REQUEST FOR MARINE MAMMAL PROTECTION ACT

INCIDENTAL HARASSMENT AUTHORIZATION FOR BAKER BAY PILE DIKE REPAIRS

CLATSOP COUNTY, OREGON

Submitted to:

Office of Protected Resources

National Marine Fisheries Service

National Oceanographic and Atmospheric Administration

JANUARY 2024

U.S. Army Corps of Engineers

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1.0 Description of Specified Activity

1.1 Introduction

The U.S. Army Corps of Engineers, Portland District (USACE) is applying for Incidental Harassment Authorization (IHA) under section 101(a)(5) of the Marine Mammal Protection Act of 1972, as amended, for the take of marine mammals incidental to the Baker Bay Pile Dike Repairs project. The pile dikes are part of the Baker Bay system which is located in the Columbia River estuary (Figure 1). It connects the Mouth of the Columbia River (MCR) FNC at RM 3 to the Port of Ilwaco, wending between Jetty A and West Sand Island. The Baker Bay West federal navigation channel (FNC) comprises two segments; the segment nearest the Columbia River is 2,000 feet long, 200 feet wide, and roughly 16 feet deep, and the segment nearest the Port of Ilwaco is 2.5 miles long, 150 feet wide, and 16 feet deep. Immediately adjacent to the BBW FNC, the BBW pile-dike system contains four pile dikes.

USACE plans to implement the project in two construction seasons, in 2024 and 2025. In order to avoid potential impacts to ESA-listed fish and Southern Resident killer whales, as well as for safety concerns, no in water work is proposed during the months of December, January, February, March, April, May, or June. Some of the proposed activities have the potential to cause Level A and Level B harassment to marine mammals, and therefore USACE is requesting Incidental Harassment Authorization.

Figure 1. Baker Bay Pile Dike System Location

1.2 Project Overview

The Baker Bay West Pile Dike (BBWPD) system focuses tidal currents through the Baker Bay West (BBW) Federal Navigation Channel (FNC). The system sustains authorized depths for navigation and maintains the configuration of nearby Jetty A Shoal and the West Sand Island shoreline. Years of deferred maintenance, erosion, and sedimentation has led to loss of pile dike function, increased frequency of dredging events in the FNC, and larger volumes of material removed per dredging event. The purpose of this project is to restore the hydraulic function of the BBWPD system. The project is needed to provide reliable navigation to channel users including recreationalists, the Port of Ilwaco, and a U.S. Coast Guard (USCG) Station. USCG

Station Cape Disappointment provides both lifeboat service to the Mouth of the Columbia River (MCR) and the Pacific from Ocean Park Washington to Tillamook Head Oregon and is the home of the USCG National Motor Lifeboat School. Maintaining the Baker Bay Channel is essential for the safety of the MCR. Repairing the BBW PD system is intended to reduce the need for annual dredging.

1.3 Project Elements

The proposed action consists of the following major activities:

1) Remove the timber piles, repair the existing rock for BB0.28 East and extend the existing dike to the present-day shoreline of West Sand Island.

3) Construct a material transition zone between the dike and the existing sandy dune on West Sand Island.

4) Reinforce a low point in the dune near the landward end of BB0.28E by placing material (such as brush, root masses, logs, branches, or sand) grubbed incidentally from the construction footprint.

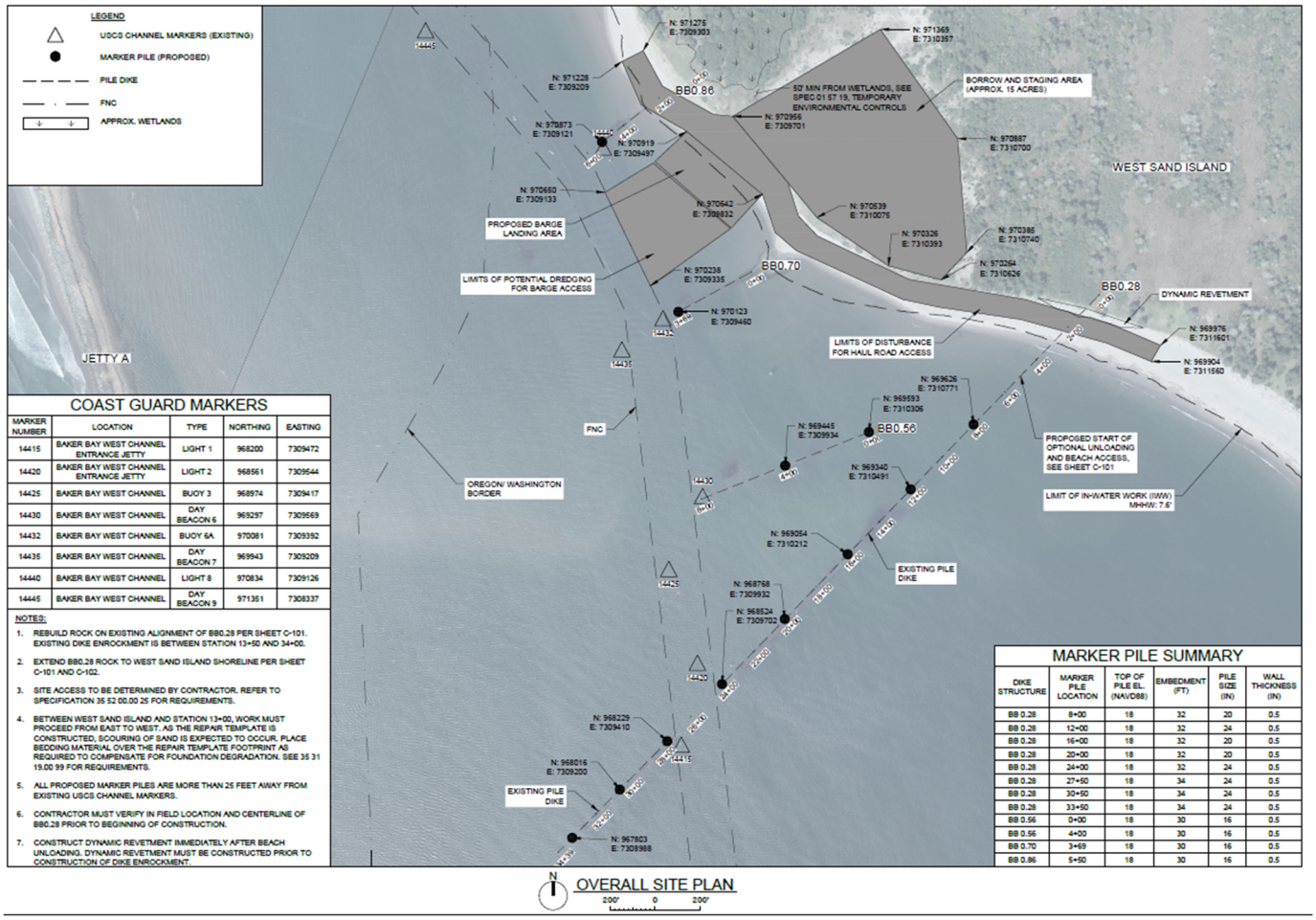
5) Installation of ten marker piles to provide warning of submerged hazards as an aid to navigation (ATON).

6) Reinforce the ends of BB0.28W by placing stone at the ends of the pile dike.

7) Construction of access facilities and staging areas.

The major activities are shown in Figure 2. Note that the project elements refer to stations. Station 0+00 commences on the West Sand Island shoreline and ends at the western end of the BB PD0.28 (refer to **Error! Reference source not found.**).

Figure 2. Map of Proposed Action.



1.3.1 BB0.28 West Material Reinforcement

The proposed action includes the reinforcement of BB0.28W by placing approximately 550 CY of material (in total) at both ends of BB0.28W as shown in Figure 4. Contractor will place rock on top of existing enrockment to bring the enrockment to elevation 0. No additional piles will be placed at BB 0.28W and all existing pile will be left in place.

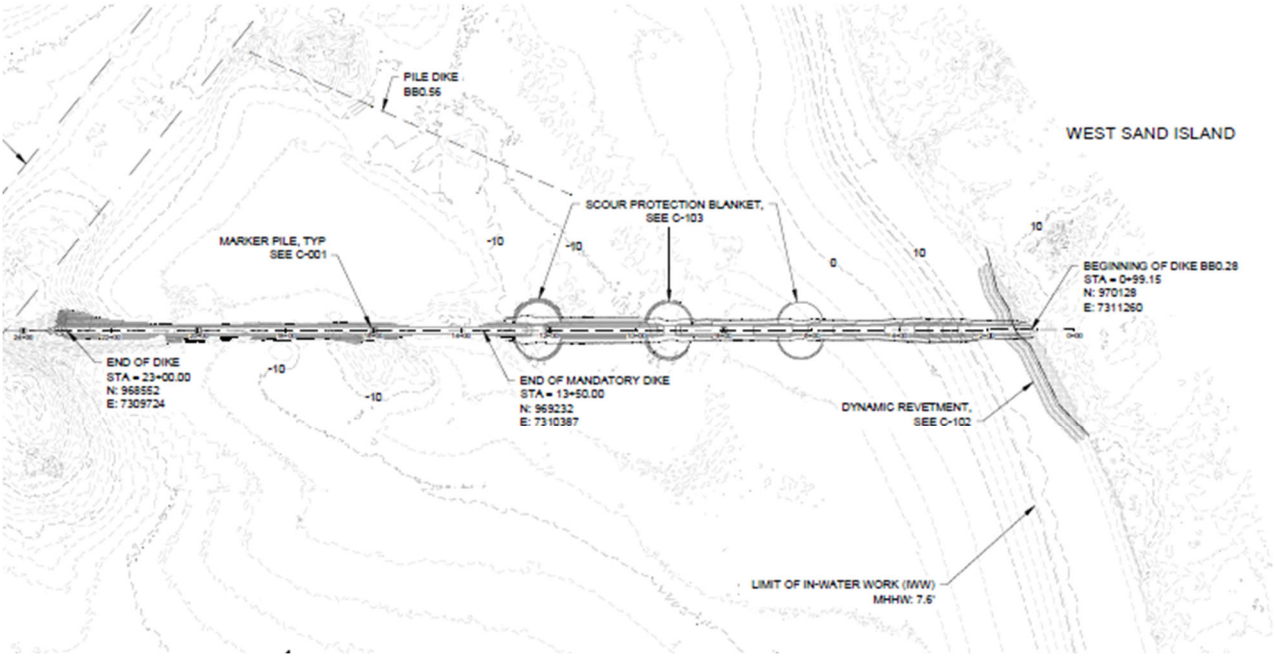


Figure 3 Plan View BBPD 0.28

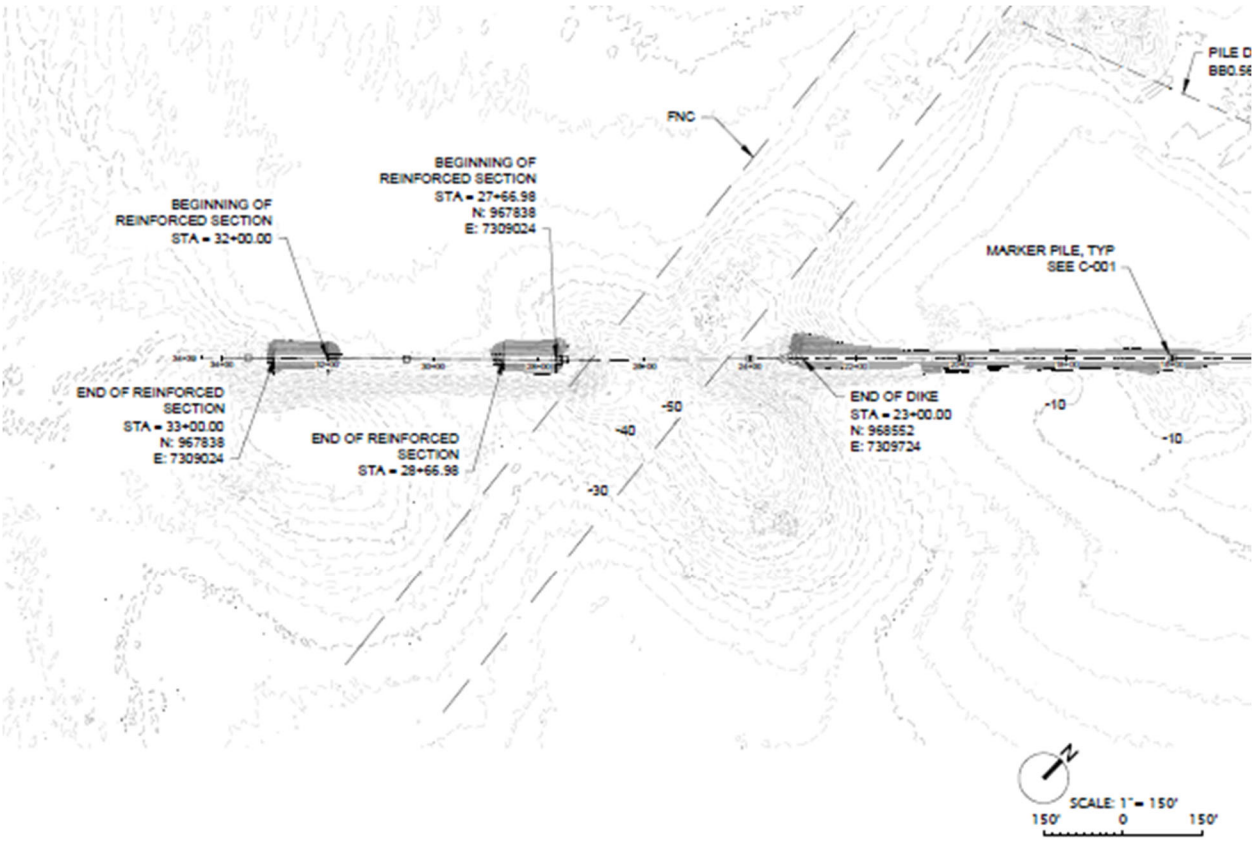


Figure 4 Plan view PDBB 0.28W

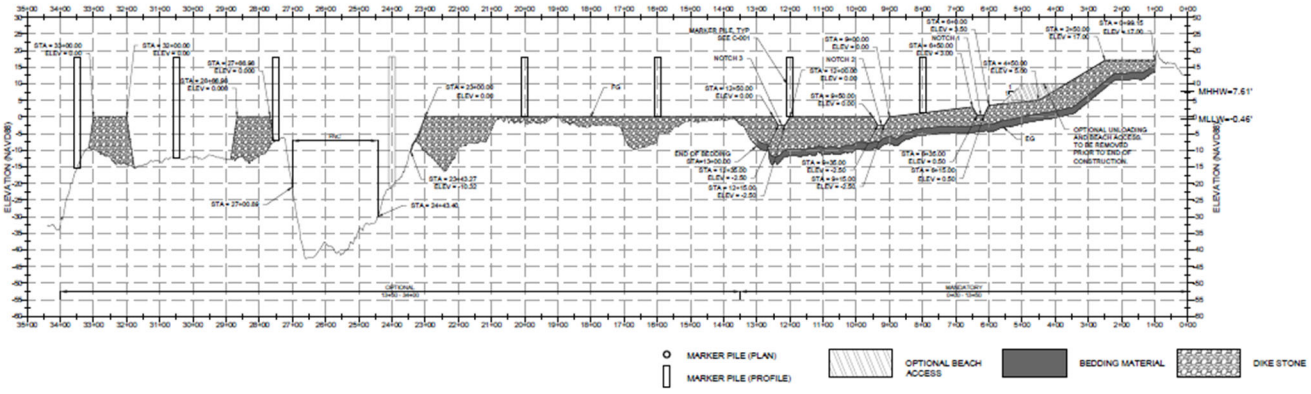


Figure 5 Profile View BBP 0.28 and 0.28W

1.3.2 BB0.28 Repair

The repair of BB0.28 will involve removing the existing timber piles, adding enrockment to repair the existing structure, and extending the existing dike to the present-day shoreline of West Sand Island (Figure 5.). The new enrockment would include notches to allow juvenile fish passage along the shoreline during low water.

The project will remove 486 existing timber piles by pulling, cutting, or snapping at the approximate level of the enrockment. Vibratory hammers will not be used for timber pile removal. The piles will be disposed of in accordance with applicable regulations.

Land-based and barge-based excavators and/or cranes will place the rock. For over-water work, the equipment barge will be moored adjacent to a rock barge. The contractor will be required to place rock from a clamshell, orange peel grab, or excavator bucket and must not open the bucket for placement until the bucket is below the water surface. For rock placement near or above the water surface, where opening the bucket below the surface is not possible, the contractor must place the bucket as close as safely possible to the placement location before opening. Releasing rocks from a bucket above the water surface will not be permitted. During rock placement, USACE would work closely with the contractor to regularly assess subsurface conditions and grades via conditional hydrographic surveys, taking corrective actions as necessary. The contractor will perform hydrographic and topographic surveys pre-construction and post-construction to ensure proper rock placement.

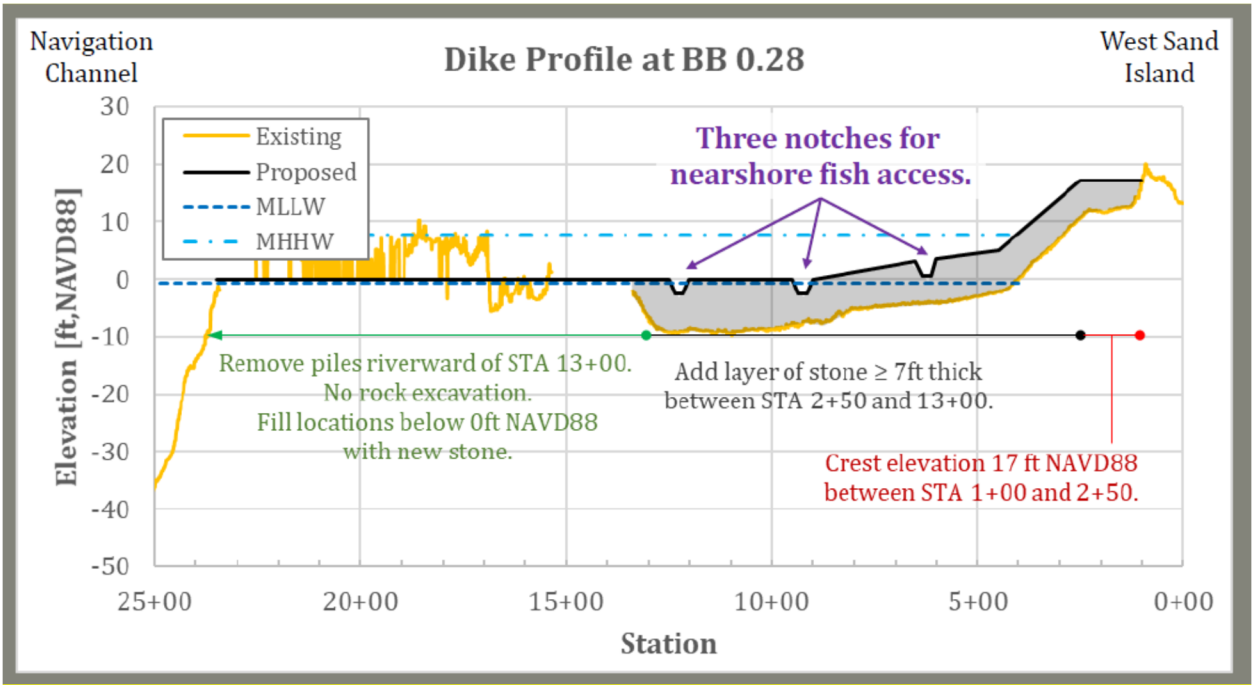


Figure 6. Proposed Repair Profile at BB 0.28

1.3.3 Material Transition Zone

USACE will construct a material transition zone above mean higher high water (MHHW) at the shoreward end of the new dike in order to protect the shoreline connection from erosion and to prevent flanking of the dikes on the shoreward end. It will extend 300 feet along the shoreline to the south of BB0.28 East and 200 feet along the shoreline to the north. Materials will be delivered by trucks using the shoreline haul road and spread into place using excavators and dozers.

1.3.4 Dune Reinforcement

The existing dune along the shoreline at West Sand Island has a low spot near the proposed location of the material transition zone that needs to be fortified to protect the morphology of the island. To address this risk, the project will reinforce the dune by placing material (such as brush, root masses, logs, branches, and sand), grubbed from the staging area into the low spot, above MHHW.

1.3.5 Pile Marker Installation

The crest of the new pile dike enrockment will frequently be below the water surface. In order to warn river users of submerged hazards, 12 marker piles will be installed. Steel pipe piles will be installed along the new enrockment, as well as along the other three existing pile dikes (not scheduled for repairs at this time) (refer to Figure 2 which shows navigation markers). The piles will vary in diameter from 12 to 24 inches, with larger diameter piles being used in locations where currents are stronger. The piles will either be 0.5-inch wall thickness epoxy coated steel or 0.75-inch bare steel pile (

Table 1). As it is unknown at this time if larger piles will be needed, USACE will assume that 24-inch steel piles will be used for all locations as these piles create the largest Zone of Influence (ZOI) due to higher installation noise. The marker piles will be driven as close to the crest as possible, but they could be offset up to 25 feet from the centerline of the existing pile dike if enrockment nearer to the crest would make pile driving infeasible. Marker piles will be fitted with bird deterrents to prevent them from being used as perching areas for piscivorous avians.

The contractor may use barge-mounted cranes equipped with survey grade positioning software to ensure the piles are installed with precision. Piles are generally installed by a rig which supports the pile leads, raises the pile, and operates a hammer. The rigs will use either impact hammers or vibratory hammers; it is anticipated that half of the piles will be driven using impact and half using vibratory. Driving shoes may be used to facilitate driving and reduce driving time.

Table 1. Location and Properties of Marker Piles

Baker Bay Pile Dike Marker Pile Locations					
Number		North	East	Latitude	Longitude
1	BB 0.86	970873	7309121	46.27396	124.0306
2	BB 0.70	970123	7309460	46.27216	124.0286
3	BB0.56	969445	7309934	46.27261	124.0272
4	BB0.56	969593	7310306	46.27261	124.0272
5	BB0.28	968524	7309702	46.26948	124.0296
6	BB0.28	968768	7309932	46.27030	124.0285

7	BB0.28	969054	7310212	46.26948	124.0277
8	BB0.28	969340	7310491	46.27194	124.0264
9	BB0.28	969626	7310771	46.27276	124.0254
10	BB 0.28W	968229	7309410	46.26877	124.0304
11	BB 0.28W	968016	7309200	46.26816	124.0312
12	BB 0.28W	968229	7309410	46.26756	124.0320

1.3.6 Site Access and Staging

USACE anticipates that contractors will use either the Port of Ilwaco or Port of Chinook to access West Sand Island; however, a similar location may be chosen. All mainland staging and parking will be the responsibility of the construction contractor.

Barges will transport all equipment and material to and from West Sand Island and the pile dike. Barges will serve as staging platforms for in-water construction and may be spudded or anchored into position. The proposed access area is located between BB PD0.86 and pile dike PD0.70. The contractor will likely require a material offloading facility (MOF) and will design and construct that. Access from West Sand Island to deep water for material and equipment delivery will either be a land peninsula constructed of a cofferdam backfilled with structural fill (option 1) or a floating transition barge (option 2). Figure 7. Example Photos of Typical Barge Landings. shows examples of each access type. Both options will require dredging. Based on a similar project (the South Jetty Rehabilitation Project), USACE anticipates that the contractor will use the barge option; however, both options will be available to the contractor. Due to the uncertainty, USACE has chosen to estimate impacts for the cofferdam configuration, because it would have the highest estimated incidental take.

Figure 7. Example Photos of Typical Barge Landings.

1.3.6.1 MOF Option 1

The cofferdam configuration (option 1) is less likely to be used, because it involves significant underwater dredging, and structural fill quantities that pose a higher cost to the contractor to both install and remove. If used, the cofferdam would be installed on the West Sand Island shoreline and consist of a three-sided rectangle, with an open side facing landward. The dimensions of the cofferdam are anticipated to be around 50 feet on the sides that are perpendicular to the shore and 100 feet on the riverward edge (paralleling the shore). The sides of the cofferdam would likely consist of 100 to 125 steel AZ sheet piles, varying in width from 24 to 30 inches. Sheet piles are installed in pairs with a vibratory hammer. Installation is assumed to take up to 5 days installing 25 piles per day. After the sheet piles are installed, the contractor would backfill granular material into the cofferdam from the open, landward side, matching the upland grades. The area outside the cofferdam on the waterward side will be dredged to allow the rock barge enough depth to access to the cofferdam. It is anticipated that a total of 25,000

CY of material, all from below MHHW, would need to be dredged for this option. If used, the cofferdam will likely stay in place for the project duration, after which it would be removed using a vibratory hammer over 3 days at a rate of up to 42 piles per day. Based on past experience USACE estimates 20 minutes per sheet pile for installation and 5 minutes per pile for removal. If this option is chosen it will entail 1875 minutes of vibratory pile driving for installation and removal.

1.3.6.2 MOF Option 2

The transition barge (option 2) consists of a system of two barges, the first barge would be spudded in place in water for the duration of active construction. The transition barge provides access to deep water and a platform to access a second material "rock barge" from. This option requires less dredging than option 1 and no structural fill is required. It is anticipated that 2,800 CY (2,700 CY below MHHW) will need to be dredged. The transition barge is anchored with a set of spuds located on each side of the barge. The spuds would be hydraulically controlled and rely on self-weight to embed into the submerged soil to hold the transition barge in place. A system of no more than four mooring dolphins with no more than 16 total pipe piles up to 24" in diameter will be necessary to moor the material delivery or "rock barge" and would be driven with a vibratory hammer. The piles are anticipated to be installed in August, over an estimated period of two days (8 piles/day). As each pile takes 20 minutes of vibratory pile driving to install, we anticipate 160 minutes of pile driving per day to install the dolphins.

As the Contractor may need to employ both MOF option 1 and option 2 take estimates are based on both options being exercised by the Contractor.

1.4 Noise Emission

USACE completed the Sand Island Test Pile Project between September 16 and October 9, 2020. An IHA was issued to USACE for the project. Marine mammal observers ensured all conditions of the IHA were implemented and collected information during pile installation for 15 days of the project (Robert Miner Dynamic Testing 2020). Acoustic monitoring was also performed. Results from the project are incorporated herein.

1.4.1 In-air Noise

Wind, waves, vessels transiting the Columbia River, and recreational activities all contribute to ambient in-air sound levels in the project vicinity.

Pile installation would result in some airborne noises; however, in-air noise was not a factor in assessing take for in-water activities because the Level B Zone of Influence (ZOI) for underwater noise extends farther. Any marine mammals impacted by in-air noise will be accounted for during the in-water noise assessment and therefore not further assessed in this document.

1.4.2 In-water Noise

Ambient in-water sound in the Proposed Action Area is affected by many factors including: wind and waves from the Pacific Ocean, commercial and recreational vessel use, sounds from resident aquatic animals, nearby landmasses and the ocean floor, currents, etc. A recent study of ambient ocean sound for Oregon's nearshore environment observed maximum and minimum levels of 136 decibels (dB) referenced to a standard pressure level of one micro-Pascal (re µPa) and 95 dB re 1 µPa, respectively, with an average level of 113 dB re 1 µPa over a period of one year (Haxel et al. 2011). This level could vary given different recreational and commercial vessels; up to 150 dB for smaller fishing vessels (Hildebrand 2005), up to 186 dB for large vessels, 81 to 166 dB for empty tugs and barges and up to 170 dB for loaded tugs and barges (Richardson et al. 1995) within the frequencies between 20 and 5000 hertz (Hz). Dolphins and toothed whales produce broadband clicks of 125 to 173 dB within frequencies between one kilohertz (KHz) and 200 KHz and humpback whale songs can range between 144 and 174 dB (DOSITS 2012).

Background sound levels were collected for three days in mid-October of 2020 as part of the Sand Island Test Piles project. One of the test piles was located on the southern tip of West Sand Island, which is approximately one mile away from PD0.28. The median value for the broadband 30 second RMS level was 114.3 dB re: 1µPa.

Pile driving to install pile markers is likely to be done with both vibratory and impact hammers. It's anticipated that the contractor will start driving each pile with a vibratory hammer and finish

with an impact hammer. Bubble curtains are proposed to be used unless current velocities preclude their use.

Pile driving to construct and remove the temporary MOF will be done solely using a vibratory hammer. Pile driving noise will be intermittent but could temporarily disturb marine mammals in the proposed project area.

Estimated in-water sound levels anticipated from vibratory and impact hammer installation of steel piles are summarized in Table 2.

Table 2. Estimated Unattenuated Underwater Sound Pressure Levels Associated with Vibratory and Impact Pile Driving.

Pile Type & Activity	**Sound Pressure Level (SPL) (single strike)[1]**		
24-Inch Steel Pile Installation w/impact hammer[2]	203 dB_{PK}	189 dB_{RMS}	178 dB_{SEL}
24-Inch Steel Pile Installation or Removal w/vibratory[3]	194 dBpk	154 dB_{RMS}	N/A
24-Inch Steel Sheet Installation or Removal w/vibratory[4]	175 dBpk	160 dB_{RMS}	N/A

[1] SPL Notations: PK = Peak; RMS = Root mean squared; SEL = Sound exposure level

[2] From CalTrans 2015 Table I.2-1. Summary of Near-Source (10-Meter) Unattenuated Sound Pressure Levels for In-Water Pile Driving Using an Impact Hammer: 0.61-meter (24-inch) steel pipe pile in water ~5 meters deep.

[3] From United States Navy. 2015. Prepared by Michael Slater, Naval Surface Warfare Center, Carderock Division, and Sharon Rainsberry, Naval Facilities Engineering Command Northwest. Revised January 2015. Table 2-2.

[4] Estimated average typical sound pressure levels for 24-inch AZ steel sheets, referenced from Caltrans (2020)

Based upon the assumptions USACE estimates the Impact for pile driving activities under this proposed action to be as shown in Tables 3 and 4 below.

Vibratory Installation and Removal Impact Table Impact Radius (meters)					
Species Type:	Cetaceans			Pinnipeds	
Hearing Group:	LF	MF	HF	PW	OW
24: Steel Pipe					
Level A Impact	3.7	0.3	5.5	2.3	0.2
Level B All Species	1847.8				
24" Sheet Pile					
Level A Impact	23.4	2.1	34.6	14.2	1.0
Level B Impact all Species	4641.6				

Table 3 Vibratory Steel Pile and Sheet Pile Installation.

Impact Hammer 24" Steel Pipe Installation (meters)					
Species Type:	Cetaceans			Pinnipeds	
Hearing Group:	LF	MF	HF	PW	OW
Level A Impact (dB/SEL)	501.4	17.8	597.2	268.3	19.5
level B Impact All Species	857.7				

Table 4 Impact Hammer 24" Steel Pile Installation

1.5 Best Management Practices, Mitigation, and Impact Minimization Measures

General Best Management Practices (BMPs), mitigation and minimization measures that may be implemented for the project are described in Section 11 of this application.

2.0 Dates and Duration

The functional repairs are anticipated to take two construction seasons to complete and are anticipated to occur in 2025 and 2026. The Oregon Department of Fish and Wildlife's recommended in water work window for the project location in the Columbia River is November 1 through February 28; however, there were several constraints in developing the in-water work schedule for the pile dike repairs. The major constraints including the following: ESA-listed fish presence, marine mammal presence, marbled murrelet considerations, and importantly unsafe sea conditions and weather during much of the year, but especially in the winter months.

Construction cannot occur when temperature is 32 °F or lower, daily total precipitation is 0.50 inches or greater, or wind speed is 25 mph or greater. These conditions cause project shutdowns until the conditions become favorable and therefore, USACE and contractors prefer to perform work in this location from May to September. In order to avoid potential impacts to ESA-listed fish and southern resident killer whales that may predate on adult salmonids, no in water work is proposed during the months of January, February, March, April, May, or June. Taking into account the timing limitations for both listed species and safe coastal construction, USACE proposes to perform in water work from July through November, with pile driving starting in August. Pile driving work would start no sooner than 30 minutes after sunrise and would stop no later than 30 minutes before sunset, which equates to a maximum workday of approximately 13 hours.

Estimated construction durations for major repair activities are shown below in Table 5.

Table 5. Estimated Duration of Major Repair Activities

Activity	Estimated Start	Estimated Duration
Season One 2024		
Mobilization (equipment arrives on site)	30-Jun	1 day

Mobilization (haul road construction, transport equipment and rock to island, access dredging for MOF)	July	35 days
Install pipe piles for mooring dolphins	August	2 days
Install cofferdam for MOF Option 1	August	10 days
Remove timber Piles, BB0.28	August	1 week
Add rock to BB 0.28 East and Reinforce BB 0.28 West	Aug – Oct	3 months
Land-based construction (place rock, place cobble revetment)	August	2 weeks
Demobilization (remove imported haul-road materials, deconstruct MOF – removal of piles)	Aug – Oct	2 months
Pile Marker installation	October	3 days
Season Two 2025		
Mobilization (equipment arrives on site)	30-Jun	1 day
Remove rock, transport, place at BB0.28 East	July – October	4 months

As discussed with NOAA, should any pile driving work not be completed in the first season, USACE will request an extension for work in the second year.

3.0 Marine Mammal Species and Numbers

USACE identified 26 species that have the potential to occur in waters off the Oregon coast during project construction (Table 6) Marine mammals are, to varying degrees, susceptible to Level B harassment (i.e., behavioral disturbance or temporary hearing threshold shift) and the more severe Level A harassment (i.e., non-serious injury or permanent threshold shift). Table 2 outlines the sound thresholds for each marine mammal group. We use this information in Section 4.0 to help assess the potential effects of proposed construction activities on species likely to be encountered in the project vicinity.

The majority of the species listed are unlikely to occur in the project vicinity. For example, numerous cetaceans (i.e., sei whale (*Balaenoptera borealis borealis)*, Risso's dolphin (*Grampus griseus),* common bottlenose dolphin *(Tursiops truncatus truncates),* striped dolphin (*Stenella coeruleoalba),* short-beaked common dolphin *(Delphinus delphis)*, short-finned pilot whale (*Globicephala macrorhynchus),* Baird's beaked whale (*Berardius bairdii)*, Mesoplodont beacked whale (*Mesoplodon* spp.), Cuvier's beaked whale (*Ziphius cavirostris),* pygmy sperm whale (*Kogia breviceps),* dwarf sperm whale (*Kogia sima),* sperm whale *(Physeter macrocephalus*) are only encountered at the continental slope (>12 miles/20 km offshore) or in deeper waters offshore and are unlikely to be affected by construction activities. Other species may occur closer inshore but are rare or infrequently encountered off the Oregon coast (i.e., minke whale (*Balaenoptera acutorostrata scammoni),* Pacific white-sided dolphin *(Lagenorhynchus obliquidens),* northern right-whale dolphin *(Lissodelphis borealis),* and Dall's porpoise *(Phocoenoides dalli dalli).* Given these considerations and no reasonable expectation for proposed activities to affect the above species, they will not be addressed in Section 4.

Table 6. Marine Mammal Species in the Vicinity of West Sand Island

Species and Marine Mammal Group[1]	**Estimated Stock(s) Abundance**[2]	**ESA* Status**	**MMPA** Status**	**Frequency of Occurrence**[3]	**Distributional Range**
Phocid pinnipeds					
Harbor seal (*Phoca vitulina richardii*) Oregon and Washington Coast Stock	24,732 (CV= 0.12)	Not listed	Non-strategic	Likely	Continental shelf (coastal and estuarine)
Northern Elephant Seal (*Mirounga angustirostris*) California Breeding Stock	179,000	Not listed	Not depleted; Non-strategic	Infrequent	Continental shelf
Otariid pinnipeds					
Steller sea lion (*Eumetopias jubatus*) Eastern U.S. Stock	43,201 (minimum)	Not listed	Not depleted; Non-strategic	Seasonal (Sept – May)	Continental shelf
California sea lion (*Zalophus californianus*) U.S. Stock, Pacific Temperate Population	257,606	Not listed	Not depleted; Non-strategic	Seasonal[4] (Sept – May)	Continental shelf
Low-frequency cetaceans					
Humpback whale (*Megaptera novaeangliae*) California/Oregon/Washington Stock	4,776 (CV ≈ 0.05)	Endangered	Depleted and Strategic	Seasonal	Continental shelf and slope

Species and Marine Mammal Group[1]	Estimated Stock(s) Abundance[2]	ESA* Status	MMPA** Status	Frequency of Occurrence[3]	Distributional Range
Fin whale (*Balaenoptera physalus physalus*) California/Oregon/Washington Stock	9,029 (CV = 0.12)	Endangered	Depleted and Strategic	Rare	Continental shelf, slope, and offshore
Gray whale (*Eschrichtius robustus*) Eastern North Pacific Stock	26,960 (CV = 0.05)	Not listed	Non-strategic	Seasonal (Nov - June)	Continental shelf, slope, and offshore
Minke whale (*Balaenoptera acutorostrata scammoni*) California/Oregon/Washington Stock	636 (CV = 0.72)	Not listed	Non-strategic	Rare	Continental shelf
Blue whale (*Balaenoptera musculus musculus*) Eastern North Pacific Stock	1,647 (CV = 0.07)	Endangered	Depleted and Strategic	Seasonal (summer and fall)	Continental slope and offshore
Sei whale (*Balaenoptera borealis borealis*) Eastern North Pacific Stock	519 (CV = 0.40)	Endangered	Depleted and Strategic	Rare	Offshore
Mid-frequency cetaceans					
Pacific white-sided dolphin (*Lagenorhynchus obliquidens*) California/Oregon/Washington, Northern and Southern Stocks	26,814 (CV = 0.28)	Not listed	Non-strategic	Infrequent and seasonal (late spring and summer)	Continental shelf and slope
Risso's dolphin (*Grampus griseus*) California/Oregon/Washington Stock	6,336 (CV = 0.32)	Not listed	Non-strategic	Rare	Continental slope and offshore
Common Bottlenose dolphin (*Tursiops truncatus truncatus*) California/Oregon/Washington Offshore Stock	1,924 (CV = 0.54)	Not listed	Non-strategic	Rare	Offshore
Striped dolphin (*Stenella coeruleoalba*) California/Oregon/Washington Stock	29,211 (CV = 0.20)	Not listed	Non-strategic	Infrequent and seasonal	Generally offshore
Short-beaked Common dolphin, (*Delphinus delphis delphis*) California/Oregon/Washington Stock	969,861 (CV = 0.17)	Not listed	Non-strategic	Rare	Continental slope and offshore
Northern right-whale dolphin (*Lissodelphis borealis*) California/Oregon/Washington	26,556 (CV = 0.44)	Not listed	Non-strategic	Infrequent (late spring and summer)	Continental shelf and slope

Species and Marine Mammal Group[1]	**Estimated Stock(s) Abundance**[2]	**ESA* Status**	**MMPA** Status**	**Frequency of Occurrence**[3]	**Distributional Range**
Stock					
Killer whale (*Orcinus orca*), West Coast Transient Stock	349	Not listed	Not depleted; Non-strategic	Infrequent	Continental shelf, slope, and offshore
Short-finned pilot whale (*Globicephala macrorhynchus*) California/Oregon/Washington Stock	836 (CV = 0.79)	Not listed	Non-strategic	Rare	Deep waters and continental slopes
Baird's beaked whale (*Berardius bairdii*) California/Oregon/Washington Stock	2,697 (CV = 0.60)	Not listed	Non-strategic	Infrequent (late spring to early fall)	Continental slope
Mesoplodont beaked whale (*Mesoplodon* spp.) California/Oregon/Washington Stock	3,044 (CV = 0.54)	Not listed	Non-strategic	Unknown	Deep waters and continental slopes
Cuvier's beaked whale (*Ziphius cavirostris*) California/Oregon/Washington Stock	3,274 (CV=0.67)	Not listed	Non-strategic	Likely	Deep waters
Pygmy Sperm whale (*Kogia breviceps*) California/Oregon/Washington Stock	4,111 (CV = 1.12)	Not listed	Non-strategic	Rare	Deep waters and continental slopes
Dwarf Sperm whale (*Kogia sima*) California/Oregon/Washington Stock	Unknown	Not listed	Non-strategic	Rare	Deep waters and continental slopes
Sperm whale (*Physeter macrocephalus*) California/Oregon/Washington Stock	1,997 (CV = 0.57)	Endangered	Depleted and Strategic	Seasonal (spring, summer, and fall)	Continental slope and offshore
High-frequency cetaceans					
Harbor porpoise (*Phocoena phocoena*) Northern Oregon/Washington Coast Stock	21,487 (CV = 0.44)	Not listed	Non-strategic	Likely	Continental shelf (coastal and estuarine)
Dall's porpoise (*Phocoenoides dalli dalli*) California/Oregon/Washington Stock	25,750 (CV = 0.45)	Not listed	Non-strategic	Infrequent	Continental shelf, slope, and offshore

[1]NOAA Marine Mammal Stock Assessments by Species

[2]Frequency defined here in the range of:

- Rare – Few confirmed sightings, or the distribution of the species is near enough to the area that the species could

Species and Marine Mammal Group[1]	Estimated Stock(s) Abundance[2]	ESA* Status	MMPA** Status	Frequency of Occurrence[3]	Distributional Range
occur there. • Infrequent – Confirmed, but irregular sightings. • Likely – Confirmed and regular sightings of the species in the stock area year-round. • Seasonal – Confirmed and regular sightings of the species in the area on a seasonal basis. • Unknown – Insufficient data to assess patterns in occurrence. * ESA = Endangered Species Act; ** MMPA = Marine Mammal Protection Act					

*Table 7. Marine Mammal Hearing Groups, Hearing Range, and Level B Disturbance Thresholds**

Hearing Group	Generalized Hearing Range	In-Air Noise	Underwater Noise	
			Non-Impulsive (Vibratory Hammer)	Impulse (Impact Hammer)
Low-frequency (LF) cetaceans (baleen whales including humpbacks)	7 Hz – 35 kHz	NA	120 dB	160 dB
Mid-frequency (MF) cetaceans (dolphins, toothed whales, including killer whales)	150 Hz – 160 kHz	NA	120 dB	160 dB
High-frequency (HF) cetaceans (true porpoises, river dolphins, including harbor porpoises)	275 Hz – 160 kHz	NA	120 dB	160 dB
Phocid pinnipeds (PW) (true seals including harbor seals)	50 Hz – 86 kHz	90 dB	120 dB	160 dB
Otariid pinnipeds (OW) (fur seals and sea lions including Stellers and California)	60 Hz – 39 kHz	100 dB	120 dB	160 dB

*****All thresholds reported as the root mean square (RMS) sound pressure level (SPL_{RMS}) and decibels are referenced to 1 micro Pascal (1µPa); Reference: NOAA West Coast Fisheries (online guidance, accessed 03 January 2019) https://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/threshold_guidance.html

*Table 8. Marine Mammal Hearing Groups and Level A Underwater Injury Thresholds**

Hearing Group	**Non-Impulsive (Vibratory Hammer)**	**Impulse (Impact Hammer)**
	SEL_{cum}	SEL_{cum}
Low-frequency (LF) cetaceans (baleen whales including humpbacks)	199 dB	183 dB
Mid-frequency (MF) cetaceans (dolphins, toothed whales, including killer whales)	198 dB	185 dB
High-frequency (HF) cetaceans (true porpoises, river dolphins, including harbor porpoises)	173 dB	155 dB
Phocid pinnipeds (PW) (true seals including harbor seals)	201 dB	185 dB
Otariid pinnipeds (OW) (fur seals and sea lions including Stellers and California)	219 dB	203 dB

* Cumulative sound exposure level (SEL_{cum}) for weighted permanent threshold shift (PTS) onset based on the Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (NMFS 2018)

4.0 Affected Species Status and Distribution

The species shown in Table 6 occur off the coast of Oregon. Most of those marine mammals have not been observed in the Mouth of the Columbia River (MCR); therefore, Corps anticipates they will not be impacted by the Baker Bay Pile Dike Repairs project and no take is being requested. All stock estimates were derived from NOAA/NMFS most recent marine mammal stock assessment reports available. Given these considerations, ten marine mammal species could potentially be affected by proposed project activities (i.e., *Orcinus orca, Megaptera novaeangliae, Eschrichtius robustus, Balaenoptera physalus physalus, Balaenoptera musculus musculus, Phocoena phocoena, Eumetopias jubatus, Zalophus californianus, Phoca vitulina richardii,* and *Mirounga angustirostris*). The following sections provide further details on their status and distribution.

4.1 Cetaceans

4.1.1 Killer Whale

Killer whales (*Orcinus orca*) are the largest member of the family *Delphinidae* (dolphin) with populations distributed globally. Along the west coast of North American, 'resident,' transient,' and 'offshore' ecotypes have overlapping distributions and multiple stocks are recognized within that broader classification scheme. According to the most recent stock assessment (Muto, 2020), the West Coast Transient (WCT) Stock includes animals that range from California to southern Alaska and is genetically distinct from both resident and other transient populations in the region (i.e., Gulf of Alaska, Aleutian Islands, and Bering Sea transients and AT1 transients).

There are an estimated 349 killer whales in the WCT Stock, excluding animals from the 'outer coast.' This estimate excludes animals from California, estimated to be approximately 150 individuals in 2018 (McInnes, 2021). Overall, the population appears to be increasing, potentially corresponding in greater prey abundance (Houghton et al. 2015a). Killer whales travel in pods ranging in size from 2 to 15 individuals. Killer whales are subject to injury from ship strikes and vessel noise that may interfere with echolocation (Veirs et al. 2016). Vessel speed has been shown as one of the best predictors of sound levels received by killer whales and adherence to speed limits may ultimately reduce the level of disturbance to the species (Houghton et al. 2015b). WCT killer whales have been observed near the MCR during the peak

spring Chinook salmon migration in March and April and a pod of transient killer whales were detected near the Astoria Bridge in May of 2018 (Frankowicz 2018) and again in 2022 (Tomlinson, 2022). Southern Resident killer whales have not been documented entering the Columbia River. Therefore, USACE will request take of WCT killer whales only.

4.1.2 Humpback Whale

The estimated population of the humpback whale (*Megaptera novaeangliae*) California/Oregon/Washington are part of the Mexican and Central American Distinct Population Segment (DPS), with a population estimate of approximately 2,900 animals (Carretta et al. 2019). Sources of human-caused mortality and injury include pot/trap and gillnet fisheries, vessel strikes, entanglements, and marine debris. The entire species was previously listed as "endangered" under Endangered Species Act (ESA) due to historical commercial whaling practices that decimated populations. The stock is now managed as three Distinct Population Segments (DPS) units and humpback whales in the Mexican and Central American DPSs are currently listed "threatened" and "endangered", respectively, under ESA. As such, the California/Washington/Oregon Stock is currently considered "endangered," "depleted," and "strategic" under Marine Mammal Protection Act (MMPA) (Carretta et al. 2019).

Humpback whales migrate long distances between winter breeding areas and summer feeding areas. Humpback whales in the North Pacific have several populations distinguished by their winter breeding areas (Calambokidis et al. 2000). Whales found off the coast of Oregon comprise the California/Washington/Oregon Stock that may include animals from the California-Oregon and Washington-southern British Columbia feeding groups (Carretta et al. 2019). These animals belong almost exclusively to the Mexican and Central American DPSs. Humpback whales are primarily found on the continental shelf and slope (Adams et al. 2014). Humpback whales are usually seen alone or in pairs and are typically seen off the Oregon coast from April to October, with peak numbers from June through August. Humpback whales were observed near Heceta Bank (i.e., 15 to 30 miles off the Oregon coast in Lincoln and Lane counties) in June 1990 (Green et al. 1991).

Humpback whale feeding groups have begun utilizing the MCR as foraging ground, arriving in the lower Columbia estuary as early as mid-June, and have been observed as late as mid-November with a peak of abundance coinciding with the peak abundance of forage fish in mid-

summer. Humpback whale have been observed in the immediate vicinity of West and East Sand Islands in late summer and fall of 2015, 2016, 2017, and 2019 (The Columbian 2016; The Columbian, 2019). They were again seen earlier in the season than ever, at the beginning of April in 2020 (Chinook Observer, 2020). Based on this information, it is possible that humpback whales may pass through and may forage intermittently in the immediate project vicinity.

4.1.3 Gray Whale

Gray whales (*Eschrichtius robustus*) in the North Pacific have two distinct population stocks, Eastern North Pacific (ENP) and Western North Pacific. During summer and fall, gray whales in the ENP migrate from breeding grounds off the coast of Baja California and Mexico to feeding areas in the Bering Seas. Approximately 200 of the aforementioned migrating whales feed between northern California and northern British Columbia (Sumich 1984, NOAA 2014). Whales seen along the Oregon coastline are typically part of this Pacific Coast Feeding Group (PCFG) and their abundance and residence time in Oregon may correlate with the availability of mysids (*Holmesimysis sculpta*), a major prey item (Newell and Cowles 2006).

The best available abundance estimate for ENP gray whales is 26,960, as of the 2015 abundance estimates from NOAA 2020 stock assessment. Though not currently managed as a separate stock, the estimated number of gray whales in the PCFG is approximately 209 (CV=0.07) animals. Gray whales in the ENP seem to have increased over the last few decades, in spite of an unusual mortality event (UME) in 1999/2000. Entanglement, ship strikes, and habitat change are ongoing concerns for the population, but the current level of human-caused mortality is still well below the potential biological removal (PBR) for the stock. ENP gray whales are not currently listed under ESA and are not considered a “strategic” stock under the MMPA (NOAA 2014).

There are few recorded sightings of Gray whales in the MCR. However, prior to 1984, they were the only mysteciti cetecean species recorded to have entered the Columbia River (Jeffries 1984). USACE field biologist Kyle Tidwell sighted mother and calf Gray whales upriver of the proposed action area near Rice Island in late summer of 2021. There are a few observations from 1989 and 1990 just north of the Long Beach Peninsula (OBIS http://seamap.env.duke.edu/species/180521 accessed 1/18/2019). Gray whales migrate along the Oregon coast in three discernible phases from early December through May (Herzing and

Mate 1984). However, individuals have been reliably sighted in the vicinity of the work area during the proposed in water work window, therefore USACE will request a take to account for this unlikely event.

4.1.4 Fin Whales

Fin whales (*Balaenoptera physalus physalus*) have three recognized stocks in the North Pacific, with whales off the Oregon coast typically part of the California/Oregon/Washington Stock. Fin whales are present year-around in Oregon waters, though they may be less abundant in spring and winter (Mizroch et al. 2009, NOAA 2016). Evidence from prey remains found in carcasses and historic whaling records suggest they inhabit waters of the continental shelf, slope and offshore, and predominantly near the surface (Mizroch et al. 2009).

Fin whales in the North Pacific were extensively harvested during commercial whaling operations. Available catch data estimates 40,650 fin whales were killed between 1911 and 1985, with the majority of harvested from May to October 1905 to 1971 (Mizroch et al. 2009). There are currently just over 9,000 fin whales estimated in waters (out to 300 nautical miles) off California, Oregon, and Washington coasts (NOAA 2016). While their numbers appear to be increasing, fin whales are still susceptible to injury or death due to gillnet entanglement or ship strikes. Fin whales, like other low-frequency cetaceans, may also be negatively affected by increasing levels of anthropogenic noise (NOAA 2016). The California/Oregon/Washington Stock of fin whales has protective status under ESA and the MMPA. They are considered "endangered" under ESA, with a default status of "depleted" and "strategic" under the MMPA (NOAA 2016). There are no recorded sightings of fin whales in the proposed action area, therefore USACE does not anticipate impacts to this species from the pile driving work.

4.1.5 Blue Whales

Blue whales (*Balaenoptera musculus musculus*) have both and eastern and western north Pacific stock, each with a unique acoustic call (Stafford et al. 2001). The ENP Stock includes animals found between the eastern tropical Pacific and the northern Gulf of Alaska and the Pacific coast represents an important feeding area for blue whales during summer and fall (Carretta et al. 2019). The majority of summer/fall feeding activity occurs off the California coast (Calambokidis et al. 2004, 2009). Blue whales are only occasionally detected in offshore waters of Oregon and Washington (Calambokidis et al. 2009, Carretta et al. 2019), and sightings of

whales from the California feeding population in British Columbia and the Gulf of Alaska would suggest that animals do migrate through Oregon and Washington waters (Calambokidis et al. 2004).

There are currently an estimated 1,647 blue whales in the ENP stock, with a fairly constant population size since the 1990s. There was extensive harvest of blue whales between 1910 and 1965, prompting their listing under ESA. Although the population is likely near the carrying capacity, entanglement, ship strikes, and increased levels of anthropogenic sound pose ongoing risks to blue whales. Blue whales are currently listed “endangered” under ESA, and “depleted” and “strategic” under MMPA (Carretta et al. 2019). There are no recorded sightings of the species in the proposed action area, therefore USACE does not anticipate impacts to this species from pile driving activities.

4.1.6 Harbor Porpoise

For the Northern Oregon-Washington Coast stock (Lincoln City, OR, to Cape Flattery, WA) of harbor porpoises (*Phocoena phocoena)*, the corrected estimate of abundance in the coastal waters in 2010-2011 was 21,487 (CV = 0.44) (Forney et al. 2013 cited in NOAA 2014b) and is currently estimated at 35,769 (NOAA 2017).

Harbor porpoise are known to occur year-round in the inland transboundary waters of Washington and British Columbia, Canada (Osborne et al. 1988 cited in NOAA 2014b) and along the Oregon/Washington coast (Barlow 1988, Barlow et al. 1988, Green et al. 1992 cited in NOAA 2014b). Aerial survey data from coastal Oregon and Washington, collected during all seasons, suggest that harbor porpoise distribution varies by depth (Green et al. 1992 cited in NOAA 2014b). Although distinct seasonal changes in abundance along the west coast have been noted and attributed to possible shifts in distribution to deeper offshore waters during late winter (Dohl et al. 1983, Barlow 1988 cited in NOAA 2014b), seasonal movement patterns are not fully understood.

Harbor porpoises are usually found in shallow water, most often nearshore, although they occasionally travel over deeper offshore waters (NOAA 2013a). West Coast populations have more restricted movements and do not migrate as much as East Coast populations (Halpin, OBIS-SEAMAP 2019). Most harbor porpoise groups are small, generally consisting of less than five or six individuals, though for feeding or migration they may aggregate into large, loose groups of 50 to several hundred animals (Halpin, OBIS-SEAMAP 2019). Behavior tends to be inconspicuous, compared to most dolphins, and they feed by seizing prey which consists of a

wide variety of fish and cephalopods ranging from benthic to demersal (Halpern, OBIS-SEAMAP 2019).

Harbor porpoises are sighted year-round in the MCR (Griffith 2015). Their abundance peaks with the abundance of anchovy presence in the river and nearshore. USACE pile driving work in 2030 Noted 5 sighting of 6 individuals during similar work in area during 1037 minutes of pile driving. Sightings in the area have been primarily single individuals with occasional sightings of two individuals.

4.2 Pinnipeds

The following Table 9 shows the average number of pinnipeds found at South Jetty, which is approximately four miles southwest of West and East Sand Island for 2000-2014.

Table 9. Average Number of Pinnipeds per Month on South Jetty, 2000-2014 (WDFW)

Month	# of Times Surveyed in Month	Avg. Number of Steller Sea Lions	# of Times Surveyed in Month	Avg. Number of California Sea Lions	# of Times Surveyed in Month	Avg. Number of Harbor Seals
January	1	249	2	10	0	--
February	6	259 (*)	7	28	1	1
March	6	177	4	17	2	14
April	8	587	7	99	0	--
May	6	824	6	125	0	--
June	18	676	14	202	7	57
July	10	358	2	1	0	--
August	4	324	4	115	2	1
September	2	209	2	249	0	--
October	6	384	6	508 (***)	0	--
November	3	1,663	3	1,214 (**)	0	--

December	1	1,112	1	725	1	57
Totals	71	6,822	58	3,293	13	130

(*) 2012 may be an anomaly with only 1 sighting.

(**) Driven by 2011 counts, which could be an anomaly.

(***) Appears to be driven by high numbers in 2006.

Source: Data from Washington Department of Fish and Wildlife 2014.

4.2.1 Steller Sea Lion

Large numbers of Steller sea lions (*Eumetopias jubatus*) use the nearby South Jetty for hauling out (Jeffries 2000) and are present, in varying abundances, all year (Table 9). Abundance is typically lower as the summer progresses when adults are at the breeding rookeries. Steller sea lions (SSL) are most abundant in the vicinity during the winter months and tend to disperse elsewhere to rookeries during breeding season between May and July (Corps 2007). All population age classes, and both males and females, use the South Jetty to haul out. Only non-breeding individuals are typically found on the jetty during May-July, and a greater percentage of juveniles are present. Corps assumes that there is a high turnover rate in SSL numbers using the jetty, meaning that the 100 or so SSL hauled out one week might not be the same individuals hauled out the following week.

Previous monthly averages between 1995 and 2004 for Steller sea lions hauled-out at the South Jetty head ranged from about 168 to 1,106 animals. Data from Oregon Department of Fish and Wildlife (ODFW) from 2000-2014 reflects a lower frequency of surveys, and numbers of SSL ranged from 0 animals to 606 (ODFW 2014). More frequent surveys by Washington Department of Fish and Wildlife (WDFW) for the same time frame (2000-2014) put the monthly range at 177 to 1,663 animals throughout the year.

Pile driving work in the vicinity noted two sighting in 2020. However, given the low level of sightings relative to their known presence in the area, USACE does not consider this data an accurate estimate of potential take during work.

4.2.2 California Sea Lion

Large numbers of California sea lions (*Zalophus californianus*) use the nearby South Jetty for hauling out (Jeffries 2000). The population size of the U.S. stock of CSL is estimated at 257,606 animals (NOAA 2019). According to ODFW (2014) most counts of CSL are also concentrated near the tip of the South Jetty. CSL can intermingle with SSL. ODFW survey information (2007 and 2014) indicates that CSL are relatively less prevalent in the Pacific Northwest during June and July, though in the months just before and after their absence there can be several hundred using the South Jetty. More frequent WDFW surveys (2014) indicate greater numbers in the summer, and use remains concentrated to fall and winter months. Nearly all CSL in the Pacific Northwest are sub-adult and adult males (females and young generally stay in California). During pile driving work in 2020, USACE identified 60 individuals in 55 separate sightings indicating an active presence in the area.

4.2.3 Harbor Seal

Harbor seals (*Phoca vitulina richardii*) are one of the most abundant pinnipeds in Oregon and can typically be found in coastal marine and estuarine waters of the Oregon coast throughout the year. On land, they can be found on offshore rocks and islands, along shore, and on exposed flats in the estuary (Harvey 1987). In 2002, the estimated absolute abundance of harbor seals on the Oregon coast (excluding Hunters Island) was 10,087 (8,445-12,046 95% CI) animals (Brown et al. 2005). Harbor seals are known to use the Chinook Channel/Baker Bay area during low tides for hauling out (Jeffries 2000).

Harbor seals are generally non-migratory, but local movements may vary with tides, weather, seasons, food resources, and reproductive behavior (NOAA 2013). They were historically hunted in Oregon as a nuisance to fishermen, however, their numbers have steadily increased since the passage of the MMPA in 1972 (Harvey 1987, Brown et al. 2005). While harbor seals are still subject to incidental take from commercial fisheries in the region, the overall mortality is relatively small, and the Oregon/Washington Coast stock of harbor seals is not depleted under MMPA or listed under ESA (NOAA 2013).

During pile driving work in 2020 USACE observed 303 harbor seals in 209 separate sightings indicating an active use of the action area by this species.

4.2.4 Northern Elephant Seals

The California Breeding Stock of Northern elephant seals (NES), (*Mirounga angustirostris*) breeds and gives birth in California but makes extended foraging trips to areas including coastal Oregon biannually during the fall and spring (Le Boeuf et al. 2000). They spend about 90% of their time at sea underwater, making sequential deep dives. While both males and females may transit areas off the Oregon coast, males seem to have focal forage areas near the continental shelf break while females typically move further offshore and feed opportunistically at numerous sites while in route (Le Beouf et al. 2000). Prior to 1984, only two sightings of Northern elephant seals were recorded (Jeffries 1984) one sighted near Tongue Point and another found dead at RM 47. Since then, they have been seen at the MCR infrequently. While Corps was unable to locate any other confirmed sighting of NES within or upriver from the ZOI there presence in the proposed action area cannot be discounted.

There are 159,000-199,000 Northern elephant seals in the United States, with an estimated annual growth rate of 3.8% between 1988 and 2010 (Lowry et al. 2014). The population is susceptible to incidental take and injury from gillnet and trawl fisheries operating offshore, however, the human-caused mortality is still well below the estimated potential biological removal (PBR) level. Northern elephant seals are not currently listed under ESA, nor considered “strategic” or “depleted” under MMPA (NOAA 2014c).

5.0 Type of Incidental Take Authorization Requested

Under the MMPA, NMFS has defined levels of harassment for marine mammals. Level A harassment is defined as, “Any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild.” Level B harassment is defined as, “Any act of pursuit, torment, or annoyance which has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering.” Under Section 101(a)(5)(D) of the MMPA, USACE is requesting an Incidental Harassment Authorization for marine mammals that may be affected by the Baker Bay Pile Dike Repairs project as described in Sections 1 and 2 above.

The in-air effects of pile driving noise were considered for this project; however, we assume that animals that would be present in the in-air disturbance zone would have already entered the in-water disturbance isopleth. Therefore, no separate take is being requested for disturbance to marine mammals outside of the water.

The in-water effects of pile driving noise include potential Level A and Level B effects on marine mammals. No serious injury or mortality is anticipated with this project. The activities including workday estimates anticipated to disturb marine mammals are shown below in Table 10.

Table 10. Summary of Proposed Pile Driving Installation Activities

Type of Disturbance	**Hammer Type**	**Workdays**	**Estimated Time of Year**
Season One 2025			
Install pipe piles for mooring dolphins	Vibratory	2	August
Install cofferdam for MOF Option 1	Vibratory	5	August
Deconstruction MOF remove steel/sheet pipe piles	Vibratory	2	October
Pile Marker installation	Vibratory and Impact	3	October
Total		12	
Deconstruction of MOF and Pile Marker Installation could be moved to October of season two in order to be completed within the work window.			

5.1 Level A Harassment - Permanent Threshold Shift

Level A harassment includes permanent hearing threshold shift or other types of non-serious injury. We utilized the NMFS technical guidance and tool for estimating Level A permanent threshold shift (PTS) isopleths, the area within which auditory damage could occur, calculated separately for each marine mammal hearing group (NMFS 2018). The estimated isopleth distances were calculated using the un-weighted Sound Pressure Levels (SPL) Root Mean Squared (RMS) values from

, with the following assumptions:

- The average number of hours in each workday is 12 hours per day.
- The steel pipe piles will be driven using a vibratory hammer in the beginning, and with an impact hammer to finish. Therefore, estimates are for 50% impact hammer use and 50% vibratory hammer use.
- The average number of strikes per pile, to imbed to depth, with an impact hammer is 450 (USACE 2019). However, for this project, piles will be started with a vibratory hammer, so Corps used the average number of strikes per half pile with an impact hammer is 225.
- The average number of strikes per minute with an impact hammer is 43.
- The average duration to install a single 24-inch pile with an impact hammer is 11 minutes (USACE 2019). Though some piles may be 12-inch and 18-inch steel piles, Corps conservatively used values for 24-inch piles. USACE estimates that 50% of ATON pile installation will be with impacts hammer and this estimates 6 minutes per pile.
- Noise dampeners, also called pile cushions or caps, will be used during all pile installations with an impact hammer and are estimated to reduce SPLs by 10 dB; however, per NOAA this deduction should not be applied to noise calculations. Bubble curtains may be used if water conditions permit; however, current condition in the location of the proposed action may preclude their use. Therefore, no noise reduction has been applied due to this uncertainty.
- The average duration to install a single 24-inch steel pipe pile with vibratory is 30 minutes. The average duration to install half of a single 24-inch steel pipe pile with vibratory is 15 minutes.

<u>MOF Construction/Deconstruction assumptions</u>:

<u>Steel pipe piles</u>:

- A maximum of 16 steel pipe piles (four cluster piles) with a maximum diameter of 24 inches may be installed for the MOF.
- All 16 steel pipe piles could be removed in a 24-hour period using vibratory methods.
- The average duration to remove a single 24-inch pipe pile with a vibratory hammer is 5 minutes.

Sheet piles:

- A maximum of 125 (24-inch) AZ steel sheet piles may be installed for MOF 1.
- Up to 25 steel sheets could be installed in a 24-hour period using vibratory methods.
- The average duration to install a single steel sheet is 10 minutes (or less).
- Up to 125 steel sheets could be removed in a 24-hour period using vibratory methods.
- The average duration to remove a single steel sheet is 3 minutes.

Table 11 Pile Driving Time Estimates per Pile Type and Installation Method

Pile Type and Method	Time in Minutes per Pile
ATON Vibratory Installation	15
ATON Impact Hammer Installation	6
MOF Vibratory 24" Steel pile Installation	20
Vibratory MOF Sheet Pile Installation	10
Vibratory MOF 24" Steel Pile Removal	5
Vibratory MOF Sheet Pile Removal	3

The spreadsheet calculations associated with PTS values presented in Table 2 are provided in Appendix A, with corresponding figures in Appendix B.

Based on these assumptions, total pile driving time is estimated to be 72 minutes of impact driving and 2205 minutes of vibratory installation.

Table 12 Total Pile Driving Time in Minutes

Pile Type	Max # of piles	Impact H time	Vibratory T
ATONs	12	72	180
MOF 24" Steel Pile	16	0	320
MOF Sheet Pile	125	0	1250
MOF 24" Steel pile removal	16	0	80
MOF Sheet removal	125	0	375
Total Impact time		72	
Total Vibratory time			2205
Total Pile driving time			2277

5.2 Level B Harassment – Behavioral Disturbance

Corps used the following practical spreading loss equation to calculate the Level B disturbance distances in water (i.e., Equation 1):

$$D_{thresh-water} = D_0 * 10^{(\frac{SPL\ Estimate\ in\ dB_{RMS\ or\ Leq} - Disturbance\ threshold\ in\ dB}{\alpha})}$$

With $D_{thresh\text{-}water}$ calculated distance from source to reach in-water threshold values, D_0 reference measurement distance (10 meters), water disturbance threshold values from Table 2, and α = 15. Estimated sound pressure levels in water were referenced from

, using the dB_{RMS} values for installing 24-inch steel piles with a vibratory hammer and 24-inch piles with an impact hammer. Figures in Appendix B show marine mammal Level B disturbance zones associated with the two types of pile driving activity (i.e., impact and vibratory).

Table 13. Calculated Level A PTS and Level B Disturbance Isopleths During Construction

Noise Generation Type	**Level A** **Permanent Threshold Shift (PTS) Isopleth Distances[1] (meters)**					**Level B Disturbance** All Groups
	LF Cetacean	MF Cetacean	HF Cetacean	Phocid Pinniped	Otariid Pinniped	Isopleth Distances (meters)
24" Steel Pile Impact Installation	501.4	17.8	597.2	268.3	19.5	857.7
24" Steel Pile Vibratory Installation	3.7	0.3	5.5	2.3	0.2	1847.8
Steel Sheet Vibratory Installation/ Removal[2]	23.4	2.1	34.6	14.2	1.0	4641.6

[1] Calculated using NMFS technical tool and spreadsheet for estimating PTS levels associated with pile driving (NMFS 2018) (see Appendix A). Estimates for vibratory installation assume unattenuated sound. Estimates associated with impact driving assume unattenuated, although pile cushions/caps are anticipated to be used.

[2]Steel sheet vibratory removal would be less impactful because it takes less than half as much time but is combined here for simplicity.

[#] Zone of Influence (ZOI) was used for estimating Level B disturbance during all pile driving.

6.0 Take Estimates for Marine Mammals

6.1 Level A Take

A minimum shutdown zone of 25 meters from pile location for pinnipeds and 50 meters for cetaceans will be strictly enforced at all times during any pile driving to minimize potential Level A injury. If a marine mammal is entering or is observed within an established shutdown zone, pile installation will be halted or delayed. These precautions, soft start procedures, and multiple trained observers onsite will minimize potential injury to marine mammals during proposed work.

During impact driving, trained observers will monitor wider shutdown zones to avoid Level A injury to marine mammals, or 25 meters for all pinnipeds and 50 meters for all cetecean, whichever is larger. If any cetecean are detected approaching Level A isopleth distances associated with their respective marine mammal group, observers will notify construction personnel and pile driving will cease. Harbor seals and harbor porpoises may go undetected until they are already within established Level A zones for phocids and HF cetaceans, and some individuals may be undetected altogether. If there is uncertainty as to the species of a marine mammal sighting between 2 species the larger shutdown zone will be enforced.

Table 14 Shutdown Zones by species and Activity.

Shutdown Zone			
	Activity		
Species	Impact Driving	Vibratory Steel Pile	Vibratory Sheet Pile
Harbor seal	**858 M**	**25 M**	**25 M**
Stellar SL	**25 M**	**25 M**	**25 M**
CA Sl	**25 M**	**25 M**	**25 M**
Northern ES	**858 M**	**25 M**	**25 M**
Harbor Porpoise	**598 M**	**50 M**	**50 M**
WCT Killer Whale	**50 M**	**50 M**	**50 M**
Humpback Whale	**502 M**	**50 M**	**50 M**
Gray Whale	**502 M**	**50 M**	**50 M**

A shutdown zone of 50 meters will be strictly enforced for any cetaceans during all vibratory pile driving. The shutdown zone for all other species will remain at the 25-meter minimum during vibratory driving. Measures to stop work will be implemented should any cetaceans be detected approaching this 50-meter shutdown zone.

6.2 Level B Take

This authorization is also requesting incidental take for Level B marine mammal disturbance that may occur due to proposed project activities. Fin, and blue whales may occur in the broader region, but none are likely to enter the Columbia River and come within the Level B disturbance zone for proposed work. In the rare event that one of these species enters the Level B disturbance zone, any pile driving will cease. Based on the marine mammal monitoring procedures and the low likelihood of these three species entering the Columbia River, no Level B harassment is anticipated or requested for fin, or blue whales. Corps is requesting authorization for Level B take for harbor seals, Northern elephant seals, Steller sea lions, California sea lions, humpback whales, Gray whales, killer whales (WCT stock only), and harbor porpoises during vibratory pile driving activities.

Level B underwater disturbance of marine mammals would occur within 858 meters during impact pile driving, within 1848 meters during vibratory installation or removal of piles, and within 4642 meters during sheet pile installation and removal (Table 13). A general monitoring zone of 1,000 meters will be established during all pile driving. The potential Level B exposure recorded by observers during vibratory driving will be extrapolated based upon the number of observed takes and the percentage of the Level B zone beyond 215 meters that was not visible. Level B monitoring protocols, outlined in Section 12, will be implemented according to these stated distances for potential in-water and in-air disturbance.

6.3 Marine Mammal Abundances in Project Area

6.1.1 Cetacean Abundances

Marine mammal counts specific to the MCR were sparse. Thus, we compiled available data in order to estimate abundances. Ancillary data may result in overestimation of the density of animals likely to be encountered in the direct project vicinity and thus the request take quantities are likely higher than the actual take that may be attributed to proposed project activities.

Killer whale

WCT killer whales are mostly transitory in the vicinity of the MCR, generally are not found close to shore, and are highly mobile. Killer whales were not detected in fall and winter aerial surveys

off the Oregon coast documented in Adams et al. 2014. Aerial seabird marine mammal surveys observed zero killer whales in January 2011, zero in February 2012, and ten in September 2012 within an approximately 1,500 km^2 range near the MCR (Adams 2014). While a rare occurrence, a pod of transient killer whales was detected near the Astoria Bridge in May of 2018 (Frankowicz 2018) and in 2022 (Tomlinson, 2022). There have been no confirmed sightings of southern resident killer whales entering the mouth of the Columbia River area.

Humpback whale

Humpback whales have been observed in the immediate vicinity of the project area in recent years. Sightings were of individuals. Humpbacks have been arriving in the lower Columbia estuary as early as mid-June and have been observed as late as mid-November with a peak of abundance coinciding with the peak abundance of forage fish in mid-summer. No surveys were located for the project area, but it is assumed that they could be present during pile driving activities. During previous pile driving activities in the area there were sightings of this species.

Gray whale

Gray whales have been documented near the project area and are known to enter the MCR. While m gray whales migrate along the Oregon coast in three discernible phases from early December through May (Herzing and Mate 1984), the one verifiable sighting in the action area was at or near the in-water work window for the proposed action. Therefore, USACE will request Level B take for this species.

Fin whale

Fin whales have not been documented near the project area and are not known to enter the MCR. Therefore, they are unlikely to occur near the project area at all, and especially unlikely in the months of proposed work.

Blue whale

Blue whales have not been documented near the project area and are not known to enter the MCR. Therefore, they are unlikely to occur near the project area at all, and especially unlikely in the months of proposed work.

Harbor porpoise

Harbor porpoises are regularly observed in the oceanward waters adjacent to the project area and are known to occur year-round. Their nearshore abundance peaks with anchovy presence, which is generally June through October. There was one recorded sighting of a harbor porpoise in the project area east of the jetties in the Sept-Nov timeframe (OBIS-SEAMAP 2019). Therefore, it is feasible that animals could be present during pile driving activities. USACE does not have (nor is aware of) data for the number of harbor porpoises that may be present in the project vicinity. The closest derived estimates of inshore density (3.642 animals/km^2) are for the entire Northern California and Southern Oregon Stock (Barlow et al. 2009), and likely overestimate the number of animals that may occur near the mouth of the Columbia River. Given these constraints, we used the monitoring data associated with the King Pile Test {project (NWP, 2020) to inform estimates in this document. Over the course of a 5-day monitoring period, observers detected 5 harbor porpoises (Grette Associates 2016), during pile driving work in the vicinity in 2020 USACE sighted 7 individuals in 5 sightings. (NWP, 2020)

6.1.2 Pinniped Abundances

For Steller sea lions (SSL), California sea lions (CSL), and harbor seals (HS), the numbers of individuals were referenced from WDFW's surveys from 2000-2014 at the South Jetty for the months of in water work (Table 15)and averaged to get an average daily count (Table 15). While animals were surveyed at the prominent haul out site along the South Jetty, we assume each of these estimates represent the total number of individuals present in the project vicinity. For harbor seals, where abundance was only estimated in July. For harbor seals and California sea lions take estimates are based on sightings during the 2020 King Pile Installation project, while for Stellar sea lions take estimates average daily populations of the area. It is assumed that the test pile observations being more recent and focused in the location of the proposed action represent the best data on the use of the species within the area. However, for Stellar sea lions USACE used population estimates due to the low level of sightings in the

Table 15. Pinniped Abundance Estimates from the South Jetty

	Abundance Estimates (WDFW Average Observations 2000-2014)		
	Steller Sea Lions	**California Sea Lions**	**Harbor Seals**
July	358	1	57
August	324	115	57*
September	209	249	57*
October	384	508	57*
Average	306	291	57
*Actual survey month was June (assume July abundance would be similar to June)			

Northern elephant seals

Northern elephant seals have been observed in the MCR; however, no abundance estimates in the MCR, or vicinity were found. They are known to haul out at Cape Arago, which is approximately 250 miles south of the project area. Surveys were conducted near Cape Arago between 2002 and 2005 (Scordino 2006) and the reference abundance (n = 54) was the maximum count observed.

6.2 Incidental Take

Level A permanent threshold shift isopleths and Level B disturbance thresholds were calculated for all species considered (refer to

Table 13, calculations in Appendix A, and Appendix B figures). The contractor will be asked to use bubble curtains; however, current conditions may not permit their use and no noise reduction has been applied due to this uncertainty. Table 13 summarizes the request for incidental take due to noise impacts associated with impact pile driving activities, along with the percentages of the stock anticipated to be affected.

Shutdown zones will be enforced to avoid Level A auditory impacts during all vibratory driving and for most species (i.e., most cetaceans and all otariid pinnipeds) during impact driving. Shutdown Zones will be monitored by trained marine mammal spotters that will enforce shutdown zones based upon marine mammal hearing groups during all impact hammer pile driving (

Table 13). If the spotter cannot identify a marine mammal to the species level, they will enforce shutdown zones equal to the largest Level A isopleth.

For harbor seals and harbor porpoises, Level A take is requested a specified in Table 18 Level A and Level B take estimated (all species)Table 18. Marine mammal spotters will monitor the Level A PTS zones during all driving activities and record “take” as outlined in Section 13 of this document.

Corps intends to all Pile driving work during the first in water work window. Take estimates are based on work proceeding along the preferred schedule. However weather or other schedule delays may cause the removal of temporary mooring piles and/or removal of MOF sheet piles to be completed in the second year. In the event that all pile driving work is not completed in the first season then USACE will request an extension to complete remaining work during the second in water work window. Corps does not anticipate the number of takes to increase as the overall pile driving time will not change.

6.2.1 Take Estimates for Cetaceans

USACE is requesting take of the following species: harbor porpoise, and humpback whales. For these species take estimates are based on the information from 2020 Pile driving work (NWP, 2020). For other species known to utilize the proposed action area, WCT (Biggs) killer whales, and Gray whales USACE based take estimates on population estimates within the MCR area. USACE defines the “project vicinity” equal to the maximum Level B disturbance ZOI for sheet pile installation 20.7 million meters^2.

Killer whale

It is rare that killer whales are observed in the MCR, however, WCT killer whales have been observed in recent years and could enter the zone of influence during proposed work. Killer whales travel in pods ranging from 2 to 20 individuals. Sightings in the MCR include one sighting of T125A (Jetsam) and 8-12 total orca in 2018 (Frankowicz) and pod T137 composed of 4 individuals in 2022 (Tomlinson). Based on this estimate USACE averaged the 2018 sighting as 10 orca and 2022 sighting as 4 orcas, USACE estimates an average pod size of 7.

Pile driving will only occur on 12 days during the first in water work window, so the likelihood of their presence during pile driving is very slight. The killer whale's size and distinct appearance make them relatively easy to spot by a qualified biologist, and work would cease if any killer whales were to come within the Level A isopleths for the project. No Level A take is being requested due the relative infrequent sightings of the species in the area and the ease of spotting this species. Level B take is requested in the amount of 7 individuals assuming one average sized pod entered the work area during pile driving and enter the level B take area.

Humpback whale

Humpback whales usually travel alone or in pairs and have the potential to enter the MCR during project construction. The humpback whale's large size and distinct behavior make them relatively easy to spot by a qualified biologist therefore no level A take is anticipated. Level B take is based on sightings during 2020 pile driving work. In 2020 there were 7 sightings of 9 individuals, however 2 of the sightings seem to be of the same 2 individuals (same number, direction, and 4 minutes apart so those sightings were counted as one. Therefore, USACE will use 6 sightings of 7 animals for an average of 1.2 individuals per sighting.

$\left(\frac{2277A}{1037B} * 6D\right) * 1.2E$=15.8 Potential Level A Takes

Where:
A is pile driving time anticipated in this action.
B is Pile Driving time during previous work in 2020
D is the total number of sightings 2020
E is the average number of animals per sighting 2020

Therefore, USACE request 16 Level B Takes for this species.

Gray whale

Based on the information provided by USACE biologist Kyle Tidwell that a humpback cow/calf pair were sighted upriver of the potential work window in August of 2020 USACE will request 2 Level B takes in the event that Gray whales enter the action area. No level A takes are being requested as Gray whales are easily identified due to their size and distinctive behaviors. USACE will request 2 Level B Take in the event a similar size group enters the Impact driving Isopleth.

Fin whale, and Blue whale

Fin whales and blue whales are not known to enter the project area and are extremely unlikely to enter the project area. No Level A or Level B take is requested, and work will cease in the unlikely event that any of these whales are detected in the Level A PTS or Level B disturbance zone.

Harbor porpoise

Harbor porpoises are known to occur year-round in the project vicinity. Test Pile work performed by USACE noted Harbor porpoises travel alone or occasionally in pairs. Sightings during test pile work in 2020 identified 8 individuals in 6 sightings therefore USACE assumes average pod size is 1.33 based on observations of the species in the project area. Given the longer duration of the proposed action (2277 minutes for Baker Bay Pile Dike Repairs compared to 1037 minutes during Sand island Test Pile Project USACE estimates potential 14 pods of up to 18 individuals may be within the Level B Take are area of the proposed action. Given the large area of Level B impact during vibratory driving of steel and sheet piles USACE believes all individual could enter the Level B impact area by Pile Driving and request 18 Level B Takes for this species.

$\left(\frac{2277A}{1037B} * 6D\right) * 1.33E$=17.52 Potential Level A Takes

Where:
A is pile driving time anticipated in this action.

B is Pile Driving time during previous work in 2020
D is the total number of sightings 2020
E is the average number of animals per sighting 2020

Level A Takes are only anticipated during the Impact Pile Driving of ATONS which will take place over the course of 3 days. Basing population estimate as 18 individuals over 12 days of work, USACE estimates the population of the species in the action area as 2.5 animals per day. Rounded to 3 animals on any given day. While USACE will utilize BMPs to minimize Level A takes, the cryptic nature of the species could lead to these individuals entering the 598M Level A isopleth during impact pile driving. 2.5 individuals per day x 3 days= 7.5 (rounded to 8) individuals. USACE requests 8 Level A Takes of the species.

6.2.2 Take Estimates for Pinnipeds

In 2020 USCE performed pile driving work in the vicinity of the proposed action. (NWP, 2020). During this work there were numerous California Sea Lion and Harbor Seal sightings. USACE based estimates of take on observations during this project. Over 1037 minutes of pile driving contract MMO observed 61 California sea lions in 56 separate sightings and 309 Harbor Seals in 303 separate sightings. Extrapolating from the data to account for the anticipated pile driving time of the proposed action (2277) minutes USACE expects to observe 2.19 times more of these species (2277 minutes projected pile driving/1037 minutes pile driving during previous work). USACE anticipates that all individuals within the proposed action area may alter behavior to avoid the calculated level B isopleths for pile driving and therefore based Level B take estimates on the projected population within the area during pile driving.

During previous pile driving work in the area. Observations of Stellar sea lions was much lower than expected based upon their utilization of the nearby South Jetty which is 4 miles from the proposed action location. , therefore take calculations for Stellar sea lions (SSL) was estimated using abundance estimates from that location as relatively consistent counts of SSL have been performed by WADFW (Table 16). In order to estimate Level B take of SSL, USACE used daily abundance estimates and multiplied those by the number of days of work in each season.

For northern elephant seals (NES), no haul out locations are known in the project vicinity; therefore, we estimate a monthly abundance of two NES in the project area based on past recorded sightings within or upriver from the area (Jefferies 1984). USACE assumes this is a high estimate however given the lack of data on the species use of the area it is best available estimate.

Type of Disturbance	Hammer Type	Workdays	Mo.	SSL	NES
				daily estimate	monthly estimate*
MOF/pipe piles for mooring dolphins	Vibratory	2	AUG	72	1
MOF/sheet piles for cofferdam	Vibratory	5	AUG	72	1
Deconstruction MOF	Vibratory	2	OCT	77	1
Pile Marker installation	Impact and vibratory	3	OCT	77	1
Total		12			

Table 16 Stellar Sea Lion And Northern Elephant Seal Estimates Proposed Action Area

*See text for explanation of how averages were calculated for each species

6.2.2.1 Otariid Pinnipeds- Level A Take

The largest Level A harassment zone for otariid pinnipeds is 19.8 m. The marine mammal monitors will be able to detect SSL and CSL at these distances and USACE proposes to enforce a minimum shutdown zone of 25 m for these species. Therefore, no Level A take is requested for SSL or CSL.

6.2.2.2 Level B Takes Stellar Sea Lions.

Level B take for Stellar sea lions was estimated by assuming that all individuals of the species present within the ZOI could enter the Level B take Isopleth during vibratory pile installation. Therefore, the level B impact is anticipated to be the estimated number of the species in the ZOI multiplied by the total days of pile driving (12). Given the scarcity of sightings during the King Piles Test Project population estimates are based on average daily populations from surveys of the area rather than from the King Piles. USACE assumes any SSL in the vicinity could enter the level B Isopleth during pile driving.

Type of Disturbance	**Hammer Type**	**Workdays**	**Mo.**	**SSL**	**SSL**
				daily estimate	Level B Take
MOF/pipe piles for mooring dolphins	Vibratory	2	AUG	72	144
MOF/sheet piles for cofferdam	Vibratory	5	AUG	72	360
Deconstruction MOF	Vibratory	2	OCT	77	154
Pile Marker installation	Impact and vibratory	3	OCT	77	231
Total		12			889

6.2.2.3 California Sea Lion

California Sea Lions were sighted 54 times with 59 individuals over 937 minutes of pile driving during the king pile test project in 2020. The proposed action is estimated to into account the longer estimated pile driving time of the proposed action compared to the work performed in 2020 (2277 minutes of pile driving proposed compared to 1037 minutes of work performed in 2020) of pile driving. USACE estimates that 144 individuals may be impacted based on the

longer duration of pile driving of the proposed action. It is assumed that any animal in the vicinity cold enter the level B take isopleth during pile driving activities. Therefore, USACE requests 144 Level B Take of this species.

6.2.2.2 Phocid Pinnipeds

6.2.2.2.1 Harbor Seals

For harbor seals, the Level A harassment zone (i.e., phocid pinnipeds) is 268m for impact driving 24" steel piles. There is no Level A Take anticipated from vibratory pile driving as the isopleths for these actions (both 24" steel pile and sheet pile) are below the 25M mandatory shutdown zone. For Take estimates USACE used the 2020 pile driving observations assuming all animals within the area could enter the Level B Take area of pile driving activity. In 2020 309 individuals were identified on 303 separate occasions. Extrapolating from the 1037 minutes of pile driving in 2020 USACE estimates there may be as many as 666 sightings during pile dike repairs and 679 individual sightings. Assuming that any animal in the vicinity may enter the Level B zone during pile driving USACE requests 679 Level B take of the species.

2020 Sightings	Individuals 2020	Average Pod size 2020	extrapolated sightings	Extrapolated Ind.	Level B Take Est.
303	309	1.02	665.31	678.49	679

Table 17 Harbor Seal Take Estimates

For level A Take USACE estimated that 3.2% of the pile driving (72 out of 2277 minutes) would be performed with an impact hammer and therefore 3.2% of the sightings could be within the Level A Harassment zone. As USACE estimates there may be as many as 679 harbor seals within the project area during pile driving work, 3.2% or 22 may enter the Level A take isopleth for impact pile driving.

6.2.2.2.2 Northern Elephant Seals

Northern elephant Seals (NES) are not commonly sighted within the ZOI of the proposed action, however based on historical sightings within the ZOI they may enter the action area. Therefore, USACE request 2 Level B takes to account for the species potential presence in the area. As phocids, the Level A take area for the species is identical to HS. USACE also requests 1 level A take to prevent exceedance of IHA limits in the unlikely event that an Elephant seal enters the level A take isopleth during impact pile driving.

Table 18 Level A and Level B take estimated (all species)

Species	**Level A Take**	**Level B Take**	**Stock Abundance**	**Percentage of Stock Taken* Level A**	**Percentage of Stock Taken Level B**
Humpback whale (*Megaptera novaeangliae*)	0	16	2,900	0.00%	0.55%
Killer whale (*Orcinus orca*)	0	7	349	0.00%	2.01%
Harbor porpoise (*Phocoena phocoena*)	8	18	21,487	0.01%	0.09%
California Sea Lion (*Zalophus. californianus*)	0	144	257,606	0.00%	0.06%
Stellar Sea Lion (*Eumetopias jubatus*)	0	889	52,932	0.00%	1.68%
Harbor Seal (*Phoca vitulina richardii*)	22	679	24,732	0.02%	2.75%
Northern Elephant Seal (*Mirounga angustirostris*) California Breeding Stock	1	2	179,000	0.00%	0.0011%
Gray Whales *(Eschrichtius robustus)*	0	2	14,500.00	0%	0.014%

7.0 Anticipated Impact of the Activity

The proposed work may cause permanent damage to harbor porpoises and harbor seals that enter the project area. Adhering to the marine mammal monitoring protocols described in Section 13 will help ensure that there are no Level A auditory damages to other marine mammal species that could transit the area during pile installation.

Marine mammals that enter the Level B ZOI may experience temporary disturbance. The effects are limited to the species listed in **Error! Reference source not found.**. Marine mammal behavioral responses could include avoidance or altered foraging patterns. Level B harassment take will be greatest for pinniped populations experiencing underwater noise exposure. However, overall project impacts have a negligible effect on marine mammal stocks in the area, as estimated take will affect less than 1% of the stock for most species, and approximately 2% and 3% of the Stellar sea lion and harbor seal stocks, respectively.

8.0 Anticipated Impacts on Subsistence Uses

There are no relevant subsistence uses of marine mammals implicated by this action.

9.0 Anticipated Impacts on Habitat

Marine mammals may pass through the project area and may be temporarily disturbed by the proposed work. Impacts would be limited to temporary visual and noise disturbance, and possibly elevated levels of turbidity during rock placement. These disturbances are expected to dissipate quickly once work is completed. The project area is not known to be used as breeding, feeding, sheltering, or foraging specifically for any marine mammals; therefore, no modification to existing habitat is expected.

10.0 Anticipated Effects of Habitat Impacts on Marine Mammals

The proposed project would not result in a permanent adverse impact to marine mammal habitat.

11.0 Mitigation Measures to Protect Marine Mammals and Their Habitat

The following mitigation measures will be implemented during construction activities to minimize disturbance during pile removal and installation activities.

- The contractor will implement a soft-start procedure for impact pile driving activities. The objective of a soft start is to provide a warning and/or give animals in close proximity to pile driving a chance to leave the area prior to an impact driver operating at full capacity thereby, exposing fewer animals to loud underwater and airborne sounds. A soft start procedure will be used at the beginning of each day that pile installation activities are conducted.
    - For impact driving, an initial set of three strikes would be made by the hammer at 40 percent energy, followed by a one-minute wait period, then two subsequent three-strike sets at 40 percent energy, with one minute waiting periods, before initiating continuous driving.
- Monitoring of marine mammals will take place starting 30 minutes before construction begins until 30 minutes after construction ends (see Section 13 for monitoring details).
- In the event of a work stoppage to prevent or due to a Level A Take, work will stop until the marine mammal leaves the work area or at least 15 minutes after the last sighting, whichever is longer.
- Before commencement of pile driving activities, USACE will establish zones for each marine mammal group as shown in Isopleth Figures (Appendix B) for Level A Shutdown Zones to prevent auditory injury.
- For in-water heavy machinery work other than pile driving (using, e.g., standard barges, tugboats, barge-mounted excavators, or clamshell equipment used to place or remove material), if a marine mammal comes within 20 meters, operations shall cease, and vessels shall reduce speed to the minimum level required to maintain steerage and safe working conditions.

- Prior to initiating in-water pile driving or pile removal, USACE will establish the following Level B ZOIs for underwater noise.
    - The Level B ZOI for impact and vibratory pile driving activities will be established out to a line-of-sight distance of up to 4615 meters, depending on the type of driving (Table 13).
    - If a marine mammal enters the Level B ZOI, but does not enter Level A shutdown zone, a "take" will be recorded and the work will be allowed to proceed without cessation. Marine mammal behavior will be monitored and documented.
- Construction waste material used or stored will be confined, removed, and disposed of properly.
- A description of spill containment and control procedures will be on-site.
- Fueling and lubrication of equipment will be conducted in a manner that affords the maximum protection against spill and evaporation. Fuel, lubricants, and oil will be managed and stored in accordance with all Federal, State, Regional, and local laws, and regulations. BMPs will be employed in order to prevent petroleum products, chemicals, or other deleterious waste materials from entering waters. Fuel hoses, oil drums, oil or fuel transfer valves and fittings, etc., will undergo frequent inspection for drips or leaks, and shall be maintained in order to prevent spills into waters.
- The contractor will be provided with, and will strictly adhere to, the marine mammal monitoring plan (Section 13 below).

12.0 Mitigation Measures to Protect Subsistence Uses

The proposed project will take place in the Columbia River at West Sand Island in Oregon. No activities will take place in or near a traditional Arctic hunting place.

13.0 Monitoring and Reporting

Impacts to marine mammals are likely to be temporary and negligible, and the mitigation measures described in Section 11 are meant to avoid and minimize impacts to any marine mammals that may be present to the maximum extent practicable. The following Monitoring and Reporting measures will be implemented to further minimize disturbance to marine

mammals, improve understanding of the level of taking or impacts on populations of marine mammals that are expected to be present while conducting activities, and increase the general knowledge about these marine mammals and the effectiveness of the mitigation measures.

USACE proposes the following monitoring protocols:

- Visual monitoring will be conducted by qualified, trained marine mammal observers (MMO) and will be implemented during all pile removal/installation activities. An observer shall have prior training and experience conducting marine mammal monitoring or surveys, and who has the ability to identify marine mammal species and describe relevant behaviors that may occur in proximity to in-water construction activities. There will be a minimum of 2 MMOs on duty during any pile driving activities. The Contractor may only drive one pile driving at a time.
- One of the two MMMO will be a lead MMO and have experience specifically with IHA monitoring activities.
- For all pile driving activities, a shutdown and disturbance zone will be monitored.
    - A minimum of two observers will be employed during all driving and removal activities, though more observers may be necessary to adequately monitor marine mammals during periods of low or obstructed visibility to ensure the entirety of the shutdown zone is monitored. One of the required observers will conduct monitoring via boat to count marine mammals entering the Level B disturbance zones and alert construction crew members of marine mammals entering the Level B zone and approaching/entering the Level A zone.
    - Monitoring will take place from 30 minutes prior to initiation through 30 minutes post-completion of pile driving.
    - Impact Pile Driving:
        - During impact hammer use, the Level A isopleth is approximately 20 meters for otariids (e.g., Stellar and California sea lions), 269 meters for phocids (e.g., Harbor seals), 502 meters for LF cetaceans (e.g., humpback and gray whales), 18 meters for MF cetaceans (e.g., killer whale), and 597 meters for HF cetaceans (e.g., harbor porpoises).

- The shutdown zone will always be a minimum of 25 meters (82 feet) for pinnipeds and 50 meters for cetaceans to prevent injury from physical interaction of marine mammals with construction equipment.
- To avoid Level A injury to larger marine mammals (i.e., humpback, gray, and killer whales) pile driving will cease if any of these species are detected approaching Level A isopleth distances associated with their respective marine mammal group; essentially enforcing shutdown zones equal to the Level A isopleth distances for these species.
- Should harbor porpoises or harbor seals be observed entering larger Level A zones of their respective marine mammal group during impact pile driving, those individuals would be counted, but pile driving would not be required to cease unless animals were detected within the 50-meter shutdown zone, or if the project had already reached the maximum Level A Take authorized for each species in the final IHA.

- Vibratory Pile Driving:
  - During vibratory removal and driving of piles, the shutdown zone will always be a minimum of 25 meters for pinnipeds to prevent injury from physical interaction of marine mammals with construction equipment.
  - The shutdown zone for cetaceans will be 50 meters during all vibratory driving.
- All Pile Driving:
  - Given potential difficulty detecting marine mammals throughout the entirety of Level A and Level B areas, observers will extrapolate counts of each marine mammal species from a monitoring zone established by the lead observer, largely based on site conditions on the day of observation.
  - This application for IHA requests Level A and Level B take up to the amounts specified in **Error! Reference source not found.**. Final limits on take would be specified in the final IHA from NOAA and would supersede any values specified in this application.

- 2 Observers will be placed at the best vantage points practicable (from the construction barges or by boat) to monitor for marine mammals and implement shutdown/delay procedures when applicable by calling for the shutdown to the hammer operator. Observers will have no other duties while observing. Marine Mammal Observers may not operate a boat while performing observing duties.

- If waters exceed a sea-state which restricts the observers' ability to make boat-based observations for the full Level A shutdown zone (e.g., excessive wind, wave action, or fog), impact pile installation will cease until conditions allow monitoring to resume. No pile driving will be done at above Beaufort Scale 4 due to mechanical limitations of the equipment, however observers can stop work prior to that if any combination of conditions diminishes visibility where the observers, in their professional opinion, compromise visibility of the potential Level A Take zone of the activity. Observers will document and photograph the conditions that stop work during daylight hours. Any Contractors will ensure compliance with NOAA advisories for safe boat operations based on the size of vessel to be used by the marine mammal observer.
- Prior to the start of pile driving, the shutdown zone will be monitored for 30 minutes to ensure that the shutdown zone is clear of marine mammals. Observers will transit the entire Level A take zone of the intended activity or 300M whichever is greater. Pile driving will only commence once observers have declared the shutdown zone clear of marine mammals.
- If a marine mammal is observed in the Level B disturbance zone, but not approaching or entering the shutdown zone, a "take" will be recorded and the work will be allowed to proceed without cessation. Marine mammal behavior will be monitored and documented.
- If a marine mammal approaches or enters a shutdown zone during pile driving, work will be halted and delayed until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone or 15 minutes have passed without re-detection of the animal.
- The observer will use a hand-held or boat-mounted GPS device or rangefinder to verify the required monitoring distance from the project site.
- The waters will be scanned using binoculars (10x42 or similar) or spotting scopes (20-60 zoom or equivalent), and by making visual observations.
- If any species for which take is not authorized are observed within the area of potential sound effects during or 30 minutes before pile driving, the observer(s) will immediately notify the on-site supervisor or inspector and require that pile driving either not initiate or temporarily cease until the animals have moved outside of the area of potential sound effects or are not sighted for 15 minutes after the last detection.
- If take limits established in the final IHA are reached, NOAA will be notified as soon as possible and USACE will work with NOAA to adjust take limits or modify work, as necessary.

- Pile driving will be conducted only during daylight hours from sunrise to sunset when it is possible to visually monitor marine mammals.
- A marine mammal observation sheet will be used to record information about marine mammals observed (see NMFS minimum requirements below).
- If any dead or dying marine mammal species are observed in the action area, regardless of known cause, the following measures will be taken:
    - Record the species type (if known), date, time, and location of the observation.
    - Take a photograph of the specimen.
    - Immediately notify NOAA Fisheries.

NMFS requires that at a minimum, the following information be collected on the sighting forms.

- Date and time that pile removal and/or installation begins and ends.
- Construction activities occurring during each observation period.
- Weather parameters (e.g., percent cover, visibility).
- Water conditions [e.g., sea state, tidal state (incoming, outgoing, slack, low, and high)].
- Species, numbers, and, if possible, sex and age class of marine mammals.
- Marine mammal behavior patterns observed, including bearing and direction of travel, and, if possible, the correlation to SPLs.
- Distance from pile removal and/or installation activities to marine mammals and distance from the marine mammal to the observation point.
- Locations of all marine mammal observations.
- Other human activity in the area.

USACE will note behavioral observations, to the extent practicable, if an animal has remained in the area during construction activities. Therefore, it may be possible to identify if the same animal or a different individual(s) is(are) being taken. Collected data will be compiled following the end of the project and submitted to NMFS.

According to NMFS Requirements, USACE will include the following minimum qualifications for marine mammal observers:

- Visual acuity in both eyes (correction is permissible) sufficient to discern moving targets at the water's surface with ability to estimate target size and distance. Use of binoculars or spotting scope may be necessary to correctly identify the target.
- Advanced education in biological science, wildlife management, mammalogy or related fields (bachelor's degree or higher is preferred).
- Experience and ability to conduct field observations and collect data according to assigned protocols (this may include academic experience).
- Experience or training in the field identification of marine mammals (cetaceans and pinnipeds).
- Sufficient training, orientation or experience with vessel operation and pile driving operations to provide for personal safety during observations.
- Writing skills sufficient to prepare a report of observations. Reports should include such information as number, type, and location of marine mammals observed; behavior of marine mammals in the area of potential sound effects during construction; dates and times when observations and in-water construction activities were conducted; dates and times when in-water construction activities were suspended because of marine mammals, etc.
- Ability to communicate orally, by radio, or in-person with project personnel to provide real time information on marine mammals observed in the area, as needed.
- One of the minimum two on-duty MMO must be a lead observer with experience performing IHA marine mammal work.

USACE will comply with any additional monitoring measures required by NMFS.

14.0 Suggested Means of Coordination

USACE has met with staff from the West Coast Marine Mammal Stranding Network to discuss this project action. Based on their feedback, USACE will continue to coordinate with the Marine Mammal Stranding Network and develop a stranding response plan prior to start of work.

USACE has also checked NMFS' interactive map and reviewed available information for other activities in the lower Columbia River.

The data recorded during marine mammal monitoring activities will be provided to NMFS in the monitoring reports. These reports will provide useful information regarding the presence of the marine mammals discussed in this document in the project area and their behavioral response to construction activities. The monitoring data collected will inform USACE and NMFS staff and assist the evaluation of the potential effects of future projects of similar scope on the lower Columbia River. USACE will also share the results of monitoring with ODFW and WDFW and upload the monitoring report into USACE' public digital library.

USACE will check NMFS' interactive IHA map prior to the start of work and reach out to any others performing similar activities in the lower Columbia River to exchange monitoring data in real time if practicable to inform both activities. USACE will also reach out to NMFS Northwest Fisheries Science Center Marine Mammal Ecology Team prior to initiating pile driving to notify them of the activity and gather any new information available on the location of marine mammals in the project area.

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Appendix A: Noise Level Worksheets

Pile Driving Level B Disturbance Calculations

SPLI- Initial Sound Pressure Level

DT – Disturbance Threshold

Practical Spreading Loss Models for Attenuation

$$Air\ D1 = D0 * 10\text{^}((SPLI\ initial - DT))/\alpha$$

α= 20 for hard site conditions

$$Water\ D1 = D0 * 10\text{^}((SPLI - DT)/\alpha)$$

α= 15 for water

Air Impact Hammer phocid 152.4 meters

Air Impact Hammer Otariid 48.19 meters

Air vibratory hammer phocid 32.21 meters

Air Vibratory hammer otariid 10.1 meters

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Impact Pile (steel pipe) Driving PTS Calculations

IMPACT PILE DRIVING REPORT

VERSION 1.2-Multi-Species: 2022

Baker Bay Pile Dike Repairs

PRINT IN LANDSCAPE TO CAPTURE ENTIRE SCREEN

(if OTHER INFO or NOTES get cut-off, please include information elsewh

PROJECT INFORMATION	PEAK	SELss	RMS
Single strike level (dB)	203	178	189
Distance associated with single strike level (meters)	10	10	10
Transmission loss constant	15		
Number of piles per day	5		
Number of strikes per pile	225		
Number of strikes per day	1125		
Cumulative SEL at measured distance	209		

OTHER INFO Assume all piles 24" St

NOTES CALTRANS 2020

Attenuation 0

RESULTANT ISOPLETHS

(Range to Effects)

FISHES

	ONSET OF PHYSICAL INJURY			BEHAVIOR	
	Peak Isopleth	SEL_{cum} Isopleth		RMS Isopleth	
		Fish ≥ 2 g	Fish < 2 g		
ISOPLETHS (meters)	6.3	271.7	502.1	3,981.1	Fishes present
Isopleth (feet)	20.7	891.4	1,647.2	13,061.3	

SEA TURTLES

	PTS ONSET		BEHAVIOR	
	Peak Isopleth	SEL_{cum} Isopleth	RMS Isopleth	
ISOPLETHS (meters)	0.1	20.0	85.8	Sea Turtles present
Isopleth (feet)	0.4	65.6	281.4	

MARINE MAMMALS

	LF Cetacean	MF Cetaceans	HF Cetaceans	PW Pinniped	OW Pinnipeds
PTS ONSET (Peak isopleth, meters)	0.9	0.2	11.7	1.0	0.1
PTS ONSET (Peak isopleth, feet)	2.8	0.5	38.3	3.3	0.4
PTS ONSET (SEL_{cum} isopleth, meters)	501.4	17.8	597.2	268.3	19.5
PTS ONSET (SEL_{cum} isopleth, feet)	1,645.0	58.5	1,959.4	880.3	64.1

	ALL MM	MF Cet. present	HF Cet. present	Phocids present	Otariids present
Behavior (RMS isopleth, meters)	857.7	LF Cet. present			
Behavior (RMS isopleth, feet)	2,814.0				

Vibratory Pile (sheet pile) Installation/Removal PTS Calculations

VIBRATORY PILE DRIVING REPORT PRINT IN **LANDSCAPE** TO CAPTURE ENTIRE SCREEN

VERSION 1.2-Multi-Species: 2022 (if OTHER INFO or NOTES get cut-off, please include information elsewh

Baker Bay Pile Dike Repairs

PROJECT INFORMATION	RMS
Sound pressure level (dB)	160
Distance associated with sound pressure level (meters)	10
Transmission loss constant	15
Number of piles per day	60
Duration to drive pile (minutes)	8
Duration of sound production in day	28800
Cumulative SEL at measured distance	205

OTHER INFO CALTRANS 2015

NOTES Sheet Pile

Attenuation 0

RESULTANT ISOPLETHS

(Range to Effects)

FISHES

	BEHAVIOR
Fishes present	RMS Isopleth
ISOPLETHS (meters)	46.4
ISOPLETHS (feet)	152.3

SEA TURTLES

	PTS ONSET	BEHAVIOR
Sea Turtles pres	SEL_{cum} Isopleth	RMS Isopleth
ISOPLETHS (meters)	0.9	1.0
ISOPLETHS (feet)	3.1	3.3

MARINE MAMMALS

	LF Cetacean	MF Cetaceans	HF Cetaceans	PW Pinniped	OW Pinnipeds
PTS ONSET (SELcum isopleth, meters)	23.4	2.1	34.6	14.2	1.0
PTS ONSET (SELcum isopleth, feet)	76.9	6.8	113.7	46.7	3.3
	ALL MM	MF Cet. present	HF Cet. present	Phocids present	Otariids present
Behavior (RMS isopleth, meters)	4,641.6	LF Cet. present			
Behavior (RMS isopleth, feet)	15,228.3				

Vibratory Pile Removal (steel pile) Driving PTS Calculations

VIBRATORY PILE DRIVING REPORT — PRINT IN **LANDSCAPE** TO CAPTURE ENTIRE SCREEN

VERSION 1.2-Multi-Species: 2022 — (if OTHER INFO or NOTES get cut-off, please include information elsewh

Baker Bay Pile Dike Repairs

PROJECT INFORMATION	RMS
Sound pressure level (dB)	160
Distance associated with sound pressure level (meters)	10
Transmission loss constant	15
Number of piles per day	60
Duration to drive pile (minutes)	8
Duration of sound production in day	28800
Cumulative SEL at measured distance	205

OTHER INFO: CALTRANS 2015

NOTES: Sheet Pile

Attenuation: 0

RESULTANT ISOPLETHS
(Range to Effects)

FISHES

	BEHAVIOR
Fishes present	RMS Isopleth
ISOPLETHS (meters)	46.4
ISOPLETHS (feet)	152.3

SEA TURTLES

	PTS ONSET	BEHAVIOR
Sea Turtles pres	SEL_{cum} Isopleth	RMS Isopleth
ISOPLETHS (meters)	0.9	1.0
ISOPLETHS (feet)	3.1	3.3

MARINE MAMMALS

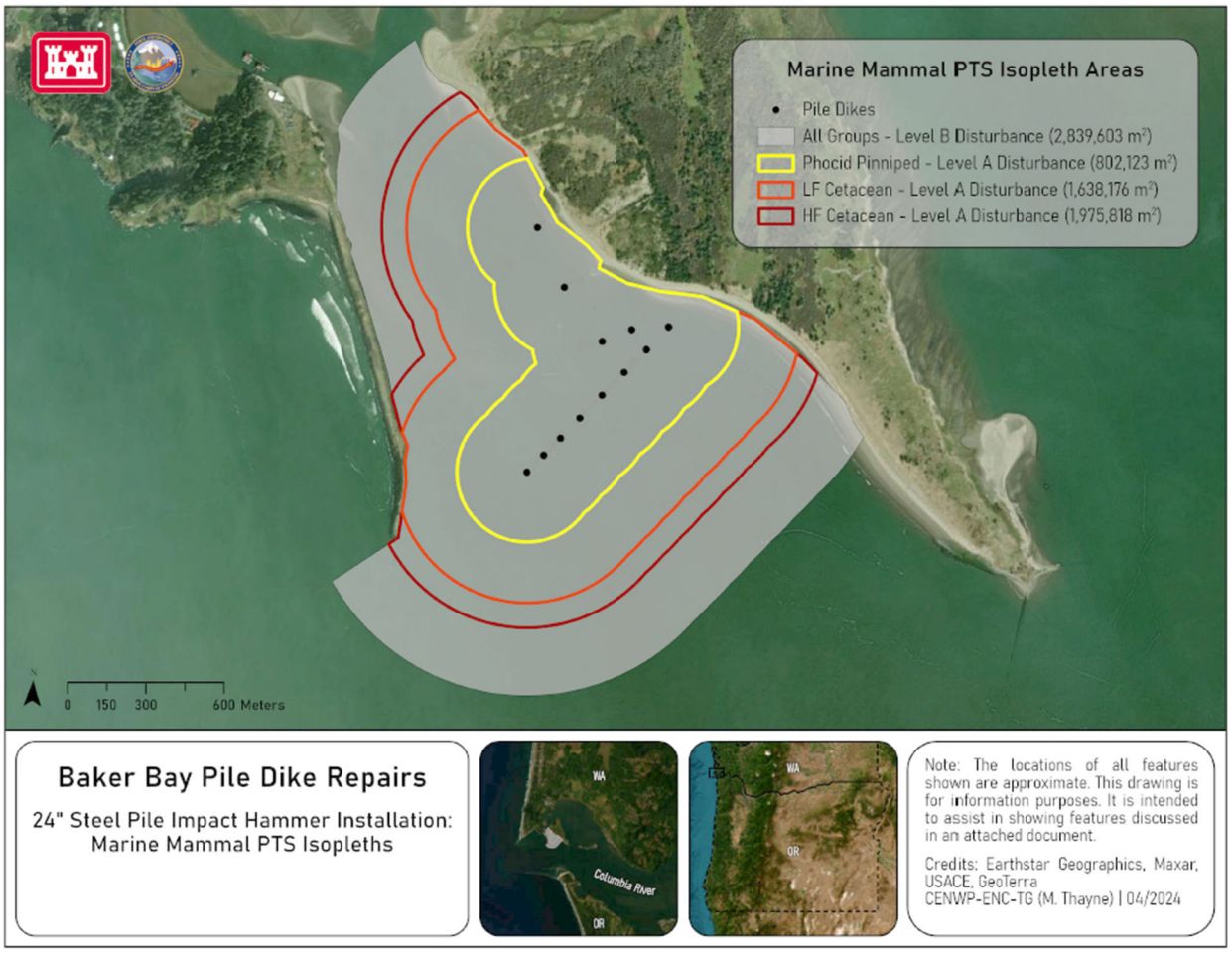
	LF Cetacean	MF Cetaceans	HF Cetaceans	PW Pinniped	OW Pinnipeds
PTS ONSET (SELcum isopleth, meters)	23.4	2.1	34.6	14.2	1.0
PTS ONSET (SELcum isopleth, feet)	76.9	6.8	113.7	46.7	3.3

	ALL MM
Behavior (RMS isopleth, meters)	4,641.6
Behavior (RMS isopleth, feet)	15,228.3

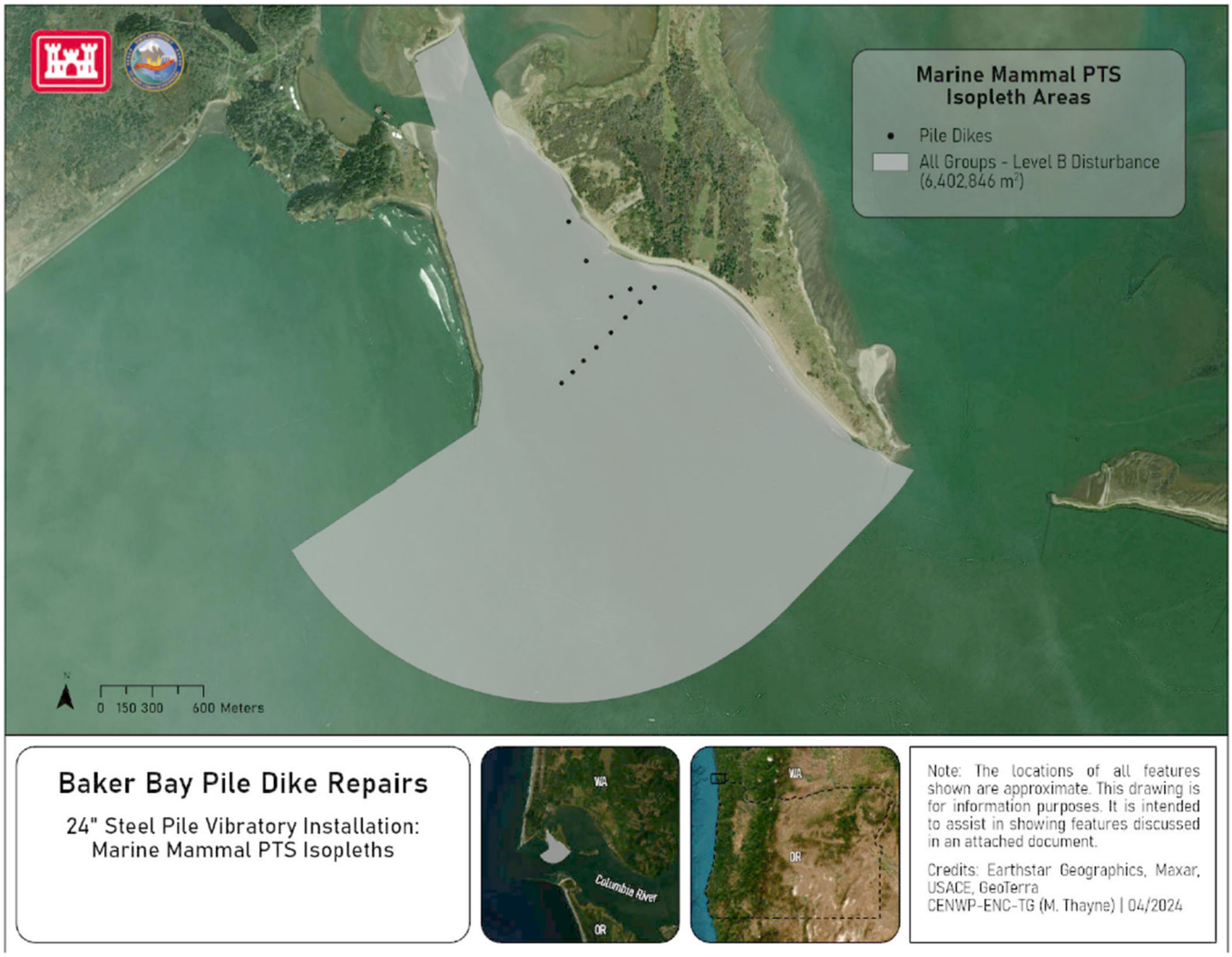
MF Cet. present HF Cet. present Phocids present Otariids present
LF Cet. present

Appendix B: Isopleth Figures

24-Inch Pile Installation Impact Hammer



24-Inch Pile Installation Vibratory Hammer


Marine Mammal PTS Isopleth Areas
Pile Dikes
All Groups - Level B Disturbance (6,402,846 m²)
N
0 150 300 600 Meters
Baker Bay Pile Dike Repairs
24" Steel Pile Vibratory Installation: Marine Mammal PTS Isopleths
WA
Columbia River
OR
WA
OR
Note: The locations of all features shown are approximate. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document.
Credits: Earthstar Geographics, Maxar, USACE, GeoTerra
CENWP-ENC-TG (M. Thayne) | 04/2024

Sheet Pile Installation/Removal Vibratory Hammer