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Request for an Incidental Harassment Authorization under the Marine Mammal Protection Act for

Unalaska (Dutch Harbor) Channels

Unalaska, Alaska

Submitted to:
National Marine Fisheries Service Office of Protected Resources
1315 East-West Highway
Silver Spring, Maryland 20910-3226

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ACRONYMS AND ABBRVIATIONS

4MP	Marine Mammal Monitoring and Mitigation Plan
µ	Micro-
ADF&G	Alaska Department of Fish and Game
CFR	Code of Federal Regulations
dB	Decibel
DoD	Department of Defense
DPS	Distinct Population Segment
ESA	Endangered Species Act
FR	Federal Register
GI	Gastrointestinal
GL	Geometric Loss Coefficient
HF	High-Frequency
Hz	Hertz
IHA	Incidental Harassment Authorization
kHz	Kilohertz
LF	Low-Frequency
MF	Mid-Frequency
MLLW	Mean Lower Low Water
MMPA	Marine Mammal Protection Act
n.d.	No Date
N_{est}	Population Estimate
NMFS	National Marine and Fisheries Service
N_{min}	Minimum Population Estimate
NOAA	National Oceanic Atmospheric Administration
OW	Otariid
Pa	Pascal
POC	Plan of Cooperation
PPOR	Potential Place of Refuge
PTS	Permanent Threshold Shift
PW	Phocid
R_1	Range of Sound Pressure Level (Meters)
R_2	Distance from the Source of the Initial Measurement (Meters)

RMS	Root-Mean-Square
s	Second
SEL	Sound Exposure Level
SEL_{CUM}	Cumulative Sound Exposure Level
SPL	Peak Sound Pressure Level
SPLASH	Structure of Populations, Levels of Abundance, and Status of Humpback Whales
TL	Transmission Loss
TTS	Temporary Threshold Shift
USACE	United States Army Corps of Engineers
WFA	Weighting Factor Adjustment

Section 1 Description of the Activity

A detailed description of the specific activity or class of activities that can be expected to result in incidental taking of marine mammals

1.1 Introduction

Unalaska/Dutch Harbor is located in the eastern Aleutian Islands in Alaska. Currently, a 7-fathom (42-feet) bar restricts access to port facilities leading to economic impacts and safety concerns, primarily for large container ships and tankers that often draw over 40 feet of water when fully loaded. This project will dredge this bar to -58 feet Mean Lower Low Water (MLLW) to allow safe access for deep draft vessels with allowance for adequate under-keel clearance and ocean swell. This bar is most likely a terminal moraine from when the area was glaciated. These moraines are usually made up of a heterogenous mixture of everything from sand to large boulders. Given how well it is compacted based on geophysical surveys, there is a possibility of needing confined underwater blasting (hereafter just "blasting") to loosen the material for dredging. It will remain unknown until dredging begins whether a large area requires blasting or whether is it is just a small portion or possibly that dredging is not needed at all. Because blasting might be necessary for a portion of the dredged area, an Incidental Harassment Authorization (IHA) is necessary to avoid numerous and lengthy shutdowns to avoid take in a large Level B zone. Ideally, no blasting will be necessary at is saves cost, time, and minimizes impacts to marine mammals.

The project will occur in marine waters that support several marine mammal species. The Marine Mammal Protection Act of 1972 (MMPA) prohibits the taking of marine mammals, which is defined as to "harass, hunt, capture or kill, or attempt to harass, hunt, capture or kill," except under certain situations. Section 101(a)(5)(D) of the MMPA allows during a period of no more than 1 year, the incidental, but not intentional, take of marine mammals after notice and opportunity for public comment finds the total taking will have negligible impact or unmitigable adverse impact on the marine mammals and would not adversely affect subsistence use of the marine mammals for that 1-year period. It also requires the selected action to produce the least adverse impact on the species and stocks along with their habitats, and to include requirements of monitoring and reporting of takings during the proposed activity. If the project fulfills the requirements stipulated in Section 101(a)(5)(D), an IHA should be issued. The project timing, along with the possible blasting, may result in marine mammals protected under the MMPA being exposed to sound levels above allowable Harassment thresholds.

1.2 Purpose and Need

The purpose of the project is to increase navigational safety and improve economic efficiencies into and out of Dutch Harbor via Iliuliuk Bay. As shown in Figure 1-1, the depth of the bar and entrance is approximately -42 feet MLLW, which is shallower than the surrounding bathymetry. The need for the project is to reduce inefficiencies in cargo transportation and provide safer options in protected waters for vessel repairs and medical evacuations that currently exist due to draft restrictions at the bar.

Vessels often must take precautionary measures to safely cross the bar. These measures include light loading, waiting outside the bar for wave conditions to improve, waiting outside the bar for adequate tidal stages, foregoing fueling to capacity to reduce draft, lightering fuel outside the bar, and discharging ballast water to reduce draft. Additionally, vessels that can cross the bar during calm sea conditions may not be able to safely cross the bar during inclement conditions and must wait for calmer conditions. The surrounding natural depth of Iliuliuk Bay is -

100 feet MLLW. The bar is the only constraint preventing access for the current and anticipated future fleet. The bar causes inefficiencies in the delivery of fuel, durable goods, and exports to/from Dutch Harbor. The existing entrance to Iliuliuk Bay constrains the economic development potential of Dutch Harbor during a time when the international shipping fleet is transitioning to deeper draft vessels.

The bar also prevents Dutch Harbor from effectively serving as a Potential Place of Refuge (PPOR) to many vessels transiting the Great Circle Route between the western United States and Asia. Deeper draft vessels are unable to safely cross the bar to seek refuge in Dutch Harbor, and if they have to conduct personnel evacuations, it must be done outside the bar in open waters. This presents risks to rescuers and vessel personnel.

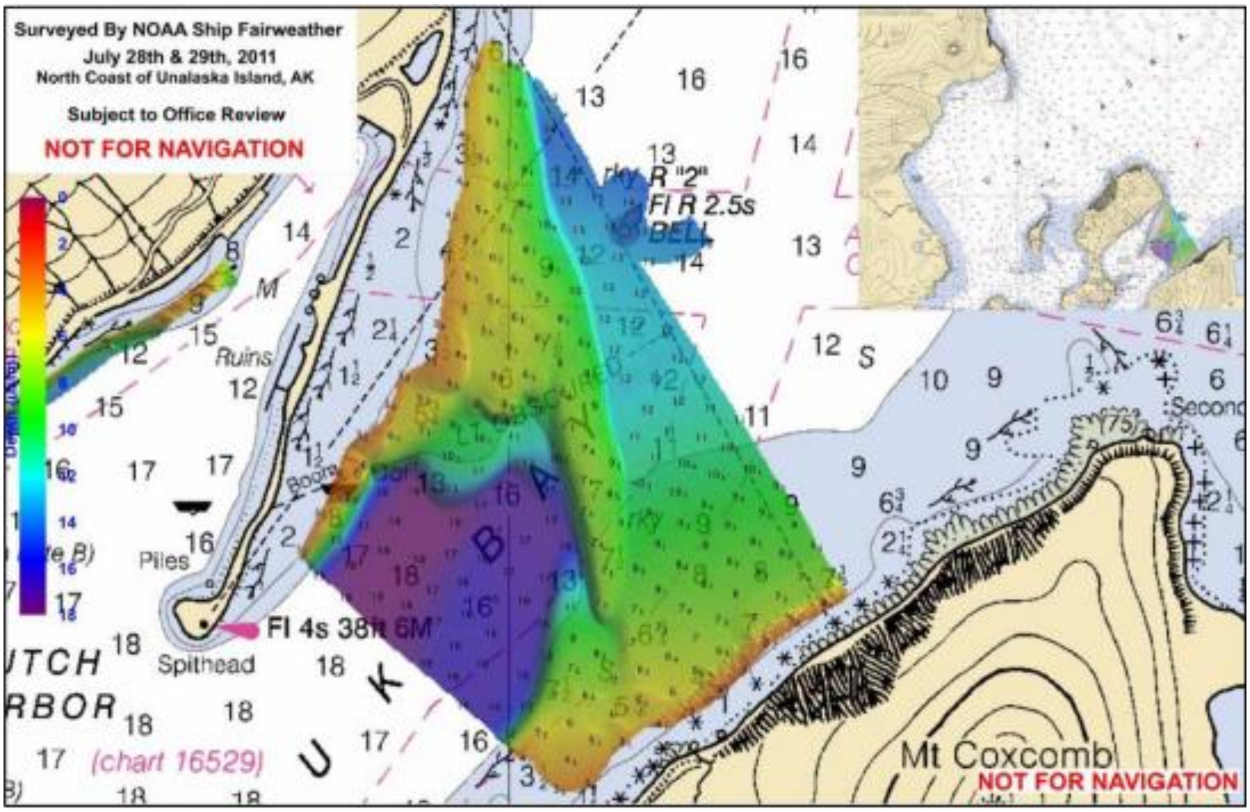


Figure 1-1. NOAA Bathymetry of the Shallow Bar

1.3 Project Description

The project would deepen the existing bar to -58 feet MLLW including 14 feet of under keel clearance. This would provide one-way access vessels with a draft up to 44 feet with waves up to 5.6 feet over the bar with tides about 0 feet MLLW. The channel dimensions are approximately 600 feet long by 600 feet wide (Figure 1-2) and initial estimates involve dredging approximately 182,000 cubic yards of sediment. The bar would be deepened by approximately 16 feet to a depth of -58 feet MLLW. Dredged materials will be placed in the water immediately adjacent to the inside of the bar in 100 feet of water. The main construction activities involved for the project include dredging, disposal, and blasting.

Dredging Description:

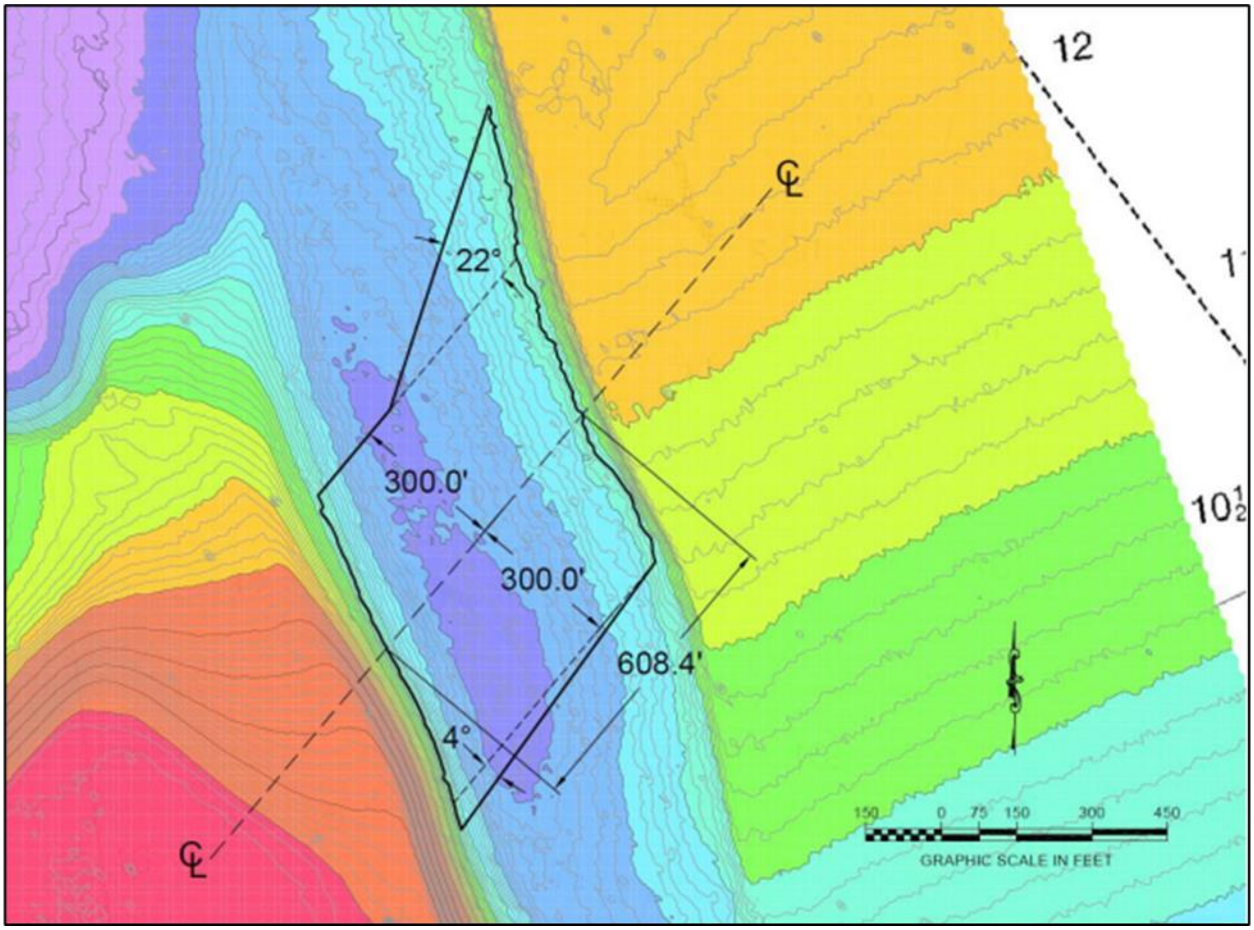
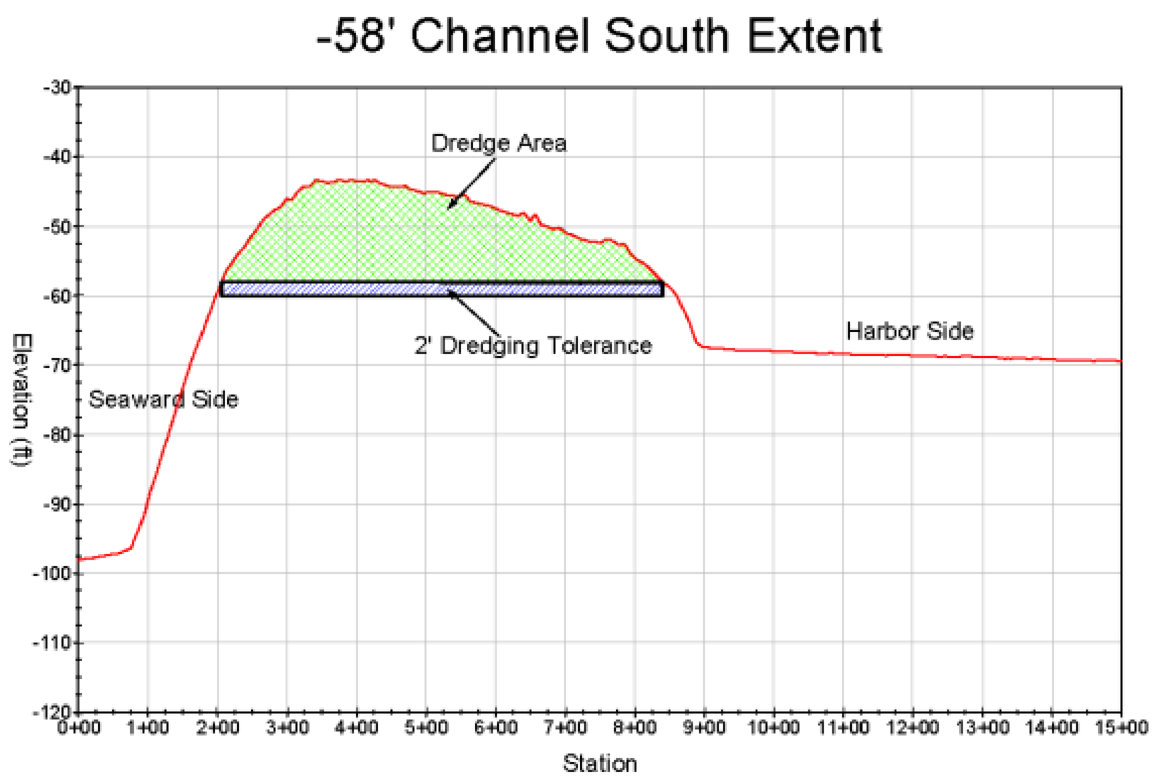


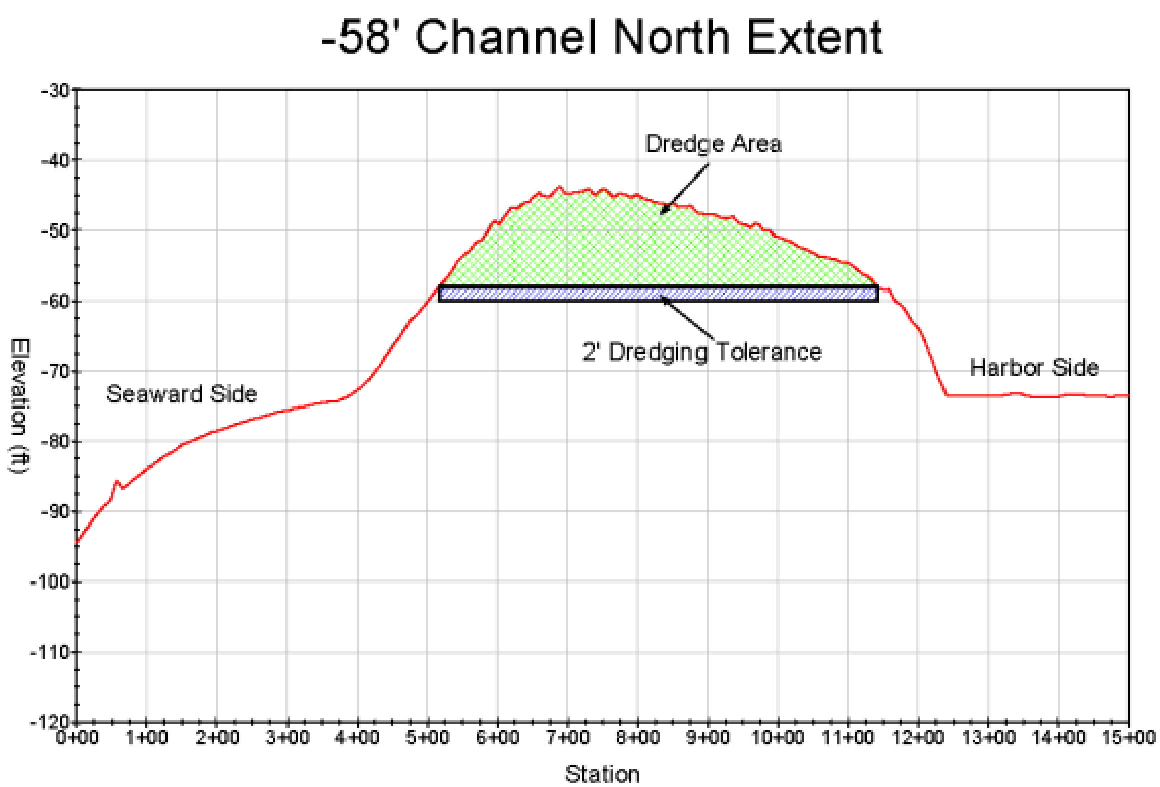
Figure 1-2. Dimension of Dredged Channel -58 feet MLLW Depth

The channel would be dredged with a side slope of 1 vertical to 2 horizontal. The material to be dredged has been characterized as a dense, consolidated, glacial drift deposit overlying bedrock. It is anticipated that this material will have a high in-situ strength, possibly requiring blasting prior to and/or during removal.

Dredging equipment and procedures cannot provide a smoothly excavated bottom at a precisely defined elevation. One foot of required overdepth and one foot of allowable overdepth dredging was added to the design depth of excavation to guarantee mariners a least-depth equivalent to the sum of ship factors. This allows for a deepening of the bar to a maximum of -60 feet MLLW.

Cross sections of the channel showing the dredged area and dredging tolerance are shown in Figure 1-3, with locations of where the cross sections are taken in Figure 1-4.


-58' Channel South Extent
Dredge Area
2' Dredging Tolerance
Harbor Side
Seaward Side
Elevation (ft)
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
0+00 1+00 2+00 3+00 4+00 5+00 6+00 7+00 8+00 9+00 10+00 11+00 12+00 13+00 14+00 15+00
Station


-58' Channel North Extent
Dredge Area
2' Dredging Tolerance
Harbor Side
Seaward Side
Elevation (ft)
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
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Station

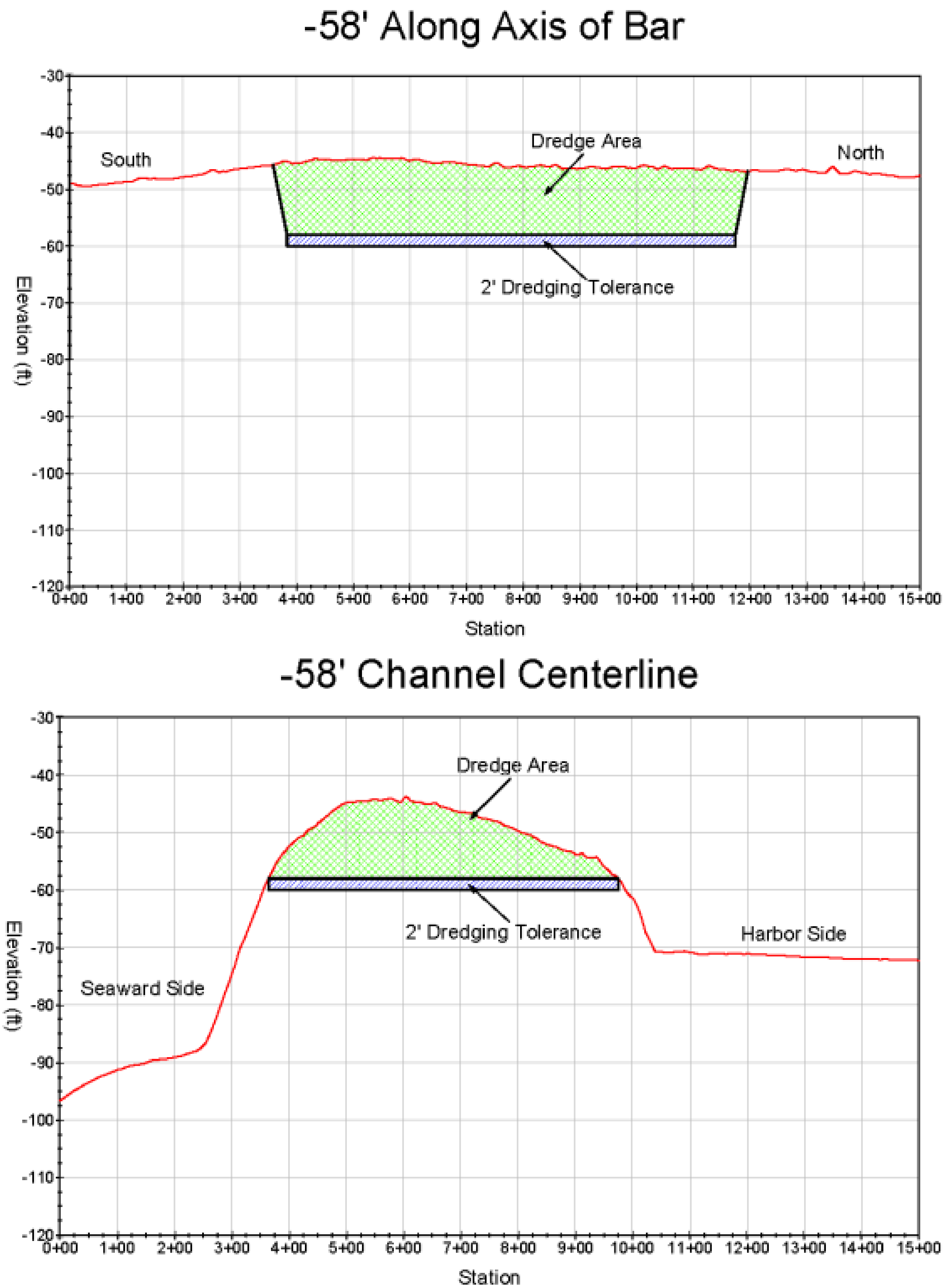

Figure 1-3. Profile View of Dredge Channel -58 feet MLLW Depth

The shallow shoal obstruction in the dredged channel consists of a hard, well-consolidated glacial moraine. The moraine likely is composed of an unsorted and unstratified accumulation of clay, silt, sand, gravel, cobbles, and boulders. From seismic velocity measurements recorded within the moraine, the material is considered rock-like and non-rippable. However, geotechnical drilling in September 2022 indicates that there is a possibility that the moraine may be able to be dredged without any blasting or with a smaller amount of blasting than would be required for the total 600-foot by 600-foot area. Once the moraine is broken and loosened by drill and blast procedures (as necessary), the material may be excavated by clamshell or long-reach excavator (backhoe), with the dredged material placed on a split hopper barge for transport to the adjacent disposal site.

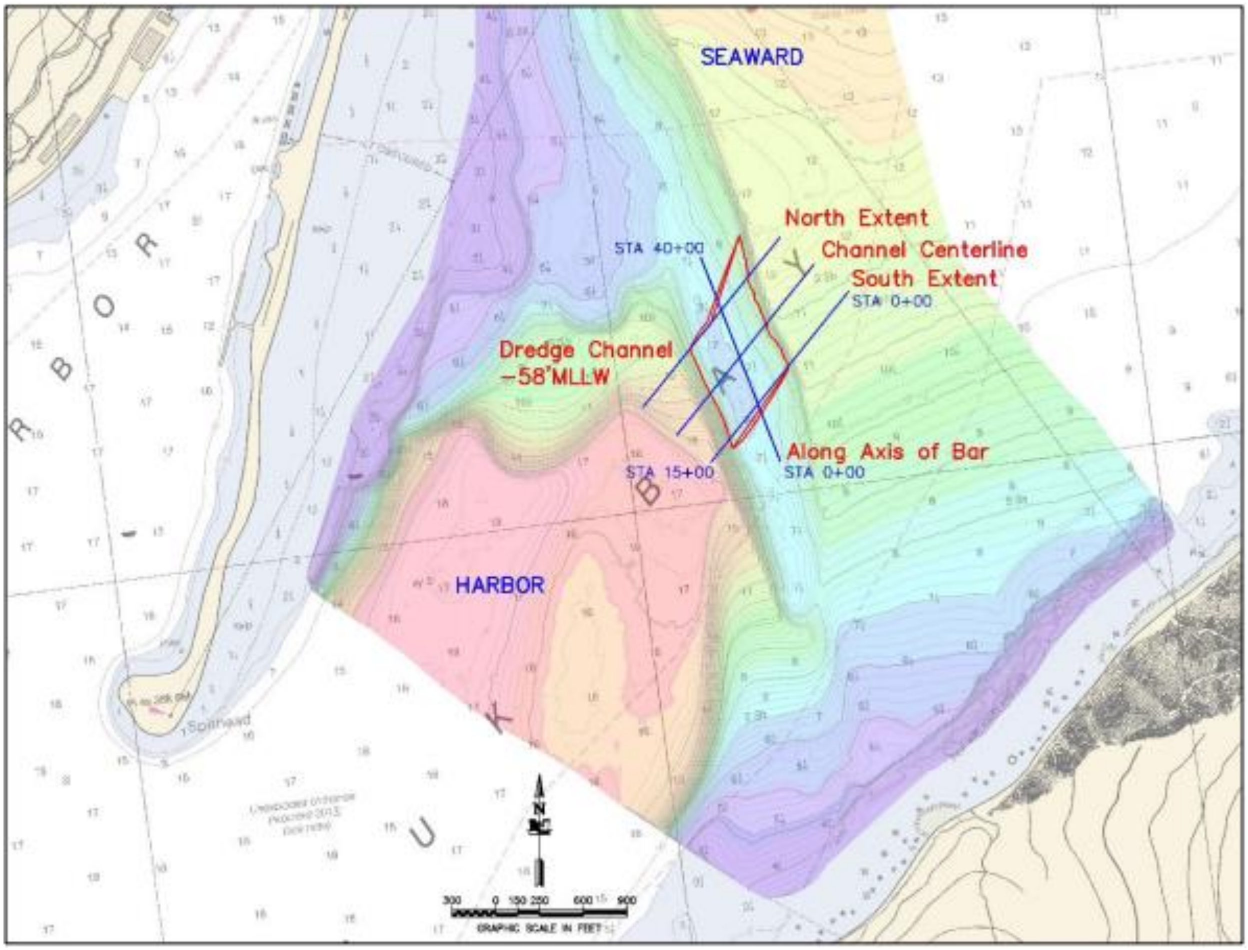

Figure 1-4. Plan View of Dredge Channel at -58 feet MLLW Depth

Drilling and Blasting Description:

The blasting plan for this project will be based on initial dredging activity and developed by the selected contractor, but a reasonable scenario for this project for planning and evaluating environmental impacts involves drilling boreholes for confined underwater blasting in a 10-foot by 10-foot grid pattern over the dredge prism. While it is possible that dredging can be accomplished without any blasting at all, it is conservative to assume that up to 50 percent of the dredged area would need to be blasted to break up the hard crust and possibly large boulders encountered in the dredge prism. This would result in up to 1,800 boreholes drilled up to -60 feet MLLW. Drilling to -60 MLLW would ensure that everything down to the design depth of -58 feet MLLW is completely fractured. However, if just the crust needs to be broken up by blasting it is possible that charges will not need to be places as deep as -60 MLLW. Drilling would likely take place from a jack-up barge with a drilling template. It is expected that after 75 holes are drilled they would be shot in a single blasting event (with delays between charges). Shooting 75 holes per event would lead to a maximum total of 24 blasting events to blast all 1,800 holes. Each of these 24 blasting events, lasting no more than 1 second, are instances where “take” could occur.

Although the desired outcome is to avoid all or at least a large portion of the blasting, for the purpose of this IHA application we have to assume that blasting would be necessary for up to 50 percent of the entire area. The 600-foot by 600-foot dredged area is 360,000 square feet. Borehole spacing of 10 feet would require a total of 3,600 boreholes, so 50 percent would be a maximum of 1,800 boreholes. It is difficult to determine the production rate on borehole drilling since it depends on the type and size of drilling barge and number of drills present on that vessel as well as weather and sea conditions. However, it is assumed that boreholes would be blasted in groups of 75 holes with delays between charges in each hole. It is estimated that there could be up to 24 days of blasting with one blasting event lasting a few milliseconds each of those 24 days. These blasting days will not occur every day but will occur as needed and be separated by the time it takes to drill the necessary holes. It is possible that drilling might occur on the 1st and 2nd of a given month and then charges are placed and shot on the third day of that month and then dredging might proceed for a week or two before drilling and blasting are needed again. While it is not possible to know the exact workplan until the dredging begins, the intent is to have the IHA cover up to 24 blasting events. These 24 events are used to estimate take numbers in Section 6 of this application.

Charge sizes would be limited to no more than 42.4 kilograms (93.5 pounds) placed in lined boreholes that would be about 3.5-4.0 inches in diameter. Smaller charge sizes could be used at the contractor’s discretion. Section 5 of this IHA application discusses how the Level B distances were derived and Section 6 discusses how these distances lead to take estimates. The general blasting plan for this project relies heavily on a blasting plan submitted in an IHA application for the Statter Harbor Improvements Project Phase III A in Juneau, Alaska in 2018. The analysis done for that application is considered a good analog for this project in terms of the blasting needs. The Unalaska project potentially has more holes that require more days of blasting, but the charge size and effects analysis used to determine threshold distances is considered a fair representation for this project. Appendix D of that application has specifics on their blasting impact analysis that is used in this application.

The boreholes would be separated by at least 15 milliseconds, so for marine mammal impact assessment purposes each hole would be treated individually. The blasting plan would also be developed to allow for continued shipping access and have a safety plan communicated to local mariners to cover associated signals and restricted access periods.

All underwater blasting would incorporate stemmed charges (i.e., crushed rock packed at the top of the hole above the explosive charge). Stemming helps to reduce the impact from blasting above the surface and maximizes the ability of the charge to fracture rock without wasting energy. Delays of several milliseconds would be planned between the charges to reduce the overall charge at one time while still retaining the effectiveness of the charges in the borehole.

Dredged Material Disposal

Dredged material would be placed immediately adjacent to the dredged area on the inside of the bar in Iliuliuk Harbor in about 16 fathoms of water. This approach minimizes the haul distance and potential disturbances of marine mammals. Haul distances would be no more than about 600 feet from the farthest dredged location.

Section 2 Dates, Duration, and Region of Activity

The date(s) and duration of such activity and the specific geographical region where it will occur.

2.1 Dates

Confined underwater blasting, dredging and disposal are planned to occur between approximately 1 November 2024 and 31 October 2024. It is uncertain if the contractor will elect to begin work in the fall and continue through winter or if they will wait until spring 2024 to begin construction.

2.2 Duration

It is estimated that up to 1,800 boreholes for confined underwater blasting would be completed within about 180 days of total construction time. It is anticipated that after one area is blasted that dredging would occur in that area while an adjacent area is drilled so that activity could proceed more efficiently. When an area is ready to be blasted, all activity would stop as vessels move off to a safe standby distance before the blast occurs before resuming activity. Overall, construction is expected to take approximately six months.

2.3 Region of Activity

The City of Unalaska is located in the Aleutian Islands, some 800 air miles from Anchorage (Figure 2-1). Dutch Harbor is a port facility on Amaknak Island within the City of Unalaska (Figure 2-2).

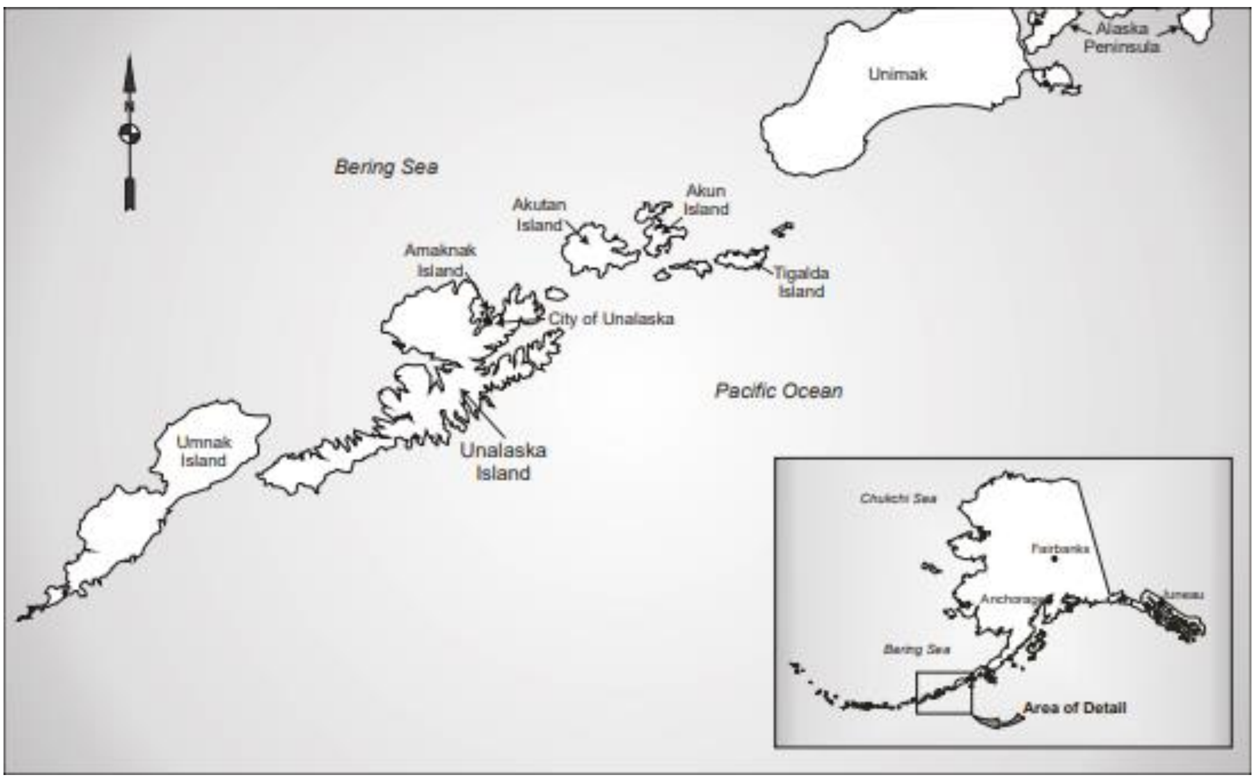

Figure 2-1. Vicinity Map, Unalaska, Alaska

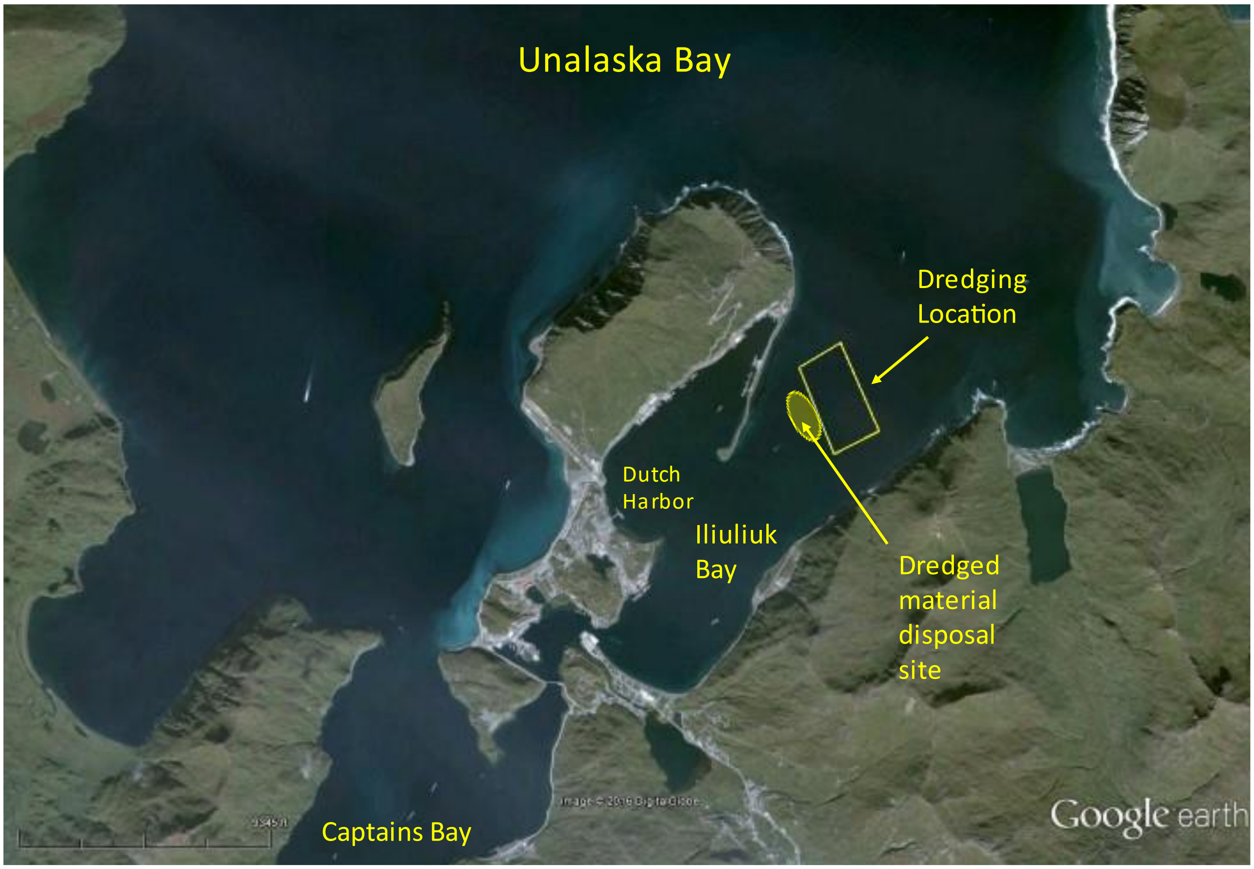

Figure 2-2. Dutch Harbor with dredging and disposal sites shown

The international Port of Dutch Harbor is the only deep draft, year-round ice-free port along the 1,200-mile Aleutian Island chain. It provides vital services to vessels operating in both the North Pacific and the Bering Sea. Dutch Harbor has been the number one United States commercial fishing port in terms of quantity of catch every year since 1997 (USACE, 2019) and in the top two since 1989. In terms of value, Dutch Harbor has been the number one or two United States port since 1989. For more than 30 years, Unalaska's economy has been based on commercial fishing, seafood processing, fleet services, and marine transportation. It has the western-most container terminal in the United States and provides ground and warehouse storage and transshipment opportunities for the thousands of vessels that fish in the region or pass through while in transit between North America and Asia.

Section 3 Species and Number of Marine Mammals in the Area

The species and numbers of marine mammals likely to be found within the activity area.

Marine mammal species, subspecies, or Distinct Population Segments (DPSs) known distribution ranges encompass a portion of the project area at Unalaska (Dutch Harbor). Table 3-1 lists the species along with their: stock or population, MMPA and Endangered Species Act (ESA) Status, occurrence in the project area, seasonality, and estimated abundance.

Many other species are listed on the NMFS Alaska Endangered Species and Critical Habitat Mapper web application but are not included in this application. The reason for this is that the majority of these species are unlikely to be observed in the project area based upon existing survey data, habitat preference, population size, seasonality, or expected occurrence. Some species in this category include blue whales and both species of beaked whales. It is understood that an IHA would not cover these species and that Level A and Level B Harassment of these other ESA and MMPA species is not authorized.

Table 3-1. Species with Ranges Extending into the Project Site

Species	Population / Stock	MMPA Status	ESA Status	Occurrence In/Near Project	Seasonality	Abundance (N_{min})
Harbor porpoise (*Phocoena phocoena*)	Bering Sea	Protected	-	Rare	Year-round	Unknown[a]
Harbor seal (*Phoca vitulina richardsi*)	Aleutian Islands	Protected	-	Common	Year-round	5,366[a]
Humpback whale (*Megaptera novaeangliae*)	Hawaii	Protected, Depleted	-	Seasonal	Summer	7,891[a]
	Mexico	Protected, Depleted	Threatened	Seasonal	Summer	5928[c]
	Western North Pacific	Protected, Depleted	Endangered	Seasonal	Summer	865[a]
Killer whale (*Orcinus orca*)	Eastern North Pacific: Alaska Resident Stock	Protected	-	Rare	Summer, Fall	2,347[a]
	Eastern North Pacific: Gulf of Alaska, Aleutian Islands, and Bering Sea Transient Stock	Protected	-	Rare	Year-round	587[a]
Steller sea lion (*Eumetopias jubatus*)	Western U.S.	Protected, Depleted	Endangered	Common	Year-round	52,932[a]

*N_{est} used for abundance if N_{min} not provided in source.
[a](Muto et al., 2021)
[b](Carretta et al., 2021)
[c](Calambokidis et al., 2008)

Section 4 Status and Description of Affected Species or Stocks

A description of the status and distribution, including season distribution (when applicable), of the affected species or stocks of marine mammals likely to be affected by such activities.

Due to the low likelihood of sightings most of the species listed in Table 3-1, the only marine mammals discussed in this IHA are the harbor seal, humpback whale, and Steller sea lion under the National Marine Fisheries Service (NMFS) jurisdiction. Additionally, the relevant critical habitat, hearing ability, and survey information applicable for the project area will be discussed in this section.

4.1 Harbor Seal (*Phoca vitulina richardsi*)

The "earless" harbor seal fur has a variety of colors that can range from light tan, blue-gray, or even silver. Adult harbor seals average weight is about 82 kilograms (Kinkhart et al., 2008). Male harbor seals tend to be larger than females and weigh up to 129 kilograms; in addition, harbor seals in Alaska will generally be larger than harbor seals in the Atlantic Ocean (NOAA, 2021c).

There are 12 distinct stocks of harbor seals in Alaska. A 1996 to 2018 survey resulted in an estimated 243,938 harbor seals throughout Alaska. The Aleutian Island Stock (1 of the 12 stocks) is the only stock which occurs within the project area and is estimated to consist of 5,588 harbor seals. The ability to obtain data on the Aleutian Island Stock is limited due to the region's size and weather; in addition, it is difficult to acquire the logistics to conduct aerial surveys in the region. The status of harbor seals is protected throughout its range under MMPA (Muto et al., 2021).

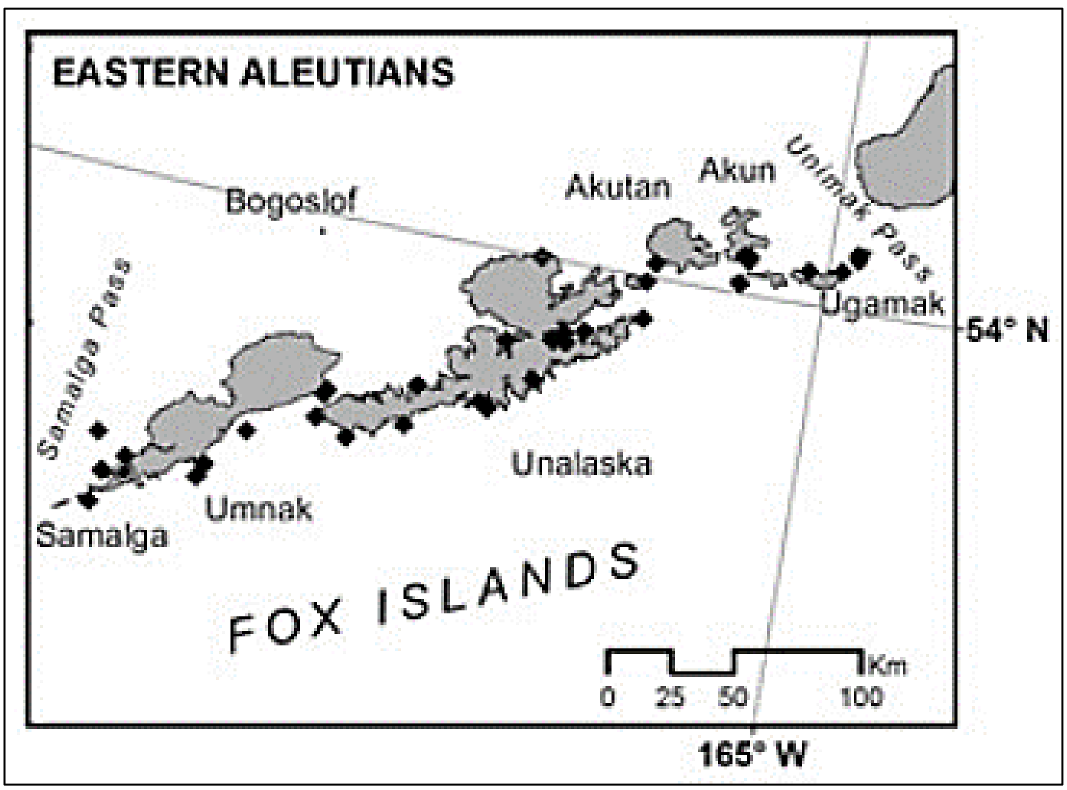

Figure 4-1. Fox Islands Harbor Seal Survey Locations

The harbor seal population range in the Pacific Ocean extends from Baja California west through the Aleutian Islands and north through the Cape Newenham and the Pribilof Islands. In surveys conducted in 1977 to 1982, 1,619 harbor seals were observed by skiff-based surveys in the Western Aleutians. Compared to an aerial survey conducted in 1999 resulting in 884 harbor seals being observed, there was a 45 percent decrease in harbor seal population (Small et al., 2008). Figure 4-1 shows the locations where these surveys were conducted in the Fox Islands through black diamond symbols. The Fox Islands includes Unalaska Island, which had a multitude of locations surveyed.

Harbor seals occurred throughout Unalaska Bay. They are usually observed as single individuals in the water, but often in groups when hauled out. They occasionally haul out in three locations when in Iliuliuk Bay (Figure 4-2). They typically haulout out in groups of 1 to 10 individuals during calm conditions. Up to about 40 harbor seals can haul out at the haulout near Ulakta Head when the tide is at lower levels in calm seas. Additionally, although they can be found anywhere along the shoreline, they are more commonly seen routinely foraging at the kelp beds along the shoreline.

Figure 4-2. Harbor Seal Typical Distribution in Unalaska and Iliuliuk Bays

Overall, harbor seals are generally considered non-migratory (Muto et al., 2021) and are associated with nearshore coastal waters (less than 25 kilometers from land). However, they will make trips of up to 100 kilometers from land. They exhibit variable patterns of movement depending on sex and age class. Some conduct localized movements while others conduct more extensive movements. Adult harbor seals typically travel shorter distances (average 60 kilometers) compared to pups (up to 373 kilometers) and juveniles (up to 499 kilometers) (Kinkhart et al., 2008). Local movements are potentially affected by tides, weather, season, and prey resources (Muto et al., 2021). When diving, harbor seals will tend to dive less than 19.8 meters and less than 4 minutes long but can dive down to about 500 meters and for over 20 minutes (Kinkhart et al., 2008). They prefer to haul out on the rocks, reefs, beaches, and drifting glacial ice (Muto et al., 2021).

Although they tend to be solitary when in the water, they can form groups of about 30 or less individuals of both sexes and all ages when hauling out. They can even reach up to a few hundred at times. Harbor seals will spend around 44 percent of their time hauled out on land or ice. Hauling out occurs in order to periodically rest, give birth or nurse; furthermore, it mostly occurs during the summer due to molting (mid-August to mid-September) and pupping (varies geographically) seasons. Pupping season in the Aleutian Islands is estimated mid-June to mid-July. (Sease, 1992). Single pups are born between May and mid-July and are weaned after about a month, which the females will mate shortly after. In winter, outside of birthing and pupping seasons, they spend 80 percent of their time in the water (Kinkhart et al., 2008).

As opportunistic feeders, their diet varies seasonally and geographically. Their diet includes a wide variety of fish, cephalopods, and crustaceans. Their diverse diet allows them to take advantage of what is available in their environment.

The current population trend of the Aleutian Island Stock is negative 131 seals per year at a 0.932 probability. Potential threats contributing to the decline are predation, commercial fishing, subsistence hunting, and other human caused effects. The most common predator of harbor seals is the killer whale (Kinkhart et al., 2008). The harbor seal Aleutian Island Stock is protected under MMPA but is neither threatened nor endangered under ESA.

4.2 Humpback Whale (*Megaptera novaeangliae*)

The humpback whale is one of the largest of the rorqual family of baleen whales. Adult females average body length is about 15 meter and weight is 35 tons, but they can reach up to about 18.3 meter and weigh 40 tons (NOAA, 2021d). Adult males tend to be slightly smaller than females. Humpback whales are predominantly black with white present on their throat, pectoral fins, flukes, and underside. The white coloring pattern of humpback whales and their distinguishable pectoral fins, flukes, and dorsal fin help biologists tell them apart from other whales and other individual humpback whales. Their pectoral fins are easily identifiable as they can reach 25 to 30 percent the whale's body length and have large knobs along the leading edge. Their dorsal fin and flukes while similar in overall shape still have distinct differences and color patterns that allow identification of separate individuals (Zimmerman and Karpovich, 2008).

Humpback whales are distributed throughout the world in all ocean basins. They are a migratory species that travel thousands of miles between destinations with some even traveling up to 8,047 kilometers one way due to their preferences between feeding and calving grounds. They prefer warmer waters near shores or reefs in shallow water (NOAA, 2021d). They seasonally migrate between their winter/spring calving and mating areas and summer/fall foraging areas separately (Muto et al., 2021). Thus, Humpback whales in the North Pacific generally mate and calve in tropical and sub-tropical waters like Mexico, Hawaii, and the western Pacific near Japan in winter/spring. In the summer/fall, they prefer the abundant food sources in temperate and subpolar waters, which is why they migrate to Alaska in the spring where they will feed in the coastal and inland waters (Zimmerman and Karpovich, 2008).

The NMFS humpback whale stock structure is currently under review due to the 14 DPS established by the ESA Final Rule, "Endangered and Threatened Species; Identification of 14 Distinct Population Segments of the Humpback Whale (Megaptera novaeangliae) and Revision of Species-Wide Listing" (81 Federal Register (FR) 62259, 2016). The DPSs relevant for this application are the Western North Pacific DPS, Mexico DPS, and the Central North Pacific DPS

(ESA's Hawaii DPS). These DPS all occur in the North Pacific and their summer/fall foraging area ranges overlap with the project area (Muto et al., 2021). Also, in a project called SPLASH (Structure of Populations, Levels of Abundance and Status of Humpback Whales in the North Pacific) humpback whales from the Aleutian Islands and Bering Sea in the summer/fall had a low resighting rate in winter areas. This brought up the likelihood that these whales had an unsampled winter destination, and it is unknown what stock of whales they could belong to (Calambokidis et al., 2008).

Satellite tracking indicates humpbacks frequently congregate in shallow, highly productive coastal areas of the North Pacific Ocean and Bering Sea. The waters surrounding the eastern Aleutian Islands are dominated by strong tidal currents, water-column mixing, and unique bathymetry. These factors are thought to concentrate the small fish and zooplankton that compose the typical humpback diet in Alaska, creating a reliable and abundant food source for whales. Unalaska Island is situated between Unimak and Umnak Passes, which are known to be important humpback whale migration routes and feeding areas (Kennedy et al., 2014). Based on an analysis of migration between winter mating/calving areas and summer feeding areas using photo-identification, it was concluded that whales feeding in Alaskan waters belong primarily to the Hawaii DPS, with small numbers of Western North Pacific DPS, and Mexico DPS individuals (Wade et al., 2016). In the summer feeding areas (Aleutian Islands, Bering, Chukchi, and Beaufort Seas) that overlap with the Iliuliuk Bay entrance to Dutch Harbor, Central America DPS individuals are estimated to comprise 0% of the humpback whales present, Mexico DPS individuals 7 percent, and Western North Pacific DPS individuals 2 percent (NMFS, 2021). The remaining whales are of the Hawaii DPS (91 percent) and are not listed under the ESA. The United States Army Corps of Engineers (USACE) biologists have worked on the water in the project area and know that humpback whales are often present near the project area during summer and show up in the larger area of Unalaska Bay beginning in April and are present well into October most years (USACE, 2019). Presence in Unalaska Bay and Iliuliuk Bay appears to be largely prey-driven, so large variations in abundance between months and years is common.

The time these whales spend in a group can lengthen when they forage together or during mate selection. Humpback whales feed on up to 1.5 tons a day of various schooling fish and euphausiids during the summer in their foraging areas. However, the humpback whale rarely feeds while migrating or during the winters when they live off fat reserves during the breeding season (Zimmerman and Karpovich, 2008). Females conceive during the winter season or on the way to winter grounds and will give birth the following winter season after a gestation period of 11 to 12 months. November may be the peak of Humpback births and suggests that conception typically occurs early in the breeding season or as they migrate to winter grounds (Craig et al., 2003).

Overall, humpback whale populations are showing a positive trend in the U.S, but this may not be the case for all breeding areas. The Central North Pacific DPS has shown signs of reproduction and encounter rates declining in 2013 to 2018 due to major environmental changes. The Western North Pacific DPS population trend is unknown (Muto et al., 2021). Nonetheless, there are estimated positive population trends for the Central North Pacific DPS (Hawaii DPS) at 7 percent annually and Mexico DPS at 6.9 percent annually (Calambokidis et al., 2008). Threats to humpback whales include commercial whaling, ecological factors, vessel strikes, and human-direct causes (Muto et al., 2021). The status of the Mexico, Western North Pacific, and Central North Pacific (Hawaii) DPSs are protected/deplete under MMPA. Under ESA the Mexico DPS is threatened, the Western North Pacific is endangered, and the Central North Pacific DPS (Hawaii DPS) is neither threatened nor endangered (NOAA, 2021d).

The most common areas to see most humpback whales in Unalaska Bay is shown in the orange shading on Figure 4-3. Up to 60 humpback whales at one time have been observed in this shaded area during USACE 2018 surveys and use of this general area is supported by casual observations over the past 23 years of working in the area. Humpback whales have been seen in Captains Bay, Iliuliuk Bay, and inside Dutch Harbor but are always in smaller numbers than the overall Unalaska Bay area.

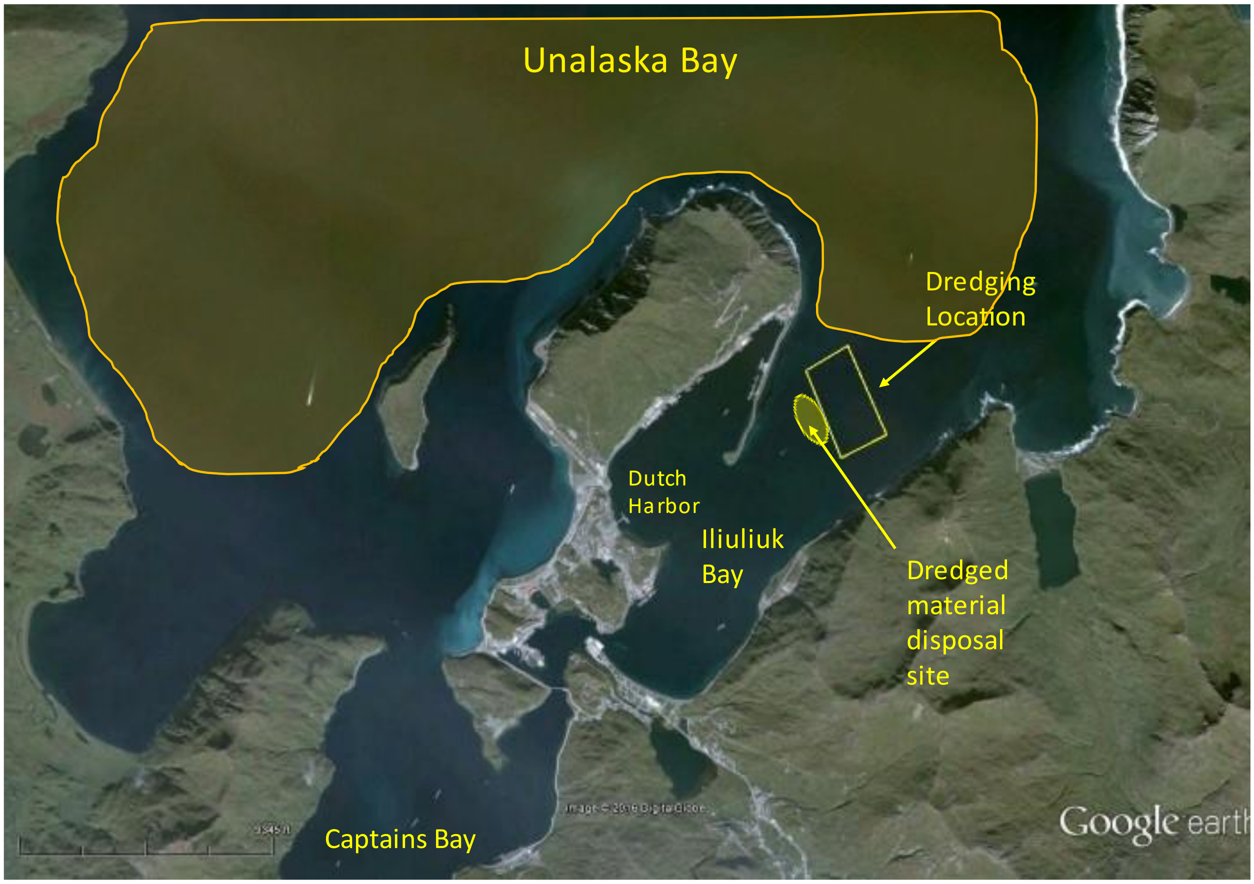

Figure 4-3. Humpback Whale Typical Distribution in Unalaska and Iliuliuk Bays

Critical Habitat:

Critical habitat was designated and became effective on May 21, 2021, under 86 FR 21082 for the Central America, Mexico, and Western North Pacific DPS of humpback whales. The critical habitat is shown in Figure 4-4.

The nearshore boundaries of the critical habitat for Mexico and Western North Pacific DPS humpback whales in Alaska are defined by the 1-meter isobath relative to MLLW. Additionally, on the northside of the Aleutian Islands, the seaward boundary is defined by a line extending from 55^o 41' N, 162^o 41' W to 55^o 41' N, 169^o 30' W, then southward through Samalga Pass to a boundary drawn along the 2,000-meter isobath on the southside of the islands.

The critical habitat does not include manmade structures (such as ferry docks or sea plane facilities) and the land on which they rest within the critical habitat boundaries. Sites owned or controlled by the Department of Defense (DoD) are also excluded from the critical habitat where they overlap.

Essential features identified as essential to the conservation of the Mexico DPS and Western North Pacific DPS relevant to this IHA are the prey species of each (which are primarily euphausiids and small pelagic schooling fish) are of sufficient quality, abundance, and accessibility within humpback whale feeding areas to support feeding and population growth.

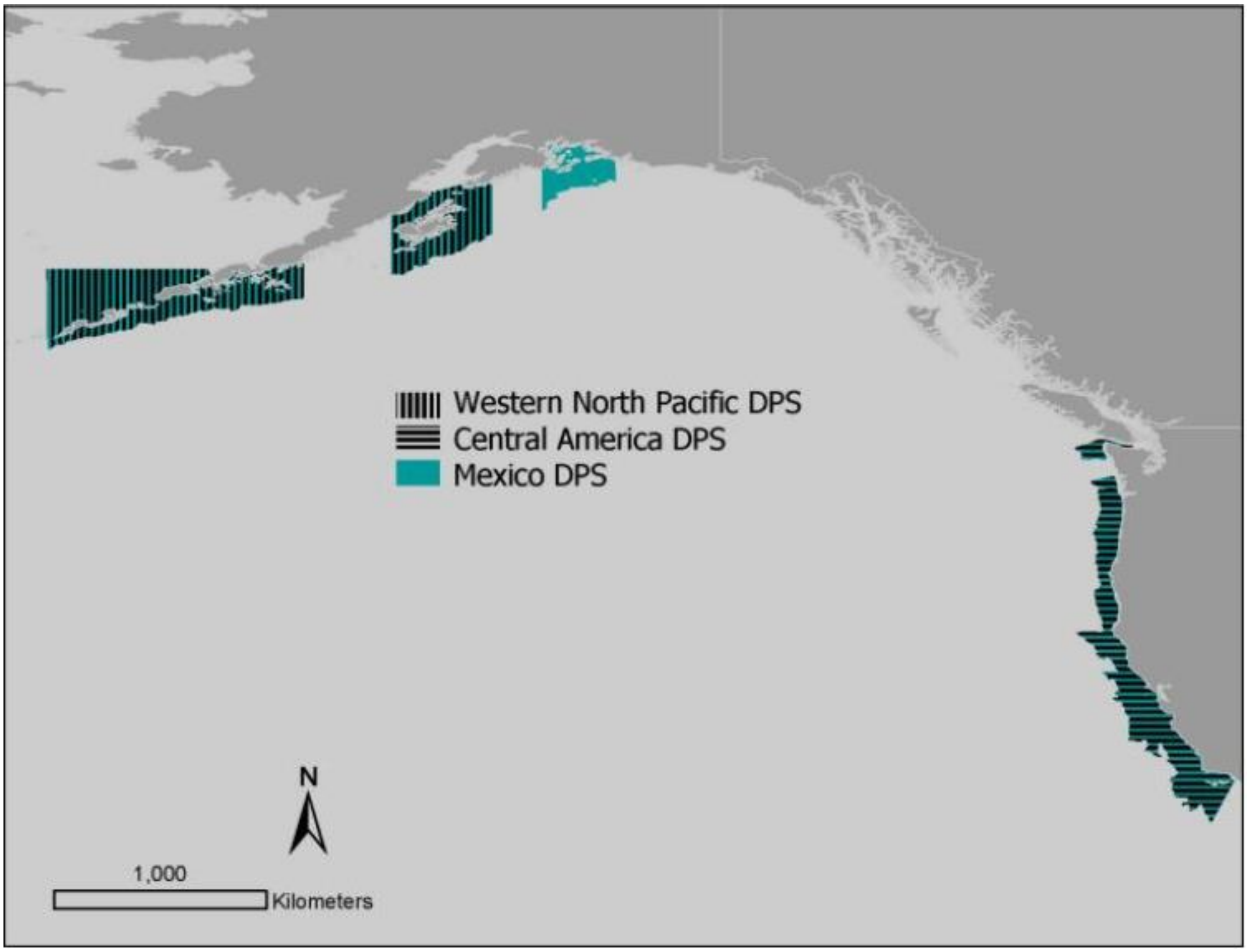

Figure 4-4. NOAA Map Showing Humpback Whale Designated Critical Habitat

4.3 Steller Sea Lion (Eumetopias jubatus)

The Steller sea lion, also known as northern sea lion, is the largest eared seal and one of the largest pinnipeds. They have hairless flippers with light blonde to reddish brown fur coats. Adult males average 565 kilograms with a body length of 3.25 meters but can weigh up to 1134 kilograms with a body length up to 3.35 meters. Adult females average 263 kilograms and 2.64 meters but can weigh up to 363 kilograms with a body length up to 2.90 meters (Zimmerman and Rehberg, 2008; NOAA, 2021g).

There are two Steller sea lion DPS in Alaska: Eastern U.S. DPS and Western U.S. DPS. Individuals born at and west of Cape Suckling, Alaska (144°W), are part of the Western U.S. DPS; while those born east of 144°W are part of the Eastern U.S. DPS (NOAA, 2021g). The project area is within the Western U.S. DPS range. The Western U.S. DPS was listed as endangered pursuant to the ESA in 1990 by 55 FR 49204 and has remained endangered since through the 62 FR 24345. The Western U.S. DPS is listed as protected and depleted under MMPA as well.

Steller sea lions range from Japan to California along the North Pacific Rim. They do not migrate, but they do change their haulout location based on their foraging activity (Zimmerman and Rehberg, 2008). Most Steller sea lions occupy rookeries or haulouts during breeding season which occurs late-May to July. There are major haulouts near Dutch Harbor and Unalaska Island. Individuals, especially male and juveniles, disperse beyond their natal habitat outside of breeding season (Sease and York, 2003). When at sea, Steller sea lions typically travel and forage within 60 kilometers of land in depths less than 400 meters and most frequently at 150 to 250 meters where there is a high density of prey (Wiles, 2015). Dutch Harbor is part of the Steller sea lions' Bogoslof foraging area and there are a number of rookeries and haulouts around Unalaska Island. Steller sea lions occur year-round in Dutch Harbor and were common during periodic USACE winter surveys in Dutch Harbor between 2000 and 2016, but they were not abundant near the proposed dredging project area. Single marine mammals were observed on occasion outside the Dutch Harbor spit. In past years during winter surveys during 2000 to 2006, there were two areas where large aggregations of 50 to 60 Steller sea lions were common (USACE, unpublished data). These areas are shown in as shaded ovals in Figure 4-5 (USACE, 2019).

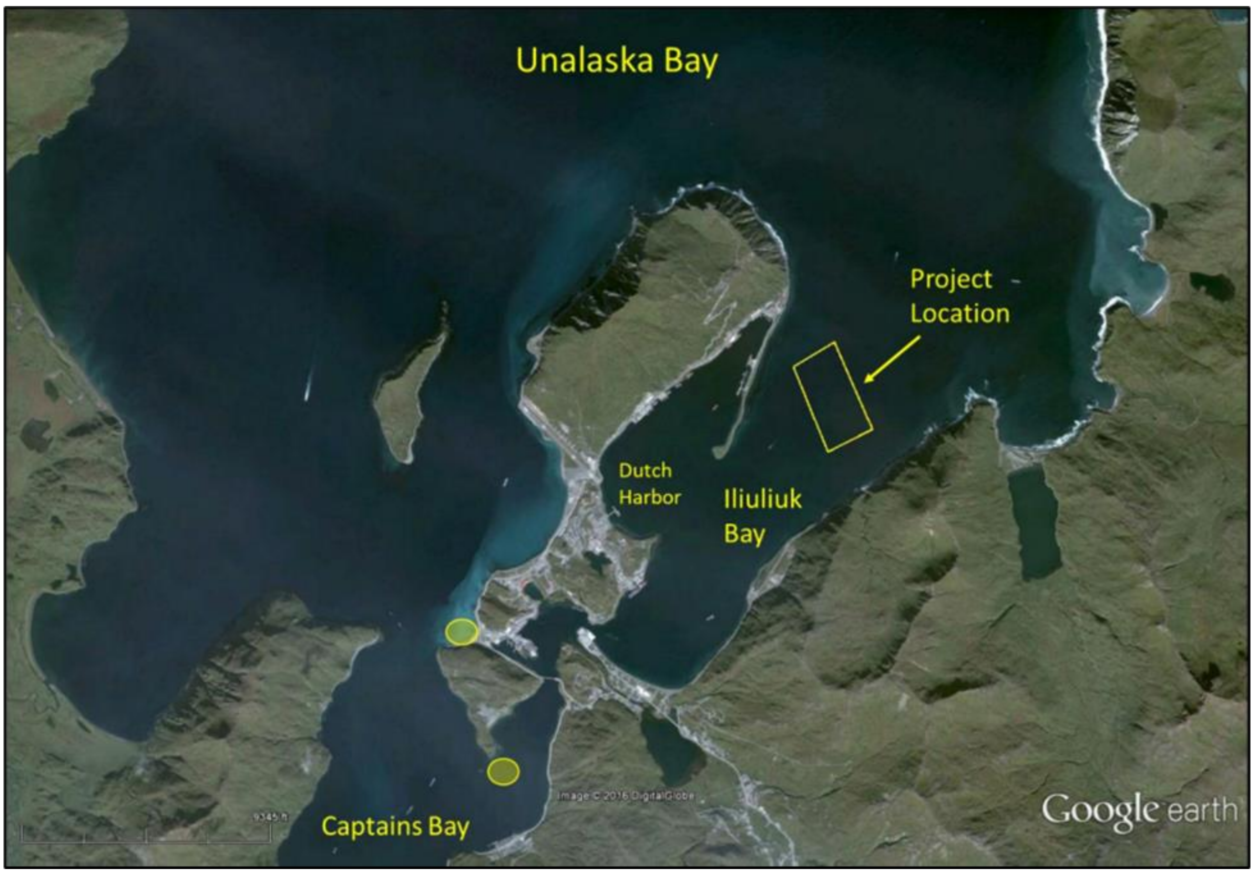

Figure 4-5. Common Steller Sea Lion Aggregation Areas for 2000 to 2006 Winter Surveys

The reproduction cycle includes 3 key events. The female Steller sea lion giving birth mid-May to late-July and peaking in June is the first event. Breeding season late-May to July is the second event and followed by the last event of implantation in late-September and October (Pitcher and Calkins, 1981). After giving birth, the female Steller sea lion will commence routine foraging at sea a few days later around the natal habitat and mate within 2 weeks. The pups are usually weaned around age 1, but some can continue to wean up to 3 years (NOAA, 2021g).

Steller sea lions are central place foragers, which means they will forage prey in foraging areas before returning back to a home base (Jemison et al., 2018). They are also known as opportunistic predators and dietary generalists. They forage for a broad variety of fish and cephalopods and on rare occasion a pinniped or bird (Zimmerman and Rehberg, 2008).

The population of the Western U.S. DPS was estimated as 52,932 in a survey conducted in 2018 to 2019. The Western U.S. DPS population showed a 1.63 percent increase from 2002 to 2018. The Western U.S. DPS in the Eastern Aleutian Islands and East of Samalga Pass where the project will take place show a positive trend of 2.54 and 2.90 respectively for pups and 1.76 and 2.71 for adults and juveniles respectively (Muto et al., 2021).

Critical Habitat:

The numerous Steller sea lion rookeries, haulouts, and special aquatic foraging areas in Alaska are identified in the 58 FR 45269 and 50 Code of Federal Regulations (CFR) 226.202. Critical habitat is defined by three zones: terrestrial zone, air zone, aquatic zone. Each zone extends out from the baseline or base point of each major rookery and major haulout in Alaska (50 CFR Part 226, 2020). The following are relevant to the project area:

- Terrestrial zone: extends 0.9 kilometers landward.
- Air zone: extends 0.9 kilometers above the terrestrial zone.
- Aquatic zone: extends 37 kilometers (20 nautical miles) seaward on State and Federally managed waters west of 144o West longitude

There are one major rookery and three major haulouts within 20 nautical miles of the Proposed Project site (Figure 4-6). The major haul-outs include Old Man Rocks and Unalaska/Cape Sedanka (approximately 15 nautical miles southeast straight-line distance from the project site) and Akutan/Lava Reef (approximately 19 nautical miles northeast straight-line distance from the project site). The closest rookery is Akutan/Cape Morgan (approximately 19 nautical miles east straight-line distance from the project site). Another major rookery is located approximately 19 nm from the project location (straight line distance over mountains) at Akutan/Lava Reef. The number of adult Steller sea lions recently observed using these sites is presented in Table 4-1.

In addition to major rookery and haulout locations, there are three special aquatic foraging areas in Alaska for the Steller sea lion (Shelikof Strait area, Bogoslof area, and Seguam Pass area). The project site is within the outer limits of the Bogoslof foraging area (Figure 4-7).

Table 4-1. 2014 Summer Steller Sea Lion Count

Site Name	Adults and Juveniles	Site Type
Akutan/Cape Morgan	1129	Major Rookery
Akutan/Lava Reef (2015)	182	Major Haulout
Old Man Rocks	15	Major Haulout
Unalaska/Cape Sedanka	0	Major Haulout

Source: NMML Steller Sea Lion Count Database (Adults) 2016

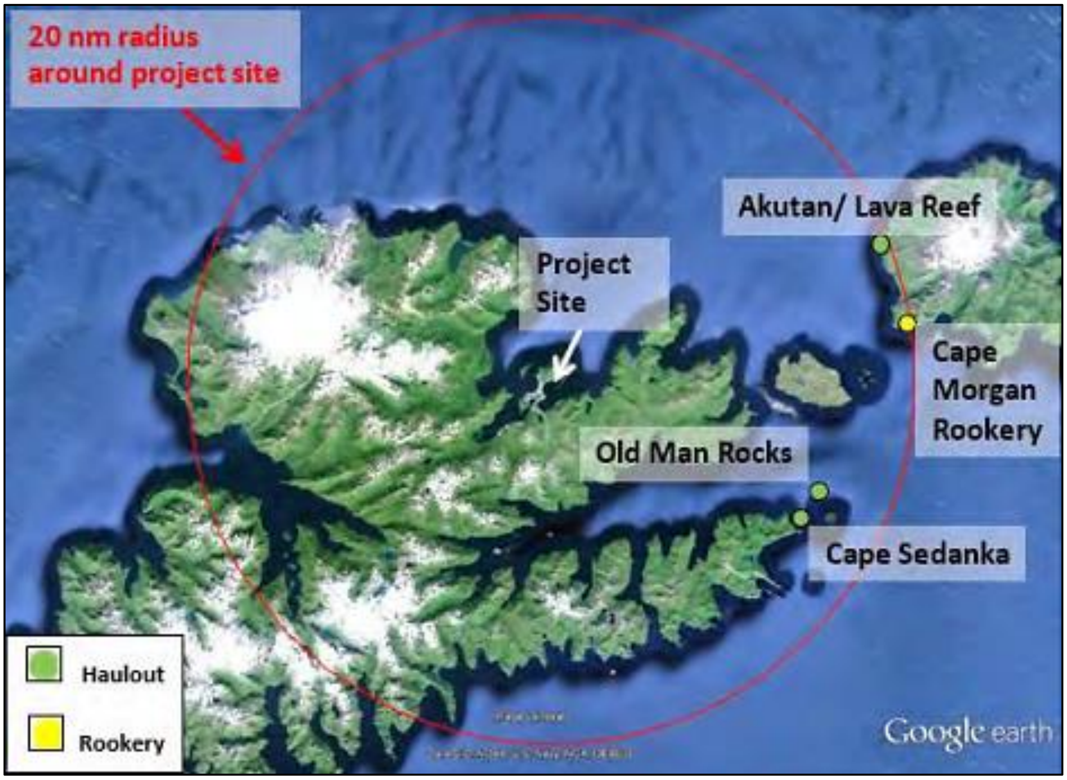

Figure 4-6. Steller Sea Lion Haulouts and Rookeries within 20 Nautical Miles of the Project Site

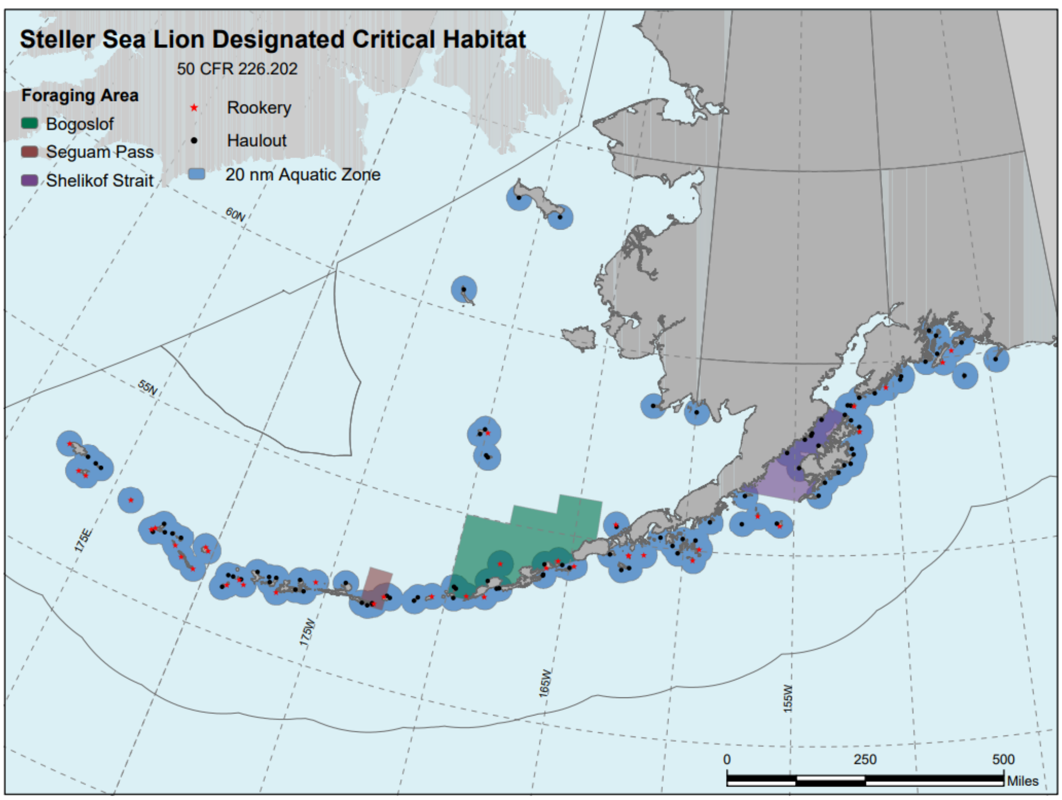

Figure 4-7. NOAA Map Showing Steller Sea Lion Designated Critical Habitat

4.4 Hearing Ability

Table 4-2 lists each species within this IHA application by its hearing group along with the generalized hearing range. Throughout this IHA, the generalized hearing range for the marine mammals will be referred to when determining zones. However, in this section, each species will be discussed more in detail.

Table 4-2. Species by Hearing Group

Hearing Group	Species	Generalized Hear Range
Low-Frequency (LF) Cetaceans	Humpback whale	7 Hz to 35 kHz
Mid-Frequency (MF) Cetaceans	N/A	150 Hz to 160 kHz
High-Frequency (HF) Cetaceans	N/A	275 Hz to 160 kHz
Phocid (PW) Pinnipeds	Harbor seal	50 Hz to 86 kHz
Otariid (OW) Pinnipeds	Steller sea lion	60 Hz to 39 kHz

(NMFS, 2018)

4.4.1 Harbor Seal

Harbor seals are part of the Phocidae family of true seals. Like other true seals, they lack the external ear flaps (called pinna) making them look “earless.” Instead, they have a hole on both sides of head that are the opening into the ear canal (NOAA, 2021c). True seals have a generalized underwater hearing ability of 0.05 to 86 kHz (NMFS, 2018).

Harbor seals use both aerial and underwater hearing during breeding, territorial, disputes, and pup rearing. The best underwater hearing range for harbor seals is 0.5 to 40 kHz when defined as the range of maximum sensitivity at 1 kHz at 56-59 dB SPL. The hearing sensitivity of harbor seals gradually decreases below 1 kHz and steeply decreases beyond 40 kHz (Kastelein et al., 2018). Their hearing sensitivity is best at 11 kHz (Schusterman, 1975). When compared to their underwater hearing, aerial hearing of harbor seals has minor differences averaging around 8 dB (Kastak and Schusterman, 1998).

4.4.2 Humpback Whale

The generalized hearing ability of baleen whales as low-frequency cetaceans is 0.007 to 35 kHz (NMFS, 2018). The humpback whale is a baleen whale, it has a good hearing sensitivity from 0.02 to 8 kHz with maximum sensitivity estimated around 0.120 to 4 kHz. Software modeling based on the anatomical measurements of their ears showed a good hearing sensitivity of 0.7 to 10 kHz with maximum sensitivity 2 to 6 kHz (Erbe, 2002). The frequency of the song ranges from 0.05 to 10.0 kHz (Ketten, 1994).

Male humpback whales use song during mating. The long, complex songs are typically 10 to 20 minutes long but are repeated for hours at a time. Distinct populations have their own unique songs from other populations. (Zimmerman and Karpovich, 2008). Masking can occur when there is noise interfering with their social communication and can lead to changes in acoustic behavior or to damage in early development. This is shown by humpback song duration increasing when sonar activities were conducted. Humpbacks may leave or changed behavior as well due to excessive noise exposure. Exposure to underwater drilling associated with construction activities may cause reduction in orientation abilities but is unlikely to cause a change in behavior (Fleming and Jackson, 2011).

4.4.3 Steller Sea Lion

The Steller sea lion hearing ability is similar to two other otariids, the California sea lion and northern fur seal. Data on the hearing ability of otariids is limited due to studies only being conducted on small sample sizes of captive individuals; however, the generalized hearing range for otariid pinnipeds underwater is 0.06 to 39kHz (NMFS, 2018). One study conducted on an individual Steller sea lion identified an aerial hearing range of approximately 0.25 to 30 kHz with a range of best hearing sensitivity from 5 to 14.1 kHZ when defined as the range of frequencies audible at 60 decibel (dB) sound pressure level (SPL; Mulsow and Reichmuth, 2010).

Another study looked at the underwater sensitivities of one male and one female Steller sea lion. The male showed an underwater best hearing range of 1 to 16 kHz while the female showed a maximum hearing sensitivity at 16 to 25 kHz. The results could have been due to sexual dimorphism or individual differences. The aerial and underwater vocalizations are likely used for social functions during territorial behavior, breeding, and pup rearing (Kastelein et al., 2005). Smell and unique vocalizations are used by females to recognize and create social bonds with a newborn pup (NOAA, 2021s).

4.5 Survey Information

2018 Surveys and Local Construction Monitoring Program 2017 Surveys:

Observation data was collected for humpback whales, northern sea otters, Steller sea lions and any other marine mammals observed while on site and is listed in Table 4-3 was separated by zones as shown in Figure 4-8. The data is comprised of data from 2018 surveys that were conducted in Unalaska Bay in the Green, Yellow, and Orange Zones along with the surveys done for the local construction monitoring program in 2017 that extensively surveyed the Red Zone. Surveys were conducted April through October for 4 days per month with two biologists for approximately 12 hours per day, weather permitting. A combination of 10 by 42 binoculars and 20 to 60x spotting scopes were used by the biologist to observe the zones. Distances from the dredge site in 2-kilometer increments are shown with red lines in Figure 4-8. Unhighlighted areas are assumed to be shielded by landmasses from noise caused by construction.

Humpback whales were only sighted in the Orange and Red Zones. The greatest humpback whale abundance occurred in the Orange Zone within 2 to 8 kilometers from the dredge site. Humpback whales were also sighted beyond the survey area. Additionally, their presence in the Red Zone, indicates they passed through the Green Zone.

In Unalaska Bay during the 2018 surveys, a single minke whale was observed in Unalaska Bay.

Steller sea lions had the greatest abundance in the Red Zone. This may be due to the commercial fishing vessels in the Red Zone that Steller sea lions will congregate around. The 32 observed one time in July in the Green Zone occurred in a few groups of 10 to 12 individuals throughout one day and were possibly the same group moving around the area.

Harbor seals were most abundant in the Orange Zone off the tip of Ulatka Head where they haul out on the large flat reefs at low tide. Harbor seals were also notably more common in Summer Bay in late summer; likely due to salmon returning to various streams in the area. Except when hauled out, most observations were of solitary seals and were usually very close to shore.

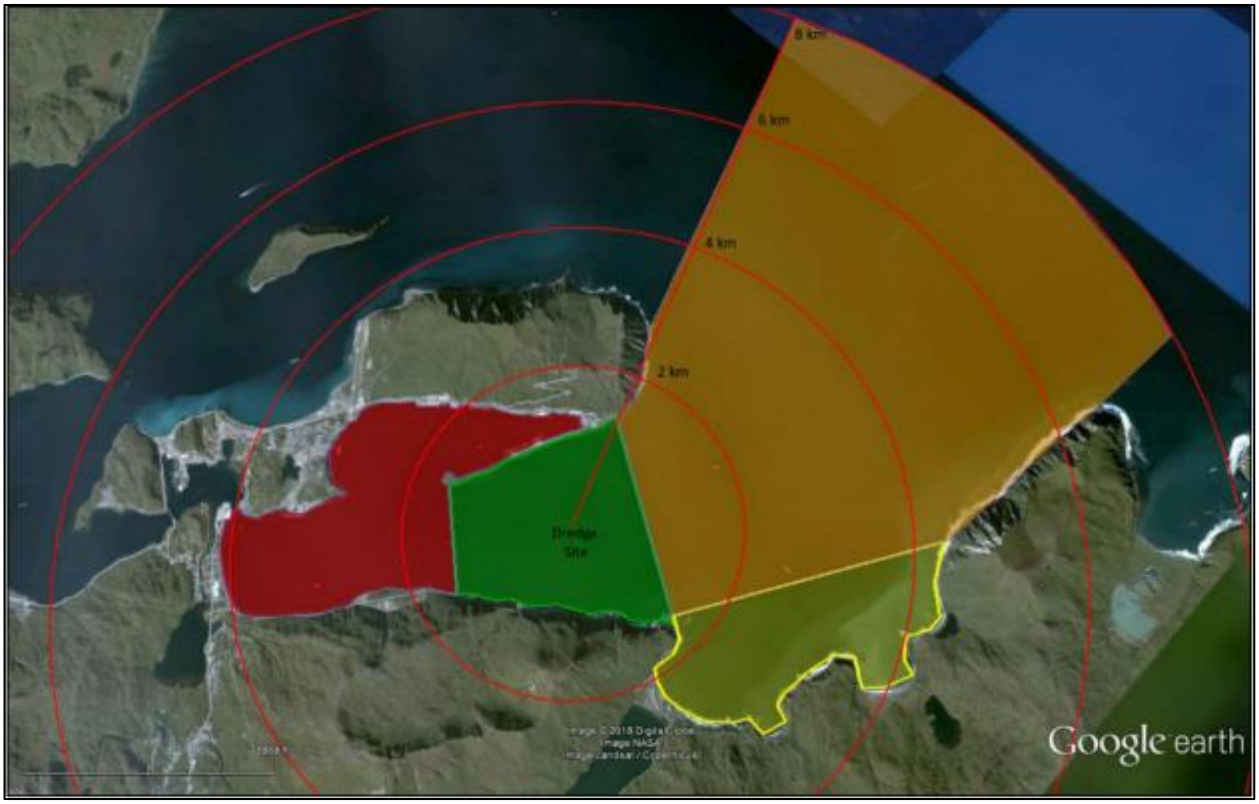

Figure 4-8. Marine Mammal Surveys 2017 and 2018 Survey Zones

Table 4-3. Marine Mammal Surveys 2018 Observation Data

2018 Marine Mammal Surveys*												
Month	**Humpback Whale**				**Harbor Seal**				**Steller Sea Lion**			
	Orange Zone	**Yellow Zone**	**Green Zone**	**Red Zone**	**Orange Zone**	**Yellow Zone**	**Green Zone**	**Red Zone**	**Orange Zone**	**Yellow Zone**	**Green Zone**	**Red Zone**
April	1	0	0	NS	9	2	8	NS	4	0	0	NS
May	2	0	0	NS	7	1	3	NS	7	0	1	NS
June	10	0	0	1	38	5	6	3	0	2	1	3
July	13	0	0	0	43	5	8	4	0	5	32	4
August	40	0	0	4	40	6	9	6	4	0	3	9
September	47	0	0	2	27	8	7	4	0	1	0	23
October	7	0	0	1	5	2	4	2	0	0	7	11
Total	**120**	**0**	**0**	**8**	**169**	**29**	**45**	**20**	**15**	**8**	**44**	**50**

*These data show the daily "worst case" total observed of these three species in each zone for each month surveyed.

Section 5 Type of Incidental Take Authorization Requested

The type of incidental taking authorization that is being requested (i.e., takes by Harassment only; takes by Harassment, injury, and/or death) and the method of incidental taking.

Under Section 101(a)(5)(D) of the MMPA, the USACE requests an IHA for takes by Level A Harassment (i.e., non-serious injury or permanent [hearing] threshold shift) and Level B Harassment (i.e., behavioral disturbance or temporary [hearing] threshold shift) (NMFS 2018b) during certain operations associated with the construction of the proposed project. The USACE requests an IHA for one year with an effective date of 1 November 2023.

Take is requested for the following activities:

- Dredging activities (as described in Section 1.3 and combined with the mitigation measures described in Section 11) have the potential to take permitted marine mammals by Level B Harassment resulting in behavioral disturbance or temporary threshold shift (TTS) due to the effects of increased underwater noise levels.
- During drilling activities associated with blasting, the project has the potential to increase airborne noise levels for pinnipeds at the surface in Iliuliuk Bay. Airborne impact isopleths are substantially smaller than underwater impact isopleths for the same activities, so it is likely that any takes from airborne noise would already be accounted for in estimates for underwater noise impacts.
- Blasting (applying the mitigation measures described in Section 11) has the potential to take permitted marine mammals by Level B Harassment resulting in TTS and to take Steller sea lions or harbor seals through Level A Harassment resulting in permanent threshold shift (PTS) or non-serious injury.

The noise levels and potential impact isopleths that are expected to result from the construction of this project are described in detail in the sections below. Mitigation measures (including operational shutdown and monitoring zones) will be incorporated into the project to minimize the potential for unauthorized injury or Harassment. Protocols for observations and mitigation methods are discussed in detail in Section 11 and in the Marine Mammal Monitoring and Mitigation Plan (4MP; Appendix A). Takes of non-permitted species will be prevented by the mitigation measures described in Section 11.

5.1 Method of Incidental Taking

This project includes dredging, in-water dredged material disposal, and blasting in an area where Steller sea lions, humpback whales, and harbor seals are commonly observed. Planned construction methodologies will temporarily increase the underwater and airborne noise within the project area. This increase in noise has the potential to result in the behavioral disturbance, hearing threshold shifts, or non-serious injury of marine mammals in the vicinity of the construction project.

5.2 Regulatory Thresholds and Modeling for the Effects of Anthropogenic Sound

Unless otherwise noted, the following notations will be used to express thresholds:

- Peak Sound Pressure Level (SPLPK): The maximum absolute value of the instantaneous sound pressure that occurs during a specified time interval, measured in dB re: 1 μPa (e.g., 198 dB_{PEAK}). (Caltrans, 2015)

- Average Root Mean Square Sound Pressure Level (SPLRMS): A decibel measure of the square root of mean square pressure. For pulses, the average of the squared pressures over the time that comprises that portion of the wave form containing 90 percent of the sound energy of the impulse in dB re: 1 μPa (for underwater) and in dB re: 20 μPa is used (e.g., 185 dB_{RMS}). (Caltrans, 2015)
- Sound Exposure Level (SEL): The integral over time of the squared pressure of a transient waveform, in dB re: 1 μPa2–sec. (e.g., 173 dB_{SEL}). This approximates sound energy in the pulse. (Caltrans, 2015)
- Cumulative Sound Exposure Level (SEL_{CUM}): Cumulative exposure over the duration of the activity within a 24-hour period. (NMFS, 2018)

5.2.1 Updated Cumulative Sound Threshold Guidance, PTS

Determination of the cumulative underwater sound exposure levels (SEL_{CUM}) required to cause PTS in marine mammals within the project area was based on the technical guidelines published by NMFS on 3 August 2016 and revised in April 2018 (Table 5-1). This guidance considers the duration of the activity, the sound exposure level produced by the source during one working day, and the effective hearing range of the receiving species. Regulatory thresholds for potentially affected species, measured in one-day SEL_{CUM}, are summarized below. Calculation of impact isopleths under the new guidance utilized the methods presented in Appendix D of the *2018 Revision to Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing.*

Table 5-1. SEL_{CUM} PTS Onset Thresholds

UNDERWATER - (dB re: 1 μPa²s)					
Source	**Low Frequency Cetaceans (LF)**	**Mid-Frequency Cetaceans (MF)**	**High Frequency Cetaceans (HF)**	**Phocid Pinnipeds (PW)**	**Otariid Pinnipeds (OW)**
Non-impulsive Noise	199	198	173	201	219
Impulsive Noise	183	185	155	185	203

(NMFS, 2018)

5.2.2 Updated Peak Sound Threshold Guidance, TTS and PTS

In addition to thresholds for cumulative noise exposure, onset thresholds for peak sound pressures must be considered for impulsive sources (Table 5-2). Peak sound pressure level (SPL_{PK}) is defined as "the greatest absolute instantaneous sound pressure within a specified time interval and frequency band" (NMFS 2018).

Table 5-2. SPL_{PK} Thresholds for Impulsive Noise

UNDERWATER - (dB re: 1 μPa)					
Source	**Low Frequency Cetaceans (LF)**	**Mid-Frequency Cetaceans (MF)**	**High Frequency Cetaceans (HF)**	**Phocid Pinnipeds (PW)**	**Otariid Pinnipeds (OW)**
TTS Onset	213	224	196	212	226
PTS Onset	219	230	202	218	232

(NMFS, 2018)

Blasting is the only activity with peak levels above peak. Calculated SPL_{PK} impact isopleths for blasting are included in Section 5.4.

5.2.3 Interim Sound Threshold Guidance, Behavioral Disturbance

The updated guidance described above does not address behavioral disturbance from underwater or airborne noise. The interim sound threshold guidance previously published by NMFS and summarized in Table 5-3 will be used for estimating exposure behavioral disturbance isopleths (NMFS 2015).

Airborne noise thresholds have not been established for cetaceans (NMFS 2015), and no adverse impacts are anticipated from airborne noise to cetaceans in the project area.

Behavioral disturbance modeling is not applicable to individual underwater blasts because of the nearly instantaneous nature of the explosive noises.

Table 5-3. Behavioral Disturbance Thresholds

UNDERWATER - (dB re: 1 µPa)		
Source	**Cetaceans & Pinnipeds**	
Non-impulsive Noise	120	
Impulsive Noise	160	
AIRBORNE - (dB re: 20 µPa)		
Source	**Harbor Seals**	**Other Pinnipeds**
All Source Types	90	100

(NMFS, 2015)

Per the interim guidance, the practical spreading loss model was used to determine the zones in which pinnipeds and cetaceans have the potential to face behavioral disturbance from underwater noise.

The formula for calculating practical spreading loss in *underwater noise* is:

$$\mathbf{TL = GL \times \log R_1/R_0}$$

where TL is the transmission loss (in dB), GL is the geometric loss coefficient (15 is the only valued allowed without real-time sound source verification), R_1 is the range to the target sound pressure level (in meters), and R_0 is the distance from the source of the initial measurement (in meters).

Per the interim guidance, the spherical spreading loss model was used to determine the zones in which pinnipeds and cetaceans have the potential to face behavioral disturbance from airborne noise.

The formula for calculating spherical spreading loss in *airborne noise* is:

$$\mathbf{TL = GL \times \log R_1/R_0}$$

where TL is the transmission loss (in dB), GL is the geometric loss coefficient (20 is the standard value), R_1 is the range to the target sound pressure level (in meters), and R_0 is the distance from the source of the initial measurement (in meters).

5.2.4 Blasting Injury and Mortality Guidance

Official sound threshold guidance has not been published by NMFS for the potential exposure of marine mammals to sound from explosive impulses with the capacity to cause mortality, slight lung injury, or mortality. The minimum acoustic impulses for predicting the onset of mortality and slight lung injury and the peak sound pressures capable of causing gastrointestinal (GI) tract injury proposed in Finneran and Jenkins (2012) will be used as thresholds for this project.

The minimum acoustic impulse for predicting the onset of mortality (I_M) is defined in Finneran and Jenkins (2012) as:

$$I_M(M,D) = 91.4M^{1/3}\left(1+\frac{D}{10.1}\right)^{1/2}$$

where M is the animal mass (in kilograms), D is the animal depth (in meters), and the units of IM are Pa·s (Pascal seconds).

The minimum acoustic impulse for predicting the onset of slight lung injury (I_S) is defined in Finneran and Jenkins (2012) as:

$$I_S(M,D) = 39.1M^{1/3}\left(1+\frac{D}{10.1}\right)^{1/2}$$

Acoustic impulse thresholds were calculated based on the body masses of newborn calves or pups by species (provided in the same study) and on an assumed receiving animal depth of 10 meters (selected as a more conservative value than the maximum project area depth of approximately 50 meters; Table 5-4). A threshold for non-serious injury to the GI tract of unweighted SPL_{PK} of 237 dB re 1 μPa was used for all marine mammals exposed to underwater explosions. (Finneran and Jenkins, 2012)

Table 5-4. Calculated Thresholds for Blasting Injury

Hearing Group	LF Cetaceans	MF Cetaceans	HF Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
Species	**Humpback whale**	**Killer whale**	**Harbor Porpoise**	**Harbor Seal**	**Steller Sea Lion**
Mortality (Pa·s)	1133.8	700.0	220.5	246.7	324.9
Slight Lung Injury (Pa·s)	485.0	299.4	94.3	105.5	139.0
GI Tract Injury (SPL_{PK})	237 dB re 1 μPa				

(Finneran and Jenkins, 2012)

5.3 Sources of Anthropogenic Sound

In the Technical Guidance (NMFS, 2018), sound sources are divided as;

- Impulsive: produce sounds that are typically transient, brief (less than 1 second), broadband, and consist of high peak sound pressure with rapid rise time and rapid decay.
- Non-impulsive: produce sounds that can be broadband, narrowband or tonal, brief or prolonged, continuous or intermittent) and typically do not have a high peak sound pressure with rapid rise/decay time that impulsive sounds do.

Underwater Sources:

For dredging and dredge disposal, sound source data was used from bucket dredging operations in Cook Inlet, Alaska (Dickerson et al., 2001). Dredging in that project consisted of six (6) distinct events, including the bucket striking the channel bottom, bucket digging, winch in/out as the bucket is lowered/raised, dumping of the material on the barge and emptying the barge at the disposal site. Although the waveform of the bucket strike has a high peak sound pressure with rapid rise time and rapid decay, the duration was potentially 1 to 3 seconds, and following events where of even longer duration and were non-impulsive in form. Therefore, 104 SPL_{RMS} measurements for the first five distinct phases of the dredging cycle were averaged and distance corrected to determine an average SPL_{RMS} of 150.5 dB_{RMS} at 1 meter for the bucket dredging process, with an assumed maximum duration of up to 50 seconds of non-impulsive, intermittent noise.

For dredge material disposal, noise calculations were based on the measured maximum level of 108.7 dB_{RMS} at 316 meters recorded in Cook Inlet for emptying the material from the barge (Dickerson *et al.,* 2001).

Dredging is estimated at a conservative 10 hours per day, allowing for the necessity for safety meetings, equipment inspections, and other breaks in work. Dredge disposal from the dump barge is anticipated at 60 minutes or less per day.

Anticipated noise levels from the blasting for excavation at the are discussed more fully in Appendix D of the 2018 Statter Harbor (Juneau, AK) IHA application. Historic data from an analog project were analyzed to create a conservative attenuation model for anticipated pressure levels from confined blasting in drilled shafts in underwater bedrock. Sound pressure data from the analog project was analyzed to compare source pressure levels to received impulse levels. These models were used to predict distances to the peak level and impulse thresholds summarized in Section 5.2.4. Cumulative source levels from the analog project were used in conjunction with the NMFS 2018 updated User Spreadsheet Tool for predicting threshold shift isopleths for multiple detonations, after being corrected to a 1-meter reference source using the practical spreading loss model (Table 5-7 through Table 5-11).

Source levels for activities with the potential to create significant underwater noise as well as parameters used in the calculation of isopleths are summarized in Table 5-5 and Table 5-6.

Table 5-5. Parameters for Underwater Noise Calculations

Source	Source Type	SPL_{RMS}	Weighting Factor Adjustment	Estimated Duration	
				Hours per Day	Ant. Days of Effort
Dredging	Non-impulsive, intermittent	150.5 dB_{RMS}[a] at 3 feet (1 meter)	2.5 kHz	10	150-180
Dredge Disposal	Non-impulsive, continuous	108.7 dB_{RMS}[a] at 1,037 feet (316 meter)	2.5 kHz	1	150-180

Dickerson *et al*., 2001
Ant. = Anticipated

Table 5-6. Parameters for Blasting Cumulative Impacts Calculations

Source	SEL_{CUM} (dB re: 1 μPa^2)	SPL_{PK} (dB re: 1 μPa)	Weighting Factor Adjustment	Estimated Duration	
				Seconds per Day	Num. of detonations in 24 hours
Blasting	228.4 dB at 3 feet (1 meter)	245.9 dB at 3 feet (1 meter)	1 kHz	0.5	75

5.4 Calculated Impact Isopleths

Table 5-7. Calculated Isopleths - Underwater Sources

	PTS Onset Isopleth					Behavioral Disturbance Isopleth
	Low Frequency Cetaceans (LF)	**Mid-Frequency Cetaceans (MF)**	**High Frequency Cetaceans (HF)**	**Phocid Pinnipeds (PW)**	**Otariid Pinnipeds (OW)**	**Cetaceans & Pinnipeds**
Dredging	1.8 ft. (0.5 m)	0.2 ft (0.0 m)	2.6 ft. (0.8 m)	1.1 ft. (0.3 m)	0.1 ft. (0.0 m)	355 ft (108 m)
Dredge Disposal	0.2 ft (0.0 m)	0.0 ft (0.0 m)	0.2 ft. (0.1 m)	0.1 ft (0.0 m)	0.0 ft (0.0 m)	Source level below threshold

Table 5-8. Calculated Isopleths - Airborne Sources

		Behavioral Disturbance Isopleth	
		Harbor Seals	**Sea lions**
(Analog for drilling blasting shafts)	96.4 dBL5EQ at 15 meters[a]	105 ft (31.8 m)	33.0 ft (10.1 m)

([a]Laughlin 2010)

Table 5-9. Calculated TTS Onset Isopleths - Blasting

	Low Frequency Cetaceans (LF)	**Mid-Frequency Cetaceans (MF)**	**High Frequency Cetaceans (HF)**	**Phocid Pinnipeds (PW)**	**Otariid Pinnipeds (OW)**
SPL_{PK} Threshold (dB re 1μPa)	213	224	196	212	226
SPL_{PK} Isopleth	537.1 ft (163.7 m)	158.9 ft (48.4 m)	3527.0 ft (1075.0 m)	600.0 ft (182.9 m)	127.4 ft (38.8 m)
SEL_{CUM} Threshold (dB re 1μPa2s)	168	170	140	170	188
SEL_{CUM} Isopleth	1652.6 ft (503.7 m)	14.1 ft (4.3 m)	385.6 ft (117.5 m)	496.6 ft (151.4 m)	36.7 ft (11.2 m)

Table 5-10. Calculated PTS Onset Isopleths - Blasting

	Low Frequency Cetaceans (LF)	**Mid-Frequency Cetaceans (MF)**	**High Frequency Cetaceans (HF)**	**Phocid Pinnipeds (PW)**	**Sea Lions and Sea Otters**
SPL_{PK} Threshold (dB re 1μPa)	219	230	202	218	232
SPL_{PK} Isopleth	276.5 ft (84.3 m)	81.8 ft (24.9 m)	1815.3 ft (553.3 m)	308.8 ft (94.1 m)	65.6 ft (20.0 m)
SEL_{CUM} Threshold (dB re $1\mu Pa^2s$)	183	185	155	185	203
SEL_{CUM} Isopleth	165.3 ft (50.4 m)	1.4 ft (0.4 m)	38.6 ft (11.8 m)	49.7 ft (15.1 m)	3.7 ft (1.1 m)

Table 5-11. Calculated Mortality and Injury Isopleths - Blasting

	Low Frequency Cetaceans (LF)	Mid-Frequency Cetaceans (MF)	High Frequency Cetaceans (HF)		Phocid Pinnipeds (PW)	Otariid Pinnipeds (OW)	
	Humpback Whale	**Killer Whale**	**Harbor Porpoise**	**Dall's porpoise**	**Harbor Seal**	**Northern Fur Seal**	**Steller Sea Lion**
Mortality	52.6 ft (16.0 m)	76.6 ft (23.4 m)	157.7 ft (48.1 m)	153.0 ft (46.6 m)	149.0 ft (45.4 m)	163.5 ft (49.8 m)	127.9 ft (39.0 m)
Slight Lung Injury	99.4 ft (30.3 m)	134.1 ft (40.9 m)	220.6 ft (67.2 m)	216.5 ft (66.0 m)	213.0 ft (64.9 m)	225.4 ft (68.7 m)	193.2 ft (58.9 m)
GI Tract Injury	37.7 ft (11.5 m)						

Section 6 Number of Marine Mammals that May be Affected

By age, sex, and reproductive condition (if possible), the number of marine mammals (by species) that may be taken by each type of taking identified in Section 5, and the number of times such takings by each type of taking are likely to occur.

The USACE is requesting the issuance of an IHA from 1 November 2023 through 31 October 2024, for take of MMPA-defined stocks that include animals in the endangered Steller sea lion DPS and humpback whales in the endangered Western North Pacific DPS and threatened Mexico DPS. This IHA request covers these ESA-listed species in their respective MMPA-defined stocks and covers anticipated takes of non-ESA listed populations (i.e., non-ESA-listed Hawaii DPS of humpback whales) as well as harbor seals.

The number of marine mammals that may be exposed to noise is calculated by estimating the likelihood of a marine mammal being present within calculated impact isopleths during the associated activities. Expected marine mammal presence is determined by past observations and general abundance near the proposed project area during construction.

Based upon the actions described above, their anticipated effect on marine mammals, and number of animals in the project area, we anticipate that a number of animals will be taken by the proposed actions. The USACE is pursuing an IHA for these potential takes. The estimated number of takes are based upon conservative ranges from the best scientific data currently available for these species near the project area. We *do not* anticipate this many takes will occur, as our avoidance and minimization of impacts efforts during the construction activity will be informed, deliberate, focused and integrated throughout all levels of project management and monitoring.

6.1 Harbor Seal

Harbor seals occur throughout Unalaska Bay and Iliuliuk Bay and are usually observed as single individuals in the water, but in groups when hauled out. They occasionally haul out in three locations when in Iliuliuk Bay (Figure 4-2). They typically haulout out in groups of 1 to 10 individuals during calm conditions. Up to about 40 harbor seals can haul out at the haulout near Ulatka Head when the tide is at lower levels in calm seas. Additionally, although they can be found anywhere along the shoreline, they are more commonly seen routinely foraging at the kelp beds along the shoreline and near the mouths of streams when salmon are spawning (as in nearby Summer Bay). Most groups sizes range from one to three harbor seals, with observations of a single seal being most common. The 9 observed in the Green Zone in one day in August 2018 represent the worst case 1-day scenario is for the entire zone in July 2018 and not a 108-meter radius around the construction activity.

The largest zone for potential takes for harbor seals is the 182.9-meter radius associated TTS from blasting (the SPL_{PK} calculation is 182.9 meters whereas the SPL_{CUM} is 151.4 meters). Using a likely daily potential maximum encounter rate of 10 harbor seals per day, the project could take up to 10 harbor seals by Level B Harassment each day of dredging. Using the same encounter rate for blasting, despite slightly larger zones to PTS and TTS thresholds, up to 240 harbor seals could be taken by Level B Harassment from blasting (10 seals per 24 days of blasting). No takes by Level B Harassment are requested for dredge disposal as the impact area is smaller than the minimum 10-meter shutdown zone that will be observed for all in-water activities. Ten harbor seal takes by Level B Harassment per blast and per day of dredging is considered very conservative. Most harbor seals observed occurred well outside of the Level B radius for dredging and blasting since they were typically observed close to shore near kelp beds.

Despite the best Protected Species Observer (PSO) monitoring efforts, there is a chance the injury zones will not be clear at the time of the blast. The explosives cannot "sleep" for longer than 24 hours without becoming a risk to private property and human health, and they cannot be detonated in the dark. If a seal enters the blast injury area following the emplacement of charges, detonation will be delayed as long as possible. All other legal measures to avoid injury will be utilized; however, the blast will be detonated when delay is no longer feasible. This activity has the potential for takes by Level A Harassment with possible effects including PTS and slight injury. It is estimated that two harbor seals could be present in the Level A zone for up to 20 percent of the 24 blasting events. This would equal 4.8 seals, which is rounded up to 5 seals. Due to the confined nature of the blast, it is not anticipated that severe injury or mortality are likely results of the proposed activity. Table 6-1 summarizes the estimated number of harbor seal takes.

The Level B Harassment and limited Level A Harassment potential from the proposed activities is **not likely** to result in significant adverse impacts to harbor seals.

Table 6-1. Estimated Number of Harbor Seal Takes

Species	Dredging (180 days)	Dredge Disposal (180 days)	Blast Level B (24 days)	Blast Level A (24 days)
Harbor Seal	1,800	No takes requested	240	5
Total Takes	2,040 (Level B), 5 (Level A)			

6.2 Humpback Whale

Humpback whales occur frequently in Iliuliuk Bay on an intermittent basis, but their genetic and stock-designation identities are rarely known; individuals are indistinguishable unless humpback whale fluke or dorsal fin shape and pattern are known. Data on their distribution suggests that 91 percent of humpback whales observed in Iliuliuk Bay, and the Aleutian Islands in general, are from the Hawaii DPS which are not ESA-listed. Similarly, 2 percent are from the Western North Pacific DPS (endangered) and 7 percent are form the Mexico DPS (threatened). No humpback whales form the Central America DPS (endangered) are expected to be in the Aleutian Islands. No quantitative agency data or published reports on humpback whales in Iliuliuk Bay are available at the time of this writing.

Humpback whales utilize habitats in the project area intermittently and are commonly present between April and October. It is possible for small numbers of humpback whales to be present in the area outside of this period, but it is unlikely and would be of relatively small numbers compared to spring through fall. Field observations by the USACE biologists in 2018 revealed that most humpback whales stay outside of the inner portions of Iliuliuk Bay where dredging would occur and are most abundant in the large Unalaska Bay of which Iliuliuk Bay is a subset.

We believe that the proposed action will likely result in direct and indirect impacts on humpback whales through short-term Harassment, possible alteration of transit or sleeping locations, and temporary prey species displacement. For purposes of estimating effects and takes of the ESA-listed humpback whales, we acknowledge that they cannot be readily distinguished from non-listed humpback whales in the project area and assume that some whales are from the Mexico DPS (7 percent) and Western North Pacific DPS (2 percent). Similarly, all whales in the project area are protected under the MMPA, and this will be reflected in the IHA documentation.

The largest zone for potential takes for humpback whales is the 504 meter radius associated with SEL_{CUM} Isopleth for TTS onset from blasting. Using a likely daily potential maximum rate of two humpback whales per blast, the project could take up to two humpback whales by Level B Harassment each day of blasting (no more than one blast per day for up to 24 total days, so a total of 48 Level B takes for humpback whales). Takes by Level B Harassment due to dredging are based on the encounter rate of 2 humpback whales per day during dredging. This equates to 2 whales per day for 180 days or 360 Level B take requested takes. No takes by Level B Harassment are requested dredge disposal as the impact areas for these activities are smaller than the minimum 10-meter shutdown zone that will be observed for all in-water activities. Five humpback takes by Level B Harassment per blast is considered very conservative. Most humpbacks observed occurred well outside of the 504 meter radius for blasting and PSO monitoring will be used to attempt to minimize Level B takes to the extent possible within the limits of safe blasting protocols.

Despite rigorous PSO monitoring, there is a chance the injury zones will not be clear at the time of the blast. The explosives cannot "sleep" for longer than 24 hours without becoming a risk to private property and human health, and they cannot be detonated in the dark. If a humpback whale enters the blast injury area following the emplacement of charges, detonation will be delayed as long as possible. All other legal measures to avoid injury will be utilized; however, the blast will be detonated when delay is no longer feasible. This activity has the potential for takes by Level A Harassment with possible effects including PTS and slight injury. It is estimated that one humpback whale could be present in the Level A zone for up to 10 percent of the 24 blasting events. This would equal 2.4 whales, which is rounded up to 3 whales. Due to the confined nature of the blast, it is not anticipated that severe injury or mortality are likely results of the proposed activity. Table 6-2 summarizes the estimated number of humpback whale takes.

The Level B and limited Level A Harassment potential from the proposed activities is **not likely** to result in significant adverse impacts to any humpback whales.

Table 6-2. Estimated Number of Humpback Whale Takes

Species	Dredging	Dredge Disposal	Blast Level B	Blast Level A
	(180 days)	**(180 days)**	**(24 days)**	**(24 days)**
Humpback Whale Hawaii DPS	360	No takes requested	43.68	2.73
Humpback Whale Mexico DPS			3.36	0.21
Western North Pacific DPS			0.96	0.06
Total Takes	408 (Level B) and 3 (Level A)			

6.3 Steller Sea Lion

Steller sea lions occur in Iliuliuk Bay on an intermittent basis year around and can be observed as individuals and in groups that can be as large as 40. Iliuliuk Bay is a pathway for Steller sea lions that might be inside Dutch Harbor or coming from Captains Bay via Iliuliuk Harbor to move out to the larger Unalaska Bay and beyond. Most groups sizes range from one to four sea lions. This large group size of 40 is larger than the maximum of 32 that is the worst-case scenario from the green zone on the USACE surveys in 2018. Even then, the 32 observed were the worst case 1-day scenario is for the entire zone in July 2018 and not the 108-meter radius around the construction activity.

The largest zone for potential takes of Steller sea lions is the 108-meter radius associated with dredging. It seemed logical that one of the blasting parameters would have had a larger radius, but the dredging radius will drive most of the take calculation due to the somewhat larger distance than the blasting Level A and B zones and the duration. Using a likely daily potential maximum encounter rate of 10 Steller sea lions per day, the project could take up to 10 Steller sea lions by Level B Harassment each day of dredging (10-hour days). Using a lower encounter rate for blasting of 2 Steller sea lions due to smaller zones to PTS and TTS thresholds and the fact that blasting lasts up to 1 second, up to 48 Steller sea lions could be taken by Level B Harassment from blasting (2 sea lions per 24 days of blasting). No takes by Level B Harassment are requested for dredge disposal as the impact area is smaller than the minimum 10-meter shutdown zone that will be observed for all in-water activities. Two sea lions takes by Level B Harassment per blast and per day of dredging is considered very conservative. Most Steller sea lions observed occurred well outside of the Level B radius for dredging and blasting.

Despite the best PSO monitoring efforts, there is a chance the injury zones will not be clear at the time of the blast. The explosives cannot “sleep” for longer than 24 hours without becoming a risk to private property and human health, and they cannot be detonated in the dark. If a sea lion enters the blast injury area following the commencement of emplacement of charges, detonation will be delayed as long as possible. All other legal measures to avoid injury will be utilized; however, the blast will be detonated when delay is no longer feasible. This activity has the potential for takes by Level A Harassment with possible effects including PTS and slight injury. It is estimated that two Steller sea lions could be present in the Level A zone for up to 20% of the 24 blasting events. This would equal 4.8 sea lions, which is rounded up to 5 sea lions. Due to the confined nature of the blast, it is not anticipated that severe injury or mortality are likely results of the proposed activity. Table 6-3 summarizes the estimated number of Steller sea lion takes.

The Level B Harassment and limited Level A Harassment potential from the proposed activities is not likely to result in significant adverse impacts to Steller sea lions.

Table 6-3. Estimated Number of Steller Sea Lion Takes

Species	**Dredging (180 days)**	**Dredge Disposal (180 days)**	**Blast Level B (24 days)**	**Blast Level A (24 days)**
Steller Sea Lion DPS	1,800	No takes requested	48	5
Total Takes	1,848 (Level B), 5 (Level A)			

Section 7 Anticipated Impact on Species or Stocks

The anticipated impact of the activity to the species or stock of marine mammal.

The Proposed Project has the potential to impact marine mammals (primarily harbor seals, humpback whales, and Steller sea lions) by increasing noise in and around Dutch Harbor, and Iliuliuk Bay to levels above the Level B Harassment threshold. The applicant will use heavy equipment to dredge the channel. Confined underwater blasting may be necessary to break up some of the channel bottom, but the intent is to resort to blasting only when necessary. These activities would cause airborne noise and underwater noise. The project also has the potential to increase the likelihood of vessel interactions with marine mammals.

7.1 Noise

Noise level increase from in-water and over-water construction activities can affect marine mammals physically, physiologically, and behaviorally. Auditory masking, TTS, and PTS are the most likely negative hearing effects that may occur during the Proposed Project's construction activities. The project will potentially result in Level B Harassment (auditory masking and TTS) of pinnipeds and cetaceans due to noise level increases associated with dredge, disposal, and blasting operations. The Level B Harassment is temporary in nature, and project impacts associated with potential Harassment will be temporary. Mitigation measures will be incorporated to prevent Level A Harassment (PTS). These mitigation measures are discussed in Section 11.

Auditory masking is the partial or complete reduction of signal audibility by noise. This may affect the behavior of marine mammals in the project area due to the decrease in ability to hunt prey, avoid predators, and communicate (Southall et al., 2007).

Threshold shifts may occur during construction activities due to the exposure of intense sounds for long periods. These threshold shifts will change a marine mammal's sound sensitivity to varying degrees depending on the intensity of the sound and the length of exposure to the sound. The pinnipeds and cetaceans most likely to enter the project area are sensitive to underwater and airborne noise. Moderate levels of underwater noise for relatively long duration can induce a TTS in marine mammals (Kastak et al., 2005). TTS is often referred to as auditory fatigue. It is recoverable hearing loss; meaning, hearing threshold can return to its pre-exposure value. Noise-caused physiological effects of TTS may include increased blood flow, reduced inner ear sensory hair cell sensitivity, displaced inner ear membranes, and residual middle-ear muscular activity. If there is not a complete recovery from the hearing threshold shift, the effect of noise is referred to as PTS, an auditory injury. PTS is the irreversible reduction in sensitivity (or elevation in hearing threshold) due to damage or death of inner or outer cochlear hair cells often followed by retrograde neuronal losses and persistent chemical and metabolic cochlear abnormalities (Southall et al., 2007).

This project is essentially a medium-sized dredging project with a behavioral effects isopleth very conservatively estimated at 108 meters. An IHA would not be pursued for this project if not for the possibility of needing to use confined underwater blasting to break up some sections of the dredge prism. In all, it is anticipated that any blasting that might be necessary could be accomplished in 24 days with no more than one blasting event per day. These days would likely be spread out over several months and the TTS zones for all of the species hearing groups are of a manageable distance to monitor with PSOs.

7.2 Vessel Interactions

Dutch Harbor is an industrial area, with several marine docks, a nearby small boat harbor, and other docking facilities. The project has the potential to temporarily increase the number of vessels using Dutch Harbor and Iliuliuk Bay. Vessels such as barges, tugboats and crew boats will be used during the course of construction. The increase in the likelihood of vessel interactions due to construction will be temporary. The area where construction will take place is already a busy area for vessel traffic and vessels used for this project will only cause a minor and temporary increase to the overall vessel traffic. Existing vessel traffic is primarily composed of large, slow moving commercial fishing vessels and cargo ships with some fast-moving recreational boat traffic occurring mainly during summer months by local residents for fishing.

Section 8 Anticipated Impact on Subsistence

The anticipated impact of the activity on the availability of the species or stocks of Marine mammals for subsistence uses.

Due to its industrial nature, Dutch Harbor is typically not used for subsistence hunting or fishing, so there are no relevant subsistence uses of marine mammals impacted by the project.

8.1 Subsistence Activities in Unalaska

Traditional subsistence activities of the Unangans include harvesting of harbor porpoise, harbor seals, northern fur seals, northern sea otters, and Steller sea lions, and occasionally Pacific walrus. However, a ban on firearm discharge within the City of Unalaska has ended hunting in waters near harbors. Due to the ban on firearm discharge within the city, harbor seals and Steller sea lions are typically shot with firearms from skiffs in areas outside of Dutch Harbor and Iliuliuk Bay.

A subsistence harvest of harbor seals did not occur in Unalaska in 2008 (Wolfe et al., 2009). The last recorded harvest in 2007 resulted in the harvest of 11 harbor seals. The harvest numbers have been decreasing since recording started in 1994 (Table 8-1). As of 2009, data from most communities that previously participated in harbor seal harvests, including Unalaska, was no longer collected. Harbor Seals are hunted near harbor seal haulouts in Wide Bay or Beaver Inlet (USACE, 2004).

Table 8-1. Estimated Harbor Seal Harvest in Unalaska from 1994-2008

Year	Estimated Harvest (Individuals)	Estimated Pounds
1994	54	3003
1995	37	2094
1996	20	1137
1997	27	1485
1998	13	713
2000	34	1920
2001	38	2117
2002	14	800
2003	14	800
2004	29	1600
2005	30	1680
2006	9	504
2007	11	605
2008	0	0

In 2008, the most recent year for published Alaska Department of Fish and Game (ADF&G) reports on subsistence harvests, 28.6 percent of native households in Unalaska used Steller sea lions (Wolfe et al., 2009). The amount of individual sea lions harvested in Unalaska has decreased from 1994 through 2008 (Table 8-2). Data from most communities that previously participated in Steller sea lion harvests, including Unalaska, was no longer collected as of 2009. Steller sea lions are hunted in the outer areas of Unalaska Bay (includes Wide Bay and Kalekta Bay), Bishop Point, Wislow Island area, and Beaver Inlet.

Table 8-2. Estimated Steller Sea Lion Harvest in Unalaska from 1994-2008

Year	Estimated Harvest (Individuals)	Estimated Pounds
1994	72	14423
1995	39	7791
1996	15	3046
1997	29	5811
1998	7	1455
2000	49	9842
2001	23	4620
2002	10	2000
2003	10	2000
2004	11	2286
2005	12	2400
2006	9	1800
2007	9	1800
2008	3	514

8.2 Impact on Subsistence Hunting

The Proposed Project will not result in the death or serious injury of any marine mammal. The project has the potential to expose pinnipeds and cetaceans to sound levels above the Level B Harassment threshold. The project is likely to result only in short-term, temporary impacts to marine mammals. The proposed project is not likely to adversely impact the availability of any marine mammal species or stocks that are commonly used for subsistence purposes.

While subsistence crabbing and fishing occurs in nearby Unalaska Bay, subsistence fishing and crabbing is not common within Dutch Harbor nor in Iliuliuk Bay near the project site. Construction activities will not limit access to more distance subsistence sites except perhaps for short periods in the immediate area prior to confined underwater blasting for safety reasons.

Section 9 Anticipated Impact on Habitat

The anticipated impact of the activity upon the habitat of the marine mammal populations and the likelihood of restoration of the affected habitat.

9.1 Marine mammal Avoidance or Abandonment

The primary reason marine mammals might leave the project area would be due to elevated noise levels during dredging, disposal, and blasting activities. The background noise levels within the project area are already elevated due to underwater noise from frequent vessel traffic, but dredging, disposal, and blasting will increase noise levels even higher, as discussed in Section 5.

While it is possible that pinnipeds and cetaceans may avoid the project area during dredging, disposal, and blasting, they are not likely to abandon the site altogether. Despite background noise levels and facility activities, nearby dock facilities often attract pinnipeds and other marine mammals to Dutch Harbor due to the availability of prey.

9.2 Impact to Physical Habitat

Approximately 8.2 acres of bottom habitat would be dredged from the existing depth of -42 feet MLLW to between -58 feet and -60 feet MLLW. The existing bottom habitat has very little aquatic vegetation present based on the USACE underwater video from 2017, so there is very little vegetation to lose. The bottom the project footprint is composed of gravel and cobble with some boulders. As this is likely an old terminal moraine, the new bottom at -60 feet MLLW will have a similar composition to the existing bottom. The adjacent dredged material disposal area will be changed from a silt bottom a rocky bottom with a higher elevation. In all, impacts to physical are minimal and represent a very small portion of Iliuliuk Bay overall.

Section 10 Anticipated Impact of Loss or Modification of Habitat

The anticipated impact of the loss or modification of the habitat on the marine mammal populations involved.

A small area of foraging habitat for marine mammals will be temporarily impacted by the increase in underwater and airborne noise during construction, but the project will not result in permanent impacts. There will be no impacts to haulouts or rookeries for pinnipeds from this project.

Section 11 Mitigation Measures

The availability and feasibility (economic and technological) of equipment, methods, and manner of conducting such activity or other means of effecting the least practicable adverse impact upon the affected species or stocks, their habitat, and their availability for subsistence uses, paying particular attention to rookeries, mating grounds, and areas of similar significance.

11.1 All Construction Activities

The project is dependent on maritime access by nature and impacts could not be entirely avoided. However, the Proposed Project avoids and mitigates impacts as much as practicable.

Mitigation for this project would fall into different categories of potential impacts, with confined underwater blasting being the greatest concern. All underwater blasting would incorporate stemmed charges (i.e., crushed rock packed at the top of the hole above the explosive charge). Stemming helps to reduce the impact from blasting above the surface and maximizes the ability of the charge to fracture rock without wasting energy. Delays of several milliseconds would be planned between the charges to reduce the overall charge at one time while still retaining the effectiveness of the charges in the borehole.

Normally, the first screening level for mitigation is avoidance. This would involve not blasting at all or only blasting during certain times of the year (timing windows). Blasting, especially underwater blasting, is typically avoided when possible due to potential environmental impacts, especially to fish and marine mammals. For this project, confined underwater blasting might be the only viable construction method available to break up the heavily consolidated glacial moraine material. If blasting is not necessary (i.e., the dredge is able to move the material without blasting to break it up) then it will not be employed.

Avoidance can also be achieved by implementing timing windows for species of concern. Due to weather and daylight limitations, construction for this project would likely not take place in winter. While the contractor might elect to begin work in November 2023, they most likely will wait until spring 2024. While some marine mammals, such as humpback whales, could be avoided by blasting in winter, Steller sea lions and harbor seals are present year around. Timing windows are not practical for avoiding impacts to marine mammals.

When avoidance is not possible or practical, minimization of impacts is the next level in the mitigation hierarchy. A shutdown distance appropriate for each species would be adhered to during blasting to minimize impacts to marine mammals. This shutdown distance would encompass the Level-A zone where lethal or permanent (e.g., PTS) effects would occur. Rigorous on-site monitoring would be conducted prior to blasting to ensure that marine mammals are not present in this zone. Small numbers of Level A takes are requested for the rare instance that blasting is initiated and cannot be stopped, and a marine mammal shows up in this narrow time window.

11.2 Dredging, Disposal, and Blasting Activities

The USACE has established Level A Harassment zones to delineate areas in which marine mammals may be exposed to injurious underwater sound levels due to blasting operations. Blasting, which could cause noise levels to reach the Level A Harassment threshold, will be delayed if marine mammals are approaching the Level A Harassment zones except in the rare circumstance where the blast has already been initiated. Marine mammal monitoring will also occur in in areas where marine mammals could be subjected to noise levels above the Level B

Harassment thresholds. The Level A and Level B Harassment zones are discussed below and are shown in the 4MP (Appendix A).

11.2.1 Level A and Level B Harassment Zones

- During blasting:
  - Shutdown zone will include the Level A Harassment thresholds described in Section 5 or where the Level B Harassment threshold would be exceeded for a marine mammal not included in the IHA. Every effort will be made to avoid Level A takes even though a small number or these takes are requested.
- During dredging:
  - There are no Level A zones for dredging. However, dredging will stop if a marine mammal comes within 10 meters of the dredge bucket when it is actively dredging.
- Harassment zones will be monitored throughout construction:
  - If a marine mammal enters the Level B zone (for blasting or dredging), a take will be recorded, and its behaviors documented as dredging and blasting activities continue.
  - If a marine mammal approaches or enters a Level A zone, all dredge, and blasting activities will be immediately halted. This may not be possible during blasting in the unlikely even that the blasting sequence has been initiated and cannot be stopped. Careful monitoring of the much larger Level B zone should provide adequate warning to avoid a Level A take.
- Take of marine mammals other than those listed in this IHA are not authorized in the form of Level A or Level B Harassment and dredging and blasting operations will be shut down before individuals of these species enter the Level B Harassment zone to avoid take. This is accomplished by monitoring well beyond the Level B zone to detect incoming marine mammals.

11.2.2 Marine Mammal Monitoring

Qualified observers will be on-site before, during, and after all dredging and blasting activities. The observers will be authorized to shut down construction activity if a marine mammal is observed approaching or within the shutdown zone. For marine mammals included in this IHA application, shutdown zones are areas where marine mammals will be exposed to Level A Harassment. For marine mammals not included and not authorized, shutdown zones will include areas where marine mammals will be exposed to Level B Harassment.

The qualified observers will follow observer protocols, meet training requirements, fill out data forms, and report findings in accordance with protocols reviewed and approved by NMFS. The detailed 4MP is found in Appendix A.

When a marine mammal is observed approaching or within the shutdown zone, shutdown procedures will be implemented to prevent unauthorized exposure. Sighting of a marine mammal observed within the monitoring zone when work is being conducted will be documented as a potential Level B take. If the number of Level B Harassment exposures approaches the number of takes allowed by the IHA, the USACE will notify NMFS and seek further consultation. In-water activity will be shut down if any marine mammal species not authorized by the IHA are encountered and likely to be exposed to sound pressure levels greater than or equal to the Level B Harassment thresholds in order to avoid take of those species.

11.2.3 Shutdown and Monitoring Zones

Proposed Level A and Level B Harassment zones for underwater noise will be monitored before, during, and after all in-water construction activity. Effective Level A and Level B Harassment zones for this project are presented in Section 5 of this application and in the 4MP (Appendix A). If any of the species listed in the IHA are about to enter the Level A Harassment zone or any marine mammals not included in the application are seen about to enter the Level B Harassment zone, the observers will have the authority to stop work immediately and until the marine mammal(s) voluntarily leave the area.

11.2.4 Pre-Activity Monitoring

A qualified observer will observe the shutdown and monitoring zones for 30 minutes or longer prior to the start of daily in-water/upland construction activity, or whenever a break of 30 minutes or longer occurs in dredging and blasting operations. The shutdown zone is considered clear when a marine mammal has not been observed within the zone for the 30 minutes period prior to construction activity.

11.2.5 Shutdown Procedures

A shutdown will occur prior to a marine mammal entering a shutdown zone as appropriate for the species and concurrent work activity. Until the observer is confident that the marine mammals is clear of the shutdown zoner, the activity will remain ceased. The shutdown zone will be considered clear if:

- The marine mammal has been observed leaving the shutdown zone; or
- the marine mammals have not been seen in the shutdown zone for 15 minutes (pinnipeds), and 30 minutes (cetaceans).

11.3 Vessel Interactions

Project vessel crews will follow NMFS's Marine Life Viewing Guidelines (NOAA, 2021f), and Alaska Marine Mammal Viewing Guidelines and Regulations (NOAA, 2021a) as practical to minimize impacts from vessels interactions with marine mammals.

Section 12 Arctic Subsistence Uses, Plan of Cooperation

Where the proposed activity would take place in or near a traditional Arctic subsistence hunting area and/or may affect the availability of a species or stock of marine mammal for Arctic subsistence uses, you must submit either a plan of cooperation (POC) or information that identifies what measures have been taken and/or will be taken to minimize any adverse effects on the availability of marine mammals for subsistence uses.

This section is not applicable to the project. The project will take place in a portion of Iliuliuk Bay where shooting is prohibited by local ordinance due to the surrounding vessels and development and is in waters south of 60˚N latitude. Additionally, no project activities will take place in or near a traditional Arctic subsistence hunting area.

Section 13 Monitoring and Reporting Plans

The suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species, the level of taking or impacts on populations of marine mammals that are expected to be present while conducting activities and suggested means of minimizing burdens by coordinating such reporting requirements with other schemes already applicable to persons conducting such activity. Monitoring plans should include a description of the survey techniques that would be used to determine the movement and activity of marine mammals near activity site(s) including migration and other habitat uses, such as feeding.

13.1 Monitoring Plan

Monitoring measures for the project's potential impacts on marine mammals are discussed briefly in Section 11.2.2 and in-depth in the 4MP (Appendix A).

13.2 Reporting

The procedures for reporting are listed below and in the 4MP (Appendix A).

Annual Report:

A comprehensive annual marine mammal monitoring report documenting marine mammal observations will be submitted to NMFS at the end of the in-water work season. The comprehensive marine mammal monitoring report draft will be submitted to NMFS within 90 calendar days of the end of the in-water work period. The report will include marine mammal observations (pre-activity, during-activity, and post-activity) during pile driving days. A final comprehensive report will be prepared and submitted to NMFS within 30 calendar days following resolution of comments on the draft report from NMFS. The reports shall include at a minimum:

- General data:
  - Date and time of activity
  - Water conditions (e.g., sea-state)
  - Weather conditions (e.g., percent cover, percent glare, visibility)
- Specific pile driving data:
  - Description of pile driving activity being conducted (pile locations, pile size and type)
  - Description of pile driving times (onset and completion)
  - The construction contractor and/or marine mammal monitoring staff will coordinate to ensure that pile driving times and strike counts are accurately recorded
  - The duration of soft start procedures should be noted as separate from the full power driving duration
  - Description of in-water construction activity not involving pile driving (location, type of activity, onset and completion times)
- Pre-activity observational survey-specific data:
  - Date and time survey is initiated and terminated
  - Description of any observable marine mammals and their behavior in the immediate area during monitoring

    - Times when pile driving and/or other in-water construction is delayed due to presence of marine mammals within shutdown zones
- During-activity observational survey-specific data:
    - Description of any observable marine mammal behavior within monitoring zones or in the immediate area surrounding the monitoring zones, including the following:
        - Distance from marine mammal to pile driving sound source
        - Reason why/why not shutdown implemented
        - If a shutdown was implemented:
            - behavioral reactions noted and if they occurred before or after implementation of the shutdown
            - the distance from marine mammal to sound source at the time of the shutdown
        - Behavioral reactions noted during soft starts and if they occurred before or after implementation of the soft start.
        - Distance to the marine mammal from the sound source during soft start.
- Post-activity observational survey-specific data:
    - Results, including the following:
        - the detections and behavioral reactions of marine mammals
        - the species and numbers observed
        - sighting rates and distances
    - Refined exposure estimate based on the number of marine mammals observed (may be reported as a rate of take, which is the number of marine mammals per hour or per day, or using some other appropriate metric)

Section 14 Coordinating Research to Reduce and Evaluate Incidental Take

Suggested means of learning, encouraging, and coordinating research opportunities, plans, and activities relating to reducing such incidental taking and evaluating its effects.

The data recorded during marine mammal monitoring for the Proposed Project will be provided to NMFS in monitoring reports. These reports will provide information on the usage of the site by marine mammals in an area with limited information.. The monitoring data will inform NMFS and future permit applicants about the behavior and adaptability of pinnipeds and cetaceans for future projects of a similar nature.

Section 15 Conclusion

For the reasons described in this IHA application, the USACE has determined that the proposed project is likely to result in the Level B Harassment of small numbers of harbor seals, humpback whales, and Steller sea lions. This project has implemented impact minimization measures, including a Marine Mammal Monitoring Plan, to reduce the potential for Level A Harassment.

While the Level B Harassment has the potential to result in minor behavioral effects to any marine mammals present during dredging and blasting, based on the analysis presented in this document, these temporary effects will have a negligible effect on the stocks of marine mammals, or their habitats described in this document.

Section 16 Literature

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