US Army Corps
of Engineers ®
Portland District

REQUEST FOR MARINE MAMMAL PROTECTION ACT INCIDENTAL HARRASSMENT AUTHORIZATION

COOS BAY NORTH JETTY MAINTENANCE AND REPAIRS

U.S. Army Corps of Engineers
Portland District, Portland, OR

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1.0 DESCRIPTION OF THE ACTIVITY

1.1 Introduction

Coos Bay is located in Coos County on the Oregon coast, approximately 200 miles south of the Columbia River. The bay provides a harbor- and water-dependent economy for the local and state community and, as the second largest estuary in Oregon (14,000 acres), the largest located entirely within state borders (Hickey and Banas 2003, Arneson 1975), and is an important biological resource. The entrance to the Coos Bay estuary and navigation channel lies between Coos Head and the Coos Bay North Spit (CBNS) (Figure 1-1). The Coos Bay north and south jetties stabilize a 1-mile long, 47-foot deep channel. Channel depth decreases to approximately 37 feet at RM 1 and extends 15 miles upstream where it runs adjacent to the cities of Charleston, North Bend, and Coos Bay.

The U.S. Army Corps of Engineers (Corps) maintains this jetty system and navigational channels, and is currently proposing major repair and rehabilitation of the North Jetty. As part of its mission to build and maintain navigation facilities, the Corps also continues to maintain ownership of CBNS land to support jetty monitoring, ensure evaluation access, and to provide construction staging and stockpile areas in the event jetty maintenance or navigation repairs are needed.

The CBNS is a large isolated peninsula about 15 miles from downtown Coos Bay; supporting unique coastal habitats, including an important wintering and breeding area for the Pacific Coast population of the western snowy plover (WSP) (*Charadrius nivosus nivosus*). The Corps parcel (Figure 1-2) runs north from the boundary of the North Jetty, to the southern boundary of land owned by the U.S. Bureau of Land Management (BLM). It is bound by the Pacific Ocean to the west, which includes South Beach (the beach between the North Jetty and the FAA towers as shown), and by the Log-Spiral Bay (LSB) and Coos Bay to the east.

1.2 Project Purpose and Need

The purpose of the Proposed Action is to repair critical damaged sections of the North Jetty, monitor erosion, and to maintain stable deep-draft navigation through the entrance into Coos Bay. Repair activities completed now will reduce the risk of jetty failure or a potential breach of the CBNS.

A structural evaluation of the North Jetty, completed by the Corps, Portland District in 2012, identified a number of sections in need of repair due to a combination of increased wave loading and on-going structural deterioration (USACE 2012). Analysis of the connection of the CBNS to the North Jetty (i.e., the jetty-land connection) observed rates of erosion at the ocean beach and within the LSB that could threaten to breach the CBNS in less than 15 years (about 2030) at its narrowest point. In the event that there is a CBNS jetty-land connection breach, the CBNS would be destabilized and inlet currents would be redirected into and through the LSB causing increased sediment shoaling into the Coos Bay Federal Navigation Channel. Emergency repairs would be necessary to stabilize the inlet, to close the breach and to restore deep-draft navigation. The costs and environmental implications of these emergency measures would be substantial and deep-draft navigation would be interrupted for several months until emergency repairs could be completed. Progressive damages to the North Jetty system over the last 20 years have already resulted in an emergency repair action in 2002 and an interim repair in 2008, each focused on sections of the jetty trunk in the vicinity of the jetty-land connection. Our aim is to complete north jetty repairs and monitor erosion rates in LSB, and along the beach, to assess the potential need and scope of any placement action in the future. The Proposed Action is critical to keeping the river and harbor open to deep-draft navigation and to sustaining important navigation-related components of local and state economies.

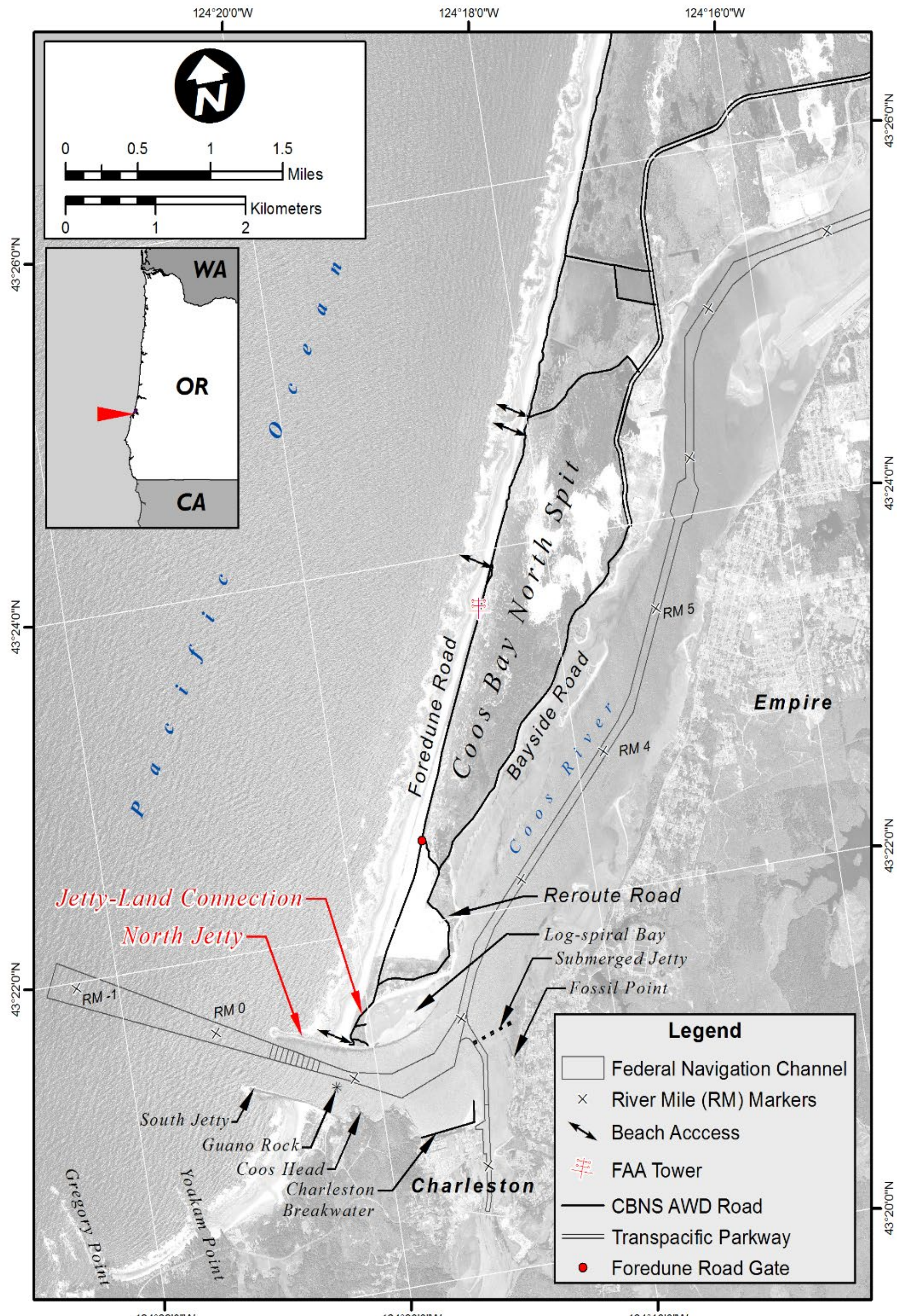

Figure 1-1. Project Vicinity

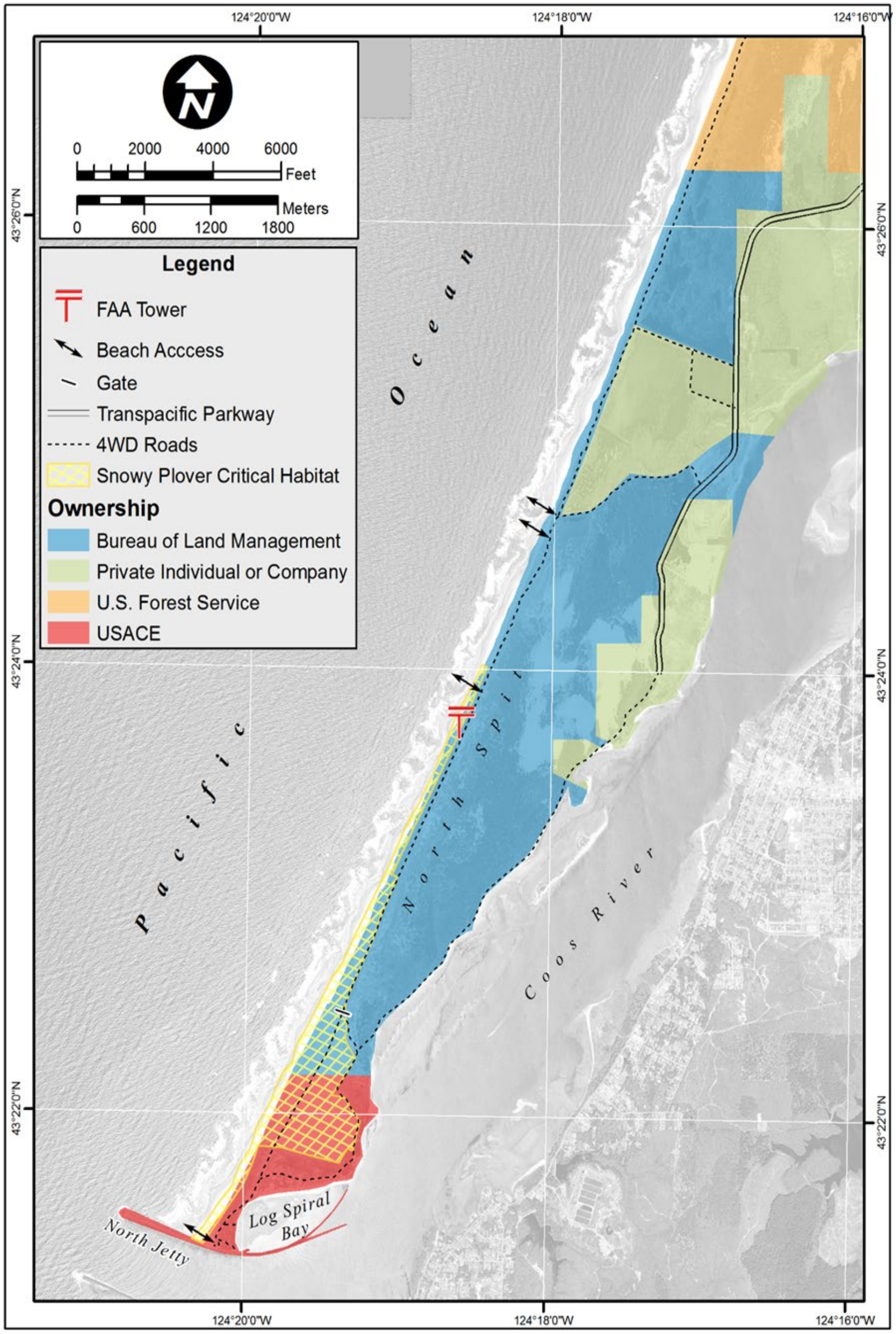

Figure 1-2. Land Ownership

1.3 Project Overview

The purpose of the proposed action is to repair critically damaged sections of the North Jetty in order to maintain stable deep-draft navigation through the entrance into Coos Bay and to prevent breaching of the CBNS. Completing the proposed repair activities now would reduce the risk of future jetty failure. Progressive damages to the North Jetty system over the last 20 years have resulted in an emergency repair action in 2002 and an interim repair in 2008. The proposed major maintenance of the Coos Bay North Jetty is critical to keeping the river and harbor open to deep-draft navigation and to sustaining important navigation-related components of local and state economies.

The Proposed Action would include repair activities for three main jetty components: the jetty head, root, and trunk.

Repair activities also require re-establishment and repair of the following three temporary construction features, which are also a part of the Proposed Action:

- Material Off-loading Facility (MOF)
- Upland staging areas
- Road turn-outs to facilitate equipment and material delivery

The Proposed Action includes removal and site restoration for each of the temporary construction features.

The majority of proposed jetty repairs will be completed within the existing authorized footprint of the jetty structure, returning specified sections to pre-erosional conditions. However, the length of the final repaired jetty (8,425 ft) will be shorter than its originally authorized footprint length of 9,600 ft. The jetty head stabilizes the oceanward end of the jetty structure and is exposed to the most severe loading. The jetty trunk connects the jetty head to the jetty root and transitions from a jetty reach exposed to both ocean-side and channel-side loading, to the root which is primarily loaded from the channel-side. Proposed repair elements may include some minor areas that occur outside of the existing jetty footprint, but are necessary to maintain jetty function:

- Repair of the Jetty Root entails rebuilding up to 1600 ft of the jetty root. Toe protection around the tip of the reconstructed section would be completed to compensate for accelerated ebb-tidal flows caused by the reconstructed root. This protection could extend beyond the area of the existing relic jetty root.
- Construction of a rubble-mound jetty head at approximately station 80 to 84+00 (located shoreward of the originally authorized North Jetty head). While it is expected that the vast majority of the head construction will remain on the relic stone base, there may be some small increase in footprint to ensure a stable jetty head design.

Specific elements required for the construction of the proposed Project are depicted in Figure 1-3 and summarized in Table 1-1. The Corps proposes to rebuild sections of the jetty root where the structure has deteriorated at or below the water line. The jetty head and trunk require extensive repairs, but not to the same extent as the jetty root, which has not been repaired since the original construction. Optional repairs to the jetty root could provide additional stability to LSB and prevent further erosion. The optional repairs to the jetty trunk could place larger stone atop sections that were previously addressed with slightly smaller stone during an interim repair. Each of these optional repairs would be contingent on funding availability.

1.4 Project Elements

Elements required for the repair of the Coos Bay South Jetty include rock installation at the jetty head and trunk, and construction of a material offloading facility (Figure 1-3; Tables 1-1 and 1-2). Figure 1-3 also depicts potential staging areas that may be utilized during construction.

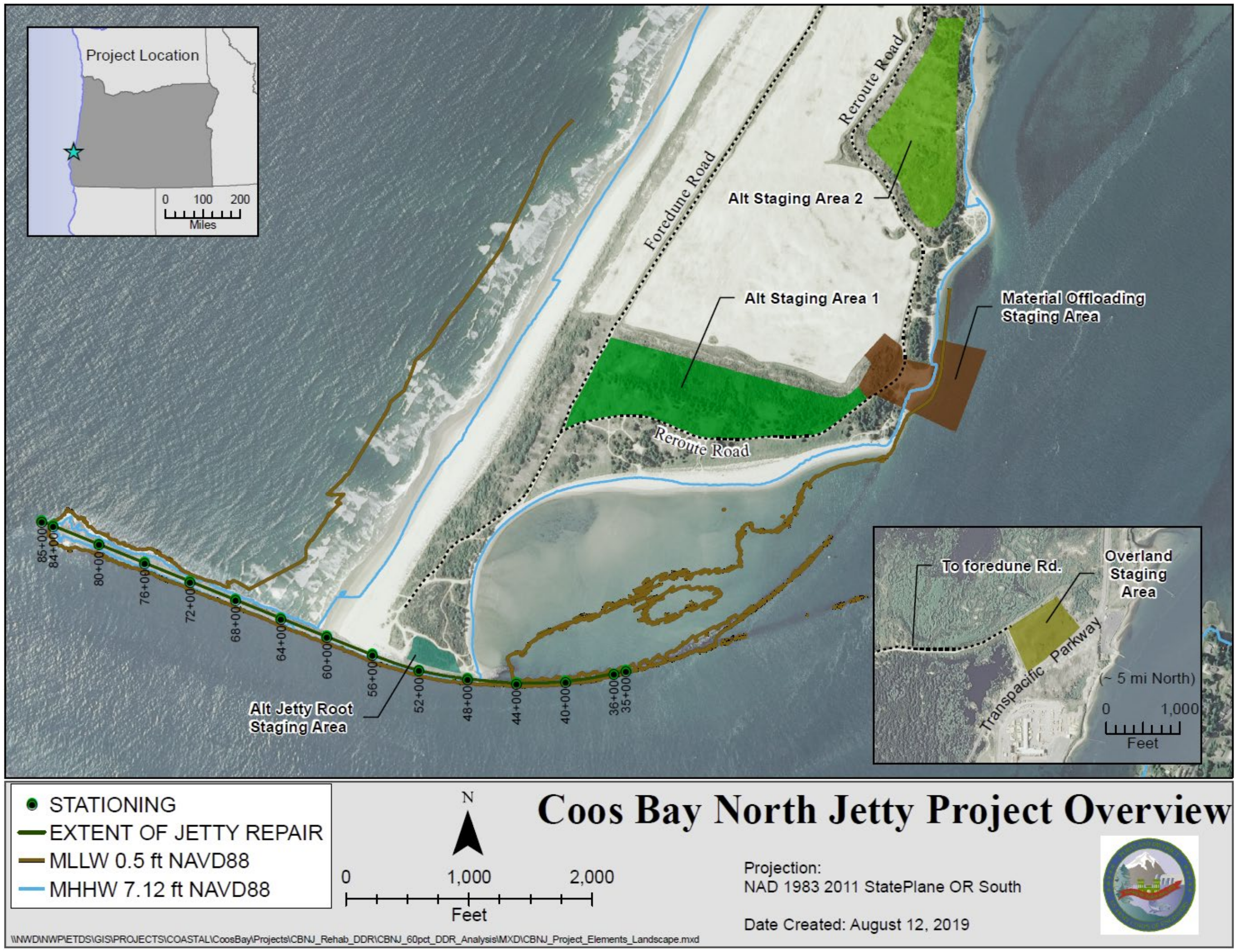

Figure 1-3. Proposed Action Elements

1.4.1 Construction Staging Areas

Jetty repairs and associated construction elements require additional areas for activities involving equipment and supply staging and storage, parking areas, access roads, scales, general yard requirements, and jetty stone stock pile areas. Staging areas are required to store materials, equipment and tools, field offices, turn and maneuver trucks, and to provide parking for contractors.

There are three proposed staging areas for the Proposed Action: the Overland Delivery Staging Area (ODSA, up to about 10 acres), the North Jetty Staging Area (NJSA, up to 20 combined acres from three alternate staging areas), and the MOF Staging Area (up to 2.5 acres) (Figure 1-3). The ODSA was used previously for the 2008 North Jetty Interim Repair Project. The MOF Staging Area, also previously used and located upland of the MOF itself, would be necessary to accommodate stockpile and transfer of jetty stone from barges to transport vehicles prior to delivery to the NJSA. The NJSA will be a combination of areas; either approximately 20 acres near the jetty root, on top of the LSB sand placement area, or a jetty root staging area (1.5 acres) and up to an additional 18.5 acres to be chosen by the Contractor from the available Alternate Staging Area locations shown on the plans.

Staging area equipment would include a crane or excavator for transferring large stones from the highway-transport vehicles to heavy-duty off-road vehicles, or from a barge to heavy-duty off-road vehicles, an excavator, front-end loaders, and bulldozers. All of the stockpile areas would accommodate storage of a range of different sized jetty stone and other rock and gravel construction materials throughout the year. Construction of each upland staging area would require vegetation clearing and site grading, which would be followed by restoration at the completion of construction.

1.4.2 North Jetty Major Maintenance and Repairs

Most of the proposed jetty stone placement work would use land-based equipment for construction of the repair and modifications to the North Jetty. The majority of the work is expected to be conducted from on top of the jetty using an excavator or a crane. Where appropriate, there may also be rework and reuse of the existing relic and jetty prism stone. Most of the proposed stone placement would occur on existing relic stone that formed the original jetty. The prism footprint could increase in width compared to the existing prism by about 10 ft along the length of the proposed repair sections. During new stone placement, there is a chance of stone slippage down the slope of the jetty. This is only a remote possibility given the size of the rocks. Additionally, dropping armor stone from a height greater than 2 ft would be prohibited, further minimizing the risk of stone slippage. The length of the repaired jetty would remain shorter than its originally authorized footprint length.

The full width of the repaired jetty crest would double as a “jetty crest haul road” that allows construction equipment to access and reach the entire jetty construction areas (i.e. crest, slope, and toe). As described in Table 1-2, up to three turnouts would also be required every 300 to 500 ft along the length of the jetty and parallel to the jetty crest haul road for safety purposes (allows for vehicle and equipment passing and turns while on the jetty). The footprint of repairs would not extend substantially beyond the extent of relic jetty stone (possibly up to 10 ft on either side).

Construction would likely proceed by first building an earthen or rock ramp up the north side slope of the jetty to allow construction equipment access to the top crest. The ramp would be removed once construction is complete. All of the construction would take place from the top of the jetty. Jetty reconstruction would begin at the root of the jetty and would extend offshore towards the head. As reconstruction extends offshore, the crest haul road would extend in kind. Rock infill, or chinking stone, would be placed in between the voids of the armor stone on the jetty crest to create a suitable travel surface for construction equipment that may include large excavators, track cranes, and off-road dump trucks. Trucks would deliver materials to the jetty root and transport equipment and materials along the length of the jetty using the jetty crest haul road to the intended repair location. Crane set up pads may be constructed along the jetty crest haul road to allow crane operation during the placement of the larger stabilization stones.

For water-based delivery of jetty stone, a towboat and barge may provide lower fuel and transport costs, and reduced traffic safety hazards, for quarries located over 150 miles away from the North Jetty, or from quarries located along coastlines and rivers where on-loading facilities may be available. Given the barge-limit (average ~3,000 CY) and total volume of jetty stone required to complete the repairs, up to 40 barge trips could be required to complete the Proposed Action if only water delivery was used. Stone delivered by barge would use the proposed MOF.

Anticipated construction equipment for the North Jetty repairs may include the following:

- An excavator for small rock would be used to move/build a rock ramp onto the North Jetty crest for equipment access. The excavator would also be used to move chinking stone to build a suitable travel surface on top of the jetty crest, which would also include a layer of understone for stability.
- A track crane would be used to move large jetty stone for repair of the jetty root and trunk sections including the crest, slope, and toe landward of Station 81+00.
- A ringer crane would need to be used to move very large stone to repair the jetty trunk and head sections including the crest, slope, and toe seaward of Station 81+00.
- Off-road heavy-duty trucks (most likely similar to a Volvo A40F off-road articulated hauler) would transport jetty stone, rock, and underlayer gravel to/from the staging/stockpile area(s) and/or the MOF to the jetty crest haul road.
- Ocean going barges (likely similar to a Marcmac 3018), with a draft of up to 20 ft and up to a 6,500-ton load limit, would deliver large jetty stone and other construction materials and equipment, to the site as needed.

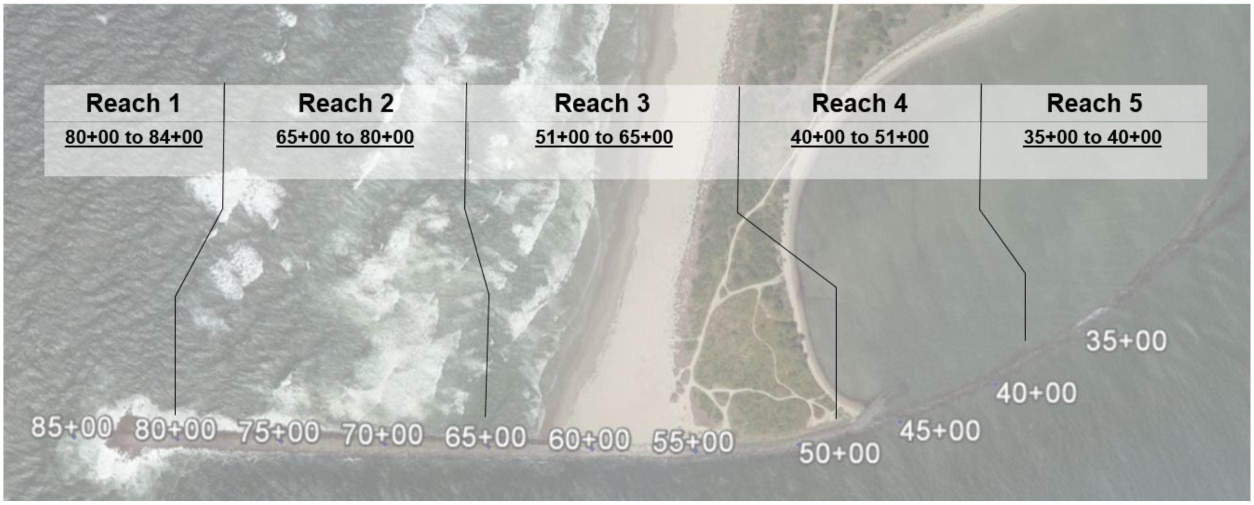

Figure 1-4. Coos Bay North Jetty Repair Reaches

1.4.3 Material Off-loading Facility (MOF) Construction

The MOF outcrop will be constructed from the land waterward using land-based equipment. The MOF outcrop will provide vehicle access to/from the shore. The MOF could either be a simplified design of singular pipe piles for mooring a barge with spuds as a dock face, or a more complicated MOF design with piles supporting mooring dolphins with H or Z-piles to help retain material. In either case, pilings will be installed by barge using vibratory pile driving methods. Figure 1-4 provides a basic overview of potential MOF elements, though the final configuration of pilings and specifications within the broader scope will be determined by the contractor. Fill material to construct the MOF could be obtained from maintenance dredging activities that occur annually in the Federal Navigation Channel, from dredging at the MOF site, or from other suitable sources, similar to those that provide the armor stone and gravel materials for the Project. Any imported material will be obtained from a clean and permitted source, suitable for in-water placement. Initial dredging of up to about 24,000 CY may be required at the MOF to reach draft depth for the delivery barges. This activity will most likely be completed by mechanical dredge (e.g., clamshell). Dredged material from the MOF site will be tested for contaminants, prior to dredging, following standard Corps and USEPA procedures[1]. If clean, material will be side-cast or used to supplement MOF construction. If not suitable for ocean placement, dredged material will be transported to a suitable and certified upland facility. Maintenance dredging at the MOF will occur throughout construction to maintain depths needed for delivery vessels.

[1] Sediment sampling and analysis follows national guidelines and the regional Screening levels that have been adopted for the Northwest Regional Sediment Evaluation Framework (SEF) (USACE et al. 2009).

Table 1-1. Proposed North Jetty Major Maintenance and Repair Activities

Repair Element	Reach	Stations	Extent (lf)	Area (acres)	Estimated Maximum Solid Volume[1] of Material (CY)	Stone Type(s) and Placement
Optional North Jetty Root	**5**	35+00 to 40+00	500		12,700 (all below MHHW)	Armor Stone (~5 to 11-ton) Core Stone (~1-ton)
North Jetty Root	**4**	40+00 to 51+00	1,100		29,600 (24,100 below MHHW)	Armor Stone (~10 to 23-ton) Core Stone (~1 to 3-ton)
Optional North Jetty Trunk	**3**	51+00 to 65+00	1,400		20,300 (9,200 below MHHW)	Armor Stone (~14 to 30-ton)
North Jetty Trunk	**2**	65+00 to 80+00	1,500		8,000 (5,200 below MHHW)	Armor Stone (~18 to 35-ton)
North Jetty Head	**1**	80+00 to 84+00	400		37,000 (12,400 below MHHW)	Main Body (~20 to 40-ton) Toe Berm (~26 to 40-ton)
Total Jetty Repair (Rounded)			**4,900**	**19**	**107,600** (~63,600 below MHHW)[2]	**Armor Stone**

[1]Volumes for the jetty head (Reach #1) assume fill down to the sea floor, whereas volumes for the trunk and root (i.e., Reaches #1-4) assume fill down to -5 NAVD88, atop relic structure.
[2]Estimates for volume of material below Mean Higher High Water (MHHW) = +7.12 ft North American Vertical Datum of 1988 (NAVD88).
lf = linear feet; CY = cubic yards

[2] It is estimated that 40% of the proposed jetty stone/fill work would occur below the MHHW mark, 60% above that.

Table 1-2. Proposed Construction Staging and Stockpiling Areas and Road Improvements

Area Name	Purpose	Components	Impact Duration	Area (acres)	Volume (CY)
Overland Delivery Staging Area[1]	Staging equipment and stockpiling jetty stone	Vegetation clearing, site grading, import of some gravel to provide base material for equipment and stone.	T	10	25,000
Combined North Jetty Staging Areas				20	65,000
Material Offloading Facility (MOF)	Marine delivery of jetty stone by barge	Fill	T	<1	24,000 (~15,000 below MHHW)
		Dredging	P	<1	24,000
		Pile installation (up to 6 dolphins supported by up 24 piles total with diam. up to 30-inch; up to 100 'AZ' sheet piles or up to 40 'H' piles)	T	n/a	
MOF Staging Area	Stockpiling jetty stone	Vegetation clearing, site grading	T	2.5	10,000
Jetty Crest Haul Road[2] Turnouts	Passing and turning areas for trucks and equipment. Up to 3 turnouts.	Armor stone and gravel	T	1.2	6,000 (1,500 below MHHW)
Foredune Access Road and Reroute Road	Overland delivery of jetty stone	Improve and widen sections of road	P	<1	1,300
Foredune Access Road Up to 10 Turnouts (for safety and access purposes)	Overland delivery of jetty stone	15 ft wide by 50 ft long turnouts for safety of passing vehicles	T	<1	1,200

[1] Staging area, not depicted in Figure 1-3, between the lumber mill (i.e., Southport Lumber Co.) and South Dike Rd., approximately 10 km from the North Jetty
[2] Road runs along the North Jetty itself
CY = cubic yards
MHHW = mean higher high water
MOF = Material Offloading Facility, NJSA = North Jetty Staging Area, ODSA = Overland Delivery Staging Area
T = temporary, P = permanent

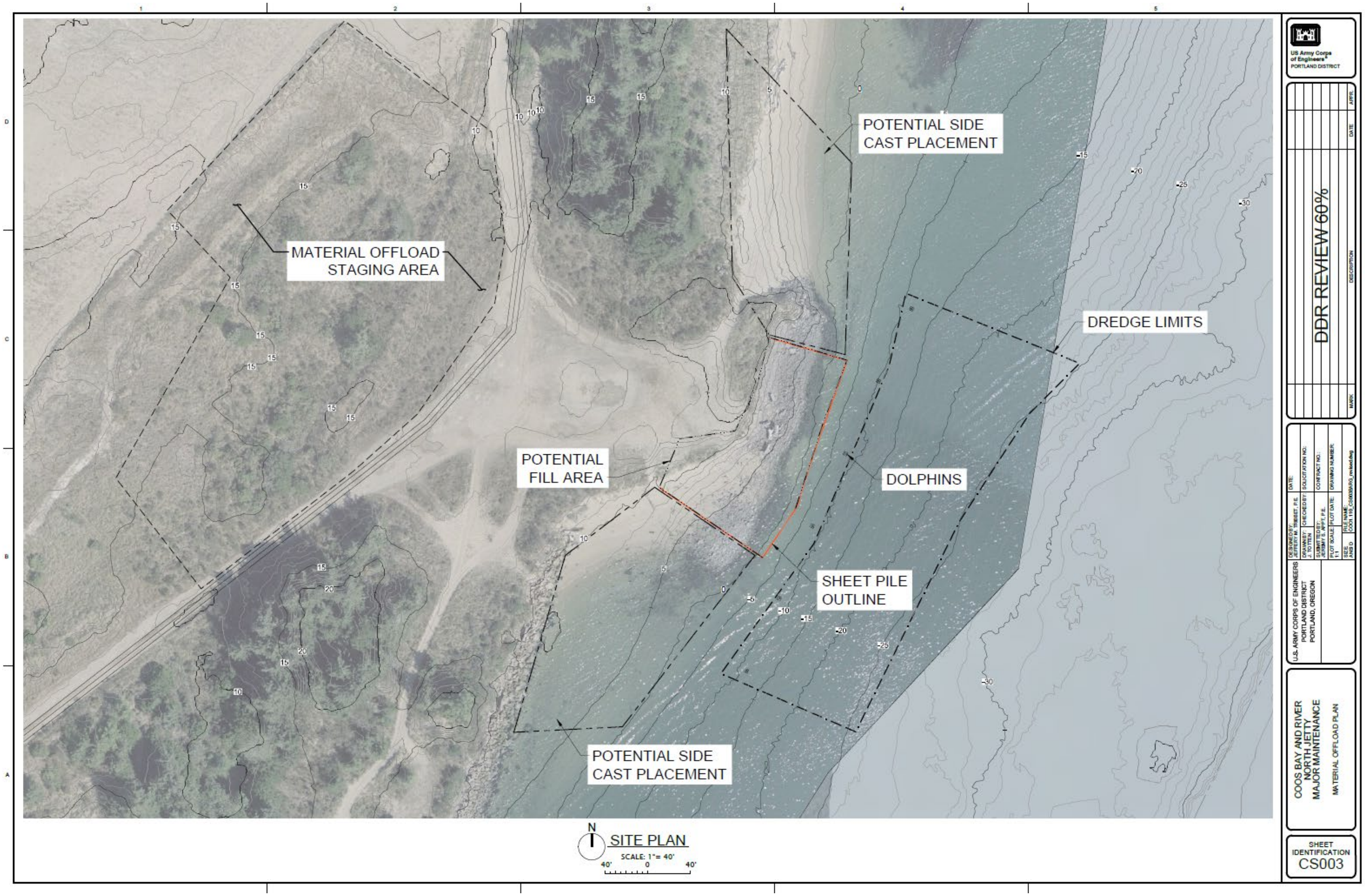

Figure 1-5. Material Offloading Facility Overview

1.5 Noise Emission

1.5.1 In-air

Wind, waves, vessels transiting into and from Coos Bay, and recreational activities all contribute to ambient in-air sound levels on the CBNS and near the North Jetty. The Southwest Oregon Regional Airport is also situated adjacent to the bay and can be expected to result in relatively high sound levels as planes can produce noise in the magnitude of 100 dBA[3]. Waterfront industrial activities in Coos Bay can also create sounds levels in the range of 70 to 90 dBA, peaking at 99 dBA for short durations (77 Federal Register [FR] 59904). These sounds are produced by heavy trucks, forklifts, marine vessels and tugs, and tools and equipment used on piers and shoreline industrial sites. During poor weather conditions, vessels in the Entrance Channel may use foghorns. The sounds from these horns can be quite loud, reaching levels of about 95 to 120 dBA (FTA 2006). Although the Highway 101 corridor through Coos Bay may only result in traffic noise of up to 75 dBA during the day (FTA 2006), wind and waves and nearby recreational and waterfront operations may result in ambient noises reaching 90 dBA intermittently. Current ambient noise levels measured at the BLM boat ramp parking lot on the CBNS were observed to range from 40.8 to 47.6 dBA (FERC 2015).

Construction equipment, tugs, and overland vehicles related to the Proposed Action could produce sound levels up to 86 dBA (Table 1-3, WSDOT 2018) and increase surrounding in-air sound levels. The installation of up to 24 steel pipe piles (with a diameter of up to 30 inches) and up to 100 (24-inch) AZ steel sheets or 40 steel H-piles for the MOF is anticipated to take up to 4 weeks. Deconstruction of the temporary MOF upon completion of the proposed jetty repair is estimated to take an additional three weeks, with comparable levels of in-air noise generated. The loudest (dBA_{LMAX}) anticipated in-air noise levels from construction will occur during daytime hours and could reach approximately 91 dBA while vibratory driving 30-inch steel pipe piles (WSDOT, 2018). This would be a temporary increase in in-air sound, which would attenuate to ambient levels (45 dBA) within approximately 2 miles. This would fall below the disturbance threshold for pinnipeds in less than 20 meters. These estimates were derived from Equation 1, a practical spreading loss model for sound attenuation (WSDOT 2018).

$$D_{ambient} = D_0 * 10^{(\frac{Construction\ Noise - Ambient\ Sound\ Level\ in\ dBA}{\alpha})} \quad (1)$$

With D_0 reference measurement distance (50 feet), $D_{ambient}$ calculated distance from source to reach ambient levels, peak construction noise values from Tables 1-3 and 1-4, and assuming $\alpha = 20$ for hard ground (e.g., water, concrete, packed soil).

The loudest in-air noise disturbances would likely be attributed to vibratory driving AZ-sheet piles. We rely on reference estimates from literature to evaluate potential airborne disturbance on marine mammals (Table 1-4). Specifically, we use the A-weighted Leq/RMS values for driving 24-inch AZ sheet piles at 50 ft, to facilitate comparison with threshold values.

[3] In-air sound is measured on an "A" weighted decibel scale (dBA).

Table 1-3. Average Maximum In-Air Sound Pressure Levels for Overland Construction Equipment (A-weighted)

Equipment Type	Average dBA_{Lmax}* at 50 ft.
Bulldozer	82
Crane	81
Excavator	81
Front End Loader	79
Dump Truck	76
Pickup Truck	75

* The maximum value of a noise level that occurs running a single event

Table 1-4. Estimated In-Air Sound Pressure Levels Associated with Pile Driving

Pile Type	Driving Method	$dBA_{Leq/RMS}$[1] at 50 ft. [A-weighted]	dBA_{Lmax}[2] at 50 ft. [A-weighted]
12-inch steel H-pile[3]	Vibratory	74	81
24-inch AZ steel sheet[3]	Vibratory	82	88
30-inch steel pipe pile[4]	Vibratory	79	91

[1] Root mean square (RMS) or equivalent continuous sound level (Leq)
[2] The maximum value of a noise level that occurs running a single event
[3] Average A-weighted Leq/RMS and Lmax values for vibratory installation of piles at JEB Little Creek Naval Station in May 2013 (Illingworth & Rodkin, 2017)
[4] Laughlin 2010

1.5.2 In-water

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 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 small 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).

Initial MOF dredging would take approximately one week to complete, with ongoing maintenance as needed. Studies have found that mechanical dredging emits sounds generally in line with those expected for a cargo ship travelling at a modest pace, between 150 and 188 dB (Clarke et al. 2002; Miles et al. 1986, etc.). Given the difficulties entering the Federal Navigation Channel, most ships entering Coos Bay would be travelling at lower speeds than those in the above study.

Placement activities will be confined to a small area adjacent to shore for the MOF outcrop. The final MOF will be constructed according to the following guidelines: Up to 24 steel pipe piles (up to 30-inch diameter); and up to 100 24-inch AZ steel sheet piles or 40 12-inch H-piles. Within these general constraints, the specific diameter of piles (up to 30-inch) and the use of AZ-sheets versus H-piles will be per any additional NMFS constraints (e.g., to minimize effects to listed fish species) and the contractor's discretion, largely based on site conditions, material availability, and cost.

Pile driving noise will be intermittent, but could temporarily disturb marine mammals. Vibratory pile driving equipment will be used for pile installation to minimize potential effects to marine mammals. Estimated in-water sound levels anticipated from vibratory installation of H-piles, AZ sheets, and steel pipe piles are summarized in Table 1-5.

Table 1-5. Estimated Unattenuated Underwater Sound Pressure Levels Associated with Vibratory Pile Driving

Pile Type	Sound Pressure Level (single strike)		
12-inch steel H-pile[1]	165 dB_{PEAK}	150 dB_{RMS}	150 dB_{SEL}
24-inch AZ steel sheet[1]	175 dB_{PEAK}	160 dB_{RMS}	160 dB_{SEL}
30-inch steel pipe pile[2]	187 dB_{PEAK}	164 dB_{RMS}	---

[1]Average typical sound pressure levels referenced from Caltrans (2015) and were either measured or standardized to 10 m from the pile
[2]Average sound pressure levels measured at the Vashon Ferry Terminal (Laughlin, 2010)

Vibratory hammers are not impact tools and noise levels are typically not as high as with impact pile drivers. Vibratory pile driving is proposed to minimize in-water noise levels. Pile proofing will not be conducted. Deconstruction of the temporary MOF upon completion of the proposed jetty repair is estimated to produce comparable levels of in-water noise.

2.0 DATES, DURATION, AND LOCATION OF ACTIVITY

Completion of the Proposed Action is anticipated to take about two construction seasons, occurring over two years, once all environmental review and regulatory compliance processes have been completed. Table 2-1 summarizes the Proposed Action sequencing during this period.

Construction activities would be limited by the following timing considerations within these two years:

- Stone, gravel, and equipment delivery to the ODSA could occur year-round.
- Stone, gravel, and equipment delivery from the ODSA to the NJSA would only occur along the Foredune Road outside of the breeding and nesting season (March 15 to September 15) for the

Pacific Coast population of the WSP, listed as threatened under the Endangered Species Act (ESA).

- Barge delivery of jetty stone would occur year-round if possible, but would most likely occur April through October when sea conditions are less severe.
- Transportation and delivery of armor stone from the MOF Staging Area to the NJSA along Reroute Road can occur year-round.
- The placement of jetty stone could occur year-round. This is unlikely given winter safety concerns. Using a placement rate of approximately 800 tons/day, the work is anticipated to be accomplished within 90 to 120 working days. Winter weather conditions would likely result in most of the work being completed between April 1 to October 15. Work at the more exposed jetty sections (i.e. the head) would likely occur between June 1 and October 15. Work would extend as long as possible to minimize the length of construction, but may be limited, as described, due to safety concerns.
- Other in-water and shoreline work elements (e.g., MOF-related construction) will be coordinated with NMFS and ODFW to minimize potential impacts to listed species, while accounting for site conditions that may limit construction during certain timeframes.
- The installation of up to 24 steel pipe piles and up to 100 AZ steel sheets or 40 H-piles for the MOF is anticipated to take approximately 1 month. Deconstruction of the temporary MOF upon completion of the proposed jetty repair is estimated to take an additional month, with comparable levels of noise generated. Thus, the maximum duration of in-water work associated with pile driving and removal is 2 months over the life of the project. While the MOF will be constructed according to the above constraints, the final design will be selected by the contractor.

Table 2-1. Proposed Action Sequencing and Schedule

Activity	Duration	Occurs in Year 1	Occurs in Year 2	Restrictions and Conditions
Construct up to 3 upland staging areas, including road turn-outs	1-4 months	Yes		Replant after construction
Construct MOF (includes pile driving)	1-4 months	Yes		In-water work periods to be coordinated with NMFS and ODFW
De-construct MOF (includes pile removal)	1-4 months		Yes	In-water work periods to be coordinated with NMFS and ODFW
Dredging MOF		Yes	Yes	In-water work periods to be coordinated with NMFS and ODFW
Upland jetty stone delivery to ODSA	Up to 18 months	Yes	Yes	
Barge jetty stone delivery to MOF	Up to 18 months	Yes	Yes	
Jetty stone on Foredune Road from ODSA to NJSA	Up to 22 months	Yes	Yes	To occur Sept 15 – Mar 15 (outside WSP nesting season)
Jetty stone on Reroute Road from MOF to NJSA	Up to 22 months	Yes	Yes	
Repair jetty	Up to 22 months	Yes	Yes	

Figure 1-3 depicts the proposed location of project elements outlined in Section 1.4 of this document. For barge/water transport, an MOF (see Figure 1-4) will be located at approximately RM 2.5 on the east shore of the CBNS. The MOF site was used for a past repair project and was considered, but not used, for the 2008 North Jetty Interim Repair Project.

3.0 SPECIES AND NUMBERS OF MARINE MAMMALS IN THE AREA

We identified approximately 26 marine mammals that have the potential to occur in waters off the Oregon coast during project construction (Table 3-1). Marine mammals are, to varying degrees, susceptible to Level B (i.e., behavioral disturbance or temporary hearing threshold shift) and more severe Level A (i.e., non-serious injury or permanent threshold shift) harassment. Table 3-2 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 in Table 3-1 are unlikely to occur in the project vicinity. For example, numerous cetaceans (i.e., *Balaenoptera borealis borealis*, *Balaenoptera physalus physalus, Grampus griseus, Tursiops truncatus truncatus, Stenella coeruleoalba, Delphinus delphis, Globicephala macrorhynchus, Berardius bairdii*, *Mesoplodon* spp., *Ziphius cavirostris, Kogia breviceps, Kogia sima, Physeter macrocephalus*) are only encountered at the continental slope (>12 miles/20 km offshore) or in deeper waters offshore and would not be affected by construction activities. Other species may occur closer nearshore, but are rare or infrequent seasonal inhabitants off the Oregon coast (i.e., *Balaenoptera acutorostrata scammoni, Lagenorhynchus obliquidens, Lissodelphis borealis, Orcinus orca ("Eastern North Pacific Southern Resident Stock"), Phocoenoides dalli dalli).* Humpback (*Megaptera novaeangliae)* and blue (*Balaenoptera musculus musculus*) whales are not uncommon along the Oregon coast, however, they are unlikely to enter Coos Bay and be affect by construction noise. Given these considerations, the temporary duration of potential pile driving, and noise isopleths that would not extend beyond the river mouth, there is no reasonable expectation for proposed activities to affect the above species and they will not be addressed in remaining sections of this document.

Table 3-1. Marine Mammal Species in the Area

Species and Marine Mammal Group[1]	Estimated Stock(s) Abundance[2]	ESA* Status	MMPA** Status	Frequency of Occurrence[3]	Distributional Range
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	Seasonal (spring and fall)	Continental shelf
Steller sea lion (*Eumetopias jubatus*) Eastern U.S. Stock	19,423 pups; 52,139 non-pups	Not listed	Not depleted; Non-strategic	Likely	Continental shelf
California sea lion (*Zalophus californianus*) U.S. Stock, Pacific Temperate Population	296,750	Not-listed	Not depleted; Non-strategic	Seasonal (Sept – May)	Continental shelf
Humpback whale (*Megaptera novaeangliae*) California/Oregon/Washington Stock	1,918 (CV ≈ 0.03)	Endangered	Depleted and Strategic	Likely	Continental shelf and slope
Fin whale (*Balaenoptera physalus physalus*) California/Oregon/Washington Stock	9,029 (CV = 0.12)	Endangered	Depleted and Strategic	Likely	Continental shelf, slope, and offshore
Gray whale (*Eschrichtius robustus*) Eastern North Pacific Stock	20,990 (CV = 0.05)	Not listed	Non-strategic	Seasonal (Dec – Feb)	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
Pacific white-sided dolphin (*Lagenorhynchus obliquidens*) California/Oregon/Washington, Northern and Southern Stocks	26,814 (CV = 0.28)	Not listed	Non-strategic	Infrequent (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	Infrequent (late spring and summer)	Continental slope and offshore
Common Bottlenose dolphin (*Tursiops truncatus truncatus*) Californina/Oregon/Washington Offshore Stock	1,924 (CV = 0.54)	Not listed	Non-strategic	Infrequent	Offshore
Striped dolphin (*Stenella coeruleoalba*) California/Oregon/Washington Stock	29,211 (CV = 0.20)	Not listed	Non-strategic	Infrequent	Generally offshore

Short-beaked Common dolphin, (*Delphinus delphis delphis*) California/Oregon/Washington Stock	969,861 (CV = 0.17)	Not listed	Non-strategic	Infrequent	Continental slope and offshore
Northern right-whale dolphin (*Lissodelphis borealis*) California/Oregon/Washington Stock	26,556 (CV = 0.44)	Not listed	Non-strategic	Infrequent (late spring and summer)	Continental shelf and slope
Killer whale (*Orcinus orca*), West Coast Transient Stock	243	Not-listed	Not depleted; Non-strategic	Infrequent	Continental shelf, slope, and offshore
Killer whale (*Orcinus orca*), Eastern North Pacific Southern Resident Stock	83	Endangered	Depleted and Strategic	Rare	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
Harbor porpoise (*Phocoena phocoena*) Northern California/Southern Oregon Stock	35,769 (CV = 0.52)	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]Marine Mammal Groups distinguished by cell color as follows:

Phocid pinnipeds (PW)	Otariid pinnipeds (OW)	Low-frequency (LF) cetacean	Mid-frequency (MF) cetacean	High-frequency (HF) cetacean

[2]NOAA/NMFS marine mammal stock assessment reports. By region at https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; By species at https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-species-stock

[3]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 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 3-2. Marine Mammal Hearing Groups, Hearing Range, and Level B Disturbance Thresholds

Hearing Group	Generalized Hearing Range	In-Air Noise[1]	Underwater Noise[2]	
			Vibratory	Impulse
Low-frequency (LF) cetaceans (baleen whales)	7 Hz – 35 kHz	NA	120 dB	160 dB
Mid-frequency (MF) cetaceans (dolphins, toothed whales, etc.)	150 Hz – 160 kHz	NA	120 dB	160 dB
High-frequency (HF) cetaceans (true porpoises, river dolphins, etc.)	275 Hz – 160 kHz	NA	120 dB	160 dB
Phocid pinnipeds (PW) (true seals)	50 Hz – 86 kHz	90 dBA	120 dB	160 dB
Otariid pinnipeds (OW) (sea lions and fur seals)	60 Hz – 39 kHz	100 dBA	120 dB	160 dB

[1] All thresholds reported as the A-weighted root mean square (RMS) sound pressure level (SPL_{RMS}) and decibels are referenced to 20 micro Pascal (20µPa); Reference: NOAA West Coast Fisheries (online guidance, accessed 03 January 2019)
[2]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 3-3. Marine Mammal Hearing Groups and Level A Underwater Injury Thresholds

Hearing Group	Vibratory	Impulse	
	SEL_{cum}[1]	SEL_{cum}[1]	SPL_{peak}[2]
Low-frequency (LF) cetaceans (baleen whales)	199 dB	183 dB	219 dB
Mid-frequency (MF) cetaceans (dolphins, toothed whales, etc.)	198 dB	185 dB	230 dB
High-frequency (HF) cetaceans (true porpoises, river dolphins, etc.)	173 dB	155 dB	202 dB
Phocid pinnipeds (PW) (true seals)	201 dB	185 dB	218 dB
Otariid pinnipeds (OW) (sea lions and fur seals)	219 dB	203 dB	232 dB

[1]Cumulative sound exposure level (SEL_{cum}) for weighted permanent threshold shift (PTS) onset
[2]Peak sound pressure level (SPL_{peak}) threshold for impulsive sources

4.0 STATUS AND DISTRIBUTION OF AFFECTED SPECIES AND STOCKS

Proposed pile driving associated with the construction of the MOF will adhere to the ODFW in-water work window for Coos Bay (see Table 2-1), minimizing potential impacts to marine mammals that occur in the area seasonally. Larger whales are unlikely inhabitants of Coos Bay. However, they could occur within the project vicinity as they migrate along the coast, most likely near the entrance channel where armor stone transport barges are transiting to and from the MOF.

Given these considerations, ten marine mammal species could potentially be affected by proposed project activities (i.e., *Phoca vitulina richardii, Mirounga angustirostris, Eumetopias jubatus, Zalophus californianus, Megaptera novaeangliae, Balaenoptera physalus physalus, Eschrichtius robustus, Balaenoptera musculus musculus, Orcinus orca* ("*West Coast Transient Stock"), Phocoena phocoena*). The following paragraphs provide further details on their status and distribution.

Harbor seals

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). Haul-out sites that have been noted in the vicinity of Coos Bay include multiple locations in the estuary (i.e., Pigeon Point, Clam Island/North Spit, Coos Port, and South Slough), three of which are within the project vicinity (see Figure 4-1). These sites and three locations on rocks south of the river mouth (Squaw Island, Simpson's Reef, and South Cove) have been utilized to varying degrees by harbor seals (Graybill 1981, Brown et al. 2005, Wright 2014). 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 generally non-migratory, but local movements may vary with tides, weather, seasons, food resources, and reproductive behavior (NOAA 2013b). 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 2013b).

Northern elephant seals

The California Breeding Stock of Northern elephant seals (*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). 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).

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).

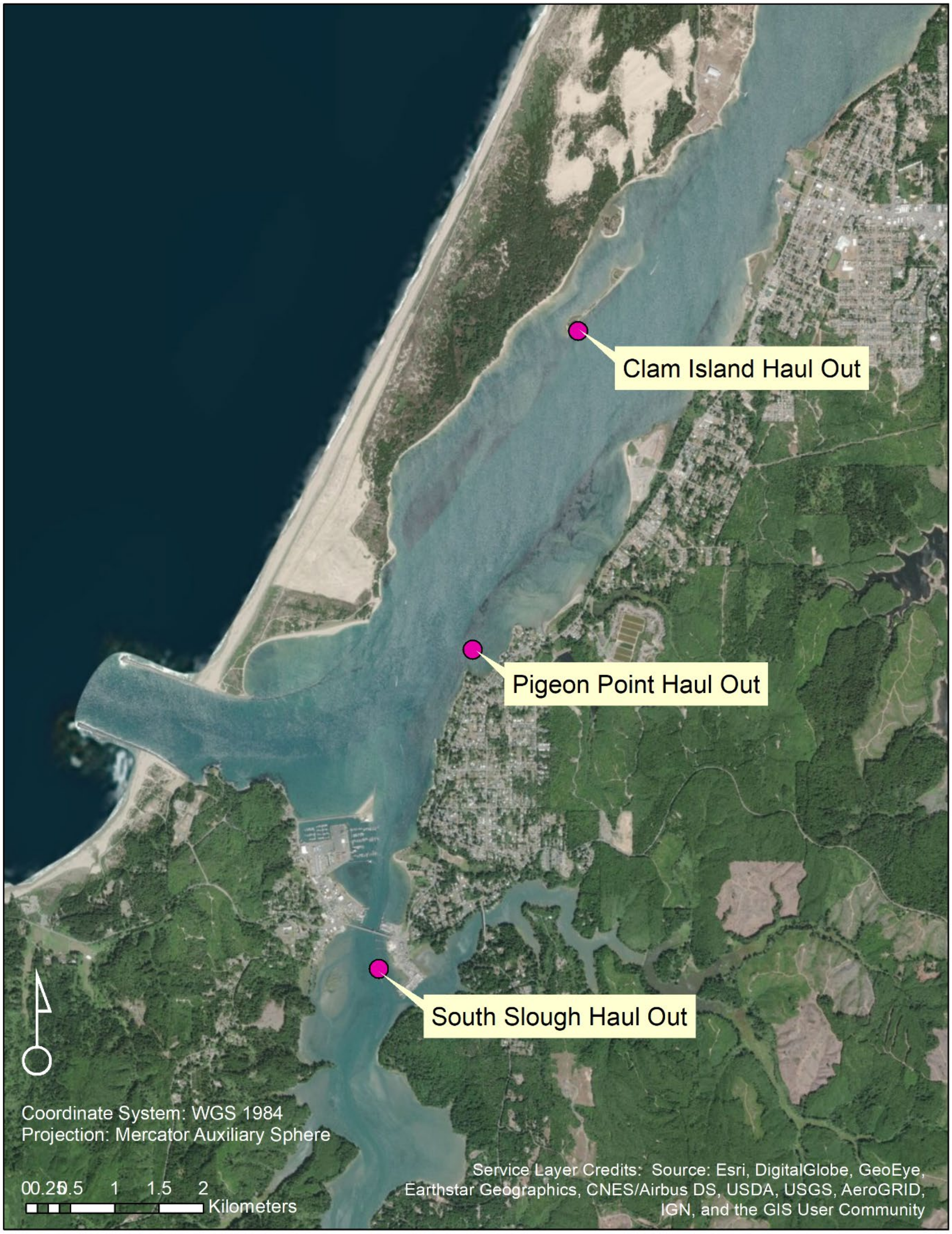

Figure 4-1. Haul-Out Sites in Project Vicinity (adapted from ODFW 2019)

Steller sea lions

Steller sea lions (*Eumetopias jubatus*) encountered off the Oregon coast are part of the Eastern U.S. Stock, with rookeries in California, Oregon, Washington, Southeast Alaska, and British Columbia (NOAA 2017d). Off the Oregon coast, Steller sea lions have been observed ashore from the Columbia River south to Rogue Reef and typically inhabit offshore rocks and islands. The southern Oregon coast has hosted two important rookeries for the species (i.e., Orford Reef and Rogue Reef) and there have been seven major hall-out sites noted in Oregon during the breeding season (Pitcher et al. 2007). Coos Bay is not known to be a prominent breeding site, however, Steller sea lions are likely to occur in the vicinity of the project.

Counts of Steller sea lions in the Eastern U.S. Stock have steadily increased over the past 30 years and available data suggest human-caused mortality and serious injury are fairly insignificant. Thus, the Eastern stock of Steller sea lions is currently not listed under the ESA or MMPA (NOAA 2017d).

California sea lions

The U.S. stock of California sea lions (*Zalophus californianus*) breeds on islands off the southern California coast. They are commonly found in Oregon haul-out sites from September to May and during this period, adult and subadult males have been observed in bays, estuaries, and offshore rocks along the Oregon coast. In fact, a few males have reported in Oregon waters throughout the year (Mate 1973). The population breeds in the California Channel Islands and most females and young pups remain in that region year-around (Mate 1973). California sea lions are likely to occur in the project vicinity.

There are nearly 300,000 California sea lions in U.S. waters (NOAA 2014a), making them one of the most abundant marine mammals within the California Current. There is a variety of human-caused mortality (e.g., due to fisheries incidental take, unauthorized shootings, collisions, etc.). However, the combined annual take from these sources (~389 animals) is well below the PBR. California sea lions are not “depleted” or “strategic” under the MMPA and have no status under ESA (NOAA 2014a).

Killer whales

Killer whales (*Orcinus orca*) are found in waters throughout the North Pacific. 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 (NOAA 2017c), the West Coast Transient (WCT) Stock includes animals that range from California to southern Alaska, and is genetically distinct from other transient populations in the region (i.e., Gulf of Alaska, Aleutian Islands, and Bering Sea transients and AT1 transients). While not regularly seen in Coos Bay, anecdotal accounts by ODFW biologists suggest bachelor pods of transient killer whales may be observed in Coos Bay semi-annually.

There are an estimated 243 killer whales in the WCT Stock, excluding animals from the ‘outer coast.’ This estimate is considered conservative because it also excludes animals from California that have not been catalogued in recent years (NOAA 2017c). Overall, the population appears to be increasing, potentially corresponding in greater prey abundance (Houghton et al. 2015a). The WCT stock is not listed under ESA and is not designated “depleted” or “strategic” under MMPA. 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).

Harbor porpoises

Harbor porpoises (*Phocoena phocoena*) are cetaceans that occupy nearshore and inland waters throughout the Pacific. They range from southern California to Alaska in the eastern Pacific and there appears to be limited movement of animals between California, Oregon, and Washington. As such, the Northern California/Southern Oregon Stock has an approximate range from Point Arena, California to Lincoln City, Oregon (NOAA 2013a). Harbor porpoises on the Pacific Northwest coast of the United States are typically found in waters roughly 100-200 meters deep (NOAA 2013a, Holdman et al. 2018). They occur along the Oregon coast year-around, and may be slightly more abundant in summer and exhibit diel or tidal movement patterns related to prey availability (Holdman et al 2018).

The estimated population estimate for harbor porpoises in the Northern Oregon/Southern California Stock is 35,769. Entanglement is the primary cause of human-related injury and death and estimated mortality rates are well below PBR. Harbor porpoises are sensitive to anthropogenic sound, with noise levels above 96 dB disrupting foraging activities (Wisniewska et al. 2018). No other habitat-related issues are of concern for this stock. The Northern Oregon/Southern California Stock is not currently listed under ESA nor considered a “strategic” stock under the MMPA (NOAA 2013a).

5.0 TYPE OF INCIDENTAL TAKE AUTHORIZATION REQUESTED

Under Section 101(a)(5)(D) of the MMPA, the U.S. Army Corps of Engineers – Portland District requests Incidental Harassment Authorization (IHA) for small numbers of marine mammals that may be affected by the installation of up to 24 steel pipe piles for a temporary MOF and other construction noise related to the repair of the Coos Bay north jetty.

5.1 Methods of Incidental Taking

In-Air

We estimated potential in-air noise level effects on marine mammals using Equation 2 to calculate the Level B disturbance distances:

$$D_{thresh-air} = D_0 * 10^{\left(\frac{SPL\ Estimate\ in\ dB_{Leq/RMS} - Disturbance\ threshold\ in\ dB}{\alpha}\right)} \quad (2)$$

With D_0 reference measurement distance (50 feet), $D_{thresh\text{-}air}$ calculated distance from source to reach air threshold values, air disturbance threshold values from Tables 3-2, and $\alpha = 20$. In-air sound pressure level estimates were referenced from Table 1-4, using the $dBA_{Leq/RMS}$ values for installing AZ steel sheets and 30-inch steel pipe piles with a vibratory hammer. The calculated in-air disturbance distances are relatively small (< 10 m). Additionally, we assume that animals that would be present in these in-air disturbance zones would have already entered the respective in-water disturbance isopleth. Given these considerations, no separate take is requested for in-air disturbance to marine mammals.

*Table 5-1. In-air Disturbance Zones for Marine Mammals**

Pile Type	Level B Disturbance (meters)#	
	Phocid Pinnipeds	Otariid Pinnipeds
12-inch H-piles	2.4	0.76
24-inch AZ Steel Sheets	6.1	1.9
30-inch steel pipe pile	4.3	1.4

*Disturbance calculations assuming vibratory installation of piles
#Estimated using Equation 2 and $dBA_{Leq/RMS}$ values in Table 1-4

In-Water

The in-water effects of pile driving noise include potential Level A and Level B effects on marine mammals. We used Equation 3 to calculate the Level B disturbance distances in water.

$$D_{thresh-water} = D_0 * 10^{\left(\frac{SPL\ Estimate\ in\ dB_{RMS\ or\ Leq} - Disturbance\ threshold\ in\ dB}{\alpha}\right)} \quad (3)$$

With D_0 reference measurement distance (10 meters), $D_{thresh\text{-}water}$ calculated distance from source to reach in-water threshold values, water disturbance threshold values from Tables 3-2, and $\alpha = 15$. Estimated sound pressure levels in water were referenced from Table 1-5, using the dB_{RMS} values for installing 30-inch steel pipe piles, H-piles, or AZ steel sheet piles with a vibratory hammer.

Table 5-2. In-water Monitoring (Level B) and Stop-Work Zone (Level A) Distances to Minimize Noise Effects on Marine Mammals

Noise Generation Type	Level A Permanent Threshold Shift (PTS) Isopleth Distance (meters)*					Level B Disturbance (meters)#
	LF Cetacean	MF Cetacean	HF Cetacean	Phocid Pinniped	Otariid Pinniped	All Groups
12-inch H-piles	3.3	0.3	4.8	2.0	0.1	1,000
24-inch AZ Steel Sheets	15.2	1.3	22.4	9.2	0.6	4,642
30-inch steel pipe pile	35.7	3.2	52.8	21.7	1.5	8,577

* Calculated using NMFS technical tool and spreadsheet for estimating PTS levels associated with pile driving (NMFS 2018, Figures 6-1 and 6-2)
# Estimated using Equation 3 and dB_{RMS} values in Table 1-5

5.2 PTS Isopleths

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 SPL RMS values from Table 1-5, with the following assumptions:

- In a 24-hour period, up to 6 piles, 25 H-piles, or 25 sheets would be installed (or removed) using a vibratory hammer
- Given the temporary nature of the MOF structure, there will be no proofing of piles with an impact hammer
- The average duration to install a single 30-inch pile is 60 minutes (or less)
- The average duration to install a single H-pile is 10 minutes (or less)
- The average duration to install a single AZ steel sheet is 10 minutes (or less)
- The estimated average sound attenuation (dB per Log [distance]) is 15 for sheet and pipe piles

These assumptions were based on measurements and calculated values reported in similar projects using vibratory methods (CalTrans, 2015; Illingworth & Rodkin, 2017; WDOT, 2018).

The largest Level A and Level B isopleths are associated with the installation of steel pipe piles, thus we depict isopleths and calculate maximum take based on driving up to 24, 30-inch steel pipe piles with up to 100 H-piles or AZ-steel sheets to complete MOF construction. Spreadsheet calculations underlying PTS values in Table 5-2 are provided in Figure 5-1.

30-inch Steel Pipe Piles							
WEIGHTING FACTOR ADJUSTMENT							
Weighting Factor Adjustment (kHz)[¥]	2.5	Blackwell 2005; Dahl et al. 2015					
SOURCE-SPECIFIC INFORMATION							
Source Level (RMS SPL)	164	*Unless otherwise specified, source levels are referenced 1 m from the source.					
Number of piles within 24-h period	6						
Duration to drive a single pile (minutes)	60						
Duration of Sound Production within 24-h period (seconds)	21600						
10 Log (duration of sound production)	43.34						
Propagation (xLogR)	15						
Distance from source level measurement (meters)*	10						
	RESULTANT ISOPLETHS *(vibratory driving: 30-inch diameter steel pipe piles)*						
		Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
		SEL_{cum} Threshold	199	198	173	201	219
		PTS Isopleth to threshold (meters)	35.7	3.2	52.8	21.7	1.5

Figure 5-1. PTS Isopleth Data for Vibratory Driving 30-inch Steel Pipe Piles

H-Piles

WEIGHTING FACTOR ADJUSTMENT		Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value
Weighting Factor Adjustment (kHz)[¥]	2.5	Blackwell 2005; Dahl et al. 2015

SOURCE-SPECIFIC INFORMATION	
Source Level (RMS SPL)	150
Number of piles within 24-h period	25
Duration to drive a single pile (minutes)	10
Duration of Sound Production within 24-h period (seconds)	15000
10 Log (duration of sound production)	41.76
Propagation (xLogR)	15
Distance from source level measurement (meters)[+]	10

[+]Unless otherwise specified, source levels are referenced 1 m from the source.

RESULTANT ISOPLETHS *(vibratory driving: 36-inch diameter steel pipe piles)*

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	3.3	0.3	4.8	2.0	0.1

Figure 5-2. PTS Isopleth Data for Vibratory Driving H-Piles

AZ-Sheets

WEIGHTING FACTOR ADJUSTMENT

		Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value
Weighting Factor Adjustment (kHz)[¥]	2.5	Blackwell 2005; Dahl et al. 2015

SOURCE-SPECIFIC INFORMATION

Source Level (RMS SPL)	160
Number of piles within 24-h period	25
Duration to drive a single pile (minutes)	10
Duration of Sound Production within 24-h period (seconds)	15000
10 Log (duration of sound production)	41.76
Propagation (xLogR)	15
Distance from source level measurement (meters)[+]	10

[+]Unless otherwise specified, source levels are referenced 1 m from the source.

RESULTANT ISOPLETHS *(vibratory driving: 36-inch diameter steel pipe piles)*

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	**15.2**	**1.3**	**22.4**	**9.2**	**0.6**

Figure 5-3. PTS Isopleth Data for Vibratory Driving AZ-Sheets

6.0 NUMBER OF MARINE MAMMALS THAT MAY BE AFFECTED (i.e., "TAKE")

6.1 Level A Take

Level A injury is not anticipated during proposed project activities. Based on the calculated PTS isopleth distances for the marine mammal groups under consideration, Figure 6-1 depicts the calculated Level A isopleths for each marine mammal group. Thus, we will implement Level A Exclusion Zones according to marine mammal groups. A stop-work zone of 25 meters for pinnipeds and 55 meters for cetaceans (see Table 5-2) will be strictly enforced during all vibratory pile driving. Measures to stop work will be implemented should any marine mammals enter the Level A Exclusion Zone. These precautions will help ensure marine mammals are not subject to auditory injury during proposed work.

6.2 Level B Take

This authorization is requesting incidental take for Level B marine mammal disturbance that may occur due to proposed project activities. Humpback, fin, and blue whales may occur in the broader region, but are unlikely to enter Coos Bay 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, pile driving will cease. Based on the marine mammal monitoring procedures and the low likelihood of larger whales entering Coos Bay, no Level B acoustical harassment is anticipated for these three species. We are requesting Level B take authorization for harbor seals, Northern elephant seals, Steller sea lions, California sea lions, gray whales, killer whales (WCT stock only), and harbor porpoises.

After accounting for the configuration of the channel and the proposed location of the MOF where pile driving could occur, propagated sound waves would hit the channel shoreline prior to reaching the full extent of estimated isopleth distances. The realized area of Level B disturbance is ~11.5 km^2 for 30-inch steel pipe piles and (Figure 6-2). For estimating maximum total take, we added the take associated with driving 30-inch pipe piles, to that associated with driving AZ steel sheets. Since it is undetermined whether AZ-sheets, H-piles, or a combination of the two will be used for MOF construction, we estimated potential take based on the larger disturbance zone (i.e., for AZ sheets). We also assume that vibratory driving of sheets and piles will occur on different work days. Level B monitoring protocols, outlined in Section 12, will be implemented according to these stated distances for potential disturbance.

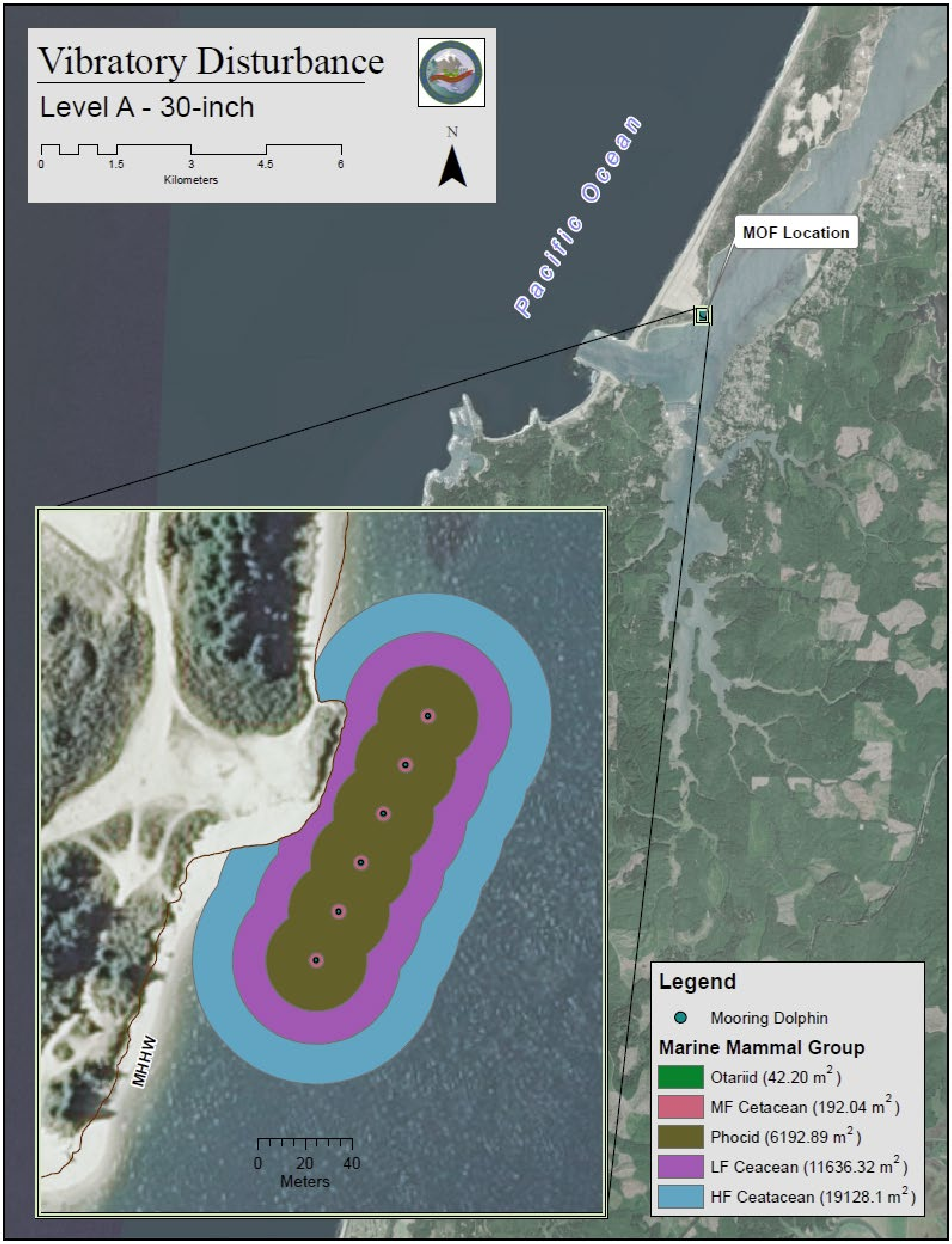

Figure 6-1. Level A PTS Distances for Vibratory Driving 30-inch Pipe Piles

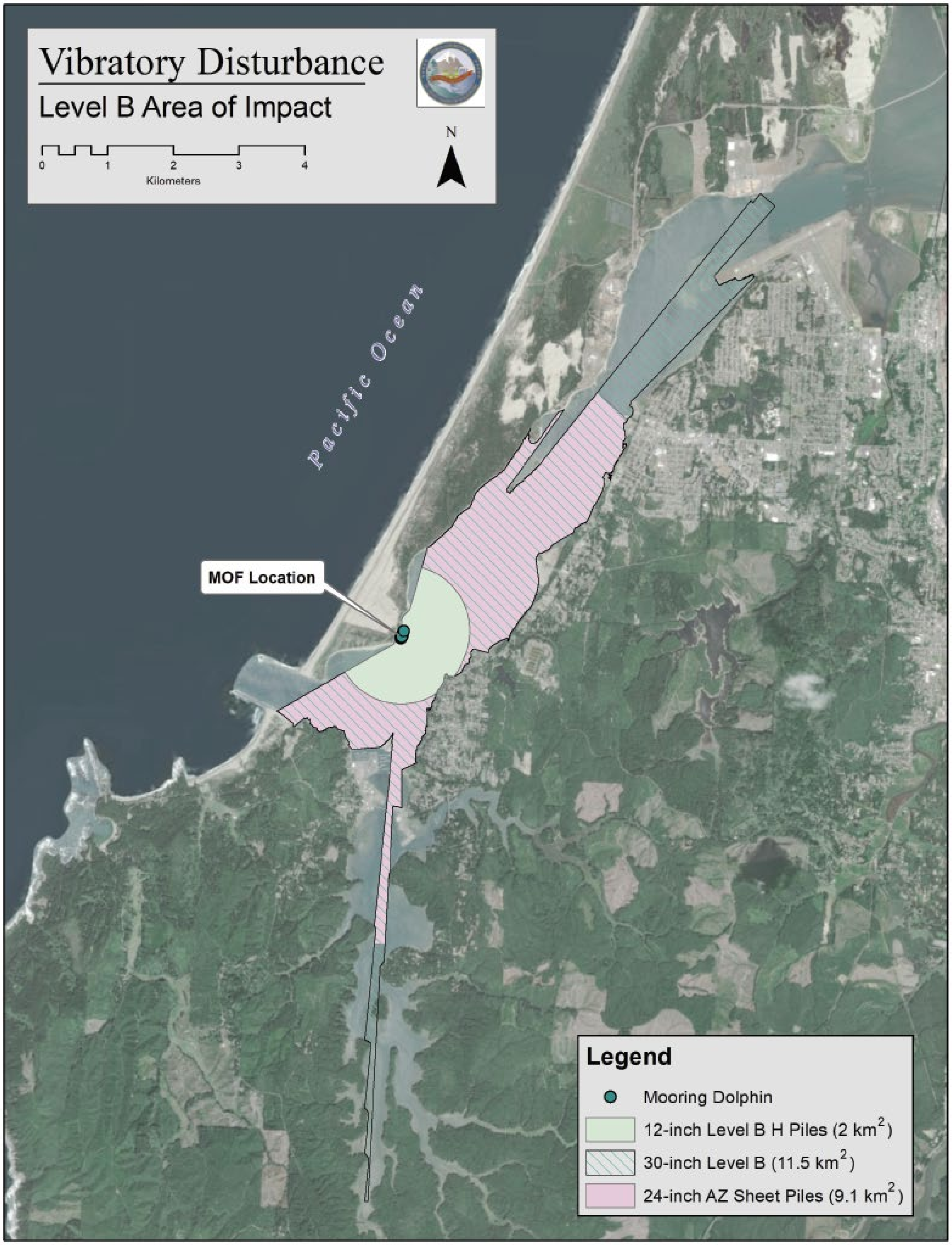

Figure 6-2. Level B Disturbance Zones

6.3 Reference Marine Mammal Abundances

In most cases, we were unable to find recent marine mammal counts conducted in Lower Coos Bay between October and February. Thus, we used maximum counts recorded in historic surveys (> 20 years) and from nearby haul-out sites to approximate local abundance relative to the estimated stock abundance at the time of the most recent assessment. Take calculations using these ancillary data likely over-estimate the density of animals likely to be encountered within Coos Bay or the direct project vicinity (Table 6-1), and therefore the Level B take estimates are likely much higher than the actual take that may be attributed to proposed project activities.

Harbor seals

Estimates for harbor seal abundance were based on recent marine mammal surveys in Coos Bay from the mouth of the river to the Highway 101 Bridge (AECOM 2017, 2018). We adopted the maximum density estimate (11.1 harbor seals/km^2) derived from aerial surveys of haul sites in the lower estuary (AECOM 2018).

Northern elephant seals

The abundance estimate for Northern elephant seals was based on the maximum number of seals observed at Cape Arago, a prominent haul-out site roughly 6 km south of Coos Bay jetties. Surveys were conducted between 2002 and 2005 (Scordino 2006) and the reference abundance (n = 54) was the maximum count observed. We then applied a 3.8% annual population growth rate (NMFS 2014c) to approximate the relative abundance of elephant seals in 2019 (i.e., n = 91). Lastly, we estimated the density of elephant seals across the project area extended to include Cape Arago (i.e., ~30 km^2) as a basis for determining the number of animals that could be present in Level B disturbance zones during vibratory pile driving activities.

Steller sea lions

The estimate for daily Steller sea lion abundance (n = 1) was based on recent marine mammal surveys in Coos Bay (AECOM 2017, 2018). Given the lack of any sea lion observations during November surveys in 2018 (AECOM 2018), we used the number of animals detected during May 2017 surveys (i.e., opportunistic observation of one Steller sea lion on May 5, 2017; AECOM 2017).

California sea lions

The estimate for daily California sea lion abundance (n = 1) was based on recent marine mammal surveys in Coos Bay (AECOM 2017, 2018). Given the lack of any sea lion observations during November 2018 surveys (AECOM 2018), we used the number of animals detected during May 2017 surveys (i.e., opportunistic observation of one California sea lion on May 5 and May 9, 2017; AECOM 2017).

Gray whales

The baseline abundance estimate for gray whales (n = 16) is based on the maximum count of whales within 1700 km^2 of Coos Bay during marine mammal aerial surveys (Adams et al. 2014). We used the estimated 6% population growth rate from the most recent stock assessment (NOAA 2014b) to derive the current estimated abundance in Table 6-1.

Killer whales

Killer whales were not detected in fall and winter aerial surveys off the Oregon coast (Adams et al. 2014). Local accounts and recent data suggest killer whales enter Coos Bay on a somewhat sporadic, biennial basis (AECOM 2017). In June 2007, a rare five individuals were detected in the Bay for a brief period (The Associated Press 2007). More recently, two transient killer whales were observed in Coos Bay in May 2017 (AECOM 2017). Though no pile driving is anticipated during summer months when killer whales appear most likely to enter Coos Bay, we estimate 2 animals could be present in the project vicinity over the entire period of MOF construction.

Harbor porpoises

No harbor porpoises were detected during recent marine mammal surveys within the Coos Bay estuary (AECOM 2017, 2018). However, harbor porpoises were counted during aerial surveys of marine mammals off the coasts of California, Oregon, and Washington. The maximum estimated count of harbor porpoises within ~1700 km^2 of Coos Bay (n = 24 in January 2011) was the basis for estimated abundance (Adams et al. 2014). We then extrapolated current abundance assuming an annual population growth rate of 4% (NOAA 2013a), and calculated the relative density.

6.4 Take Calculations

Take estimates for each species were calculated based on Equation 4:

$$Level\ B\ Exposure = N(animals\ per\ day) * days\ of\ noise\ exposure \qquad (4)$$

Over the life of the project (~2 years), there would be 14 total days of noise exposure from pile driving. The 14 days includes seven days for driving pipe piles and seven days for driving AZ sheets or H-piles. The combined 14 days of noise exposure would occur over a 4-week period during initial construction, and again during deconstruction. The requested take for year 1 (YR-1) is therefore based on 14 days of pile driving activities associated with the initial construction of the MOF. Whereas the estimated take for year 2 (YR-2) is for an estimated 14 total days needed to deconstruct the MOF.

The number of animals, N, in the monitoring zone (or project area) can be estimated from the approximate species density (i.e., animals per unit area) relative to the size of the project area. We used the reference abundance levels, adjusted for population growth (see Section 6.3), and the following estimates for the size of survey regions to calculate animal densities:

- Lower Coos Bay area: 16.35 km^2
- Lower Coos Bay, extended to Cape Arago area: 30 km^2
- Survey area for porpoises and whales near Coos Bay: ~1700 km^2

The approximate extent of each disturbance zone was used to estimate the marine mammal take associated with each type of disturbance (Table 6-1):

- Level B (in-water) disturbance area for AZ sheet pile installation: 9.053 km^2
- Level B (in-water) disturbance area for 30-inch steel pipe pile installation: 11.456 km^2

Table 6-2 summarizes the request for incidental take, along with the percentage of the stock affected.

Table 6-1. Marine Mammal Level B Take Estimates for Vibratory Pile Driving

Marine Mammal and Group[1]	Estimated Abundance[2]	Species Density[3]	Level B Take[4] AZ sheets		Level B Take 30-inch piles	
			YR-1	YR-2	YR-1	YR-2
Harbor seal	NA	11.1	703	703	890	890
Northern Elephant seal	91	3.03	192	192	243	243
Steller sea lion	NA	NA	7	7	7	7
California sea lion	NA	NA	7	7	7	7
Gray whale	16	0.0094	1	1	1	1
Killer whale	NA	NA	–	–	–	–
Harbor porpoise	33	0.019	1	1	2	2

[1]Marine Mammal Groups distinguished by cell color as follows:

Phocid pinnipeds (PW)	Otariid pinnipeds (OW)	Low-frequency (LF) cetacean	Mid-frequency (LF) cetacean	High-frequency (HF) cetacean

[2]Based on available data as outlined in Section 6.3
[3]Based on the approximate area where surveys were undertaken or reference densities (e.g., AECOM 2017), see text
[4]All take estimates assume 7 days driving each pile type with a vibratory hammer. Minimum take estimate for each type of disturbance was rounded to 1 for any species density greater than 0.

Table 6-2. Summary of Level B Harassment Take Request for Marine Mammal Species

Marine Mammal Stock and Group[1]	Stock Abundance[2]	Total Level B Take	
		YR-1 (%)[3]	YR-2 (%)
Harbor seal (*Phoca vitulina richardii*) Oregon and Washington Coast Stock	70,151	1,594 (2.3%)	1,594 (2.3%)
Northern elephant Seal (*Mirounga angustirostris*) California Breeding Stock	215,695	435 (0.2%)	435 (0.2%)
Steller sea lion (*Eumetopias jubatus*) Eastern U.S. Stock	86,191	14 (0.02%)	14 (0.02%)
California sea lion (*Zalophus californianus*) U.S. Stock, Pacific Temperate Population	366,229	14 (<0.001%)	14 (<0.001%)
Gray whale (*Eschrichtius robustus*) Eastern North Pacific Stock	28,355	2 (<0.001%)	2 (<0.001%)
Killer whale (*Orcinus orca*) West Coast Transient Stock	405	2 (0.5%)	2 (0.5%)
Harbor porpoise (*Phocoena phocoena*) Northern California/ Southern Oregon Stock	48,952	3 (<0.001%)	3 (<0.001%)

[1]Marine Mammal Groups distinguished by cell color as follows:

Phocid pinnipeds (PW)	Otariid pinnipeds (OW)	Low-frequency (LF) cetacean	Mid-frequency (LF) cetacean	High-frequency (HF) cetacean

[2]Current (2019) stock abundance was estimated using population abundances (see Table 3-1) and growth rates from the most recent stock assessment for the species, with growth rates as follows: Harbor seals – 6.4%; Northern elephant seals – 3.8%; Steller sea lions – 4.76%; California sea lions – 5.4%; Humpback whales – 6.5%; Fin whales – 7.5%; Gray whales – 6.2%; Blue whales – 3%; Killer whales – 4%; Harbor porpoises – 4%

[3]Take combines estimated take for driving 30-inch steel pipe piles with take associated with driving sheet piles to capture the total potential noise disturbance during MOF construction. Since estimated take likely represents repeated take of the same individual(s), the actual percentage of the stock taken is probably much lower than the values in parentheses.

7.0 ANTICIPATED IMPACT ON SPECIES OR STOCKS

The proposed work will not cause any permanent damage to marine mammals that may be present in the area. Adhering to marine mammal monitoring protocols will help ensure that there will be no Level A auditory damage caused by vibratory pile driving activities.

There will be temporary disturbance to marine mammals that enter the Level B disturbance zone. These effects are limited to seven species (Table 6-2) and should not exceed a cumulative eight weeks of in-water work over two years. Marine mammal behavioral responses could include avoidance or altered foraging patterns, though these changes would likely be temporary. The greatest levels of disturbance would be associated with vibratory driving steel pipe piles during construction of the MOF. Level B harassment will be greatest for pinniped populations. Harbor seals could be most affected by proposed actions, with approximately 2% of their stock taken by Level B harassment (Table 6-2) over each of the projected 2 years of construction. However, it should be noted that these estimates likely overestimate the percentage of the stock that will actually be affected, since the same individuals will likely be taken over the course of work. Proposed work will have negligible, temporary effects on the majority of marine mammal species considered, as estimated take will affect less than 1% of the stock for all remaining species (Table 6-2).

8.0 ANTICIPATED IMPACT ON SUBSISTENCE USE

There are no known subsistence uses of marine mammals in Coos Bay.

9.0 ANTICIPATED IMPACTS ON HABITAT

Proposed repair of the Coos Bay North Jetty will cause temporary disturbance to the jetty itself, which provides intertidal habitat for fish and invertebrates, as well as potential foraging and resting habitat for pinnipeds. Generally, effects to in-water habitat could include potential unforeseen indirect far-field effects from hydraulic influence (slight, localized changes to accretion, currents, velocities, etc). Stone placement would modify existing habitat by converting tidal to above-tidal habitat near the crest of the jetty while raising deep subtidal substrate to expand available intertidal and shallow subtidal habitat. However, relatively little habitat conversion and footprint expansion would occur because a majority of the stone placement for construction of the jetty head, trunk, and root features would occur on existing relic jetty stone and within the existing structural prism. Placement of rock will temporarily displace motile species, while potentially crushing sessile organisms. These effects would be limited to the duration of rock placement and the North Jetty is anticipated to provide intertidal habitat of similar quality and complexity upon project completion.

Construction and use of the jetty crest haul road could contribute suspended sediments that would create turbidity during stormy seasons or overtopping events, but since the road is above MHHW, this would likely be an infrequent occurrence. Small increases in turbidity from construction activities on the jetties would likely occur on a nearly daily basis but would be of limited extent and duration, as rock placement would involve clean fill of large, individual boulders with a majority of the placement actions occurring above MLLW upon existing, relic jetty rock. Wave and current conditions in the Project Area naturally contribute to higher background turbidity levels, and such conditions preclude the effective use of isolating measures to minimize turbidity.

Placement of stone for construction of the MOF would result in the conversion of sandy, shallow-water subtidal and intertidal habitat to rocky intertidal or above-tidal habitat. However, impacts to benthic organisms would be localized, as the area impacted by the MOF outcrop would be relatively small (180 feet by 180 feet) as a relative percentage of shallow water habitat available in lower Coos Bay.

Physical injury or mortality to benthic organisms may occur during dredging near the MOF site, which can disrupt the benthic community in the immediate vicinity of dredging activities until the area is recolonized. This can cause a slight, temporary reduction in prey species for aquatic animals such as pelagic fish (e.g., Endangered Species Act [ESA]-listed salmon, etc.). Recolonization of disturbed habitat can take up to one year or longer depending on the site, sediments and species of organisms (Hitchcock et al. 1996). Disturbance tolerant species would recolonize the area first and more rapidly, within a few months (Pemberton and MacEachern 1997). They are usually more mobile and/or rapid builders or burrowers, such as crabs, sand dollars, bristleworms and tubeworms.

10.0 ANTICIPATED IMPACTS OF HABITAT LOSS OR MODIFICATION ON MARINE MAMMALS

Rock placement on the Coos Bay North Jetty will temporarily displace pinnipeds that may rest on jetty rocks or forage in the direct vicinity. Marine mammals will likely be deterred or disturbed by the presence of construction equipment, construction personnel, and all related noise. The displacement of marine mammals from areas near the Coos Bay North Jetty should be temporary in nature, with affected species re-populating the area upon project completion.

11.0 MITIGATION MEASURES

Provided below is a summary of the minimization measures and best management practices (BMPs) that will be implemented to reduce potential adverse effects to marine mammals and habitat during proposed construction activities.

- Offloading facilities will be installed via vibratory hammer, versus impact hammers, to minimize in-water noise levels.
- The Corps will use environmentally acceptable lubricants for equipment on the jetty, and will employ a Wiggins Fast Fuel system or equivalent when it is required to refuel stationary equipment on the jetties.
- A spill prevention and response plan will also be developed and kept onsite with appropriate supplies.
- An Environmental Protection Plan will be developed and implemented prior to the commencement of any construction activities. The plan identifies construction elements and recognizes spill sources at the site. The plan outlines BMPs, response actions in the event of a spill or release, and notification and reporting procedures. The plan also outlines contractor management elements such as personnel responsibilities, project site security, site inspections, and training.
- No petroleum products, fresh cement, lime, fresh concrete, chemicals, or other toxic or harmful materials will be allowed to enter surface waters.

- Wash water resulting from wash-down of equipment or work areas will be contained for proper disposal and will not be discharged unless authorized.
- Equipment that enters surface waters will be maintained to prevent any visible sheen from petroleum products.
- No oil, fuels, or chemicals will be discharged to surface waters, or onto land where there is a potential for re-entry into surface waters to occur. Fuel hoses, oil drums, oil or fuel transfer valves, fittings, etc. will be checked regularly for leaks and will be maintained and stored properly to prevent spills.
- No cleaning solvents or chemicals used for tools or equipment cleaning will be discharged to ground or surface waters.
- Construction materials will not be stored where high tides, wave action, or upland runoff could cause materials to enter surface waters.
- The Corps will conduct briefings between construction supervisors and crews, the marine mammal monitoring team, and Corps staff prior to the start of all pile driving activity in order to explain responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures.
- For vibratory pile driving, the contractor will initiate noise from vibratory hammers for 15 seconds at reduced energy followed by a 30-second waiting period. The procedure shall be repeated two additional times.
- For in-water construction, heavy machinery activities other than pile driving (e.g., use of barge-mounted excavators, or dredging), if a marine mammal comes within 10 m, contractor(s) will cease operations and reduce vessel speed to the minimum level required to maintain steerage and safe working conditions.
- Pile driving will only be conducted during daylight hours from sunrise to sunset when it is possible to visually monitor marine mammals.
- For all vibratory pile driving, shutdown and disturbance zones will be monitored according to specifications outlined in Section 12.
- A monitoring plan will be implemented as described in Section 12. This plan includes shut-down zones and specific procedures in the event a mammal is encountered.

12.0 MONITORING AND REPORTING PLAN

The Corps will conduct one pinniped monitoring count a week prior to construction and report of the number of sea lions and seals (by species if possible) present at the North Jetty and the two haul out sites (i.e., Pigeon Point and Clam Island) closest to the proposed pile driving activities. After construction and removal of the MOF facility, the Corps will provide a final report to NMFS that will include a summary of the numbers of marine mammals that may have been disturbed as a result of the construction activities.

Multiple observers will be required to detect marine mammals within the Level B disturbance zone. During vibratory driving of AZ-sheets or H-piles, two marine mammal observers will be present. One will be located on the shoreline adjacent to the MOF site or on the barge used for driving piles. The other observer will be boat-based and detect animals in the water, along with monitoring the three haul-out sites in the Level B disturbance zone (i.e., Pigeon Point, Clam Island/North Spit, and South Slough). During vibratory driving steel pipe piles (≤30-inches), three marine mammal observers will be present. As indicated above, one observer will be on the shoreline or barge adjacent to the MOF site. A second observer will be stationed near the South Slough haul out site, and the third observer will be boat-based and make observations while actively monitoring at and between the two remaining haul out sites (i.e., Pigeon Point and Clam Island). Reports will provide dates, time, tidal stage, maximum number of sea lions and seals and any observed disturbances. The Corps also will provide a description of construction activities at the time of observation.

Upon completion of jetty repairs, a marine mammal observer will conduct post-construction monitoring, with one count every 4 weeks for 8 weeks, to determine recolonization of the North Jetty. The Corps will submit a report to the NMFS and the AMT within 90 days of completion of proposed work at the North Jetty. The Corps will designate biologically trained on-site marine mammal observers to carry out the monitoring and reporting.

For work at Coos Bay North Jetty, the Corps is proposing the following monitoring protocols.

- Visual monitoring will be conducted by qualified, trained marine mammal observers (hereafter "observer"). Visual monitoring will be implemented during all pile installation activities and at the jetty. An observer is someone who has 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.
- Trained observers will be placed at the best vantage points practicable (from the construction barges, on shore, or jetty-side) to monitor for marine mammals and implement shutdown/delay procedures when applicable by calling for the shutdown to the hammer operator.
- Marine mammal observer(s) will be on site at all times during pile driving. Each observer must meet a list of qualifications for marine mammal observers (see below) to be considered qualified, or undergo training to meet the qualifications before the start of pile driving.
- Observers will monitor the area of potential sound effects for injury to marine mammals during pile driving. The primary observer positions could include the top of the jetty, the shoreline adjacent to MOF construction, and the shoreline adjacent to Pigeon Point.
- Observers will use a hand-held GPS device or rangefinder to verify the required monitoring distance from the project site.
- Observers will scan the waters within the area of potential sound effects using binoculars (10x42 or similar) or spotting scopes (20-60 zoom or equivalent), and make visual observations of marine mammals present.
- Observers will use a marine mammal observation sheet to record the species, date, time of any marine mammal sightings, marine mammal behavior, and any communication between the observer and the contractor during pile driving.
- If an Observer detects any dead or dying marine mammal species in the action area, regardless of known cause, the following procedure will be implemented:
    - Record the species type (if known), date, time, and location of the observation
    - Take a photograph of the specimen

  - Immediately notify NOAA Fisheries.
- For all vibratory pile driving, shutdown and disturbance zones will be monitored as follows:
  - Monitoring will take place from 30 minutes prior to initiation through 30 minutes post-completion of pile driving.
  - The shutdown zone will include all areas where the underwater SPLs are anticipated to equal or exceed the Level A (injury) criteria for marine mammals. The shutdown zone zones would be implemented at 25 meters for pinnipeds and 55 meters for cetaceans.
- If the shutdown zone is obscured by fog or other weather/sea conditions that restrict the observers' ability to observe, pile driving will not be initiated or will cease until the entire shutdown zone is visible so that monitoring may resume.
- 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. Pile driving will only commence once observers have declared the shutdown zone clear of marine mammals.
- If a marine mammal is observed in the acoustic disturbance zone (i.e., Level B 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 (i.e., injury) zone, work will be halted and delayed until either the animal has voluntarily left and been visually confirmed beyond the disturbance zone; or the animal has not been re-detected in 15 minutes for pinnipeds or 30 minutes for cetaceans.
- Observers will scan the waters for 30 minutes before and during all pile driving. If any marine mammal species for which take is not authorized are observed within the area of potential sound effects during 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.
- Per NMFS Requirements, the following information will be collected on 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.

Behavioral observations will be noted, 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 individuals are being taken. Collected data will be compiled following the end of each construction season and submitted to NMFS.

According to NMFS Requirements, the Corps 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.

13.0 SUGGESTED MEANS OF COORDINATION

ODFW and NMFS will be apprised of the Corps work and results of the monitoring efforts. In addition, all marine mammal detected from the shoreline adjacent to the MOF and Pigeon Point will be recorded each day of pile driving. This data will be provided to NMFS and ODFW on a monthly basis, or upon request.

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