St. Paul and St. Herman harbors at Kodiak, Alaska, and the disposal of the material within St. Herman's harbor basin. The project is authorized under Section 5033 of the Water Resource and Development Act of 2007, which states: "The Secretary shall carry out, on an emergency basis, the necessary removal of rubble, sediment, and rock impeding the entrance to the St. Herman and St. Paul harbors, Kodiak, Alaska...." The entrances to these harbors are, at several points, of depths less than design requirements, due to rocky pinnacles or pieces of breakwater armor rock that have moved from their intended locations.

I. PROJECT DESCRIPTION

A. Location: The project area is immediately offshore of the City of Kodiak on Kodiak Island, Alaska. Two harbor basins are involved: St. Paul Harbor (adjacent to downtown Kodiak), and St. Herman's Harbor (just to the south at Near Island).

B. General Description: The environmental assessment (EA) to which this evaluation is appended contains additional information on the potential effects of the proposed actions and a brief discussion of alternatives to the proposed action. In general, the project would include the use of a hydro hammer and an excavator within the entrance to St. Paul Harbor and the north entrance of St. Herman's Harbor, as well as the removal of misplaced pieces of armor rock from the south entrance of St. Herman's Harbor. The loose material would be removed from the water via a barge-mounted crane with a clamshell bucket, loaded into a scow/barge, and then discharged at the disposal site, an area at the southeast end of the St. Herman's Harbor basin with depths of greater than 50 feet below MLLW.

The project has been divided into six areas for contracting purposes; table 1 summarizes the estimated quantity of dredged material expected from each area. "Maximum Payment" is the *in situ* volume of material to be removed down to the required depth plus an allowed 1-foot over-depth. The "Disposal Volume" assumes that the material increases in volume by a factor of 1.61 removal and handling and that no effort is made to compact the material.

Table 1. Summary of Dredged Material Quantities

Area	"Maximum Payment" (cubic yards)	"Disposal Volume" (cubic yards)
Area 1 - St. Paul entrance	3,050	7,100
Area 2 - St. Herman's south entrance	90	90
Area 3 - St. Herman's north entrance	3,525	6,075
Area 4 - St. Herman's north side	1,350	2,175
Area 5 - St. Herman's north entrance	1,775	3,150
Area 6 - St. Herman's north entrance	475	900
TOTAL	**10,265**	**19,400**

C. Authority: The authority for the project is discussed above and in the EA.

D. General Description of Dredged or Fill Material: The bedrock substrate to be removed by hydro-hammering is believed to be a fine-grained, moderately hard slate, based on a single core sample drilled at St. Herman's Harbor in 1989, and observations of exposed bedrock in the area. The geotechnical report described the slate in the core sample as highly fragmented, suggesting that the slate may tend to fracture into relatively small pieces. An April 2011 underwater video of the channel areas to be dredged showed pockets and expanses of sediment amongst the rocky outcroppings. The 1989 geotechnical report described a thin mantle, about 1 foot thick, of "well-graded gravel with silt and sand" overlying the bedrock. Subsequent observations of the sediment have been consistent with this description. The 1989 exploration log classified the sediment as "54% gravel, 40% sand, 6% fines, and 3% organic content". The gravel and sand appear to be weathered bedrock, and are predominately black, with elongated, angular particles. Finely pulverized shell is also common in the sediment, giving it a more pale appearance in some locations.

E. Description of the Proposed Discharge Site: The discharge site is a 6.4-acre (roughly 610-ft by 455-ft) area within the St. Herman's Harbor basin, located between the harbor float system and the main breakwater (figure 1in the EA). The material removed from the dredge site would be placed in depths of approximately -50 feet MLLW. Underwater video of the site taken in April 2011 showed surface sediments at the disposal site to be similar to those visible in the harbor channel areas, but with a flatter topography and sparser vegetation.

F. Description of Disposal Method: The dredged material would be placed into a barge/scow and transported to the disposal area. The dredged material would either be removed from the barge with an excavator or front-end loader, or with the use of a "belly dump" barge.

II. FACTUAL DETERMINATIONS

A. Physical Substrate Determinations: The disposal area is a level 6.4-acre expanse at roughly 50 feet below MLLW within the existing confines of St. Herman's Harbor. The existing bottom sediment of the disposal area has not been sampled, but appears to be similar to that found in the harbor channel areas: dark sandy gravel with shells and chunks of rock. In contrast, the dredged material placed in the disposal area would be rocky rubble. The particle size distribution of the rubble to be created by hydro-hammering is unknown. If evenly distributed across the 610-foot

by 455-foot disposal site, the estimated 19,400 total cubic yards of dredged material would cover the site to a depth of approximately 2 feet. However, the discharged material may be allowed to accumulate in one or more heaps to raise the bottom relief at the site and potentially improve the biological productivity of the new habitat.

B. Water Circulation, Fluctuation, and Salinity Determinations: The discharge of the dredged material within St. Herman's Harbor should have no effect on the water circulation, fluctuation or salinity. The placement of the dredged material would slightly reduce the total volume of the harbor basin and create a small rock rubble mound at the southwest end of the basin, but the quantity of fill and change in harbor contour would be too small in relation to the total harbor area and volume to have a discernible effect on water circulation within the basin. The rock rubble fill should be low in dissolvable nutrients and organic material, and should not introduce any substance into the water column that would suppress oxygen concentrations. The hydro hammer and dredging at the entrance channels would deepen the channels by a few feet in selected areas. This modification may slightly reduce velocities of water through the channels; however, the overall circulation and exchange of water within the harbor basin should not be significantly affected.

C. Suspended Particulate/Turbidity Determinations: The rock rubble to be discharged at the disposal site would contain very little in the way of fines to be suspended in the water column, and little turbidity should be generated during disposal. The initial impact of the rock on the bottom substrate would loft some silt and organic matter into the water column, but the predominately gravel-and-sand sediment should settle quickly. During the underwater video surveys, the heavy camera was deliberately bounced on the bottom sediments to see how easily they were disturbed, and very little sediment was lofted into the water as a result.

Suspended sediment may be more of an issue in the harbor entrance channels that are to be dredged. More sediment would be suspended during the dredging of the rocky rubble. The surface sediments would be mixed into and dredged together with the rubble, but most sediment would probably escape the excavator or clam-shell and wash back into the water column. The gravel and sand would settle relatively quickly back to the seafloor; a small amount of silt and organic material would remain suspended in the water column for a longer period of time, eventually settling within the harbor basin or in the channel outside the harbor.

D. Contaminant Determinations: None of the sediment or bedrock material involved in this project has been tested for chemical contamination. The material to be discharged to the disposal area will be almost entirely rubble from fractured bedrock, and there is no reason to believe the bedrock has either adsorbed or absorbed and therefore contains substantial anthropogenic contamination. The gravel and sand sediments in the dredging areas are also too coarse and have too low an organic material content to be a significant vehicle for chemical contamination, and should largely settle back into the general area from which they were displaced. Entrance channels are typically not accumulation points for chemical contaminants released in small boat harbors.

E. Aquatic Ecosystem and Organism Determinations: The disposal site is within an existing harbor basin. The existing ecosystem at the disposal site appears to be a low-productivity benthic community of sparse algae and a small number of epibenthic and infaunal organisms, on a flat expanse of silty, sandy gravel. *Meretridium* sp. anemones, clams, and a low, dark filamentous alga are the dominant organisms revealed on an underwater video taken in April 2011. Within the area receiving the dredged material, this ecosystem would be completely replaced with an expanse of rock and gravel that would recruit a different assemblage of organisms. The new rocky substrate would encourage the growth of more hard-substrate organisms such as anemones, sea urchins, sea stars, grazing gastropods, and kelps. The increased structure on the sea floor may attract crustaceans and juvenile fish. Raising the seafloor several feet higher into the photic zone may also increase the diversity and productivity of marine algae. Habitat for infauna such as clams and marine worms would be eliminated within the footprint of dredged material disposal.

The ecosystems within the entrance channels are more productive and diverse, due to greater light exposure in the shallower areas and a greater variety of substrate (exposed rock interspersed with pockets of gravel). Short-bladed kelps (e.g., *Agarum* spp.) and coralline algae are abundant, along with anemones, sea stars, and mollusks. The dredging activity at the harbor entrance channels would destroy the existing habitat and organisms within a small area. However, the resulting modified seafloor would not be substantively different than what exists now: exposed rock with pockets of sand and gravel. Based on recolonization rates observed at other Corps harbor projects, these areas would rapidly recruit an assemblage of algae and epibenthic animals similar to what exists now.

F. Proposed Disposal Site Determinations: The rocky rubble discharged at the disposal site would be expected to descend through the water column with little dispersion, and remain within the defined disposal area. The sandy gravel sediment lofted from the harbor floor at the disposal site would settle rapidly within the St. Herman's basin.

G. Determination of Cumulative/Secondary Effects: The proposed dredging and disposal operation should have no cumulative or secondary effects. There would not be an increase of vessel traffic nor would ancillary facilities be constructed because of the proposed action. St. Herman's and St. Paul harbors do not require regular dredging, so there should not be a demand to use the St. Herman's basin disposal site on a repeated basis. There are no other known or proposed dredging operations within the project area; therefore, this project would not add to the adverse impacts of another similar project.

III. FINDINGS OF COMPLIANCE

A. Adaptation of the Section (404)(b)(1) Guidelines to this Evaluation: No adaptations of the guidelines were made relative to this evaluation.

B. Evaluation of Availability of Practical Alternatives: Several upland disposal sites were considered for this project. However, the -50-foot-depth depression within St. Herman's Harbor offers a unique in-water disposal option that may be used with no negative effects (and perhaps a small net positive effect) on the local environment and with significant financial benefit to the

project. The use of the upland disposal sites would not be without environmental impact, when one considers the additional heavy truck traffic that would be required to move the dredged material, and the risk of sediment release from the disposal sites. Given the low impact on the environment of using the St. Herman's basin disposal site, there is no particular environmental advantage to using upland disposal sites.

C. Compliance with Applicable State Water Quality Standards: The disposal of the dredged material would not violate any applicable State water quality standards. The fill operation would not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

D. Compliance with Endangered Species Act of 1973: The proposed action is not expected to harm any endangered species or their critical habitat (northern sea otter). The work would be planned to minimize the risk of a taking of Steller sea lions known to frequent St. Herman's Harbor. As well as avoid potential impacts to Steller's eider, northern sea otter, yellow-billed loon and Kittlitz's murrelet.

E. Compliance with Specified Protection Measures for Marine Sanctuaries Designed by the Marine Protection Research and Sanctuaries Act of 1972: There is no action associated with the proposed project which would violate the above Act.

F. Evaluation of Extent of Degradation of the Waters of the United States: There would be no significant adverse impacts to municipal and private water supplies, recreation and commercial fisheries, plankton, fish, shellfish, wildlife and/or aquatic sites caused by the proposed action. There would be no significant adverse effects on regional aquatic ecosystem diversity, productivity, and/or stability caused by the placement of the fill material nor would there be significant adverse effects on recreation, aesthetic, and/or economic values caused by this project.

G. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on Aquatic Ecosystems: All appropriate and practicable steps would be taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem. Those steps include timing of disposal activities to avoid species of concern.

On the basis of the Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR part 230), the proposed project has been specified as complying with the requirements of the guidelines for Section 404 of the Clean Water Act.

APPENDIX 2
Essential Fish Habitat Assessment
ASSESSMENT

St. Paul & St. Herman Harbors
Maintenance Dredging
Kodiak, Alaska

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ESSENTIAL FISH HABITAT ASSESSMENT
St. Paul & St. Herman Harbors
Maintenance Dredging
Kodiak, Alaska

Preface

The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act set forth the essential fish habitat (EFH) provision to identify and protect important habitats of federally managed marine and anadromous fish species. Federal agencies, that fund, permit, or undertake activities that may adversely affect EFH, are required to consult with National Marine Fisheries Service (NMFS) regarding the potential effects of their actions on EFH, and respond in writing to NMFS recommendations.

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. "Substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities.

Upon completing the Corps's EFH-coordination with the NMFS, the Corps' will incorporate its EFH evaluation and findings and NMFS conservation recommendations (if any) into the project's environmental assessment.

Project Purpose

The proposed federal action is operations and maintenance dredging of those portions of St. Paul and St. Herman harbors shown in figure 1. The purpose of the proposed action is as stated in Section 5033 of the Water Resource Development Act of 2007 via the following language: "The Secretary shall carry out, on an emergency basis, the necessary removal of rubble, sediment and rock impeding the entrance to the St. Herman and St. Paul harbors, Kodiak, Alaska…..", the purpose of the proposed action is therefore defined as: the removal of the impedance of access to the entrance's of Kodiak's St Paul and St. Herman harbors'.

The underlying need is the provision of design depth at the entrance/exit channels. The need for adequate entrance/exit channel depth has resulted in the proposed dredge action. While this depth was previously authorized the density of the rock precluded previous mechanical dredging attempts to reaching design depth in all areas.

If the proposed action is not implemented, full (design level) access to St. Paul Harbor's only entrance and exit will remain restricted. Vessel operators will continue to experience grounding and channel constrictions due to vessels being forced to utilize a limited portion of the

entrance/exit channel depending on tidal elevation. The result is a continuation of vessel operators experiencing grounding and channel constriction issues based on tidal elevations.

Project Authority

St. Paul Harbor at Kodiak was authorized via the Rivers and Harbors Act of 3 September 1954 (House Doc. 465, 83rd Congress, 2nd Session) as adopted. St. Herman's Harbor at Kodiak was authorized on November 17, 1986, in the Water Resources Development Act of 1986, Public Law 99-662. Authorization for the proposed action is contained in Section 5033 of the Water Resource Development Act of 2007. That language stated; "The Secretary shall carry out, on an emergency basis, the necessary removal of rubble, sediment and rock impeding the entrance to the St. Herman and St. Paul harbors, Kodiak, Alaska…..".

Project Area Description

St. Paul and St. Herman's harbors are located on the northeastern corner of Kodiak Island, Alaska within the Gulf of Alaska. Homer and Anchorage Alaska are located approximately 137 and 251 miles north, respectively.

The history of the U.S. Army Corps of Engineers (USACE) construction and dredging roles in Near Channel, St. Paul and St. Herman's harbors at Kodiak Island. Past dredging history of the harbors, geotechnical and engineering analysis, coordination with dredging contractors with operational experience in Alaska and St. Paul and St. Herman's harbors, and on-site surveys have led USACE staff to expect that to dredge the bedrock that is restricting harbor access will typically require a hydro hammer followed by dredging with a barge mounted, clamshell bucket equipped crane and hopper style barge.

FIGURE 1. St. Paul and St. Herman Harbors at Kodiak.

Project Description

The U.S. Army Corps of Engineers is proposing to conduct maintenance dredging of a total of 10,265 cubic yards of bedrock substrate in six locations in Kodiak's St. Paul and St. Herman's harbors as shown figure 1. Drilling and rock fracturing (via a hydraulically driven rock hammer) is expected to be required to fracture bedrock in all areas except Area 2 in South Herman's Harbor, followed by excavation of dredged materials into a transport barge via crane mounted clamshell bucket. Disposal of dredged materials in water in the southern end of St. Herman's Harbor is proposed at an elevation of -50 Mean Lower Low Water (MLLW).

Essential Fish Habitat

NMFS authority to manage EFH is directly related to those species covered under Fishery Management Plans (FMPs) in the United States. The Corps' maintenance dredging action is within an area designated as EFH for three FMPs—Gulf of Alaska (GOA) Groundfish, Bering Sea/Aleutian Island (BSAI) Groundfish and Alaska Stocks of Pacific Salmon. These three FMPs include species or species complexes of groundfish and invertebrate resources and the Pacific salmon species (table 1). See Appendix 2 for a description of Pacific Salmon, GOA and BSAI Groundfish resources. No EFH "habitat areas of particular concern" are in the Corps' project area.[1]

Nearshore habitats in proximity to the harbor are expected to be used by juvenile salmonids during their early marine life history. According to the Alaska Department of Fish and Game mapping tool used to identify anadromous waters, salmon streams exist both northeast and southwest of the harbors. DOT 2009 clearly defines salmonid use and outmigration for Chiniak Bay. Coho and pink salmon are the salmon species that are the heaviest users of streams that outfall into Chiniak Bay, followed by chum, Chinook and sockeye salmon. Juvenile salmon from these streams may use the nearshore project area during their spring outmigration and rearing in the nearshore environment, thereby gaining size and swimming ability before moving into more offshore waters. Young-of-the-year (all fish less than 1 year old) of all species but Chinook salmon are expected to be found along the shoreline.

Rocky shorelines typical of this area provide a prey base of gammarid amphipods, and harpacticoid copepods. Nearshore waters also harbor a myriad of predators on juvenile salmonids, including larger fish (e.g., rockfish and other salmonids), piscivorous birds (e.g. grebes, cormorants, herons), and marine mammals (seals, sea lions, and humpback whales). To avoid these predators, juvenile salmonids benefit from the presence of shoreline complexity (e.g., large wood, rocks, and kelp beds) that provide escape and hiding spaces.

Larval, juvenile, and adult life stages of several rockfish species could occur in and in proximity to the Corps' project area.

[1] http://www.fakr.noaa.gov/habitat/efh/hapc/hapc_ak.pdf

Table 1. Fish with designated essential fish habitat in the Gulf of Alaska Groundfish, Bering Sea/Aleutian Islands Groundfish and Alaska Stocks of Pacific Salmon Fishery Management Plan areas

Gulf of Alaska Ground Fish		**Alaska Stocks of Pacific Salmon**
Skates (Rajidae) Pacific cod Walleye Pollock Thornyhead Rockfish Pacific ocean perch Rougheye rockfish Yelloweye rockfish Rex sole Dover sole Flathead sole Sablefish Atka mackerel	Shortraker rockfish Northern rockfish Dusky rockfish Yellowfin sole, Arrowtooth flounder Rock sole Alaska plaice Sculpins (Cottidae) Sharks Forage fish complex Squid Octopus	Chinook salmon Coho salmon Pink salmon Chum salmon Sockeye salmon

Gulf of Alaska Ground Fish	
Walleye Pollock Eggs Pacific Cod Yellowfin Sole Greenland Turbot Arrowtooth Flounder Rock Sole Alaska Plaice Rex Sole Dover Sole Flathead Sole Sablefish Octopus	Pacific Ocean Perch Shortraker & Rougheye Rockfish Northern Rockfish Thornyhead Rockfish Yelloweye Rockfish Dusky Rockfish Atka Mackerel Skates Sculpins Sharks Forage Fish Complex Squid Eggs

Assessment of Project Effects on Essential Fish Habitat

Short-term impacts include: (1) water quality impacts in the form of increased levels of turbidity resulting from drilling, dredging and disposal (2) oil/grease releases from work vessels and equipment; (3) noise disturbance from operation of heavy equipment, dredging via a clamshell bucket, hydraulic rock fracturing, and detonation of explosives; and (3) disturbance from increased construction-related work boat traffic in the project area and along the disposal route.

Long-term impacts include: reconfiguration of the depth and surface contour of EFH on the rock surface at the bottom of the harbors within the dredge footprints and at the disposal site.

Short-term Impacts

Water Quality. Any turbidity would be temporary, occur only in the immediate vicinity of clamshell dredging and hydro hammer use. During dredged material disposal, any sediment that does occur would dissipate rapidly by tidal mixing.

Juvenile salmon have been shown to avoid areas of high turbidities (Servizi 1988), although they may seek out areas of moderate turbidity (10 to 80 NTU), presumably as refuge against predation (Cyrus and Blaber 1987a and 1987b). Feeding efficiency of juveniles is impaired by turbidities

in excess of 70 NTU, well below sub-lethal stress levels (Bisson and Bilby 1982). Reduced preference by adult salmon homing to spawning areas has been demonstrated where turbidities exceed 30 NTU (20 mg/L suspended sediments). However, Chinook salmon exposed to 650 mg/L of suspended volcanic ash were still able to find their natal water (Whitman et al. 1982). Based on these data, it is unlikely that the short-term (measured in hours based on tidal exchange frequency) localized elevated turbidities generated by the proposed action would directly affect EFH juvenile or adult salmonids and EFH groundfish, such as flatfish, sculpins, and rockfish that may be present. Potential impacts would be further minimized by conducting all in-water work within approved regulatory work windows that would avoid major periods of juvenile salmon outmigration.

Except for the short-term, localized turbidity associated with maintenance dredging, no adverse impacts to water or sediment quality is expected to occur as a result of the recommended dredging action.

Waterborne Noise and Pressure. Waterborne noise would result from construction activities, such as the noise generated directly by work vessels (propulsion, power generators, on-board cranes, etc.) or by activities conducted by those vessels (e.g., drilling bore holes, clamshell dredging, placement of material into the dump barge, hydraulic rock fracturing).

Underwater noise or sound pressure from construction activities can have a variety of impacts on marine biota, especially fish and marine mammals. The most adverse impacts are associated with activities like underwater explosions and impact pile driving that produce a sharp sound through the water column (Hastings and Popper, 2005). Only blasting is expected to produce sound levels at decibels that could injure fish. At present, blasting is not being considered for this proposed action. Sound and pressure waves produced by all other in-water work does not have the potential to generate the type and intensity of sound or pressure waves that would result in injury or death of fish. Non-blasting activities are expected to cause both adult and juvenile fish to leave or avoid the work area. Affects would be further minimized by restricting in-water work to periods when few juvenile salmonids are in the area. Groundfish species such as flatfish, rockfish, and sculpins can be present year-round, so they may move out of the area during the construction period as well.

Construction-related Work Boat Traffic. Constructing the Corps's proposed project would primarily involve drilling, rock fracturing via hydraulic rock hammer, clamshell dredging and the placement of materials into a dump barge. For EFH fish, interactions with tug and barge traffic would be relatively benign in a harbor and marine navigational channel environment consisting of the fish moving away from the vessels and barge. Vessels and barges would not be working at depths that would result in their grounding themselves on the bottom during low tide periods, thus no destruction or alteration of bottom habitats that constitute EFH.

Long-term Impacts

Loss and Conversion of Marine Habitat. EFH marine habitat will not be lost. Within the dredge and disposal area footprints smooth rock and sediment surfaces will be replaced by a fractured and angular rock surface after rock fracturing and dredging is complete. Some portions of the dredge footprints will accumulate sediments over time and smooth sediment based contours will return to some areas. The smooth sediment surface at the disposal area will be partially replaced by an angular rock rubble pile in areas where the rock rubble does not sink below the surface of the sediments. The in-water disposal of dredged material would take place in the southern end of St. Herman's harbor at -50 feet MLLW and is expected to act as crab habitat.

Water Quality. With the exception of the previously discussed short term, localized turbidity associated with the dredging of and disposal of dredged material into the marine environment, no adverse impacts to water or sediment quality, EFH, and EFH-related species/species complexes are expected to occur as a result of the recommended maintenance dredging.

Mitigation Measures

"Mitigation" is the process used to avoid, minimize, and compensate for environmental consequences of an action. Incorporating the following mitigation measures and conservation measures into the recommended corrective action will help to assure that no significant adverse impacts would occur to EFH and EFH-managed species/species complexes and other fish and wildlife resources in the project area.

- The proposed action shall cease in-water construction (drilling, and dredging) between April 1 and September 30 during peak herring spawn activities, juvenile salmon outmigration, and rearing activities. All marine mammals, except for humpback whales, are likely to occur in the project area year round, so avoidance with timing windows is not possible. Kittlitz's murrelets could be in the project area at any time of the year and other listed and candidate waterfowl species are likely to be in the area during late fall and winter. However, safety radi, shut down distances, and other protective measures will be coordinated with the endangered species staff at the U.S. Fish and Wildlife Services (USFWS) and National Marine Fisheries Service (NMFS) through a biological assessment and follow-on coordination.
- To minimize the danger to marine mammals from project-related vessels, speed limits (e.g. less than 8 knots) shall be imposed on contractor vessels moving in and around the project area.
- A construction oil spill prevention plan shall be prepared.
- Project-related vessels shall not travel within 3,000 feet of federally designated Steller sea lion critical habitat (haul-outs or rookeries). The sea lion float in St. Herman's Harbor is not a federally designated haul-out.
- The Corps will conduct post-dredging bathymetry surveys to ensure that authorized depth was achieved and that dredging was completed within the specified boundaries.
- A dump barge will be loaded so that enough freeboard remains to allow for safe movement (without material loss) of the barge and its dredged material en route to the disposal area in south St. Herman's Harbor.

Conclusions and Determination of Effect

The project actions described above have the potential to affect the EFH for several Gulf of Alaska groundfish species (e.g., rockfish, sculpin, and flatfish), Bering Sea/Aleutian Island groundfish species and for Alaska stocks of Pacific salmon, in the short-term. Short-term effects in the form of avoidance and possibly injury of a few individuals because of noise disturbances, vessel traffic, and turbidity would be intermittent and low level. No long-term effects are expected other than the change in the elevation and surficial texture of the EFH on that portion of the harbor substrate that is dredged.

The potential effects of turbidity would be intermittent and low level. No adverse impacts related to circulation and harbor-flushing is expected. Year-round resident EFH species would likely respond by temporarily moving out of work areas during construction.

The Corps' recommended maintenance dredging would likely be constructed over a period of one to two months and within an anticipated in-water work window. Seasonal work restrictions would minimize any impacts to out-migrating juvenile salmonids and to spawning herring by prohibiting work in open waters between approximately April 1 to September 30. Work would be allowed in marine waters from October 1 to March 31.

Potential impacts to EFH and EFH-managed species/species complexes are likely to be highly localized, temporary, and minimal, and not reduce the overall value of EFH in either harbor. The aforementioned mitigation measures will be prescribed to offset the potential impacts of the Corps' maintenance dredging activity. Therefore, the Corps concludes that its Federal action may affect, but is not likely to adversely affect, EFH and EFH-managed species/species complexes for Gulf of Alaska groundfish, Bering Sea/Aleutian Island groundfish and Alaska stocks of Pacific salmon.

APPENDIX 1
PROPOSED MAINTENANCE DREDGING

The proposed action involves the use of a hydro hammer and an excavator fitted with a toothed bucket. After use of the hydro hammer to fracture rock, the rubble would be dredged via barge mounted crane equipped with a clamshell bucket and deposited into a transport barge. Area 2 would be dredged via mechanical fracturing of bedrock substrate and picking up errant breakwater riprap with a clamshell bucket. All dredge materials removed would be placed in-water at a depth of -50 feet MLLW north east of St. Herman's harbor's southern main breakwater. The total benthic surface acreage to be dredged is 2.56 acres, the total cubic yardage dredged to achieve design depth is 6,570; however, as dredging via a clamshell bucket (after mechanical fracturing) from a vertically and horizontally mobile platform (water surface) effects precision, the contractor may dredge and dispose of up to 10,265 cubic yards of benthic substrate. Because dredging via a clamshell bucket (after mechanical fracturing) from a vertically and horizontally mobile platform (water surface) effects precision, the NEPA and related analyses will analyze the effects of a maximum pay dredging effort (maximum dredging effort authorized) consisting of 10,265 cubic yards of dredged benthic substrate and related disposal.

TABLE 1. Dredged and Disposal Volume Quantities

LOCATION	Required Depth*	Max Pay Line**	Loose Disposal Quantity***	Surface Area Dredged
Area 1 St. Paul	1,550 cy	3,050 cy	7,100 cy	0.91 ac
Area 2 St. Herman	50 cy	90 cy	90 cy	0.03 ac
Area 3 St. Herman	2,700 cy	3,525 cy	6,075 cy	0.68 ac
Area 4 St. Herman	460 cy	1,350 cy	2,175 cy	0.54 ac
Area 5 St. Herman	1,450 cy	1775 cy	3,150 cy	0.30 ac
Area 6 St. Herman	360 cy	475 cy	900 cy	0.10 ac
Total	6,570 cy	10,265 cy	19,400 cy	2.56 ac

(Note: The minimum in water footprint disposal of 19,400 cy's of rock rubble would occupy is 1.5 acres. This is a best case scenario consolidated pile that includes a substantial quantity of interstitial space resulting from the fact that the pile is not compacted. The largest footprint the rubble pile is expected to occupy is 6.4 acres if all rubble were disposed of in a uniform 2-foot layer.

*Required Depth includes the quantity of material (cubic yards) needing to be dredged to reach the bathymetric contour that achieves the design depth.

**Max Pay Line includes the maximum quantity (cubic yards) of material the Corps would pay the contractor to dredge. This additional cubic yardage represents the total cubic yardage of dredge material contained in the next one foot of depth below the design depth over the entire area to be dredged. This additional cubic yardage is included because of the depth tolerances dredgers operate within while dredging from the water's surface which may be moving vertically and horizontally while the dredge action is taking place. As a result it is necessary to recognize that the dredger may not be able to maintain a specific depth at all times over the entire area to be dredged.

***Loose Disposal Quantity includes the volume of dredged material and empty interstitial space within an un-compacted pile of disposed dredge material.

The Corps of Engineers Regulations Manual on Navigation and Dredging Operations and Maintenance ER 1130-2-520 states that:

> "It is the policy of the Corps of Engineers that dredging shall be accomplished in an efficient, cost-effective, and environmentally acceptable manner to improve and maintain the Nation's waterways and make them suitable for navigation and other purposes consistent with Federal laws and regulations."

And that:

> "The maximum practical benefits will be obtained from materials dredged from authorized Federal navigation projects, after taking into consideration economics, engineering, and environmental requirements in accordance with applicable Federal laws and regulations (33 CFR Parts 335-338)."

Based on these regulations and the available dredging and material placement options that meet the constraints of the type of material found in the harbor (bedrock), the Corps is proposing to fracture the bedrock substrate via hydro hammer and by mechanical dredging with a crane mounted clamshell bucket. The Corps proposes in-water placement of the material in the southern end of St. Herman harbor at a depth of -50 MLLW. Dredging will occur in compliance with all terms of the Water Quality Certificate and in accordance with the in-water work windows for this operation. Any exceptions to these agreements will require the concurrence of the appropriate regulating agency. This dredging method and placement option takes into consideration the required economic, engineering, and environmental requirements and minimizes negative water quality impacts to the degree reasonably possible.

APPENDIX 2

Description of Essential Fish Habitat for the Groundfish Resources of the Gulf of Alaska Region[2]

Walleye Pollock

Eggs
EFH for walleye pollock eggs is the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m), upper slope (200 to 500 m), and intermediate slope (500 to 1,000 m) 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 shelf (0 to 200 m), upper slope (200 to 500 m), and intermediate slope (500 to 1,000 m) throughout the GOA.

Early Juveniles—No EFH Description Determined
Limited information exists to describe walleye pollock early juvenile larval general distribution.

Late Juveniles
EFH for late 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), middle (50 to 100 m), and outer (100 to 200 m) shelf along the throughout the GOA. No known preference for substrates exist.

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 shelf (0 to 200) and slope (200 to 1,000 m) throughout the GOA. No known preference for substrates exist.

Pacific Cod

Eggs
EFH for Pacific cod eggs is the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m) and upper (200 to 500 m) slope throughout the GOA wherever there are soft substrates consisting of mud and sand.

[2] http://sharpfin.nmfs.noaa.gov/website/efh_mapper/newinv/efh_inventory.html

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) and middle (50 to 100 m) shelf throughout the GOA wherever there are soft substrates consisting of mud and sand.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for late 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), middle (50 to 100 m), and outer (100 to 200 m) shelf throughout the BSAI wherever there are soft substrates consisting of sand, mud, sandy mud, and muddy sand.

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), middle (50 to 100 m), and outer (100 to 200 m) shelf throughout the GOA wherever there are soft substrates consisting of sand, mud, sandy mud, muddy sand, and gravel.

Yellowfin Sole

Eggs
EFH for yellowfin 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 (200 to 500 m) 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 shelf (0 to 200 m) and upper slope (200 to 500 m) throughout the GOA.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for late juvenile 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), middle (50 to 100 m), and outer (100 to 200 m) shelf throughout the GOA wherever there are soft substrates consisting mainly of sand.

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), middle (50 to 100 m), and outer (100 to 200 m) shelf throughout the GOA wherever there are soft substrates consisting mainly of sand.

Arrowtooth Flounder

Eggs—No EFH Description Determined
Insufficient information is available.

Larvae
EFH for larval arrowtooth flounder is the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m) and slope (200 to 3,000 m) throughout the GOA.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for late 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), middle (50 to 100 m), and outer (100 to 200 m) shelf and upper slope (200 to 500 m) throughout the GOA wherever there are softer substrates consisting of gravel, sand, and mud.

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), middle (50 to 100 m), and outer (100 to 200 m) shelf and upper slope (200 to 500 m) throughout the GOA wherever there are softer substrates consisting of gravel, sand, and mud.

Rock Sole

Eggs—No EFH Description Determined
Insufficient information is available.

Larvae
EFH for larval rock 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 1,000 m) throughout the GOA.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for late juvenile 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), middle (50 to 100 m), and outer (100 to 200 m) shelf throughout the BSAI wherever there are softer substrates consisting of sand, gravel, and cobble.

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), middle (50 to 100 m), and outer (100 to 200 m) shelf throughout the BSAI wherever there are softer substrates consisting of sand, gravel, and cobble.

Alaska Plaice

Eggs
EFH for Alaska plaice 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 Alaska plaice 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.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for late 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), middle (50 to 100 m), and outer (100 to 200 m) shelf throughout the BSAI wherever there are softer substrates consisting of sand and mud.

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), middle (50 to 100 m), and outer (100 to 200 m) shelf throughout the BSAI wherever there are softer substrates consisting of sand and mud.

Rex Sole

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.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for juvenile 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), middle (50 to 100 m), and outer (100 to 200 m) shelf throughout the GOA wherever there are substrates consisting of gravel, sand, and mud.

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), middle (50 to 100 m), and outer (100 to 200 m) shelf throughout the GOA wherever there are substrates consisting of gravel, sand, and mud.

Dover Sole

Eggs
EFH for Dover sole eggs is the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m) and slope (200 to 3,000 m) 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 shelf (0 to 200 m) and slope (200 to 3,000 m) throughout the GOA.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for late juvenile 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), and outer (100 to 200 m) shelf and upper slope (200 to 500 m) throughout the GOA wherever there are substrates consisting of sand and mud.

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), and outer (100 to 200 m) shelf and upper slope (200 to 500 m) throughout the GOA wherever there are substrates consisting of sand and mud.

Flathead Sole

Eggs
EFH for flathead sole eggs is the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m) and slope (200 to 3,000 m) throughout the GOA.

Larvae
EFH for larval flathead sole is the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m) and slope (200 to 3,000 m) throughout the GOA.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for 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), middle (50 to 100 m), and outer (100 to 200 m) shelf throughout the GOA wherever there are softer substrates consisting of sand and mud.

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), middle (50 to 100 m), and outer (100 to 200 m) shelf throughout the GOA wherever there are softer substrates consisting of sand and mud.

Sablefish

Eggs
EFH for sablefish eggs is the general distribution area for this life stage, located in deeper waters along the slope (200 to 3,000 m) throughout the GOA.

Larvae
EFH for larval sablefish is the general distribution area for this life stage, located in epipelagic waters along the middle shelf (50 to 100 m), outer shelf (100 to 200 m), and slope (200 to 3,000 m) throughout the GOA.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for late juvenile 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 shelf gulleys along the slope (200 to 1,000 m) throughout the GOA.

Adults
EFH for adult 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 shelf gulleys along the slope (200 to 1,000 m) throughout the GOA.

Pacific Ocean Perch

Eggs—No EFH Description Determined
Insufficient information is available.

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 shelf (0 to 50 m), middle shelf (50 to 100 m), outer shelf (100 to 200 m), and upper slope (200 to 500 m) throughout the GOA.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for late 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 shelf (0 to 50 m), middle shelf (50 to 100 m), outer shelf (100 to 200 m), and upper slope (200 to 500 m) throughout the GOA wherever there are substrates consisting of cobble, gravel, mud, sandy mud, or muddy sand.

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 shelf (100 to 200 m) and upper slope (200 to 500 m) throughout the GOA wherever there are substrates consisting of cobble, gravel, mud, sandy mud, or muddy sand.

Shortraker and Rougheye Rockfish

Eggs—No EFH Description Determined
Insufficient information is available.

Larvae
EFH for larval shortraker and rougheye rockfish is the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m) and slope (200 to 3,000 m) throughout the GOA.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles—No EFH Description Determined
Insufficient information is available.

Adults
EFH for adult shortraker and rougheye rockfish is the general distribution area for this life stage, located in the lower portion of the water column along the outer shelf (100 to 200 m) and upper

slope (200 to 500 m) regions throughout the GOA wherever there are substrates consisting of mud, sand, sandy mud, muddy sand, rock, cobble, and gravel.

Northern Rockfish

Eggs—No EFH Description Determined
Insufficient information is available.

Larvae
EFH for larval northern rockfish is the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m) and slope (200 to 3,000 m) throughout the GOA.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles—No EFH Description Determined
Insufficient information is available.

Adults
EFH for adult northern rockfish is the general distribution area for this life stage, located in the middle and lower portions of the water column along the outer slope (100 to 200 m) and upper slope (200 to 500 m) throughout the GOA wherever there are substrates of cobble and rock.

Thornyhead Rockfish

Eggs—No EFH Description Determined
Insufficient information is available.

Larvae
EFH for larval thornyhead rockfish is the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m) and slope (200 to 3,000 m) throughout the GOA.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for late juvenile 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 shelf (50 to 200 m) and upper to lower slope (200 to 1,000 m) throughout the GOA wherever there are substrates of mud, sand, rock, sandy mud, muddy sand, cobble, and gravel.

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 shelf (50 to 200 m) and upper to lower slope (200 to 1,000 m) throughout the GOA wherever there are substrates of mud, sand, rock, sandy mud, muddy sand, cobble, and gravel.

Yelloweye Rockfish

Eggs—No EFH Description Determined
Insufficient information is available.

Larvae
EFH for larval yelloweye rockfish is the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m) and slope (200 to 3,000 m) throughout the GOA.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for late 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), middle (50 to 100 m), and outer shelf (100 to 200 m) 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.

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 shelf (0 to 50 m), middle shelf (50 to 100 m), outer shelf (100 to 200 m) and upper slope (200 to 500 m) 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.

Dusky Rockfish

Eggs—No EFH Description Determined
Insufficient information is available.

Larvae
EFH for larval dusky rockfish is the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m) and slope (200 to 3,000 m) throughout the GOA.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles—No EFH Description Determined
Insufficient information is available.

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 shelf (100 to 200 m) and upper slope (200 to 500 m) throughout the GOA wherever there are substrates of cobble, rock, and gravel.

Atka Mackerel

Eggs—No EFH Description Determined
Insufficient information is available.

Larvae
EFH for larval Atka mackerel is the general distribution area for this life stage, located in epipelagic waters along the shelf (0 to 200 m), upper slope (200 to 500 m), and intermediate slope (500 to 1,000 m) throughout the GOA.

Early Juveniles —No EFH Description Determined
Insufficient information is available.

Late Juveniles—No EFH Description Determined
Insufficient information is available.

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), middle (50 to 100 m), and outer shelf (100 to 200 m) throughout the GOA wherever there are substrates of gravel and rock and in vegetated areas of kelp

Sculpins

Eggs—No EFH Description Determined
Insufficient information is available.

Larvae—No EFH Description Determined
Insufficient information is available.

Juveniles
EFH for juvenile sculpins 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), middle (50 to 100 m), outer shelf (100 to 200 m) and portions of the upper slope (200 to 500 m) throughout the GOA wherever there are substrates of rock, sand, mud, cobble, and sandy mud.

Adults
EFH for adult sculpins 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), middle (50 to 100 m), outer shelf (100 to 200 m) and portions of the upper slope (200 to 500 m) throughout the GOA wherever there are substrates of rock, sand, mud, cobble, and sandy mud.

Skates

Eggs—No EFH Description Determined
Insufficient information is available.

Larvae—No EFH Description Determined
Insufficient information is available.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles—No EFH Description Determined
Insufficient information is available.

Adults
EFH for adult skates is the general distribution area for this life stage, located in the lower portion of the water column on the shelf (0 to 200 m) and the upper slope (200 to 500 m) throughout the GOA wherever there are of substrates of mud, sand, gravel, and rock.

Sharks

Eggs—No EFH Description Determined
Insufficient information is available.

Larvae—No EFH Description Determined
Insufficient information is available.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles—No EFH Description Determined
Insufficient information is available.

Adults—No EFH Description Determined
Insufficient information is available.

Forage Fish Complex—Eulachon, Capelin, Sand Lance, Sand Fish, Euphausiids, Myctophids, Pholids, Gonostomatids, etc.

Eggs—No EFH Description Determined
Insufficient information is available.

Larvae—No EFH Description Determined
Insufficient information is available.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles—No EFH Description Determined
Insufficient information is available.

Adults. No EFH Description Determined
Insufficient information is available.

Squid

Eggs—No EFH Description Determined
Insufficient information is available.

Young Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for older juvenile squid is the general distribution area for this life stage, located in the entire water column, from the sea surface to sea floor, along the inner (0 to 50 m), middle (50 to 100 m), and outer (200 to 500 m) shelf and the entire slope (500 to 1,000 m) throughout the GOA.

Adults
EFH for adult squid is the general distribution area for this life stage, located in the entire water column, from the sea surface to sea floor, along the inner (0 to 50 m), middle (50 to 100 m), and outer (200 to 500 m) shelf and the entire slope (500 to 1,000 m) throughout the GOA.

Octopus

Eggs—No EFH Description Determined
Insufficient information is available.

Young Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles—No EFH Description Determined
Insufficient information is available.

Adults. No EFH Description Determined
Insufficient information is available.

Description of Essential Fish Habitat for the Groundfish Resources of the Bering Sea/Aleutian Islands Region[3]

EFH Description for BSAI Walleye Pollock

Eggs EFH for walleye pollock eggs is the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m), upper slope (200 to 500 m), and intermediate slope (500 to 1,000 m) throughout the BSAI, as depicted in Figure D-77.

Larvae
EFH for larval walleye pollock is the general distribution area for this life stage, located in epipelagic waters along the entire shelf (0 to 200 m), upper slope (200 to 500 m), and intermediate slope (500 to 1,000 m) throughout the BSAI, as depicted in Figure D-78.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for late 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), middle (50 to 100 m), and outer (100 to 200 m) shelf throughout the BSAI, as depicted in Figure D-79. No known preference for substrates exist.

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 shelf (0 to 200 m) and slope (200 to 1,000 m) throughout the BSAI, as depicted in Figure D-79. No known preference for substrates exists.

EFH Description for BSAI Pacific Cod

Eggs—No EFH Description Determined
Scientific information notes the rare occurrence of Pacific cod eggs in the BSAI.

Larvae
EFH for larval Pacific cod is the general distribution area for this life stage, located in epipelagic waters along the entire shelf (0 to 200 m), upper slope (200 to 500 m), and intermediate slope (500 to 1,000 m) throughout the BSAI, as depicted in Figure D-80.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

[3] http://sharpfin.nmfs.noaa.gov/website/efh_mapper/newinv/efh_inventory.html

Late Juveniles
EFH for late 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), middle (50 to 100 m), and outer (100 to 200 m)
shelf throughout the BSAI wherever there are soft substrates consisting of sand, mud, sandy mud, and muddy sand, as depicted in Figure D-81.

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), middle (50 to 100 m), and outer (100 to 200 m) shelf throughout the BSAI wherever there are soft substrates consisting of sand, mud, sandy mud, muddy sand, and gravel, as depicted in Figure D-81.

EFH Description for BSAI Yellowfin Sole

Eggs—No EFH Description Determined
Scientific information notes the rare occurrence of yellowfin sole eggs in the BSAI.

Larvae—No EFH Description Determined
Scientific information notes the rare occurrence of larval yellowfin sole in the BSAI.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for late juvenile 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), middle (50 to 100 m), and outer (100 to 200 m) shelf throughout the BSAI wherever there are soft substrates consisting mainly of sand, as depicted in Figure D-82.

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), middle (50 to 100 m), and outer (100 to 200 m) shelf throughout the BSAI wherever there are soft substrates consisting mainly of sand, as depicted in Figure D-82.

EFH Description for BSAI Greenland Turbot

Eggs
EFH for Greenland turbot eggs is the general distribution area for this life stage, located principally in benthypelagic waters along the outer shelf (100 to 200 m) and slope (200 to 3,000 m) throughout the BSAI in the fall, as depicted in Figure D-83.

Larvae
EFH for larval Greenland turbot is the general distribution area for this life stage, located principally in benthypelagic waters along the outer shelf (100 to 200 m) and slope (200 to 3,000 m) throughout the BSAI and seasonally abundant in the spring, as depicted in Figure D-84.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for late juvenile Greenland turbot 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), middle (50 to 100 m), and outer (100 to 200 m) shelf and upper slope (200 to 500 m) throughout the BSAI wherever there are softer substrates consisting of mud and sandy mud, as depicted in Figure D-85.

Adults
EFH for late adult Greenland turbot is the general distribution area for this life stage, located in the lower and middle portion of the water column along the outer shelf (100 to 200 m), upper slope (200 to 500 m), and lower slope (500 to 1,000 m) throughout the BSAI wherever there are softer substrates consisting of mud and sandy mud, as depicted in Figure D-85.

EFH Description for BSAI Arrowtooth Flounder

Eggs—No EFH Description Determined
Insufficient information is available.

Larvae—No EFH Description Determined
Scientific information notes the rare occurrence of larval arrowtooth flounder in the BSAI.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for late 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), middle (50 to 100 m), and outer (100 to 200 m) shelf and upper slope (200 to 500 m) throughout the BSAI wherever there are softer substrates consisting of gravel, sand, and mud, as depicted in Figure D-86.

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), middle (50 to 100 m), and outer (100 to 200 m) shelf and upper slope (200 to 500 m) throughout the BSAI wherever there are softer substrates consisting of gravel, sand, and mud, as depicted in Figure D-86.

EFH Description for BSAI Rock Sole

Eggs—No EFH Description Determined
Insufficient information is available.

Larvae
EFH for larval rock 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 1,000 m) throughout the BSAI, as depicted in Figure D-87.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for late juvenile 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), middle (50 to100 m), and outer (100 to 200 m) shelf throughout the BSAI wherever there are softer substrates consisting of sand, gravel, and cobble, as depicted in Figure D-88.

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), middle (50 to 100 m), and outer (100 to 200 m) shelf throughout the BSAI wherever there are softer substrates consisting of sand, gravel, and cobble, as depicted in Figure D-88.

EFH Description for BSAI Alaska Plaice

Eggs
EFH for Alaska plaice 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 BSAI in the spring, as depicted in Figure D-89.

Larvae—No EFH Description Determined
Scientific information notes the rare occurrence of larval Alaska plaice in the BSAI.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for late 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), middle (50 to 100 m), and outer (100 to 200 m) shelf throughout the BSAI wherever there are softer substrates consisting of sand and mud, as depicted in Figure D-90.

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), middle (50 to 100 m), and outer (100 to 200 m) shelf throughout the BSAI wherever there are softer substrates consisting of sand and mud, as depicted in Figure D-90.

EFH Description for BSAI Rex Sole

Eggs—No EFH Description Determined
Scientific information notes the rare occurrence of rex sole eggs in the BSAI.

Larvae—No EFH Description Determined
Scientific information notes the rare occurrence of larval rex sole in the BSAI.

Late Juveniles
EFH for juvenile 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), middle (50 to 100 m), and outer (100 to 200 m) shelf throughout the BSAI wherever there are substrates consisting of gravel, sand, and mud, as depicted in Figure D-91.

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), middle (50 to 100 m), and outer (100 to 200 m) shelf throughout the BSAI wherever there are substrates consisting of gravel, sand, and mud, as depicted in Figure D-91.

EFH Description for BSAI Dover Sole

Eggs—No EFH Description Determined
Scientific information notes the rare occurrence of Dover sole eggs in the BSAI.

Larvae—No EFH Description Determined
Scientific information notes the rare occurrence of larval Dover sole in the BSAI.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for late juvenile 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), and outer (100 to 200 m) shelf and upper slope (200 to 500 m) throughout the BSAI wherever there are substrates consisting of sand and mud, as depicted in Figure D-92**.**

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), and outer (100 to 200 m) shelf and upper slope (200 to 500 m) throughout the BSAI wherever there are substrates consisting of sand and mud, as depicted in Figure D-92.

EFH Description BSAI Flathead Sole

Eggs
EFH for flathead sole eggs is the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m) and slope (200 to 3,000 m) throughout the BSAI in the spring, as depicted in Figure D-93.

Larvae
EFH for larval flathead sole is the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m) and slope (200 to 3,000 m) throughout the BSAI, as depicted in Figure D-94.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for 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), middle (50 to 100 m), and outer (100 to 200 m) shelf throughout the BSAI wherever there are softer substrates consisting of sand and mud, as depicted in Figure D-95.

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), middle (50 to 100 m), and outer (100 to 200 m) shelf throughout the BSAI wherever there are softer substrates consisting of sand and mud, as depicted in Figure D-95.

EFH Description for BSAI Sablefish

Eggs—No EFH Description Determined
Scientific information notes the rare occurrence of sablefish eggs in the BSAI.

Larvae
EFH for larval sablefish is the general distribution area for this life stage, located in epipelagic waters along the middle shelf (50 to 100 m), outer shelf (100 to 200 m), and slope (200 to 3,000 m) throughout the BSAI, as depicted in Figure D-96.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles

EFH for late juvenile 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 shelf gulleys along the slope (200 to 1,000 m) throughout the BSAI, as depicted in Figure D-97.

Adults
EFH for adult 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 shelf gulleys along the slope (200 to 1,000 m) throughout the BSAI, as depicted in Figure D-97.

EFH Description for BSAI Pacific Ocean Perch

Eggs—No EFH Description Determined
Insufficient information is available.

Larvae
EFH for larval Pacific ocean perch is the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m) and slope (200 to 3,000 m) throughout the BSAI, as depicted in Figure D-98, General Distribution of Rockfish Larvae.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for late 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 shelf (1 to 50 m), middle shelf (50 to 100 m), outer shelf (100 to 200 m), and upper slope (200 to 500 m) throughout the BSAI wherever there are substrates consisting of cobble, gravel, mud, sandy mud, or muddy sand, as depicted in Figure D-99.

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 shelf (100 to 200 m) and upper slope (200 to 500 m) throughout the BSAI wherever there are substrates consisting of cobble, gravel, mud, sandy mud, or muddy sand, as depicted in Figure D-99.

EFH Descriptions for BSAI Shortraker and Rougheye Rockfish

Eggs—No EFH Description Determined
Insufficient information is available.

Larvae
EFH for larval shortraker and rougheye rockfish is the general distribution area for this life stage, located in epipelagic waters along the entire shelf (0 to 200 m) and slope (200 to 3,000 m) throughout the BSAI, as depicted in Figure D-98, General Distribution of Rockfish Larvae.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles—No EFH Description Determined
Insufficient information is available.

Adults
EFH for adult shortraker and rougheye rockfish is the general distribution area for this life stage, located in the lower portion of the water column along the outer shelf (100 to 200 m) and upper slope (200 to 500 m) regions throughout the BSAI wherever there are substrates consisting of mud, sand, sandy mud, muddy sand, rock, cobble, and gravel, as depicted in Figure D-100.

EFH Description for BSAI Northern Rockfish

Eggs—No EFH Description Determined
Insufficient information is available.

Larvae
EFH for larval northern rockfish is the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m) and slope (200 to 3,000 m) throughout the BSAI, as depicted in Figure D-98, General Distribution of Rockfish Larvae.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles—No EFH Description Determined
Insufficient information is available.

Adults
EFH for adult northern rockfish is the general distribution area for this life stage, located in the middle and lower portions of the water column along the outer slope (100 to 200 m) and upper slope (200 to 500 m) throughout the BSAI wherever there are substrates of cobble and rock, as depicted in Figure D-101.

EFH Description for BSAI Thornyhead Rockfish

Eggs—No EFH Description Determined
Insufficient information is available.

Larvae
EFH for larval thornyhead rockfish is the general distribution area for this life stage, located in epipelagic waters along the outer shelf (100 to 200 m) and slope (200 to 3,000 m) throughout the BSAI, as depicted in Figure D-98, General Distribution of Rockfish Larvae.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for late juvenile 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 shelf (50 to 200 m) and upper to lower slope (200 to 1,000 m) throughout the BSAI wherever there are substrates of mud, sand, rock, sandy mud, muddy sand, cobble, and gravel, as depicted in Figure D-102.

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 shelf (50 to 200 m) and upper to lower slope (200 to 1,000 m) throughout the BSAI wherever there are substrates of mud, sand, rock, sandy mud, muddy sand, cobble, and gravel, as depicted in Figure D-102.

EFH Description for BSAI Yelloweye Rockfish

Eggs—No EFH Description Determined
Insufficient information is available.

Larvae
EFH for larval yelloweye rockfish is the general distribution area for this life stage, located in the epipelagic waters along the entire shelf (0 to 200 m) and slope (200 to 3,000 m) throughout the BSAI, as depicted in Figure D-98, General Distribution of Rockfish Larvae.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for late 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), middle (50 to 100 m), and outer shelf (100 to 200 m) throughout the BSAI wherever there are substrates of rock and in areas of vertical relief, such as crevices, overhangs, vertical walls, coral, and larger sponges, as depicted in Figure D-103.

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 shelf (0 to 50 m), outer shelf (100 to 100 m), and upper slope (200 to 500 m) throughout the BSAI wherever there are substrates of rock and in vegetated areas of vertical relief, such as crevices, overhangs, vertical walls, coral, and larger sponges, as depicted in Figure D-103.

EFH Description for BSAI Dusky Rockfish

Eggs—No EFH Description Determined
Insufficient information is available.

Larvae
EFH for larval dusky rockfish is the general distribution area for this life stage, located in the pelagic waters along the entire shelf (0 to 200 m) and slope (200 to 3,000 m) throughout the BSAI, as depicted in Figure D-98, General Distribution of Rockfish Larvae.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles—No EFH Description Determined
Insufficient information is available.

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 shelf (100 to 200 m) and upper slope (200 to 500 m) throughout the BSAI wherever there are substrates of cobble, rock, and gravel, as depicted in Figure D-104.

EFH Description for BSAI Atka Mackerel

Eggs—No EFH Description Determined
Insufficient information is available.

Larvae
EFH for larval atka mackerel is the general distribution area for this life stage, located in epipelagic waters along the shelf (0 to 200 m), upper slope (200 to 500 m), and intermediate slope (500 to 1,000 m) throughout the BSAI, as depicted in Figure D-105.

Early Juveniles —No EFH Description Determined
Insufficient information is available.

Late Juveniles—No EFH Description Determined
Insufficient information is available.

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), middle (50 to 100 m), and outer shelf (100 to 200 m) throughout the BSAI wherever there are substrates of gravel and rock and in vegetated areas of kelp, as depicted in Figure D-106.

EFH Description for BSAI Skates

Eggs—No EFH Description Determined
Insufficient information is available.

Larvae—No EFH Description Determined
Insufficient information is available.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Adults
EFH for adult skates is the general distribution area for this life stage, located in the lower portion of the water column on the shelf (0 to 200 m) and the upper slope (200 to 500 m) throughout the BSAI wherever there are of substrates of mud, sand, gravel, and rock, as depicted in Figure D-107.

EFH Description for BSAI Sculpins

Eggs—No EFH Description Determined
Insufficient information is available.

Larvae—No EFH Description Determined
Insufficient information is available.

Juveniles
EFH for juvenile sculpins 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), middle (50 to 100 m), outer shelf (100 to 200 m) and portions of the upper slope (200 to 500 m) throughout the BSAI wherever there are substrates of rock, sand, mud, cobble, and sandy mud, as depicted in Figure D-108.

Adults
EFH for adult sculpins 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), middle (50 to 100 m, outer shelf (100 to 200 m) and portions of the upper slope (200 to 500 m) throughout the BSAI wherever there are substrates of rock, sand, mud, cobble, and sandy mud, as depicted in Figure D-108.

EFH Description for BSAI Sharks

Eggs—No EFH Description Determined
Insufficient information is available.

Larvae—No EFH Description Determined
Insufficient information is available.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles—No EFH Description Determined
Insufficient information is available.

Adults—No EFH Description Determined
Insufficient information is available.

EFH Description for BSAI Forage Fish Complex—Eulachon, Capelin, Sand Lance, Sand Fish, Euphausiids, Myctophids, Pholids, Gonostomatids, etc.

Eggs—No EFH Description Determined
Insufficient information is available.

Larvae—No EFH Description Determined
Insufficient information is available.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles—No EFH Description Determined
Insufficient information is available.

Adults—No EFH Description Determined
Insufficient information is available.

EFH Description for BSAI Squid

Eggs—No EFH Description Determined
Insufficient information is available.

Young Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for older juvenile squid is the general distribution area for this life stage, located in the entire water column, from the sea surface to sea floor, along the inner (0 to 50 m), middle (50 to 100 m), and outer (200 to 500 m) shelf and the entire slope (500 to 1,000 m) throughout the BSAI, as depicted in Figure D-109.

Adults
EFH for adult squid is the general distribution area for this life stage, located in the entire water column, from the sea surface to sea floor, along the inner (0 to 50 m), middle (50 to 100 m), and outer (200 to 500 m) shelf and the entire slope (500 to 1,000 m) throughout the BSAI, as depicted in Figure D-109.

EFH Description for BSAI Octopus

Eggs—No EFH Description Determined
Insufficient information is available.

Young Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles—No EFH Description Determined
Insufficient information is available.

Adults—No EFH Description Determined
Insufficient information is available.

D.3.1.3 EFH Map Descriptions for BSAI Groundfish

Figures D-77 through D-109 show EFH distribution under Alternative 3 for the BSAI groundfish species as described in Section D.3.1.2.

Description of Essential Fish Habitat for Alaska Stocks of Pacific Salmon

EFH Description for Pink Salmon

Freshwater Eggs

EFH for pink salmon eggs is the general distribution area for this life stage, located in gravel substrates in those waters identified in ADF&G's *Catalogue of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes* (ADF&G 1998a), as depicted in Figures D-156 through D-161.

Freshwater Larvae and Juveniles

EFH for larval and juvenile pink salmon is the general distribution area for this life stage, located in those waters identified in ADF&G's *Catalogue of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes* (ADF&G 1998a) and contiguous rearing areas within the boundaries of ordinary high water during the spring, generally migrate in darkness in the upper water column. Fry leave streams in within 15 days and the duration of migration from a stream towards sea may last 2 months, as depicted in Figures D-156 through D-161.

Estuarine Juveniles

Estuarine EFH for juvenile pink salmon is the general distribution area for this life stage, located in estuarine areas, as identified by the salinity transition zone (ecotone) and the mean higher tide line, within nearshore waters and generally present from late April through June, as depicted in Figures D-156 through D-161.

Marine Juveniles

Marine EFH for juvenile pink salmon is the general distribution area for this life stage, located in all marine waters off the coast of Alaska from the mean higher tide line to the 200-nautical mile (nm) limit of the U.S. EEZ, including the GOA, EBS, Chukchi Sea, and Arctic Ocean, as depicted in Figure D-162.

Marine Immature and Maturing Adults

EFH for immature and maturing adult pink salmon is the general distribution area for this life stage, located in marine waters off the coast of Alaska to depths of 200 m and range from the mean higher tide line to the 200-nm limit of the U.S. EEZ, including the GOA, EBS, Chukchi Sea, and Arctic Ocean. Mature adult pink salmon frequently spawn in intertidal areas and are know to associate with smaller coastal streams, as depicted in Figure D-162.

Freshwater Adults

EFH for pink salmon is the general distribution area for this life stage, located in freshwaters identified in ADF&G's *Catalogue of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes* (ADF&G 1998a) and wherever there are spawning substrates consisting of medium to course gravel containing less than 15 percent fine sediment (less than 2-mm diameter), 15 to 50 cm in depth from June through September, as depicted in Figures D-156 through D-161.

EFH Description for Chum Salmon

Freshwater Eggs

EFH for chum salmon eggs is the general distribution area for this life stage, located in gravel substrates in those waters identified in ADF&G's *Catalogue of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes* (ADF&G 1998a), as depicted in Figures D-163 through D-168.

Freshwater Larvae and Juveniles

EFH for larval and juvenile chum salmon is the general distribution area for this life stage, located in those waters identified in ADF&G's *Catalogue of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes* (ADF&G 1998a) and contiguous rearing areas within the boundaries of ordinary high water and contiguous rearing areas within the boundaries of ordinary high water during the spring, generally migrate in darkness in the upper water column. Fry leave streams in within 15 days and the duration of migration from a stream towards sea may last 2 months, as depicted in Figures D-163 through D-168.

Estuarine Juveniles

Estuarine EFH for juvenile chum salmon is the general distribution area for this life stage, located in estuarine areas, as identified by the salinity transition zone (ecotone) and the mean higher tide line, within nearshore waters from late April through June, as depicted in Figures D-163 through D-168.

Marine Juveniles

Marine EFH for juvenile chum salmon is the general distribution area for this life stage, located in all marine waters off the coast of Alaska to approximately 50 m in depth from the mean higher tide line to the 200-nm limit of the EEZ, including the GOA, EBS, Chukchi Sea, and Arctic Ocean.Ocean, as depicted in Figure D-169.

Marine Immature and Maturing Adults

EFH for immature and maturing adult chum salmon is the general distribution area for this life stage, located in marine waters off the coast of Alaska to depths of 200 m and ranging from the mean higher tide line to the 200-nm limit of the EEZ, including the GOA, EBS, Chukchi Sea, and Arctic Ocean, as depicted in Figure D-169.

Freshwater Adults

EFH for chum salmon is the general distribution area for this life stage, located in freshwaters identified in ADF&G's *Catalogue of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes* (ADF&G 1998a) and wherever there are spawning substrates consisting of medium to course gravel containing less than 15 percent fine sediment (less than 2-mm diameter) and finer substrates can be used in upwelling areas of streams and sloughs from June through January, as depicted in Figures D-163 through D-168.

EFH Description for Sockeye Salmon

Freshwater Eggs

EFH for sockeye salmon eggs is the general distribution area for this life stage, located in gravel substrates in those waters identified in ADF&G's *Catalogue of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes* (ADF&G 1998a), as depicted in Figures D-170 through D-175.

Freshwater Larvae and Juveniles

EFH for larval and juvenile sockeye salmon is the general distribution area for this life stage, located in those waters identified in ADF&G's *Catalogue of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes* (ADF&G 1998a) and contiguous rearing areas within the boundaries of ordinary high water. Juvenile sockeye salmon require year-round rearing habitat. Fry generally migrate downstream to a lake or, in systems lacking a freshwater lake, to estuarine and riverine rearing areas for up to 2 years. Fry out migration occurs from approximately April to November and smolts generally migrate during the spring and summer, as depicted in Figures D-170 through D-175.

Estuarine Juveniles

Estuarine EFH for juvenile sockeye salmon is the general distribution area for this life stage, located in estuarine areas, as identified by the salinity transition zone (ecotone) and the mean higher tide line, within nearshore waters. Under-yearling, yearling, and older smolts occupy estuaries from March through early August, as depicted in Figures D-170 through D-175.

Marine Juveniles

Marine EFH for juvenile sockeye salmon is the general distribution area for this life stage, located in all marine waters off the coast of Alaska to depths of 50 m and range from the mean higher tide line to the 200-nm limit of the U.S. EEZ, including the GOA, EBS, Chukchi Sea, and Arctic Ocean from midsummer until December of their first year at sea, as depicted in Figure D-176.

Marine Immature and Maturing Adults

EFH for immature and maturing adult sockeye salmon is the general distribution area for this life stage, located in marine waters off the coast of Alaska to depths of 200 m and range from the mean higher tide line to the 200-nm limit of the U.S. EEZ, including the GOA, EBS, Chukchi Sea, and Arctic Ocean, as depicted in Figure D-176.

Freshwater Adults

EFH for sockeye salmon is the general distribution area for this life stage, located in freshwaters identified in ADF&G's *Catalogue of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes* (ADF&G 1998a) and wherever there are spawning substrates consisting of medium to course gravel containing less than 15 percent fine sediment (less than 2-mm diam.) and finer substrates can be used in upwelling areas of streams and sloughs from June through September. Sockeye often spawn in lake substrates, as well as in streams, as depicted in Figures D-170 through D-175.

EFH Description for Chinook Salmon

Freshwater Eggs

EFH for Chinook salmon eggs is the general distribution for this life stage, located in gravel substrates in those waters identified in ADF&G's *Catalogue of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes* (ADF&G 1998a) (see Figures D-177 through D-182).

Freshwater Larvae and Juveniles

EFH for larval and juvenile Chinook salmon is the general distribution area for this life stage, located in those waters identified in ADF&G's *Catalogue of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes* (ADF&G 1998a) and contiguous rearing areas within the boundaries of ordinary high water. Juvenile Chinook salmon out-migrate from freshwater areas in April toward the sea and may spend up to a year in a major tributaries or rivers, such as the Kenai, Yukon, Taku, and Copper Rivers (see Figures D-177 through D-182).

Estuarine Juveniles

Estuarine EFH for juvenile Chinook salmon is the general distribution area for this life stage, located in estuarine areas, as identified by the salinity transition zone (ecotone) and the mean higher tide line, within nearshore waters. Chinook salmon smolts and post-smolt juveniles may be present in these estuarine habitats from April through September (see Figures D-177 through D-182).

Marine Juveniles

Marine EFH for juvenile Chinook salmon is the general distribution area for this life stage, located in all marine waters off the coast of Alaska from the mean higher tide line to the 200-nm limit of the EEZ, including the GOA, EBS, Chukchi Sea, and Arctic Ocean. Juvenile marine Chinook salmon are at this life stage from April until annulus formation in January or February during their first winter at sea (see Figure D-183).

Marine Immature and Maturing Adults

EFH for immature and maturing adult Chinook salmon is the general distribution area for this life stage, located in marine waters off the coast of Alaska and ranging from the mean higher tide line to the 200-nm limit of the U.S. EEZ, including the GOA, EBS, Chukchi Sea, and Arctic Ocean (see Figure D-183).

Freshwater Adults

EFH for adult Chinook salmon is the general distribution area for this life stage, located in fresh waters identified in ADF&G's *Catalogue of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes* (ADF&G 1998a) wherever there are spawning substrates consisting of gravels from April through September (see Figures D-177 through D-182).

EFH Description for Coho Salmon

Freshwater Eggs

EFH for coho salmon eggs is the general distribution area for this life stage, located in gravel substrates in those waters identified in ADF&G's *Catalogue of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes* (ADF&G 1998a), as depicted in Figures D-184 through D-189.

Freshwater Larvae and Juveniles

EFH for larval and juvenile coho salmon is the general distribution area for this life stage, located in those waters identified in ADF&G's *Catalogue of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes* (ADF&G 1998a) and contiguous rearing areas within the boundaries of ordinary high water. Fry generally migrate to a lake, slough, or estuary and rear in these areas for up to 2 years, as depicted in Figures D-184 through D-189.

Estuarine Juveniles

Estuarine EFH for juvenile coho salmon is the general distribution area for this life stage, located in estuarine areas, as identified by the salinity transition zone (ecotone) and the mean higher tide line, within nearshore waters. Juvenile coho salmon require year-round rearing habitat and also migration habitat from April to November to provide access to and from the estuary.

Marine Juveniles

Marine EFH for juvenile coho salmon is the general distribution area for this life stage, located in all marine waters off the coast of Alaska from the mean higher tide line to the 200-nm limit of the U.S. EEZ, including the GOA, EBS, Chukchi Sea, and Arctic Ocean, as depicted in Figure D-190.

Marine Immature and Maturing Adults

EFH for immature and maturing adult coho salmon is the general distribution area for this life stage, located in marine waters off the coast of Alaska to 200 m in depth and range from the mean higher tide line to the 200-nm limit of the U.S. EEZ, including the GOA, EBS, Chukchi Sea, and Arctic Ocean, as depicted in Figure D-190.

Freshwater Adults

EFH for coho salmon is the general distribution area for this life stage, located in freshwaters as identified in ADF&G's *Catalogue of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes* (ADF&G 1998a) and wherever there are spawning substrates consisting mainly of gravel containing less than 15 percent fine sediment (less than 2-mm diameter) from July to December, as depicted in Figures D-184 through D-189.

D.3.5.3 EFH Map Descriptions for Alaska Stocks of Pacific Salmon

Figures D-155 through D-190 show EFH distribution under Alternative 3 by region for the Alaska stocks of Pacific salmon as described in Section D.3.5.2.