US Army Corps of Engineers
Alaska District

Environmental Assessment and Finding of No Significant Impact

Maintenance Dredging
Nome Harbor Entrance Channel
Nome, Alaska

October 2012

FINDING OF NO SIGNIFICANT IMPACT

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The U.S. Army Corps of Engineers (Corps) will conduct annual maintenance dredging of sediment from the existing Nome Harbor entrance channel and basin each year for 10 years, 2013 through 2022. The Federal project at Nome Harbor includes 3,950 linear feet of channel that would be dredged to authorized project depths ranging from -22 feet below mean lower low water (MLLW) to -10 MLLW. Littoral transport and storms deposit large quantities of marine sediment within the channel, and the Federal project must be dredged annually to maintain safe access to the harbor. An estimated 50,000 cubic yards of sediment would be dredged in 2013, with about 34,000 cubic yards dredged most subsequent years through 2022.

Since 2009, the Corps has successfully placed dredged material from the channel on the shoreline east of the breakwater for beach nourishment. This helps replace sediment partially blocked from the area by the causeway and breakwater and substantially increases the width of protective beach along the foot of the rock seawall that extends east along the Nome waterfront. The sediment has been typically transported from a hydraulic cutter-head dredge through a pipeline to the placement site. The Corps plans to continue using this dredged material placement strategy during the period 2013 through 2022.

This action has been evaluated for its effects on several significant resources, including fish and wildlife, wetlands, threatened or endangered species, marine resources, and cultural resources. No significant short-term or long-term adverse effects were identified.

This Federal action complies with the National Historic Preservation Act, the Endangered Species Act, the Clean Water Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the National Environmental Policy Act. The completed environmental assessment supports the conclusion that the action does not constitute a major Federal action significantly affecting the quality of the human and natural environment. An environmental impact statement (EIS) is therefore not necessary for the maintenance dredging.

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Colonel, Corps of Engineers
District Commander

DATE 20121218

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ABBREVIATIONS AND ACRONYMS

ADEC – Alaska Department of Environmental Conservation

ADFG – Alaska Department of Fish and Game

AHRS – Alaska Heritage Resources Survey

APE – Area of Potential Effect

BMP's – Best Management Practices

Corps – U.S. Army Corps of Engineers

CWA – Clean Water Act

cy – Cubic Yards

EA – Environmental Assessment

EFH – Essential Fish Habitat

EPA – U.S. Environmental Protection Agency

ESA – Endangered Species Act

FONSI – Finding of No Significant Impact

HAPC – Habitat Area of Particular Concern

MHHW – Mean Higher High Water

MLLW – Mean Lower Low Water

NMFS – National Marine Fisheries Service

NOAA – National Oceanic Atmospheric Administration

SHPO – State Historic Preservation Officer

USFWS – U. S. Fish and Wildlife Service

USACE – U.S. Army Corps of Engineers

Environmental Assessment

Maintenance Dredging
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Nome, Alaska

1.0 Introduction

1.1. Purpose and Need

The proposed action is to conduct annual maintenance dredging within the Federal project limits at Nome Harbor to include the entrance channel, the inner north harbor, and the sediment traps as needed (figure 1). Coastal transport mechanisms and storms deposit large quantities of marine sediment within the channel, and the Federal project must be dredged annually to maintain the authorized project depths and preserve safe navigational access. Without the proposed action, shoaling will rapidly restrict access to Nome Harbor by ships and barges.

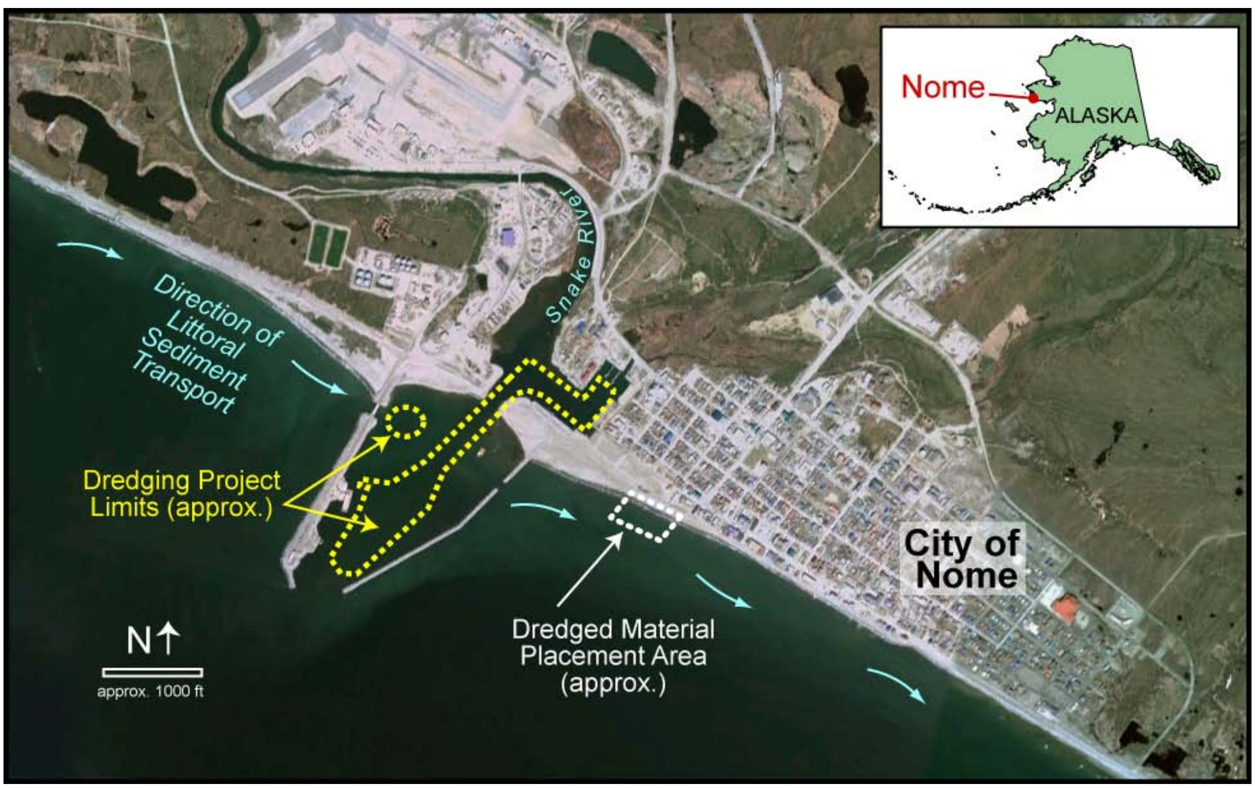

Figure 1. Location and vicinity of Nome Harbor dredging project features.

1.2 Project Authority

The original improvements to Nome Harbor were approved via the Rivers and Harbors Act of 8 August 1917, Public Law (P.L.) 37. Subsequent authorizations modified the original authorization to produce the current project configuration completed in 2006:

- Rivers and Harbors Act, 30 August 1935
- Rivers and Harbors Act, 16 June 1948 (P.L. 80-649)
- Section 101 (a)(3), P.L. 106-53, Water Resources Development Act of 1999

1.3 Project Description

The Federal project at Nome Harbor consists of an approximately 3,950-foot-long entrance channel, an inner harbor basin, and a sediment trap (figure 2). These are dredged to project depths ranging from -22 to -10 feet mean lower low water (MLLW). Between 2006 (when the current entrance channel configuration was completed) and 2011, the quantity of sediment dredged annually has ranged from 20,000 to 49,595 cubic yards. The inner sediment trap requires dredging roughly once every 5 years. The dredging planned for 2013 would include the sediment trap and is expected to remove about 50,000 cubic yards. In subsequent years, dredging of just the entrance channel and inner basin would remove about 34,000 cubic yards.

2.0 Alternatives and Proposed Action

2.1 No Action Alternative

The No Action alternative would result in no annual maintenance dredging of the Nome Harbor entrance channel. This alternative would avoid the potential environmental impacts and port access issues described in later sections. However, it would also allow the continued accumulation of sediments that would rapidly restrict safe access by ships and barges to the harbor at Nome.

2.2 Action Alternatives

Any dredging action requires a dredging method, a place to put the dredged material, and the means of transporting the dredged material to the disposal/placement site. The Corps' review of dredging alternative for this project has been informed by its many decades of dredging activities conducted at Nome. The basic choices of dredge type are mechanical (clamshell) versus hydraulic (suction), and transport via a barge or hopper versus a pipeline.

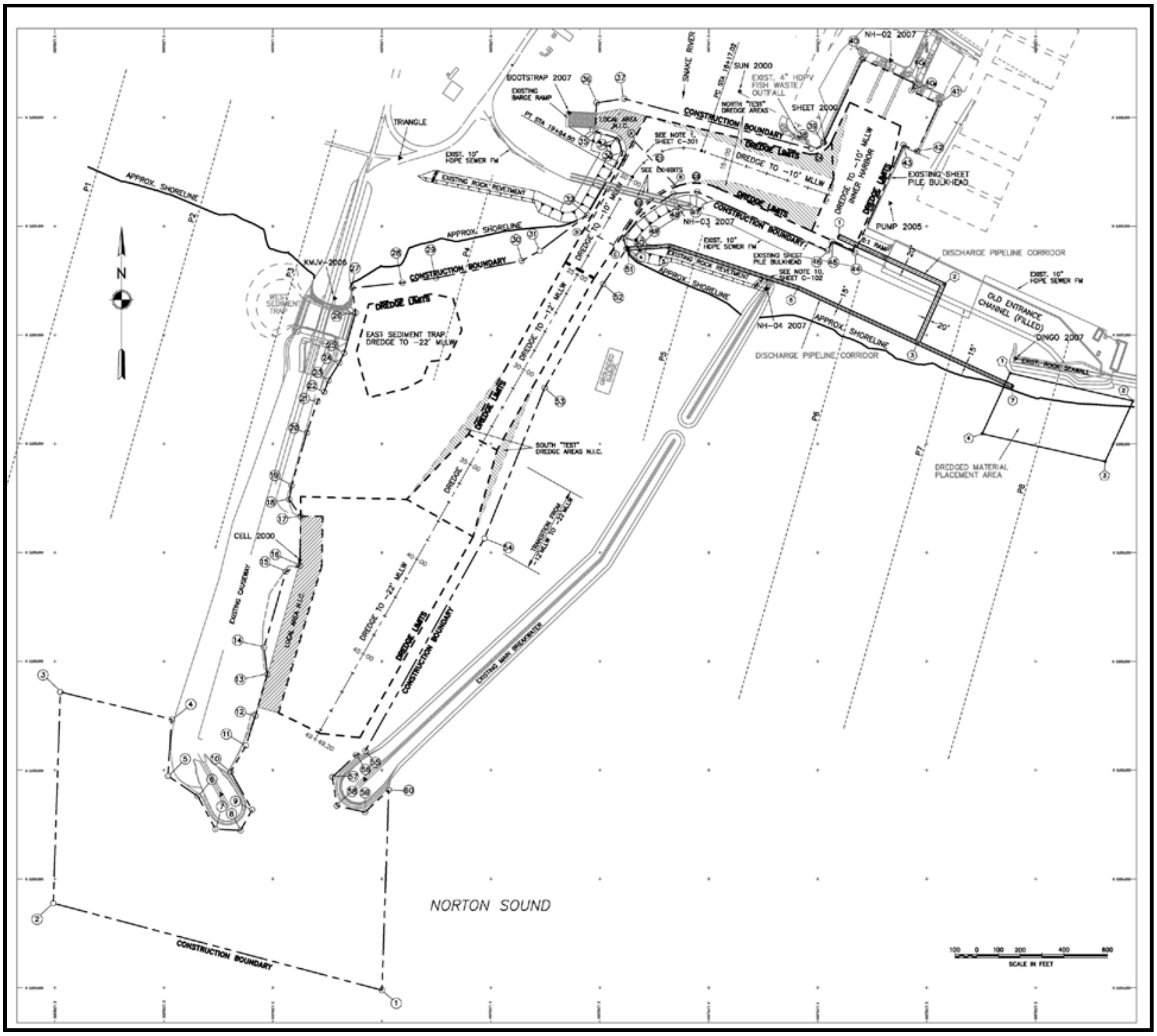

Figure 2. Drawing of proposed limits of dredging, and the dredged material placement area (excerpted from USACE 2012).

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 sediment from the harbor bottom. An open bucket clamshell dredge is often used in marine environments due to an increased rate of efficiency for moving sediment. The captured sediment 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 with the other dredging methods, less turbidity can be expected, thus minimizing the spread of containments to adjacent areas or to the water column.

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 waterbody. The overflow water can increase turbidity and may not meet water quality standards immediately after discharge (dewatering).

Pipeline Dredge. A pipeline dredge, like the hopper dredge, uses suction and a cutter head to bring sediment from the bottom of the harbor. However, a pipeline dredge does not have a hopper to contain the material. Instead, the material is moved directly to the placement site. As with a hopper dredge, excess water is removed with the sediment. The excess water helps to keep the sediment "fluid" so that it can be pumped to the dredged material disposal facility. The pipeline dredge must have a placement location within pumping range of the dredge.

Both clamshell and hydraulic pipeline dredges have been used at Nome in the past. The pipeline dredge has some distinct advantages for the maintenance dredging project at Nome. Pipeline dredges are able to operate almost continuously (without pauses to change out scows or hoppers), resulting in higher productivity and faster project completion. At Nome, a pipeline discharge system allows the dredge and support craft to work almost entirely within the protection of the breakwater and causeway; if the dredged material had to be transported out of the harbor in a scow, high winds or unfavorable sea conditions could slow or temporarily halt the dredging operations.

Dredged Material Placement. At the present time, the maintenance project has only one viable placement site for the dredged material. The onshore placement area is at the shoreline at the western end of the rock seawall (figures 1 and 2). This roughly 600-foot by 300-foot (less than 5 acres) area would primarily receive sediment dredged from the harbor basin and inner channel. This placement site has been used successfully since 2009, and its use has contributed to the widening of the beach in front of the Nome seawall. The dredged material would be placed at the waterline within this area and periodically spread with a grader or bulldozer to match the surrounding beach profile. The dredged material discharged in this area would serve as beach nourishment as it is naturally redistributed eastward along the foot of the seawall. The coordinates of the corners of the onshore placement area are:

- 64° 29 52.76' N, 165° 25 00.00' W;
- 64° 29 51.46' N, 165° 24 47.15' W;
- 64° 29 48.73' N, 165° 24 50.13' W;
- 64° 29 50.03' N; 165° 25 03.00' W.

Previously, two in-water disposal sites authorized by the U.S. Environmental Protection Agency (EPA) under Section 102 of the Marine Protection, Research, and Sanctuaries Act (MPRSA), have been used for disposal. These two disposal areas flanked the former entrance channel and extended several thousand feet seaward. The EPA prepared an environmental impact statement to assess the impacts of using these disposal sites, and a Record of Decision was signed in 1992 authorizing the use of these sites for the disposal of dredged material for a 10-year period. The authorization to use these in-water disposal sites has expired and had not yet been renewed at the time this environmental assessment was written.

No economically feasible upland disposal alternative exists for the dredged material considering the quantities that would be generated on an annual basis. The coastal plain on which Nome was developed is mostly wetlands, and the dredged material would have to be trucked inland a considerable distance to find an area of unoccupied uplands large enough to receive it. Placement onshore as beach nourishment is considered to be the most practical, economical, and environmentally benign alternative for managing the dredged material.

The beneficial use of the dredged material as beach nourishment is supported by Corps and Federal regulations:

- "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 (Corps ER 1130-2-520)."

- "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)."

2.3 Preferred Alternative

The preferred alternative selected for the proposed annual maintenance dredging at Nome is dredging via a hydraulic pipeline dredge, with the dredged material deposited at the previously-used on-shore placement site for beach nourishment.

2.4 Mitigation Measures

Incorporating the following mitigation measures into the preferred alternative would help ensure that nothing more than short-term, minor adverse impacts would occur to local water quality and local fish and wildlife populations, including ESA-listed species and their critical habitats, marine mammals, and essential fish habitat (EFH).

- Based on direction from the Alaska Department of Fish and Game (ADFG) through its amendments to Fish Habitat Permit FG98-III-0074, dredging would start as soon as the ice goes out, but be completed in the narrow inner channel area by 25 June, and in the rest of the project area by 31 July. This work-window is intended to protect juvenile salmon, which are believed to start out-migration from Snake River in mid-June.

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

- Project-related vessels and barges shall not be permitted to ground themselves on the bottom during low tide periods unless there is a human safety issue requiring it.

- A construction oil spill prevention plan shall be prepared.

- The Corps will conduct post-dredge bathymetry surveys to ensure that only the material identified to be dredged was removed to the authorized depth and that the design depth was achieved by the dredge action.

3.0 Affected Environment

3.1 Project Site Description

Nome is a community of 3,960 people (as of 2011; ADCRA 2012) on the south coast of the Seward Peninsula in northwestern Alaska (figure 1). It serves as a major hub of transportation, commerce, education, and government services for much of northwest Alaska. Nome cannot be reached by road from Anchorage or other population centers of Alaska, but a network of minor roads across the Seward Peninsula connects Nome to villages such as Council and Teller, and to numerous mines and other resource development sites. Thus, the port facilities at Nome provide direct economic support to a region much larger than Nome itself.

The current configuration of the harbor (figure 3) at Nome was the result of a Corps navigation improvements project completed in 2006. The previous harbor entrance channel was filled in, a new channel was breached through the Snake River sand spit, and a protected outer approach channel was formed by building a new breakwater to the east of and roughly parallel to the existing causeway. The causeway and the new breakwater are both breached near shore to allow passage of marine organisms, small watercraft, and some sediment.

Figure 3. Aerial oblique view of current harbor configuration; view is towards the east-northeast.

3.2 Marine Environment

The harbor at Nome was built where the Snake River discharges into Norton Sound. The harbor site is on an exposed stretch of low-relief sand and gravel coastline. The seabed near the harbor is a largely featureless expanse of sand and gravel that deepens very gradually, only reaching a depth of -40 feet MLLW at a distance of about 3,000 feet offshore. The natural environment includes the continuous migration and redistribution of benthic sediments, as well as frequent disruption from ice scouring and violent storms. Studies of the general biological setting offshore of Nome describe species typical of a high-energy, sandy-gravelly coastal environment dominated by epifaunal and infaunal species such as sea stars, polychaetes, bivalves, and amphipods that are adapted to a loose, shifting substrate (USACE 1998; Feder and Mueller 1974).

Tides and Surge. The tidal range at Nome is rather narrow, with a mean tidal range (difference between mean high water and mean low water) of only 1.04 feet, and a mean diurnal range (difference between mean higher high water and mean lower low water) of 1.52 feet (NOAA 2012). Nome is particularly susceptible to positive and negative surges, such as changes in water level brought on by meteorological conditions that can cause changes in water elevation greater than tidal effects. Positive surges are increases in water elevation brought on by low atmospheric pressure and wind-driven transport of seawater, which can be enhanced by the relatively shallow and unobstructed bathymetry of Norton Sound. A 1974 storm reportedly generated a surge of over 11 feet. Negative surges are also possible under certain wind conditions; Nome residents have reported the harbor turning basin going dry because of wind "set-down" of water (USACE 1998).

Waves. The shoreline at Nome is exposed to waves approaching along an arc of 180 degrees from east to west. The longest fetch is from a southwest approach, along an unobstructed line between the Alaska mainland and St. Lawrence Island. No direct wave measurements are available for the area near the harbor. For the previous navigation improvements project, a wave climate was calculated using historical wind data and wave models, and validated against Bering Sea buoy data and local experience. The wave climate calculations found the most common (66.3%) wave direction was from the south-southwest (180° to 210° of the compass); the next most common (24.6%) was from the south-southeast (150° to 180°; USACE 1998).

Currents and Circulation. Bottom circulation off Nome is influenced by a combination of regional currents, tidal currents, wave action, wind direction, and storm surges. Regional currents are commonly toward the west, resulting in a counterclockwise gyre in western Norton Sound. The velocity of this prevailing flow is relatively low compared with other factors (USACE 1998).

Wave and/or storm driven circulation between Norton Sound and Nome Harbor has been found to be negligible, due in part to the narrow connecting breach and the volume of flow of freshwater entering the harbor from Snake River during the warmer months. A single drogue study has demonstrated a strong water-density stratification during summer months with freshwater over-lying salt water; the surface freshwater layer continually flows into Norton Sound regardless of tidal stage. A counterclockwise gyre exists in the harbor basin as well as in Norton Sound (USACE 1998).

Sediment Transport. The movement of littoral drift is dependent primarily on the wave climate and the incident wave angle to the beach. Because waves are approaching the harbor site from the southwest the majority of the time, net sediment transport at Nome is from west to east (figure 1). This is evidenced by the large accumulation of sediment on the west side of the harbor causeway (visible at the extreme left side of figure 3), which tends to act as a littoral barrier. The gross annual sediment transport rate is estimated to be 180,500 cubic yards, while the net transport towards the east is an estimated 60,170 cubic yards each year.

Under normal flow conditions, the Snake River discharges only about 400 cubic yards of sediment a year. This river is a stable, low-velocity stream that drains the relatively flat tundra coastal plain surrounding Nome (USACE 1998).

Sediment Quality. Previous sampling and chemical analysis of harbor sediments at Nome has shown little indication of significant human-caused chemical contamination. However, notably high concentrations (up to 200 mg/kg) of arsenic have been reported regularly in sediment samples from the harbor area. The State of Alaska has not established marine sediment standards, but Alaska District has historically used a sediment screening level of 57 mg/kg (adopted from the Puget Sound Dredge Disposal Analysis guidelines, currently DMMP 2008); the National Oceanic and Atmospheric Administration (NOAA) has published marine sediment threshold effects levels (TELs) for arsenic as low as 7 mg/kg (Buchman 2008). Previous concern over high concentrations of arsenic in the Nome harbor dredged material led to some material being buried within the harbor basin under a 1-meter-thick cap in 1995 and 1996. The elevated concentrations of arsenic in some Seward Peninsula mineral formations and in the sediments of area streams (including Snake River) are well established (USKH 2012). Arsenic sulfide compounds are commonly associated with gold ores (Straskraba and Moran 2006), and the Nome area has been the scene of intense gold mining for more than a century. The presence of natural sources of arsenic and the lack of identifiable human-generated sources of arsenic at Nome Harbor suggest that the high concentrations of arsenic detected in some samples of the harbor sediment are due primarily to local mineralogy. Soil samples taken from borings along Nome Spit in 2000 also showed consistently high levels of arsenic (up to 93 mg/kg) even at depths of greater than 20 feet below the surface (USACE 2001), suggesting that the marine sediments that formed the spit were also rich in arsenic.

Water Quality. Water quality studies have not been carried out specifically at the Nome Harbor site. A study of general water quality in northern Norton Sound (Hood & Burrell 1974) found uniformly high dissolved oxygen concentrations, including in bottom waters, due to the mixing effects of storms. Concentrations of nutrients such as phosphorus and nitrogen were extremely high due to the influx of sediment and dissolved matter from the Yukon River into Norton Sound. Measurements of pH were within the slightly-basic norm (7.7-8.1) for coastal marine waters.

The waters of Norton Sound are characteristically turbid due to an enormous load of sediment discharged by the Yukon River to the south and carried throughout the Sound by a counterclockwise gyre (Cacchione and Drake 1979). These sediments, once deposited on the sea floor, can be readily resuspended by severe storms, especially given the shallow depths found through much of Norton Sound.

Because of the history of mining in the Nome area, the presence of metals in the marine environment has been the subject of several studies (Hood & Burrell 1974; MMS 1990). Some early sampling efforts reported high metals levels, but in later studies ambient concentrations of dissolved or suspended metals such as lead, copper, and zinc have not been found to be elevated in the marine waters off Nome compared with other coastal areas (MMS 1990). A study of metal concentrations in the plume of a gold dredge working offshore of Nome found, unsurprisingly, that samples of the water column containing resuspended sediment contained elevated concentrations of metals. Those same samples, when filtered, showed similar concentrations to samples collected outside the plume, suggesting that the resuspension of sediment by the dredge was not driving significant amounts of metals into the dissolve phase (MMS 1990).

3.3 Biological Resources

Invertebrates. No site-specific studies of benthic marine organisms have been done for the harbor or material placement site; however, one 1974 survey was conducted in the general Nome vicinity. This study found species typical of a well-oxygenated, high-energy, sandy-gravel sediment regime (Feder and Muller 1974). Echinoderms such as sea stars, brittle stars, sea cucumbers, and sea urchins were the most common phylum in both numbers of species and biomass. Other common invertebrate species were soft coral, several species of shrimp, and a species of clam. Another study of areas east of Nome found polychaete worms to be the dominant taxon, followed by amphipods and bivalves (USACE 1998).

Scouring and gouging of the sea bottom sediments by sea ice is believed to occur at depths as great as 40 feet below the surface in Norton Sound. Ice scouring, along with massive movements of sediment caused by storms, presumably plays a major role in the composition, distribution, and abundance of benthic organisms.

Fish. Groundfish found in Norton Sound include saffron and arctic cod, starry flounder, yellowfin sole, Alaska plaice, and several species of sculpin. Saffron cod are the dominant species found near the harbor and are an important forage and subsistence fish. Saffron cod generally move close to shore during the winter but then move farther offshore in the summer.

Important pelagic fish include salmon, herring, smelt, and capelin. Salmon spawn in Snake River and several other streams in the Nome area. Adult salmon migrate into Norton Sound from about mid-June through August. Chinook salmon are the earliest to appear in the spring, while chum salmon are the latest. The ADFG Anadromous Waters Catalog (AWC) identifies Snake River (designated AWC# 333-10-11200) as providing spawning habitat for sockeye and pink salmon, while Chinook and coho salmon are listed as “present” along with Dolly Varden trout and whitefish (ADFG 2012). Brackish waters near the mouths of streams are important areas for juvenile salmon to transition from freshwater to marine environments, and out-migrating juvenile salmon may linger in near-shore waters for several weeks before heading into ocean feeding areas (USACE 1998).

Herring spawn in the intertidal and shallow subtidal waters of Norton Sound in the spring, using rockweed or bare rock as a spawning substrate. Capelin spawn on sandy beach areas, where their eggs remain buried in the sand for about 2 weeks before hatching; it is not known if capelin spawn at the Nome dredged material placement site (USACE 1998).

Birds. The most common species of seabirds to be found around Nome are glaucous gulls, black legged kittiwakes, murres, and horned and horned and tufted puffins. Seabird colonies along the Norton Sound coast are concentrated at the relatively few rocky outcroppings, such as at Sledge Island (22 miles west of Nome) and Bluff Cliffs (about 50 miles east of Nome). Several species of tern nest along sandy beaches and gravel bars. Most seabird species in the area feed on fish such as sand lance, juvenile cod, and prickleback during nesting season (USACE 1998).

Other coastal bird species include ducks such as greenwing teal, pintail, and American widgeon, and shorebirds such as semipalmated sandpiper, western sandpiper, dunlin, and black turnstone. The only bird likely to be found along the shoreline in the winter would be common ravens (USACE 1998).

Marine Mammals. Marine mammals routinely found within the vicinity of the project include the ringed seal, bearded seal, spotted seal and the beluga whale. Species occasionally or rarely found include the Pacific walrus, polar bear, ribbon seal, and killer, minke, bowhead and gray whales. Ringed seals, bearded seals, walrus, and polar bears are closely associated with sea ice, and tend to migrate with the movement of the sea ice edge. These species are unlikely to be found in Norton Sound during the ice-free summer months when dredging would occur. Spotted seals and beluga whales do, however, make use of shallow coastal waters within the Norton Sound area during summer months. Beluga whales may feed on herring and other fish species within the proposed project area during the summer (USACE 1998).

3.4 Threatened and Endangered Species

In an email dated 27 April 2012, the U.S. Fish & Wildlife Service noted that the following species listed under the Endangered Species Act may be found in the vicinity of the project area during at least part of the year:

Polar Bear (Threatened). Polar bears would be expected in the Nome area primarily in association with sea ice, and they may follow the sea ice edge into Norton Sound to keep in range of the ice seals and walrus that make up their diet. Critical habitat designated for polar bear near Nome includes “Unit 1 –Sea Ice” and “Unit 3 – Barrier Island (USFWS 2012a).

Steller’s Eider (Threatened). The Seward Peninsula is part of the historic breeding range of this sea duck, but Steller’s eider is currently known to breed in Alaska only on the North Slope near Barrow and decreasingly along the Yukon-Kuskokwim Delta. Critical habitat for the Alaska-breeding population of the Steller’s eider includes breeding habitat on the Yukon-Kuskokwim Delta and four units in the marine waters of southwest Alaska, including the Kuskokwim Shoals in northern Kuskokwim Bay, and Seal Islands, Nelson Lagoon, and Izembek Lagoon on the north side of the Alaska Peninsula. Steller’s eiders found near Nome would most likely be in transit between North Slope breeding areas and wintering and molting habitat along the Alaska Peninsula and Aleutian Islands (USFWS 2012b).

Spectacled Eider (Threatened). Critical habitat for this sea duck was designated for molting in Norton Sound and Ledyard Bay, for nesting on the Yukon-Kuskokwim Delta, and for wintering south of St. Lawrence Island. Spectacled eiders use shallow offshore waters in the far east end of Norton Sound as molting habitat from July through October, then winter in a concentrated ice-free zone south of St. Lawrence Island. Spectacled eiders found near Nome would most likely be in transit (USFWS 2012c).

Several endangered species of whales under the jurisdiction of the National Marine Fisheries Service (NMFS) could conceivably appear in western Norton Sound during certain seasons of the year. These include the bowhead, humpback, fin, and blue whales. Bowhead whales can be found in the area during migration from late March to May and from September to December. Humpback, fin, and blue whales may occur in the area from June through September.

The endangered Steller sea lion might rarely be found in the area, but haul-outs and rookeries are not documented in Norton Sound, and no critical habitat areas are designated north of St. Lawrence Island, more than 100 miles to the south (NMFS 2012a).

As of December 2011, two species of ice seal, the bearded seal and the ringed seal, were under consideration by the NMFS to be listed as threatened under the ESA. The USFWS listed the Pacific walrus as a candidate species under the ESA in February 2011. The current size of the Pacific Walrus population and population trends are not known with any certainty, but the USFWS believes that the species is vulnerable to loss of sea ice due to climate change (NMFS 2012c).

3.5 Essential Fish Habitat

The marine waters offshore of Nome are designated by the National Marine Fisheries Service as essential fish habitat (EFH) for all five Pacific salmon species and for several species of Bering Sea groundfish (NMFS 2012a). Appendix 2 has a full evaluation of EFH species in the project area. No Habitat of Particular Concern (HAPC) or designated EFH area protected from fishing exists in Norton Sound. The waters off Nome are included in the Northern Bering Sea Research Area.

3.6 Cultural and Historic Resources

No cultural or historic resources are expected to exist in the marine setting of the maintenance dredging project. The navigation improvements project that created the current harbor configuration involved much coordination between the Corps, the Alaska State Historic Preservation Officer, and Native organizations in the Nome area. A new archaeological site, cataloged as NOM-00146 (Snake River Sandspit Site) in the Alaska Historic Resource System (AHRS) was discovered in 2006 when the harbor's new entrance channel was cut through the shoreline sandspit. Construction was halted long enough for the site to be archaeologically excavated. A memorandum of understanding (USACE 2011) was drawn up to formalize the mitigation of the site and disposition of recovered artifacts and faunal remains.

3.7 Economics and Subsistence

Nome functions as the supply, service, and transportation center for the Bering Strait region. Local, state, and federal government jobs account for most employment, while mining, retail services, medical, and transportation businesses make up most private sector jobs (ADCRA 2012).

Nome is not a significant port in the overall North Pacific fishing industry; however, the commercial fishing that does occur out of Nome is important to the local economy. In 2000, Nome had 60 commercial permit holders, with 83 permits for commercial fisheries. Nome's fleet participated in Alaskan salmon, herring, halibut, groundfish, and crab fisheries (AFSC 2012).

Despite a larger economic base than many Alaskan communities, Nome's remote location and large Alaska Native population drive a strong subsistence tradition. ADFG estimates that Nome's annual wild food harvest is more than 200 pounds per person annually. Nome residents hold 151 household permits to catch subsistence salmon, and are eligible for Subsistence Halibut Registration Certificates (AFSC 2012).

3.8 Air and Noise Quality

Nome presumably enjoys good air quality because of the community's isolation, the small number of pollutant emission sources, and persistent winds from the nearby ocean. The primary source of air pollutants are the community's electric generator, along with individual fuel oil or wood stoves, and vehicles such as trucks, cars, boats, and snowmachines. There is no established ambient air quality monitoring program at Nome, however, and little existing data to compare with the National Ambient Air Quality Standards (NAAQS) established under the Clean Air Act (CAA). These air quality standards include concentration limits on the "criteria pollutants" carbon monoxide, ozone, sulfur dioxide, nitrogen oxides, lead, and particulate matter. The community is not in a CAA "non-attainment" area, and the "conformity determination" requirements of the CAA would not apply to the proposed project at this time.

No specific noise data exist for Nome, but with the presence of a busy sea port, jet-capable airport, light industry, and substantial road network, the ambient level of human generated noise at Nome is probably much higher than at most rural Alaska locations.

4.0 Environmental Consequences

4.1 Effects on the Marine Environment

Tides, Surge, and Waves. The dredging would remove at most a few feet of bottom sediment at any one time from the project limits. This should have no discernible on the small tidal movements at the dredging sites or on the effects of surges or waves.

The deposition of dredged material in the onshore placement area is intended to have a localized beneficial effect on waves and storm surge by increasing the width of the beach along the city seawall and diverting wave energies farther offshore.

Currents and Circulation. The effects of dredging on water circulation patterns are expected to be minor or negligible. As noted, there is little circulation between the harbor basin and Norton Sound. Deepening the channel from the basin to the ocean may temporarily alter the flow of freshwater out of the harbor, perhaps thickening the wedge of surface low-salinity water that flows into Norton Sound. Any such effects of dredging on currents and circulation would be fairly quickly negated as the channels refill with sediment.

The deposition of dredged sediment in the onshore placement area should not have a significant effect on broader water circulation patterns. The material discharged onshore will be spread and smoothed to conform to the natural shore contours, which should minimize disruption to water circulation that could be caused by allowing a large mass of discharged sediment to accumulate along the shoreline.

Sediment Transport. The sediment to be removed from the Nome Harbor entrance channel and basin is almost entirely material deposited there by littoral transport and storm surge, and trapped by the artificial structures of the harbor. The proposed annual dredging and beach nourishment may be thought of a means of partially compensating for the interruption of west-to-east littoral drift created by the causeway and breakwater, and returning the sediment to its natural transport systems.

Sediment Quality. Nearly all the material to be dredged from the project limits would be sediment brought in over the previous year by storms and littoral transport. There are no known sources of human-generated contamination along the coast west of Nome, so the concentrations of arsenic or other metals present in these deposited sediments can be presumed to be naturally-occurring. The sediment dredged from the outer channel would make up the great majority of the total material to be dredged; the quantity removed from the inner channel and basin would be a relatively small percentage of the total. Snake River is estimated to discharge about 400 cubic yards of sediment annually, which is roughly 1 percent of the 34,000 cubic yards that would be removed from the harbor system during most years of annual dredging. Dredging in the harbor basin would not disturb the high-arsenic sediments buried under a 3-foot-thick cap in 1995-1996. In general, the dredged material placed at the beach nourishment site would be indistinguishable from sediments that would arrive at and migrate through that location via natural transport processes.

Water Quality. The proposed cutter-head hydraulic pipeline dredge would loft some sediment into the water column near the site of dredging, but much less than other potential methods that require hauling the material up through the water column (clamshell dredge) or dewatering it at the dredge site (hopper dredge). The dredged material is expected to be primarily sand and gravel, which would settle out of the water column quickly. Discharge of the dredged material would temporarily increase the suspended solids along the shoreline of the placement area. On the other hand, to the extent that the discharge water percolates down into the sand of the beach, the beach itself may serve to filter and trap some percentage of fines. The waters of Norton Sound are typically turbid with silt discharged from major river systems and stirred up from its shallow bottom by storms. The discharge of fines in the dredged material would cause a temporary incremental increase in suspended solids at the discharge site, which may have little effect on primary producers and aquatic filter feeders already adapted to a turbid environment.

As described in the previous section, the great majority of sediment relocated by the annual maintenance dredging would be newly-deposited oceanic material, which would not pose a greater toxicological risk to water quality than that of ambient sediments transported by natural processes.

The Corps would apply for a new Clean Water Act Section 401 Water Quality Certification from the State of Alaska before continuing the proposed maintenance dredging in 2013; the certification would need to be renewed every 5 years.

4.2 Effects on Biological Resources

Invertebrates. The areas to be dredged have been dredged annually since 2006, so it is unlikely that substantial populations of benthic invertebrates have had a chance to establish themselves there. Likewise, the onshore placement area has been in use since 2009, and continued use of this area to deposit sand and gravel from the dredged areas is unlikely to further degrade the beach environment. Existing populations of organisms in the near shore benthic environment, adapted to maneuvering and burrowing through loose, shifting sediment, would most likely not suffer significant adverse effects from the addition of several inches of new material to their environment.

Fish. Maintenance dredging would have little direct affect on mature fish inhabiting the project area, as their mobility allows them to avoid construction activities (e.g. dredging, generated turbidity, vessel movements, and underwater construction noise). Long-shore movements of juvenile fish may be disrupted for a matter of hours. However, given the small scale of the dredge and its cutter-head, and the fact that the dredge will spend a very limited portion of its time within the zone juvenile fish would use to move along the shore and through the breakwaters, the disruption of long-shore migration should be minimal. Juvenile fish moving into or out of the harbor and Snake River may encounter a moderately greater level of disturbance and delay depending on how much dredging is being done at the mouth of or in the harbor.

Based on direction from ADFG through its amendments to Fish Habitat Permit FG98-III-0074, dredging would start as soon as the ice goes out, but be completed in the narrow inner channel area by 25 June, and in the rest of the project area by 31 July. This work-window is intended to protect juvenile salmon, which are believed to start out-migration from Snake River in mid-June.

At the dredged material placement area, fish such as sand lance or capelin that feed or lay eggs in loose shoreline sediments may be affected by the addition of more sand and gravel to the beach environment. However, the discharged sediments would be quickly redistributed by intentional spreading, wave action, and littoral currents.

Birds. The proposed dredging activities would affect a relatively small area of coastal habitat already partly degraded by human use and previous dredging. The dredging and discharge locations are not known to be unique or valuable habitat for birds. Vessels moving through the area to access the entrance channel and harbor could displace waterfowl and sea ducks within their intended course. Vessel lights have the potential to become an attractive nuisance causing bird collisions and subsequent injury or death; however, given the length of daylight and twilight hours in the Nome area between June and August, there is little likelihood that collisions would occur. The greater potential for environmental impacts associated with vessels would be the effects of spills of fuels or other hazardous materials. The effects of fuel spills on bird 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 bird populations from the project area during construction would be short term. Overall, the Corps believes that dredging would not have a long-term effect on local bird populations. No significant adverse impacts are expected. The disposal area can be expected to attract shore birds that prey on marine organisms as the dredged material pumped onto the shoreline will expose intertidal organisms and sub-tidal normally preyed upon when storm events wash them onto the beach.

Marine Mammals. Maintenance dredging would temporarily and indirectly disturb any marine mammals in proximity to the site due to construction noise, construction vessel traffic, and construction-generated turbidity. Airborne noise would be generated by the operation of heavy equipment, and waterborne noise would be generated by work boats, dredge slurry pump(s), and the cutter-head dredge. The primary reaction of marine mammals is likely to be movement away from the work area during the construction period. Similarly, the noise generated by barges and tugs in transit to or from the work area from other locations in Alaska would be similar to that generated by routine small vessel traffic through the entrance channel and harbor. Low to moderate levels of turbidity would be generated by dredging and hydraulic disposal of the dredged material potentially causing marine mammals to temporarily avoid the area until such time that the construction-generated plume dissipates to background levels.

Overall, the Corps's 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.

4.3 Effects on Threatened and Endangered Species

The proposed project would pose very little threat to endangered or threatened species, as it would be unlikely for any such species discussed in Section 3.3 to be present in the project area during the spring-summer dredging season. The very rare polar bear that might find itself at Nome would have arrived there following the sea ice edge in late fall and early winter and would have little reason to remain in Norton Sound as the sea ice retreated. A polar bear that lingered in busy, densely-populated Nome would be in far more immediate danger from vehicles, hunters, and public safety officers than from the Corps' maintenance dredging activities.

Spectacled and Steller's eiders would appear in the Nome Harbor area only as migrating transients in the early spring or fall. The noise, movement, and degraded environment around Nome Harbor would likely discourage migrating eiders from setting down close enough to the dredge to be harmed by it, especially when more attractive undeveloped wetland and coastal habitat is readily available nearby.

The National Marine Fisheries Service has previously concurred with a Corps determination that no endangered or threatened marine mammal species under its jurisdiction (e.g. Steller sea lions and whales) would suffer adverse effects from a similar navigation improvements project at Nome (NMFS 2002).

4.4 Effects on Essential Fish Habitat

The Corps has initiated coordination with the NMFS regarding the potential effects of the recommended corrective action (dredging) on EFH. Impacts due to implementation of project alternatives would result in short-term alterations of EFH for salmon and groundfish, as well as forage fish such as capelin and sand lance 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 in the limited project area. See Appendix 2 for the Corps' EFH assessment.

4.5 Effects on Cultural and Historic Resources

The Corps determines that its proposed annual dredging of marine sediment from submerged navigation features would have no adverse effect on cultural or historic resources, and has sought concurrence with that determination from the State Historic Preservation Officer.

4.6 Effects on Economics and Subsistence

The intent of the proposed maintenance dredging is to benefit economic activity by ensuring safe, effective access to the port by ships, boats, and barges. The presence of the dredge within the channel and basin may cause some temporary, very short-term access delays, which could be minimized by close coordination with the Nome harbormaster. Any fishing within the harbor or entrance channel may be affected by temporary increases in turbidity or disruption of the bottom environment by the dredge. The Corps believes there should be no significant impacts to economic or subsistence activities in the limited area affected by the dredging activities.

4.7 Effects on 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 of dredged material. Noise levels related to dredging are not expected to exceed the decibel level generated each year as the same dredge operating in the same area via the same method will complete the proposed work. Disposal is expected to generate moderately more noise as the dredge is expected to use an additional slurry pump to pump dredged material to the disposal site. Given that the additional pump would be an in-line pump located remotely from the dredge (along the disposal pipeline), no impacts beyond that associated with an additional noise generating source are expected.

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. Although no analysis was done, it is clear that this short-term and relatively minor dredging project will 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 Effects on 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 Nome community. No racial, ethnic, age, or other population group would be adversely affected disproportionately.

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. All the alternatives considered in detail are located 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.

4.9 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 following is a non-inclusive list of the project related past and present actions that have occurred within and adjacent to the project area. Together these actions have resulted in the existing conditions of the project area:

1919 – Construction of the original project begins.

1922 – Dredging of the original channel and basin completed.

1923 – Construction of original jetties and revetments completed.

1949 – Seawall and turning basin extension construction initiated. First recorded maintenance dredging.

1951 – Turning Basin expanded.

1964 – Records indicate annual maintenance dredging has been occurring and is on-going.

1979 – Maintenance dredging continues.

1989 – Annual maintenance dredging halted for 3 years due to environmental concerns (naturally occurring arsenic hotspot found).

2000 – Annual maintenance dredging.

2001 – Annual maintenance dredging and emergency dredging occurs.

2002 – 2004 – Annual maintenance dredging.

2005 – Annual maintenance dredging, original entrance channel filled in, new entrance channel excavated.

2006 – Annual maintenance dredging.

2007 – Annual maintenance dredging and east sediment trap dredged.

2008 – 2012 – Annual maintenance dredging.

Some reasonably foreseeable future actions considered in this analysis are identified below. The listing includes relevant foreseeable actions within and adjacent to the project area including those by the Corps, other Federal agencies, state and local agencies, and private and commercial entities:

- Continued operation and maintenance of the harbor and entrance channel to the various design depths plus 1 foot of over-depth.

- Continued use and development of the project area, including areas adjacent to the harbor for commercial, industrial, and residential uses in proportion to potential future increases in population within the Nome area.

- Continued operation and maintenance of private berths and terminals associated with the harbor.

Marine Environment. Future development, construction activities, and other foreseeable future projects, in combination with population growth within and adjacent to the project area, would produce limited changes in the amount of impervious surfaces and associated runoff in and around the harbor and adjacent watersheds. However, all projects are required to adhere to local, state, and Federal storm water control regulations, and best management practices, which are designed to limit surface water inputs.

Biological Resources. Biological resources include fish and wildlife, aquatic vegetation, Federal threatened and endangered species, other protected species, and natural resources management. The legacy contamination (arsenic and mercury) caused by naturally occurring concentrations of both, development, maintenance dredging, effects of propeller and jet propulsion, and industrial use in the harbor will 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 will 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.

Cultural and Historic Resources. The entrance channel and harbor have been dredged in the past. No cultural and historic resources are expected to be impacted by the proposed dredging action. The beach area fronting Nome and the offshore disposal area have been used many times for deposition of dredged material. 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 be anticipated to have minor impacts, if any, on cultural resources.

Air and Noise Quality. The proposed action and the past, present, and reasonably foreseeable future 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.

Socioeconomic Resources. The proposed action and future Corps' maintenance dredging activities would alleviate shoaling impacts to navigation and would not change the type or quantity of goods shipped or the type or size of commercial vessels transiting the entrance channel and 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, and as a result, no disproportionately high or adverse effect on minority populations or low-income populations.

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 that have been considered included relevant foreseeable actions within and adjacent to the project area and 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, Regulatory 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 Nome entrance channel and harbor, and the most recent correspondence with state and Federal resource agencies. Per the NEPA process and Corps regulations and guidance, the EA and unsigned FONSI is subject to a 30-day public review. If requested, a public meeting may be held to discuss project alternatives and solicit public views and opinions.

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 (Appendix 1). The ADEC regulates compliance with State of Alaska water quality standards under the Section 401 of the Clean Water Act. The Corps determines 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 certificate if there is reasonable assurance that the proposed corrective action would meet and maintain the standards.

A checklist of project compliance with relevant Federal, state, and local statutes and regulations is shown in Table 1.

Table 1. Environmental Compliance Checklist

FEDERAL	Compliance
Archeological & Historical Preservation Act of 1974	PC
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 *	N/A

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.

5.2 Mitigation

Details of mitigation activities will be developed further as the project develops, but based on previous coordination with state and Federal agencies, mitigation for this project is likely to include the following elements:

- Based on direction from ADFG through its amendments to Fish Habitat Permit FG98-III-0074, dredging would start as soon as the ice goes out, but be completed in the narrow inner channel area by 25 June, and in the rest of the project area by 31 July. This work-window is intended to protect juvenile salmon, which are believed to start out-migration from Snake River in mid-June.

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

- Project-related vessels and barges shall not be permitted to ground themselves on the bottom during low tide periods, unless there is a human safety issue requiring it.

- A construction oil spill prevention plan shall be prepared.

- The Corps will conduct post-dredge bathymetry surveys to ensure that only the material identified to be dredged was removed to the authorized depth and that the design depth was achieved by the dredging action.

6.0 Conclusion

The completed environmental assessment supports the conclusion that the proposed maintenance dredging does not constitute a major Federal action significantly affecting the quality of the human and natural environment. An environmental impact statement (EIS) is therefore not necessary for the annual maintenance dredging, and the prepared Finding of No Significant Impact (FONSI) may be signed.

7.0 Document Preparation

This environmental assessment was prepared by Keith Gordon, Chris Floyd, and Diane Walters, of the Environmental Resources Section, Alaska District, U.S Army Corps of Engineers. The Corps of Engineers Project Manager is Julie Anderson.

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APPENDIX 1

404 (b)(1) Evaluation

EVALUATION UNDER SECTION 404(b)(1)
of the CLEAN WATER ACT

MAINTENANCE DREDGING
NOME, ALASKA

This is the factual documentation of evaluations conducted under the auspices of Section 404 of the Clean Water Act of 1977. This report covers the annual maintenance dredging of the harbor entrance channel, sediment traps, and inner north harbor at Nome, Alaska, and the placement of materials dredged from those areas. The harbor at Nome was originally authorized by the Rivers and Harbors Act of 1917 as adopted by Public Law No. 37. The current configuration, completed in 2006, was authorized under the Water Resources Development Act of 1999.

This evaluation is divided into three sections: Project Description, Factual Determinations, and Findings of Compliance.

I. PROJECT DESCRIPTION

A. <u>Location</u>: The project is located in the city of Nome, Alaska.

B. <u>General Description</u>: The current harbor consists of an approximately 3,000-foot-long entrance channel protected by a causeway on the west side and a breakwater to the east, leading to an inner harbor basin. The causeway and breakwater are breached to allow fish passage; the breach in the causeway is flanked by sediment traps to slow the shoaling of the entrance channel. Littoral (long-shore) transport and storms bring in large quantities of sediment moving in a generally west-to-east direction, and the Federal project must be dredged annually. From 2006 to 2011, 20,000 to 49,595 cubic yards were dredged each year to maintain the Federal project depths. Sediment build-up is heaviest in the outer portions of the entrance channel, and relatively light to moderate in the inner harbor basin. The Snake River, which empties into the inner harbor, is thought to carry relatively little sediment into the harbor and entrance channel each year compared with the volume of marine sediment deposited.

Since 2009, the Corps has been placing dredged material from the harbor along the shoreline east of the breakwater for beach nourishment, helping replace sediment partially blocked from the area by the causeway and breakwater. This placement of dredged material has substantially increased the width of beach along the foot of the rock seawall protecting the city shoreline. Previously, two in-water disposal sites authorized by the U.S. Environmental Protection Agency (EPA) under Section 102 of the Marine Protection, Research, and Sanctuaries Act (MPRSA) have been used for disposal. These two disposal areas flanked the former entrance channel and extended several thousand feet seaward. The EPA prepared an environmental impact statement to assess the impacts of using these disposal sites, and a Record of Decision was signed in 1992 authorizing the use of these sites for the disposal of dredged material for a 10-year period.

C. Authority: The authority and purpose of the project are discussed above.

D. General Description of Dredged or Fill Material: The material to be dredged from the Federal project is mostly marine material carried into the project area by the littoral transport process and storm surge; the Snake River is believed to discharge relatively little sediment (estimated at less than 400 cubic yards) into the harbor basin on an annual basis. The marine sediments are primarily sand and gravel; material from the basin may include sandy silt.

Previous sampling and chemical analysis of harbor sediments at Nome has shown little indication of significant human generated chemical contamination. However, notably high concentrations (up to 200 mg/kg) of arsenic have been reported regularly in sediment samples from the area. The State of Alaska has not established marine sediment standards, but Alaska District has historically used a sediment screening level of 57 mg/kg (adopted from the Puget Sound Dredge Disposal Analysis guidelines); the National Oceanic and Atmospheric Administration (NOAA) has published marine sediment threshold effects levels (TELs) for arsenic as low as 7 mg/kg. Previous concern over high concentrations of arsenic in the Nome Harbor dredged material led to some material being buried within the harbor basin under a 1-meter-thick cap in 1995 and 1996. The elevated concentrations of arsenic in some Seward Peninsula mineral formations and in the sediments of area streams (including Snake River) are well established. The presence of natural sources of arsenic and the lack of identifiable human generated sources of arsenic at Nome Harbor suggest that the high concentrations of arsenic detected in some samples of the harbor sediment are due primarily to local mineralogy. Soil samples taken from borings along Nome Spit in 2000 also showed consistently high levels of arsenic (up to 93 mg/kg) even at depths of greater than 20 feet below the surface, suggesting that the marine sediments that formed the spit were also rich in arsenic.

E. Description of the Proposed Discharge Sites: The onshore placement area is at the shoreline at the western end of the rock seawall. This roughly 600-foot by 300-foot (less than 5 acres) area would primarily receive sediment dredged from the harbor basin and inner channel. The dredged material would be placed at the waterline within this area and periodically spread with a grader or bulldozer to match the surrounding beach profile. The dredged material discharged in this area would serve as beach nourishment as it is naturally redistributed eastward along the foot of the seawall. The coordinates of the corners of the onshore placement area are presented in Table 1.

Table 1. Coordinates of Onshore Placement Area

Point	Latitude	Longitude
1	64° 29 52.76’ N	165° 25 00.00’ W
2	64° 29 51.46’ N	165° 24 47.15’ W
3	64° 29 48.73’ N	165° 24 50.13’ W
4	64° 29 50.03’ N	165° 25 03.00’ W

This area has been used for onshore placement and beach nourishment every year since 2009, so the existing surface sediment within the area is predominantly previously dredged material from the harbor project.

F. Description of Disposal Method: The most probable disposal method would be via pipeline from a cutter-head hydraulic dredge. This technique has been used successfully at this site, and, since it allows nearly all dredging operations to be conducted within the protected entrance channel and basin, it is less subject to unfavorable weather or sea conditions.

II. FACTUAL DETERMINATIONS

A. Physical Substrate Determinations: Deposition of dredged material at the onshore placement area is intended to replace sediment at a location starved of material by the causeway and breakwater's tendency to interfere with littoral transport. Several years of this beach nourishment activity was found to beneficially widen the beach along the foot of the city seawall; cessation of the beach nourishment would presumably cause a return to the previous sediment-starved condition.

B. Water Circulation, Fluctuation, and Salinity Determinations: Placement of dredged material in the onshore placement area is intended to have a localized beneficial effect on water movement patterns by increasing the width of the beach along the city seawall and diverting wave energies farther off-shore. However, the beach nourishment activity should not have a significant effect on broader water circulation patterns or salinity in the area. The material discharged onshore will be spread and smoothed to conform to the natural shore contours, which should minimize disruption to water circulation that could be caused by allowing a large mass of discharged sediment to accumulate along the shoreline.

C. Suspended Particulate/Turbidity Determinations: The discharge of the dredged material would temporarily increase the suspended solids/turbidity in the water column at the disposal site. The dredged material is expected to be primarily sand and gravel, which would settle out of the water column quickly. The waters of Norton Sound are typically turbid with silt discharged from major river systems and stirred up from its shallow bottom by storms. The discharge of fines in the dredged material will cause a temporary incremental increase in suspended solids at the discharge site, which may have little effect on primary producers and aquatic filter feeders already adapted to a turbid environment.

D. Contaminant Determinations: The principle chemical of concern in the sediment is arsenic. While arsenic concentrations of sediment dredged from the harbor basin and entrance channel may exceed some published sediment quality standards, there is ample reason to believe that this arsenic is naturally occurring, and that sediment with high mineral concentrations of arsenic has been moving through the Nome near-shore environment for a long time. The material to be dredged annually from the Nome Federal project will be primarily marine sediments deposited in the preceding year, which will have little opportunity to accumulate any human-generated contamination that might be present in the harbor. The high-arsenic sediment previously buried under a cap within the harbor is well below project depths and will not be disturbed by the dredging operations. The discharge of dredged material in the designated placement/disposal areas will not cause significant introduction of contaminants into the marine environment.

E. Aquatic Ecosystem and Organism Determinations: Studies of the general biological setting offshore of Nome describe species typical of a high-energy, sandy-gravelly coastal environment dominated by epifaunal and infaunal species such as sea stars, polychaetes, bivalves, and amphipods. The natural environment includes the continuous migration and redistribution of benthic sediments, as well as frequent disruption from ice scouring and violent storms. The dredged material to be discharged is similar to the existing benthic sediments in the discharge area; existing populations of organisms, adapted to maneuvering and burrowing through loose sediment, would most likely not suffer significant adverse effects from the addition of several inches of new material to their environment.

F. Proposed Disposal Site Determinations: A small percentage of the total dredged material would be dispersed into the water column and settle some distance laterally from the point of discharge. The bulk of the material would settle more rapidly to the sea floor in the immediate discharge area. Currents and storms should cause the material to spread fairly evenly on the sea floor.

The disposal action would comply with the applicable water quality standards and would have no detrimental effects on any of the following:
1. Municipal and private water supplies
2. Recreational and commercial fisheries
3. Water-related recreation
4. Esthetics
5. Parks, national and historic monuments, national seashores, wilderness areas, research sites, and similar preserves.

G. Determination of Cumulative/Secondary Effects: The proposed dredging and disposal operation should have no cumulative or secondary effects. The placement of dredged material in the onshore area is to some extent replacing sediments blocked by the causeway and breakwater from being carried along the shoreline by littoral transport.

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: No economically feasible upland disposal alternative exists for the dredged material, considering the quantities that would be generated on an annual basis. The coastal plain on which Nome was developed is mostly wetlands, and the dredged material would have to be trucked inland a considerable distance to find an area of unoccupied uplands large enough to receive it. Placement onshore as beach nourishment is the most practical, economical, and environmentally benign alternative for managing the dredged material.

C. Compliance with Applicable State Water Quality Standards: The disposal of the dredged material would not violate 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 would not harm any endangered species or their critical habitat.

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 any significant adverse effects on recreation, aesthetic, and/or economic values caused by these project aspects. The dredging and disposal activities would be coordinated with the City of Nome to avoid conflicts with subsistence and recreational activities.

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. Specific steps would include:

- The dredging schedule would be coordinated with the Alaska Department of Fish & Game (ADFG). Based on direction from the ADFG through its amendments to Fish Habitat Permit FG98-III-0074, dredging would start as soon as the ice goes out, but be completed in the narrow inner channel area by 25 June, and in the rest of the project area by 31 July. This work-window is intended to protect juvenile salmon, which are believed to start out-migration from Snake River in mid-June.

- The placement of dredged material would be at a site already impacted by similar activities.

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

MAINTENANCE DREDGING
NOME, ALASKA

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October 2012

ESSENTIAL FISH HABITAT ASSESSMENT

Maintenance Dredging
Nome, 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 purpose of the proposed action is the annual restoration of design depth to provide safe navigational access to Nome's harbor.

Project Authority
The original improvements to Nome Harbor were approved via the Rivers and Harbors Act of 8 August 1917, Public Law (P.L.) 37. The following authorizations modified the original authorization to produce the current project footprints depicted in Figure 2 of the attached EA:

- Rivers and Harbors Act, 30 August 1935
- Rivers and Harbors Act, 16 June 1948 (P.L. 80-649)
- Section 101 (a)(3), P.L. 106-53, Water Resources Development Act of 1999

Project Area Description
The harbor at Nome was built where the Snake River discharges into Norton Sound. The harbor site is on an exposed stretch of low-relief sand and gravel coastline. The seabed near the harbor is a largely featureless expanse of sand and gravel that deepens very gradually, only reaching a depth of -40 feet MLLW at a distance of about 3,000 feet offshore. The natural environment includes the continuous migration and redistribution of benthic sediments via littoral transport, as well as frequent disruption from ice scouring and violent storms. Studies of the general

biological setting offshore of Nome describe species typical of a high-energy, sandy-gravelly coastal environment dominated by epifaunal and infaunal species such as sea stars, polychaetes, bivalves, and amphipods that are adapted to a loose, shifting substrate.

The current configuration of Nome Harbor, shown in Figure 1, has existed since 2006. The entrance channel requires annual dredging to remove sediments deposited by littoral transport.

Figure 1. Aerial oblique view of current Nome harbor configuration; view is towards the east-northeast.

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 two FMPs—Bering Sea/Aleutian Island (BSAI) Groundfish and Alaska Stocks of Pacific Salmon. These two FMPs include species or species complexes of groundfish and invertebrate resources and the all Pacific salmon species Table 1. See Appendix B for a description of BSAI Groundfish and Pacific Salmon resources. No EFH "habitat areas of particular concern" are in the Corps' project area. The waters off Nome are included in the Northern Bering Sea Research Area.

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

Bering Sea/Aleutian Island Groundfish	Alaska Stocks of Pacific Salmon
Walleye pollock Pacific cod Yellowfin Sole Greenland Turbot Arrowtooth Flounder Rock Sole Alaska Plaice Rex Sole Dover Sole Flathead Sole Sablefish Pacific Ocean Perch Shortraker Rockfish and Rougheye Rockfish Northern Rockfish Thornyhead Rockfish Light Dusky Rockfish Atka Mackerel Forage Fish Complex Sculpins Sharks Skates Squid Octopus	Chinook salmon Coho salmon Pink salmon Chum salmon Sockeye Salmon

Assessment of Project Effects on Essential Fish Habitat

Short-term impacts include water quality impacts in the form of increased levels of turbidity, noise from dredging operations, pollution in the form of fuel or oils spilled from the dredging equipment, noise from the dredging equipment, and disturbance from the movement of equipment through the area.

Short-term Impacts

Water Quality. Norton Sound is characteristically quite turbid; the material to be dredged will consist of sand and gravel with relatively little fines. The proposed cutter-head hydraulic pipeline dredge would loft some sediment into the water column near the site of dredging, but much less than other potential methods that require hauling the material up through the water column (clamshell dredge) or dewatering it at the dredge site (hopper dredge). Any increase in ambient turbidity would be minor and temporary. The discharge of the dredged material would temporarily increase the suspended solids along the shoreline of the placement area. The dredging schedule would be coordinated with the Alaska Department of Fish & Game (ADFG). Based on direction from the ADFG through its amendments to Fish Habitat Permit FG98-III-

0074, dredging would start as soon as the ice goes out, but be completed in the narrow inner channel area by 25 June, and in the rest of the project area by 31 July. This work-window is intended to protect juvenile salmon, which are believed to start out-migration from Snake River in mid-June.

Pollution. The dredge vehicle and any booster pumps for the pipeline use fuel and lubricants and are potential sources of spills into the marine environment. The contractor would be required to prepare a spill prevention and response plan and have appropriate spill response materials at the work site.

Waterborne Noise. The quantitative level of noise generated by the proposed cutter-head hydraulic dredge is not available. However, in principle, the hydraulic pipeline dredge should be much less likely than other technologies to create the type of abrupt, high-intensity noise most harmful to fish and other marine life, as its continuous manner of operation would avoid the underwater impacts caused by other dredging methods (e.g., a clamshell dredge striking the bottom). All dredging will be performed within the confines of the causeway and breakwater or the inner channel, which should limit the area of the local environment affected by dredge-generated sound. Other noise generated by the dredging vessel would be comparable to that created by other vessels in this busy harbor. Adult resident fish should be able to swim out of the vicinity of the slowly moving cutter-head if they are disturbed by the noise. Juvenile salmon should be protected in part by the work-closure window described above.

Construction-Related Vessel Traffic. Another benefit of the pipeline dredge is the much reduced vehicle traffic, compared with the steady movement of scows or hopper barges required for other dredging methods. The dredging will take place within a busy harbor, and its activities will be an incremental increase in the disturbances already created by other boat traffic.

Long-Term Impacts

Loss and Conversion of Marine Habitat. The natural environment along the Norton Sound coast at Nome is a high-energy sand-and-gravel regime that is subject to constant redistribution of substrate through littoral transport, storm surge, and ice scouring. The Nome Harbor entrance channel requires annual dredging because the sea bed is being continuously reformed as new sediments are deposited but trapped by the artificial structures built at the harbor. The proposed dredging activities would make only a temporary and highly localized alteration in this constantly shifting environment. In fact, the annual dredging and beach nourishment may be thought of a means of partially compensating for the interruption of west-to-east littoral drift created by the causeway and breakwater and returning the sediment to its natural transport systems.

Any species currently using the dredged area as habitat would be already adapted to a high-energy environment of loose, continuously redistributed substrate. At the dredged material placement area, fish such as sand lance or capelin that feed or lay eggs in loose shoreline sediments may be affected by the addition of more sand and gravel to the beach environment. However, the discharged sediments would be quickly redistributed by intentional spreading, wave action, and littoral currents.

Water Quality. The proposed dredging project would have no long-term impact on coastal water quality. The great majority of the material removed and relocated by the annual dredging would be newly deposited oceanic material that was in transit along the Nome coastline. The proposed dredging would in effect be returning material trapped by the artificial harbor structures to its natural transport systems.

Mitigation Measures. Planned measures to limit the project's impact on fish habitat include:

- Based on direction from the Alaska Department of Fish and Game (ADFG), dredging would start as soon as the ice goes out, but be completed in the narrow inner channel area by 25 June, and in the rest of the project area by 31 July. This work-window is intended to protect juvenile salmon, which are believed to start out-migration from Snake River in mid-June.
- To minimize the danger to marine mammals from project-related vessels, speed limits (e.g. less than 8 knots) shall be imposed on vessels moving in and around the project area.
- Project-related vessels and barges shall not be permitted to ground themselves on the bottom during low tide periods, unless there is a human safety issue requiring it.
- A construction oil spill prevention plan shall be prepared.
- The Corps will conduct post-dredge bathymetry surveys to ensure that only the material identified to be dredged was removed to the authorized depth and that the design depth was achieved by the dredge action.

Conclusions and Determination of Effect.

The proposed action has the potential to cause short-term effects on EFH for several Bering Sea groundfish species, particularly species, such as flatfish and forage fish like capelin, that favor a loose sandy substrate. Short-term avoidance of the dredged area during dredging operations because of noise disturbances, boat traffic, and turbidity may occur. Discharge of sediment at the dredged material placement area may potentially affect fish (e.g., capelin and sand lance) that lay their eggs in shoreline sand. These effects would occur only in very limited areas of the harbor and adjacent beach that have already been impacted by similar dredging and sediment discharge over many years and are unlikely to represent the loss of valuable habitat. The movement of juvenile salmon through Snake River and the inner channel should be protected by the dredging work-windows developed by the ADFG. Long-shore movement of fish should not be significantly hampered by the presence of the relatively-small dredge vessel in the outer channel.

No long-term effects are expected. The proposed dredging activities would create transient and highly localized alterations to a very dynamic environment. Any species using the project area as habitat are adapted to a high-energy environment of constantly redistributed substrate. The annual dredging and beach nourishment arguably helps maintain coastal habitat at Nome in something closer to its natural state by compensating for the interrupted littoral movement of sediments along the coast and limiting the sediment starvation and coastal erosion that would be expected on the down-current side of the causeway and breakwater.

APPENDIX A
PROPOSED OPERATIONS AND MAINTENANCE DREDGING

The Federal project at Nome Harbor consists of an approximately 3,950-foot-long entrance channel, an inner harbor basin, and a sediment trap (figure 1). These are dredged to project depths ranging from 22 to 10 feet below mean lower low water (MLLW). Between 2006 (when the current entrance channel configuration was completed) and 2011, the quantity of sediment dredged annually has ranged from 20,000 to 49,595 cubic yards. The inner sediment trap requires dredging roughly once every 5 years. The dredging planned for 2013 would include the sediment trap and is expected to remove about 50,000 cubic yards. In most subsequent years, dredging of just the entrance channel and inner basin would remove about 34,000 cubic yards.

The preferred alternative for the method of dredging is to use a hydraulic pipeline dredge with a cutter-head. This equipment has been used at Nome Harbor before and has distinct advantages for the maintenance dredging project at Nome. Pipeline dredges are able to operate almost continuously (without pauses to change out scows or hoppers), resulting in higher productivity and faster project completion. At Nome, a pipeline discharge system allows the dredge and support craft to work almost entirely within the protection of the breakwater and causeway; if the dredged material had to be transported out of the harbor in a scow, high winds or unfavorable sea conditions could slow or temporarily halt the dredging operations.

At the present time, the maintenance project has only one viable placement site for the dredged material. The onshore placement area is at the shoreline at the western end of the rock seawall (figure 1). This roughly 600-foot by 300-foot (less than 5 acres) area would primarily receive sediment dredged from the harbor basin and inner channel. This placement site has been used successfully since 2009, and its use has contributed to the beneficial widening of the beach in front of the Nome seawall. The dredged material would be placed at the waterline within this area and spread periodically with a grader or bulldozer to match the surrounding beach profile. The dredged material discharged in this area would serve as beach nourishment as it is naturally redistributed eastward along the foot of the seawall. The coordinates of the corners of the onshore placement area are:

- 64° 29 52.76’ N, 165° 25 00.00’ W;
- 64° 29 51.46’ N, 165° 24 47.15’ W;
- 64° 29 48.73’ N, 165° 24 50.13’ W;
- 64° 29 50.03’ N; 165° 25 03.00’ W.

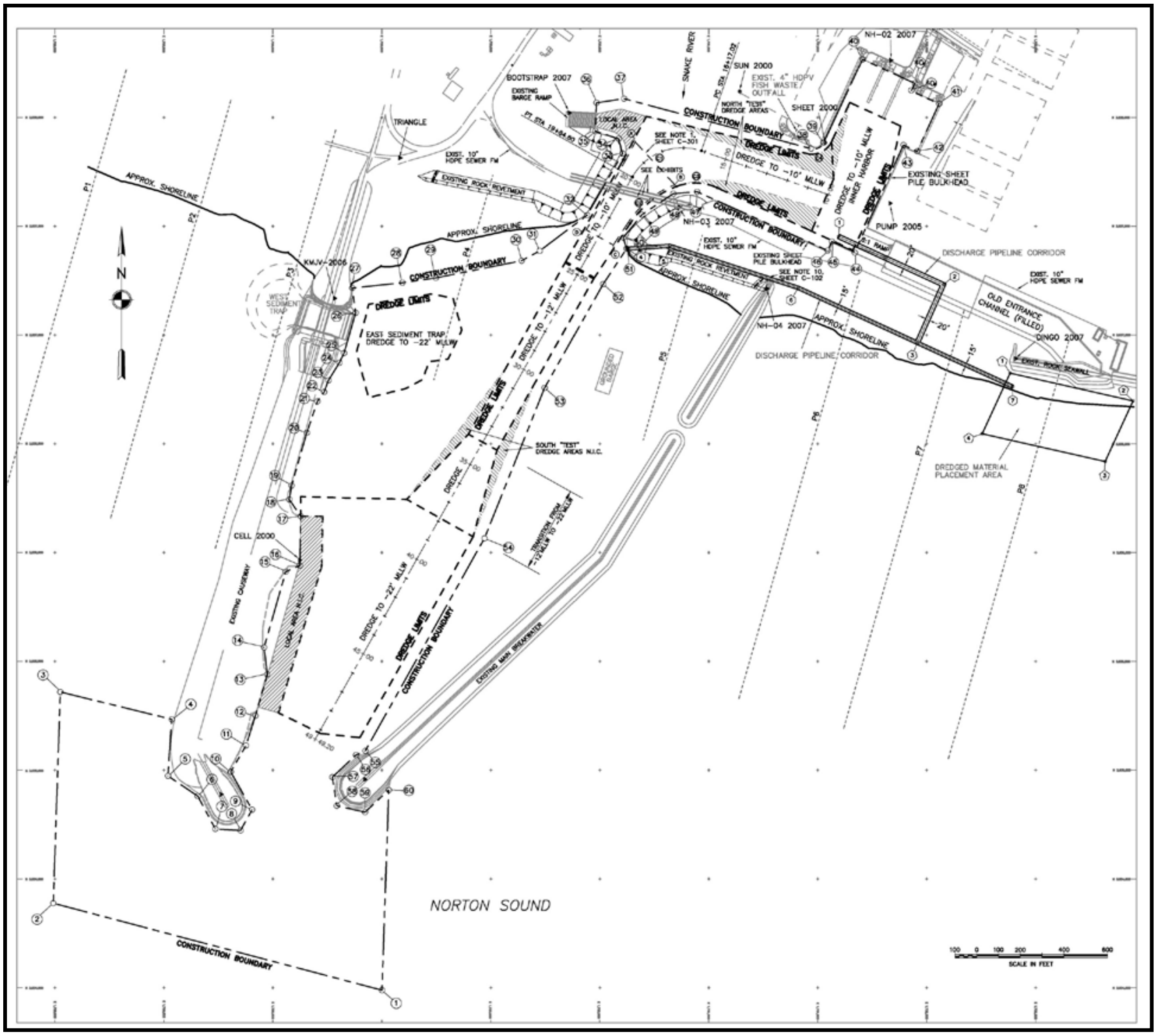

Figure 2. Drawing of proposed limits of dredging, and the dredged material placement area.

APPENDIX B
DESCRIPTIONS OF ESSENTIAL HABITAT

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.*

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* 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.

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.

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.

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 known to associate with smaller coastal streams.

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* 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.

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*.

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* 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.

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.

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.

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.

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* 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.

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*.

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* 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.

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.

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 mid-summer until December of their first year at sea.

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.

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* 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.

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*.

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* 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.

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.

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.

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.

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* wherever there are spawning substrates consisting of gravels from April through September.

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*.

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* 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.

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.

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.

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* 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.

Description of Essential Fish Habitat for the Groundfish Resources of the Bering Sea/Aleutian Islands Region[1]

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.

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. 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. No known preference for substrates exist.

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.

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

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[1] 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.

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.

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.

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.

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.

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.

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.

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.

<u>EFH Description for BSAI Arrowtooth Flounder</u>

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.

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.

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.

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.

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.

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.

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.

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.

<u>EFH Description for BSAI Rex Sole</u>

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.

<u>EFH Description for BSAI Dover Sole</u>

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**.**

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

<u>EFH Description for BSAI Yelloweye Rockfish</u>

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.

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.

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.

<u>EFH Description for BSAI Dusky Rockfish</u>

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.

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.

<u>EFH Description for BSAI Atka Mackerel</u>

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.

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.

<u>EFH Description for BSAI Skates</u>

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

<u>EFH Description for BSAI Sculpins</u>

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.

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.

<u>EFH Description for BSAI Sharks</u>

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.

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

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.

<u>EFH Description for BSAI Squid</u>

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.

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.

<u>EFH Description for BSAI Octopus</u>

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.