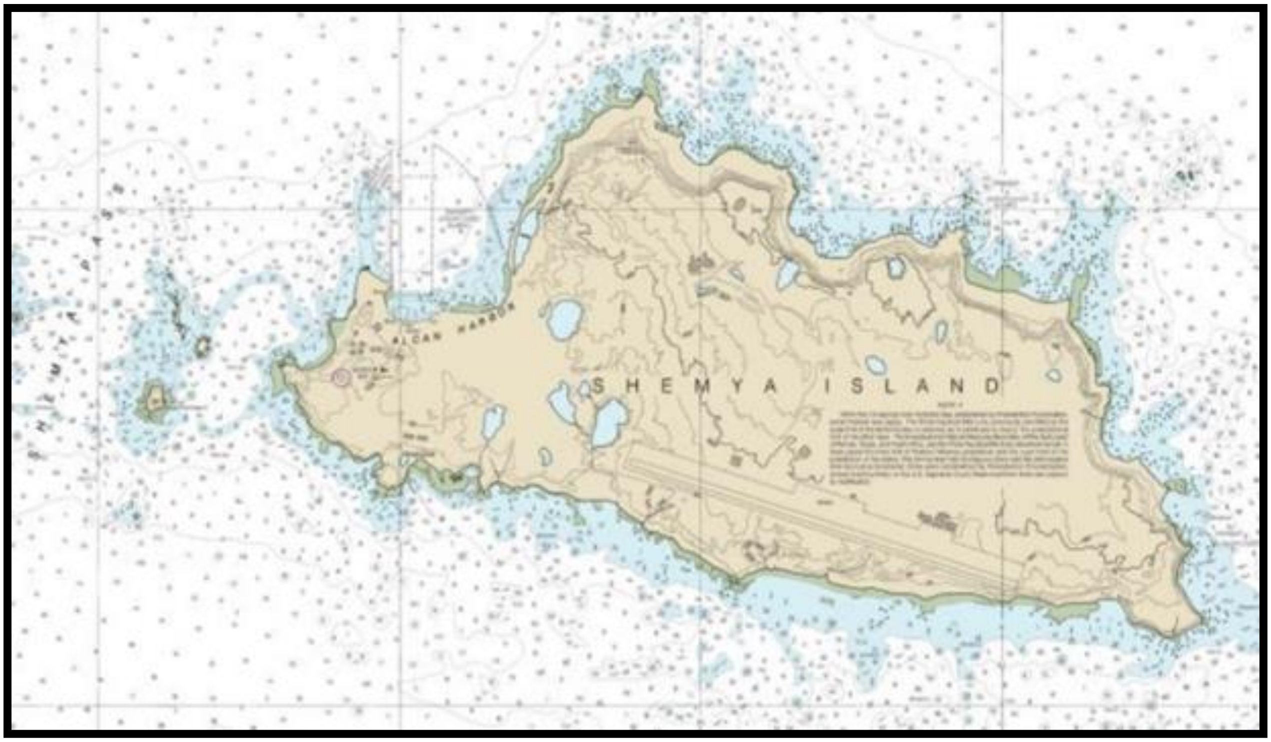
Request for an Incidental Harassment Authorization under the Marine Mammal Protection Act for

Eareckson Air Station Long-term Fuel Pier Repairs

Shemya Island, Alaska



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ACRONYMS AND ABBREVIATIONS

μ_{OR}	Average of Monthly Observation Rates
µPa	Micropascal
ADFG	Alaska Department of Fish and Game
AK	Alaska
CFR	Code of Federal Regulations
CHU	Critical Habitat Unit
CI_{95}	95% Confidence Interval
dB	Decibel
DoD	Department of Defense
DPS	Distinct Population Segment
DTH	Down-the-Hole
EAS	Eareckson Air Station
ESA	Endangered Species Act
FR	Federal Register
ft	Foot
GL	Geometric Loss Coefficient
GOA/AI/BS	Gulf of Alaska, Aleutian Islands, Bering Sea
HF	High Frequency
IHA	Incidental Harassment Assessment
in.	Inches
kg	Kilogram
kHz	Kilohertz
km	Kilometers
lf	Linear Foot
LF	Low-Frequency
m	Meter
MEC	Munitions and Explosives of Concern
MF	Mid-Frequency
Mi	Mile
min	Minute
MLLW	Mean Lower Low Water
MML	Marine Mammal Laboratory
MMMP	Marine Mammal Monitoring Plan
MMPA	Marine Mammal Protection Act
mph	Miles Per Hour
N_{est}	Population Estimate
nm	Nautical Mile
NMFS	National Marine Fisheries Service
N_{min}	Minimum Population Estimate
NOAA	National Oceanic and Atmospheric Administration
OR	Observation Rate
OP	Otariid Pinniped
POC	Plan of Cooperation
PP	Phocid Pinniped
PSO	Protected Species Observer
PTS	Permanent Threshold Shift
PW	Phocid Pinnipeds
R1	Range of Sound Pressure

R2	Distance from Source of Initial Measurement
RMS	Root-Mean-Square
s	Second
SEL	Sound Exposure Level
SEL_{CUM}	Cumulative Sound Exposure Level
SPL	Sound Pressure Level
SPLASH	Structure of Population, Levels of Abundance and Status of Humpback whales
SPL_{PEAK}	Peak Sound Pressure Level
SPL_{RMS}	Root-Mean-Square Sound Pressure Level
T	Ton
TL	Transmission Loss
TTS	Temporary Threshold Shift
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USFWS	United States Fish and Wildlife Service
UXO	Unexploded Ordnance
WA	Washington
WFA	Weighting Factor Adjustment
XR	Exposure Rate

1.0 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

Eareckson Air Station (EAS) is located on Shemya Island, a remote island in the Western Aleutian Islands of Alaska (Figure 1-1). The United States Air Force (USAF) proposes to conduct long-term repairs on the existing, and only, Fuel Pier on Shemya Island. Fuel delivered to the pier is used by on island generator systems that aid in the operation of Homeland Defense early warning radar surveillance and communications systems. EAS also functions as an emergency divert airfield supporting commercial and air traffic destined for Japan, China, Indochina, and other destinations in Asia and the Pacific. EAS is restricted to mission-related personnel. No public recreation or tourism is currently permitted.

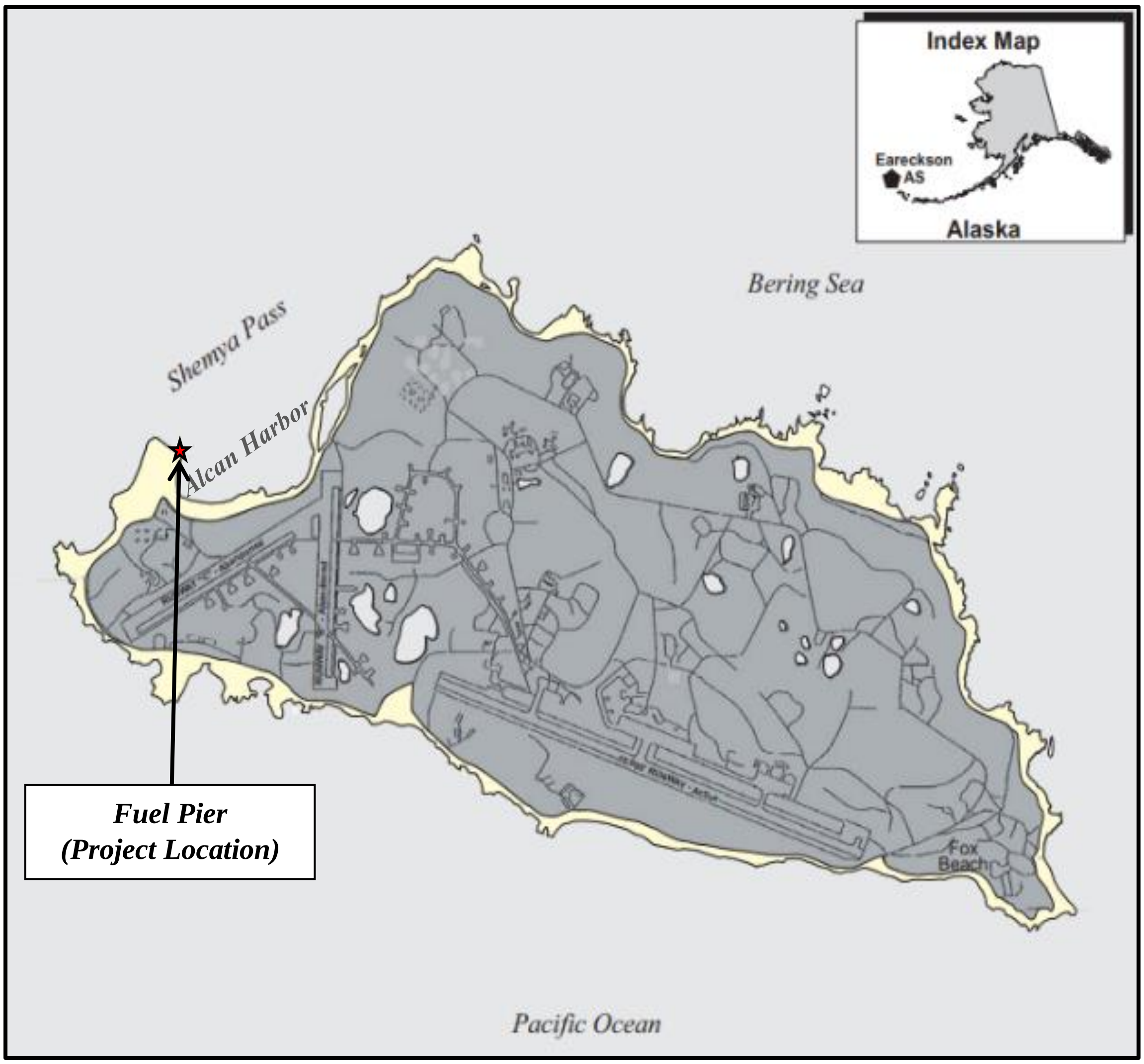


Figure 1-1. Project Location (MDA, 2002)

The Proposed 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 Incidental Harassment Authorization (IHA) should be issued. The project timing, along with the duration of pile driving activities, may result in marine mammals protected under the MMPA being exposed to sound levels above allowable noise harassment thresholds.

1.2 Project Purpose and Need

The purpose of the Proposed Action is to repair the degraded Pier and implement measures to maintain efficient, safe, and reliable resupply operations that support the EAS mission. The frequent severe weather conditions and the strong surrounding water wave action are constantly increasing the risk of further damage to the Pier. The nearby shoreline is also eroding due to these natural forces, and if not addressed, there is increased potential for the Pier access to be cut off from Shemya Island's mainland. Thus, the goal of the repair is to: (1) restore the Pier and prevent future degradation or catastrophic loss of the Pier's structure and function, and (2) protect the shoreline and Pier shoreline facilities from further erosion to maintain access to the Pier.

The Pier is the only structure on Shemya Island that enables barges to securely connect to the Pier fuel hydrant and transfer fuel to storage tanks and to safely dock for barge resupply and offloading operations. Thus, the Pier is considered critical infrastructure for ensuring EAS mission continuity and execution.

Shemya Island is subjected to severe weather events with winds that can exceed 80 miles per hour. Such an event on February 2, 2020, resulted in brute damage to the Pier and left the Pier in critical condition, unable to serve its full purpose. Emergency repairs have been implemented to restore minimal function to the Pier in support of barge resupply efforts. However, emergency repairs have not returned the Pier to full function, and they may not be comprehensive enough to address anticipated future damages, which would likely result in the catastrophic loss of the Pier's structure or function.

In its current state (Figure 1-2 through Figure 1-7, as of September 24, 2021), the damaged Pier has weight capacity restrictions that reduce the number of personnel and equipment can be supported at any one time. There are large holes in the existing sheet pile that expose the Pier structural components to the surrounding constant wave energy, and there are voids within the cells where the structural fill has eroded away. The entire eastern berthing face of sheet pile has been torn off and other sheet piles have been worked loose by wave action. Additionally, local wave action and currents have been progressively eroding the shoreline, which, if not addressed, have the potential to cut off Pier access from the mainland.

A long-lasting repair needs to be enacted to avoid the complete loss of the Pier's structure and function. Due to the seasonal North Pacific and South Bering Sea weather patterns, there is a limited timeframe (June through August) that barges can reliably deliver fuel and supplies essential to the EAS mission. This requires repairs to be completed in a timely manner to reduce the potential of disruption or shutdown of the EAS mission and Shemya Island operations. Therefore, the long-lasting repair is not only necessary but urgent.

Figure 1-2. View of Eastern Berth of Pier from Alcan Beach

Figure 1-3. Closer View of Pier Eastern Berth

Figure 1-4. View of Western Shoreline from Pier

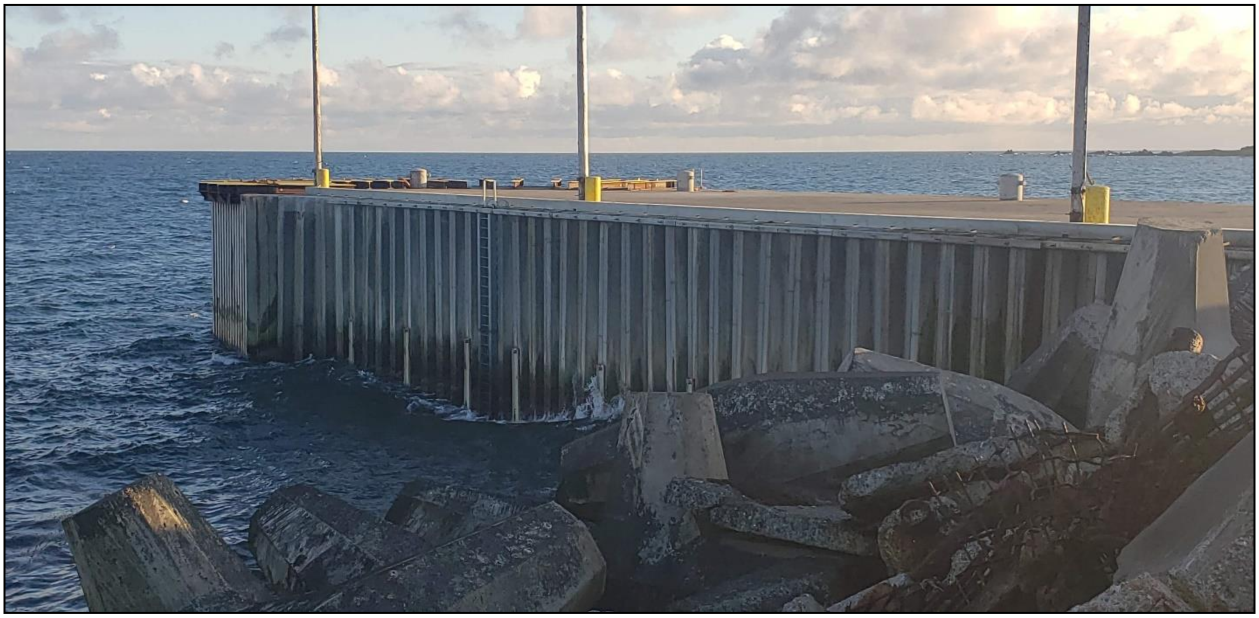


Figure 1-5. View of West Side of Pier

Figure 1-6. View of Exposed Fuel Lines and Erosion Behind Eastern Bulkhead

Figure 1-7. View of Pier Deck

1.3 Project Description

The Project would extend the Pier's life by 50 years by replacing and refurbishing the existing Pier and Pier facilities and armoring the adjacent western shoreline. The Project would take three construction seasons, ranging from April to October, to complete. While the entire project is described in this section, the only activity for which an IHA is sought is the pile driving in 2024. The other project activities are either not in-water activities or are in-water activities that can be easily mitigated to avoid the need for take. Pile driving, by virtue of the large underwater zones of ensonification, cannot be effectively mitigated with monitoring and shutdowns to avoid all potential takes.

The Project activities by year are:

- **2023:** Vessel movement and mobilization/staging activities. No construction will occur and no IHA is sought for these activities.
- **2024:** Vessel movement, pile installation (round exterior piles as well as sheets for tiebacks), screening/clearance activities, remote equipment operations, removal of existing precast dolosse from western shoreline, and crushing/recycling concrete. The IHA for this project is for the pile installation planned in 2024.
- **2025:** Cyclopean concrete placement, Pier deck demolition, pressure grouting existing Pier structure, tieback installation, Pier leveling course placement, electrical system rough-in, and fuel line repair and backfill. No IHA is sought for these activities.
- **2026:** Pour in place Pier concrete deck, electrical system upgrades finish, fuel line upgrades finish, shoreline revetment installation, and demobilization.

In 2023, only mobilization and staging activities would occur in the summer and early fall, and no ground disturbance or permanent installation work would occur. The start of the 2024 construction season would be the earliest construction work would begin and an IHA is only sought for pile driving during this year. 2026 is the last year construction activities are planned to occur.

Key project locations are depicted in Figure 1-8. The Project design is shown in Figure 1-9 and Figure 1-10. There are 83 piles on the long sides, 21 one each short side for a total of 208, 42-inch round interlocking piles. The two internal sheet pile anchor walls are 46 feet, 6 inches long on the shore side (left) and 54 feet, 10 inches long on the end (right) ride.

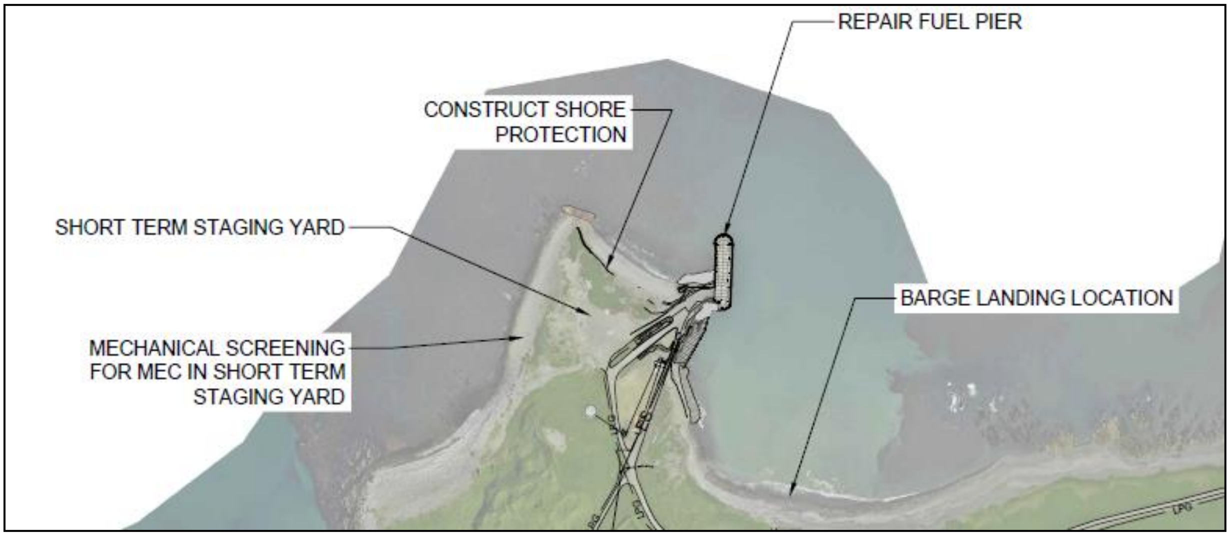


Figure 1-8. Key Project Locations

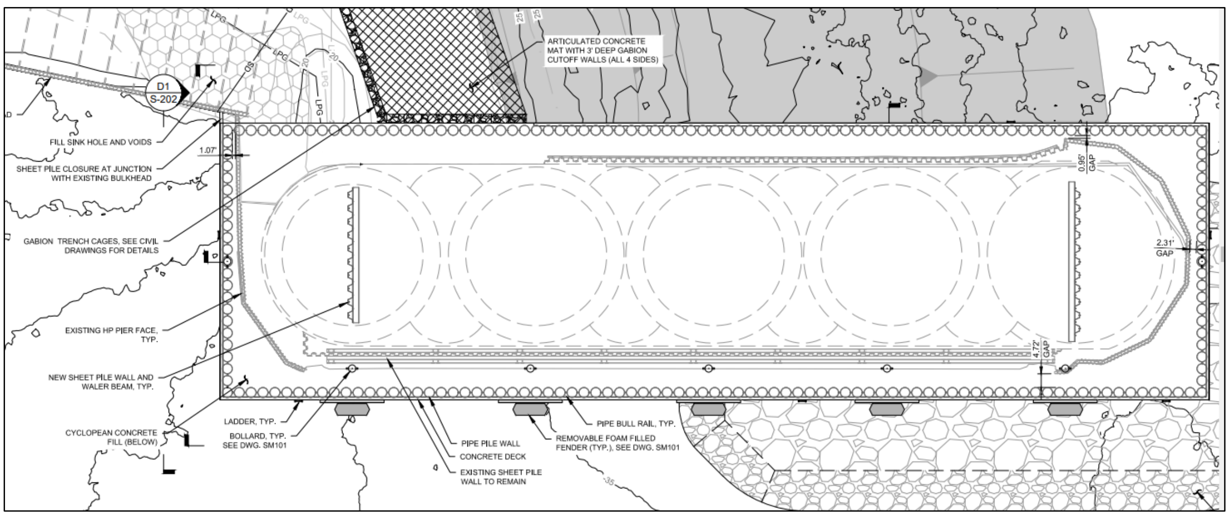


Figure 1-9. Overall Project Design with New Structure Encapsulating the Old One

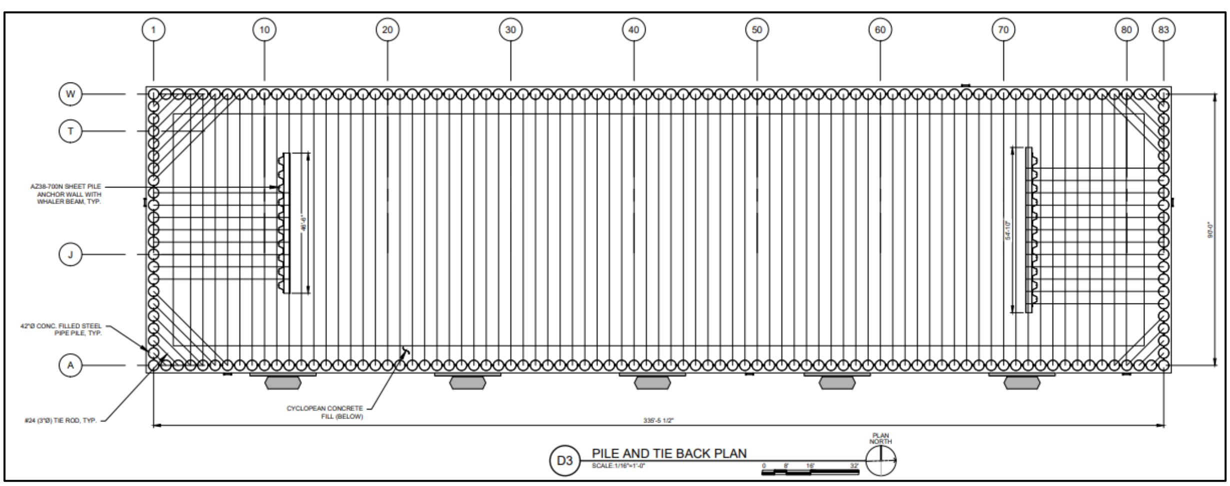


Figure 1-10. Pile Plan View

The steel pipe-pipe combi-wall system would be installed to encapsulate most of the existing Pier after Military Explosives of Concern (MEC) screening operations are completed. These MEC screenings are required to determine whether any military explosives are present near the pile diving footprint. The proposed combi-wall would be installed up to 15 feet off the existing Pier's footprint to clear the existing sheet pile wall, creating an exterior pipe pile wall. Template frames for the pile wall would be installed to construct the new Pier exterior structure and subsequently removed. Prior to pile placement, magnetometer surveys would occur. Remotely operated vibratory hammer pile driving would be the method used to drive the piles through the bottom sediment to specified depths. If a vibratory hammer alone was unable to achieve the specified embedment depth, a diesel or hydraulic impact hammer would be utilized. Piles would be socketed into bedrock via a drill. The dimensions of the new Pier footprint would be approximately 100 by 340 feet.

The steel combi-wall system would extend approximately 560 linear feet from the northern bulkhead corner, along the entire Pier berthing face, and around the northern perimeter. The main component of the combi-wall system would be interlocking steel pipe piles that would be pile-driven and/or socketed into bedrock or, at a minimum, 30 feet below the mudline. The pile interlocks would be designed to transfer soil and water pressure to the interlocking steel pipe piles, which would carry most of the load. The interlocking steel pipe piles would be 42 inches in diameter and approximately 208 piles would be required to construct the steel combi-wall system. This pile installation would be considered in-water work and is the reason for this IHA application.

Most permanent pile templates for this project will be installed utilizing the existing structure. Template frames will be designed and constructed to cantilever off the existing fuel pier structure (i.e., not be placed in the water). Some 30-inch template piles have been included in the pile table in the event, such as at corners, additional support is required. These 30-inch piles, if needed, would be installed in the water.

The two hundred eight (208) permanent 42-inch diameter pile will be vibrated through the soil layer to the specified embedment depths developed during design. It is expected that most, if not all piling will require a rock socket. Rock sockets will be installed utilizing a down-the-hole hammer and bit. The bit will be slightly larger than the outside diameter of the permanent pipe pile.

The dock's in-water construction will begin in April of 2024. Construction of the proposed dock would follow this sequence:

1. Set one or two cantilevered templates utilizing existing fuel pier as support. These cantilevered templates would not be installed in the water. However, template pile may be utilized in some areas to offer additional support and are accounted for in Table 1-1.
2. Within the frame, loft and stab 6-12 each 42-inch permanent pile.
3. Within the frame, vibrate, impact, and down-the-hole drill 42-inch diameter pipe pile. Only one pile would be driven at a time, even if two pile templates are used.
4. Remove the frame and any temporary piles and move to the next permanent pile location. Repeat this process for placement of all the permanent piles.

Table 1-1. Pile Driving Plan and Level of Effort

	Temp Pile Installation	Temp Pile Removal	Perm Pile Installation	Sheet Pile Installation
Diameter of Steel Pile (inches)	30	30	42	28 (width)
# of Piles	60	60	208	44
Vibratory Pile Driving				
Total Quantity	60	60	208	44
Max # Piles Vibrated per Day	4	4	4	4
Vibratory Time per Pile (minutes)	15	15	30	30
Vibratory Time per Day (minutes)	60	60	120	120
Number of Days	15	15	52	11
Vibratory Time Total (minutes)	900	900	6,240	1,320
Impact Pile Driving				
Total Quantity	44	-	208	44
Max # Piles Impacted per Day	4	-	4	4
# of Strikes per Pile	900	-	1,800	1,800
Impact Time per Pile (minutes)	30	-	45	45
Impact Time per Day (minutes)	120	-	180	180
Number of Days	11	-	52	11
Impact Time Total (minutes)	1,320	-	9,360	1,980
Down-the-Hole Drilling				
Total Quantity	44	-	208	-
Max # of Piles Installed per Day	3	-	3	-
Time per Pile (minutes)	150	-	180	-
Time per Day (minutes)	450	-	540	-
Number of Days	15	-	70	-
DTH Drilling Time Total (minutes)	6,600	-	37,440	-

The annular space between the existing Pier structure and new exterior steel combi-wall would be filled with cyclopean concrete fill (concrete filled with rubble). The rubble would consist of concrete debris and clean rock from on-island or upland-imported sources. The cyclopean concrete would extend from the seafloor to just below the new pile wall tieback elevation. Additionally, existing voids and undermining in the original cells of the Pier would be filled via pressure grouting after vibro-compaction of existing gravel fill and pressure grouting to mitigate settlement and improve load path and transfer.

After placement of cyclopean concrete within the annular spaces, a new tieback system would be installed approximately five feet below the elevation of the top of the deck to tie the east bulkhead into the Pier. The proposed tieback system includes approximately 3.9-inch diameter threaded rods running the Pier's full width anchored where possible to the steel combi-wall on the other side. The north and south piles will tie back to newly installed sheet piles driven into existing cells.

The proposed tieback system would require the removal of the existing Pier deck and excavation of the upper portion of gravel fill within the cells, cutting holes in the surrounding steel sheet piles, and drilling or chipping through the cell concrete walls. A cast-in-place concrete deck, precast concrete cap, galvanic aluminum or magnesium anodes designed for seawater, tieback anchors, seven 200-ton bollards, pipe bull rail, and five low-profile fender panels would be installed. The fender panels would be steel-framed, ultra-high-molecular-weight polyethylene faced panels with foam-filled floating fenders to allow retraction of the fenders along the berthing face during severe weather to reduce potential damage. The new deck would reach approximately +23 feet MLLW.

To reduce scouring of the installed steel combi-wall, two rock layers would be utilized as scour protection. The underlayer would consist of filter stone, and the top layer would consist of 5- to 10-ton armor rock. The scour protection would extend approximately 25 feet out from the Pier toe before declining on a 1V on 2H slope to the mudline, and it would be about seven feet thick. Scour protection material would be placed utilizing a crane, clamshell bucket, hydraulic grapple, and large excavator, and it would be placed on top the seabed at an approximately -38 feet MLLW depth that would accommodate a barge draft of 21 feet. Thus, the top of the scour protection would reach about -31 feet MLLW. No dredging is anticipated for the installation of the scour protection.

The western shoreline engineered revetment would replace the current failing 150-linear foot dolosse revetment with approximately 750 linear feet of reinforced engineered revetment. The new engineered revetment would extend from the west side of the Pier to the western tip of the headlands to minimize erosion to nearshore infrastructure from strong wave action and severe weather. Prior to installation of the engineered revetment, the remaining 12-ton dolosse and bedding stone need to be removed, and subsequently replaced by either 20-ton Core-Loc precast armor units or a rock armored berm The toe of the revetment (ranging approximately -5 to -25 feet MLLW) would be an 1V on 1.5H slope reaching +13.3 feet MLLW where it would transition into a large rock berm. The toe would be covered with armor rock for stability and erosion protection. The berm would connect to the crest with Core-Loc units or armor rock inboard the crest and laid over bedding rock on a 1V to 1.5H slope. If the Core-Loc approach is taken, the armored rock toe of the revetment would transition into Core-Locs overtop a bedding rock layer (100- to 1,000-pound rock) followed by an armored rock berm above them. If the armored rock approach is taken, the first underlayer would consist of 2- to 5-ton armor rock and the second underlayer would consist of 100- to 1,000-pound bedding rock. The crest would reach +25 MLLW with an outbound slope of 1V on 1.5H. The flank protection of the western shoreline revetment would be at a 1V on 2H slope, which would tie into the natural existing contours. This system would be an interconnected, self-healing system.

Excavation activities for the western shoreline engineered revetement installation would follow the MEC screening protocols. Thus, remotely controlled equipment would be used to run the material through the screening process. Excavated material from these activities would be used as upland fill, south of the revetment to raise the grade of depression that periodically floods from severe weather events. Dolosse outside of the marine waters from the prior revetment would be rigged with straps by commercial divers for removal, as necessary, using an excavator or crane. This equipment would be remotely operated if activity is ground disturbing. Removed dolosse and precast materials (e.g., wave dissipating concrete blocks and pier caps) would be transferred to the concrete disposal area via truck and repurposed as cyclopean concrete fill for the Preferred Alternative construction and repair activities.

Chartered barging for the Preferred Alternative would take place in all years of anticipated Preferred Alternative activities (2023 through 2026). Approximately five barges per season would be used for project purposes. The anticipated sizes of used vessels would be 100-foot tugboats towing 400- by 100-foot barges. The first vessel movement would occur in the summer and potentially go through the fall of 2023, for delivering construction equipment and materials to the project site for the subsequent 2024 construction season. For 2024 through 2026, vessel movements would occur around April through October. Each potential vessel movement is expected to take up to a month. The potential movements that would be taken by project-dedicated vessels are shown in Table 1-2.

Table 1-2. Project-dedicated Vessel Movements

Movement Type	Location		
	Originating	Midway	Terminal
One Way	Seattle, WA	N/A	Shemya Island, AK
One-Way	Seattle, WA	Seward, AK	Shemya Island, AK
Round	Shemya Island, AK	Seward, AK	Shemya Island, AK
Round	Shemya Island, AK	Kodiak, AK	Shemya Island, AK
Round	Shemya Island, AK	Anchorage, AK	Shemya Island, AK
One Way	Shemya Island, AK	N/A	Seattle, WA

AK – Alaska; WA – Washington

Vessels would generally travel no more than eight knots along standard commercial shipping routes, and all vessels would originate from Seattle, WA. At Shemya, barges would be tied up to the Pier and equipment and materials would be relocated to upland staging areas via crane, conveyors, and trucks. No barges would be grounded at any tidal stage for the duration of the project. Once yearly barge requirements are met, project-dedicated vessels would return to Seattle, WA.

2.0 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

Project construction is expected to be conducted in 2023 and completed in 1 construction season. If work cannot be completed in 2023, USAF will request an IHA extension in order to complete work the following construction season in 2024. A construction season is defined as April to October and the project is expected to take 1 season.

2.2 Duration

Workdays will typically follow a 7/12 schedule (7 days a week, 12-hour days) with pile driving work being conducted during daylight. The daily construction window for pile driving will begin no sooner than 30 min. after sunrise to allow for initial marine mammal monitoring to take place and will end 30 min. before sunset to allow for post-activity monitoring. (These protocols are discussed in detail in Section 11.2). Some days will likely involve work beyond 12 hours, typically to take advantage of good weather days, but pile driving will always be limited to daylight hours as described above to monitor the Level A and B zones.

2.3 Region of Activity

The Pier is located in Alcan Harbor on Shemya Island. Alcan Harbor is adjacent to Shemya Pass to its west and the Bering Sea to its north and east. The Pier is in Section 16, Township 86 South, Range 257 West, of the Seward Meridian, Alaska. Tidelands in this vicinity and Shemya Island's waters (to include submerged lands) are under the jurisdiction of the USAF with the

Secretary of the Interior having secondary jurisdiction (MDA, 2002). The project area requires work specifically within and around Alcan Harbor. Shemya Island and its waters are also within the Alaska Maritime National Wildlife Refuge, which if not for it being a military base, would typically be under the jurisdiction of USFWS (USFWS, 2021). There are no neighboring piers/docks. The next nearest developed location that is inhabited is Nikol'skoe, which is approximately 370 miles west on Bering Island, Russia. Adak, Alaska, is approximately 400 miles to the east in the Central Aleutians. The United States Coast Guard previously maintained a long-range navigation station on Attu Island, Alaska, 28 miles to the west, but that site has been abandoned for several years, and there is no routine presence there. No former Alaska Native village sites in the region have been reoccupied since residents were captured from Attu as prisoners of war during World War II.

3.0 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 Proposed Project area at EAS. 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. Most of these species are unlikely to be observed in the project area based upon existing survey data, habitat preference, population size, seasonality, expected occurrence, and the range of operations. All the species listed in Table 3-1 fall under the jurisdiction of the National Marine Fisheries Service (NMFS). Descriptions of each species distribution and status are further described in Section 4. Take is not being requested for North Pacific right whales, Pacific white-sided dolphins, and ribbon seals; the rationale is presented in Section 4 by species.

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

Species	Population / Stock	MMPA Status	ESA Status	Occurrence In/Near Project	Seasonality	Abundance (N_{min})
Baird's beaked whale (*Berardius bairdii*)	Alaska	Protected	-	Very rare	Summer, Fall	Unknown[a]
Blue whale (*Balaenoptera musculus*)	Central North Pacific	Protected, Depleted	Endangered	Very rare	Summer	63[b]
Dall's porpoise (*Phocoenoides dalli*)	Alaska	Protected	-	Rare	Year-round	83,400[a*]
Fin whale (*Balaenoptera physalus*)	Northeast Pacific	Protected, Depleted	Endangered	Rare	Spring, Summer	2,554[a]
Gray whale (*Eschrichtius robustus*)	Western North Pacific	Protected, Depleted	Endangered	Rare	Summer, Fall	231[b]
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]

Species	Population / Stock	MMPA Status	ESA Status	Occurrence In/Near Project	Seasonality	Abundance (N_{min})
Humpback whale (*Megaptera novaeangliae*)	Central North Pacific (Hawaii)	Protected, Depleted	-	Common	Summer	7,891[a]
	Mexico	Protected, Depleted	Threatened	Common	Summer	5928[c]
	Western North Pacific	Protected, Depleted	Endangered	Common	Summer	865[a]
Killer whale (*Orcinus orca*)	Eastern North Pacific: Alaska Resident Stock	Protected	-	Common	Year-round	2,347[a]
	Eastern North Pacific: Gulf of Alaska, Aleutian Islands, and Bering Sea Transient Stock	Protected	-	Common	Year-round	587[a]
Minke whale (*Balaenoptera acutorostrata*)	Alaska	Protected	-	Rare	Year-round	Unknown[a]
Northern fur seal (*Callorhinus ursinus*)	Eastern Pacific	Protected, Depleted	-	Rare	Summer, Fall	514,738[a]
North Pacific right whale (*Eubalaena japonica*)	Eastern North Pacific	Protected, Depleted	Endangered	Rare	Spring, Summer	Unknown[a]
Pacific white-sided dolphin (*Lagenorhynchus obliquidens*)	North Pacific	Protected	-	Rare	Year-round	26,880[a]*
Ribbon seal (*Histriophoca fasciata*)	Alaska	Protected	-	Rare	Summer	163,086[a]
Sperm whale (*Physeter macrocephalus*)	North Pacific	Protected, Depleted	Endangered	Rare	Year-round	244[a]
Stejneger's beaked whale (*Mesoplodon densirostris*)	Alaska	Protected	-	Very rare	Year-round	Unknown[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)

4.0 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.

In this section, the general distribution and status of each species listed in Section 3 (Table 3-1) will be discussed by species in order of the following groups: *Mysticeti*, *Odontoceti*, *Otariidae*, and *Phocidae*. This will be followed by the relevant critical habitat, hearing ability, and survey information applicable to the Proposed Project area.

4.1 *Mysticeti*

This section includes the species that fall under the taxonomic division of whales comprised of baleen whales called *Mysticeti*.

4.1.1 Blue Whale (*Balaenoptera musculus*)

Blue whales are found in all ocean waters except the Arctic (NOAA, 2021c). Although mainly pelagic and found along the continental shelf (Zimmerman and Rehberg, 2008a), blue whale will go into nearshore environments to feed and possibly to breed (Jefferson et al., 2015). Blue whales generally migrate seasonally between summer foraging and winter breeding areas. However, there is evidence suggesting individuals in certain areas might not migrate at all. Their migration routes are not well known, and their distribution and movement vary depending on location (NOAA, 2021c). It is thought that their movement poleward in spring is related to the high concentration of krill in the high-latitude waters during summer. In the fall, blue whales migrate south towards warmer waters that provide favorable conditions for reproduction. Blue whales in the northern hemisphere will breed and give birth in the late fall and winter. Much data is obtained from passive acoustic technology due to the difficulty to sight blue whales. The data obtained is blue whale vocalizations, or “calls.” The calls are distinguished between two different regions: “northeast” heard in the eastern tropical Pacific through the Gulf of Alaska, and “northwest” heard off Hawaii, Midway Island, the northwest Pacific and Alaska (Zimmerman and Rehberg, 2008a). Whaling catch data also indicated that whales feeding along the Aleutian Islands were likely part of the Central Pacific Stock. Blue whales belonging to the Central North Pacific Stock appear to forage in the southwest of Kamchatka, in the south of the Aleutians, and in the Gulf of Alaska during summer before migrating to lower latitudes in the western and central Pacific, to include Hawaii (Carretta et al., 2021). Two blue whale sightings were also made in the Aleutians in August 2004 (Calambokidis et al., 2009).

Hydrophone data collected on blue whale calls in the North Pacific showed evidence of a clear seasonal migration from higher to lower latitudes during late autumn. In the Western Aleutians, northwestern vocalizations were recorded most often from July to December and barely at all from March to May. There were over 1,300 northwestern Pacific type vocalizations that came from a minimum 35 blue whales. The proportion of northwestern vocalizations increased from June to August and remaining at high levels until October when decreasing to low levels by February were observed. In November 1995 to 1996, only northwestern vocalizations were recorded by hydrophones in the Western Pacific that includes the Western Aleutians. The vocalizations were recorded 27.5 to 59.3 percent of the total recorded time (Stafford et al., 2001).

Blue whales typically travel in pairs or alone. Nonetheless, they may converge in larger numbers on productive foraging grounds. There dive behavior is related to the movement of their prey, and they dive down further and longer in daylight than at night due to prey occurring deeper in the ocean. They have been observed diving for at least 17.5 min., but blue whales may be able to dive for twice as long (Zimmerman and Rehberg, 2008a). They are among the loudest marine mammals on the planet, emitting a series of pulses, groans, and moans that may be able to be heard by other whales thousands of miles away. Scientists think they use these vocalizations to communicate and perhaps to navigate dark ocean depths with sonar (NOAA, 2021c).

The Central Pacific Stock of blue whales concerned for this project is protected and depleted under MMPA as well as endangered under ESA.

4.1.2 Fin Whale (*Balaenoptera physalus*)

The Fin whale is found in worldwide polar, temperate, and subtropical waters. They are found off the coast of North America seasonally and in the Bering Sea during summer within the Pacific Ocean U.S. waters (Clark, 2008a). They tend to travel in open seas, away from coasts making them hard to track. Most will migrate from the colder polar feeding areas in the summer to more tropical breeding and calving areas in the winter. The location of winter breeding grounds is not known. Their migration pattern is complex and will vary by region. In general (NOAA, 2021e), the spring and early summer are spent in cold, high latitude feeding waters while the fin whales return to lower latitudes in fall for winter breeding. They may remain in residence of the high latitude ranges if there are plentiful prey resources. Typically seen in groups of 6 to 10 individuals, they are also sighted in pairs, alone, or in feeding aggregations up to 100 individuals. In the central eastern Bering Sea, most sightings were along the continental shelf break in a zone of high prey abundance (Clark, 2008a).

There has also been data collected on the seasonal distribution of fin whales from offshore hydrophone arrays that would detect whale calls. These arrays were in the Aleutian Islands, along the U.S. Pacific coast, and in the central North Pacific (Clark, 2008a). Fin whale calls detected along the U.S. Pacific coast showed the highest rates from August and September through February. This indicated important feeding areas during the winter for fin whales. In the Aleutian Islands and central North Pacific, the call rates peaked during late summer, fall, and winter. The fin whale was the most sighted common large whale for Bering Sea shelf surveys except in 1997 and 2004. Additionally, they were typically distributed around the eastern Bering Sea continental shelf green belt and the middle shelf. Abundance of fin whales in the Bering Sea showed evidence of being higher in cold years compared to warm years and indicated a shift in distribution. A comparison of data from a cold year (1999) and a warm year (2002) resulted in encounter rates 7 to 12 times higher in the cold year. This is likely due to the availability of preferred prey (Muto et al., 2021). The fin whale is also known to use the shelf edge as a migration route.

Based on historical whaling data, the range of the fin whale extended into the southern Sea of Okhotsk and Chukchi Sea where it is thought they would pass through the Bering Strait to the Chukchi Sea in August and September. More current evidence consisting of acoustic and visual data, supports the notion that fin whales stay in the Alaska Arctic and are present in the Bering Sea during July and August. During winter months when they breed and give birth, fin whales have been seen over a wide geographic area from 23°N to 60°N (Muto et al., 2021).

The Northeast Pacific Stock of fin whale is protected and depleted under MMPA as well as listed as endangered under ESA.

4.1.3 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 m and 35 tons, but they can reach up to about 18.3 m and weigh 40 tons (NOAA, 2021i). 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 km one way due to their preferences between feeding and calving grounds. They prefer warmer waters near shores or reefs in shallow water (NOAA, 2021i). 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 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). The probability of encountering humpback whales by DPS within the Aleutian Islands or Bering Sea during the summer is 2 percent for the Western North Pacific DPS, 91 percent for the Hawaii DPS, and 7 percent for the Mexico DPS (NMFS, 2021).

Humpback whales will generally travel alone. They can travel in small groups but typically only for a few hours. The time they spend in a group can lengthen when they forage together or during mate selection. Humpback whales feed on up to 1.5 ton 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, 2021i).

4.1.4 Gray Whale (*Eschrichtius robustus*)

Gray whales occur in the North Pacific Ocean and adjacent waters of the Arctic Ocean. They rarely feed while migrating or during winter when they tend to be in tropical waters for breeding. They will live off fat reserves during this period. When giving birth, gray whales will concentrate in shallow protected lagoons. Feeding will occur almost exclusively in their summer foraging grounds in the colder, more productive waters of the north. Gray whales can migrate 8,050 to 11,275 km (5,000 to 7,000 mi.) each way (Frost and Karpovich, 2008). It is in their nature to stay close to the coast where they are mainly found in shallow coastal waters; however, they can cross deep water far from shore while migrating (NOAA, 2021f). Once at their summer foraging areas, they will feed in shallow waters 60 m (200 ft) or less deep. The gray whale will typically stay in small groups of about 3 whales but have been seen in groups of 16. When feeding, these groups can converge and hundreds of the whale can be seen in the same area. Feeding dives can last from 3 to 15 minutes. Since they are bottom feeders, the whales will dive to the bottom. Gray whales will also breach or spy hop (sticking their head vertically out of the water), especially during migration and breeding, which beaching is specifically thought to be associated with (Frost and Karpovich, 2008).

Two Pacific Ocean gray whale populations exist: Western North Pacific Stock (the one with range overlapping the project area) and Eastern (Frost and Karpovich, 2008). The Western North Pacific Stock of gray whales feed during the summer and fall in Okhotsk Sea northeast of Sakhalin Island and in the Bering Sea southeast of Kamchatka, and they have a higher percentage of inbreeding compared to the Eastern North Pacific Stock (Carretta et al., 2021). The Western Pacific Stock migration route that is largely unknown (Frost and Karpovich, 2008). However, there is data showing that some of the Western North Pacific Stock will travel to breeding areas of Eastern North Pacific Stock in the eastern North Pacific (Weller et al., 2012, 2013; Mate et al., 2015), as well as historical evidence of wintering areas in Asian waters. Historical and current evidence indicates different wintering grounds within the Western North Pacific Stock. The historical evidence shows the Western North Pacific Stock may have had a migratory route in the coastal waters of eastern Russia, the Korean Peninsula, and Japan into wintering grounds in the China Sea. Currently, records of sighting in these areas are infrequent except in Japan which has appeared to be increasing during the past two decades. Information from tagging, photo-identification, and genetic studies identified individuals from the Western North Pacific Stock off Russia have been sighted in the Easter North Pacific Stock areas to include the coastal waters of Canada, the U.S., and Mexico. The data gathered from these studies showed the number of whales moving between the western North Pacific and eastern North Pacific represented 14 percent of gray whales identified off Sakhalin Island and Kamchatka. This indicates that while some Western North Pacific Stock whales that fed off

Sakhalin Island in summer migrated east through the Aleutians across the Pacific to the west coast of North America, others migrated south to waters off Japan and China.

The Western North Pacific Stock of gray whale is depleted and protected under MMPA and endangered under ESA.

Given that only the Western North Pacific Stock overlaps with the project area and the overall numbers of these whales is near 100, there is a low likelihood of these gray whales in Alaska waters and an even lower (near zero) likelihood that that would be found within the ensonified area near Alcan Harbor for this project. For these reasons, takes are not being sought for Gray whales (Western North Pacific Stock) in this IHA application.

4.1.5 Minke Whale (*Balaenoptera acutorostrata*)

Minke whales occur in polar, temperate, and tropical waters worldwide in a range extending from the ice edge in the Arctic during the summer to near the equator during winter. However, they are known to prefer temperate to boreal waters due to the abundance of prey (Guerrero, 2008b). When comparing distribution and abundance in years 2002, 2008, and 2010, it was found that that minke whales were scattered throughout all oceanographic domains: coastal, middle shelf, and outer shelf/slope (Muto et al., 2021). The minke whale mostly migrates seasonally and can travel long distances; although, some minke whale individuals and stocks have resident home ranges and are not highly migratory (Guerrero, 2008b). The Alaska Stock of minke whales are migratory and are common in the waters of the Bering Sea, Gulf of Alaska, and Southeast Alaska in the spring and summer (NOAA, 2021l).

The distribution of minke whales will vary based off age, sex, and reproductive status. Older mature males are commonly found in small social groups around the ice edge of polar regions during the summer feeding season. Comparatively, adult females will migrate farther into the higher latitudes but generally remain in coastal waters. Immature minke whales tend to be solitary and stay in lower latitudes during the summer (Guerrero, 2008b). Although the minke whale tends to be solitary or in groups of 2 to 3 individuals, they can congregate in larger groups containing up to 400 individuals at the higher latitude foraging areas (NOAA, 2021l). During surveys in Alaska, minke whales were predominately seen alone (Wade et al., 2003 Waite, 2003). Breeding season is typically December to March, but in some regions minke whales breed year-round. When migrating north in spring and summer, they will travel along in coastal waters, whereas in fall and winter, they move farther offshore (NOAA, 2021l). In a sea otter survey conducted in 2003, a minke whale was observed in July when a survey was being conducted at Attu Island (Doroff et al., 2004).

Minke whales can dive for at least 15 min. but generally dive for 6 to 12 min. at a time. They are active at the surface, often breaching or spy hoping in areas of mobile ice. They also demonstrate curiosity as they tend to approach vessels, especially if the vessel is stationary. They are also known to vocalize and produce sounds to include clicks, grunts, pulse trains, ratchets, thumps, and boings. These vocalizations are distinct depending on species and geographic area (Guerrero, 2008b).

The Alaska Stock of minke whales are protected under MMPA but are neither threatened nor endangered under ESA.

4.1.6 North Pacific Right Whale (*Eubalaena japonica*)

Historically, North Pacific right whales have occurred in all the world's oceans from temperate to subpolar latitudes (NOAA, 2021m). Most of the data shows right whales concentrated north of 35°N and included North Pacific coastal and offshore waters such as the Alaska Peninsula, Aleutian Islands, and Bering Sea (Muto et al., 2021). In 1965 to 1999 the U.S.S.R. harvested North Pacific right whales illegally, and there were only 82 sightings of right whales in the entire eastern North Pacific. The majority the sightings occurred in the Bering Sea and the nearby areas of the Aleutian Islands. Today they are among the rarest marine mammals with most sightings of the North Pacific right whales occurring in the central North Pacific and Bering Sea. They are also sighted repeatedly in their Critical Habitat in the southeastern Bering Sea during summer. Their migration patterns are largely unknown. In general, it is thought they migrate from high-latitude northern feeding grounds in the summer to unknown warmer waters in the south for winter (NOAA, 2021m). The summer range (May to December) of the eastern stock of North Pacific right whales includes the Gulf of Alaska and the Bering Sea, while the western stock is thought to feed in the Okhotsk Sea and pelagic waters of the northwestern North Pacific. Their winter calving grounds are unknown (Muto et al., 2021); however, most known nursery areas of other right whales are in shallow, coastal waters (NOAA, 2021m).

North Pacific right whale aerial and vessel surveys in the southeastern Bering Sea have observed and acoustically detected right whales for most summers since 1996. They have been observed consistently within the Bering Sea but there is evidence they may winter outside the Bering Sea. In 1996 a right whale sighted off Maui, Hawaii, was identified about 4,100 km (2550 mi) to the north in the Bering Sea (Muto et al., 2021). There is also call frequency data that showing increased calls during July to October compared to May to June or November to December (Munger et al., 2008).

The Eastern North Pacific Stock of the North Pacific right whale is both protected and depleted under MMPA. It is also listed as endangered under ESA.

Due to their extremely low abundance and that most are observed in the southeastern Bering Sea near their Critical Habitat, takes are not being sought for North Pacific Right Whales in this IHA application.

4.2 *Odontoceti*

This section includes the species that fall under the taxonomic division for toothed whales called *Odontoceti*.

4.2.1 Baird's Beaked Whale (*Berardius bairdii*)

Baird's beaked occurs in the North Pacific and Bering Sea along the Aleutian Islands as well as the adjacent waters of the Gulf of Alaska, Sea of Okhotsk, and the Sea of Japan (Guerrero, 2008a). Within the North Pacific Ocean, Baird's beaked whales have been sighted north of 30°N in deep, cold waters over the continental shelf (Muto et al., 2021), particularly in regions with 1000 m (3,300 ft) or deeper contours, submarine canyons, and seamounts. They will tend to dive more than 1,000 m followed by a series of dives less than 1,000 m (Guerrero, 2008a). However, they can be occasionally found in nearshore environments along narrow continental shelves. Baird's beaked whales migrate seasonally based on the temperature of surface water

(NOAA, 2021b). They occur in waters of the continental slope during summer and fall months when surface water temperatures are the highest (Muto et al., 2021). They have also been seen in the nearshore waters of the Bering Sea and Okhotsk Sea in May to October (NOAA, 2021b). There were no detections or sightings of Baird's beaked whale off Kiska Island near the project area from early June to late August in 2010 (2020 Stock Assessment). Breeding season is thought to occur between October to November with births occurring through March and April (Guerrero, 2008a). During winter and spring, they will move further offshore as the sea temperatures decrease although there is little known about their wintering grounds (NOAA, 2021b).

There are two recognized forms of Baird's beaked whales: the common slate-gray form and a smaller, rare black form. Both forms can be found in and around the Aleutians (Morin et al., 2017). They travel in pod of 2 to 20 individuals. As a toothed whale, it uses echolocation to locate prey and gain information about its environment. They are shy and difficult to approach with vessels, which when combined with their open ocean habitat, limits information being learned mostly from dead, stranded Baird's beaked whales (Guerrero, 2008a).

Baird's beaked whale Alaska Stock is protected under MMPA, but it is neither threatened nor endangered under ESA.

4.2.2 Dall's Porpoise (*Phocoenoides dalli*)

Dall's porpoises occur solely in the North Pacific Ocean where they range from Japan to southern California and up to Alaska and the Bering Sea in coastal and pelagic waters between 28°N and 65°N (Wells, 2008; Muto et al., 2021). Although, they can dive up to about 500 m (1,640 ft), they prefer temperate to boreal waters more than 180 m (600 ft) deep and between 36°F and 63°F. They primarily fed at night when their prey moves towards the surface. The highest abundance of Dall's porpoise is near the shelf break due to the availability of prey; however, they are found over the continental shelf adjacent to the slope and over oceanic waters 2,500 m or deeper. Throughout most of the eastern North Pacific they are present during all months of the year, although there may winter movements out of areas of ice like Prince William Sound and the Bering Sea or onshore-offshore movements along the west coast of the continental U.S. (Muto et al., 2021). Depending on morphology/type, geography, and seasonality, they have inshore-offshore and north-south migration patterns (NOAA, 2021d).

Dall's porpoises typically give birth between June and September, and the calves and their mothers will live separate from main porpoise herds for a period of time. They will generally travel in groups of 10 to 20 individuals and can occur in groups with over hundreds of individuals (Wells, 2008). These groups appear to be fluid as they form and break-up during play and feeding. They emit low-frequency clicks that are presumably used for echolocation and are attracted to fast moving vessels, which they will commonly bow ride alongside (NOAA, 2021d).

The Alaska Stock of Dall's porpoise relevant to this project area is protected under MMPA but is neither threatened nor endangered under ESA.

4.2.3 Killer Whale (*Orcinus orca*)

The killer whale is the largest member of the dolphin family. They are predominantly black with patches of white under the jaw, near the eye, and from the ventral area to the flanks. They can often be identified individual by the saddle area behind their dorsal fin, which can reach up to 1.8 m in males but generally does not exceed 0.9 m for females. Adult male killer whales can grow up to 8.2 m and 6,033 kg while the females average 7 m and weigh almost half as much. They generally dive 3 to 50 min., but the duration varies often depending on the activity (Zimmerman and Small, 2008).

The NMFS is reassessing the killer whale stock structure due to new genetic information. Under the current structure, there are 8 killer whale stocks recognized in the Pacific U.S. Exclusive Economic Zone. The stocks from this zone that overlap with the project area are identified as the Eastern North Pacific Alaska Resident Stock (Alaska Resident Stock) and the Eastern North Pacific Gulf of Alaska, Aleutian Islands, and Bering Sea Transient Stock (GOA/AI/BS Transient Stock). The Alaska Resident Stock occurs from Southeast Alaska to the Aleutian Islands and Bering Sea. The COA/AI/BS Transient Stock occurs mainly from Prince William Sound through the Aleutian Islands and Bering Sea.

Killer whales occur in all oceans and seas of the world and at higher densities within the productive colder waters of high latitudes. They are most common in coastal areas at the high latitudes but do occur offshore and in tropical waters as well. They seasonal migration patterns often associated with the increase in prey availability (Forney and Wade, 2006). The killer whale will typically migrate northward in spring as the pack ice retreats and southward in fall as the ice advances (Zimmerman and Small, 2008). In the North Pacific Ocean, killer whales will tend to travel in groups, called pods. Larger pods are likely the temporary grouping of smaller, more stable groups. Evidence has suggested that are long-term associations between individuals and little dispersion from the maternal group of a female and her offspring (Baird, 2000). Pods will vary greatly in size due to behavioral differences, prey availability, and number of killer whales in the area (NOAA, 2021j).

There are three ecotypes in the North Pacific Ocean: resident, offshore, and transient. Many killer whale populations and ecotypes are sympatric but do not interact or interbreed; additionally, they are genetically distinct and demonstrate different behavioral characteristics, ecology, and morphology, and food habits (Forney and Wade, 2006). Resident and offshore killer whales have rounder dorsal fins compared to transients. (NOAA, 2021j). When comparing movement, residents tend to have more predictable movements and the smallest home ranges and they return annually, whereas transients are less predictable due to their larger home ranges and quick transits through local areas. Offshore ecotypes have the largest home ranges that are generally farther offshore compared to the other two ecotypes. (Zimmerman and Small, 2008).

Killer whales reproduce slowly. The birth rate was estimated to be 4 to 5 percent annually. The gestation period has been estimated to be 16 to 18 months. (Zimmerman and Small, 2008). Calving and weaning data is largely limited. Calving has shown high variability but occurs year-around with most births appearing between the fall and spring in the North Pacific. The calving interval in Prince William Sound was observed as a range of 4 to 10 years (Baird, 2000).

Killer whales are known as top carnivores with no known predators, and they are opportunistic feeders who feed cooperatively within their pods. Killer whales have been known to prey on fish, marine mammals, river otters, squid, and birds. Pod hunting strategy will differ depending on the prey. When hunting large marine mammals, like other whales, killer whales may attack from several angles as a small pack of 2 to 8 individuals. Comparatively, larger sized pods will hunt schools of fish together where smaller killer whales may swim close to shore and drive the fish towards the rest of the pod. This is reflective of differences between killer whale ecotypes. For offshores, there is limited data, but they appear to prey primarily on fishes, including sharks, and have been seen in large groups (Zimmerman and Small, 2008). Resident killer whales live in large, stable groups ranging normally from 5 to 50 individuals and up to 100 or more. They feed only on fish, especially Pacific salmon. Transient killer whales, on the other hand, hunt marine mammals, like pinnipeds and porpoises, in smaller groups of 10 individuals or less (Forney and Wade, 2006).

There is not reliable data for determining a population trend for the either the Alaska Resident Stock or GOA/AI/BS Transient Stock. Except the AB pod, the Alaska Resident Stock killer whales that summer in the Kenai Fjords and Prince William Sound showed trends of increase in 2003. As for the GOA/AI/BS Transient Stock, the population was thought to be stable in 2012 based off photographic data collected since 1984. (Muto et al., 2021). Humans are the main threat to killer whales. As a top carnivore, they are not the prey of other marine mammals. Whaling, commercial fishing, illegal shooting, pollution, and other human direct impacts are the biggest threat the killer whale populations (Zimmerman and Small, 2008). The Alaska Resident Stock and GOA/AI/BS Transient Stock of killer whale are both protected under MMPA, but neither are endangered nor threatened under ESA.

4.2.4 Harbor Porpoise (*Phocoena phocoena*)

The harbor porpoise tends to occur in shallow, coastal temperate and subarctic waters that are typically 60°F (15°C) or lower in temperature (Schmale, 2008). They tend to be seen in shallow water less than about 100 m (330 ft) in the nearshore areas but have been sighted in deeper offshore water (Muto et al., 2021). There appears to be a linear correlation between abundance and depth. As depth increases, it seems that abundance of harbor porpoises decreases (Barlow, 1988). Commonly found in bays, estuaries, harbors, and fjords no more than 200 m (650 ft) deep, the harbor porpoises in the North Pacific are found from Japan north to the Chukchi Sea and from Point Conception of California north to the Beaufort Sea and throughout the Aleutian Islands (NOAA, 2021g). They appear to go into deeper offshore occasionally in winter (Schmale, 2008).

Harbor porpoises are often seen alone but can form groups of about less than 10 individuals (Schmale, 2008). Most mating appears to occur in summer with most births occurring in May and July (NOAA, 2021g). They do not appear to be panmictic, and it is suggested by genetic analysis that their restricted movement results in genetic differences. Thus, the Alaska stock structure of harbor porpoise is defined by geographic areas and includes the Bering Sea stock that occurs throughout the Aleutian Islands and all waters north of Unimak Pass (Muto et al., 2021). There is not much data on sightings of the harbor porpoise in the Aleutian Island chain.

The Bering Sea Stock of Harbor Porpoise are protected under MMPA but are neither threatened nor endangered under ESA.

4.2.5 Pacific White-sided Dolphin (*Lagenorhynchus obliquidens*)

Pacific white-sided dolphins are pelagic and prefer temperate waters of the North Pacific Ocean. They commonly occur in deep offshore waters and along the continental margins (NOAA, 2021o). They are also known to enter inshore passes of Alaska although they occur less commonly in nearshore areas (Muto et al., 2021). Generally, the northern extent of their range extends into the Gulf of Alaska and west to Amchitka Island in the Aleutians, which is east of the project area (Clark, 2008b). In the eastern North Pacific, they can be found from the southern Gulf of California, north to the Gulf of Alaska, west to Amchitka in the Aleutian Islands, and is sometimes encountered in the southern Bering Sea (Muto et al., 2021).

Their movement pattern is not very well understood in most areas. However, in the summer, the Pacific white-sided dolphin has been seen in the Aleutians and the Gulf of Alaska. Whether the individuals were part of a local North Pacific stock or migrated in from the California/Oregon/Washington stock is not clearly known (Clark, 2008b). The Pacific white-sided dolphin mates and will give birth from late spring to fall, except in the central Pacific where calves are born in late winter to spring. When diving to feed, they can stay underwater for more than 6-min. (NOAA, 2021o). Pacific white-sided dolphins are sociable by nature and can be found traveling in multi-species herds consisting of thousands of marine mammals. However, most commonly they will be in groups of several hundred that contain all age classes and both sexes (Clark, 2008b).

The North Pacific Stock of the Pacific white-sided dolphin is protected under MMPA and is neither threatened nor endangered under ESA.

Due to their extremely low abundance and that most are observed east of Amchitka Island, takes are not being sought for this species in this IHA application.

4.2.6 Sperm Whale (*Physeter macrocephalus*)

Sperm whales have a worldwide distribution and occur in the Northern and Southern Hemispheres. However, their distribution is patchy, with high abundance in areas including Hawaii, Alaska, and the western coast of the U.S. (Jaquet and Whitehead, 1996). Sperm whales can dive for over 2 hours (average of 20 to 50 min.) in water deeper than 200 m (655 ft) making them hard to locate and survey (King, 2008). They tend to occur offshore in submarine canyons at the edge of the continental shelf in water 1,000 m (3,300 ft) deep (Jaquet and Whitehead, 1996). They are capable of diving to depths of over 10,000 ft for over 60 min. and only required to go to the surface for several minutes to breathe and recover for their next dive (NOAA, 2021q).

The movement of sperm whales is largely dictated by gender and age (King, 2008) and is linked to its social structure. In tropical and subtropical waters at latitudes less than 40ºN, the groups generally consist of adult females and juveniles of both sexes year-round. Adult males will move towards higher latitudes after leaving these groups and are often the whales seen in the Aleutians. The largest males can be discovered at the highest latitudes. The adult male sperm whale tends to only return to tropical and subtropical regions to breed (Whitehead, 2009). During breeding season, a male may leave its “bachelor school” temporarily for a few hours at a time before returning. The group of female and juveniles is also known as “breeding school” and can consist of hundreds of individuals, while the males will tend to form their bachelor schools with up to 5 individuals. Female sperm whales appear to give communal care to young sperm whales as they maintain the breeding schools even after breeding season.

In the North Pacific, rather than a north to south migration, there is indication of an east to west movement between Alaska, Japan and the Bonin Islands. (King, 2008). Females thought to remain in tropical and temperate waters year-round have been caught above 50ºN and as far as

62ºN in the western Bering Sea and Western Aleutian Islands, and adult male sperm whales were found in Bering Sea and waters around the Aleutians during the summer. Alaska Fisheries Science Center's Marine Mammal Laboratory (MML) conducted a survey during the summers of 2001 and 2010. In the survey, the sperm whale was the most frequently sighted large cetacean in the Central and Western Aleutian Islands coastal waters. Nonetheless, seasonality detections on the movement of Sperm Whales in Alaska were still consistent with the hypothesis that sperm whales generally move to higher latitudes in summer and to lower latitudes in winter. Whaling data has found that historically males and females concentrated seasonally along oceanic frontal zones, like the subarctic frontal zones (approximately 40-43°N). Males concentrated seasonally near the Aleutian Islands and the approximate distribution of sperm whales in the North Pacific Ocean includes along the Bering Sea shelf edge (Muto et al., 2021). In 12 cetacean sighting surveys from 2001 to 2007 and 2009 to 2010 along the Aleutian Islands, 393 sightings of adult male sperm whales were sighted (Figure 4-1

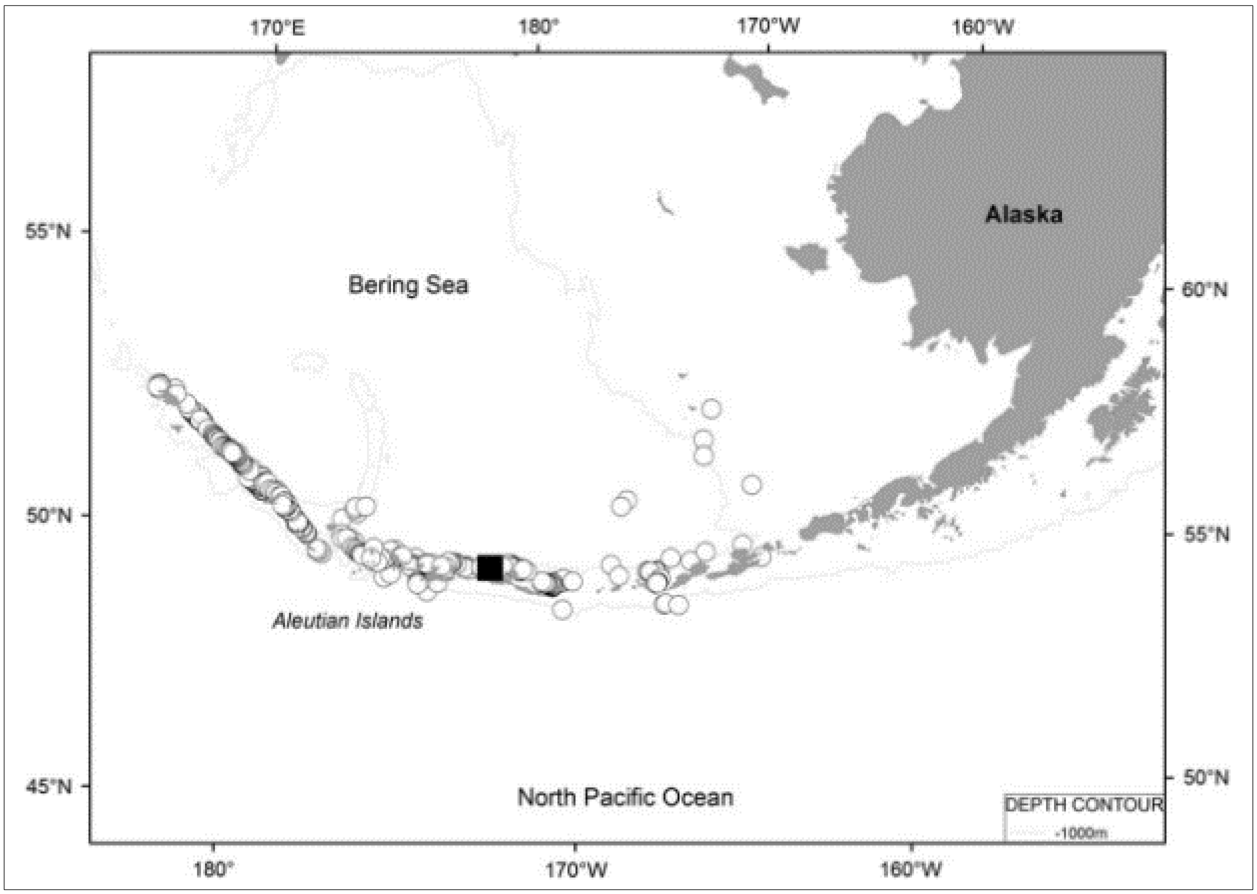


Figure 4-1). Additionally, a mixed group of female and immature sperm whales was sighted (Fearnbach et al., 2012).

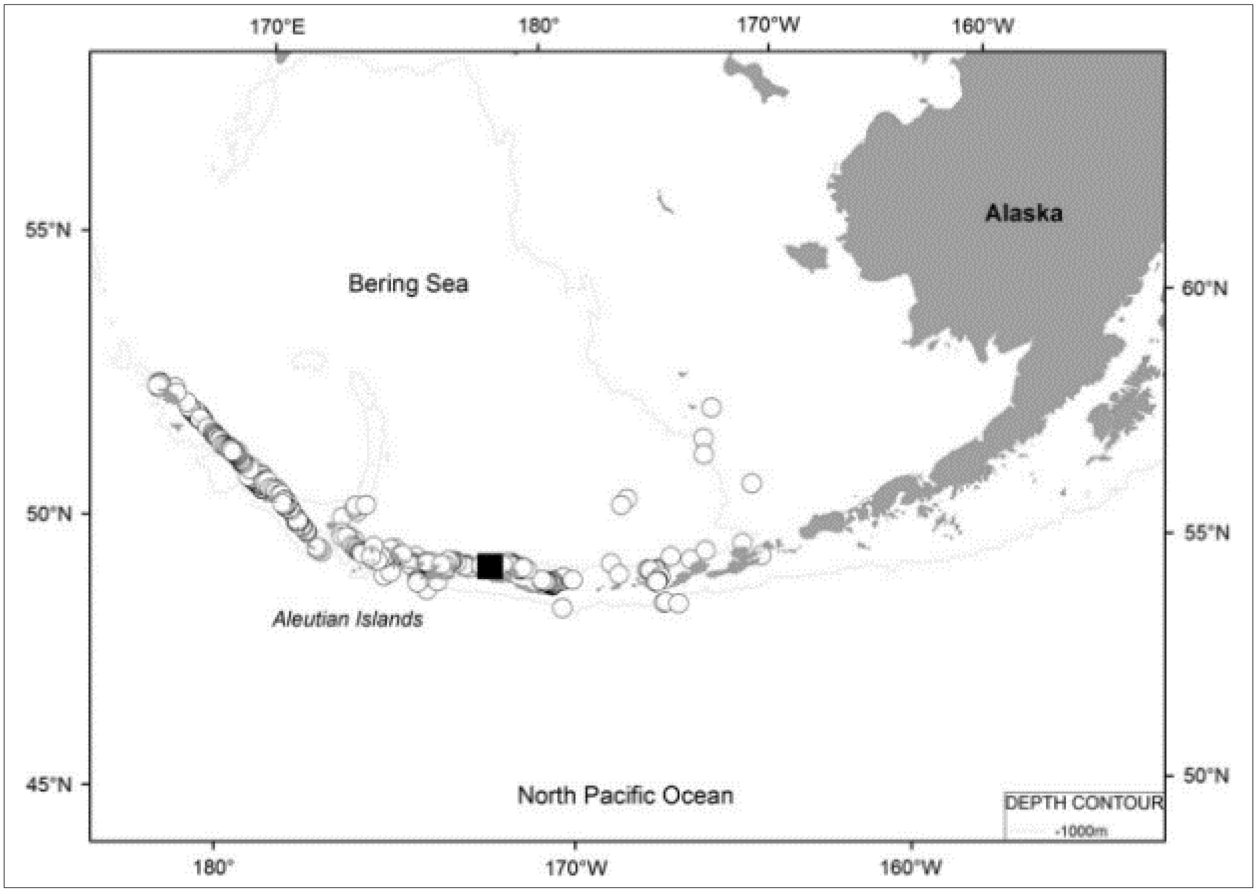


Figure 4-1. Sperm Whale Sightings from 2001-2007 and 2009-2010 (Fearnbach et al., 2012)

Open circles in
Figure **4-1** are adult male sperm whale sightings whereas the darkened square represents an incident where a mixed group of female and immature sperm whales was sighted. The red star is approximate location of Shemya Island in the Western Aleutians.

In a sea otter survey conducted in 2003, 2 sperm whales were observed when a survey was being conducted at Attu Island in July (Doroff et al., 2004). More recent research indicates sperm whales are relatively nomadic, and their movements are linked to geographical and temporal variations in the abundance of their prey, pelagic squids (Muto et al., 2021). Sperm whales also use echolocation to feed in the nearly lightless areas of the ocean and use repetitive clicks to communicate with other whales (King, 2008).

The North Pacific Stock is the only sperm whale stock relevant to the project area. It is listed as protected and depleted under MMPA and endangered under ESA.

4.2.7 Stejneger's Beaked Whale (*Mesoplodon densirostris*)

Stejneger's beaked whale can be found in the subarctic and cool-temperate waters of the North Pacific Alaskan waters that surround the Aleutian Islands. Near the central Aleutian Islands, pods of 3 to 15 Stejneger's beaked whales have been sighted on a few occasions. It lies principally between 50° and 60°N to about 45°N in the eastern Pacific and about 40°N in the western Pacific (Muto et al., 2021). This whale is rarely sighted at sea, but they have been detected acoustically in the Aleutian waters in summer, fall, and spring (Baumann-Pickering et al., 2014). Acoustic signals believed to be produced by Stejneger's beaked whales (based on frequency characteristics, interpulse interval and geographic location) were recorded 2 to 5 times a week in July off Kiska Island (Muto et al., 2021).

The whale will typically make 5 to 6 shallow dives followed by a longer dive that lasts 10 to 15 min. (NOAA, 2021r). Stejneger's beaked whale commonly occurs in 750 m (2,500 ft) to 1,500 m (5,000 ft) along or beyond the continental slope. It is speculated that calving is from April to May and that their movements may be migratory in nature. Notable behavior of Stejneger's beaked whales is their use of echolocation to locate prey and to gain information about their environment. They also demonstrate avoidance and shy behavior when encountering boats (Guerrero, 2008c). Most data on Stejneger's beaked whale have been collected and inferred from stranded individuals. While in the Aleutian Islands most strandings occur in the Central Aleutians, there was a stranding of an adult male Stejneger's beaked whale on the southeast coast of Shemya Island on September 1, 2005 (Savage et al., 2021; Figure 4-2).

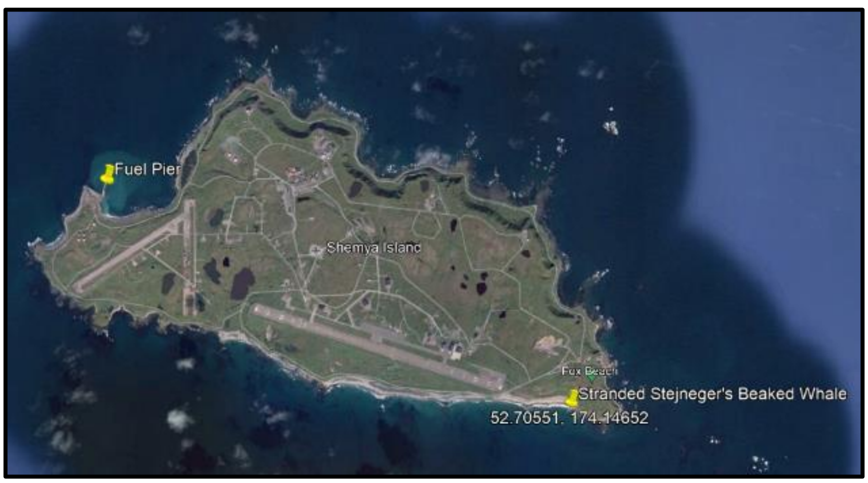


Figure 4-2. Stranded Stejneger's Beaked Whale on Shemya Island in 2005

The Stejneger's beaked whale Alaska Stock is the relevant stock to the project area. Its status is protected under MMPA and is neither endangered nor threatened under ESA.

4.3 *Otariidae*

This section includes the species that fall under the *Otariidae* family of *Pinnipedia* comprised of eared seals.

4.3.1 Northern Fur Seal (*Callorhinus ursinus*)

Northern fur seals occur from southern California north to the Bering Sea and west to the Sea of Okhotsk and Honshu Island, Japan. They are found from about 32°N to the central Bering Sea (Zimmerman and Jemison, 2008). Their preferred land sites, like haulouts, tend to be rocky or sandy islands beaches and are used by northern fur seals mainly for resting, molting, reproduction, and rearing their young (NOAA, 2021n). Most of the worldwide population will concentrate on the Pribilof Islands in the southern Bering Sea during breeding season May to August. The remaining northern fur seals will occur on rookeries in Russia, on Bogoslof Island, on San Miguel Island, and on the Farallon Islands during breeding season. Males will haulout for the duration of breeding season, and sometimes until November while adult females will be ashore from about June to November (Muto et al., 2021).

Adult northern fur seals will spend more than 300 days per year (about 80 percent of their time) at sea (NOAA, 2021n), and usually haulout only due to being sick or injured outside breeding season (Zimmerman and Jemison, 2008). Both genders will migrate south after breeding season; although, females will move much further south than males. Adult females will move throughout the Aleutian Islands to the North Pacific Ocean and often to offshore Oregon and California waters with their pups (Muto et al., 2021). Their movements follow the movements of the Alaska Gyre and North Pacific Current (Ream et al., 2005). Adult males will usually only migrate as far as the Gulf of Alaska or Kuril Islands (Muto et al., 2021) and are thought to spend most of their time in the Bering Sea and North Pacific Ocean along the Aleutian Islands (NOAA, 2021n). Tracked adult male fur seals that were tagged on St. Paul Island in the Bering Sea in October 2009 (Sterling et al., 2014). Pups are born during summer and leave rookeries in the fall (October to early December) in Alaska for about 22 months. The pups travel through Aleutian passes during those 22 months at sea before returning to a rookery that is typically also their island of origin (Muto et al., 2021).

The Eastern Pacific stock of concern for the project area ranges from the Pribilof Islands and Bogoslof Island in the Bering Sea during summer to California during winter. Northern fur seals are a mostly solitary when at sea and nocturnal hunters (NOAA, 2021n). As nocturnal hunters, they hunt mostly at night and may dive to depths of 180 m (600 ft) in search of prey that changes they migrate, principally due to the changing abundance of prey (Zimmerman and Jemison, 2008). Studies indicate they forage in colony-specific areas and around oceanographic features like eddies, convergence-divergence zones, and frontal boundaries due to availability of prey (NOAA, 2021n).

The northern fur seal Eastern Pacific Stock is protected and depleted under MMPA but is neither endangered nor threatened under ESA.

4.3.2 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 kg with a body length of 3.25 m but can weigh up to 1134 kg with a body length up to 3.35 m. Adult females average 263 kg and 2.64 m but can weigh up to 363 kg with a body length up to 2.90 m (Zimmerman and Rehberg, 2008b; NOAA, 2021s).

There are two Stellar 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, 2021s). 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 Federal Register (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, 2008b). Most Steller sea lions occupy rookeries or haulouts during breeding season which occurs late-May to July. There are major haulouts near Shemya 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 km of land in depths less than 400 m and most frequently at 150 to 250 m where there is a high density of prey (Wiles, 2015).

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, 2021s).

Steller sea lions are central place foragers, which means they will forage prey in foraging areas before returning 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, 2008b).

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% increase from 2002 to 2018. However, the Western U.S. DPS in the Western Aleutian Islands Region where the project will take place showed a 6.47% decrease for the same survey (Muto et al., 2021). The potential factors contributing to the population decline of the Western U.S. DPS in the Western Aleutian Islands Region when the overall population showed an increase are environmental variability, competition with fisheries, predation by killer whales, toxic substances, incidental take with fishing gear, Alaska native subsistence harvest, illegal shooting, entanglement in marine debris, disease and parasites, disturbance from vessel traffic and tourism, and disturbance due to research activities (NMFS, 2008).

4.4 *Phocidae*

This section includes the species that fall under the *Phocidae* family of *Pinnipedia* comprised of seals with hair and lacking external ears.

4.4.1 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 kg (Kinkhart et al., 2008). Male harbor seals tend to be larger than females and weigh up to 129 kg; in addition, harbor seals in Alaska will generally be larger than harbor seals in the Atlantic Ocean (NOAA, 2021h).
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).

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, 1,875 harbor seals were observed by skiff-based surveys in the Western Aleutians. Compared to an aerial survey conducted in 1999, there was an 86 percent decrease in harbor seal population (Small et al., 2008). Specific counts from these surveys at the Western Aleutians Near Islands locations are shown in Table 4-1. along with counts from a 2003 survey that was conducted for sea otters in Table 4-2.

Table 4-1. Harbor Seal 1997 to 1992 and 1999 Survey Counts

Location	Latitude	Longitude	1997 to 1992 Survey Count (July 5 to 18, 1979)	1999 Survey Count (August 6 to 15, 1999)
Attu Island	52º 55'N	172º 55'N	913	120
Agattu Island	52º 26'N	173º 36'N	294	67
Alaid Island	52º 45'N	173º 54N	205	43
Nizki Island	52º 44'N	173º 59'N	103	21
Shemya Island	52º 43'N	174º 07'N	116	8
Shemya Pass Group	52º 43'N	174º 07'N	222	0

(Small et al., 2008)

Table 4-2. Harbor Seal Counts from July 2003 Sea Otter Survey

Location	Harbor Seals
Attu Island	105
Agattu	7
Alaid	22
Nizki	4
Shemya Island	2

(Doroff et al., 2004)

Harbor seals are generally considered non-migratory (Muto et al., 2021) and are associated with nearshore coastal waters (less than 25 km from land). However, they will make trips of up to 100 km off 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 km) compared to pups (up to 373 km) and juveniles (up to 499 km) (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 m and less than 4 min. long but can dive down to about 500 m and for over 20 min. (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 -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.

4.4.2 Ribbon Seal (*Histriophoca fasciata*)

Ribbon seals are distributed throughout the North Pacific Ocean and adjacent parts of the Arctic Ocean. In Alaskan waters, ribbon seals range covers the North Pacific Ocean and Bering Sea into the Chukchi and western Beaufort seas with predominant occurrence in the Bering (Muto et al., 2021). As an ice seal, the ribbon seal relies on the pack ice for feeding, resting, and pupping. Because ribbon seals are unable to maintain a breathing hole through more than 10 to 15 cm (4 to 6 in.) of sea ice, they are primarily in ice that is unconsolidated to allowing surfacing between ice floes. They are concentrated in open sea in summer and in the packed ice during winter (Nelson, 2008). Specially, they are found along the ice pack of the Bering Sea ice front from late March to early May with the highest concentration in the northern part of the ice front in the central and western parts of the Bering Sea (Muto et al., 2021). Ribbon seals give birth to pups on the pack ice between April and mid-May (Nelson, 2008). As the ice front moves, the ribbon seals move with it northward in May and mid-July and concentrate more in the Bering Strait and southern park of the Chukchi Sea (Muto et al., 2021). Once melted, in the summer, the ribbon seal will move out and spend most of their time in the open sea, and there is very little data on what occurs during this time. However, it is likely that the majority of ribbon seals remain in the Bering Sea during this time.

The National MML tagged 10 ribbon seals captured in the Russian Bering Sea and along the Kamchatka Peninsula coast in 2005. The movement of the ribbon seals showed most of the ribbon seals stayed in the eastern and central Bering Sea during the summer and fall with one individual who traveled the southside of the Aleutian Island chain (Muto et al., 2021; Nelson, 2008). Another satellite tagging event of 72 ribbon seals in the central Bering Sea from 2007 to 2010, showed 21 seals (29 percent) moved to the Bering Strait, Chukchi Sea, or Arctic Basin as the ice retreated northward; however, the other 51 tagged seals did not pass north of the Bering Strait. The 72 ribbon seals tagged in the central Bering Sea and the 10 ribbon seals tagged near Kamchatka dispersed widely and occupied coastal areas and the middle of the Bering Sea on and off the continental shelf (Muto et al., 2021).

Ribbon seals haulout far from the edge on ice, leave pups alone on ice for extended periods of time, and do not leave when humans or boats pass by. This indicates a lack of predation some other species encounter. They are usually solitary marine mammals, especially in the open sea; however, congregations occur loosely around favorable areas during whelping (birthing), pupping, and molting seasons in the spring (NOAA, 2021p). Population estimates are difficult to calculate due to their remote habitats and time spent in open water where they cannot be seen (Nelson, 2008). Nonetheless, the Alaska Stock relevant to the project area, is not listed as threatened or endangered under ESA, but they are listed as protected under MMPA.

Due to their extremely low abundance and that most are observed outside of the project area, takes are not being sought for this species in this IHA application.

4.5 Critical Habitat

There is critical habitat for the following species with population stocks whose ranges extend into the project area: Steller sea lion, North Pacific right whale, and humpback whale. Only the critical habitat of the Steller sea lion has critical habitat within the project area. Thus, only the Steller sea lion's critical habitat will be discussed in-depth within this section.

Steller Sea Lion 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 km landward.
- Air zone: extends 0.9 km above the terrestrial zone.
- Aquatic zone: extends 37 km (20 nm) seaward on State and Federally managed waters west of 144º West longitude

The 6 major haulouts and rookeries near the project site are listed in Table 4-3 and shown in Figure 4-3. However, the project site is only within 20 nm of two haulouts: Shemya Island Major Haulout and Alaid Island Major Haulout. The approximate straight-line distance of the 2 haulouts from project site are about 2.75 nm east (Shemya Island Major Haulout) and 5 nm northwest (Alaid Island Major Haulout). The other haulouts and rookeries shown were included because the underwater noise may transverse into the 20 nm boundary of the major haulout. Steller sea lion observations and usage data at these haulouts during June through July from 2015 to 2017 are represented in Table 4-4 along with the straight-line distance (in nm) and direction of the rookery/haulout from the project site. Based off survey results and locations of known rookeries and haulouts, there are likely to be Steller sea lions within 20 nm of the project area. However, the number of Steller sea lions within the immediate work area for the project is likely to be low as the survey data from USACE Marine Mammal Surveys, ERDC, and Fairweather PSO Project Monitoring data (Section 4.7) showed only 18 total Steller sea lions were observed. Also, although 225 Steller sea lions were observed over 3 years at the Alaid Major Haulout 2015 to 2017 surveys, 0 Steller sea lions were observed at Nizki Island and Shemya Island.

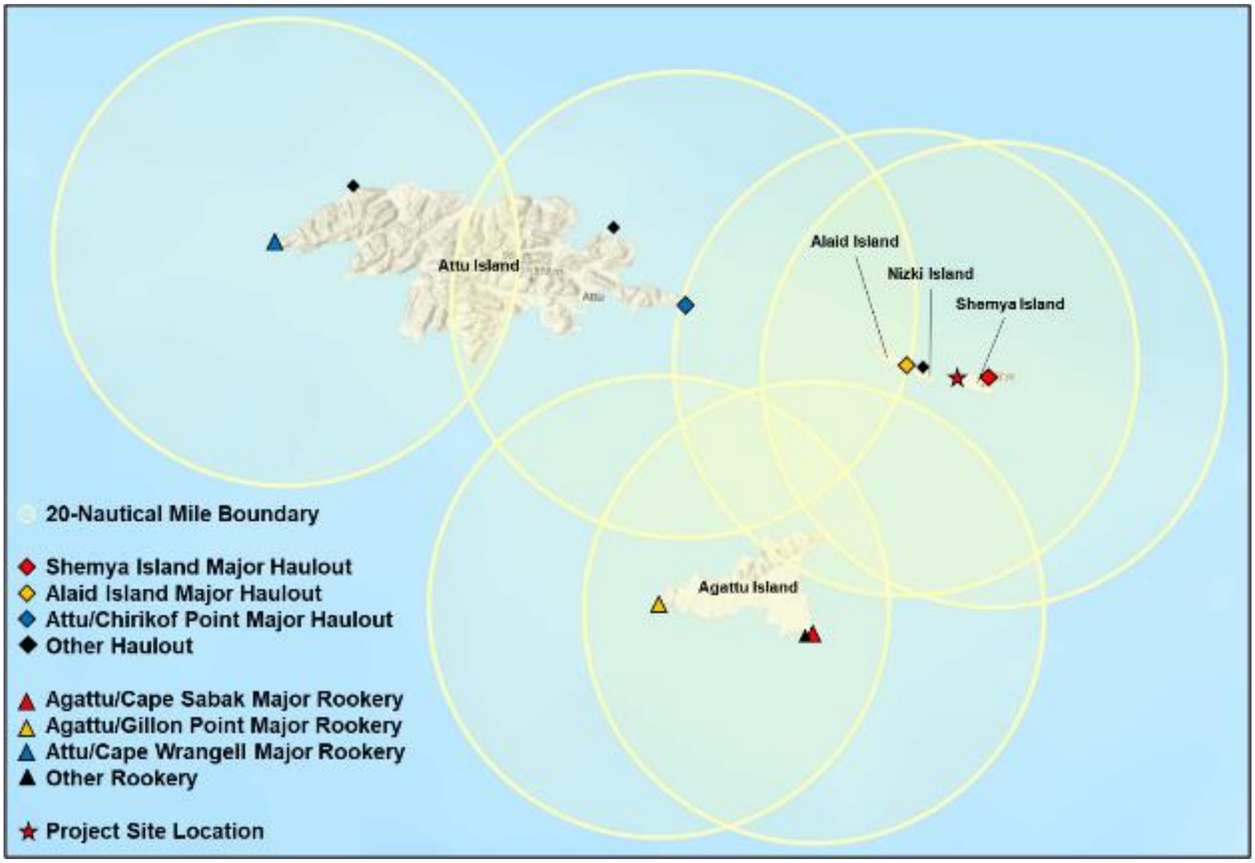


Figure 4-3. Steller Sea Lion Critical Habitat Near the Project Area

Table 4-3. Steller Sea Lion Location Data of Major Haulout/Rookery Sites

Description	Coordinates	From Project Site	
		Straight-Line Distance (nm)	Direction
Project Site (Pier)	52 43.7N, 174 03.9E	-	-
Shemya Island Major Haulout	52 44.0N, 174 09.0E	~2.75	E
Alaid Island Major Haulout	52 45.0N, 173 56.5E	~5	NW
Attu/Chirikof Point Major Haulout	52 49.7N, 173 25.6E	~24	NW
Attu/Cape Wrangell Major Rookery	52 45.5N, 172 28.5E	~60	NW
Agattu/Cape Sabak Major Rookery	52 23.5N, 173 43.55E	~25	SW
Agattu/Gillon Point Major Rookery	52 24.0N, 173 21.5E	~32	SW

(50 CFR Part 226, 2020)

Table 4-4. Steller sea lion June/July 2015-2017 Survey Results

Location	Habitat Type	Year	Non-pup	Pup	Survey Year Total	2015-2017 Total
Agattu/Cape Sabak	Major Rookery	2015	95	43	138	491
	Major Rookery	2016	116	42	158	
	Major Rookery	2017	141	54	195	
Agattu/Gillon Point	Major Rookery	2016	174	100	274	274
Agattu/Kohl Island	Other Rookery	2016	3	0	3	3
Alaid	Major Haulout	2015	59	0	59	225
	Major Haulout	2016	66	14	80	
	Major Haulout	2017	78	8	86	
Attu/Kresta Point	Other Haulout	2016	0	0	0	0
Attu/Cape Wrangell	Major Rookery	2015	88	0	88	262
	Major Rookery	2016	132	42	174	
Attu/Chichagof Point	Other Haulout	2017	15	0	15	134
	Other Haulout	2015	51	0	51	
	Other Haulout	2016	68	0	68	
Attu/Chirikof Point	Major Haulout	2015	1	0	1	1
	Major Haulout	2016	0	0	0	
Nizki*	Other Haulout	2016	0	0	0	0
Shemya	Major Haulout	2016	0	0	0	0
	Major Haulout	2017	0	0	0	

(Fritz et al., 2015; Sweeney et al., 2016; Sweeney et al., 2017)

The special aquatic foraging areas in Alaska for the Steller sea lion (Shelikof Strait area, Bogoslof area, and Seguam Pass area) are not within the project area.

4.6 Hearing Ability

Table 4-5 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. However, in this section, the marine mammals the commonly occur in the vicinity of the Proposed Project (humpback whale, killer whale, harbor seal, and Steller's sea lion) will be discussed more in detail.

Table 4-5. Species by Hearing Group

Hearing Group	Species	Generalized Hearing Range
Low-Frequency (LF) Cetaceans	Blue whale	7 Hz to 35 kHz
	Fin whale	
	Humpback whale	
	Gray whale	
	Minke whale	
	North Pacific right whale	
Mid-Frequency (MF) Cetaceans	Baird's beaked whale	150 Hz to 160 kHz
	Killer whale	
	Sperm whale	
	Stejneger's beaked whale	
	Pacific white-sided dolphin	
High-Frequency (HF) Cetaceans	Dall's porpoise	275 Hz to 160 kHz
	Harbor porpoise	
Phocid Pinnipeds (PW)	Harbor seal	50 Hz to 86 kHz
	Ribbon seal	
Otariid Pinnipeds (OW)	Northern fur seal	60 Hz to 39 kHz
	Steller sea lion	

(NMFS, 2018)

4.6.1 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 min. 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 does not change behavior in survey (Fleming and Jackson, 2011).

4.6.2 Killer Whale

The killer whale is a toothed whale and falls under the mid-frequency cetaceans hearing group. This hearing group has a generalized hearing range of 0.15 to 160 kHz (NMFS, 2018). Killer whales are sensitive to frequencies of 0.5 to 105 kHz (Bain et al., 1993). Their range of best hearing is 18 to 42 kHz (Deeke et al. 2004).

Killer whales produce various calls. The most commonly produced calls are echolocation clicks, pulsed calls, and whistles. Typically, echolocation clicks are used for foraging and navigation while pulsed calls and whistles are used for social interactions. These calls are important to group social dynamics and can be population or pod specific (Holt et al., 2011).

Between the killer whale ecotypes, there are variations in communication behavior due to hearing ability overlap with their prey and difference in habitat. The hearing range overlap between marine mammal-eating transient killer whales and their prey is greater than fish-eating resident killer whales and their prey. This leads to a greater ecological cost to transients when they vocally communicate, because it alerts their prey increasing the difficulty to hunt. On the other hand, resident killer whales feed mostly on salmonids that mostly cannot detect their vocalizations. Because of the difference in ecological cost, transients produce calls less frequently than residents. A study showed resident whales make 0.34 calls per minute compared to the 0.05 calls per minute of transients. Transients are usually silent except when they are milling after a kill (0.27 calls per minute) or surface-active (0.63 call per minute). Additionally, the calls of resident killer whales can be heard over many miles unlike the fainter calls of transient killer (Deeke et al. 2004).

Resident killer whales also have a higher minimum noise figure than transient killer whales. This is likely due to their low-frequency hearing range prey in addition to the amount of ship noise in their habitat. Typically, vessel traffic is much higher in habitats resident killer whales occupy. This ship noise can mask killer whale calls and lead to increase call duration (Foote and Nystuen, 2007).

4.6.3 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, 2021h). True seals have a generalized underwater hearing ability of 0.05 to 86 kHz (NMFS, 2018).

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 to 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).

4.6.4 Steller Sea Lion

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 kHz to 39 kHz (NMFS, 2018). One study conducted on an individual Stellar 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 was on underwater sensitivities of a male and female Steller sea lion. The male best underwater hearing range was 1 to 16 kHz. The female maximum hearing sensitivity was 16 to 25 kHz. The results could have been due to sexual dimorphism or individual differences. Aerial and underwater vocalizations are likely used for social functions during territorial behavior, breeding, and 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).

4.7 Survey Information

Specific data regarding frequency of occurrence of the affected species is available from three sources as summarized within this section.

4.7.1 USACE 2021 Marine Mammal Survey at Shemya Island

USACE Civil Works Environmental Resource Section conducted marine mammal surveys, specifically for this application's project during the months of May through October 2021 at EAS, Shemya Island, Alaska. The purpose of the survey was to gain data on marine mammal occurrence within and around the project area during the expected timeframe of the Proposed Project (April to October). The area was typically monitored 4 to 5 days each month from April to October expect for April and August. The goal of the survey was to gain observation data to fill data gaps for when determining the requested take numbers of marine mammals. During the surveys, the area around Shemya Island would be monitored using naked eye, binoculars (10x42), and scope (20 to 60x). The consolidated monitoring data from these surveys are displayed in Figure 4-4 and Table 4-6.

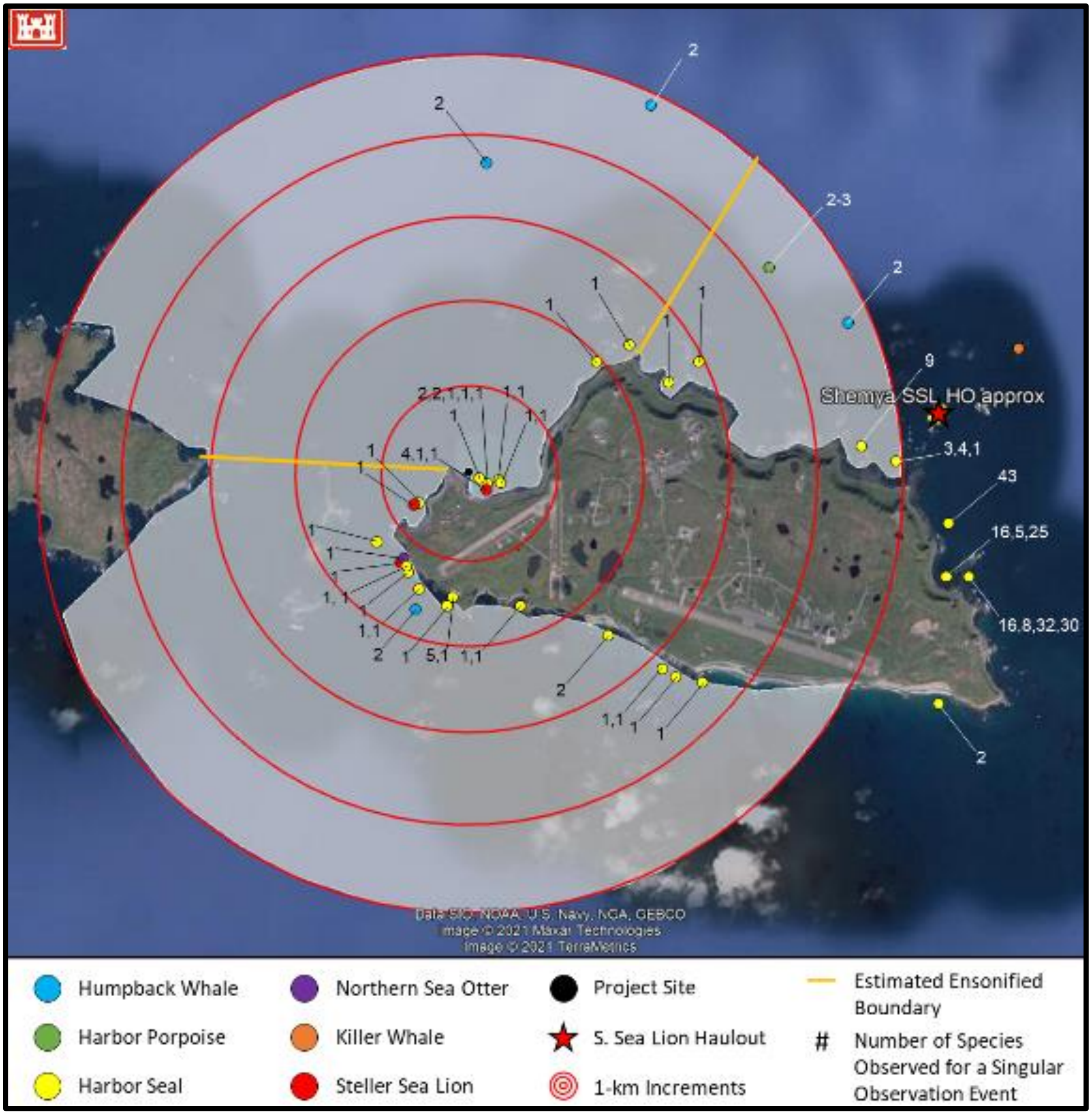


Figure 4-4. Consolidated USACE 2021 Marine Mammal Survey Observations Figure

Table 4-6. Consolidated USACE 2021 Marine Mammal Survey Observation Counts

Species	2021 Observation Counts					Total Observations
	May 20-23	June 16-20	July 16-20	September 23-30	October 25-28	
Harbor Porpoise	0	0 (2-3)	0	0	0	0 (2-3)
Harbor Seal	0 (25)	0 (65)	2 (3)	12 (97)	0 (28)	14 (218)
Humpback Whale	0	4	0 (2)	0 (2)	0	4 (4)
Northern Sea Otter	0 (2)	0	0	0	0	0 (2)
Killer Whale	0	0	0	0 (8)	0	0 (8)
Steller Sea Lion	6 (1)	0 (1)	0	0	0	6 (2)
Total Monthly Counts	6 (28)	4 (68-69)	2 (5)	12 (107)	0 (28)	24 (236-237)

(#) indicates numbers observed outside of the ensonified range and boundaries

The project area overlaps with Steller sea lion critical habitat, but only low numbers were observed. It is important to note that observations for the Steller sea lion occurred in or very near the project location on the westside of the island within Shemya Pass and Alcan Harbor. Harbor seals were the most commonly and consistently observed mammal around Shemya Island. Although they were typically hauled out on the eastside of the island in large numbers, they were observed alone or in pairs all around the island, likely foraging for prey. The other marine mammals observed, humpback whales, killer whales, and harbor porpoise were mostly north of the island towards the Bering Sea. Pairs of humpback whales and 2 to 3 harbor porpoises were seen within the estimated range construction noise will travel. No killer whales were observed within this range, but a pod of 8 killer whales did occur to the northwest of the island during September. Within the noise boundary, 75 to 76 marine mammals were survey. An additional 185 marine mammals were observed outside the noise boundary. Combined, 260 to 261 marine mammals were observed around Shemya Island.

4.7.2 ERDC Marine Mammal Surveys

The USACE Engineer Research Development Center (ERDC) conducted island-wide faunal surveys between 2016 and 2020 with additional Steller sea lion surveys in summer and fall 2021 (Neipert and Fischer, 2019a, 2019b, 2020 and 2021). The survey sectors used on ERDC surveys are shown in Figure 4-5. Of these survey sectors, only sectors A-C will be subject to underwear noise from construction from the proposed project. These marine mammal surveys were part of a larger effort to categorize faunal presence including birds and terrestrial mammals.

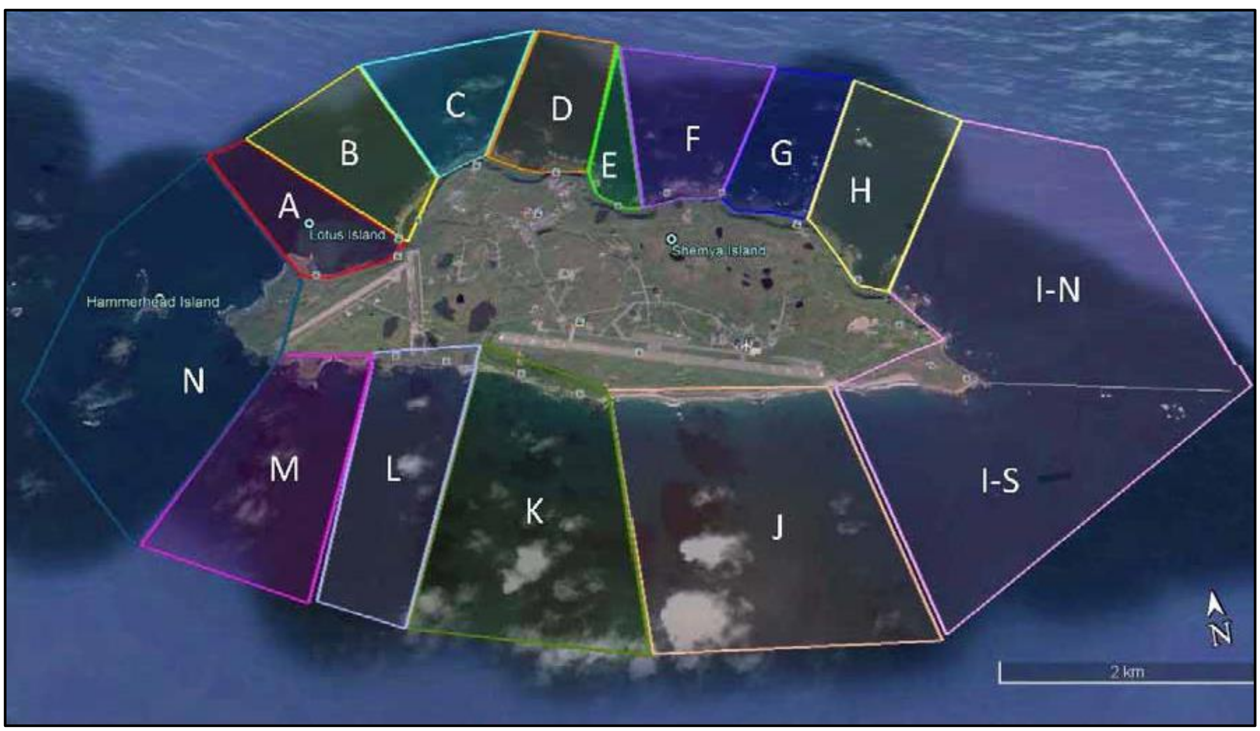


Figure 4-5. Survey Sectors used on ERDC Surveys

Survey data are shown in Table 4-7 through Table 4-9. Observations in Sectors A-C are shown in red. In all, 35 surveys over the entire island shoreline were completed between spring 2016 and summer 2021. The total number of marine mammals observed during these surveys in the combined areas of Sectors A-C is three Steller sea lions, two orcas, two harbor seals, and three unidentified seals. These data show that there are very few marine mammals in these three zones despite extensive surveys during three seasons of over a period of five years.

Table 4-7. Marine Mammal Observations during 2016-2013 Spring Beach Surveys in and around EAS, Shemya Island, Alaska

Date	Species	Area															
		A	B	C	D	E	F	G	H	I-N	I-S	J	K	L	M	N	Total
Spring 2019																	
05/05	Steller Sea Lion				14			14									28
05/18	Steller Sea Lion						1	12									13
05/23	Steller Sea Lion	1						7									8
05/05	Harbor Seal													9		1	10
05/13	Harbor Seal						1						2				3
05/18	Harbor Seal				17				15	4				16			52
05/23	Harbor Seal			1	15			2	21	5				7		2	53
05/18	Orca									10		3					13
05/23	Orca					3			1								4
05/23	Sperm Whale				4												4
Spring 2018																	
05/15	Steller Sea Lion							20									20
05/20	Steller Sea Lion			1	1			36									38
05/26	Steller Sea Lion							15									15
05/15	Harbor Seal				8				31	1				10	1		51
05/20	Harbor Seal				10				42	3		1	3	2			61
05/26	Harbor Seal				13			3	15	2			1		2		36
05/26	Orca						8										8
Spring 2017																	
05/07	Steller Sea Lion						25										25
05/12	Steller Sea Lion							20									20

Date	Species	A	B	C	D	E	F	G	H	I-N	I-S	J	K	L	M	N	Total
05/18	Steller Sea Lion							20	1								21
05/07	Harbor Seal					2							2				4
05/12	Harbor Seal				4			16				2				10	32
05/18	Harbor Seal				13				35					6			54
05/07	Whale sp.					1											1
Spring 2016																	
05/21	Steller Sea Lion					18			4								22
05/27	Steller Sea Lion								2								2
05/21	Harbor Seal				20					22				6		1	49
05/27	Harbor Seal									24				11			35
05/21	Sea Otter															4	4
05/27	Sea Otter															2	2
05/20*	Whale sp.										2						2
05/21	Whale sp.															1	1

*Observation collected during non-beach survey.

Table 4-8. Marine Mammal Observations during 2016-2019 Autumn Beach Surveys in and around EAS, Shemya Island, Alaska

Date	Species	A	B	C	D	E	F	G	H	I-N	I-S	J	K	L	M	N	Total
Autumn 2019																	
09/15	Steller Sea Lion							1				1					2
09/29	Steller Sea Lion							58									58
10/05	Steller Sea Lion															1	1
09/15	Harbor Seal				14				42					6			62
09/20	Harbor Seal				22				30	2	1	4		1			60

Date	Species	Area															
		A	B	C	D	E	F	G	H	I-N	I-S	J	K	L	M	N	Total
09/29	Harbor Seal													8			8
10/05	Harbor Seal												2				2
09/20	Unknown Phocoenidae			3													3
Autumn 2018																	
09/10	Steller Sea Lion							39									39
09/10	Harbor Seal				2		1		1								4
09/22	Harbor Seal	1			9			1	24	1			2			1	39
09/29	Harbor Seal				3	1			65					2		12	83
09/10	Orca			2													2
Autumn 2017																	
09/27	Steller Sea Lion							3									3
10/07	Steller Sea Lion											1					1
10/17	Steller Sea Lion						1	2									3
09/27	Harbor Seal							25		1				11			37
10/07	Harbor Seal				34			1	36	1				2			74
10/17	Harbor Seal				24				17	1			17				59
Autumn 2016																	
09/06	Harbor Seal					7				42							1
09/11	Harbor Seal					13											13
09/16	Harbor Seal							1								1	2
09/23	Harbor Seal				10			24				1		7	1		43
09/11	Orca								6								6

Table 4-9. Marine Mammal Observations during 2018-2020 Winter Wildlife Surveys in and around EAS, Shemya Island, Alaska

Date	Species	Area															
		A	B	C	D	E	F	G	H	I-N	I-S	J	K	L	M	N	Total
Winter 2018-2019																	
01/03	Steller Sea Lion				1												1
01/09	Harbor Seal								26	4					1	6	37

Date	Species	Area															
		A	B	C	D	E	F	G	H	I-N	I-S	J	K	L	M	N	Total
01/09	Harbor Seal				20				34							1	55
01/15	Harbor Seal				22				53					3		19	97
Winter 2019-2020																	
01/05	Steller Sea Lion											1					1
01/12	Steller Sea Lion	1															1
12/31	Harbor Seal				36	1			39					1			77
01/05	Harbor Seal				12		1	3	15					2		27	60
01/12	Harbor Seal								17	1			1	1		23	43
01/12	Sea Otter													1			1
01/05	Orca												6	4			10
01/05	Unknown Whale										10						10

4.7.3 Fairweather PSO Project Monitoring Data

The PSOs hired by Fairweather collected observation data while monitoring for marine mammals during emergency repair Pier construction from 24 June 2021 to 23 August 2021. Emergency repairs that included underwater welding, power washing, debris removal, drilling, jack hammering, and excavation. This is the same site where the long-term repairs will occur, so the dates and location coincide with the Proposed Project and are thus relevant. The PSOs were trained observers with extensive experience in both the Atlantic and Pacific Oceans. The data they collected included notes on the behavior of marine mammals and their movements in and out of exclusion zones. Observations were conducted from land vantage points using the naked eye or 7x50 binoculars. Table 4-10 summarizes the counts of marine mammals observed during project construction.

Table 4-10. 2021 Emergency Repair Marine Mammal Observation Data Summary

Species	2021 Observation Counts			Total Observations
	June 24–30	July 1–31	August 1–23	
Harbor Seal	2	22	14	38
Humpback Whale	0	2	1	3
Killer Whale	16	12	39	67
Steller Sea Lion	2	4	1	7
Unidentified Whale	0	2	5	7
Total Monthly Counts	20	42	60	122

Killer whales and harbor seals were the most commonly occurring marine mammals within viewing range from the project area. Killer whales were observed in pods from 3 to 16 marine mammals while the harbor seals were all seen traveling or foraging solo near the project site.

The unidentified whales were about 5,000 or more meters from the project site making it difficult to discern the species. The Steller sea lions were often looking towards the Pier when observed in the area. Harbor seals generally hauled out when observed in the area, but they also looked towards the Pier.

5.0 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.

The USAF requests the issuance of an IHA pursuant to Section 101(a)(5) of the MMPA for incidental take by Level B harassment of fourteen species (humpback whale, fin whale, gray whale, minke whale, blue whale, harbor porpoise, Dall's porpoise, harbor seal, Steller sea lion, killer whale, Baird's beaked whale, Stejneger's beaked whale, Northern fur seal, and sperm whale) and Level A take of eight species (humpback whale, fin whale, gray whale, minke whale, blue whale, harbor porpoise, Dall's porpoise, harbor seal) that may occur in the EAS Fuel Pier Replacement harassment zones during construction.

The activities outlined in Section 1 have the potential to take marine mammals through exposure to in-water sound. Level B take of the fourteen species listed above will potentially result from noise associated with pile installation and removal using the methods mentioned above (vibrating, impacting, and DTH drilling). Pile driving will be shut down if species enter or appear likely to enter Level A shutdown zones for pile driving activities (see Table 11-1), thereby decreasing potential Level A take of marine mammals. However, zones where Level A take could occur are larger than the Level B zones for LFC, HFC and more than or close to the Level B zone for phocid pinnipeds during 30" and 42" impact pile driving. Section 11 describes mitigation measures including shutdown zones and procedures that will prevent Level A takes, except for the species for which Level A take is requested.

The applicant requests an IHA for incidental take of marine mammals described within this application for 1 year, beginning on April 1, 2024 (or the issuance date, whichever is later). The applicant is not requesting a Letter of Authorization (LOA) at this time because the activities described herein are expected to be completed within 1 year from the date of authorization and are not expected to rise to the level of serious injury or mortality, which would require an LOA.

6.0 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.

6.1 Estimated Take

Incidental take is estimated for each species considering the following:

1. Acoustic thresholds above which NMFS believes marine mammals will be behaviorally harassed or incur some degree of permanent hearing impairment;
2. The size of the action area (the area of water that will be ensonified above acoustic thresholds in a day);

3. The density or occurrence of marine mammals in the action area;
4. The number of days of pile driving and removal activity.

Protected Species Observer data, USACE surveys, and available scientific literature are used to estimate the density or occurrence of marine mammals in the action area. Incidental take is being requested for each species that was observed during on-site surveys. Additionally, take is being requested for species that may be in the area infrequently in low numbers due to the size of the isopleths, the duration of the pile driving and the limited ability to monitor the full extent of the Level B zones due to the geography and typical sea conditions.

To obtain more accurate Level B take estimations, we estimated an hourly occurrence probability of each marine mammal species in the action area rather than a weekly or daily estimation, since pile driving activities would not be occurring over an entire day but rather over a certain number of hours. Occurrence probability estimates are based on conservative density approximations for each species and factor in historic data of occurrence, seasonality, and group size in near and offshore of Alcan Harbor.

Assumptions for these hourly estimations were that common species (Steller sea lion, harbor seal) would have about one to two group sightings per day in the 16,345 m Level B zone (the largest zone, which is for 42” pile by vibratory hammer), and infrequent species would have far fewer sightings which varied for each species (Table 6-1). In these estimations, a sighting does not equal one animal; a sighting equals one group of each particular species. To standardize observation estimates across species, these numbers were distilled down to obtain the hourly occurrence probability for each species. Additionally, one day was equated to 12 hours rather than 24 hours to obtain a rough estimate of observations during daylight hours when pile driving and project activities would be occurring, and to obtain more conservative estimates of species occurrence.

Table 6-1. Group Sighting Occurrence Estimate

Species Occurrence in the Action Area		**Group Sighting Occurrence Estimate**			
		Monthly	Weekly	Daily	Hourly
Observed	Humpback whale	24	6	0.86	0.07
	Steller sea lion	30	7.5	1.07	0.09
	Harbor seal	48	12	1.71	0.14
	Killer whale	7	1.75	0.25	0.02
	Harbor porpoise	3	0.75	0.11	0.01
Possible	Fin whale	0.5	0.125	0.02	0.002
	Minke whale	0.5	0.125	0.02	0.002
	Baird’s beaked whale	0.2	0.05	0.01	0.001
	Dall’s porpoise	0.5	0.125	0.02	0.002
	Sperm whale	2	0.5	0.07	0.006
	Stejneger’s beaked whale	0.2	0.05	0.01	0.001
	Northern fur seal	1	0.25	0.04	0.003

Using the hourly occurrence probability for a species group, we multiplied by the estimated group size and by the number of hours of all pile driving activities for total take estimate (Table 6-2):

$$Estimated\ Take\ = \\ Hourly\ Group\ Sighting\ Occurrence\ \times Average\ Group\ Size\ \times Hours\ of\ Pile\ Driving\ Activity$$

Table 6-2. Take Estimates

Species	Occurrence Information	Level B Take Calculations	Level A Take Calculations
Humpback whale (LFC)	• Infrequently observed from Shemya • More frequent in summer months • Group size (2 whales) is based on limited on-site observations	Humpback whale hourly sighting estimate = 0.07, average group size = 2. Pile driving time = 1,101 hours minus Level A takes of 9. 0.07 x 2 x 945 = 154 – 23 = 131 **Level B takes = 131.**	Based on an adjusted hourly occurrence for the large LFC isopleth for 42" impact and DTH driving time. 0.028 x 2 x 156 hours = 9 Level A takes by impact 42". 0.01 x 2 x 624 = 14 Level A takes from DTH 42". **Level A takes = 23.**
Fin whale (LFC)	• Not observed in surveys, but possible due to range • Group size of 8 is a conservative estimate for fin whales	Fin whale hourly sighting estimate = 0.002, average group size = 8. Pile driving time = 1,101 hours minus Level A takes of 3. 0.002 x 8 x 1,101 = 17 – 3 = 14 **Level B takes =14.**	Based on an adjusted hourly occurrence for the large LFC isopleth for 42" impact and DTH driving time. 0.0008 x 8 x 156 hours = 1 Level A take by impact 42". 0.0003 x 8 x 624 = 1.5 Level A takes from DTH 42". **Level A takes = 3.**
Minke whale (LFC)	• Not observed in surveys, but possible due to range • Group size of 3 is a conservative estimate for minke whales	Minke whale hourly sighting estimate = 0.002, average group size = 3. Pile driving time = 1,101 hours minus Level A takes of 1. 0.002 x 3 x 1,101 = 7 – 1 = 6. **Level B takes = 6.**	Based on an adjusted hourly occurrence for the large LFC isopleth for 42" impact and DTH driving time. 0.0008 x 3 x 156 hours = 0.4 Level A take by impact 42". 0.0003 x 3 x 624 = 0.6 Level A takes from DTH 42". **Level A take = 1.**
Harbor porpoise (HFC)	• Infrequently observed from Shemya • Group size of 1 is common	Harbor porpoise hourly sighting estimate = 0.01, average group size = 1. Pile driving time = 1,101 hours minus Level A takes of 2. 0.01 x 1 x 1,101 = 11 – 2 = 9 **Level B takes = 6.**	Based on an adjusted hourly occurrence for the large LFC isopleth for 42" impact and DTH driving time. 0.0008 x 3 x 156 hours = 0.4 Level A take by impact 42". 0.0003 x 3 x 624 = 0.6 Level A takes from DTH 42". **Level A take = 1.**
Dall's porpoise (HFC)	• Infrequently observed from Shemya • Group size of 15 is common	Dall's porpoise hourly sighting estimate = 0.002, average group size = 15. Pile driving time = 1,101 hours minus Level A takes of 6. 0.002 x 15 x 1,101 = 33 – 6 = 27 **Level B takes = 27.**	Based on an adjusted hourly occurrence for the large LFC isopleth for 42" impact and DTH driving time. 0.001 x 15 x 156 hours = 2.25 Level A takes by impact 42". 0.0004 x 15 x 624 = 3.6 Level A takes from DTH 42". **Level A take = 6.**

Species	Occurrence Information	Level B Take Calculations	Level A Take Calculations
Harbor seal (phocid pinniped)	• Common near Alcan Harbor in the Level A zones • Group size is typically 1	Harbor seal hourly sighting estimate = 0.14, average group size = 1. Pile driving time = 1,101 hours minus Level A takes of 56. 0.14 x 1 x 1,101 = 154 – 56 = 98 **Level B takes = 98.**	Based on an adjusted hourly occurrence for the large LFC isopleth for 42” impact and DTH driving time. 0.03 x 1 x 156 hours = 47 Level A takes by impact 42”. 0.014 x 1 x 624 = 9 Level A takes from DTH 42”. **Level A take = 56.**
Steller sea lion (otariid pinniped)	• Common near Alcan Harbor • Group size is typically 1 • As an otariid, Level A zones are very small.	Steller sea lion hourly sighting estimate = 0.09, average group size = 1. Pile driving time = 1,101 hours. 0.09 x 1 x 1,101 = 99 **Level B takes = 99.**	**0**
Northern fur seal (otariid)	• Possible near Alcan Harbor • Group size is typically 10 • As an otariid, Level A zones are very small.	N fur seal hourly sighting estimate = 0.003, average group size = 10. Pile driving time = 1,101 hours. 0.003 x 10 x 1,101 = 33 **Level B takes = 33.**	**0**
Killer whale (MFC)	• Observed infrequently near Alcan Harbor • Group size is typically 8 • As an MFC, Level A zones are very small.	Killer whale hourly sighting estimate = 0.02, average group size = 8. Pile driving time = 1,101 hours. 0.02 x 8 x 1,101 = 176 **Level B takes = 176.**	**0**
Baird’s beaked whale	• Possible near Shemya • Group size is typically 10 • As an MFC, Level A zones are very small.	Baird’s beaked whale hourly sighting estimate = 0.001, average group size = 10. Pile driving time = 1,101 hours. 0.001 x 10 x 1,101 = 11 **Level B takes = 11.**	**0**
Stejneger’s beaked whale	• Possible near Shemya • Group size is typically 8 • As an MFC, Level A zones are very small.	Stejneger’s beaked whale hourly sighting estimate = 0.001, average group size = 8. Pile driving time = 1,101 hours. 0.001 x 8 x 1,101 = 9 **Level B takes = 9.**	**0**
Sperm whale (MFC)	• Observed infrequently near Shemya • Group size is typically 4 • As an MFC, Level A zones are very small.	Sperm whale hourly sighting estimate = 0.006, average group size = 4. Pile driving time = 1,101 hours. 0.006 x 4 x 1,101 = 27 **Level B takes =27.**	**0**

Level A take is also requested for LFC, HFC, and phocid pinnipeds given their frequency in the action area, the large Level A zones for LF, HF cetaceans and phocid pinnipeds, the possibility they may not be seen in the water before pile driving could be shut down, their long dive durations, and the fact that Level A isopleths for certain pile driving activities extend beyond the calculated level B zone for that activity. For instance, the Level A zones for 42-inch impact pile driving are 6,571 m, 7,827 m, and 3,517 m for LFC, HFC, and phocid pinnipeds, respectively. Two of these Level A zones are larger than the Level B Zone for 42" impact of 3,745 meters. The Level A take calculations are based on the occurrence estimate for the species in the largest Level B zone (16,345 meters) reduced by a factor for each smaller Level A isopleth. For example, the Level A isopleth for LFCs during impact pile driving of 42-inch steel piles is 6,571 meters, so Level B estimates are multiplied by a factor of 0.4 (6,571/16,345 = 0.4). This factor (0.4) is multiplied by the hourly occurrence rate of the Level B zone to get the occurrence rate of the Level A zone for certain impact and DTH pile driving. This number is multiplied by the group size and then by the hours of the appropriate pile driving activity. For example, for fin whales the hourly occurrence rate is 0.002 multiplied by 0.4 (the factor presented above for 42" impact pile driving for LFCs) and then by the group size of 8 and the hours of 156 for 42" impact pile driving. This yields 1 Level A take by 42" impact pile driving. A similar process, with a factor of 0.15 and 624 hours, yields 1.5 Level A takes for fin whales by 42" DTH pile driving. Together, this is rounded up to 3 Level A takes for fin whales. This process was carried out to assess all Level A takes.

Level A takes are sought for all HFC and all LFC species covered in this application. Level A takes for LFCs are possible due to the size of the Level A zones for 42" impact pile driving (6,571 meters) and DTH (2,550 meters). Based on conditions typical conditions near Shemya, it seems prudent to have Level A takes authorized due to the size of these zones. The intent is for PSOs to shut down these activities prior to an LFC entering these zones, but the take allocations are sought because it is possible to miss seeing these whales until they are already in the zone.

Level A takes were also sought for phocid pinnipeds (harbor seals in this IHA application) for both 42" impact pile driving and 42" DTH. The 42" impact zone is 3,517 meters and is very large just as is the case for HFC and LFC species. The Level A zone for 42" DTH for harbor seals is only 1,365 meters, but field experience has routinely demonstrated that harbor seals have a way of showing up near an observer without detection at farther distances. With their low profile and any chop on the water it is simply easy to miss them until they are close. While the intent will be to stop work to avoid any Level A takes, having some authorized seems prudent given the nature of the work and the species characteristics.

Level A takes are not requested for any MFC or otariid pinnipeds due to their small Level A zones.

6.2 All Marine Mammal Take Requested

This analysis for the EAS fuel pier replacement predicts the following Level B takes: 119 potential takes of non-ESA listed and 12 potential takes of ESA listed humpback whales, 14 potential takes of fin whales (ESA), 6 potential takes of minke whales, 9 potential takes of harbor porpoises, 27 potential takes of Dall's porpoise, 98 potential takes of harbor seals, 99 potential takes of Steller sea lions (ESA), 176 potential takes of killer whales, 11 potential takes of Baird's beaked whales, 9 potential takes of Stejneger's beaked whales, 33 potential takes of northern fur seals, and 27 potential takes of sperm whales (ESA). All of these potential takes would be classified as Level B harassment under the MMPA. Potential Level A takes are predicted for 23 humpback whales, 1 minke whale, 2 harbor porpoises, 6 Dall's porpoise, and 56 harbor seals. See Table 6-3.

Table 6-3. Take Requests for Marine Mammals and Percent of Stock

Species	Stock/DPS (N_{est})[a]	Level A[b]	Level B[b]	Percent of Stock[c]
Humpback whale	Western NP DPS (2%) (865)	0.5	3	Less than 1
	Mexico DPS (7%) (5,928)	1.6	9	Less than 1
	Central (Hawaii) DPS (91%) (7,891)	21	119	Less than 1
Fin whale	Northeast Pacific (2,554)	3	14	Less than 1
Minke whale	Alaska (unknown)	1	6	unknown
Harbor porpoise	Bering Sea (unknown)	2	9	unknown
Dall's porpoise	Alaska (83,400)	6	27	Less than 1
Harbor seal	Aleutian Islands (5,366)	56	98	2.9
Steller sea lion	Western U.S. (59,932)	-	99	Less than 1
Killer whale	Eastern N Pacific: Alaska Resident Stock (2,347)	-	132	5.6
	Eastern N Pacific: Aleutian Islands and Bering Sea Transient Stock (587)	-	44	7.5
Baird's beaked whale	Alaska (unknown)	-	11	unknown
Stejneger's beaked whale	Alaska (unknown)	-		unknown
Northern fur seal	Eastern Pacific (514,738)	-	33	Less than 1
Sperm whale	North Pacific (244)	-	27	11

[a] Stock estimate from Muto et al. 2022; Appendix 2 unless otherwise noted.
[b] Take estimates are weighted based on calculated percentages of population for each distinct stock, assuming animals present would follow same probability of presence in project area
[c] Percent of stock refers to combined Level B and Level A take (if requested).

7.0 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 increasing noise in and around Alcan Harbor or Shemya Pass to levels above the Level B harassment threshold. The project requires the use of heavy equipment to conduct pile driving to drive piles into the bottom, which 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 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 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 pile driving. The Level B harassment is temporary in nature, and project impacts associated with potential harassment will be temporary. Level A harassment (PTS) is intended to be avoided by the use of shutdown zones (mitigation measures), but it is not realistic to expect 100% success in shutting down given the large areas of some Level A zones, the sea conditions, dive durations and cryptic nature of some species. Some species are likely to be exposed to underwater noise that could result in PTS, but no mortality is expected from any Level A exposure. 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. 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).

7.2 Vessel Interactions

EAS Pier is the only pier on Shemya Island. It is used to facilitate supply and equipment drop off for USAF operations on the island and thus has limited traffic. Normally, fuel is delivered by barge in the spring and late summer and other deliveries of freight are irregular and infrequent. The purpose of this project is to repair storm damage and there is no plan to increase normal traffic to the dock due to the repairs, so there will be no long-term increase in vessel traffic. The project will temporarily increase the number of vessels using the Pier and the adjacent waters during construction. The potential increase of vessel interactions will be temporary and occur only during construction. A few barges and attendant tugs will be on site during construction and deliveries of construction materials will occur at the beginning of the project and during construction as needed. No take is anticipated from vessel interactions. Vessel collisions with marine mammals are unlikely given the slow speeds tug and towed barges typically travel (under 8 knots, usually 6-7 knots).

8.0 Anticipated Impact on Subsistence

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

8.1 Subsistence Hunting on Shemya Island

Currently, there is no subsistence hunting that occurs on Shemya Island.

8.2 Impact on Subsistence Hunting

The Proposed Project will not result in the death or serious injury of any marine mammal, but does have the potential to cause short-term, temporary impacts to pinnipeds and cetaceans exposed to sound levels above the Level B harassment threshold. 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. There is no subsistence hunting at Shemya Island at or near Alcan Harbor or Shemya Pass.

9.0 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

Anticipated noise level increase from project could cause marine mammals to avoid the area during the pile driving activities. The elevated noise level is the primary reason that marine mammals would leave the project area. The pile driving has the potential to increase underwater noise levels in a radius as large as 16.3 kilometers during 42” vibratory pile driving. Other construction methods lead to much smaller Level B radii. However, marine mammals are expected to avoid the area during pile driving rather than abandon the area. Some marine mammals may even be attracted to the area despite the background noise levels and pier activities. During fueling operations at EAS, Steller sea lions have been known to appear for unknown reasons.

9.2 Impact to Physical Habitat

Impacts to the physical habitat are expected to be minimal. The dock face will be extended about 12 feet seaward resulting in a small permanent loss of marine habitat. Armor rock placement will also alter or covert small amounts of habitat in or near areas that are currently disturbed.

9.3 Critical Habitat

There is designated critical habitat for WDPS Steller sea lions within the project area and it is described in detail in section 4.5. These sea lions could experience a temporary loss of suitable habitat in the action area for several hours per day of construction during spring, summer and fall of 2024 if elevated noise levels associated with in-water construction results in their displacement from the area. While the Shemya Island and Alaid Island major haulouts are within the 20 nm zone from the project, the haulouts themselves are not directly exposed to underwater noise from the project due to geographical masking from the landscape. The project would not impact the essential physical and biological features that make the area critical habitat for WDPS Steller sea lions, such as good water quality, prey availability, or open space for transiting and foraging for more than the duration of the 2024 construction season. The area is already somewhat impacted with vessels transiting through the area (resupply and commercial fishing), and critical habitat features would not be permanently altered, nor would it result long-term effects to the local population. No known rookeries or major haulouts would be impacted.

10.0 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.

The dock face will be extended about 12 feet seaward into area that is already disturbed, resulting in the loss of approximately 0.15 acres of marine habitat. Armor rock placement from the west side of the pier towards the wrecked fishing vessel will also affect about 0.3 acres of marine habitat by the placement of large rocks or dolos. Overall, impacts to physical habitat are expected to be negligible and occur in an area that has been developed since the early 1940s.

11.0 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.

Mitigation measures and construction techniques will be employed to minimize effects to marine mammal species and habitat. These measures are described below and presented in detail in the EAS Fuel Pier Replacement Project 4MP (Appendix A).

11.1 Mitigation Measures Designed to Reduce Project Impacts

The project uses the most compact design possible while meeting the demands of the vessels that would use the facility.

- The project uses a design that minimizes pile diameters, number of piles, and footprint to the greatest extent practicable.
- Design alternatives considered during the NEPA scoping process that would have greatly increased the project footprint and involved creation of a breakwater were eliminated from detailed consideration and design.

11.2 Oil and Spill Prevention

- The contractor will provide and maintain a spill cleanup kit on-site at all times, to be implemented as part of the Oil Pollution Emergency Plan for oil spill prevention and response.
- Fuel hoses, oil drums, oil or fuel transfer valves and fittings, and similar equipment would be checked regularly for drips or leaks and maintained and stored properly to prevent spills.
- Oil booms will be readily available for oil/fuel, or another containment should a release occur.
- All chemicals and petroleum products will be properly stored to prevent spills.

- No petroleum products, chemicals, or other deleterious materials will be allowed to enter surface waters.

11.3 Mitigation and Monitoring to Reduce Impacts to Marine Mammals

- The contractor is required to conduct briefings for construction supervisors and crews and the monitoring team prior to the start of all pile driving activity, and upon hiring new personnel, to explain responsibilities, communication procedures, the marine mammal monitoring protocol, and operational procedures.
- The contractor is required to employ PSOs during all in-water construction activities. PSOs will be third-party and not employees from the construction company.
- Marine mammal monitoring must take place starting 30 minutes prior to initiation of pile driving and end 30 minutes after completion of pile driving activity. Pile driving may commence when observers have declared the shutdown zone clear of marine mammals. In the event of a delay or shutdown of activity resulting from marine mammals in the shutdown zone (Table 11-1), their behavior must be monitored and documented until they leave of their own volition, at which point the activity may begin or resume.
- Pile driving must be halted or delayed If a marine mammal is observed entering or within an established shutdown zone (Table 11-1). Pile driving may not commence or resume until either: the animal has voluntarily left and has been visually confirmed beyond the shutdown zone; 15 minutes have passed without subsequent observations of small cetaceans and pinnipeds; or 30 minutes have passed without subsequent observations of large cetaceans.
- The contractor must use soft start techniques when impact pile driving. Soft start requires contractors to provide an initial set of strikes at reduced energy, followed by a thirty-second waiting period, then two subsequent reduced energy strike sets. A soft start must be implemented at the start of each day’s impact pile driving and at any time following cessation of impact pile driving for a period of thirty minutes or longer.
- The contractor will attempt to minimize the use of an impact hammer to the extent possible by utilizing a vibratory hammer to advance the piling as deep as possible prior to switching to impact driving.
- Pile installation and removal must be delayed or halted immediately if a species for which authorization has not been granted, or a species for which authorization has been granted but the authorized takes are met, is observed approaching or within the monitoring zone (Table 11-1). Activities must not start or resume until the animal has been confirmed to have left the area or the observation time period, as indicated in the conditions above, has elapsed.

11.4 Shutdown and Monitoring Zones

The USAF is requesting Level A and B takes described in detail in sections 6.1 and 6.2. The USAF is not requesting take for any other marine mammals. Shutdown and monitoring zones are described in the following sub-sections.

11.4.1 Level A Shutdown Zones

There will be a nominal 10-meter shutdown zone for construction-related activity where acoustic injury is not an issue. This type of work could include (but is not limited to) the following activities:

- positioning of the pile on the substrate via a crane (i.e., stabbing the pile);
- other over-water work that has the potential to harm marine mammals.

The contractor will implement additional shutdowns to protect marine mammals from Level A harassment and prevent auditory injury to all hearing groups during pile installation and removal project activities as shown in Table 11-1 and Figure 11-1. Level A take has been requested for several species (see section 6.1; mainly LFC, HFC and harbor seals for 42" impact and DTH) in those instances in which they occur within the Level A shutdown zone and are not visualized in time for the project to be shut down (Table 11-1 and Figure 11-1).

11.4.2 Level B Shutdown Zones

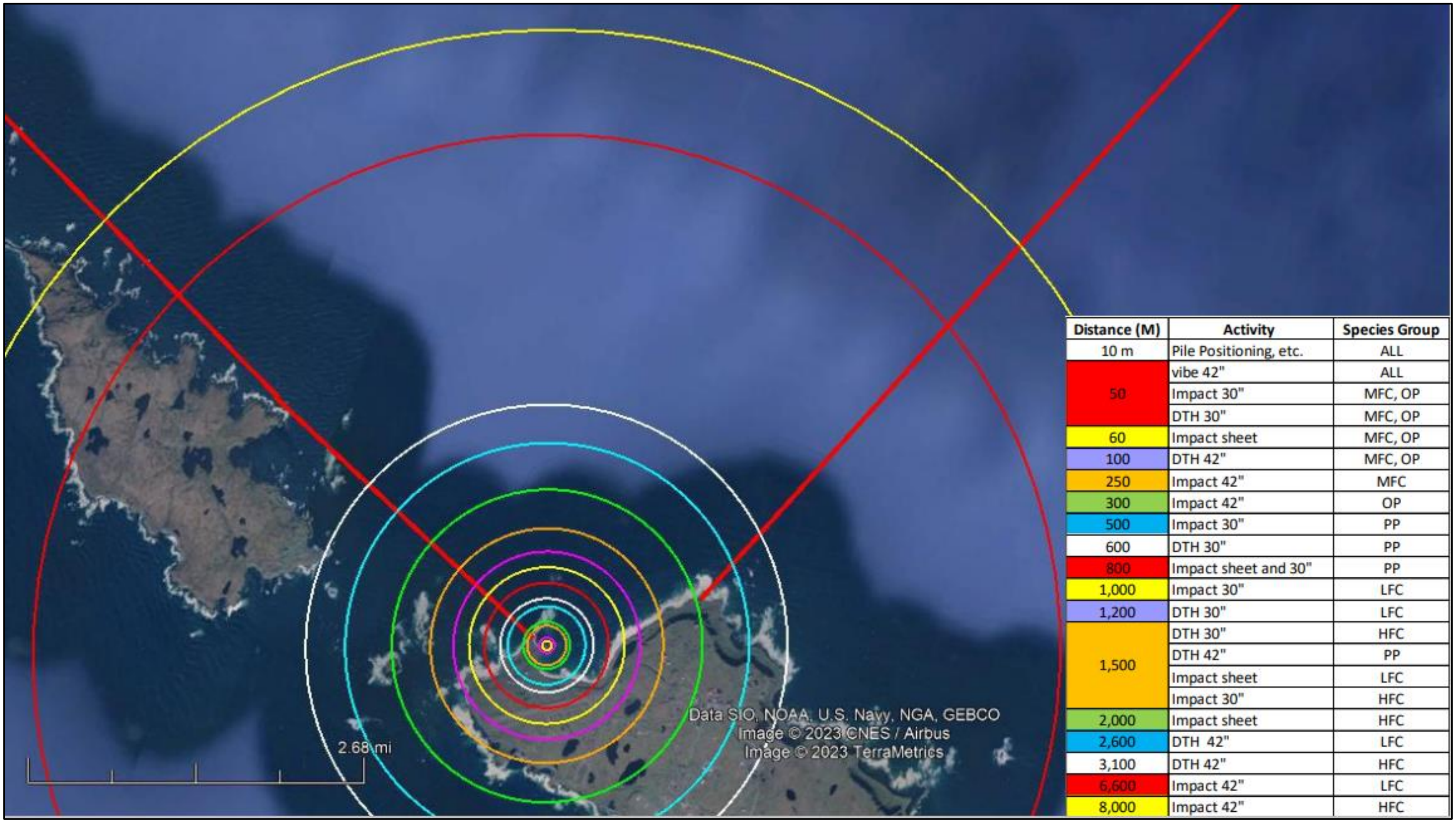
The USAF is requesting Level B takes as described in section 6.1 and 6.2. Shutdowns associated with Level B harassment of these species are not proposed. Calculated distances to Level B thresholds will reach their full extent; however, where land masses block sound transmission distances will be truncated. These zones are indicated with thick red lines projecting from shore in Figure 11-1 and Figure 11-2. The monitoring zones associated with Level B disturbance are outlined in Table 11-1 and Figure 11-2.

If species other than those listed above approach or appear likely to enter the Level B area, in-water work would be shut down. The only species not covered in this take request are ribbon seals, Pacific white-sided dolphins, and North Pacific right whales and the Western North Pacific Stock of gray whales. These species show up on a very generalized range map (NMFS Alaska Endangered Species and Critical Habitat Mapper Web Application) but are extremely unlikely to occur near Shemya. Shutdowns for the Level B zone (and the Level A zone, of course) would occur for these species as well as any other more obscure species of marine mammals that might enter these zones.

Table 11-1. Level A Shutdown and Level B Monitoring Zones

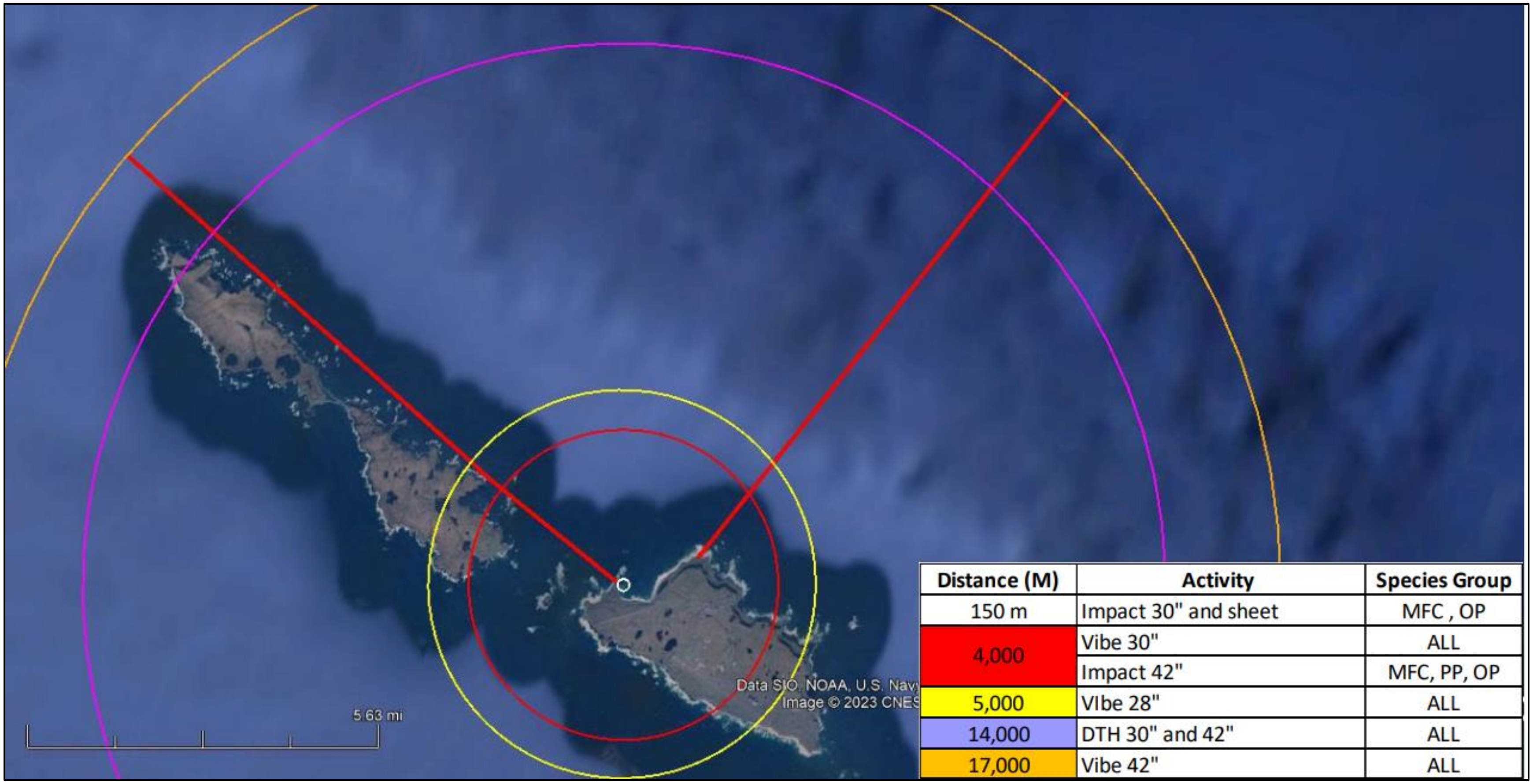
Activity	Received Levels at 10m	Distance (in meters, m) to Level A and Level B Thresholds					
		Level A					Level B
		Low-Frequency Cetaceans (LFC)	Mid-Frequency Cetaceans (MFC)	High-Frequency Cetaceans (HFC)	Phocid Pinnipeds	Otariid Pinnipeds	
In-Water Construction Activities							
Barge movements, pile positioning, etc.[1]	171-176 dB[2]	10	10	10	10	10	--
Vibratory Pile Driving/Removal (Values rounded up in parentheses will be used for simplicity)							
30-inch temp pile install (60 piles, ~60 minutes per day on 15 days)	159 RMS	5 (10)	0.4 (10)	7.4 (10)	3.1 (10)	0.2 (10)	3,981 (4,000)
30-inch temp pile removal (60 piles, ~60 minutes per day on 15 days)	159 RMS	5 (10)	0.4 (10)	7.4 (10)	3.1 (10)	0.2 (10)	3,981 (4,000)
42-inch perm pile install (208 piles, ~120 minutes per day on 52 days)	168.2 RMS	32.7 (50)	2.9 (50)	49.4 (50)	19.9 (50)	1.4 (50)	16,345 (17,000)
28-inch sheet pile install (44 sheets, ~120 minutes per day on 11 days)	160 RMS	5.9 (10)	0.5 (10)	8.7 (10)	3.6 (10)	0.2 (10)	4,492 (5,000)
Impact Pile Driving (Values rounded up in parentheses will be used for simplicity)							
30-inch temp pile install (44 piles, ~120 minutes per day on 11 days)	177 SEL/ 191 RMS	933.8 (1,000)	33.2 (50)	1,112.3 (1,500)	499.7 (500)	36.4 (50)	136 (150)
42-inch perm pile install (208 piles, ~180 minutes per day on 52 days)	186.7 SEL/ 198.6 RMS	6,570.9 (6,600)	233 (250)	7,827 (8,000)	3,516.4 (3,600)	256.0 (300)	3,745 (4,000)
28-inch sheet pile install (44 sheets, ~180 minutes per day on 11 days)	177 SEL/ 191 RMS	1,482.4 (1,500)	52.7 (60)	1,765.7 (2,000)	793.3 (800)	57.8 (60)	136 (150)
DTH Drilling							
30-inch temp pile install (44 piles, ~450 minutes per day on 15 days)	159 SEL/ 162 RMS	1,047.9 (1,200)	37.3 (50)	1,248.2 (1,500)	560.8 (600)	40.8 (50)	13,595 (14,000)
42-inch perm pile install (208 piles, ~540 minutes per day on 70 days)	164 SEL / 167 RMS	2,549.4 (2,600)	90.7 (100)	3,036.7 (3,100)	1,364.3 (1,500)	99.3 (100)	13,595 (14,000)

[1] This shutdown zone applies to all construction activities and is shown in Figure 11-1. Although acoustic injury is not the primary concern with these activities, shutdowns will be implemented to avoid impacts to species.
[2] Richardson et al. 1995; Kipple and Gabriele 2004



Distance (M)	Activity	Species Group
10 m	Pile Positioning, etc.	ALL
50	vibe 42"	ALL
	Impact 30"	MFC, OP
	DTH 30"	MFC, OP
60	Impact sheet	MFC, OP
100	DTH 42"	MFC, OP
250	Impact 42"	MFC
300	Impact 42"	OP
500	Impact 30"	PP
600	DTH 30"	PP
800	Impact sheet and 30"	PP
1,000	Impact 30"	LFC
1,200	DTH 30"	LFC
1,500	DTH 30"	HFC
	DTH 42"	PP
	Impact sheet	LFC
	Impact 30"	HFC
2,000	Impact sheet	HFC
2,600	DTH 42"	LFC
3,100	DTH 42"	HFC
6,600	Impact 42"	LFC
8,000	Impact 42"	HFC

Figure 11-1. Level A Shutdown Zones



Distance (M)	Activity	Species Group
150 m	Impact 30" and sheet	MFC , OP
4,000	Vibe 30"	ALL
	Impact 42"	MFC, PP, OP
5,000	VIbe 28"	ALL
14,000	DTH 30" and 42"	ALL
17,000	Vibe 42"	ALL

Figure 11-2. Level B Shutdown Zones

Note: Level A zones exceed Level B zones for all types of impact pile driving for LFC, HFC and PP.

12.0 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 Proposed Project. The project will take place on Shemya Island where there is no marine mammal subsistence hunting 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.

13.0 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 MMMP (Appendix A).

13.2 Reporting

Reporting procedures in this section and in the MMMP (Appendix A).

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)

14.0 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 very 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.

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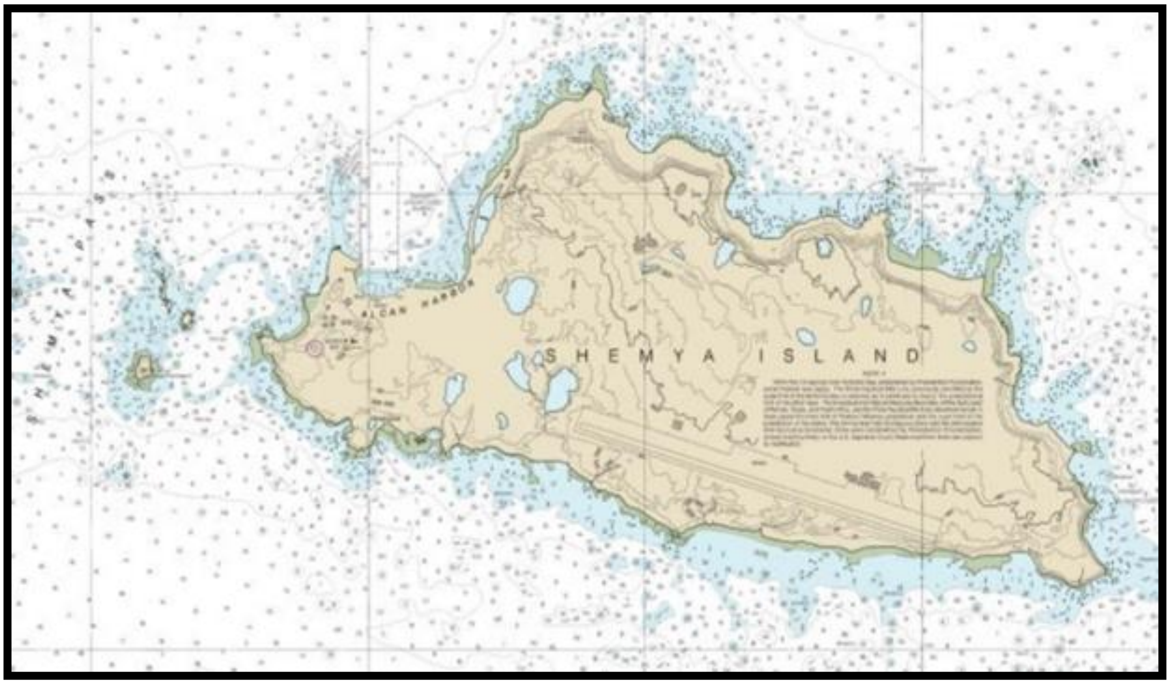
Appendix A.

Marine Mammal Monitoring and Mitigation Plan (4MP)

Marine Mammal Monitoring & Mitigation Plan

Eareckson Air Station
Long-term Fuel Pier Repairs Project

Shemya Island, Alaska



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ACRONYMS AND ABBREVIATIONS

4MP	Marine Mammal Monitoring and Mitigation Plan
dB	Decibel
ESA	Endangered Species
GPS	Global Position System
IHA	Incidental Harassment Authorization
MMPA	Marine Mammal Monitoring Plan
NMFS	National Marine Fisheries Service
NOAA	National Oceanic Atmospheric Administration
Pier	Fuel Pier
PPE	Personal Protective Equipment
SPL	Sound Pressure Level
USAF	United States Air Force

1.0 Introduction

The purpose of this Marine Mammal Monitoring and Mitigation Plan (4MP) is to provide a protocol for monitoring of affected species during the proposed construction of the Eareckson Air Station Long-term Fuel Pier Repairs Project in Alcan Harbor, Shemya Island, Alaska (**Figure 1-1**). This plan was developed to support the Incidental Harassment Authorization (IHA) document for Marine Mammal Protection Act, Section 101(a)(5)(D) permitting. The IHA application provides a more in-depth discussion on the marine mammal monitoring and mitigation plan for the project.

A Marine Mammal Monitoring Program will be implemented at the start of construction and will follow the protocols outlined in this MMMP. The primary goals of the monitoring program are to:

- Monitor the proposed shutdown (i.e., Level A) and monitoring zones;
- Estimate the number of marine mammals exposed to noise at established thresholds;
- Document marine mammal responses;
- Minimize impacts to the marine mammal species present in the project area by implementing mitigation measures including monitoring, clearing the zones, soft start, and shutdown procedures; and,
- Collect data on the occurrence and behavior of marine mammal species in the project area and any potential impacts from the project.

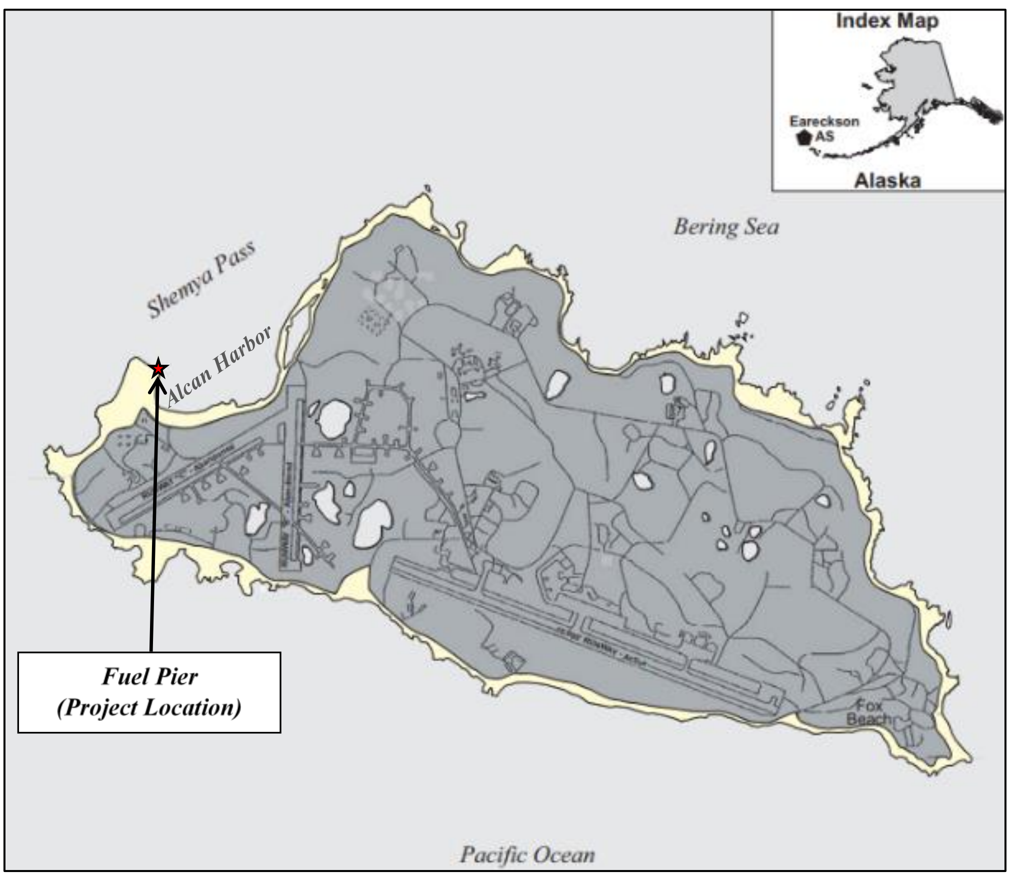


Figure 1-1. Project Location

2.0 Project Description

The Project would extend the Pier's life by 50 years by replacing and refurbishing the existing Pier and Pier facilities and armoring the adjacent western shoreline. The Project would take three construction seasons, ranging from April to October, to complete. While the entire project is described in this section, the only activity for which an IHA is sought is the pile driving in 2024. The other project activities are either not in-water activities or are in-water activities that can be easily mitigated to avoid the need for take. Pile driving, by virtue of the large underwater zones of ensonification, cannot be effectively mitigated with monitoring and shutdowns to avoid all potential takes.

The Project activities by year are:

- **2023:** Vessel movement and mobilization/staging activities. No construction will occur and no IHA is sought for these activities.
- **2024:** Vessel movement, pile installation (round exterior piles as well as sheets for tiebacks), screening/clearance activities, remote equipment operations, removal of existing precast dolosse from western shoreline, and crushing/recycling concrete. The IHA for this project is for the pile installation planned in 2024.
- **2025:** Cyclopean concrete placement, Pier deck demolition, pressure grouting existing Pier structure, tieback installation, Pier leveling course placement, electrical system rough-in, and fuel line repair and backfill. No IHA is sought for these activities.
- **2026:** Pour in place Pier concrete deck, electrical system upgrades finish, fuel line upgrades finish, shoreline revetment installation, and demobilization.

In 2023, only mobilization and staging activities would occur in the summer and early fall, and no ground disturbance or permanent installation work would occur. The start of the 2024 construction season would be the earliest construction work would begin and an IHA is only sought for pile driving during this year. 2026 is the last year construction activities are planned to occur.

The Proposed Project requires the installation of various types and sizes of piles using a vibratory hammer, an impact hammer, and DTH drilling/hammering methods. These activities are anticipated to result in Level B harassment (behavioral disruption) and likely a small amount of Level A disturbance to some species. This Marine Mammal Monitoring and Mitigation Plan (4MP) will be implemented to reduce the potential for exposure to Level A harassment and document instances of Level B harassment.

3.0 Methods

Experienced land-based observers will be located on-site before, during, and after in-water construction activity at sites appropriate for monitoring marine mammals within and approaching the Level A and Level B harassment zones (Section 3.4).

During observation periods, observers will continuously scan the area for marine mammals using binoculars and the naked eye. Observers will work shifts of up to 4 consecutive hours maximum followed by an observer rotation or a 1-hour break and will work no more than 12 hours in any 24-hour period. Observers will collect data including, but not limited to, environmental conditions (e.g., sea state, precipitation, glare, etc.), marine mammal sightings (e.g., species, numbers, location, behavior, responses to construction activity, etc.), construction activity at the time of sighting, and number of marine mammal exposures. Observers will conduct observations, meet training requirements, fill out data forms, and report findings in accordance with this 4MP.

Observers will implement mitigation measures including monitoring of the proposed shutdown and monitoring zones, clearing of the zones, and shutdown procedures. They will be in continuous contact with the construction personnel via two-way radio. Cellular phones do not work on Shemya, so back-up radios will be provided.

An employee of the construction contractor will be identified as the main point of contact for observers at the start of each construction day. Observers will report directly to the monitoring coordinator when a shutdown is deemed necessary due to marine mammals approaching the relevant shutdown zones during a potentially hazardous construction activity.

3.1 Observer Qualifications

Monitoring will be conducted by qualified, trained marine mammal observers (hereafter, "observers"). In order for observers to be considered qualified, the following requirements must be met:

1. Visual acuity in both eyes (correction is permissible) sufficient for discernment of moving targets at the water's surface with ability to estimate target size and distance;
2. Physical capability of performing essential duties, including sitting or standing for periods of up to 4 hours, using binoculars or other field aids, and documenting observations;
3. Experience and ability to conduct field observations and collect data according to assigned protocols;
4. Experience or training in the field identification of marine mammals and marine mammal behavior, including the ability to accurately identify marine mammal species in Alaskan waters;
5. Sufficient training, orientation or experience with the construction operation to provide for identification of concurrent activities and for personal safety during observations;
6. Writing skills sufficient to prepare reports of observations; and,
7. Ability to communicate orally, by radio and in person, with project personnel to provide real-time information on marine mammals observed in the area and the appropriate mitigation response for the circumstances.

3.2 Data Collection

Observers will use a National Marine Fisheries Service (NMFS)-approved Observation Record (Appendix A) which will be completed by each observer for each survey day and location. Observation records will be used by observers to record the following:

- Date and time that permitted construction activity begins or ends;
- Weather parameters (e.g., percent cloud cover, percent glare, visibility) and sea state. (The Beaufort Wind Force Scale will be used to determine sea-state.);

- Species, numbers, and, if possible, sex and age class of observed marine mammals;
- Construction activities occurring during each sighting;
- Marine mammal behavior patterns observed, including bearing and direction of travel;
- Specific focus should be paid to behavioral reactions just prior to, or during, soft-start and shutdown procedures;
- Location of marine mammal, distance from observer to the marine mammal, and distance from pile driving activities to marine mammals;
- Record of whether an observation required the implementation of mitigation measures, including shutdown procedures and the duration of each shutdown; and,
- Other human activity in the area. Record the hull numbers of fishing vessels if possible.

3.3 Equipment

The following equipment will be required to conduct observations for this project:

- Appropriate Personal Protective Equipment (PPE);
- Portable radios and headsets for the observers to communicate with the monitoring coordinator and other observers;
- Contact information for the other observers, monitoring coordinator, and NMFS point of contact;
- Daily tide tables for the project area;
- Watch or chronometer;
- Binoculars (7 x 50 or stronger) with built-in rangefinder (rangefinder may be provided separately);
- Hand-held Global Position System (GPS) unit, map and compass, or grid map to record locations of marine mammals;
- Copies of MMMP, IHA, and/or other relevant permit requirement specifications in sealed clear plastic cover; and,
- Notebook with pre-standardized monitoring Observation Record forms on waterproof paper.

3.4 Level A and Level B Harassment Zones

Zones have been established zones to delineate areas where marine mammals would experience Level A or Level B harassment due to exposure to underwater sound from construction activity. Shutdown of construction will occur where the underwater sound pressure levels (SPLs) are anticipated to equal or exceed the Level A harassment thresholds for permitted pinnipeds and cetaceans or where the Level B harassment threshold would be exceeded for a marine mammal not included in the IHA. Where underwater SPLs would exceed the Level B harassment thresholds for non-pulse (120 dB isopleth) and impulsive (160 dB isopleth) sound sources, observers will monitor and record sightings and behavior of permitted species but will not shut down.

Species with permitted “take” (Level B harassment) under the IHA include the following species: Baird's beaked whale, Dall's porpoise, fin whale, harbor porpoise, humpback whale, killer whale, minke whale, sperm whale, Stejneger's beaked whale, harbor seal, northern fur seal, and Steller sea lion. Take of any other marine mammal by Level B harassment is not permitted under the IHA. Species with allowable Level A take include humpback whale, fin whale, minke whale, harbor porpoise, Dall's porpoise, and harbor seal. Shutdowns will be implemented to best of the PSO abilities to avoid any Level A take.

Determination of harassment radii is discussed fully in Section 11 of the IHA application, which is subject to update based on any National Oceanic Atmospheric Administration (NOAA) Technical Memorandum by NMFS for the project's IHA application. The radii are summarized in Table 3-1 and Figure 3-1 and Figure 3-2 below. If additional acoustic data collection determines that smaller radii are appropriate, the table(s) will be updated accordingly.

The harassment zones will be monitored throughout the time required to drive or remove a pile. If a marine mammal enters the monitoring zone, an exposure will be recorded, and marine mammal behaviors documented. However, pile driving would continue without stopping, unless the marine mammal approaches or enters the shutdown zone. If a marine mammal approaches or enters the shutdown zone, all pile driving/removal activities will be immediately halted.

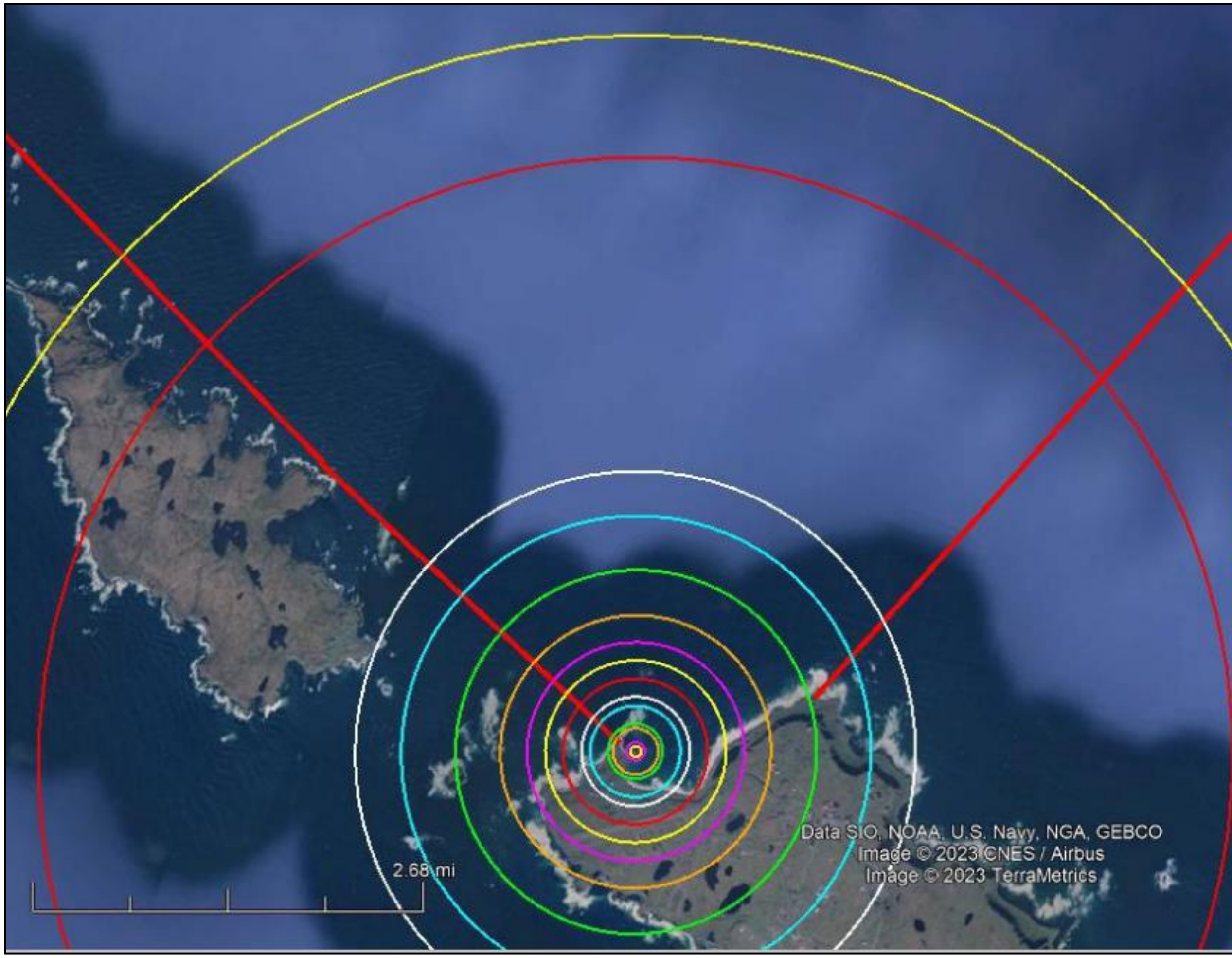
During in-water or over-water construction activities having the potential to affect marine mammals, but not involving a pile driver, a shutdown zone of 10 meters will be monitored to ensure that marine mammals are not endangered by physical interaction with construction equipment. These activities could include, but are not limited to, the positioning of the pile on the substrate via a crane ("stabbing" the pile) or the removal of the pile from the water column/substrate via a crane ("deadpull"), or the slinging of construction materials via crane.

Table 3-1. Level A Shutdown and Level B Monitoring Zones

Activity	Received Levels at 10m	Distance (in meters, m) to Level A and Level B Thresholds					
		Level A					Level B
		Low-Frequency Cetaceans (LFC)	Mid-Frequency Cetaceans (MFC)	High-Frequency Cetaceans (HFC)	Phocid Pinnipeds	Otariid Pinnipeds	
In-Water Construction Activities							
Barge movements, pile positioning, etc.[1]	171-176 dB[2]	10	10	10	10	10	--
Vibratory Pile Driving/Removal (Values rounded up in parentheses will be used for simplicity)							
30-inch temp pile install (60 piles, ~60 minutes per day on 15 days)	159 RMS	5 (10)	0.4 (10)	7.4 (10)	3.1 (10)	0.2 (10)	3,981 (4,000)
30-inch temp pile removal (60 piles, ~60 minutes per day on 15 days)	159 RMS	5 (10)	0.4 (10)	7.4 (10)	3.1 (10)	0.2 (10)	3,981 (4,000)
42-inch perm pile install (208 piles, ~120 minutes per day on 52 days)	168.2 RMS	32.7 (50)	2.9 (50)	49.4 (50)	19.9 (50)	1.4 (50)	16,345 (17,000)
28-inch sheet pile install (44 sheets, ~120 minutes per day on 11 days)	160 RMS	5.9 (10)	0.5 (10)	8.7 (10)	3.6 (10)	0.2 (10)	4,492 (5,000)
Impact Pile Driving (Values rounded up in parentheses will be used for simplicity)							
30-inch temp pile install (44 piles, ~120 minutes per day on 11 days)	177 SEL/ 191 RMS	933.8 (1,000)	33.2 (50)	1,112.3 (1,500)	499.7 (500)	36.4 (50)	136 (150)
42-inch perm pile install (208 piles, ~180 minutes per day on 52 days)	186.7 SEL/ 198.6 RMS	6,570.9 (6,600)	233 (250)	7,827 (8,000)	3,516.4 (3,600)	256.0 (300)	3,745 (4,000)
28-inch sheet pile install (44 sheets, ~180 minutes per day on 11 days)	177 SEL/ 191 RMS	1,482.4 (1,500)	52.7 (60)	1,765.7 (2,000)	793.3 (800)	57.8 (60)	136 (150)
DTH Drilling							
30-inch temp pile install (44 piles, ~450 minutes per day on 15 days)	159 SEL/ 162 RMS	1,047.9 (1,200)	37.3 (50)	1,248.2 (1,500)	560.8 (600)	40.8 (50)	13,595 (14,000)
42-inch perm pile install (208 piles, ~540 minutes per day on 70 days)	164 SEL / 167 RMS	2,549.4 (2,600)	90.7 (100)	3,036.7 (3,100)	1,364.3 (1,500)	99.3 (100)	13,595 (14,000)

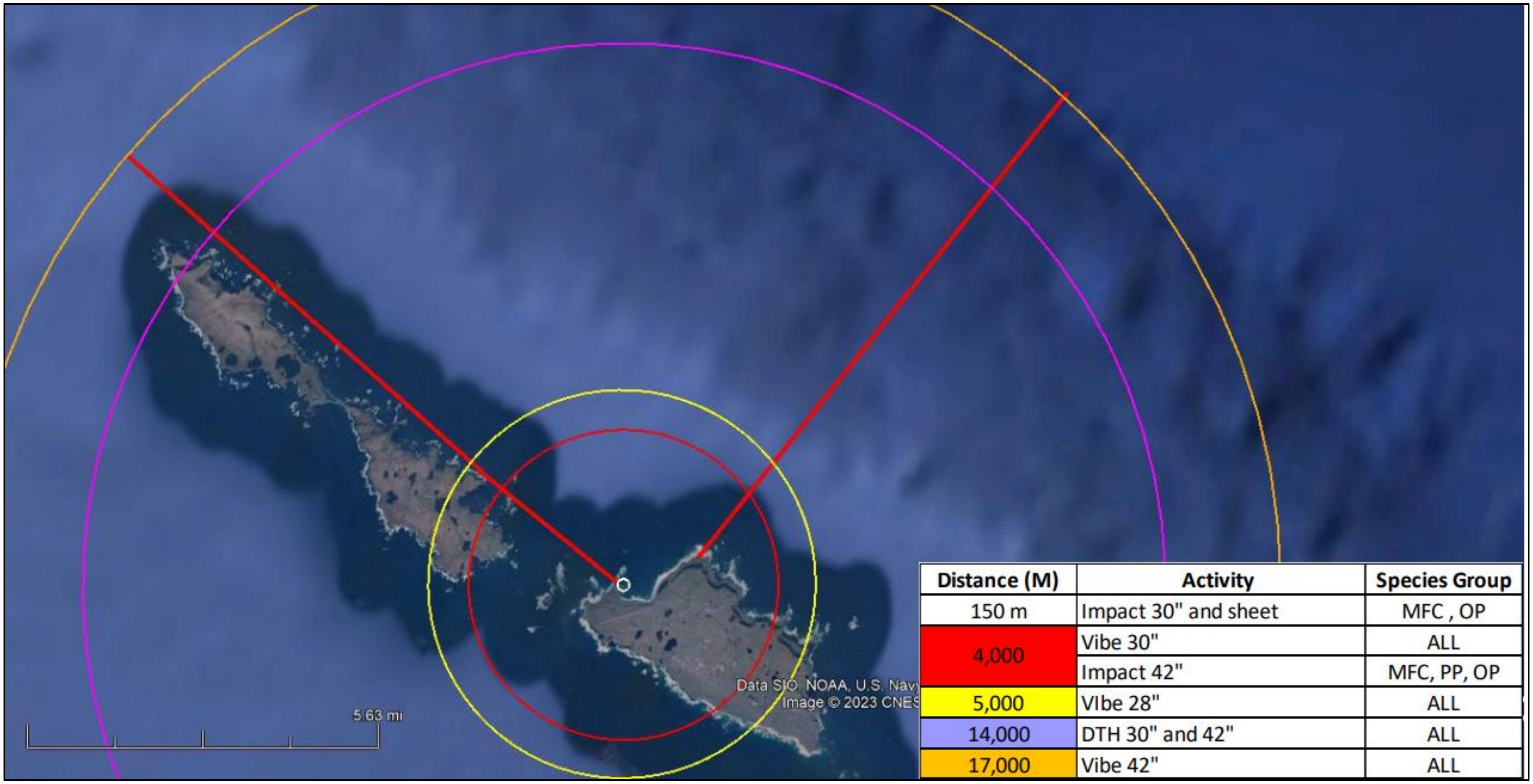
[1] This shutdown zone applies to all construction activities. Although acoustic injury is not the primary concern with these activities, shutdowns will be implemented to avoid impacts to species.

[2] Richardson et al. 1995; Kipple and Gabriele 2004



Distance (M)	Activity	Species Group
10 m	Pile Positioning, etc.	ALL
50	vibe 42"	ALL
	Impact 30"	MFC, OP
	DTH 30"	MFC, OP
60	Impact sheet	MFC, OP
100	DTH 42"	MFC, OP
250	Impact 42"	MFC
300	Impact 42"	OP
500	Impact 30"	PP
600	DTH 30"	PP
800	Impact sheet and 30"	PP
1,000	Impact 30"	LFC
1,200	DTH 30"	LFC
1,500	DTH 30"	HFC
	DTH 42"	PP
	Impact sheet	LFC
	Impact 30"	HFC
2,000	Impact sheet	HFC
2,600	DTH 42"	LFC
3,100	DTH 42"	HFC
6,600	Impact 42"	LFC
8,000	Impact 42"	HFC

Figure 3-1. Level A Shutdown Zones



Distance (M)	Activity	Species Group
150 m	Impact 30" and sheet	MFC , OP
4,000	Vibe 30"	ALL
	Impact 42"	MFC, PP, OP
5,000	VIbe 28"	ALL
14,000	DTH 30" and 42"	ALL
17,000	Vibe 42"	ALL

Figure 3-2. Level B Shutdown Zones

Note: Level A zones exceed Level B zones for all types of impact pile driving for LFC, HFC and PP.

3.5 Observer Monitoring Locations

In order to monitor the Level A and Level B harassment zones effectively, marine mammal observers will be positioned at the best practicable vantage points, taking into consideration safety, access, and space limitations. Observers will be stationed at locations that provide adequate visual coverage for the Level A and Level B harassment zones. Proposed observation locations are depicted in Figure 3-3. Two of these locations would be monitored at all times during construction. The observer locations will be decided up by the observers based on the work scheduled, visibility and sea state. Location "MMO D" is ideal but is sometimes too high and shrouded in fog. Observers may select alternate locations that work better for the conditions at the time.

One observer will be placed at a suitable location on or near the Pier in order to observe the Level A harassment zones. This observer's monitoring will be primarily dedicated to observing Level A harassment zones; however, this observer will also record all marine mammal sightings beyond the radius of the Level A harassment zone, provided it does not interfere with their effectiveness at carrying out the shutdown procedures.

An additional observer will be situated so as to provide complete visibility of the observation zone. If visibility does not allow for full clearance of the observation zone, additional stations or vantage point will be sought.

Figure 3-3. Proposed Observer Monitoring Locations A-E

3.6 Monitoring Techniques

Observers will collect sighting data and behaviors of marine mammal species that are observed in the shutdown and monitoring zones during periods of construction. NMFS requires that the observers have no other construction-related tasks while conducting monitoring. Observation necessitates that daylight is sufficient for observers to visualize the entirety of the monitoring zones, so observations will commence and complete during daylight hours. Monitoring of shutdown and observation zones will take place from 30 minutes prior to initiation through 30 minutes post-completion of all pile driving and removal activities.

3.6.1 Pre-Activity Monitoring

The following survey methodology will be implemented prior to commencing permitted activities:

- Prior to the start of permitted activities, observers will monitor the shutdown and monitoring zones for 30 minutes. They will ensure that no marine mammals are present within shutdown zone before permitted activities begin.
- The shutdown zone will be cleared when marine mammals have not been observed within zone for that 30-minute period. If a marine mammal is observed within the shutdown zone, a soft start cannot proceed until the marine mammal has left the zone or has not been observed for 15 minutes (for pinnipeds) and 30 minutes (for cetaceans).
- When all applicable zones have been cleared, the observers will radio the monitoring coordinator. Permitted activities will not commence until the monitoring coordinator receives verbal confirmation the zones are clear.
- If permitted species are present within the Level B monitoring zone, work will not be delayed, but observers will monitor and document the behavior of individuals that remain in the monitoring zone.
- In case of fog or reduced visibility, observers must be able to see the entirety of Level A shutdown zones for the type of activity being undertaken (i.e., vibratory or impact pile driving or DTH) before permitted activities can be initiated.

3.6.2 Soft Start Procedures

Soft start procedures will be used prior to periods of pile removal, pile installation, and in-water fill placement to allow marine mammals to leave the area prior to exposure to maximum noise levels.

- For vibratory hammers, the soft start technique will initiate noise from the hammer for short periods at a reduced energy level, followed by a brief waiting period and repeating the procedure two additional times.
- For impact hammers, the soft start technique will initiate several strikes at a reduced energy level, followed by a brief waiting period. This procedure would also be repeated two additional times.
- If work ceases for more than 30 minutes, soft start procedures must recommence prior to performing additional work.

3.6.3 During-Activity Monitoring

The following survey methodology will be implemented during permitted activities:

- If permitted species are observed within the monitoring zone during permitted activities, an exposure would be recorded, and behaviors documented. Work will not stop unless a marine mammal enters or appears likely to enter the shutdown zone.
- If the Level B harassment zone has been observed for the pre-activity period and non-permitted species are not present within the zone, soft start procedures can commence, and work can continue even if visibility becomes impaired within the Level B zone.
- If the Level A zone for the type of activity being undertaken (i.e., vibratory or impact pile driving or DTH) is not fully visible, work cannot continue.

3.6.4 Shutdown

If a marine mammal enters or appears likely to enter the shutdown zone:

- The observers shall immediately radio or call to alert the monitoring coordinator.
- All permitted activities will be immediately halted.
- In the event of a shutdown of pile installation or removal operations, permitted activities may resume only when:
    - The marine mammal(s) within or approaching the shutdown zone has been visually confirmed beyond the shutdown zone or has not been resighted in the size for 15 minutes (for pinnipeds) or 30 minutes (for cetaceans);
    - Observers will then radio the monitoring coordinator that activities can re-commence.

3.6.5 Breaks in Work

During an in-water construction delay, the shutdown and monitoring zones will continue to be monitored. No exposures will be recorded for permitted species in the monitoring zone if there are no concurrent permitted construction activities.

If permitted activities cease for more than 30 minutes and monitoring has not continued, pre-activity monitoring and soft start procedures must recommence. This includes breaks due to scheduled or unforeseen construction practices or breaks due to permit-required shutdown. Following 30 minutes of monitoring, work can begin according to the pre-activity monitoring protocols. Work cannot begin if a marine mammal is within the shutdown zone or if visibility is not clear throughout the shutdown and monitoring zones.

3.6.6 Post-Activity Monitoring

Monitoring of the shutdown and monitoring zones will continue for 30 minutes following completion of piledriving/DTH activities. A post-monitoring period is not required for other in-water construction. These surveys will record observations and will focus on observing and reporting unusual or abnormal behavior of marine mammals. Observation Record forms will be used to document observed behavior.

4.0 Reporting

4.1 Modifications

In the event that USAF needs to modify terms of this MMMP, the NMFS representative will be promptly contacted for discussion of the requested modification.

4.2 Unauthorized Exposure without Injury

If an unauthorized exposure without injury (as described below) occurs, observers will initiate shutdown, observe the marine mammal leaving the shutdown zone, and resume work according to the directions in Section 3.6.4. If this occurs, report of the exposure will be made to NMFS Alaska Region within one business day

4.3 Injured or Dead Marine Mammal

If Observers or a contractor finds an injured, sick, or dead marine mammal, a USAF representative will notify NMFS and provide the species or description of the marine mammal(s), condition of the marine mammal or carcass, location, date and time of first discovery, observed behaviors (if alive), and photo or video (if available).

- If marine mammal's condition is a direct result of the project, notification will be made, and work will stop until NMFS is able to review the circumstances of the prohibited take.
- If the lead observer determines that the injury or death is not associated with or related to the activities authorized in the IHA (e.g., previously wounded marine mammal, carcass with moderate to advanced decomposition, scavenger damage), USAF shall report the incident within 24 hours of the discovery. Construction activities may continue while NMFS reviews the circumstances of the incident and makes a final determination on the cause of the reported injury or death.
- If cause of death is unclear, USAF shall immediately report the incident. Construction activities may continue while NMFS reviews the circumstances of the incident and makes a final determination on the cause of the reported injury or death. NMFS will work with USAF to determine whether additional mitigation measures or modifications to the activities are appropriate.

Care should be taken in handling dead specimens to preserve biological materials in the best possible state for later analysis of cause of death, if that occurs. In preservation of biological materials from a dead marine mammal, the finder (i.e., marine mammal observer) has the responsibility to ensure that evidence associated with the specimen is not unnecessarily disturbed.

Reports will be made to the Office of Protected Resources and the Alaska Regional Stranding Coordinator.

4.4 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 draft comprehensive marine mammal monitoring report 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 the pile driving activity being conducted (pile locations, pile size and type), and times (onset and completion) when pile driving occurs.
    - 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, 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.
        - If a shutdown was implemented, 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, which include 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. This may be reported as a rate of take (number of marine mammals per hour or per day) or using some other appropriate metric.

Appendix A.

Marine Mammal Observation Record

MARINE MAMMAL OBSERVATION RECORD

Project Name: Eareckson Air Station Long-term Pier Repair

Monitoring Location:

Date:

Time Effort Initiated:

Time Effort Completed

Page of

Time	Visibility	Glare	Weather Condition	Wave Height	BSS	Wind Dir.	Swell Dir.
:	B - P - M - G - E	%	S - PC - L - R - F - OC - SN - HR	Lt / Mod / Hvy		N S E W	N S E W
:	B - P - M - G - E	%	S - PC - L - R - F - OC - SN - HR	Lt / Mod / Hvy		N S E W	N S E W
:	B - P - M - G - E	%	S - PC - L - R - F - OC - SN - HR	Lt / Mod / Hvy		N S E W	N S E W
:	B - P - M - G - E	%	S - PC - L - R - F - OC - SN - HR	Lt / Mod / Hvy		N S E W	N S E W
:	B - P - M - G - E	%	S - PC - L - R - F - OC - SN - HR	Lt / Mod / Hvy		N S E W	N S E W
:	B - P - M - G - E	%	S - PC - L - R - F - OC - SN - HR	Lt / Mod / Hvy		N S E W	N S E W
:	B - P - M - G - E	%	S - PC - L - R - F - OC - SN - HR	Lt / Mod / Hvy		N S E W	N S E W

Event Code	Sight # (1 or 1.1 if resight)	Time/Dur. (Start/ End time if cont.)	WP/ Grid #/ Dir. of Travel	Zone/ Radius/ Impact Pile #?	Obs.	Sighting Cue	Species	Group Size	Behavior Code(s)	Construction Type	Mitigation Type	Exposure?	Behavior Change/ Response to Activity/ Comments/ Human Activity/ Vessel Hull # or Name/ Visibility Notice
E ON - PRE - POST - CON - S - M - OR - E OFF		: :	GRID N or S W or E			BL - BO - BR - DF - SA - OTHER		MIN: MAX: BEST:		SSV - SSI - V - DR - I - DP - ST - OWC - NOWC - NONE	SS - BC - DE - SD - NONE	Y / N	
E ON - PRE - POST - CON - S - M - OR - E OFF		: :	GRID N or S W or E			BL - BO - BR - DF - SA - OTHER		MIN: MAX: BEST:		SSV - SSI - V - DR - I - DP - ST - OWC - NOWC - NONE	SS - BC - DE - SD - NONE	Y / N	
E ON - PRE - POST - CON - S - M - OR - E OFF		: :	GRID N or S W or E			BL - BO - BR - DF - SA - OTHER		MIN: MAX: BEST:		SSV - SSI - V - DR - I - DP - ST - OWC - NOWC - NONE	SS - BC - DE - SD - NONE	Y / N	
E ON - PRE - POST - CON - S - M - OR - E OFF		: :	GRID N or S W or E			BL - BO - BR - DF - SA - OTHER		MIN: MAX: BEST:		SSV - SSI - V - DR - I - DP - ST - OWC - NOWC - NONE	SS - BC - DE - SD - NONE	Y / N	
E ON - PRE - POST - CON - S - M - OR - E OFF		: :	GRID N or S W or E			BL - BO - BR - DF - SA - OTHER		MIN: MAX: BEST:		SSV - SSI - V - DR - I - DP - ST - OWC - NOWC - NONE	SS - BC - DE - SD - NONE	Y / N	
E ON - PRE - POST - CON - S - M - OR - E OFF		: :	GRID N or S W or E			BL - BO - BR - DF - SA - OTHER		MIN: MAX: BEST:		SSV - SSI - V - DR - I - DP - ST - OWC - NOWC - NONE	SS - BC - DE - SD - NONE	Y / N	
E ON - PRE - POST - CON - S - M - OR - E OFF		: :	GRID N or S W or E			BL - BO - BR - DF - SA - OTHER		MIN: MAX: BEST:		SSV - SSI - V - DR - I - DP - ST - OWC - NOWC - NONE	SS - BC - DE - SD - NONE	Y / N	
E ON - PRE - POST - CON - S - M - OR - E OFF		: :	GRID N or S W or E			BL - BO - BR - DF - SA - OTHER		MIN: MAX: BEST:		SSV - SSI - V - DR - I - DP - ST - OWC - NOWC - NONE	SS - BC - DE - SD - NONE	Y / N	
E ON - PRE - POST - CON - S - M - OR - E OFF		: :	GRID N or S W or E			BL - BO - BR - DF - SA - OTHER		MIN: MAX: BEST:		SSV - SSI - V - DR - I - DP - ST - OWC - NOWC - NONE	SS - BC - DE - SD - NONE	Y / N	

BEHAVIOR CODES

CODE	BEHAVIOR	DEFINITION
BR	Breaching	Leaps clear of water
CD	Change Direction	Suddenly changes direction of travel
CH	Chuff	Makes loud, forceful exhalation of air at surface
DI	Dive	Forward dives below surface
DE	Dead	Shows decomposition or is confirmed as dead by investigation
DS	Disorientation	An individual displaying multiple behaviors that have no clear direction or purpose
FI	Fight	Agonistic interactions between two or more individuals
FO	Foraging	Confirmed by food seen in mouth
MI	Milling	Moving slowly at surface, changing direction often, not moving in any particular direction
PL	Play	Behavior that does not seem to be directed towards a particular goal; may involve one, two, or more individuals
PO	Porpoising	Moving rapidly with body breaking surface of water
SL	Slap	Vigorously slaps surface of water with body, flippers, tail, etc
SP	Spyhopping	Rises vertically in the water to "look" above the water
SW	Swimming	General progression in a direction. Note general direction of travel when last seen (Ex, "SW (N)" for swimming north)
TR	Traveling	Traveling in an obvious direction. Note direction of travel when last seen (Ex, "TR (N)" for traveling north)
UN	Unknown	Behavior of animal undetermined, does not fit into another behavior
AWA	Approach Work	Approaching the area where work is being conducted
LWA	Leave Work Area	Leaving the area where work is being conducted
PINNIPED ONLY		
EW	Enter Water (from haulout)	Enters water from a haul-out for no obvious reason
FL	Flush (from haulout)	Enters water in response to disturbance
HO	Haulout (from water)	Hauls out on land
RE	Resting	Resting onshore or on surface of water
LO	Look	Is upright in water "looking" in several direction or at a single focus
SI	Sink	Sinks out of sight below surface without obvious effort (usually from an upright position)
VO	Vocalizing	Animal emits barks, squeals, etc
CETACEAN ONLY		
LG	Logging	Resting on surface of water with no obvious signs of movement

VISIBILITY

CODE	DISTANCE VISIBLE
B	Bad (<0.5km)
P	Poor (0.5-0.9km)
M	Moderate (0.9-3km)
G	Good (3-10km)
E	Excellent (>10km)

WEATHER CONDITIONS

CODE	WEATHER CONDITION
S	Sunny
PC	Partly Cloudy
L	Light Rain
R	Steady Rain
F	Fog
OC	Overcast
SN	Snow
HR	Heavy Rain

WAVE HEIGHT

CODE	WAVE HEIGHT
Lt	Light (0-3ft)
Mod	Moderate (4-6ft)
Hvy	Heavy (>6ft)

GLARE

Percent glare should be the total glare of observers' area of responsibility. Determine if observer coverage is covering 90 degrees or 180 degrees and document daily. Then assess total glare for that area. This will provide needed information on what percentage of the field of view was poor due to glare.

BEAUFORT SEA SCALE (BSS)

Use Beaufort Sea State Scale for Sea State Code located in Appendix C. This refers to the surface layer and whether it is glassy in appearance or full of white caps. In the open ocean, it also takes into account the wave height or swell, but in inland waters the wave height (swells) may never reach the levels that correspond to the correct surface white cap number. Therefore, include wave height for clarity.

WIND DIRECTION

Wind direction should also be where the wind is coming from.

SWELL DIRECTION

Swell direction should be where the swell is coming from (S for coming from the south). If possible, record direction relative to fixed location (pier). Choose this location at beginning of monitoring project.

SPECIES

CODE	MARINE MAMMAL SPECIES
BBW	Baird's Beaked Whale
BW	Blue Whale
DP	Dall's Porpoise
FW	Fin Whale
GW	Gray Whale
HP	Harbor Porpoise
HS	Harbor Seal
HW	Humpback Whale
KW	Killer Whale
MW	Minke Whale
NFS	Northern Fur Seal
NPRW	North Pacific Right Whale
PWSD	Pacific White-Sided Dolphin
RS	Ribbon Seal
SW	Sperm Whale
SBW	Stejneger's Beaked Whale
SSL	Steller Sea Lion
NSO	Northern Sea Otter
UW	Unknown Whale
UP	Unknown Pinniped
UNK	Unknown

SIGHTING CUES

CODE	ACTIVITY TYPE
BL	Blow
BO	Body
BR	Breach
DF	Dorsal Fin
SA	Surface Activity
OTR	Other

EVENT CODES

CODE	ACTIVITY TYPE
E ON	Effort On
E OFF	Effort Off
PRE	Pre-Construction Watch
POST	Post-Construction Watch
CON	Construction (see types)
S	Sighting
M	Migration (see types)
OR	Observer Rotation

CONSTRUCTION TYPE

CODE	ACTIVITY TYPE
V	Vibratory Pile Driving
I	Impact Pile Driving
DP	Dead pull
ST	Stabbing
DR	Drilling
OWC	Over-Water Constrcution
NOWC	No Over-Water Construction
NONE	No Construction

MITIGATION TYPE

CODE	ACTIVITY TYPE
SS	Soft Start
BC	Bubble Curatin
DE	Delay onset of in-water work
SD	Shut down in-water water

Appendix B.
Beaufort Sea Scale

Beaufort Number (Wind Force)	Wind Velocity (Knots)	Wind Description	Sea Conditions	Heights of Waves (Feet)	Photographic Example
0	<1	Calm	Sea surface smooth and mirror-like	0	
1	1-3	Light Air	Scaly ripples, no foam crests	0-1	
2	4-6	Light Breeze	Small wavelets, crest glassy, no breaking	1-2	
3	7-10	Gentle Breeze	Large wavelets, crests begin to break, scattered whitecaps	2-3.5	

4	11-16	Moderate Breeze	Small waves, becoming longer, numerous whitecaps	1-4	
5	17-21	Fresh Breeze	Moderate waves, taking longer form, many whitecaps, some spray	4-8	
6	22-27	Strong Breeze	Larger waves, whitecaps common, more spray	8-13	
7	28-33	Near Gale	Sea heaps up, white foam streaks off breakers	13-19	
8	34-40	Gale	Moderately high, waves of greater length, edges of crests begin to break into spindrift, foam blown into streaks	18-25	

9	41-47	Strong Gale	High waves, sea begins to roll, dense streaks of foam, spray may reduce visibility	23-32	
10	48-55	Storm	Very high waves, with overhanging crests, sea white with densely blown foam, heavy rolling, lowered visibility	29-41	
11	56-63	Violent Storm	Exceptionally high waves, foam patches cover sea, visibility more reduced	37-52	
12	64+	Hurricane	Air filled with foam, sea completely white with driving spray, visibility greatly reduced	45+	

Images obtained from an online webpage titled, “The Seas of the Beaufort Scale,” at http://www.meiotic.co.uk/my/research/beaufort-seas/.

Appendix B.

Underwater Noise Calculations

PTS Calculations

(Pile diameter and drive type listed in each project title)

A.1: Vibratory Pile Driving (STATIONARY SOURCE: Non-Impulsive, Continuous)

VERSION 2.2: 2020

KEY

(green)	**Action Proponent Provided Information**
(pink)	**NMFS Provided Information (Technical Guidance)**
(blue)	**Resultant Isopleth**

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	EAS Fuel Pier Replacement 30" Vibratory
PROJECT/SOURCE INFORMATION	Caltrans 2020.

Please include any assumptions

PROJECT CONTACT	Chris Hoffman

STEP 2: WEIGHTING FACTOR ADJUSTMENT

		Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value
Weighting Factor Adjustment (kHz)[¥]	2.5	default

¥ Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 48), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

Sound Pressure Level (L_{rms}), specified at "x" meters (Cell B30)	159
Number of piles within 24-h period	4
Duration to drive a single pile (minutes)	15
Duration of Sound Production within 24-h period (seconds)	3600
10 Log (duration of sound production)	35.56
Transmission loss coefficient	15
Distance of sound pressure level (L_{rms}) measurement (meters)	10

NOTE: The User Spreadsheet tool provides a means to estimates distances asso with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorizatio Endangered Species Act (ESA) consultation or permit are independent manageme decisions made in the context of the proposed activity and comprehensive effects a and are beyond the scope of the Technical Guidance and the User Spreadsheet too

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	**5.0**	**0.4**	**7.4**	**3.1**	**0.2**

E.1: IMPACT PILE DRIVING (STATIONARY SOURCE: Impulsive, Intermittent)

VERSION 2.2: 2020

KEY

(green)	**Action Proponent Provided Information**
(pink)	**NMFS Provided Information (Technical Guidance)**
(blue)	**Resultant Isopleth**

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	EAS Fuel Pier Replacement 30" IMPACT
PROJECT/SOURCE INFORMATION	Caltrans 2020.

Please include any assumptions

PROJECT CONTACT	Chris Hoffman

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

Weighting Factor Adjustment (kHz)[¥]	2	default

[¥] Broadband: 95% frequency contour percentile (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 73), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

NOTE: METHOD E.1-1 is PREFERRED method when SEL-based source levels are available (because pulse duration is not required). Only use method E.1-2 if SEL-b

E.1-1: METHOD TO CALCULATE PK AND SEL_{cum} (SINGLE STRIKE EQUIVALENT) **PREFERRED METHOD (pulse duration not needed)**

Unweighted $SEL_{cum\ (at\ measured\ distance)}$ = SEL_{ss} + 10 Log (# strikes)	**212.6**

SEL_{cum}

Single Strike SEL_{ss} ($L_{E,p,\ single\ strike}$) specified at "x" meters (Cell B32)	177
Number of strikes per pile	900
Number of piles per day	4
Transmission loss coefficient	15
Distance of single strike SEL_{ss} ($L_{E,p,\ single\ strike}$) measurement (meters)	10

PK

$L_{p,0\text{-}pk}$ specified at "x" meters (Cell G29)	212
Distance of $L_{p,0\text{-}pk}$ measurement (meters)⁺	10
$L_{p,0\text{-}pk}$ Source level	227.0

RESULTANT ISOPLETHS*

*Impulsive sounds have dual metric thresholds (SELcum & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	183	185	155	185	203
PTS Isopleth to threshold (meters)	**933.8**	**33.2**	**1,112.3**	**499.7**	**36.4**
PK Threshold	219	230	202	218	232
PTS PK Isopleth to threshold (meters)	**3.4**	**NA**	**46.4**	**4.0**	**NA**

"NA": PK source level is $\leq$ to the threshold for that marine mammal hearing group.

E.2: DTH SYSTEMS (STATIONARY SOURCE: Impulsive, Intermittent)

VERSION 2.2: 2020

KEY

(green)	**Action Proponent Provided Information**
(pink)	**NMFS Provided Information (Technical Guidance)**
(blue)	**Resultant Isopleth**

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	EAS Fuel Pier Replacement 30" DTH
PROJECT/SOURCE INFORMATION	36-inch DTH Source: 42-inch DTH Proxy from Reyff & Heyvaert, 2019; Reyff, 2020; and Denes et al., 2019

Please include any assumptions

PROJECT CONTACT	Chris Hoffman

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

Weighting Factor Adjustment (kHz)[¥]	2	default

[¥] Broadband: 95% frequency contour percentile (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 50), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

Unweighted $SEL_{cum\ (at\ measured\ distance)}$ = SEL_{ss} + 10 Log (# strikes)	**213.3**

SEL_{cum}

Single Strike SEL_{ss} ($L_{E,p,\ single\ strike}$) specified at "x" meters (Cell B30)	159
Strike rate (average strikes per second)	10
Duration to drive pile/drill hole (minutes)	150
Number of piles/holes per day	3
Transmission loss coefficient	15
Distance of single strike SEL_{ss} ($L_{E,p,\ single\ strike}$) measurement (meters)	10
Total number of strikes in a 24-h period	270000

PK

$L_{p,0\text{-}pk}$ specified at "x" meters (Cell G26)	194
Distance of $L_{p,0\text{-}pk}$ measurement (meters)[+]	10
$L_{p,0\text{-}pk}$ Source level	209.0

RESULTANT ISOPLETHS*

*Impulsive sounds have dual metric thresholds (SELcum & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	183	185	155	185	203
PTS Isopleth to threshold (meters)	**1,047.9**	**37.3**	**1,248.2**	**560.8**	**40.8**
PK Threshold	219	230	202	218	232
PTS PK Isopleth to threshold (meters)	**NA**	**NA**	**2.9**	**NA**	**NA**

"NA": PK source level is ≤ to the threshold for that marine mammal hearing group.

A.1: Vibratory Pile Driving (STATIONARY SOURCE: Non-Impulsive, Continuous)

VERSION 2.2: 2020

KEY

(green)	**Action Proponent Provided Information**
(pink)	**NMFS Provided Information (Technical Guidance)**
(blue)	**Resultant Isopleth**

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	EAS Fuel Pier Replacement 42" Vibratory
PROJECT/SOURCE INFORMATION	42-inch Vibratory Source:48- inch unattentuated vibratory hammer installation during Port of Anchorage Test Pile Program (Austin et al. 2016; Table 16)

Please include any assumptions

PROJECT CONTACT	Chris Hoffman

STEP 2: WEIGHTING FACTOR ADJUSTMENT

		Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value
Weighting Factor Adjustment (kHz)[¥]	2.5	default

[¥] Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 48), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

Sound Pressure Level (L_{rms}), specified at "x" meters (Cell B30)	168.2
Number of piles within 24-h period	4
Duration to drive a single pile (minutes)	30
Duration of Sound Production within 24-h period (seconds)	7200
10 Log (duration of sound production)	38.57
Transmission loss coefficient	15
Distance of sound pressure level (L_{rms}) measurement (meters)	10

NOTE: The User Spreadsheet tool provides a means to estimates distances asso with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorizati Endangered Species Act (ESA) consultation or permit are independent manageme decisions made in the context of the proposed activity and comprehensive effects a and are beyond the scope of the Technical Guidance and the User Spreadsheet to

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	32.7	2.9	48.4	19.9	1.4

E.1: IMPACT PILE DRIVING (STATIONARY SOURCE: Impulsive, Intermittent)

VERSION 2.2: 2020

KEY

(green)	**Action Proponent Provided Information**
(pink)	**NMFS Provided Information (Technical Guidance)**
(blue)	**Resultant Isopleth**

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	EAS Fuel Pier Replacement 42" Impact
PROJECT/SOURCE INFORMATION	42-inch Impact Source: 48-inch unattentuated impact hammer installation during Port of Anchorage Test Pile Program (Austin et al. 2016; Table 9)

Please include any assumptions

PROJECT CONTACT	Chris Hoffman

STEP 2: WEIGHTING FACTOR ADJUSTMENT

		Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value
Weighting Factor Adjustment (kHz)¥	2	default

¥ Broadband: 95% frequency contour percentile (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 73), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

NOTE: METHOD E.1-1 is PREFERRED method when SEL-based source levels are available (because pulse duration is not required). Only use method E.1-2 if SEL-b

E.1-1: METHOD TO CALCULATE PK AND SEL_{cum} (SINGLE STRIKE EQUIVALENT) **PREFERRED METHOD (pulse duration not needed)**

Unweighted $SEL_{cum\ (at\ measured\ distance)}$ = SEL_{ss} + 10 Log (# strikes)	**225.3**

SEL_{cum}

Single Strike SEL_{ss} ($L_{E,p,\ single\ strike}$) specified at "x" meters (Cell B32)	186.7
Number of strikes per pile	1800
Number of piles per day	4
Transmission loss coefficient	15
Distance of single strike SEL_{ss} ($L_{E,p,\ single\ strike}$) measurement (meters)	10

PK

$L_{p,0\text{-}pk}$ specified at "x" meters (Cell G29)	212
Distance of $L_{p,0\text{-}pk}$ measurement (meters)⁺	10
$L_{p,0\text{-}pk}$ Source level	227.0

RESULTANT ISOPLETHS*

*Impulsive sounds have dual metric thresholds (SELcum & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	183	185	155	185	203
PTS Isopleth to threshold (meters)	**6,570.9**	**233.7**	**7,827.0**	**3,516.4**	**256.0**
PK Threshold	219	230	202	218	232
PTS PK Isopleth to threshold (meters)	**3.4**	**NA**	**46.4**	**4.0**	**NA**

"NA": PK source level is ≤ to the threshold for that marine mammal hearing group.

E.2: DTH SYSTEMS (STATIONARY SOURCE: Impulsive, Intermittent)

VERSION 2.2: 2020

KEY

(green)	**Action Proponent Provided Information**
(pink)	**NMFS Provided Information (Technical Guidance)**
(blue)	**Resultant Isopleth**

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	EAS Fuel Pier Replacement 42" DTH
PROJECT/SOURCE INFORMATION	42-inch DTH Source: 42-inch DTH Proxy from Reyff & Heyvaert, 2019; Reyff, 2020; and Denes et al., 2019

Please include any assumptions

PROJECT CONTACT	Chris Hoffman

STEP 2: WEIGHTING FACTOR ADJUSTMENT

		Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value
Weighting Factor Adjustment (kHz)¥	2	

¥ Broadband: 95% frequency contour percentile (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 50), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

Unweighted $SEL_{cum\ (at\ measured\ distance)}$ = SEL_{ss} + 10 Log (# strikes)	**219.1**

SEL_{cum}

Single Strike SEL_{ss} ($L_{E,p,\ single\ strike}$) specified at "x" meters (Cell B30)	164
Strike rate (average strikes per second)	10
Duration to drive pile/drill hole (minutes)	180
Number of piles/holes per day	3
Transmission loss coefficient	15
Distance of single strike SEL_{ss} ($L_{E,p,\ single\ strike}$) measurement (meters)	10
Total number of strikes in a 24-h period	324000

PK

$L_{p,0\text{-}pk}$ specified at "x" meters (Cell G26)	194
Distance of $L_{p,0\text{-}pk}$ measurement (meters)⁺	10
$L_{p,0\text{-}pk}$ Source level	209.0

RESULTANT ISOPLETHS*

*Impulsive sounds have dual metric thresholds (SELcum & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	183	185	155	185	203
PTS Isopleth to threshold (meters)	**2,549.4**	**90.7**	**3,036.7**	**1,364.3**	**99.3**
PK Threshold	219	230	202	218	232
PTS PK Isopleth to threshold (meters)	**NA**	**NA**	**2.9**	**NA**	**NA**

"NA": PK source level is ≤ to the threshold for that marine mammal hearing group.

A.1: Vibratory Pile Driving (STATIONARY SOURCE: Non-Impulsive, Continuous)

VERSION 2.2: 2020

KEY

(green)	**Action Proponent Provided Information**
(pink)	**NMFS Provided Information (Technical Guidance)**
(blue)	**Resultant Isopleth**

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	EAS Fuel Pier Replacement 28-inch sheet vibratory
PROJECT/SOURCE INFORMATION	Caltrans 2020.

Please include any assumptions

PROJECT CONTACT	Chris Hoffman

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

Weighting Factor Adjustment (kHz)[¥]	2.5	default

[¥] Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 48), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

Sound Pressure Level (L_{rms}), specified at "x" meters (Cell B30)	160
Number of piles within 24-h period	4
Duration to drive a single pile (minutes)	15
Duration of Sound Production within 24-h period (seconds)	3600
10 Log (duration of sound production)	35.56
Transmission loss coefficient	15
Distance of sound pressure level (L_{rms}) measurement (meters)	10

NOTE: The User Spreadsheet tool provides a means to estimates distances asso with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorizati Endangered Species Act (ESA) consultation or permit are independent manageme decisions made in the context of the proposed activity and comprehensive effects a and are beyond the scope of the Technical Guidance and the User Spreadsheet to

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	**5.9**	**0.5**	**8.7**	**3.6**	**0.2**

E.1: IMPACT PILE DRIVING (STATIONARY SOURCE: Impulsive, Intermittent)

VERSION 2.2: 2020

KEY

(green)	**Action Proponent Provided Information**
(pink)	**NMFS Provided Information (Technical Guidance)**
(blue)	**Resultant Isopleth**

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	EAS Fuel Pier Replacement 28 inch sheet pile impact
PROJECT/SOURCE INFORMATION	Caltrans 2020.

Please include any assumptions

PROJECT CONTACT	Chris Hoffman

STEP 2: WEIGHTING FACTOR ADJUSTMENT

		Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value
Weighting Factor Adjustment (kHz)[¥]	2	default

[¥] Broadband: 95% frequency contour percentile (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 73), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

NOTE: METHOD E.1-1 is PREFERRED method when SEL-based source levels are available (because pulse duration is not required). Only use method E.1-2 if SEL-b

E.1-1: METHOD TO CALCULATE PK AND SEL_{cum} (SINGLE STRIKE EQUIVALENT) **PREFERRED METHOD (pulse duration not needed)**

Unweighted $SEL_{cum\ (at\ measured\ distance)}$ = SEL_{ss} + 10 Log (# strikes)	**215.6**

SEL_{cum}

Single Strike SEL_{ss} ($L_{E,p,\ single\ strike}$) specified at "x" meters (Cell B32)	177
Number of strikes per pile	1800
Number of piles per day	4
Transmission loss coefficient	15
Distance of single strike SEL_{ss} ($L_{E,p,\ single\ strike}$) measurement (meters)	10

PK

$L_{p,0\text{-}pk}$ specified at "x" meters (Cell G29)	212
Distance of $L_{p,0\text{-}pk}$ measurement (meters)[+]	10
$L_{p,0\text{-}pk}$ Source level	227.0

RESULTANT ISOPLETHS*

*Impulsive sounds have dual metric thresholds (SELcum & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	183	185	155	185	203
PTS Isopleth to threshold (meters)	**1,482.4**	**52.7**	**1,765.7**	**793.3**	**57.8**
PK Threshold	219	230	202	218	232
PTS PK Isopleth to threshold (meters)	**3.4**	**NA**	**46.4**	**4.0**	**NA**

"NA": PK source level is ≤ to the threshold for that marine mammal hearing group.