Appendix J: Draft Biological Assessment

US Army Corps of Engineers®

Draft Biological Assessment

Port of Nome Modification Feasibility Study, Navigation Improvements Nome, Alaska

March 2020

Nome Harbor Navigation Improvements

Biological Assessment

Nome, Alaska

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Alaska District

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Table of Contents

List of Figures

Executive Summary

The U.S. Army Corps of Engineers (USACE), Alaska District proposes to improve navigation at the Port of Nome. Improvement will involve constructing and dredging the Deep-Water Basin to -40 feet MLLW, and the Outer Basin dredged to -28 feet MLLW. This project includes removing the breakwater spur off the west causeway and adding one dock, extending the west causeway to deep-water and adding three docks to the extension and removing the east breakwater and relocating it further east with a new dock on the inside of the basin. The construction of the project has the potential to impact several species listed under the Endangered Species Act. The species, listing status, managing agency, and effects determination are included in Table ES-1.

Table ES-1. Executive summary effects determination.

Species Common Name	Species Latin Name	Listed Population	ESA Status	Determination of Effect	Critical Habitat Adversely Modified?
Ringed seal	*Pusa hisipida*	Arctic DPS	Threatened	**May effect, likely to adversely affect**	N/A
Bearded seal	*Erignathus barbatus*	Beringia DPS	Threatened	**May effect, likely to adversely affect**	N/A
Gray whale	Eschrichtius robustus	W. North Pacific DPS	Endangered	**May effect, likely to adversely affect**	N/A
Humpback whale	*Megaptera novaeangliae*	W. Pacific DPS	Endangered	**May effect, likely to adversely affect**	N/A
		Mexico DPS	Threatened		
Steller sea lion	*Eumetopias jubatus*	Western DPS	Endangered	**May effect, likely to adversely affect**	**No**
Sperm whale	*Physeter macrocephalus*	All	Endangered	No effect	N/A
N. Pacific right whale	*Eubalaena japonica*	All	Endangered	No effect	**No**
Bowhead whale	*Balaena mysticetus*	All	Endangered	No effect	N/A
Fin whale	*Balaenoptera physalus*	All	Endangered	No effect	N/A
Blue whale	*Balaenoptera musculus*	All	Endangered	No effect	N/A

1.0 INTRODUCTION

The purpose of this Biological Assessment (BA) is to review the proposed dredging and pile-driving activities at Nome, Alaska, in sufficient detail to determine whether the project might affect species protected under the federal Endangered Species Act (ESA). A BA is needed because there is a potential for “may-effect,” likely to adversely affect impacts to fish and wildlife habitats within the project area that may be caused by the proposed activities. The need for a BA from a regulatory standpoint is due to the fact that there is federal funding, and there are federal permits needed for the project. The U.S. Army Corps of Engineers (USACE) will be prepare a 404(b)(1), and the project must fulfill the National Environmental Policy Act (NEPA) requirements. USACE will apply for an Incidental Harassment Authorization (ITA) to take marine mammals by Level B (Behavioral) harassment; primarily due to impacts of marine pile-driving. Accordingly, this document is prepared consistent with legal requirements set forth under Section 7 of the Endangered Species Act (19 U.S. Code 1536 (c)).

An Incidental Take Authorization (ITA) to take marine mammals by Level B (Behavioral) harassment, will be necessary for this project, primarily due to impacts of pile-driving in marine waters will be necessary. The term “ITA” is inclusive of both single-year Incidental Harassment Authorizations (IHAs) and multi-year Letters of Authorization (LOAs). The use of an IHA is appropriate because it is not feasible to monitor a roughly 8-kilometer zone for marine mammals and shut down pile-driving until the ESA species leaves the area. While it often makes sense to accept the shutdowns on smaller projects with even moderate areas that are ensonified, the risk of long delays for the Nome project justifies obtaining an IHA. Also, there are non-ESA species in the area that are protected by the Marine Mammal Protection Act (MMPA). The only regulatory mechanism available to harass the marine mammals that are just MMPA listed is an ITA. All of the harassment is incidental Level B (behavioral) due to pile-driving, but an ITA is necessary to continue pile-driving while marine mammals are in the Level B zone.

This draft BA lays out the rationale for which ESA species are considered and the rationale for the preliminary likely effect determinations. Since USACE, has through its analysis, determined that its action “may affect, and is likely to adversely affect” ESA-listed marine mammals, the formal ESA consultation procedures established by 50 CFR 402 et seq. are triggered, which will lead to the development of a Biological Opinion (BO) by the National Marine Fisheries Service (NMFS). Section 7(b)(4)(C) of the ESA further provides that if an endangered or threatened marine mammal is involved, the taking must first be authorized by Section 101(a)(5) of the Marine Mammal Protection Act (MMPA). Other non-ESA species, such as beluga and the non-ESA listed gray whales, will likely be included in the ITA application package. These details will inform the ITA application to help determine estimated take numbers for marine mammals and serve to advance this BA from a draft to a final version. Authorized take numbers from the ITA are necessary to assess the effects under the ESA and allow for accurate completion of the BA and resulting BO.

1.1 Purpose and Need

The purpose of the "Port of Nome Modification" project is to provide safe, reliable, and efficient navigation and mooring for vessels serving the hub community of Nome, Alaska (Figure 1). The project is needed to alleviate existing vessel restrictions that are imposed by insufficient channel depths and harbor area. Ship transportation into the Port of Nome is presently limited by depth, with existing depths inadequate to safely accommodate vessels with drafts exceeding -18 feet MLLW, which allows for a 2- to 3-foot under keel clearance and a 1.5-foot tide fluctuation.

Figure 1. Location and vicinity of Port of Nome.

2.0 PROJECT DESCRIPTION

2.1 Location

The proposed project site (i.e., Port of Nome, also referred to as the Nome Harbor) is located in proximity to mining operations, offshore petroleum operations, shipping lanes, and the other communities in the region. The local road network is confined to the Seward Peninsula, with no road access to the rest of Alaska. Nome is a regional center for retail services, transportation, mining, medical, native art, and other businesses for the region, and beyond, including the western and northern coastlands of Alaska. The Nome Airport is a state-owned, public-use airport approximately 2 miles west of the business district of Nome and the Port of Nome.

The Port of Nome is a regional port located on the Seward Peninsula and adjacent to the Norton Sound, which is centrally located along the Western Alaska coast (Figure 1). Nome has no access to the Alaska road system and is approximately 545 miles northwest of Anchorage, Alaska.

2.2 Definition of the Action Area

The action area is defined in the ESA regulations (50 CFR 402.02) as the area within which all direct and indirect effects of the project will occur. The action area is distinct from and larger than the project footprint because some elements of the project may affect listed species some distance from the project footprint. The action area, therefore, extends out to a point where no measurable effects from the project are expected to occur.

The Action Area for the purposes of this biological assessment includes:

a. The dredged navigation channel, dredged construction channel, and disposal area
b. The footprint of the breakwaters
c. The ensonified area surrounding the noise sources (pile-driving, dredging, vessel operation)
d. The transit routes between the dredged channels and placement site during construction
e. The transit route between the Port of Nome and Cape Nome

While it is uncertain that rock would come from established quarry at Cape Nome and the use of this quarry will not be specified in the construction contract, it is the most likely source and is used for analysis in this draft BA. It is possible that this source, and thus the route, might change between this draft BA and the final BA prepared in PED.

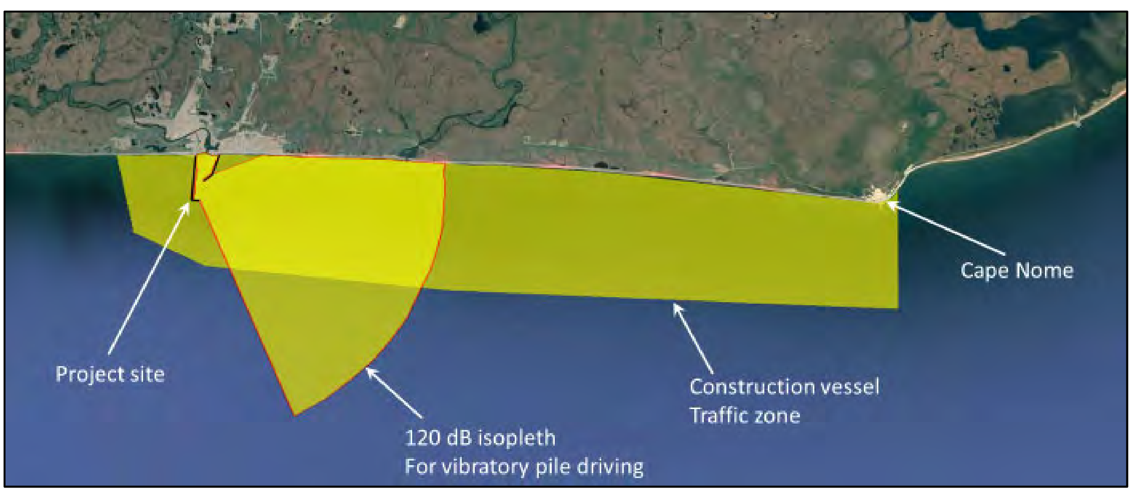

Figure 2. Action area. The entire yellow area is the action area considered for this project.

The action area is shown in figure 2. The entire yellow area is the action area for this project and is a combination of the calculated 120 dB isopleth for vibratory pile-driving plus an estimated zone that would encompass project-related vessel traffic between the

Port of Nome and the potential rock source at Cape Nome. The length of this action area is approximately 24 kilometers from east to west. The majority of the shaded area extends from the shoreline for four kilometers to about the 9-fathom contour interval. The offshore portion of the 120-dB isopleth extends 8 kilometers offshore at its farthest point to approximately 12-fathoms.

2.3 Proposed Action

2.3.1 Project Details

The USACE plans to construct "Alternative 8b", with the Deep-Water Basin dredged to -40 feet MLLW, and the Outer Basin dredged to -28 feet MLLW (Figure 2). This alternative includes:

- Removing the breakwater stub off the west causeway and adding one dock;
- Extending the west causeway to deep-water, adding three docks to the extension;
- Dredging the deep-water basin to -40 feet MLLW;
- Removing the east breakwater and relocating it further east with one dock addition;
- Dredging the Outer Harbor basin to a depth of -28 feet MLLW.

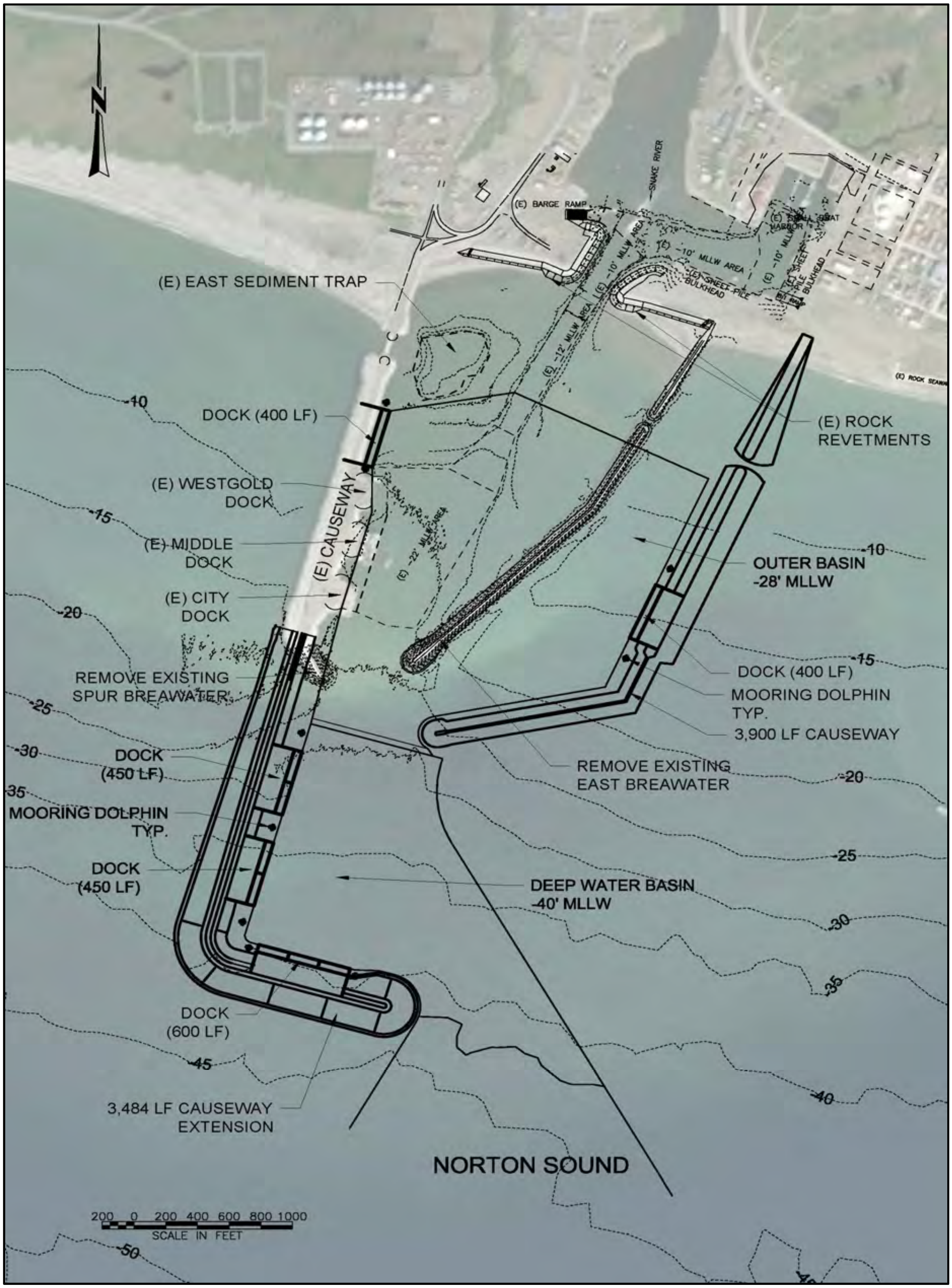

Figure 3. Layout of Proposed Action (Alternative 8b)

Breakwaters and Dredging

The Outer Basin modifications include removing the existing breakwater spur from the south end of the existing West Causeway, extending this causeway to deep-water, and increasing the entrance width to Outer Basin. The existing east breakwater is removed, and the generated materials reused in other new project features (causeways and/or breakwaters), as applicable. A new East Causeway/Breakwater combination, approximately aligned with F-Street, extends to approximately -25 ft MLLW with a total length of 3,900 ft (2,400 ft causeway/1500 ft breakwater). The Outer Basin channel entrance width increases to approximately 650 ft. Four, hundred-foot long docks are added to the West and East Causeways. The Outer Basin is deepened from -22 ft MLLW to -28 ft MLLW. The maximum pay dredge depth in the Outer Basin is -29ft MLLW to allow for 1 foot of allowable over depth.

The new Deepwater Basin is formed by extending the West Causeway by approximately 3,484 ft to a depth of approximately -40 ft MLLW. This extension is “L” shaped with the north-south section 2,100 ft long and the west-east section 1,384 ft long. The “L” shaped opening faces east, which provides wave protection during west and south winds. Two 450-foot and a 650-foot long dock are incorporated in the West Causeway extension. The Deep-Water basin is deepened to -40 ft MLLW with a maximum pay dredge to -42 ft MLLW to allow for 2 ft of allowable over depth.

New work dredge material totals are approximately 2,015,800 cubic yards from the Outer Basin and 517,600 cubic yards from the Deep-Water Basin for a total of approximately 2,533,400 cubic yards. New work dredging is anticipated to require mechanical dredging equipment to reach design depths. A scow would be loaded and used to deliver and place the dredged material in front of the sea wall area east of the port between bathymetric contours of -15 ft MLLW to -30 ft MLLW. The placement area is about 241 acres (6,000 ft wide and 1,800 ft long). The cross-section of the place material mound would be wedge-shaped with thicker side toward the -30 ft MLLW with the maximum height no greater than -15 ft MLLW. Wave and current energy should migrate a portion of the dredged material (sand) to nourish the beach.

Annual maintenance dredging in the Outer Basin will generate approximately 88,000 cubic yards, with the Deep-Water Basin generating approximately 16,000 cubic yards. Characteristics of the material encountered during maintenance dredging should be similar to the current sediment type (sand) dredged from the existing navigation channel and sediment trap. As a result, hydraulic cutter head dredging equipment with pipe-line discharge would be used for maintenance dredging with the sediment being placed directly on shore as currently practiced at the Port of Nome.

Dredged Material Placement

New work dredging is assumed to require mechanical dredging equipment to reach design depths. A scow would be loaded and used to deliver and place the dredged material in the near-shore placement area in front of the sea wall area east of the port between bathymetric contours of -15 ft MLLW to -30 ft MLLW (figure 3). This placement site is within the action area defined for this assessment. At this depth, the wave and current energy should cause some of this placed dredged material to migrate on to the beach area. The larger material should remain in place remain in place. The placement area is about 30 acres (6,000 ft wide and 1,800 ft long). New work dredge material totals are approximately 2,015,800 cubic yards from the Outer Basin and 517,600 cubic yards from the Deep-Water Basin for a total of approximately 2,532,800 cubic yards.

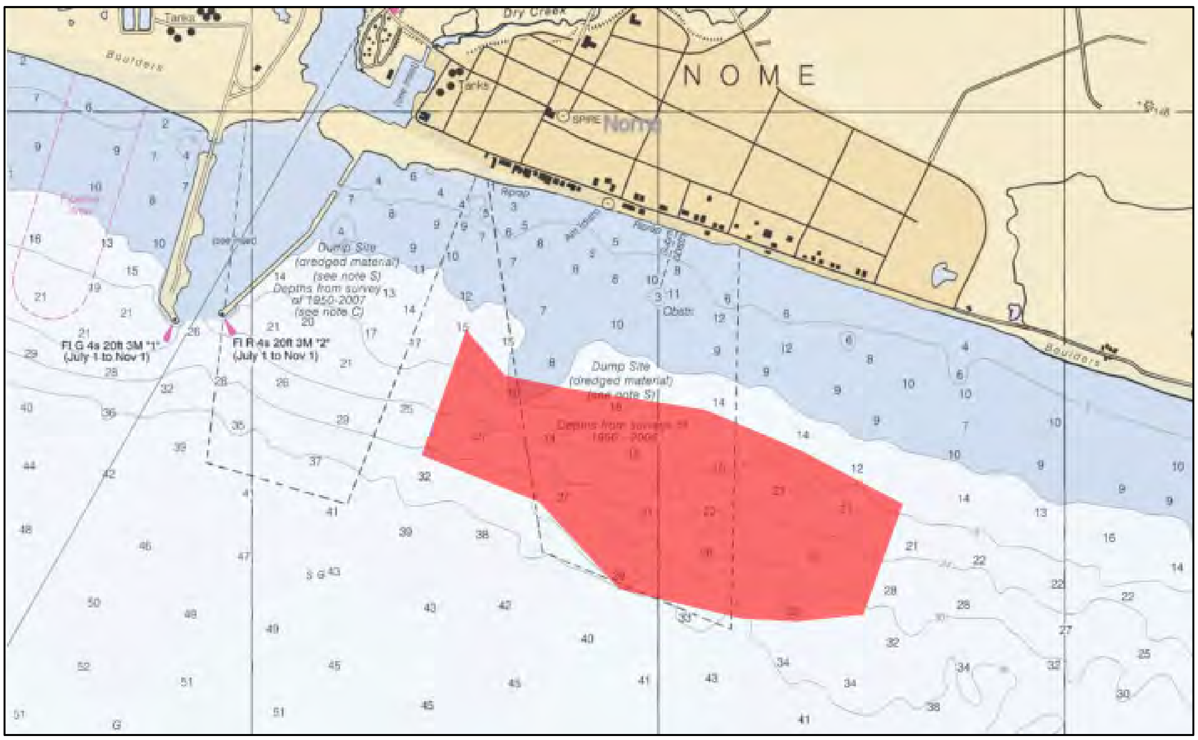

Figure 4. Approximate dredged material placement site (red shading).

Docks

Steel sheet pile modified-diaphragm docks are proposed for the 5 new docks planned within the Outer and Deepwater Basins (Figure 2). The new docks would have lengths of 400, 450, or 600 feet depending on the location. The widths of the sheet pile docks would range from 93 feet wide to 145 feet wide and consist of PS27.5 or PS31 steel face sheets and tail wall anchor pile sheets driven into the seafloor. Face sheets would have a tip elevations ranging from -34 feet MLLW to -47 feet MLLW, tail wall sheets would be stepped down at one-foot increments to a minimum elevation of two feet below the face sheets, and anchor pile sheets would be driven to the minimum elevation of the tail wall sheets. Fenders, mooring bollards, and anodes for corrosion protection would be provided. Each new dock would be flanked by two mooring dolphins. Each dolphin would consist of 4 driven steel piles, each 36-inches in diameter and 80 feet long. Vibratory and impact pile-driving are necessary for installing sheet pile and fender and mooring dolphins.

2.3.2 Mitigation Measures

The USACE intends to collect the data required for the ITA during the PED phase of the project, which will provide more detail regarding the specific impacts to protected resources. Well-reasoned and effective mitigations to reduce those impacts will also be developed, in consultation with the managing agency, along with the number of marine mammals that may be taken by harassment. The final mitigation measures for the proposed project cannot be presented prior to the development of the ITA, but the USACE would likely incorporate the following generic mitigation measures in the construction of the project to reduce specific temporary construction impacts on discrete natural resources:

1. Marine Mammal Monitoring – This is a required component of any issued ITA since monitoring is necessary to assess exposures to various harassment by various sources. The Level B zone will be monitored for species presence, and abundance, and a shutdown zone will be established and monitored to ensure Level A take does not occur (if there are not Level A take allowances) or Level A takes are minimized if allowed.
2. Speed limits for construction vessels to reduce the likelihood of vessel strikes.
3. Shutdown distances are typically limited when constructing with ITAs, but shutdown distances around the dredge and for Level A harassment from pile-driving would be established. Avoidance measures for vessels would be developed to minimize harassment when construction vessels are underway, particularly for barge traffic between the project site and Cape Nome. These avoidance measures always prioritize safe navigation.
4. Work windows would avoid winter work to minimize impacts to ice seals when they are most abundant.

3.0 DESCRIPTION OF SPECIES AND THEIR HABITATS

This section provides a description of the species and their habitat that may be affected by the Nome Harbor project. Species listed in Executive Summary table ES-1 that have a “no effect” determination next to them are not discussed further in this section or in subsequent sections. “No effect” determinations are commonly made by the action agency when species have a very low or no chance of being in the action area due to either geographic constraints, seasonal timing, very low abundance, or a combination of some or all of these factors. The resource agency, NMFS, in this case, is not obligated to concur or comment on “no effect” determinations made by an action agency.

3.1 Ringed Seals

Ringed seals exhibit a circumpolar distribution and are found in all seasonally ice-covered seas in the Northern Hemisphere. The ringed seal Arctic subspecies are listed as threatened under the Endangered Species Act. According to NMFS distribution maps, the nearshore waters of the Pribilof Islands appear to be the species’ southern-most range extent. Ringed seals are closely associated with sea ice; they use it for hauling out, pupping, nursing and molting, they follow its recession north in the springtime. Currently, a reliable population estimate of Alaska's stock is unavailable, and the data utilized in past estimates is over ten years old.

Ringed seals have a small head, a short cat-like snout, and a plump body. Their coat is dark with light-colored rings on their back and sides, and a light-colored belly. Their small foreflippers have thick, strong claws that are used to maintain breathing holes through 6 feet or more of ice.

Ringed seals grow to an average length of 4 to 4.5 feet with weights ranging from 110 to 150 pounds. The average weight of a ringed seal pup at birth is about 10 pounds.

Ringed seals eat a wide variety of mostly small prey. They rarely prey on more than 10 to 15 species in any specific geographic location, and not more than two to four of these species are considered important prey. Regional and seasonal variations in the diet of ringed seals, fishes of the cod family tend to dominate the diet in many areas from late autumn through spring. Crustaceans appear to become more important in many areas during the open-water season and often dominate the diet of young seals. While foraging, ringed seals dive to depths of up to 150 feet or more.

Ringed seals can live in areas that are completely covered with ice. They use their sharp claws to make and maintain their own breathing holes through the ice, which may be 6 feet or more in thickness. In winter through early spring, they also carve out lairs in snowdrifts over their breathing holes. As the temperatures warm and the snow covering their lairs melts during spring, ringed seals transition from lair use to basking on the surface of the ice near breathing holes, lairs, or cracks in the ice as they undergo their annual molt. Ringed seals do not live in large groups and are usually found alone, but they may occur in large groups during the molting season, gathered around cracks or breathing holes in the ice.

Ringed seals are primarily associated with shore-fast ice, whereas other ice seals prefer moving ice. Near Nome, ringed seals are often seen using open-water offshore from Cape Nome and Safety Sound in winter and spring. Most seals follow the ice pack north as it retreats in summer, but some remain in open-water all summer (Oceana and Kawerak 2014). Small numbers of ringed seals could be present in the action area during construction and be exposed to disturbance from project vessels and underwater noise from pile-driving. Hearing abilities of ringed seals are discussed in detail in Chapter 5, Effects Analysis.

3.2 Bearded Seals

Bearded seals exhibit circumpolar distribution and are closely associated with the presence of sea ice, they utilize it for hauling out, pupping, nursing, and molting in the spring and early summer. Bearded seal Beringia DPS is listed as threatened under the Endangered Species Act. NMFS distribution maps for bearded seal show their southern-most range extent to be the Bering shelf and nearshore waters of the Pribilof Islands.

Reliable population abundance data on bearded seals is unavailable. While Saint George is near the fringe of their range during years where the pack ice extends far to the south, there is a moderate likelihood that at least some bearded seals could be in the action area during winter blasting where they could expose to Level B harassment. It is difficult to distinguish seal species in open-water unless they are very close to the observer, so bearded seals are included in this BA since they would be part of an LOA application package in the future. Their inclusion in an LOA application is based on the fact that they could be in the area (the multi-kilometer action area for blasting) and remain undetected and thus expose to Level B harassment rather than a need to harass them because they are expected to be present at most times.

Bearded seals are the largest species of Arctic seal. They grow to lengths of about 7 to 8 feet and range from about 575 to 800 pounds. In some regions, females appear to be slightly larger than males. Bearded seals generally have unpatterned gray to brown coats, large bodies, and small square fore flippers. They have a short snout with thick, long white whiskers, which gives this species its "beard."

Bearded seals primarily feed on or near the sea bottom on a variety of invertebrates (e.g., shrimps, crabs, clams, and whelks) and some fish (e.g., cod and sculpin). While foraging, they typically dive to depths of less than 325 feet. They do not like deep-water and prefer to forage in waters less than 650 feet deep where they can reach the ocean floor. Still, adult bearded seals have been known to dive to depths greater than 1,600 feet.

Bearded seals tend to prefer sea ice with natural openings, though they can make breathing holes in thin ice using their heads and/or claws. Sea ice provides the bearded seal and its young some protection from predators, such as polar bears, during whelping and nursing. Sea ice also provides bearded seals, a haul-out platform for molting and resting. Bearded seals are solitary creatures and can be seen resting on ice floes with their heads facing downward into the water. This allows them to quickly escape into the sea if pursued by a predator. Bearded seals also have been seen sleeping vertically in open-water with their heads on the water surface.

Bearded seals are extremely vocal, and males use elaborate songs for advertising breeding condition or establishing aquatic territories. These vocalizations, which are individually distinct, predominantly consist of several variations of trills, moans, and groans. Some trills can be heard for up to 12 miles and can last as long as 3 minutes.

Bearded seals are generally found in moving ice and areas of open-water. They can be found in the Bering Strait region all year, although a large portion of the population migrates north into the Arctic Ocean during the summer and early fall. Many juveniles remain in the Bering Sea during summer, feeding in bays and estuaries. Like the ringed seals, bearded seals make use of the open-water found near Cape Nome and Sledge Island in winter (Oceana and Kawerak 2014). Small numbers of bearded seals could be present in the action area during construction and be exposed to disturbance from project vessels and underwater noise from pile-driving. Hearing abilities of bearded seals are discussed in detail in Chapter 5, Effects Analysis.

3.3 Gray Whale – Western North Pacific DPS

Gray whales are found mainly in shallow coastal waters in the North Pacific Ocean. There are two geographic distributions of gray whales in the North Pacific: the eastern North Pacific stock, found along the west coast of North America, and the western North Pacific stock, found along the coast of eastern Asia. Most of the eastern North Pacific stock spends the summer feeding in the northern Bering and Chukchi Seas, but some gray whales have also been reported feeding along the Pacific coast during the summer, in waters off of Southeast Alaska, British Columbia, Washington, Oregon, and northern California. In the fall, gray whales migrate from their summer feeding grounds, heading south along the coast of North America to spend the winter in their wintering and calving areas off the coast of Baja California, Mexico. Calves are born during migration or in the shallow lagoons and bays of Mexico from early January to mid-February. From mid-February to May, eastern North Pacific gray whales can be seen migrating northward along the U.S. west coast. Photo-identification studies indicate that gray whales in this stock move widely within and between areas on the Pacific coast. They are not always observed in the same area each year, and there may be gaps of several years between repeat sightings. Although western and eastern DPS gray were thought to be relatively isolated from each other, recent satellite tagging data, have shown that at least some western North Pacific DPS gray whales migrate across the northern Gulf of Alaska, and along the west coast of British Columbia, the United States, and Mexico. The eastern North Pacific population was once listed as endangered under the ESA but has successfully recovered and was delisted in 1994. The western North Pacific population remains low, and its continued survival is questionable. This population is estimated to include fewer than 200 individuals. Small numbers of gray whales could be present in the action area during construction and be exposed to disturbance from project vessels and underwater noise from pile-driving. Of the gray whales that may be protected, most are likely to be the non-ESA listed whales. However, whales from the listed western North Pacific DPS are not distinguishable from the majority of gray whales that are only protected under the MMPA. The forthcoming ITA application will cover both the listed DPS and the non-ESA listed whales since both have the potential to be in the project area during the open-water period. Hearing abilities of gray whales (low-frequency cetaceans) are discussed in detail in Chapter 5, Effects Analysis.

3.4 Humpback Whale – Mexico and Western North Pacific DPS

Humpback whales are either threatened, endangered, or delisted under the Endangered Species Act depending upon which DPS they derive from. According to NMFS guidance, humpback whales observed in the Aleutian Islands, Bering, Chukchi, and Beaufort Seas derive from three recognized North Pacific DPSs: the Western North Pacific DPS, the Hawaii DPS, and the Mexico DPS. Humpback whales deriving from the Western North Pacific DPS, which are listed as Federally endangered, are the least likely to be encountered in Alaskan waters at only 4.4 percent. Humpback whales deriving from the Mexico DPS, which are listed as federally threatened, have a similarly low encounter probability at 11.3 percent. Humpback whales deriving from the Hawaii DPS are not listed under the Endangered Species Act; they are most likely to be encountered in Alaskan waters, at 86.5 percent. It should be noted that among these DPSs, individual whales do not exhibit physical traits that would allow for visual confirmation of population lineage (NMFS 2016).

Humpback whales are migratory, spending the summer feeding in the cold waters of the northern seas and migrating to lower latitudes for breeding and calving. They feed by lunging, open-mouthed, through swarms of small fish and invertebrates, and forcing the water through their baleen plates to filter separate the food from the water. Humpback whales are known to traverse the Bering shelf and likely come within visual observation range of the landmass of Nome. Furthermore, Humpback whales are gregarious and often travel together or congregate at areas where food density is relatively high. They are distinguishable among other whales by not only their physical characteristics, large pectoral fins, and humped dorsal fins, but they also display frequent rounds of breaching and fin- and tail slapping the water's surface. The various DPS (Mexico and Western Pacific DPS) are indistinguishable from the majority of the population that is not listed under the ESA. Small numbers of humpback whales could be present in the action area during construction and be exposed to disturbance from project vessels and underwater noise from pile-driving. The forthcoming ITA application will cover all humpback whales, but only a small portion of the total allocation authorized for incidental Level B harassment will be from the two listed DPSs. Hearing abilities of humpback whales (low-frequency cetaceans) are discussed in detail in Chapter 5, Effects Analysis.

3.5 Steller Sea Lion - Western DPS and Critical Habitat

Steller sea lions (Eumetopias jubatus) occur in two Distinct Population Segments (DPSs) in Alaska. An eastern U.S. DPS, including animals east of Cape Suckling, Alaska (144°W), was listed as threatened under the ESA until recently being de-listed, and a western U.S. DPS listed as endangered, including sea lions at and west of Cape Suckling (including Norton Sound and the associated project area) (62 CFR 30772, June 5, 1997, and 78 CFR 66140, November 4, 2013).

Steller sea lions are large, sexually dimorphic otariid, with males attaining 11 feet in length and 2,500 pounds, and females 9.5 feet and 800 pounds. Steller sea lions are dependent upon isolated haulouts and rookery areas; they do not tolerate disturbance in these areas. Although not technically migratory, Steller sea lions move about the entirety of their range as they pursue prey species' seasonal abundances. Steller sea lions are not known to migrate, but individuals disperse widely outside the breeding season (late May to early July). At sea, Steller sea lions commonly occur near the 656-foot (200-meter) depth contour but have been seen from near shore to well beyond the continental shelf (Kajimura and Loughlin, 1988). Steller sea lions are opportunistic predators, feeding primarily on a wide variety of fishes and cephalopods, including walleye pollock (Theragra chalcogramma), Atka mackerel (Pleurogrammus monopterygius), Pacific herring (Clupea pallasi), capelin (Mallotus villosus), Pacific sand lance (Ammodytes hexapterus), Pacific cod (Gadus macrocephalus), and salmon (Oncorhynchus spp.) (Pitcher, 1981; Merrick et al., 1997). On rare occasions, Steller sea lions prey on seals, and possibly sea otter pups. Overall, populations of Steller sea lions declined precipitously in the decades between the 1950s and 1980s and began to stabilize and slightly increase by the 2000s, but there are trends in either direction depending upon which portion of the species' overall range is sampled. It is likely that the Steller sea lion will remain endangered for the foreseeable future.

Small numbers of ringed Steller sea lions could be present in the action area during construction and be exposed to disturbance from project vessels and underwater noise from pile-driving. Nome is near the northern limits of their range, but with changing seasonal ice extents, it is possible that they could be in the action area. Hearing abilities of sea lions are discussed in detail in Chapter 5, Effects Analysis.

The nearest designated Steller Sea Lion Critical Habitat is located over 100 nautical miles southwest of Nome on St. Lawrence Island.

4.0 ENVIRONMENTAL BASELINE

The environmental baseline includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in the process (50 CFR § 402.02).

A number of human activities have contributed to the current status of populations of ESA-listed whales, ringed seals, and bearded seals in the Chukchi Sea. In the recent "Biological Opinion: Oil and Gas Leasing and Exploration Activities in the U.S. Beaufort and Chukchi Seas, Alaska," NMFS (2013) identified and described major threats to ESA-listed marine mammals. While this report focuses on the Beaufort and Chukchi Seas, it is also useful for impacts in Nome. Nome is located in Norton Sound in the Bering Sea is relatively close, and the species overlap with the Beaufort and Chukchi Sea report. The report did not cover Steller sea lions or humpback whales, but the discussion of underwater noise, vessel strike, commercial fishing interaction and pollutants, and climate change is relevant to sea both species. There is no hunting of humpback whales and only very limited hunting of Steller sea lions.

NMFS indicated the principal stressors to large whales, and ice seals in the Chukchi Sea that affect the likelihood that these species will survive and recover in the wild are:

- Targeted hunts
- Acoustic Noise
- Ship Strike
- Commercial Fishing Interaction

- Pollutants and Contamination
- Climate Change

Discussion of the six factors NMFS considers to most pertinent to the ability of bowhead whales, ringed seals, and bearded seals to recover and survive in the wild within the context of the environmental baseline of the greater Chukchi Sea area can be found in the 2013 Biological Opinion: Oil and Gas Leasing and Exploration Activities in the U.S. Beaufort and Chukchi Seas, Alaska.

Acoustic Impacts

Underwater noise can have a myriad of impacts on marine mammals, including temporary and permanent threshold shifts, masking, behavioral impacts, and interference with echolocation.

Baleen Whales

Cetaceans like whales and dolphins may be particularly susceptible to hydroacoustic impacts due to their reliance on acoustic information for communication, navigation, and finding food. Numerous studies in the Arctic support the understanding that whales are sensitive to noise from offshore drilling, particularly migrating whales. Feeding whales may be more tolerant to underwater noise than migrating whales. A study by Blackwell et al. (2015) found that bowhead whales react differently to different thresholds of seismic noise. At relatively low cumulative exposure levels (as soon as airguns were just detectable), bowhead whales almost doubled their call rates. Once cumulative exposure levels exceeded 127 dB re 1 μPa2-s, call rates decreased. Bowhead whales went completely silent at received levels over 160 dB re 1 μPa2-s.

Underwater sounds can be broadly classified as ambient and anthropogenic, natural and man-made, respectively. Ambient noise can come from all sorts of sources, including animals, tides, currents, ice, seismic activity, and others. It forms the background from which any escalations are compared. Anthropogenic noise is related directly to the actions of people; ship traffic, pile-driving, and blasting are three examples of common sources of anthropogenic noise.

Ice seals

Pinnipeds are less impacted by underwater noise than are cetaceans because pinnipeds do not rely on echolocation for feeding the way that cetaceans do. Pinnipeds are not known to communicate underwater with sound either, so they are not susceptible to acoustic masking in the way that cetaceans are. The prior effects of underwater noise on pinnipeds are general disturbance and threshold shifts from powerful sounds.

Ship strike
Vessels transiting the marine environment have the potential to collide with or strike, marine mammals (Laist et al. 2001, Jensen and Silber 2003). The probability of strike events depends on the frequency, speed, and route of the marine vessels, as well as the distribution of marine mammals in the area. Humpback whales are especially susceptible to ship strike injury and mortality in narrow bottleneck passages (Williams and O'Hara 2010). Laist et al. (2001) found that while all sizes and types of vessels can strike a whale, ships greater than 80 meters and those going faster than 14 knots were most likely to cause severe or fatal injuries.

Baleen whales
Vessel collisions with whales remain a significant management concern, given the increasing abundance of whales foraging in Alaska, as well as the growing presence of marine traffic in Alaska's coastal waters and in the Norton Sound area. The reduction in Arctic sea ice that has occurred in recent years has renewed interest in using the Arctic Ocean as a potential waterway for coastal, regional, and trans-Arctic marine operations. Climate models predict that the warming trend in the Arctic will accelerate, causing the ice to begin melting earlier in the spring and resume freezing later in the fall, resulting in an expansion of potential shipping routes and lengthening the potential navigation season. Based on these factors, injury and mortality of baleen whales as a result of vessel strike may likely continue or possibly increase in the future (Neilson et al., 2012).

Ice Seals
Seals are less susceptible to impacts from vessel traffic, largely because vessel traffic tends to avoid areas of high ice concentration due to the hazard the ice poses to navigation, reducing the likelihood of a vessel injuring or killing a seal from direct impact. The discharge of hazardous substances related to shipping represents a residual threat to ice seals in the form of acute and chronic toxicity and trophic effects. Vessel traffic can also present noise and disturbance impacts to ice seals, but pinnipeds are generally less receptive to noise impacts than cetaceans. They also spend a significant portion of their lives above the water, where the hydroacoustic impact pathway is disrupted.

Commercial Fishing Interaction

Bowhead Whales
There are no observer program records of bowhead whale mortality incidental to commercial fishing interactions in Alaskan waters, but the range of satellite-tagged whales in the Bering Sea geographically overlaps the extent of commercial pot fisheries. The temporal disconnect (bowheads are closely associated with the ice edge, and pot fishing can only be conducted in open-water) has likely contributed to the lack of reported fatal entanglements. Lost pot fishing gear still poses a risk to bowhead whales; 12% of bowheads harvested by Alaska Natives showed entanglement scars from
Ice Seals

The Alaska District considers the remaining factors of climate change and targeted hunts to be the applicable stressors to ESA-listed species in Norton Sound that could affect the ability of those species to recover and survive in the wild.

Targeted Hunting

Seal Hunting
Marine mammals play a critical role in the traditions of the Native people of Norton Sound. The subsistence harvest of marine mammals and ESA-listed species is permissible under the MMPA, and the listing of bearded seals and ringed seals under the ESA does not affect the subsistence harvest of ice seals by Alaska Natives. The number of seals taken annually varies considerably between years due to ice and wind conditions, which impact hunter access to seals. Currently, there is no comprehensive effort to quantify harvest levels of seals in Alaska. The best estimate of the statewide annual ringed seal subsistence harvest is 9,567 (Allen and Angliss 2014). Kelly et al. (2010) concluded that although subsistence harvest of Arctic ringed seals is currently substantial in some parts of their range, harvest levels appear to be sustainable.

The following passage with respect to the subsistence harvest of bearded seals was extracted directly from the 2013 NMFS Biological Opinion “Oil and Gas Leasing in the Beaufort and Chukchi Seas, Alaska,” NMFS consultation number F/AKR/2011/0647 “Alaska Native hunters mostly take bearded seals during their northward migration in the late spring and early summer, using small boats in open leads among ice floes close to shore (Kelly 1988). Allen and Angliss (2010) reported that based on subsistence harvest data maintained by ADF&G primarily for the years 1990 to 1998, the mean estimated annual harvest level in Alaska averaged 6,788 bearded seals as of August 2000 (Coffing et al. 1998, Georgette et al. 1998, Wolfe and Hutchinson-Scarbrough 1999, Allen and Angliss 2011). The estimate of 6,788 bearded seals is considered by Allen and Angliss (2010) to be the best estimate of the subsistence harvest level in Alaska. Cameron et al. (2010) noted that ice cover in hunting locations can dramatically affect the availability of bearded seals and the success of hunters in retrieving seals that have been shot, which can range from 50-75% success in the ice (Burns and Frost 1979, Reeves et al. 1992) to as low as 30% in open-water (Burns 1967, Smith and Taylor 1977, Riewe and Amsden 1979, Davis et al. 1980). Using the mean annual harvest reported from 1990-1998, assuming 25 to 50% of seals struck are lost, they estimated the total annual hunt by Alaska Natives would range from 8,485 to 10,182 bearded seals.”

Climate Change
Climate change is a factor potentially affecting the range-wide status of all species (including humans) and is of particular relevance for Arctic species. The general discussion in this Section applies to all species addressed in this Biological Assessment.

Since the 1950s, the atmosphere and oceans have warmed, snow and sea ice have diminished in both areal extent and volume, sea level has risen, and concentrations of greenhouse gases have increased. The time period 1983-2012 was likely the warmest 30-year period in the Northern Hemisphere in the last 1400 years. There has been strong scientific consensus over the past two decades that atmospheric temperatures are increasing, affecting many of the earth's climate-related processes. The overwhelming majority of climate scientists agree that human activities, especially the burning of fossil fuels (coal, oil, and gas), are responsible for most of the climate change currently being observed (IPCC, 2014).

Effects to marine ecosystems from increased atmospheric CO2 and climate change include ocean acidification, expanded oligotrophic gyres, and shifts in temperature, circulation, stratification, and nutrient input. Altered oceanic circulation and warming cause reduced subsurface oxygen concentrations. These large-scale shifts have the potential to disrupt existing trophic pathways as change cascades from primary producers to top level predators. Effects to marine mammals could result from changes in the distribution of temperatures suitable for rearing young, the distribution and abundance of prey, and the distribution and abundance of competitors or predators. (Doney et al., 2012)

The potential impacts of climate and oceanographic change on whales and seals will likely affect habitat availability and food availability. Site selection for feeding, breeding, and whale migration may be influenced by factors such as ocean currents and water temperature. For example, there is some evidence from Pacific equatorial waters that sperm whale feeding success and, in turn, calf production rates are negatively affected by increases in sea surface temperature (Smith and Whitehead 1993, Whitehead 1997). Any changes in these factors could render currently used habitat areas unsuitable. Changes to climate and oceanographic processes may also lead to decreased prey productivity and different patterns of prey distribution and availability. Such changes could affect whales and seals that are dependent on those affected prey. Variations in sea-surface temperatures and the extent of sea ice cover during the winter months have been linked to variations in the recruitment of krill (Euphausia sp.) and the reproductive success of krill predators. Different species of whales will likely react to these changes differently. For example, range size, location, and whether or not specific range areas are used for different life history activities (e.g., feeding, breeding) are likely to affect how each species responds to climate change (Learmonth et al. 2006).

Climate change could affect pinnipeds on land where they rest and give birth to young, and at sea where they forage. On land, sea level rise, and larger, more frequent storms may reduce or eliminate resting and birthing areas. (Learmonth et al. 2006; NPS 2016). Changes in ocean currents, ocean acidification, and other alterations in climate cycles such as changes in the frequency of El Nino events are likely to alter ocean food webs and affect the abundance and diversity of prey items. These changes may also affect susceptibility to diseases. Some changes may be positive. For example, new suitable habitats may become available for some species (Learmonth et al. 2006, NPS 2016).
The most pronounced warming is expected in the north, exceeding the estimate for mean global warming by a factor of 3, due in part to the "ice-albedo feedback loop." As the reflective areas of Arctic ice and snow retreat, the northern latitudes absorb more heat, exacerbating the warming (NRC 2012). Climate change is projected to have substantial direct and indirect effects on individuals, populations, species, and the structure and

function of marine, coastal, and terrestrial ecosystems in the foreseeable future (NRC 2012).

According to the National Aeronautics and Space Administration (NASA), the average September sea ice extent is declining by 12.8% per decade. In 2018, the Arctic ice cap shrank to 1.77 million square miles, tied for the sixth lowest September minimum on record. All indications are that the extent of sea ice will continue to decrease in the future, which will translate to increasing impacts of climate change on ice seals.

Ice Seals

The principal threat to ringed and bearded seals, as well as all ice seals, is the climate driven reduction in sea ice. Climate change impacts to sea ice were the driving force behind listing bearded seals and ringed seals in the ESA. Sea ice is a primary constituent element of ringed seal critical habitat and, while bearded seal critical habitat has not been formally designated, a critical requirement for multiple life stages of bearded seals. The Final Rule listing bearded seals under the ESA describes five main functions that sea ice performs during the life cycle of bearded seals; (1) A dry and stable platform for whelping and nursing of pups in April and May (Kovacs et al., 1996; Atkinson, 1997); (2) a rearing habitat that allows mothers to feed and replenish energy reserves lost while nursing; (3) a habitat that allows a pup to gain experience diving, swimming, and hunting with its mother, and that provides a platform for resting, relatively isolated from most terrestrial and marine predators; (4) a habitat for rutting males to hold territories and attract post-lactating females; and (5) a platform suitable for extended periods of hauling out during molting.

If suitable ice cover is absent from shallow feeding areas during times of peak whelping and nursing (April/May), or molting (May/June and sometimes through August), bearded seals would be forced to seek either sea-ice habitat over deeper waters (perhaps with poor access to food) or onshore haul-out sites (perhaps with increased risks of disturbance, predation, and competition). Both scenarios would require bearded seals to adapt to novel (i.e., potentially suboptimal) conditions, and to exploit habitats to which they may not be well adapted, likely compromising their reproduction and survival rates (NMFS 2017d).

Ringed seals are strongly impacted by the synergistic relationship between diminished ice cover and reduced snow accumulation predicted by climate models throughout their range. Ringed seals need 50-65 cm of snow depth to excavate subnivean birthing lairs, but current climate change models predict inadequate snow cover within this century for the Alaska stock’s entire range (Kelly et al., 2010). Ringed seals, particularly pups, are vulnerable to freezing without adequate snow cover.

5.0 EFFECTS ANALYSIS

“Effects of the action” means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action that will be added to the environmental baseline. Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur (50 CFR § 402.02).

The principle impacts to the Action Area that would occur as a result of the proposed action are in-water noise within the zone of influence and elevated vessel strike hazard. Pile-driving, marine construction, and dredging generates underwater noise that can potentially result in disturbance to marine mammals in the project area. In addition to disturbance, underwater noise from pile-driving is capable of causing injury to marine mammals if they are exposed at close distances. Because the presence of an existing harbor at Nome produces anthropogenic noise, some of the project activities would not be distinguishable from the ambient noise levels.

The proposed activities of primary concern to ESA-listed humpback whales, ringed seals, bearded seals, and sea lions include exposure to sounds from pile-driving and dredging, general disturbance from the elevated anthropogenic activities associated with construction and operation of the proposed project, and vessel strikes from construction related vessels. Upland project features are ill-defined and would have discountable effects on the ESA-listed marine mammals in the action area, so the effects of those upland features will not be discussed in the effects of the action.

5.1 Marine Pile-Driving Impacts

The Alaska District does not have source level (SL) sound data for pile-driving in the waters around Nome. A literature review was conducted to find appropriate surrogate data and extrapolate those data for the subject analysis. This extrapolation recruits some existing data and requires some assumptions regarding the SL that would be produced by the proposed pile-driving and the attenuation rate of the underwater noise.

The only known offshore borings in the project area are from a 1982 geotechnical investigation performed for the City of Nome by Harding Lawson Associates in support of construction of the existing causeway. Subsurface conditions below the causeway consist of four strata consisting of recently deposited sediment underlain by three identifiable older deposits:

a. Silty sand with a trace amount of gravel (recent deposition) to depths -5 to -37 ft MLLW
b. Gravelly silty sand (glacial till) to depths of approximately -15 ft to -47 ft MLLW
c. Silty fine sand (older marine deposits) to depths of approximately -35 ft to -71 ft MLLW
d. Sandy gravel rubble to depths of approximately -45 ft to -72 ft MLLW

Below the sandy gravel, weathered micaceous schist bedrock was encountered to a maximum depth explored (-77 ft MLLW). The recent deposits, glacial till, and older marine deposits were determined to be medium to dense, medium to very dense, and dense to very dense, respectively.

Geotechnical investigations will need to be performed within the project footprint during preconstruction engineering and design (PED) to properly characterize the proposed dredge material, evaluate and recommend the suitability of breakwater foundation material, and identify any geological conditions that would require special foundation treatment.

The sediment in the proposed project area is sufficiently fine that a vibratory hammer is expected to be sufficient to reach the required embedment depth for the sheet-pile docks. An impact hammer would likely be required to install the 36” round piles for the dolphins. According to Caltrans (2015), sheet pile installation for bridge construction over the Tanana River near Salcha, Alaska, in 2012 recorded a peak average amplitude of 140-156 dB at 10 meters from the pile face. Scientific Fishery Systems, Inc. recorded a variety of pile-driving operations in the Port of Anchorage in 2008. (SFS, 2009) The SFS study recorded pile-driving sounds from ranges of 31-1207 meters from the source and applied a transmission loss multiplier of 20 to predict the source sound pressure level (SPL). The prediction resulted in an average source SPL of 187 dB and included a range of tides between 18.93 feet MLLW and 30.42 feet MLLW. The tide level significantly affected the propagation of sound energy; higher tides resulted in more efficient transmission of sound energy due to the increased vertical area of the pile in contact with the water.

The NMFS published a notice in the Federal Register on May 23, 2017, announcing the issuance of an incidental harassment authorization for the take of marine mammals’ incidental to dock replacement project in Unalaska, Alaska citing sound pressure of 163 dB RMS recorded 10 meters from the source. (FR Vol. 82, No. 98, Pg. 23535-23550) This sound was recorded during the use of a vibratory hammer to drive sheet pile and lies within the range of recorded SL for other projects, so the Alaska District has used it to calculate the harassment radii for vibratory installation of sheet pile in the absence of project-specific SL data.

Caltrans (2015) also describes several projects involving the use of an impact hammer to drive 36” round piles. The typical received SPLs for pile-driving in water less than 5 meters deep are 208 dB Peak, 190 dB RMS, and 180 dB SEL. The Alaska District has assumed the Caltrans data are acceptable surrogates for the proposed impact pile-driving at Nome.

The NMFS has promulgated guidance regarding the effects of anthropogenic noise on marine mammals. (NMFS 2018) The NMFS guidance provides information regarding the onset of permanent threshold shift (PTS) in various clades of marine mammals, low-frequency cetaceans, mid-frequency cetaceans, high-frequency cetaceans, Phocid pinnipeds, and Otariid pinnipeds. The ESA-listed species included in this biological assessment and their respective generalized hearing ranges are:

- Phocid pinniped (PW)-ringed seals and bearded seals (50 Hz-86 kHz)
- Otariid pinniped (OW)-Steller sea lions (60 Hz-39 kHz)
- Low-frequency (LF) cetacean-bowhead whale, Pacific right whale, gray whale, humpback whale, fin whale and blue whale (7 Hz-35 kHz)
- Mid-frequency (MF) cetacean- sperm whale, and beluga whale (150 Hz-160 kHz)

The impacts of noise on marine mammals are also influenced by the type of noise produced by the activity, broadly classified as impulsive and non-impulsive noise. Impulsive noise is characterized by the rapid increase and decay of sound pressure, while non-impulsive does not have the rapid increase and decay of sound pressure associated with impulsive noise. Both classes of noise can be broadband and brief, but non-impulsive noise can be prolonged, continuous, or intermittent. The use of a vibratory hammer to drive piles is considered non-impulsive, while the use of an impact hammer is considered impulsive.

The MMPA defines “harassment” as “any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment]” (16 U.S.C. § 1362(18)(A)(i)-(ii)).

While the ESA does not define “harass,” NMFS recently issued guidance interpreting the term “harass” under the ESA as to: “create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering” (Wieting 2016). For the purposes of this biological assessment, any action that amounts to incidental harassment under the MMPA—whether Level A or Level B—constitutes an incidental “take” under the ESA and must be authorized by the ITA (Section 10).

As described below, we anticipate that exposures to listed marine mammals from noise associated with the proposed action may result in disturbance (Level B harassment) and/or permanent injury (Level A harassment) under the MMPA, collectively representing “take” under the ESA. Due to the relatively low sound pressure emitted by vibratory pile-driving, no Level A harassment, permanent impairment to hearing, or mortalities are anticipated. Impact pile-driving would produce powerful sounds with the potential to cause permanent injury or hearing damage.

The NMFS guidance provides thresholds for the onset of PTS in the various hearing groups of marine mammals for non-impulsive noise. The PTS threshold for humpback whales is 199 dB, while the PTS threshold for ringed and bearded seals is 201 dB, and the PTS threshold for sea lions is 219 dB. The source SPL for vibratory pile-driving is assumed to be 178 dB, which is lower than the PTS thresholds for whales, ringed seals, bearded seals, and sea lions. The use of a vibratory hammer to drive sheet pile for the pier and dock does not have the potential to result in a permanent threshold shift at the source, so there is no need to determine a PTS radii. As an additional precaution against impacts to protected resources, the USACE will establish a 100-meter exclusion radius around all pile-driving activities. No pile-driving would occur during times when protected species are observed within the exclusion radius.

The harassment threshold for non-impulsive noise, based on behavioral modifications and temporary threshold shift (TTS), is set at 120 dB RMS for all marine mammal species.

No injury, serious injury, or mortality of marine mammals would be anticipated as a result of noise above the harassment threshold and below the PTS threshold. Except when vibratory hammers are operated continuously for long periods of time in the presence of marine mammals that do not move away from the noise source, vibratory hammers do not have the potential to cause injury to marine mammals due to the relatively low SPL and lack of potentially injurious sound characteristics (rapid rise and decay of sound pressure).

The harassment threshold for impulsive sound (impact pile-driving) is set at 160 dB RMS. Impulsive sounds are typically transient, brief (less than 1 second), broadband, and consist of high peak sound pressure with rapid rise time and rapid decay. Impact pile-driving has the potential to exceed the permanent threshold shift (PTS) criteria and cause permanent injury to exposed marine mammals.

The NMFS recommends the transmission loss formula TL=15log(R2/R1) to predict the attenuation of underwater noise with respect to the effects of underwater noise on marine mammals; where TL is the transmission loss, R1 is the distance of a known or measured sound level, and R2 is the estimated distance that is required for sound to attenuate to a prescribed acoustic threshold. The formula can be rewritten to predict the attenuation distance, the bounds of which is known as the isopleth, to which the amplitude of the underwater noise would deteriorate to a specified threshold. The modified formula is R2=R1x10^((dBR1-dBt)/15); where R1 is the distance of a known or measured sound level, and R2 is the estimated distance that is required for sound to attenuate to a prescribed acoustic threshold, dBR1 is the amplitude of the sound measured at the distance R1, dBt is the specified acoustic threshold.

Vibratory Hammer Pile-Driving

Assuming a transmission loss coefficient of 15, a received SPL of 163 dB at 10 meters, and the 120 dB acoustic threshold for harassment, the practical spreading loss model, would provide a harassment isopleth of 7,356 meters from the source.

R2=10x10^((163-120)/15)

R2=7,356.422545m

A harassment isopleth of 7,356 meters around each of the sheet pile docks produces an area of ensonification exceeding the 120 dB harassment threshold of 111.2 square kilometers for the sheet pile project features, after removing the terrestrial portion of the radii. This does not account for the impact of the breakwaters on sound propagation. The breakwaters would likely be constructed prior to the docks, so their presence would have an attenuating impact on the hydroacoustic contours.

The Alaska District does not have specific data regarding the effects of breakwaters on the propagation of underwater noise, but has made qualitative assumptions regarding the intensity of the sound within the 7,356-meter isopleth; i.e., the District believes the aquatic environment in the “shadow” of the breakwaters to be protected from the full amplitude of the underwater sound, but cannot speculate as to what degree of attenuation would be presented by the breakwaters (Figure 4).

The 120 dB isopleth polygon was divided into three areas, based on best professional judgment, with respect to the amount of influence the breakwaters would have on the propagation of sound. Area 1 would be exposed to the full magnitude of the sound produced by vibratory pile-driving emitted during dock construction because there would be no breakwater to absorb or deflect any of the sound waves. This area totals about 43.17 square kilometers and is shown in red on the figure. Area 2 would be partially protected by breakwater, but the degree of protection is uncertain and contingent on phasing. Area 2 covers about 0.76 square kilometers. Area 3 is behind the breakwater and should be protected from the full magnitude of sound produced by the use of a vibratory pile driver to install sheet pile and is shown in green. This area totals about 67.3 square kilometers.

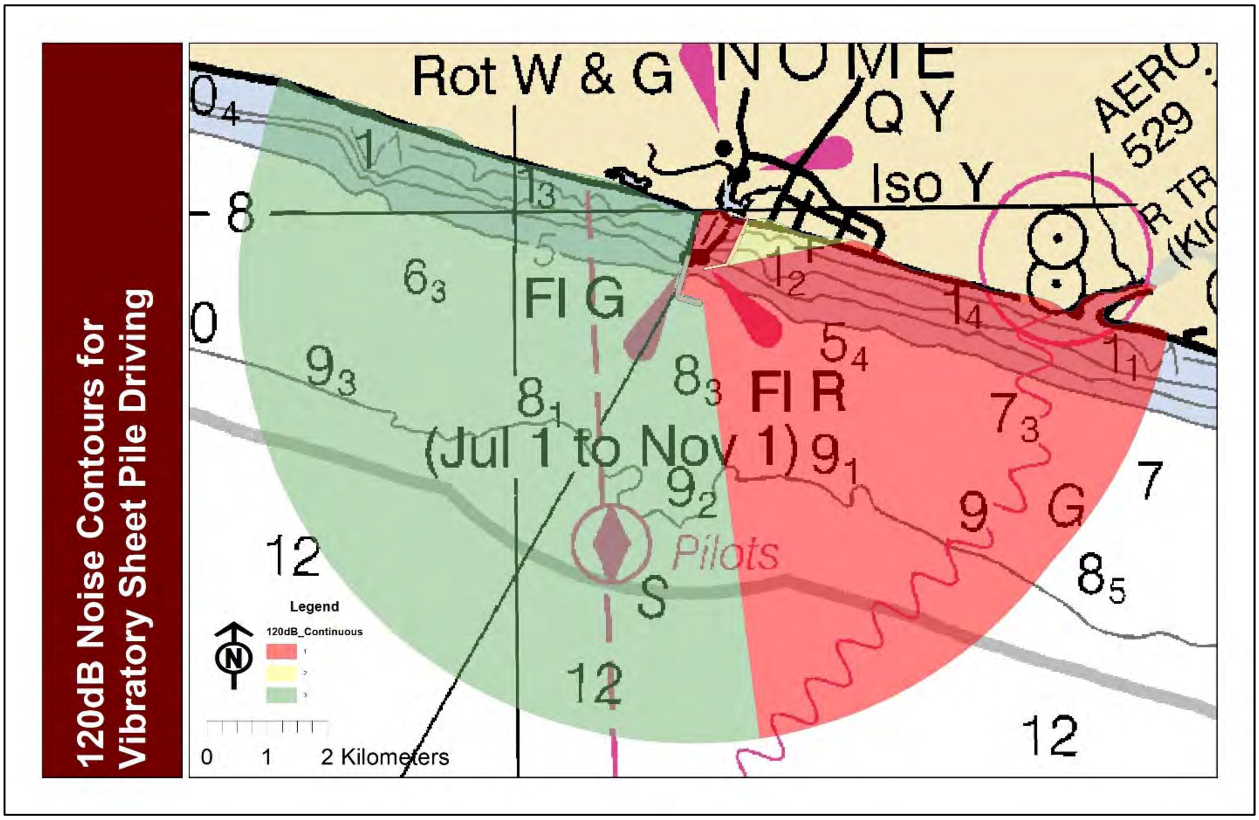

Figure 5. 120dB Vibratory Sheetpile Noise Contour and Assumed Zonation

Observation of an area so large would present tremendous implantation challenges and costs. The additional time associated with observing the ensonified area and shutting down operations in the event a protected species enters the ensonified area would present unacceptable delays to the completion of the project considering the cost of mobilizing to the project location, the limited duration of the construction season, and the challenges of marine construction in such remote area. The Alaska District intends to prepare an ITA application during the design phase of the project and collect specific observation data regarding the abundance and distribution of ESA-listed species in order to determine the potential exposures of protected species to anthropogenic marine noise.

Without the direct observation data required for the ITA, the quantification of takes under the definition of harassment is not possible.

Impact Hammer Pile-Driving

Harassment

Assuming a transmission loss coefficient of 15, a received SPL of 190 dB at 10 meters, and the 160 dB acoustic threshold for harassment, the practical spreading loss model, would provide a harassment isopleth of 1,000 meters from the source.

$$R2=10x10^{((190-160)/15)}$$

$$R2=1000m$$

A harassment isopleth of 1,000m around each of the dolphins would create an area of 5.6 square kilometers of water that would be ensonified beyond the 160 dB threshold for harassment from impulsive sound. This area calculation does not account for the effects of the breakwaters on sound propagation.

The District employed the same methodology to estimate the zonation of hydroacoustic noise described in the previous section. Area 1 is 2.22 km2, Area 2 is 0.58 km2, and area 3 is 2.65 km2. The results are depicted in figure 5.

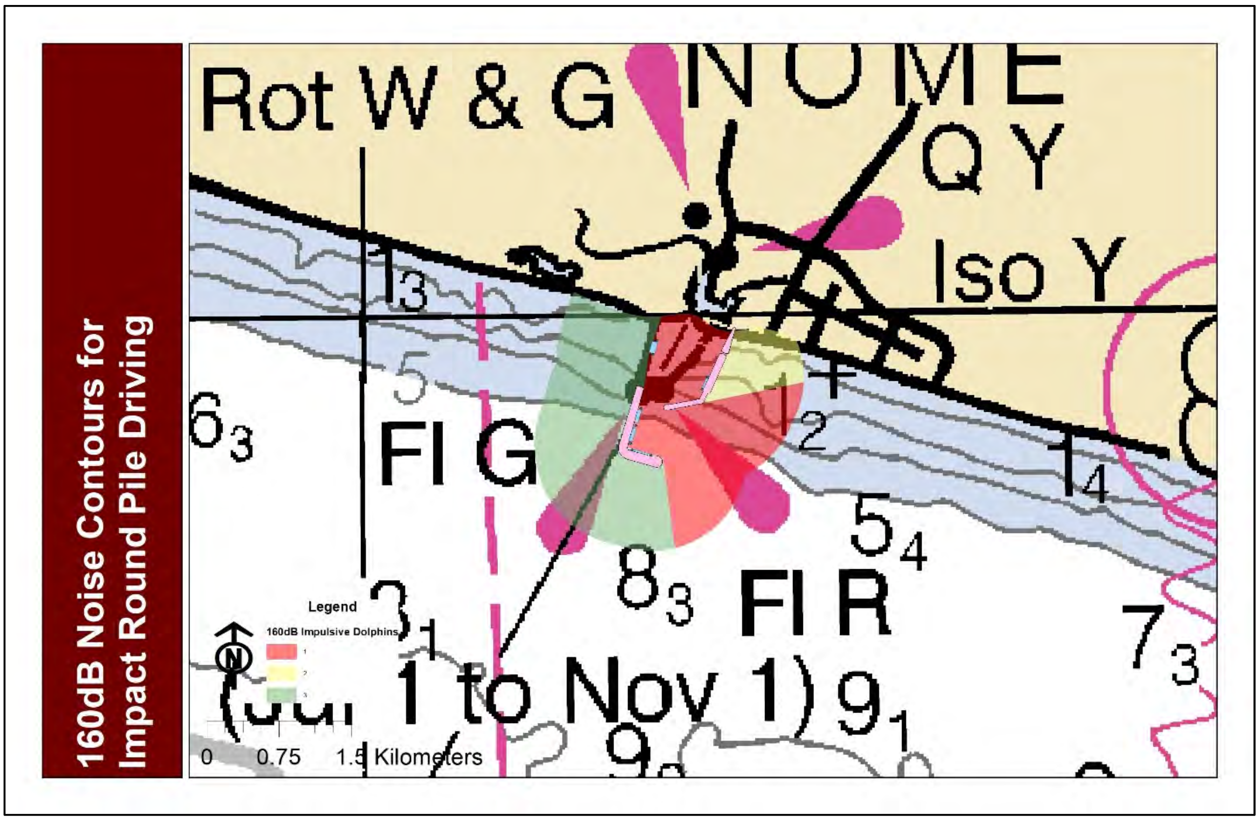

Figure 6. 160dB Noise Contour and Assumed Zonation

Injury

Phocid pinnipeds. Assuming a transmission loss coefficient of 15, a received SPL of 190 dB at 10 meters, and the 185 dB acoustic threshold for PTS, the practical spreading loss model, would provide a PTS isopleth of 22 meters from the source.

R2=10x10^((190-185)/15)
R2=22.5m

Otariid pinnipeds. Assuming a transmission loss coefficient of 15, a received SPL of 190 dB at 10 meters, and the 203 dB acoustic threshold for PTS, the practical spreading loss model, would provide a PTS isopleth of 1 meter from the source.

R2=10x10^((190-203)/15)
R2=1.4m

Mid-frequency cetaceans. Assuming a transmission loss coefficient of 15, a received SPL of 190 dB at 10 meters, and the 185 dB acoustic threshold for PTS, the practical spreading loss model, would provide a PTS isopleth of 1 meter from the source.

R2=10x10^((190-185)/15)
R2=22.5m

Low-frequency cetaceans. Assuming a transmission loss coefficient of 15, a received SPL of 190 dB at 10 meters, and the 183 dB acoustic threshold for PTS, the practical spreading loss model, would provide a PTS isopleth of 29 meters from the source.

R2=10x10^((190-183)/15)
R2=29.3m

The areas ensonified by acoustic energy of a magnitude sufficient to cause injury to marine mammals are small enough that the Alaska District could effectively observe and shut down work in the event of marine mammal incursion. There would be no “Level A” take of marine mammals.

Dredging

The USACE would employ a mechanical dredge, likely a clamshell dredge, to excavate virgin sediment to the project depth of -26 feet MLLW for the navigation channel and turning basin. A mechanical dredge would also construct the construction access channel to -10 feet MLLW. The dredged material from these navigation features would be placed in the near shore region about 1.2 miles west of the pier. Dredging and dredged material placement has the potential to create noise, turbidity, direct physical, and vessel strike impacts.

Vessels transiting the marine environment have the potential to collide with or strike, marine mammals (Laist et al. 2001, Jensen and Silber 2003). The probability of strike events depends on the frequency, speed, and route of the marine vessels, as well as the distribution of marine mammals in the area. Humpback whales are especially susceptible to ship strike injury and mortality in narrow bottleneck passages (Williams and O'Hara 2010). Laist et al. (2001) found that while all sizes and types of vessels can strike a whale, ships greater than 80 meters and those going faster than 14 knots were most likely to cause severe or fatal injuries.

Mechanical dredges are relatively stationary, so there is a minimal potential for vessel strike impacts during dredging. The dredge plant would excavate sediment and place the material on a barge for transportation to the placement location. The barge would only be capable of traveling about 8 knots, which minimizes the potential for impacting ESA-listed species by vessel strike.

Bucket dredging noise can be delineated into six distinct events to complete a single cycle. These events are repeated every time the bucket is deployed and retrieved. The first event is winch noise as the boom and bucket are swung into position, and the bucket is lowered. The bucket striking the water surface creates a splash noise detectable at short distances. The second event is the noise of the bucket striking the sediment surface. This is followed by the noise of the bucket closing and capturing the dredged material. The fourth event is the noise of the bucket jaws contacting each other. The bucket is raised by the winch, creating the fifth noise. The sixth and final noise of the cycle is the sound of the material being dumped into the scow. The amplitude of the second, third, and sixth event are strongly influenced by the granularity of the sediment that is being excavated. Coarse material produces for powerful sounds than fine material. Winching noise is produced at a higher frequency than the other event noises, so it attenuates more quickly. Bucket dredging is classified as a repetitive class of sound, rather than continuous.

Clark et al., recorded the clamshell dredge *Viking* dredging sand and gravel from Cook Inlet in 2001. The *Viking* is a 1,475 hp clamshell dredge with an 11.5-cubic meter bucket. Clark recorded sounds digging sounds between 113-107 dB at distances of 158-464 meters from the source, respectively. Assuming a transmission loss coefficient of 15 for the practical spreading calculation, a received level of 113 dB at a range of 158 meters indicates an SL of 146 dB. The same calculation using a received level of 107 dB at a range of 464 meters indicates an SL of 147 dB.

The equipment used to dredge at Nome would be similar in scale to the *Viking* and could be assumed to generate noise of a similar amplitude. The amplitude of the sounds produced by dredging near Nome would be similar to the amplitude of the sounds produced by the *Viking* dredging in Cook Inlet.

The dredging noise would be below the PTS threshold at the source, so the dredging noise would not have the potential to seriously injure or kill low-frequency cetaceans or Phocid seals, assuming an SL of between 146-147 dB. The sound would attenuate to the 120 dB harassment threshold between 54-63 meters from the source. The Corps would establish a 75-meter exclusion radius around the dredge to monitor for the presence of ESA-listed species and halt dredging operations as soon as safely possible in the event a protected species enters or appears on a course to enter the exclusion radius.
Considering the observation of a 75-meter exclusion radius around the dredge plant and support vessels, the underwater noise produced by dredging may affect, not likely to

adversely affect, ESA-listed ringed seals and bearded seals. The underwater noise produced by dredging would have no effect on humpback whales due to the relatively low amplitude of the noise and the low potential for bowhead whales to be in the project area during dredging.

General Habitat Alteration
The proposed dredging would alter the bottom composition of the area within the dredge prism and the placement area. Established communities of benthic and epibenthic organisms would be excavated, transported to the placement area, discharged from the scow, and the sediments in which the organisms are entrained would smother in situ communities of organisms. Many of the organisms that would be excavated and/or smothered are broadcast spawning invertebrates and would be capable of quickly recolonizing the disturbed area. This action would have an immediate deleterious impact on the productivity of the dredged prism and the placement area. Higher trophic level organisms, such as seals, sea lions, and whales, which forage in these areas are unlikely to be affected given the very small scale of the disturbance relative to their overall usable foraging area. The material placement area is already routinely disturbed by recreational and commercial gold dredging, storms, and sea ice scouring. Underwater video surveys of dredge and placement areas in summer 2018 revealed that the bottom was only sparsely colonized with sessile invertebrates, indicating dynamic conditions that do not lend to long term survival of these non-motile invertebrates. Algae was also very limited in these areas despite being located in photic zones with suitable attachment substrate. These observations indicate the bottom habitat is routinely disturbed and that dredging and placement will have relatively minor and temporary effects in this area compared to other regions in Alaska.

Steller sea lion critical habitat will not be impacted by this project as the nearest designated critical habitat is over 100 nautical miles away on the northeast corner of St. Lawrence Island.

6.0 DETERMINATION OF EFFECTS

6.1 Ringed Seals

The project ***May Affect*** ringed seals because:

- Acoustic harassment from vibratory pile-driving.
- Acoustic harassment from dredging.
- Additional vessel traffic during construction.

The project is ***Likely to Adversely Affect*** ringed seals because:

- Of exposure to underwater noise from dredging and pile-driving. This would be limited to Level B (Behavioral) harassment.

6.2 Bearded Seals

The project ***May Affect*** bearded seals because:

- Acoustic harassment from vibratory pile-driving.
- Acoustic harassment from dredging.
- Additional vessel traffic during construction.

The project is ***Likely to Adversely Affect*** bearded seals because:

- Of exposure to underwater noise from vibratory pile-driving and dredging. This would be limited to Level B (Behavioral) harassment.

6.3 Gray Whale – Western North Pacific DPS

The project ***May Affect*** gray whales because:

- Acoustic harassment from vibratory pile-driving.
- Acoustic harassment from dredging.
- Additional vessel traffic during construction.

The project is ***Likely to Adversely Affect*** gray whales because:

- Of exposure to underwater noise from vibratory pile-driving and dredging. This would be limited to Level B (Behavioral) harassment.

6.4 Humpback Whale – Western Pacific DPS and Mexico DPS

The project ***May Affect*** humpback whales because:

- Acoustic harassment from vibratory pile-driving.
- Acoustic harassment from dredging.
- Additional vessel traffic during construction.

The project is ***Likely to Adversely Affect*** humpback whales because:

- Of exposure to underwater noise from vibratory pile-driving and dredging. This would be limited to Level B (Behavioral) harassment.

6.5 Steller Sea Lion - Western DPS

The project ***May Affect*** sea lions because:

- Acoustic harassment from vibratory pile-driving.

- Acoustic harassment from dredging.
- Additional vessel traffic during construction.

The project is ***Likely to Adversely Affect*** sea lions because:

- Of exposure to underwater noise from vibratory pile-driving and dredging. This would be limited to Level B (Behavioral) harassment.

7.0 PREPARERS

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8.0 REFERENCES

Alaska Department of Fish and Game (ADFG). 2019. Anadromous Waters Catalog website: https://www.adfg.alaska.gov/sf/SARR/AWC/

ADFG. 2012. Alaska's Nome Area Wildlife Viewing Guide, Exploring the Nome Roadways.

California Department of Transportation (CALTRANS). 2015. Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile-driving on Fish. November 2015.

Lean, Charlie. 2019. Email dated 2 January 2019, subject: Port of Nome Modifications - relative environmental, cultural impacts of 6 alternative designs.

RJW Consulting (RJW). 2013. Final Report, 2013 Environmental Baseline Studies, Nome Offshore Report, Document #PMM001-3300-101. December 2013.

Smith, M. A., M. S. Goldman, E. J. Knight, and J. J. Warrenchuk. 2017. *Ecological Atlas of the Bering, Chukchi, and Beaufort Seas*. 2nd edition. Audubon Alaska, Anchorage, AK.