US Army Corps of Engineers ®
Portland District

REQUEST FOR MARINE MAMMAL PROTECTION ACT INCIDENTAL HARRASSMENT AUTHORIZATION

TILLAMOOK SOUTH JETTY REPAIRS

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

May 2022

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1.0 DESCRIPTION OF THE ACTIVITY

1.1 Introduction

Tillamook Bay is located on the Oregon Coast (OC) near the city of Garibaldi in Tillamook County, Oregon (Figure 1-1). The Bay provides a safe harbor for the water-dependent economies of local and state entities. It is the third largest bay in Oregon and sustains significant biological and economic resources.

The U.S. Army Corps of Engineers - Portland District (Corps), constructed, and continues to maintain, two jetties at the entrance of Tillamook Bay to provide reliable navigation into and out of the bay. A Major Maintenance Report (MMR) was completed in 2003 to evaluate wave damage to the jetties and provide design for necessary repairs. Some repairs to the North Jetty were completed in 2010, and further repairs to the North Jetty root and trunk began in January 2022. The Tillamook South Jetty Repairs Project (i.e., the “Proposed Action”) would complete critical repairs to the South Jetty, as described in the MMR, with a focus on rebuilding the South Jetty head. Pile driving associated with a temporary material offload facility (MOF) could commence as early as late Fall of 2022 but the majority of construction work would likely begin in Spring 2023. Work would consist of repairs to the existing structures within the original jetty footprints, with options to facilitate land- and water-based stone transport, storage, and placement operations.

The Corps is requesting two, one-year Incidental Harassment Authorizations (IHAs) for construction and subsequent deconstruction of the temporary MOF. We are requesting Level A and B harassment take for harbor seals, Northern elephant seals, and harbor porpoises. In addition, we area requesting solely Level B harassment take for Steller and California sea lions.

1.2 Project Purpose and Need

The purpose of the Proposed Action is to protect the structural integrity of the South Jetty and to improve navigation conditions at the channel entrance through major maintenance repair activities (Figure 1-1). The South Jetty has a total length that is approximately 1,050 feet shorter than the authorized footprint, and the head is severely damaged with an estimated recession rate of ~28 feet per year (Figure 1-2). As with the North Jetty, there has also been erosion of the jetty trunk. Under the Proposed Action, repair activities would consist of two main components at the South Jetty: trunk repairs and construction of a 100-foot cap to repair the South Jetty head.

Repair activities would require construction of multiple temporary construction features: a barge material offloading facility (MOF) near Kincheloe Point, two upland staging areas, and access road improvements. The Proposed Action also includes removal and site restoration for each of the temporary construction features.

Figure 1-1. Tillamook Bay Jetties

Figure 1-2. Significant Erosion of the Tillamook South Jetty Head

1.3 Background

As with most jetties along the Oregon coast, the Tillamook South Jetty was constructed to facilitate safe navigation and support a more stable entrance channel at the mouth of Tillamook Bay. The unique construction and repair history of the South Jetty is summarized briefly below:

South Jetty

- Constructed in phases between 1969 and 1979 to a final length of 8,025 feet
- No repairs since original construction

The 2003 MMR report and subsequent 2014 Corps inspection recommended several repair actions that are the basis for proposed construction activities in this application.

1.4 Project Elements

Tillamook South Jetty repairs include rock placement at the South Jetty head and trunk. Related construction activities include construction of a temporary MOF near Kincheloe Point; channel dredging to maintain access to MOF; roadway improvements and possible turnouts along Bayocean Dike Road; and utilization of two upland staging and stockpiling areas (Figure 1-3). Pile driving associated with MOF construction and deconstruction may result in marine mammal Levels A and B take. Two protected species observers (PSOs) would be on onsite during all pile driving, with at least one observer stationed on the shoreline near the Port of Garibaldi and another observer stationed on the shoreline adjacent to the proposed MOF site (Figure 1-3).

The Contractor will ultimately decide on the means and methods for construction, within the constraints outlined above. Given uncertainty about which features will be implemented to facilitate site access, this application assumes a temporary MOF, which requires pile driving, would be constructed to accommodate barge operations. All temporary features will be removed upon project completion, with areas restored to pre-construction conditions.

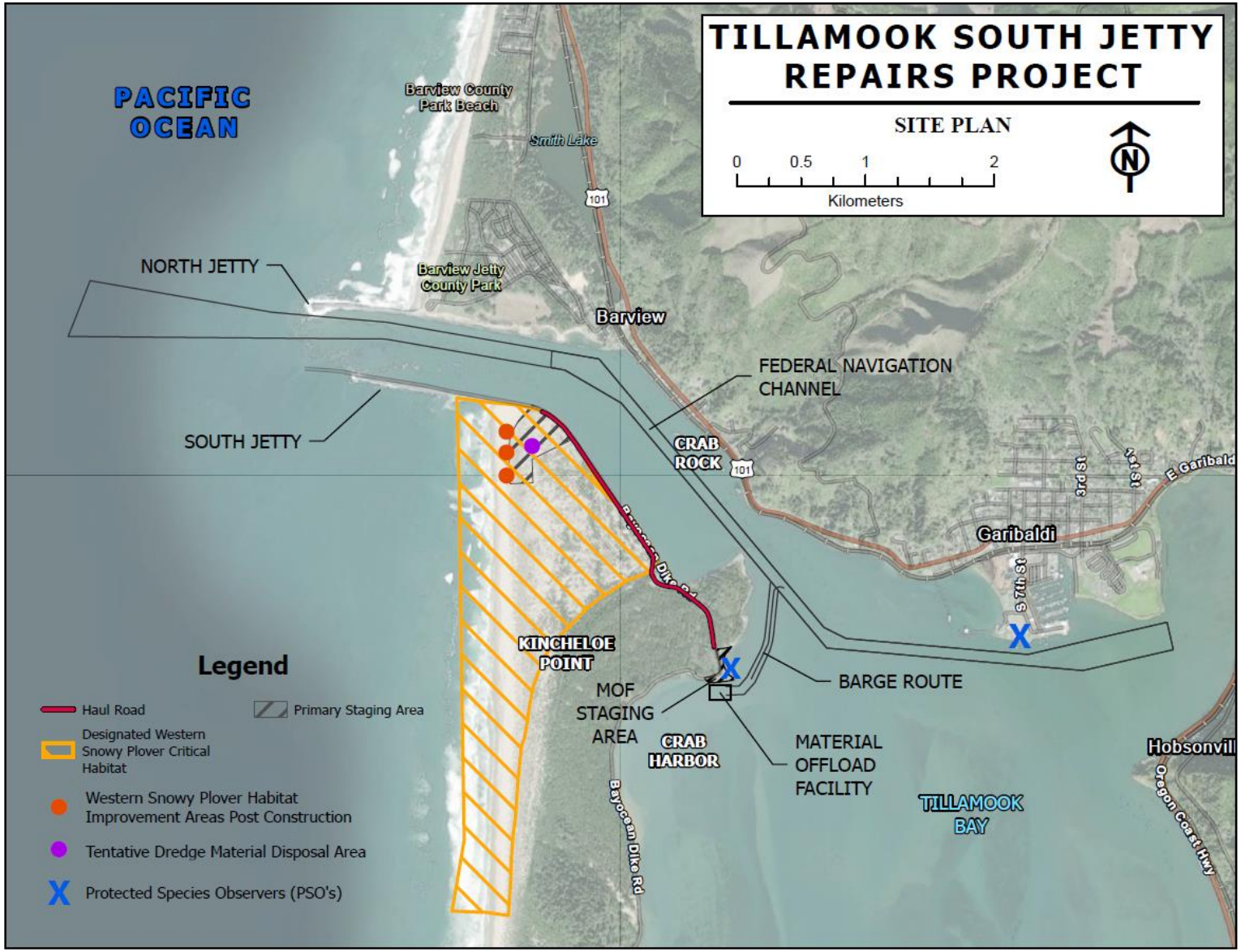

Figure 1-3. Overview of Proposed Action Elements and Wetland Features at the South Jetty

1.4.1 Construction Staging Areas

Jetty repairs and associated construction elements require areas for equipment and supply staging and storage, parking areas, access roads, scales, general yard requirements, and jetty stone stockpile areas. There would be one primary staging area adjacent to the South Jetty trunk and a smaller staging area near the MOF (Figure 1-3).

The up to 20 acres identified for staging at the South Jetty are undeveloped, consisting of sparsely vegetated sand. This area may be cleared and graded by pushing the sand to create a level surface. Excess sand moved from the area could be formed into berms around the perimeter of the staging area, as feasible. Following grading, the staging area could then be stabilized with gravel to provide a base that can support the jetty stone. The specifics of permissible work within the Designated Critical Habitat (DCH) for Western snowy plover (WSP) will be coordinated with U.S. Fish and Wildlife Service (USFWS). At a minimum, all gravel, rock, and otherwise non-sand materials placed within the WSP critical habitat boundary beyond any existing roads would be fully removed upon project completion. A haul road would likely be constructed through the center of the South Jetty storage area. A berm may also be built from on-site material along the existing jetty root alignment and along the eastern edge of the storage area to prevent a water runnel along the low portion of the jetty toe. Any mature trees and wetlands within storage areas to be protected and avoided in order to preserve cultural resources or prevent unauthorized fill activities will be flagged or otherwise marked with a 50ft marked buffer.

1.4.2 Temporary Material Off-loading Facility (MOF) Construction

A temporary MOF is needed to transfer jetty rock from barges to shore at the South Jetty. The MOF provides moorage for barges and a structure for crane support. The preferred location of the MOF is on the south side of Kincheloe Point, on the site of a former staging area, as shown in Figure 1-4. Detailed design of the MOF would be completed closer to the time of construction. The discussion in this section is based on general assumptions about likely design elements.

Construction of the MOF would result in temporary impact to aquatic and upland habitat. While precise impacts would not be known until the MOF has been designed, based on an MOF built for a similar project (The Coos Bay North Jetty Maintenance project), it is estimated that temporary impacts below the high tide line (HTL) would be limited to 0.14 acres or less. The full extent of the MOF and associated access dredging would be approximately 3.6 acres, with an additional 3.7 acres of upland disturbance associated with the MOF staging area.

The offloading platform could require the use of an anchor line moorage or dolphins. The platform would be approximately 50 feet by 100 feet and would be constructed using a sheet pile perimeter wall, installed using a vibratory hammer. Vibratory hammers are the preferred method of pile driving and any necessary impact driving would include use of a confined bubble curtain to reduce in-water noise disturbance. A maximum of 24, 24-inch timber or steel piles would be installed as mooring dolphins, up to 10, 12-inch steel H-piles for support, and up to 250, 24-inch AZ-type steel sheets would be driven for the perimeter wall. The maximum pile diameter would be 24 inches, and caps (or other deterrence devices) would be installed on each pile to discourage birds from perching. The platform would be constructed within the confines of

the perimeter wall by filling in the area with backfill. Borrow material for backfill may consist of sand, dredge spoils, and/or quarry spalls. Stone may be required at the shore-to-sheet-pile interface to confine the backfill. A conceptual design of the potential MOF is presented in Figure 1-4. Construction of the MOF could take up to 1 month to complete. Pile driving would occur 20-23 days over that period. An additional 13 days of in-water noise would be associated with vibratory removal of sheets and pilings to deconstruct the temporary MOF upon completion of South Jetty repairs. Again, deconstruction of the MOF would be completed in less than a month.

In order to allow fully loaded barges to access the MOF, dredging would occur prior to the construction of the platform. Based on the conditions at the preferred MOF location, it is conservatively estimated that no more than 5,000 cubic yards of material would be dredged. The barge route from the main channel to the MOF is sited to avoid potential adverse effects to eelgrass. Recent surveys have confirmed that the primary MOF area is 160 feet from existing eelgrass beds and measures outlined under Section 1.6 of this application will further minimize potential indirect effects to eelgrass. The area dredged would include the area adjacent to the shore where the barge would be moored (Figure 1-4). The MOF would be sited to achieve project purposes while minimizing potential environmental impacts. Sandy dredged material removed to facilitate barge access would be placed in the Primary Staging Area as indicated in Figure 1-3 and used to fill depressions and create better habitat for WSP post construction.

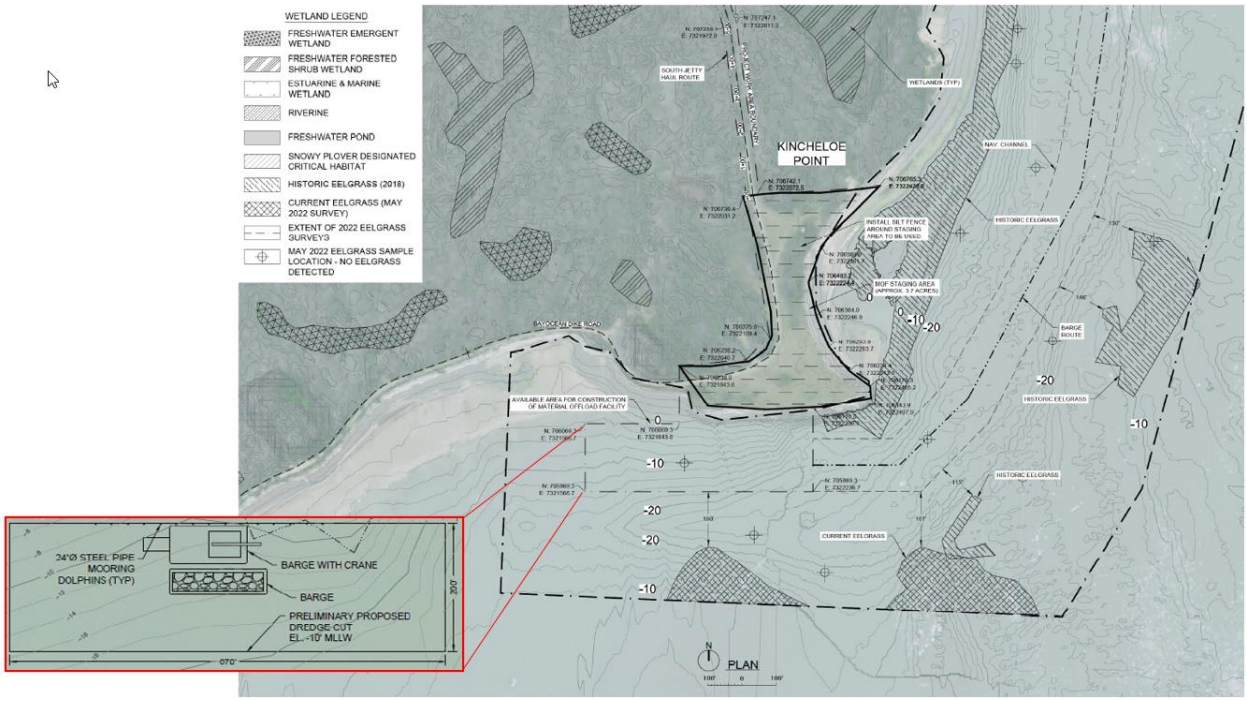

Figure 1-4. Preliminary Layout of Material Offloading Facility (MOF) for South Jetty

1.4.4 Site Access and Haul Roads

The South Jetty will be accessed via the water, by a propelled barge (or similar watercraft), or through county lands using existing roads (Figure 1-5). Ocean barging is anticipated to be the primary method of material and equipment transport to the site. Bayocean Dike Road (Figure 1-3) would only be used by workers and smaller construction vehicles to access staging areas and work sites. Prior to construction, this road would be improved to facilitate the necessary level of construction traffic. Specific details and locations of road improvement actions would depend on the condition of the road at the start of construction, but would likely include scraping/grading, gravel placement, and compaction. Turnouts would be constructed, as needed along the eastern side of the road to minimize encroachment upon existing wetlands. Some removal of vegetation adjacent to the road could be necessary, and vegetation removal would be minimized to the maximum extent practicable. All road improvements and turnouts would avoid wetlands and Waters of the U.S., and only minimal maintenance of weedy and encroaching vegetation would be necessary. Should contractors be unable to maintain a 50-foot buffer, silt fencing, straw waddles, hardened or other temporary barriers will be installed to prevent unintentional wetland fill.

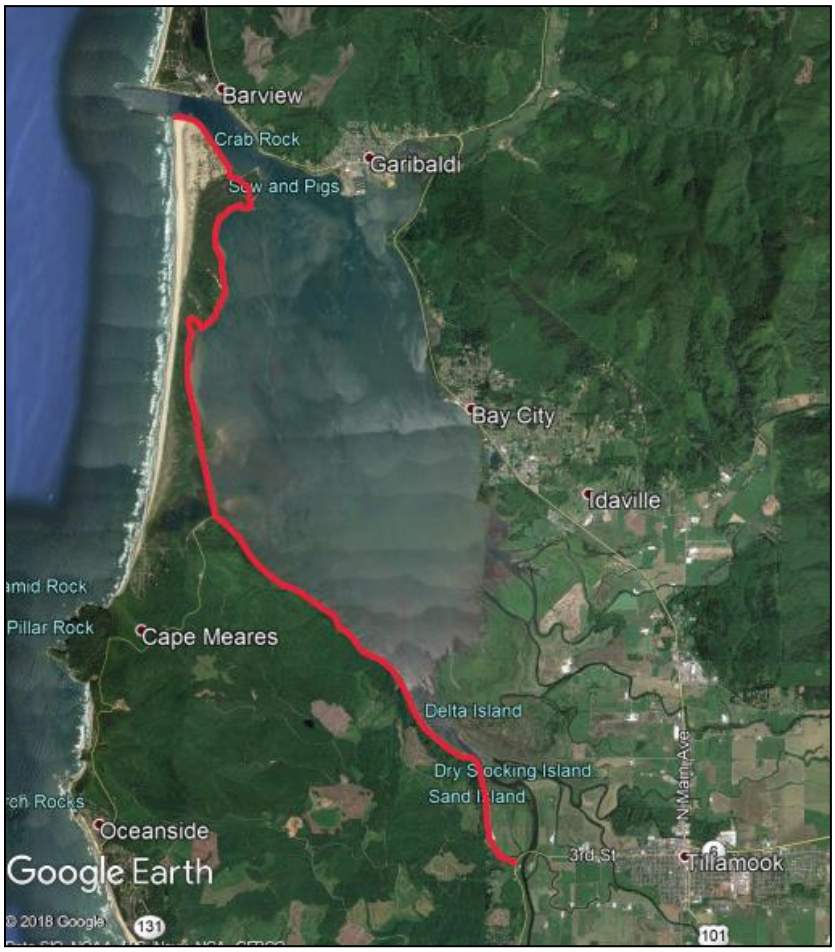

Figure 1-5. Potential Land-based Access Route to the South Jetty

1.4.5 South Jetties Maintenance and Repairs

Significant repairs are proposed along the South Jetty, with the majority of work occurring from STA 70+00 westward. These stations are enumerated in 100-foot increments such that STA 71+00 would be 100 feet seaward from STA 70+00. Additional repairs to the jetty trunk between Stations 43+00 and 49+00 are also planned. The jetty cap will be from STA 77+00 to 77+75 to elevation +18 feet relative to North American Vertical Datum of 1988 (NAVD88). From the final head station centerline, the end of the jetty will be built out in a 20-foot radius to elevation +18 feet NAVD88. The crest width of the jetty cap would be 40 feet. The crest width of the jetty trunk would be 30 feet with a target crest elevation of +18 feet NAVD88. The average stone density would be approximately 180 lbs/ft^3, and the total quantity of stone required for the Proposed Action is estimated at 31,000 cubic yards (~76,000 tons) at the South Jetty.

The following construction equipment may be required to complete jetty repairs:

- An excavator for small rock could be used to move dirt or rock to facilitate equipment access.
- A track crane could be used to move large jetty stone for repair of jetty root and trunk sections.

- A ringer crane could be needed to move very large stone to repair the jetty head.
- 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 haul roads.
- 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 South Jetty site as needed.

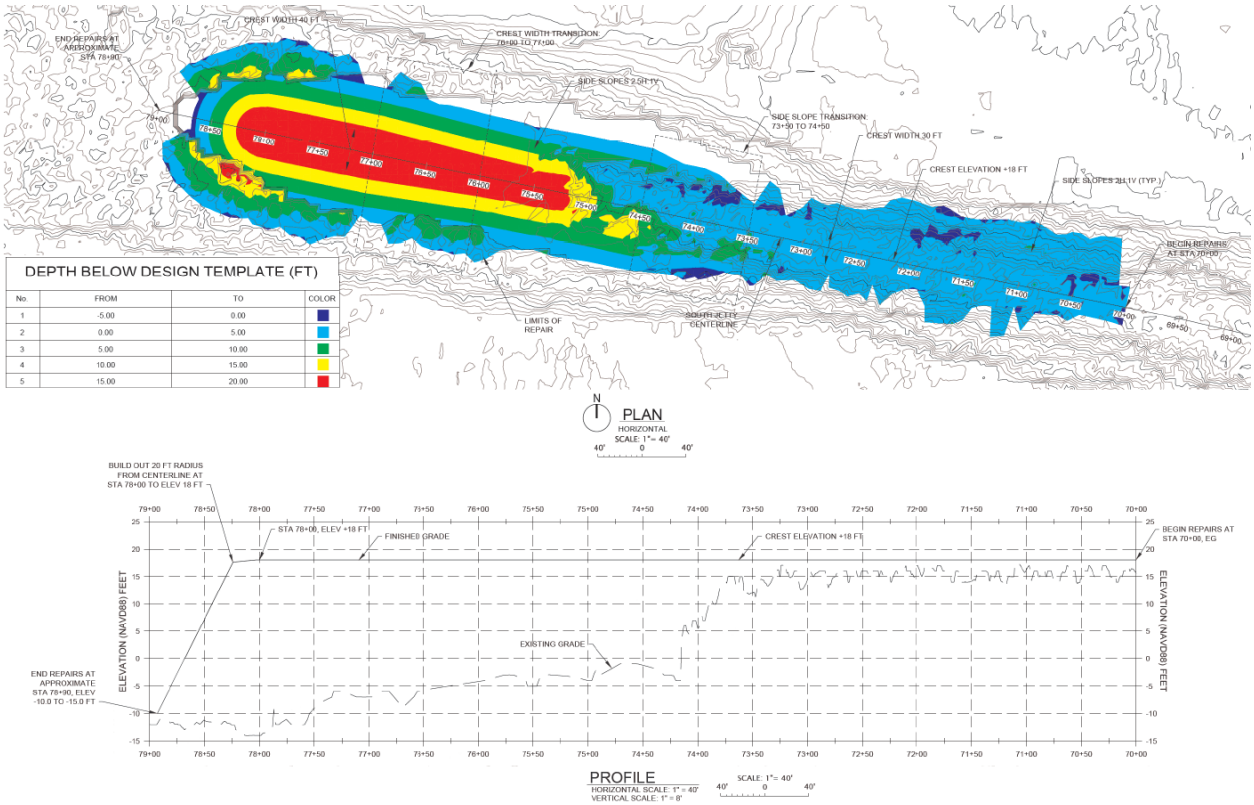

Figure 1-7. Tillamook South Jetty Repair Reaches

1.5 Noise Emission

1.5.1 In-air

Sources of ambient in-air sound near the South Jetty include wind, waves, and vessels transiting into and from Tillamook Bay, recreational and commercial activities, and road traffic. The Port of Garibaldi is located approximately 2 miles east of the entrance to Tillamook Bay and contains a lumber mill, seafood processing plants, marine repair shops, a commercial and charter fishing marina, and a public boat launch. The USCG Station Tillamook Bay is also located at the Port of Garibaldi; operations include towing vessels and assisting recreational and commercial boaters throughout the year with five search and rescue boats. The U.S. Highway 101 corridor is adjacent to Tillamook Bay, passing through the coastal cities of Bay City, Garibaldi, and Barview closest to the South Jetty (Figure 1-1). The nearest residences to the Proposed Action Area are located in Barview, approximately 2,000 feet away on the opposite side of the entrance channel.

Sound levels are measured in decibels on a logarithmic scale. Sound level meters and monitors utilize a filtering system to approximate the human perception of sound, referred to as A-weighted decibels (dBA). Nearby waterfront activities may create sounds levels in the range of 70 to 90 dBA, mostly peaking at 99 dBA for short durations (77 Federal Register [FR] 59904). These sounds may be produced by heavy trucks, forklifts, marine vessels and tugs, and industrial equipment. During poor weather conditions, vessels may use foghorns that can reach levels of about 95 to 120 dBA (FTA 2006). U.S. Highway 101 may result in traffic noise of up to 75 dBA, while traffic on local roads reaches about 50 dBA. Wind and waves and nearby recreational and waterfront operations may result in ambient noises near the transportation corridor reaching 90 dBA intermittently.

Construction equipment (excluding pile drivers) such as tugs and overland vehicles related to the Proposed Action could produce in-air sound levels up to 86 dBA, after accounting for the top three non-driver sound levels and rules for decibel addition (Table 1-1, WSDOT 2018) and increase surrounding in-air sound levels. The loudest (dBA_{LMAX}) anticipated in-air noise levels would occur during pile driving and could reach approximately 110 dBA for any necessary impact pile driving (Table 1-1, WSDOT 2018). Pile driving to construct the MOF is anticipated to take up to 20-23 days over the course of a month. Deconstruction of the temporary MOF upon completion of the proposed jetty repair is estimated to take an additional 13 days, with comparable levels of in-air noise generated. This would be a temporary increase in in-air sound, which would attenuate to estimated ambient levels (70 dBA) within approximately 1 mile. This would fall below the disturbance threshold for pinnipeds in approximately 150 meters (phocids) and 50 meters (otariids). The majority of proposed jetty repairs over the construction period will not involve pile driving and noise from the aforementioned construction equipment (excluding drivers) would attenuate to ambient levels within 100 meters. These estimates were derived from Equation 1, a practical spreading loss model for sound attenuation (WSDOT 2018).

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

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

The loudest in-air noise disturbances would likely be attributed to impact pile driving, should it be necessary. We rely on reference estimates from literature to evaluate potential airborne disturbance on marine mammals (Table 1-1).

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

Equipment Type	Average dBA_{Lmax}* at 50 ft.
Impact Pile Driver	110
Vibratory Pile Driver	101
Bulldozer	82
Crane	81
Excavator	81
Front End Loader	79
Dump Truck	76
Pickup Truck	75

Table adapted from WSDOT 2018, Table 7-4
*The maximum value of a noise level that occurs running a single event

1.5.2 In-water

Ambient in-water sound in the Proposed Action Area is affected by many factors including: wind and waves, commercial and recreational vessel use, aquatic animals, traffic noise along adjacent roadways, 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.).

Placement activities, aside from large stone to be placed in the footprint of the original jetty structure, would be confined to the temporary MOF feature constructed to facilitate barge loading and unloading at the MOF. The MOF would be constructed according to the following guidelines for in-water driving: Up to 24 steel pipe piles (up to 24-inch diameter); and up to 250 24-inch steel sheets (type NZ, AZ, PZ, or SCZ). The MOF would also be supported by approximately 10 12-inch H-type anchor piles. The H-piles would be shoreward of installed sheets and most likely driven into the fill material with very little water, if any. A contractor would be limited by these general constraints, but the final MOF design would be per their discretion, largely based on site conditions, material availability, and cost.

Pile driving noise would be intermittent and could temporarily disturb marine mammals. A vibratory driver is the preferred means for pile installation to minimize potential injury to marine mammals and fish species protected under the Endangered Species Act (ESA) and MMPA. However, impact driving may be required for steel pipe piles if vibratory means prove infeasible. For any impact driving, a confined bubble curtain will be used to reduce in-water sound. Estimated in-water sound pressure levels anticipated from installation of steel sheets (NZ, AZ, PZ, or SCZ type), H-piles, and steel pipe piles are summarized in Table 1-2. AZ sheets are most likely to be used and served as a proxy for estimating noise levels, though a contractor could elect to use a different type of sheet pile of equal or less diameter. Deconstruction of the temporary MOF, which would include vibratory pile removal, upon completion of the proposed jetty repair is estimated to produce comparable levels of in-water noise, but over fewer days.

Table 1-2. Estimated Underwater Sound Pressure Levels Associated with Pile Driving

Pile Type	Sound Pressure Level (single strike)		
24-in AZ Steel sheets w/vibratory (unattenuated)[1]	177 dB_{PEAK}	163 dB_{RMS}	162 dB_{SEL}
12-in Steel H-piles w/ vibratory (unattenuated)[2]	165 dB_{PEAK}	150 dB_{RMS}	147 dB_{SEL}
24-Inch Steel Pipe Piles w/vibratory (unattenuated)[3]	---	161 dB_{RMS}	---
24-Inch Steel Pipe Piles w/impact hammer (attenuated)[4]	198 dB_{PEAK}	184 dB_{RMS}	173 dB_{SEL}

[1] Estimated average sound pressure levels for 24-inch AZ steel sheets using the sound levels recorded at Port of Oakland Berth 35/37 for reference (Caltrans 2020, Table 1.2-1d). Water depth at the MOF location will be much less than 15 meters so actual sound levels may differ.
[2] Estimated average sound pressure levels for 12-inch steel H-type piles were based on average levels detected for vibratory driving 14-inch H-piles in water approximately 2 meters deep at the Cheveron Long Wharf in Richmond, CA (Caltrans 2020, Table I.2-1b). This site was chosen based on comparable water depths and a pile size just above the 12-inch H-piles proposed for use in the current project.

[3] Reference sound pressure levels for vibratory driving 16- and 24-inch steel pipe piles for U.S. Navy installation projects (Navy 2015, Appendix H).
[4] Estimated average typical sound pressure levels for 24-inch steel pipe piles assuming a water depth of approximately 5 meters similar to a dock repair project in Rodeo, CA (Caltrans 2020, Table I.2-1a), w/ 5dB reduction for use of bubble curtain attenuation (as per R. Pauline (NMFS), personal communication, January 18, 2022).

1.6 Conservation Measures and Best Management Practices

Conservation measures and Best Management Practices (BMPs) for the Proposed Action would be used during construction to avoid and minimize the potential for adverse impacts to physical and biological resources. The Corps and its contractors will be required to adhere to any Reasonable and Prudent Measures and Terms and Conditions issued through a Biological Opinion by the USFWS. Conservation measures for WSP include those post construction rehabilitation requirements of any area used for construction within DCH for WSP (i.e., Section 3.2.5 above).

Upland Work

Conservation measures and BMPs to reduce the environmental footprint and to avoid and minimize impacts on upland areas and significant cultural resources are incorporated in the Proposed Action design and would be implemented during construction. The following conservation measures and BMPs would be implemented during construction in upland areas as needed.

- Staging areas, stockpiles, and most of the MOF would remain above the Mean Higher High Water (MHHW) mark and would be sited to minimize adverse effects to wetlands, habitats identified as having higher ecological value, and any locations identified as having significant cultural resources. Silt fencing and other hardened temporary barriers will be placed to protect wetlands, as appropriate, when a 50-foot barrier cannot be maintained.
- There will be no widening of Bayocean Dike Road and roadway improvements would be limited to turnouts (up to 15-foot width and 50-foot length) to accommodate safe passage of vehicles, and potential gravel placement and grading to improve surface conditions where needed. There is no proposed permanent fill of wetlands along roadways and turnouts would be sited to avoid these areas to the maximum extent practicable. Hardened wetland protection measures would be installed on both sides of the road in cases where the roadway has abutting wetlands on both sides. Roadway improvements would also avoid any locations identified as having significant cultural resources. Turnouts would likely be placed along the western side of the road in areas where wetlands and significant cultural resources are not present. The MOF would be used to transport larger vehicles and equipment that cannot use Bayocean Dike Road due to width constraints.
- Ground disturbance and removal of native vegetation, especially trees and shrubs, would be kept to a minimum, as feasible.
- Before alteration of the Action Area, the project boundaries would be flagged. Sensitive resource areas, including areas below MHHW, any nearby wetlands (i.e., next to the

access road, staging area, and MOF), trees to be protected, significant cultural resource locations, and sensitive plover habitat would be flagged. Construction or silt fencing, or something functionally equivalent, would encircle much of the construction areas, staging area, and MOF. Plover habitat along the western edge of the primary South Jetty storage area would be clearly marked and avoided.

- Temporary erosion controls would be in place before any alteration of the site. With the exception of WSP DCH, disturbed areas would be seeded and/or covered with coir fabric at the completion of ground disturbance to provide immediate erosion control. Erosion control materials (e.g., silt fence, straw bales) would remain on-site at all times during active construction and disturbance activities. If needed, these measures would be maintained on-site until permanent ground cover or site landscaping is established, and reasonable likelihood of erosion has passed. When permanent ground cover and landscaping is established, temporary erosion prevention and sediment control measures, pollution control measures, and turbidity monitoring equipment would be removed from the site, unless otherwise directed.
- An Erosion and Sediment Control Plan (ESCP) would outline facilities and BMPs that would be implemented and installed prior to any ground-disturbing activities on the project site, including mobilization. These erosion controls would prevent pollution caused by surveying or construction operations and ensure sediment-laden water do not leave the project site, enter Tillamook Bay, or impact aquatic and terrestrial wildlife.
- Training would be provided to construction workers and equipment operators on the identification of weeds to be avoided.
- All construction material sources used for supplies of sand, gravel, rock, and mulch would be certified as weed-free prior to transport or use.
- Certified weed-free straw or fiber roll logs would be used for sediment containment.
- All vehicles would be completely washed (or blown clean using an air compressor) and inspected for weed seeds and plant parts prior to mobilization onto the job site or after entering weed-infested areas of the job site.
- All revegetation materials (i.e., soil components and mulches) would be obtained from non-weed infested sources. Seed procured for the project would be certified as noxious weed-free with a weed content of 0.05 percent or less.
- Site revegetation will use plant materials with a high likelihood of survival, and consist of regionally native species

In-water/Near water work

- Prior to the commencement of construction operations, the Corps would coordinate the work schedule with the local port, the U.S. Coast Guard (USCG), and Tillamook County.
- Dredging for the MOF and placement of material for the MOF would occur between July 15 and March 15 to avoid the peak timing for juvenile coho salmon outmigration.
- The MOF would be sited to avoid direct impacts to eelgrass during dredging and/or construction.
- Only mechanical dredging would be permissible, and dredges would be operated to limit dredge spillover.
- The scope and duration of dredging would be limited to the minimum area and amount

of time needed to achieve project purposes.

- Placement of jetty stone could occur year-round. However, winter weather conditions would likely result in most of the work being completed between April 1 and October 15, with work at the more exposed jetty sections likely occurring between June 1 and October 15. Work would extend as long into the fall as possible to maximize the length of the construction period but may be limited due to safety concerns.
- Other in-water and shoreline work elements (MOF-related construction [i.e., pile driving] and eventual removal) would be completed between July 1 and August 31 or the regular in-water work window for Tillamook Bay (November 1 to February 15), consistent with the NMFS ESA coordination for this project.
- To minimize water turbidity and the potential for entrainment of organisms during dredging for the MOF, the clamshell bucket or head of the dredge would remain on the bottom to the greatest extent possible and only be raised 3 feet off the bottom when necessary for dredge operations.
- If the Captain or crew operating the vessels observes any kind of sheen or other indication of contaminants, they would immediately stop their activities and notify the USCG and the Corps environmental staff to determine the appropriate action.
- Contractors will not release any trash, garbage, oil, grease, chemicals, or other contaminants into the waterway. Spill prevention measures shall be in place prior to and during construction activities.
- The Corps works to meet state water quality standards. Water turbidity - no more than10% cumulative increase in natural stream turbidities may be allowed, as measured relative to a control point immediately upstream of the turbidity causing activity. However, limited duration activities necessary to address an emergency or to accommodate essential dredging, construction, or other legitimate activities and which cause the standard to be exceeded may occur provided all practicable turbidity control techniques have been applied. See Oregon Administrative Rules (OAR) 340-041-0036. For jetty work activities, turbidity levels will be monitored via visual observations to identify any adverse detectable change in water quality. A hand-held turbidity meter will be deployed and used during MOF dredging and fill activities.

2.0 LOCATION, DATES, AND DURATION OF ACTIVITY

The proposed action is located on the Bayocean Spit, Tillamook County, Oregon (Figure 1-5).

Tillamook Bay, River Mile 1

Section(s) 18 of Township 1N, Range 10W

Latitude: 45.565500 Longitude: -123.948983

Completion of the Proposed Action is anticipated to take multiple construction seasons, once all environmental review and regulatory compliance processes have been completed. The primary in-water sound effects would be associated with construction (Year 1) and deconstruction (Year 2) of an MOF at the Kincheloe Point. Table 2-1 summarizes the full sequencing of work at the South Jetty over the approximate 2 years of active construction. MOF construction and deconstruction would only occur during authorized work windows and when weather conditions

would not restrict watercraft operations or compromise crew safety. The Corps anticipates commencing work in Fall 2022, with pile driving for the MOF starting between November 2022 and February 2023. Pending jetty construction progress, deconstruction of the MOF is anticipated to commence around November 2024.

Construction activities would be limited by the following timing considerations:

- Stone, gravel, and equipment delivery adjacent to WSP habitat will adhere to any terms and conditions included in the final USFWS Biological Opinion (BiOp) to minimize potential take of this species, currently listed as threatened under the Endangered Species Act (ESA).
- Barge delivery of jetty stone and equipment to the MOF would occur year-around, 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 South Jetty could 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, stone placement at the South Jetty would take just under 150 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 USFWS to minimize potential impacts to listed and protected species, while accounting for site conditions that may limit construction during certain timeframes.
- In-water construction would consist of placing stone in the footprint of the originally constructed South Jetty, for which no marine mammal take is requested, and construction of a temporary barge offload facilities as follows:
    - MOF at Kincheloe Point
        - Up to 24, 24-inch steel pipe piles
        - Up to 10 12-inch H-piles
        - Up to 250 24-inch AZ (or comparable) steel sheets
    - Pile installation to construct the MOF would take no longer than 1 month. Deconstruction of the temporary MOF is estimated to take fewer days and again, persist for no longer than a month. Pile removal is assumed to generate comparable levels of noise, but for less time (Tale 2-1).

- The maximum duration of in-water pile-driving work is approximately 2 months total over the life of the project and work would proceed in accord with details outlined in Table 2-2.

Table 2-1. In-water Work, Pile Driving, and Workdays

In-water Work	Total Piles	Min. Days	Contingency	Max. Days
Jetty Stone Placement*	NA	---	---	150
MOF Access Dredging	NA	---	---	5
MOF construction (YR-1):				
Up to 8, 24-inch steel pipe piles would be installed using a vibratory hammer in a 24-h period	24	3	3	6
		OR		
Up to 4, 24-inch steel pipe piles would be installed using an impact hammer in a 24-h period	24	6	3	9
Up to 25, steel sheets would be installed using a vibratory hammer in a 24-h period	250	10	2	12
Up to 10 H-piles would be installed using a vibratory hammer in a 24-h period	10	1	1	2
Total YR-1 Pile Driving Days				**20 - 23**
MOF deconstruction (YR-2):				
Up to 12, 24-inch steel pipe piles would be removed (vibratory only) in a 24-h period	24	2	2	4
Up to 50, steel sheets would be removed in a 24-h period using vibratory methods	250	5	2	7
Up to 10 H-piles would be removed using a vibratory hammer in a 24-h period	10	1	1	2
Total YR-2 Pile Driving Days				**13**

*We assume 150 total working days for stone placement distributed equally over YR-1 and YR-2 (i.e., 75 days of stone placement each year).

Table 2-2. Proposed Action Sequencing and Schedule

Activity	Duration	Year 1	Year 2	Work Windows and Sequencing
Construct up to 3 upland staging areas, including road turnouts	1-4 months	Yes		Anytime, with replanting upon construction completion
Construct MOF (pile installation)	1-4 months	Yes		July 1 – August 31; November 1 – February 15
De-construct MOF (pile removal)	1-4 months		Yes	July 1 – August 31; November 1 – February 15

Dredging MOF	As needed	Yes	Yes	Likely completed in coordination with any scheduled maintenance dredging of the Garibaldi Access Channel (July 15 – March 15)
Jetty stone delivery and placement at South Jetty head	Up to 18 months	Yes	Yes	Anytime
Jetty stone delivery and placement at South Jetty trunk	Up to 18 months	Yes	Yes	Anytime

3.0 SPECIES AND NUMBERS OF MARINE MAMMALS IN THE AREA

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 3-1 and Table 3-2 outline the sound threshold values for disturbance and injury, respectively, corresponding with 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.

We identified approximately 26 marine mammal species, 27 stocks, that have the potential to occur in waters off the Oregon coast during project construction (Table 3-3). The majority of the species listed in Table 3-3 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 Tillamook Bay and be affected by construction noise. Given these considerations, the temporary duration of potential pile driving, and noise isopleths that would not extend beyond the bay entrance, 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 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 3-2. 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

Table adapted from NOAA (2018a)

[1]Cumulative sound exposure level (SEL_{cum}) for weighted permanent threshold shift (PTS) onset with a reference value of 1 $\mu Pa^2 s$

[2]Peak sound pressure level (SPL_{peak}) threshold for impulsive sources with a reference value of 1 µPa

Table 3-3. Marine Mammal Species in the Area

Species and Marine Mammal Group	Estimated Stock Abundance[1]	ESA Status	MMPA Status	Frequency of Occurrence[2]	Distribution
Phocids					
Harbor seal (*Phoca vitulina richardii*) Oregon and Washington Coast Stock	unknown	Not listed	Non-strategic	Likely	Continental shelf (coastal and estuarine)
Northern Elephant Seal (*Mirounga angustirostris*) California Breeding Stock	187,386	Not listed	Not depleted; Non-strategic	Seasonal (spring and fall)	Continental shelf
Otariids					
Steller sea lion (*Eumetopias jubatus*) Eastern U.S. Stock	43,201 (minimum)	Not listed	Not depleted; Non-strategic	Likely	Continental shelf
California sea lion (*Zalophus californianus*) U.S. Stock, Pacific Temperate Population	257,606	Not-listed	Not depleted; Non-strategic	Seasonal (Sept – May)	Continental shelf
Low-frequency cetaceans					
Humpback whale (*Megaptera novaeangliae*) California/Oregon/Washington Stock	4,973 (CV = 0.05)	Endangered	Depleted and Strategic	Likely	Continental shelf and slope
Fin whale (*Balaenoptera physalus physalus*) California/Oregon/Washington Stock	11,065 (CV = 0.41)	Endangered	Depleted and Strategic	Likely	Continental shelf, slope, and offshore
Gray whale (*Eschrichtius robustus*) Eastern North Pacific Stock	26,960 (CV = 0.05)	Not listed	Non-strategic	Seasonal (Dec – Feb)	Continental shelf, slope, and offshore
Minke whale (*Balaenoptera acutorostrata scammoni*) California/Oregon/Washington Stock	915 (CV = 0.79)	Not listed	Non-strategic	Rare	Continental shelf
Blue whale (*Balaenoptera musculus musculus*) Eastern North Pacific Stock	1,363 (CV = 0.53)	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 Stock	34,998 (CV = 0.22)	Not listed	Non-depleted; Non-strategic	Infrequent (late spring and summer)	Continental shelf and slope

Species and Marine Mammal Group	Estimated Stock Abundance[1]	ESA Status	MMPA Status	Frequency of Occurrence[2]	Distribution
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	3,477 (CV = 0.70)	Not listed	Non-strategic	Infrequent	Offshore
Striped dolphin (*Stenella coeruleoalba*) California/Oregon/Washington Stock	29,988 (CV = 0.30)	Not listed	Non-strategic	Infrequent	Generally offshore
Short-beaked Common dolphin, (*Delphinus delphis delphis*) California/Oregon/Washington Stock	1,056,308 (CV = 0.21)	Not listed	Non-strategic	Infrequent	Continental slope and offshore
Northern right-whale dolphin (*Lissodelphis borealis*) California/Oregon/Washington Stock	29,285 (CV = 0.72)	Not listed	Non-strategic	Infrequent (late spring and summer)	Continental shelf and slope
Killer whale (*Orcinus orca*), West Coast Transient Stock	349 (CV = N/A)	Not listed	Not depleted; Non-strategic	Infrequent	Continental shelf, slope, and offshore
Killer whale (*Orcinus orca*), Eastern North Pacific Southern Resident Stock	72 (CV = N/A)	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	1,363 (CV = 0.53)	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

Species and Marine Mammal Group	Estimated Stock Abundance[1]	ESA Status	MMPA Status	Frequency of Occurrence[2]	Distribution
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	16,498 (CV = 0.61)	Not listed	Non-strategic	Infrequent	Continental shelf, slope, and offshore

[1]U.S. Pacific Marine Stock Assessments (Carretta et al. 2021a, 2021b)

[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 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

4.0 STATUS AND DISTRIBUTION OF AFFECTED SPECIES AND STOCKS

Proposed pile driving associated with the construction and deconstruction of the MOF would occur over a relatively short period during winter or summer (see Table 2-1), minimizing potential impacts to marine mammals that occur in the area in other seasons. While ten marine mammal species could occur in the vicinity of the proposed project activities (i.e., harbor seals, *Phoca vitulina richardii;* Northern elephant seal, *Mirounga angustirostris;* Steller sea lion, *Eumetopias jubatus;* California sea lion, *Zalophus californianus;* humpback whales, *Megaptera novaeangliae;* fin whales, *Balaenoptera physalus physalus;* gray whales, *Eschrichtius robustus;* blue whales, *Balaenoptera musculus musculus;* killer whales, *Orcinus orca;* and harbor porpoises, *Phocoena phocoena*), Tillamook Bay is relatively shallow and the MOF at the South Jetty would limit likely noise impacts to the interior waters of the bay. Larger whales may transit the waters near the coastline but are unlikely inhabitants of Tillamook Bay itself. In reviewing OBIS-SEAMAP (2022) and records for all marine mammals recorded within a 10-mile radius of Tillamook Bay, only humpbacks, gray whales, harbor porpoises, California sea lions, Steller sea lions, and harbor seals are commonly reported. Dall's porpoise (*Phocoenoides dalli*), and northern right whales (*Lissodelphis borealis*) have been detected a bit further offshore (Halpin et al. 2009; OBIS-SEAMAP 2022) and orcas are only seen on rare occasions ([TinyFishTV] 2014, [rempeetube] 2016, [Core.c] 2017). Given these considerations, the following paragraphs will only address the status and distribution of the five marine mammals that could be affected by pile driving associated with constructing (and deconstructing) the MOF: harbor seals, Northern elephant seals, Steller sea lions, California sea lions, and harbor porpoises. Killer, gray, and humpback whales, while observed in the vicinity of Tillamook Bay, are excluded from take considerations because they are highly unlikely to enter the relatively shallow waters of Tillamook Bay and be subject to pile driving noise disturbance. Should any of these larger species be observed entering Tillamook Bay during pile driving activities, pile driving would cease until they voluntarily leave and have been visually confirmed beyond the disturbance zone; or animals have not been re-detected in 15 minutes.

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). There is one haul-out site roughly 1.5 km east of the proposed MOF that has been historically noted in Tillamook Bay that is located on an intertidal sand flat in the middle of the bay (Figure 4-1) and highest utilization has been observed during the May/June reproductive season (B.E. Wright, personal communication, February 12, 2021; ODFW 2022). This is consistent with other findings noting harbor seals more abundant in Tillamook Bay during the summer pupping season (Brown and Mate 1983). There is also evidence that animals may move between Netarts Bay, a prominent feeding site, and Tillamook Bay in the non-pupping season (Brown and Mate 1983). 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). Their current abundance is unknown (Carretta et al. 2021a, 2021b).

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, overall mortality is relatively low and the Oregon/Washington Coast stock of harbor seals is not depleted under MMPA or listed under ESA (NOAA 2013b).

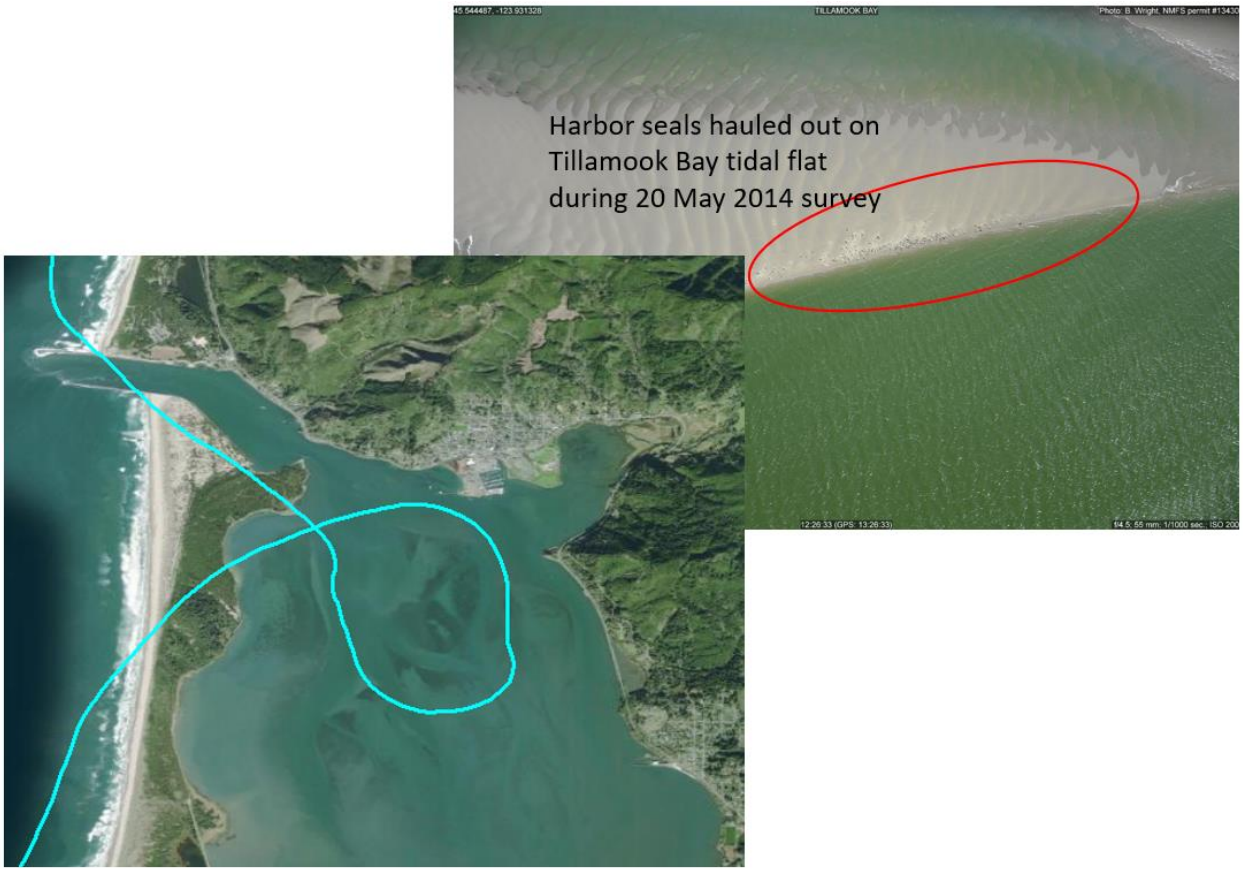

Figure 4-1. Tillamook Bay ODFW aerial flight plan and photo taken during 2014 surveys (B.E. Wright, personal communication, February 12, 2021)

Northern elephant seals

The California Breeding Stock of Northern elephant seals (*Mirounga angustirostris*) breeds and gives birth in California and 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). Although there have been no recorded sightings in

the immediate vicinity of Tillamook Bay, there were sightings toward Netarts Bay and further offshore (Halpin et al. 2009; OBIS-SEAMAP 2022) and animals could transit the area.

There are approximately 187,386 Northern elephant seals in the United States, with an estimated annual growth rate of 3.1% since 1988 (Carretta et al. 2021b). 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 (Carretta et al. 2021b).

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 2019). 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. There are seven major hall-out sites noted in Oregon during the breeding season, however, there are no known rookery sites near Tillamook Bay (Pitcher et al. 2007). Steller sea lions have been detected in Tillamook Bay during marine mammal surveys (Pearson and Verts 1970; Halpin et al. 2009; Ford et al. 2013) and may 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 2019).

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 may occur in the project vicinity, but there have been no confirmed sightings in Tillamook Bay (Halpin et al. 2009; OBIS-SEAMAP 2022).

There are nearly 300,000 California sea lions in U.S. waters (NOAA 2018b), 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 commercial fisheries incidental take, shootings, collisions, entrainment, etc.). However, the combined annual take from these sources (≥321 animals) is well below the PBR (14,011 animals). California sea lions are not “depleted” or “strategic” under the MMPA and have no status under ESA (NOAA 2018b, Carretta et al. 2021a).

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 Oregon/Washington Coast Stock has an approximate range from Cape Flattery, Washington 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). Harbor porpoises have been detected in the coastal waters just north of the Tillamook Bay entrance during summer (Halpin et al. 2009; Ford et al. 2013) and they could potentially occur in the project vicinity.

The population estimate for harbor porpoises in the Northern Oregon/Washington Coast Stock is 21,487. Entanglement is the primary cause of human-related injury and death, however, estimated fishery mortality and serious injury 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/Coastal Washington Stock is not currently listed under ESA nor considered a “strategic” stock under the MMPA (NOAA 2013a). There have been numerous sightings of harbor porpoises within a 10-mile radius of the Tillamook Bay entrance channel (Halpin et al. 2009; OBIS-SEAMAP 2022) and animals may transit the area during construction.

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 subject to Level A and Level B harassment during the installation of up to 24 24-inch steel pipe piles, up to 10 12-inch H-piles, and up to 250 24-inch AZ steel sheets for a temporary MOF at the Tillamook Bay South Jetty.

5.1 Methods of Incidental Taking

In-Air

We assume that the majority of marine mammals that would be present in the in-air disturbance zones would have already entered the respective in-water disturbance isopleth during pile driving. For example, an animal hauled out or resting near construction activities will likely enter the water at some time during the day and will thereby experience Level B harassment from underwater sound. Thus, we assume all animals hauled out are accounted for in the Level B take estimates.

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.

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

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 α = 15. Estimated sound pressure levels in water were referenced from Table 1-2, using the dB_{RMS} values for installing 24-inch steel pipe piles (impact and vibratory), 12-inch H-piles (vibratory only) and 24-inch AZ steel sheets (vibratory only). While a contractor could elect to use 24-inch diameter timber piles in lieu of pole piles

Table 5-1. In-water Monitoring (Level B) and Stop-Work Zone (Level A) Distances to Minimize Noise Effects on Marine Mammals

Noise Generation Type	**Level A PTS Distance*** (meters)	**Level A PTS Distance** (meters)	**Level A PTS Distance** (meters) [km²]	**Level A PTS Distance** (meters) [km²]	**Level A PTS Distance** (meters)	**Level B Disturbance#** (meters) [km²]
	LF Cetacean	MF Cetacean	HF Cetacean	Phocid Pinniped	Otariid Pinniped	All Groups
MOF Construction (YR 1)						
24-inch steel pipe pile (impact attenuated)	356.4	12.7	424.5 [*0.44 km²*]	190.7 [*0.11 km²*]	13.9	398 [*0.39 km²*]
24-inch steel pipe pile (vibratory install)	10.8	1.0	16.0	6.6	0.5	5,412 [*20.14 km²*]
12-inch H-piles (vibratory install)	1.8	0.2	2.6	1.1	0.1	1,000 [*1.84 km²*]
24-inch AZ steel sheets (vibratory install)	24.0	2.1	35.5	14.6	1.0	7,356 [*27.01 km²*]
MOF Deconstruction (YR 2)						
24-inch steel pipe pile (vibratory removal)	6.8	0.6	10.1	4.2	0.3	5,412 [*20.14 km²*]
12-inch H-piles (vibratory removal)	0.8	0.1	1.2	0.5	0	1,000 [*1.84 km²*]
24-inch AZ steel sheets (vibratory removal)	17.1	1.5	25.3	10.4	0.7	7,356 [*27.01 km²*]

*Level A permanent threshold shift (PTS) distances (meters) were calculated using NMFS technical tool and spreadsheet for estimating PTS levels associated with pile driving (NMFS 2018, Figures 6-1 and 6-2). See assumptions regarding the number of piles to be driven per day, duration of driving (vibratory), and number of strikes per pile (impact) in Section 5.2. No take is being requested for LF or MF cetaceans, although distances were calculated and isopleths are shown in subsequent maps. **The area (km²) is shown in square brackets, only when those estimates were needed for take calculations**.
#Level B disturbance distances (meters) were estimated using Equation 3 and dB_{RMS} values in Table 1-2

5.2 PTS and Disturbance 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 1-2, with the assumptions listed below. Unless otherwise noted, durations required for vibratory installation and removal of piles were estimated based on average measurements recorded at various Naval Installations for pile driving using comparable means and methods (Illingsworth and Rodkin 2017, Table 3).

MOF pile driving constraints:

- Up to 8, 24-inch steel pipe piles could be installed using a vibratory hammer in a 24-hour period
- Up to 4, 24-inch steel pipe piles could be installed using an impact hammer in a 24-hour period, assuming vibratory methods were unsuccessful
- Up to 25, 24-inch AZ steel sheets could be installed in a 24-hour period using vibratory methods
- Up to 10, 12-inch steel H-piles could be installed in a 24-hour period using vibratory methods
- The average duration to install a single 24-inch steel pipe pile with a vibratory hammer is 15 minutes (Caltrans 2015)
- The maximum duration to install a single steel sheet with a vibratory hammer is approximately 10 minutes (Illingworth & Rodkin 2017, Table 3)
- The maximum duration to install a single H-pile with a vibratory hammer is approximately 10 minutes (Illingworth & Rodkin 2017, Table 3)
- The average number of strikes per 24-inch diameter pipe pile (impact hammer) is 533 (Laughlin 2005)
- The estimated average sound attenuation (dB per Log [distance]) is 15 for all piles (WSDOT 2018)

MOF deconstruction:

- Up to 12, 24-inch steel pipe piles could be removed (vibratory only) in a 24-hour period
- Up to 50, steel sheets could be removed in a 24-hour period using vibratory methods
- Up to 10, steel H-piles could be removed in a 24-hour period using vibratory methods
- The maximum duration to remove a single 24-inch pipe pile is 5 minutes (Illingworth & Rodkin 2017, JEB Little Creek Naval Station)
- The maximum duration to remove a single steel sheet is 3 minutes, assuming durations would be comparable to H-pile removal

- The maximum duration to remove a single H-pile with a vibratory hammer is approximately 3 minutes (Illingworth & Rodkin 2017, Table 3)
- Vibratory removal of a pile of a certain type and size (e.g., 24-inch pipe pile) will generate the same noise levels as the installation of that same pile type
- The estimated average sound attenuation (dB per Log [distance]) is 15 for all piles

These assumptions were based on measurements and calculated values reported in similar pile driving projects (Caltrans 2015; Illingworth & Rodkin 2017; WDOT 2018a, 2018b). The time estimates for pile driving and removal are likely conservative. We used the maximum time recorded for installing or removing 24-inch steel pipe piles, H-piles, and steel sheets. We calculate maximum take based on driving up to 24, 24-inch steel pipe piles, 10 H-piles, and up to 250 steel sheets for the proposed MOF at the South Jetty. Spreadsheet calculations underlying PTS values in Table 5-1 are provided in Figures 5-1 through 5-6.

24-inch Steel Pipe Pile (impact install)

E.1-2: ALTERNATIVE METHOD TO CALCULATE PK AND SEL_{cum} (SINGLE STRIKE EQUIVALENT)

Unweighted $SEL_{cum\ (at\ measured\ distance)}$ = SEL_{ss} + 10 Log (# strikes)	**206.3**

SEL_{cum}

Source Level (Single Strike SEL)	173
Number of strikes per pile	533
Number of piles per day	4
Propagation (xLogR)	15
Distance of single strike SEL measurement (meters)⁺	10

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

PK

Source Level (PK SPL)	198
Distance of source level measurement (meters)⁺	10
Source level at 1 meter	213.0

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

RESULTANT ISOPLETHS*

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

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	183	185	155	185	203
PTS Isopleth to threshold (meters)	**356.4**	**12.7**	**424.5**	**190.7**	**13.9**
PK Threshold	219	230	202	218	232
PTS PK Isopleth to threshold (meters)	**NA**	**NA**	**5.4**	**NA**	**NA**

Figure 5-1. PTS Isopleth Data for Impact Driving 24-inch Steel Pipe Piles

24-inch Steel Pipe Pile (vibratory install)

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz)¥	2.5	Default

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (RMS SPL)	161
Number of piles within 24-h period	8
Duration to drive a single pile (minutes)	15
Duration of Sound Production within 24-h period (seconds)	7200
10 Log (duration of sound production)	38.57
Propagation (xLogR)	15
Distance from source level measurement (meters)+	10

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

RESULTANT ISOPLETHS

Hearing Group	**Low-Frequency Cetaceans**	**Mid-Frequency Cetaceans**	**High-Frequency Cetaceans**	**Phocid Pinnipeds**	**Otariid Pinnipeds**
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	**10.8**	**1.0**	**16.0**	**6.6**	**0.5**

Figure 5-2. PTS Isopleth Data for Vibratory Driving 24-inch Steel Pipe Piles

24-inch Steel Pipe Pile (vibratory removal)

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz)¥	2.5	Default

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (RMS SPL)	161
Number of piles within 24-h period	12
Duration to drive a single pile (minutes)	5
Duration of Sound Production within 24-h period (seconds)	3600
10 Log (duration of sound production)	35.56
Propagation (xLogR)	15
Distance from source level measurement (meters)+	10

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

RESULTANT ISOPLETHS

Hearing Group	**Low-Frequency Cetaceans**	**Mid-Frequency Cetaceans**	**High-Frequency Cetaceans**	**Phocid Pinnipeds**	**Otariid Pinnipeds**
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	**6.8**	**0.6**	**10.1**	**4.2**	**0.3**

Figure 5-3. PTS Isopleth Data for Vibratory Removal 24-inch Steel Pipe Piles

AZ steel sheets (vibratory install)

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz)¥	2.5	Default

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (RMS SPL)	163
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

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)	**24.0**	**2.1**	**35.5**	**14.6**	**1.0**

Figure 5-4. PTS Isopleth Data for Vibratory Driving Steel Sheets

AZ steel sheets (vibratory removal)

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz)¥	2.5	Default

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (RMS SPL)	163
Number of piles within 24-h period	50
Duration to drive a single pile (minutes)	3
Duration of Sound Production within 24-h period (seconds)	9000
10 Log (duration of sound production)	39.54
Propagation (xLogR)	15
Distance from source level measurement (meters)+	10

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

RESULTANT ISOPLETHS

Hearing Group	**Low-Frequency Cetaceans**	**Mid-Frequency Cetaceans**	**High-Frequency Cetaceans**	**Phocid Pinnipeds**	**Otariid Pinnipeds**
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	**17.1**	**1.5**	**25.3**	**10.4**	**0.7**

Figure 5-5. PTS Isopleth Data for Vibratory Removal Steel Sheets

H-pile (vibratory install)

WEIGHTING FACTOR ADJUSTMENT

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	10
Duration to drive a single pile (minutes)	10
Duration of Sound Production within 24-h period (seconds)	6000
10 Log (duration of sound production)	37.78
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)	**1.8**	**0.2**	**2.6**	**1.1**	**0.1**

Figure 5-6. PTS Isopleth Data for Vibratory Install H-piles

H-pile (vibratory removal)

WEIGHTING FACTOR ADJUSTMENT

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	10
Duration to drive a single pile (minutes)	3
Duration of Sound Production within 24-h period (seconds)	1800
10 Log (duration of sound production)	32.55
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)	**0.8**	**0.1**	**1.2**	**0.5**	**0.0**

Figure 5-7. PTS Isopleth Data for Vibratory Removal H-piles

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

6.1 Shutdown Zones

There will be a minimum 15-meter Exclusion/Shutdown Zone for all marine mammals during all pile driving activities. The Shutdown Zone for high-frequency cetaceans (e.g., harbor porpoises) only will increase to 50-meters (~0.02 km^2) during vibratory driving of steel pipe piles and steel sheets. During impact pile driving, the Shutdown Zone will increase to 100-meters (~0.04 km^2) for HF cetaceans (e.g., harbor porpoises) and phocid pinnipeds (e.g., harbor and elephant seals) only. Measures to stop work would be implemented should either porpoises or seals be detected approaching these Exclusion Zones.

6.2 Level A Take

Level A injury is not anticipated during proposed project activities. Figures 5-1 through 5-6 show the calculations underlying PTS isopleth distances for each marine mammal group, by the type of pile driving activity. Take would be recorded for any HF cetaceans or phocids broaching their respective Level A isopleths (see Table 5-1), but beyond the explicit Shutdown Zone. These Shutdown Zones would prevent any Level A take during vibratory pile driving and reduce the amount of potential Level A and Level B take for phocids and harbor porpoises during impact pile driving. No take is requested for low (e.g., baleen whales) or mid-frequency (e.g., killer whales) cetaceans due to their low likelihood of entering the relatively shallow waters of Tillamook Bay. Should any of these species be observed entering Tillamook Bay during pile driving, all work will cease until either the animal(s) has/have voluntarily left and been visually confirmed beyond the disturbance zone; or the animal(s) has/have not been re-detected in 15 minutes.

6.3 Level B Take

This authorization is requesting Level B harassment that may occur due to proposed project activities. We are requesting Level B harassment authorization for harbor seals, Northern elephant seals, Steller sea lions, California sea lions and harbor porpoises.

After accounting for the configuration of the channel and the proposed location of barge offloading facilities (i.e., MOF) where pile driving could occur, propagated sound waves would hit shorelines prior to reaching the full extent of larger isopleths listed in Table 5-1. After accounting for the land configuration, the realized geodesic isopleth areas of Level B disturbance during vibratory pile installation at the MOF are approximately 1.84 km^2 for 24-inch steel pipe piles; 20.14 km^2 for 12-inch H-piles, and 27.01 km^2 for 24-inch AZ steel sheets (Figure 6-1). We assume Level B disturbance areas for pile removal are the same as installation. Should impact driving be required to install 24-inch steel pipe piles, the realized Level B isopleth area would be 0.39 km^2 at the MOF (Figure 6-2). Estimates for the maximum Level B take for each species includes the take associated with vibratory driving 24-inch steel pipe piles, 12-inch H-piles, and 24-inch AZ steel sheets. We assume that vibratory driving of sheets and piles would occur on different workdays. These same assumptions hold true for vibratory removal of piles and sheets during MOF deconstruction. Level B monitoring protocols

outlined in Section 13 would be implemented according to these stated distances for potential disturbance.

Figure 6-1. Shutdown Zone and Level B Isopleths for Vibratory Driving at the Material Offload Facility (MOF)

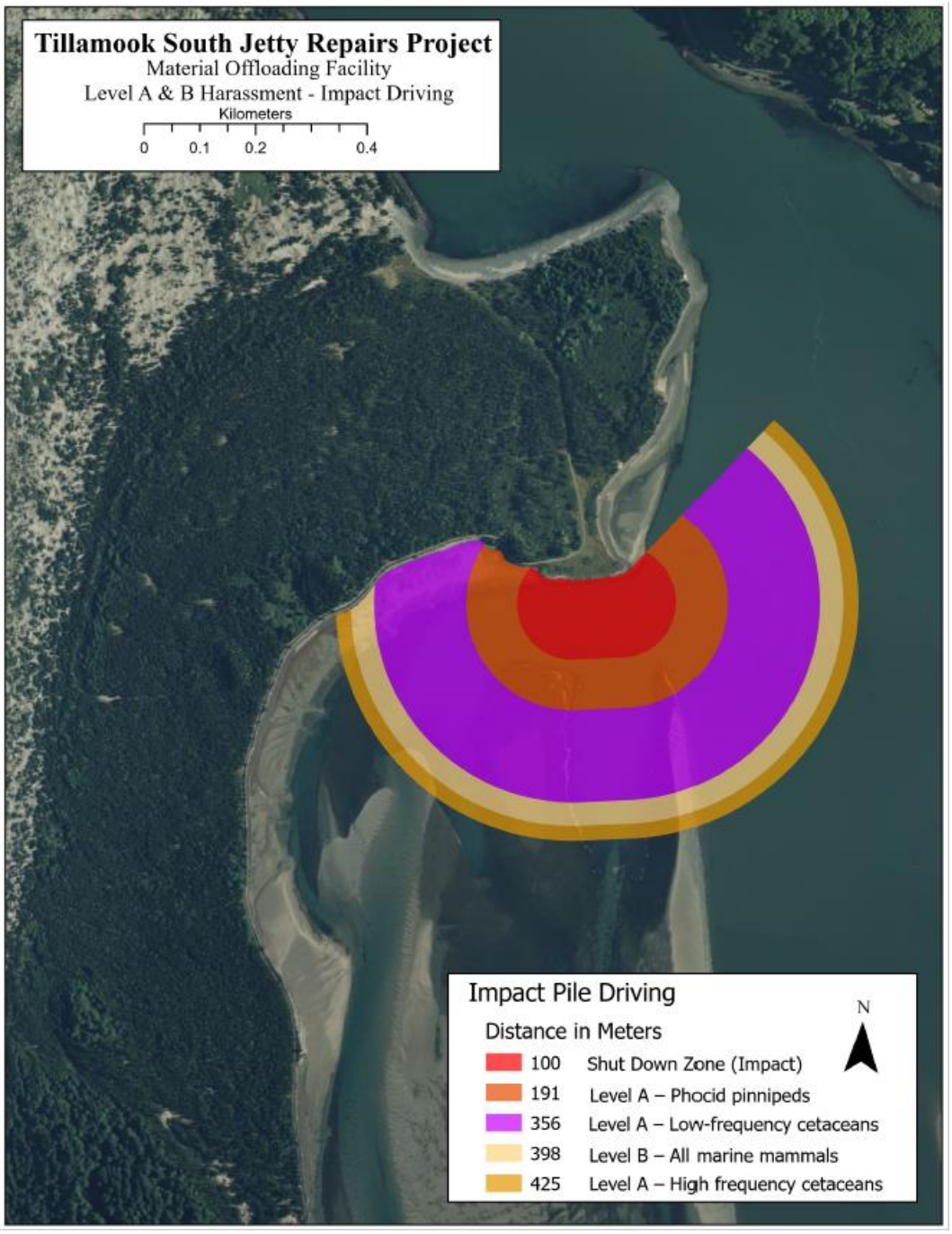

Figure 6-2. Shutdown Zone, Level A, and Level B Isopleths for Potential Impact Driving 24-inch Pipe Piles

6.4 Reference Marine Mammal Abundances

In most cases, we were unable to find recent marine mammal counts, density estimates, or abundance estimates conducted in Tillamook Bay. Thus, we used proximal data from nearshore sightings and haul-out sites (e.g., Three Arch Rock) to approximate local abundance relative to the estimated stock abundance at the time of the most recent assessment. When proximal count estimates were available (i.e., for harbor seals, Steller sea lions, and California sea lions), density estimates were derived with an assumption that surveys accounted for animals present in the entirety of Tillamook Bay, an area roughly 37 km^2 (Oregon Coastal Atlas 2022). Thus, we could approximate a density per square kilometer and multiply by isopleth areas to estimate potential take associated with pile driving. For harbor porpoises that area more difficult to detect and elephant seals, which are simply less common in the area, we used an estimate for the maximum number of animals likely to be encountered in a single day as the basis for potential take. All estimates are conservative and likely over-estimate the density or number of animals likely to be in the direct project vicinity (Table 6-1). Therefore, the Level A and Level B harassment estimates are likely much higher than the actual take that may be attributed to proposed project activities.

Harbor seals

The latest (May 2014) pinniped aerial surveys conducted by the Oregon Department of Fish and Wildlife (ODFW) estimated 220 harbor seals (pups and non-pups combined) within Tillamook Bay (B.E. Wright, personal communication, February 12, 2021). After applying the Huber et al. (2001) correction factor of 1.53, used to account for likely imperfect detection during surveys, the adjusted number of harbor seals that may have been present in 2014 surveys is approximately 337 individuals. However, that estimate likely overestimates the number of harbor seals present in the non-pupping season. Brown and Mate (1983) conducted monthly surveys of Tillamook Bay haul outs sites between 1978 and 1981. We used their calculations to estimate the proportion of animals present Nov – Feb and Jul – Aug (relative to counts observed in May) at 0.67 and 1.2, respectively. Thus, accounting for this seasonality, the 337 harbor seals likely present in May 2014 would have equated to an average abundance of 404 harbor seals between July and August or 226 harbor seals between November and February. Thus, we estimated the harbor seal density dispersed throughout Tillamook Bay during proposed pile driving at 6.11 (Nov-Feb) or 10.92 (Jul-Aug) animals per square kilometer per day. For harbor porpoises only, we subtracted the area of the vibratory (0.02 km^2) and impact (0.04 km^2) driving Shutdown Zones from the isopleth areas prior to multiplying by the assumed daily density since implementing Shutdown Zones would reduce the level of take.

Northern elephant seals

There were no recorded sightings of elephant seals within 10 miles of Tillamook Bay within the OBIS-SEAMAP database (Halpin et al. 2009; OBIS-SEAMAP 2022) nor were any animals detected at the closest haul out site (i.e., Three Arch Rock) during pinniped surveys between 2002 and 2005 (Scordino 2006). In fact, the closest haul out site with Northern elephant seal observations during surveys was Cape Arago (Scordino 2006), roughly 6 km south of Coos Bay

and 256 kilometers south of Tillamook Bay. Given the low likelihood of occurrence within the project vicinity and the lack of reported sightings within the bay (Halpin et al. 2009; OBIS-SEAMAP 2022), we estimated elephant seal abundance within Tillamook Bay at 1 individual every other day. This is likely an overestimate, but was our best, conservative approximation given the lack of data.

Steller sea lions

Estimates for Steller sea lion abundance were based on the maximum number of animals detected (n = 38 for between November and February; n=58 between July and August) at the Three Arch Rock haul out site during coastal surveys between 2002 and 2005 (Scordino 2006). Given that this haul out site is roughly 14 miles away from the proposed MOF, we conservatively estimate approximately half of the individuals present at Three Arch Rock (19 Steller sea lions November-February; 29 Steller sea lions July-August) could potentially disperse throughout Tillamook Bay during pile driving and be subject to daily take. This equates to an approximate daily density of 0.51 (Nov-Feb) or 0.78 (Jul-Aug) Steller sea lions per square kilometer.

California sea lions

The estimate for daily California sea lion abundance (*n* = 11) was based on coastal surveys conducted between 2002 and 2005 (Scordino 2006). While pile driving will occur in winter or summer, we used the maximum number of animals detected during any month (i.e., 11 sea lions in April) at the Three Arch Rock haul out site. Given the distance of this haul out site from the project, the fact that we are not proposing any pile driving in April, and the low likelihood that all animals present at the Three Arch Rock would leave and enter Tillamook Bay on a single day; we estimate a daily density based on approximately half of the individuals present at Three Arch Rock (6 California sea lions) potentially entering Tillamook Bay during pile driving and subject to daily take. This equates to an approximate daily density of 0.16 California sea lions per square kilometer.

Harbor porpoises

There were multiple occurrences of 1-2 harbor porpoises detected in the coastal waters just north of the Tillamook Bay entrance during June and July of 1990 (Halpin et al. 2009; Ford et al. 2013). More recently, aerial surveys have detected single animals near the Tillamook Bay entrance in October 2011 and September 2012 (Adams et al. 2014). Although there were no recorded harbor porpoise observations within Tillamook Bay itself, the species is somewhat cryptic and there is potentially low detection during aerial surveys. Thus, we estimate the daily harbor porpoise abundance within Tillamook Bay at 1 individual.

6.5 Take Calculations

Take estimates for each species were calculated based on Equations 4a (*i.e.*, Northern elephant seals and harbor porpoises) or 4b (*i.e.*, harbor seals, Steller sea lions, and California sea lions):

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

OR

$$Level\ B\ Exposure = density\ animals\ per\ day * isopleth\ area * days\ of\ noise\ exposure \quad (4b)$$

There could be 20-23 total days of noise exposure from pile driving during MOF construction during year 1 (YR-1) and up to 13 days of pile driving at the MOF to deconstruct the MOF in YR-2 (see Table 2-1). Noise exposure from pile driving would be discontinuous over the in-water work windows. Vibratory removal of piles produces comparable sound levels but takes less time, thus fewer days will be needed in YR-2 (Table 2-1)

The number of animals, *N*, in the monitoring zone (or project area) can be based on general assumptions about their likely daily abundance in the vicinity (i.e., Equation 4a) or estimated from the approximate species density (i.e., animals per unit area) relative to the size of the project area (i.e., Equation 4b). 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:

- Tillamook Bay estuary area: ~37 km^2

The approximate extent of each disturbance zone was used to estimate the marine mammal take associated with each type of pile driving (Tables 6-1 and 6-2), then subtracting the area of the 50- and 100-meter Shutdown Zones for phocids and harbor porpoises:

- Level B disturbance area for vibratory installation or removal of steel sheets: 27.01 km^2
- Level B disturbance area for vibratory installation or removal of 24-inch steel pipe piles: 20.14 km^2
- Level B disturbance area for vibratory installation or removal of 12-inch H-piles: 1.84 km^2
- 50-meter Shutdown Zone for harbor porpoises during vibratory driving steel sheets: 0.0158 km^2
- 100-meter Shutdown Zone for harbor porpoises and harbor seals during impact driving: 0.0392 km^2

Table 6-3 summarizes the request for incidental take for all species and the percentage of each stock that could be affected by pile driving noise. Because we do not know how long it may take a contractor to procure piles or mobilize equipment, it is uncertain whether pile driving would commence in late Fall 2022, or be delayed until July or August 2023. If the latter, estimated take numbers for harbor seals and Steller sea lions would be higher, as indicated in Tables 6-1 and 6-2.

Table 6-1. Marine Mammal Level A and Level B Take Estimates – Year 1*

Species	**Species Density**[1]	MOF[2] installation	MOF installation	MOF installation	MOF installation
		Pipe Piles impact Level B & [Level A][2]	Pipe Piles vibratory Level B	Steel Sheets vibratory Level B	H-piles vibratory Level B
Harbor seals (Nov-Feb)	6.1	16 [4]	737	1978	23
Harbor seals (Jul-Aug)	10.9	28 [7]	1320	3540	41
Northern elephant seals	NA	2 [3]	3	6	1
Steller sea lions (Nov-Feb)	0.51	2	62	166	2
Steller sea lions (Jul-Aug)	0.78	3	95	253	3
California sea lions	0.16	1	20	52	1
Harbor porpoises	NA	0 [9]	6	12	2

MOF = material offload facility

[1]Based on available data and assumptions outlined in Table 2-1, Table 5-1, Sections 6.3, and Section 6.4. Estimated take for each species assumes up to 12 days vibratory driving steel sheets at the MOF; up to 6 days vibratory driving pipe piles OR up to 9 days impact driving pipe piles; and up to 2 days for vibratory installation of H-piles.

[2]Requested Level B take during impact pile driving excludes animals that could also be subject to Level A take (e.g., for harbor seals in Fall/Winter, if 20 animals pass the Level B disturbance threshold area, 4 could also enter the Level A zone and be subject to Level A take prior to hitting the Shutdown Zone – the remaining 16 individuals would only experience Level B disturbance). For harbor porpoises, the Level A isopleth area is larger than the Level B isopleth during impact driving so all takes are attributed to Level A harassment during impact driving.

Table 6-2. Marine Mammal Level B Take Estimates – Year 2*

Species	**Species Density**[1]	MOF removal	MOF removal	MOF removal
		Pipe Piles (vibratory)	Steel Sheets (vibratory)	H-piles (vibratory)
Harbor seals (Nov-Feb)	6.1	492	1154	23
Harbor seals (Jul-Aug)	10.9	880	2065	41
Northern elephant seals	NA	2	4	1
Steller sea lions (Nov-Feb)	0.51	42	97	2
Steller sea lions (Jul-Aug)	0.78	63	148	3
California sea lions	0.16	13	31	1
Harbor porpoises	NA	4	7	2

MOF = material offload facility
[1]Based on available data and assumptions outlined in Table 2-1, Table 5-1, Sections 6.3, and Section 6.4. Estimated take for each species assumes up to 7 days for vibratory removal of steel sheets; up to 4 days for vibratory removal of steel pipe; and up to 2 days for vibratory removal of H-piles.

Table 6-3. Summary of Level A and Level B Take Requested for Marine Mammals

Marine Mammal Stock Effects	**Stock Abundance**[1]	Year 1 **Level B**[2] MOF installation	Year 1 **Level B** MOF installation	Year 2 **Level B** Take MOF removal
		if Impact	***if*** Vibratory only	Vibratory *Only*
		YR-1 (%)	**YR-1 (%)**	**YR-2 (%)**
Harbor seal (*Phoca vitulina richardii*) Oregon and Washington Coast Stock	unknown	Nov-Feb: 2017 or Jul-Aug: 3609 Level A: 4	Nov-Feb: 2738 or Jul-Aug: 4901	Nov-Feb: 1669 or Jul-Aug: 2986
Northern elephant seal (*Mirounga angustirostris*) California Breeding Stock	187,386	9 (0.0048%) Level A: 3 (0.0016%)	10 (0.0046%)	7 (0.0033%)
Steller sea lion (*Eumetopias jubatus*) Eastern U.S. Stock	43,201	Nov-Feb: 170 (0.39%) or Jul-Aug: 259 (0.60%)	Nov-Feb: 230 (0.53%) or Jul-Aug: 351 (0.81%)	Nov-Feb: 141 (0.33%) or Jul-Aug: 214 (0.50%)
California sea lion (*Zalophus californianus*) U.S. Stock, Pacific Temperate Population	257,606	54 (0.020%)	73 (0.028%)	45 (0.017%)
Harbor porpoise (*Phocoena phocoena*) Northern Oregon/Washington Coast Stock	21,487	14 (0.065%) Level A: 9 (0.042%)	20 (0.093%)	13 (0.061%)

[1]Stock abundance was estimated using latest population estimate from most recent NOAA stock assessments (see Table 3-3).
[2]Estimates combine take for installing/removing 24-inch steel pipe piles, 24-inch AZ sheet piles, and 12-inch H-piles to capture the total potential noise disturbance during MOF construction. For harbor seals only, Level B take for visual disturbance to animals that may be hauled out on or near the jetty during stone placement is also included. Estimated take likely represents repeated take of the same individual(s) and the actual percentage of the stock taken is probably much lower than the values in parentheses. Also, the upper estimates for harbor seals and Steller sea lions were based on available summer abundance estimates and assume all work occurs in July and August. No such data were available for the remaining species and take was based on abundance estimates as described in Section 6.3.

7.0 ANTICIPATED IMPACT ON SPECIES OR STOCKS

Proposed work could cause incidental Level A harassment to harbor seals, Northern elephant seals, and harbor porpoises, but potential adverse effects over the duration of construction would be limited to less than 0.1% of the stocks most likely to enter the project vicinity. Effects to harbor seals and harbor porpoises during any impact pile driving could include a temporary threshold shift (TTS, i.e., a temporary reduction in hearing sensitivity), PTS, or other non-serious injury. Given that the size of the Level A noise isopleth for phocids is roughly 200 meters smaller than the Level B harassment isopleth, seals in the vicinity are unlikely to continue traveling toward the source of sound and be subject to PTS or injury. For harbor porpoises, the Level A isopleth is larger than the Level B isopleth so potential auditory injury is more likely for individuals that enter the project vicinity during any impact pile driving. That said, none of the Level A harassment isopleths block the entrance into Tillamook Bay (Figure 6-2), thus marine mammals could enter the bay and engage in foraging, social behavior, or other activities without being subject to Level A harassment. Elephant seals appear to be rare in the vicinity of Tillamook Bay and are unlikely to be affected by projected work. No Level A take is requested for California or Steller sea lions because the minimum Shutdown Zone of 15-meters is larger than the largest isopleth (~13.9 meters) whereby a Level A PTS could occur to otariid species present. No Level A or B take is requested for killer whales or any other large cetaceans due to the low likelihood that they would enter Tillamook Bay. Should any larger cetaceans enter the bay during pile driving, shutdown procedures would be implemented to avoid any take.

There may be incidental Level B disturbance to 5 marine mammal stocks (Table 6-3). These effects should not exceed a cumulative 2 months of in-water pile driving 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 Level B harassment would be associated with vibratory driving steel sheet piles during construction and deconstruction of the MOF. Level B harassment take would be greatest for pinniped populations, namely due to their greater abundance in the area. Harbor seals could be most affected by proposed actions, with up to 2% of their stock subject to Level B harassment should pile driving occur in summer (Table 6-3). However, it should be noted that these estimates are conservative and likely overestimate the percentage of the stock that would actually be affected, since the same individuals would likely be taken over the course of work. Proposed work would have negligible, temporary effects on the majority of marine mammal species considered, as estimated take would affect 1% or less of the stocks for all remaining species (Table 6-3).

8.0 ANTICIPATED IMPACT ON SUBSISTENCE USE

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

9.0 ANTICIPATED IMPACTS ON HABITAT

Tillamook Bay is a mixture of natural and developed shore and upland areas, reflecting the current land uses in the watershed (rural-residential, commercial-industrial, agricultural, recreation, and commercial forestry). Agricultural lands are dominant east of Tillamook Bay. Natural upland consists of conifer and deciduous forest stands and meadow, marsh, and sandy beach and dune plant communities. The most commercially important and widely distributed

tree species in Tillamook Bay is Douglas-fir (*Pseudotsuga menziesii*). Older stands include western-red cedar (*Thuja plicata*), Sitka spruce (*Picea sitchensis*), and western hemlock (Tsuga heterophylla). Upland beach and dune communities may be classified as bare sand, grass-forb, or shrub communities. Beachgrass occurs behind most of the bare sandy areas with scotch broom (*Cytisus scoparius*) as the dominant species elsewhere. The greater Tillamook Bay ecosystem includes shoreline areas that provide habitat.

Proposed repairs to the Tillamook South Jetty would cause temporary disturbance to the jetty structure itself, which currently provide 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 constructing portions of the jetties' head, trunk, and/or root features would occur on relic jetty stone and within the previously authorized footprint. Placement of rock would temporarily displace motile species, while potentially crushing sessile organisms. These effects would be limited to the duration of rock placement and the jetties are anticipated to provide intertidal habitat of similar quality and complexity upon project completion.

Construction and use of haul roads for site access could contribute suspended sediments that would create turbidity during stormy seasons or overtopping events. 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 placed above MLLW. 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.

Construction of the MOF would result in alteration of sandy bottom, shallow aquatic habitat, including riprap to stabilize the side slopes. Most of this material would be placed waterward/below the High Tide Line (HTL). Dredging prior to platform construction would result in the loss of benthic habitat. Direct loss of some benthic habitat and organisms would occur. Following the 2-year active construction period, the MOF would be removed, and over time, the shallow-water habitat would be naturally restored and recolonized by benthic organisms. Adverse effects to benthic organisms would be localized and temporary, as the MOF area is small relative to the percentage of shallow water habitat available in Tillamook 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, bristle worms and tube worms.

Wetlands would be avoided as described in Section 1.4. BMPs described in Section 1.6 would be implemented during construction, and wetland protection barriers would be installed along the Bayocean Dike Road where necessary. Roadway improvements would be limited to surface improvements, road turnouts along Bayocean Dike Road, and repairs to a washout area between the MOF and South Jetty staging area. Any temporary fill needed in wetlands or waters would not exceed 0.5 acres and all fill would be removed upon project completion.

Direct and indirect effects to eelgrass in the project vicinity would be avoided. Bathymetric surveys conducted in April 2022 indicated that water depths in the channel from the FNC to the MOF site would preclude eelgrass establishment. There are shallower waters below the maximum 17-foot depth threshold in the MOF vicinity. Previous mapping efforts have shown patches of eelgrass in the project vicinity. A new eelgrass survey was conducted in May 2022 and proposed MOF placement and access dredging will completely avoid direct effects to existing eelgrass beds (Figure 1-4). Sediments in the MOF vicinity and barge access channel are primarily coarse-grained sand and gravel and reflect the strong currents and waves present in the area (USACE 2020). Given these sediment characteristics, indirect effects to eelgrass from turbidity or sediment dispersal are highly unlikely. The eelgrass beds confirmed in recent surveys are roughly 50 meters from the MOF dredge area (Figure 1-4). Potential dredging in the barge access channel is similarly unlikely to cause adverse effects to areas where eelgrass was historically detected due to strong currents, deeper depths, and steeper slopes on either side of the proposed barge access channel. BMPs listed under Section 1.6 of this document would further reduce potential adverse effects to habitat.

10.0 ANTICIPATED IMPACTS OF HABITAT LOSS OR MODIFICATION ON MARINE MAMMALS

Rock placement on the Tillamook South Jetty could temporarily displace pinnipeds that may rest on jetty rocks or forage in the direct vicinity. Marine mammals would 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 Tillamook jetties should be temporary in nature, with affected species re-populating the area upon project completion. Dredging and pile driving activities for the temporary MOF could deter pinnipeds that may forage in nearby eelgrass beds. This potential avoidance behavior would likely occur during MOF construction and deconstruction but could also extend to periods of stone delivery and transport. There will be no direct loss of eelgrass habitat as a result of proposed work and there are likely other eelgrass beds in Tillamook Bay (PMEP 2022) where pinnipeds may forage during construction.

11.0 MITIGATION MEASURES

In addition to the BMPs outlined under Section 1.6, the following measures will be implemented to reduce potential adverse effects to marine mammals and habitat during proposed construction activities.

- PSOs would be employed and positioned at the monitoring locations depicted in Figure 1-3 and described in Section 1.4. During impact pile driving, both PSOs would be stationed on Kincheloe Point along the MOF shoreline. The Corps contractor would monitor the project area to the maximum extent possible based on the required number of PSOs, required monitoring locations, and environmental conditions.
- Monitoring would take place from 30 minutes prior to initiation of pile driving activity (i.e., pre-start clearance monitoring) through 30 minutes post-completion of pile driving activity.
- If a marine mammal is observed entering or within the Shutdown Zones indicated in Section 6.1, pile driving activity must be delayed or halted. Pile driving must be commenced or resumed as described in Chapter 12 of this IHA.
- Pre-start clearance monitoring must be conducted during periods of visibility sufficient for the lead PSO to determine that the Shutdown Zones indicated in Section 6.1 of this IHA are clear of marine mammals. Pile driving may commence following 30 minutes of observation when the determination is made that the Shutdown Zones are clear of marine mammals.
- If pile driving is delayed or halted due to the presence of a marine mammal, the activity would not commence or resume until either the animal has voluntarily exited and been visually confirmed beyond the Shutdown Zone indicated in Section 6.1 of this IHA or 15 minutes have passed without re-detection of the animal.
- The Corps contractor would use soft start techniques when impact pile driving. Soft start requires contractors to provide an initial set of three strikes at reduced energy, followed by a 30-second waiting period, then two subsequent reduced-energy strike sets. A soft start must be implemented at the start of each day's impact pile driving and at any time following cessation of impact pile driving for a period of 30 minutes or longer.
- Vibratory hammers are the preferred method for installing piles at the MOF. If impact hammers are required, a confined bubble curtain would be used for any piles driven in water to minimize noise levels.
    - The bubble curtain must distribute air bubbles around 100 percent of the piling circumference for the full depth of the water column.
    - The lowest bubble ring must be in contact with the substrate for the full circumference of the ring, and the weights attached to the bottom ring shall ensure 100 percent substrate contact. No parts of the ring or other objects shall prevent full substrate contact.
    - Air flow to the bubblers must be balanced around the circumference of the pile.
- The Corps would 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 in-water construction (e.g., rock placement, use of barge-mounted excavators, or dredging), if a marine mammal comes within 10 m, contractor(s) would cease operations.
- Should a marine mammal come within 10 m of a vessel in transit, the boat operator would reduce vessel speed to the minimum level required to maintain steerage and safe working conditions.
- Pile driving would only be conducted during daylight hours from sunrise to sunset when it is possible for protected species observers (PSOs) to visually monitor marine mammals.
- For all pile driving, shutdown and disturbance zones would be monitored according to specifications outlined in Section 13.

12.0 MITIGATION MEASURES TO PROTECT SUBSISTENCE USES

There are no known subsistence uses of marine mammals in Tillamook Bay, thus no measures proposed to protect those uses.

13.0 MONITORING AND REPORTING PLAN

The Corps would conduct one pinniped monitoring count a week prior to construction and report the number of marine mammals present within 500 meters of the Tillamook South Jetty or MOF. After construction and removal of the MOF features, the Corps would provide a final report to NMFS that would include a summary of the numbers of marine mammals that may have been disturbed as a result of construction activities.

Multiple observers would be required to detect marine mammals within the Level B disturbance zone. During all pile driving, two marine mammal observers would be present. One would be located on the shoreline adjacent to the proposed MOF site and another observer would be stationed on the shoreline near the Port of Garibaldi (Figure 1-3). Due to the relatively large size of the Level B harassment zone during vibratory driving, monitors would estimate the proportion of the Level B zone that could be effectively monitored from each vantage point at the onset of monitoring. Reports would provide distance/bearing from source of any species sighted, dates, time, tidal stage, maximum number of marine mammals and any observed disturbances. The Corps also would provide a description of construction activities at the time of observation.

Upon completion of jetty repairs, a marine mammal observer would conduct two post-construction monitoring events, with one approximately 4 weeks after construction, and another at 8 weeks post construction. These post-construction marine mammal surveys would help to determine whether marine mammal detections post-construction were comparable to surveys conducted prior to construction. The Corps would submit a report to NMFS within 90 days of completion of the proposed work at the Tillamook South Jetty. The Corps would designate biologically trained on-site PSOs to carry out the monitoring and reporting.

13.1 Monitoring

For work at Tillamook South Jetty, the Corps is proposing the following monitoring protocols.

- Visual monitoring would be conducted by qualified, trained PSOs. Visual monitoring would be implemented during all pile installation activities and at the jetty. A qualified

PSO will be 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.

- PSOs would be present during all pile driving and meet the following qualifications.
    - PSOs must be independent (i.e., not construction personnel) and have no other assigned tasks during monitoring periods.
    - At least one PSO must have prior experience performing the duties of a PSO during construction activity pursuant to a NMFS-issued incidental take authorization.
    - Other PSOs may substitute other relevant experience, education (degree in biological science or related field), or training for prior experience performing the duties of a PSO during construction activity pursuant to a NMFS-issued incidental take authorization.
    - Where a team of three or more PSOs is required, a lead observer or monitoring coordinator must be designated. The lead observer must have prior experience performing the duties of a PSO during construction activity pursuant to a NMFS-issued incidental take authorization.
    - PSOs must be approved by NMFS prior to beginning any activity subject to this IHA.
    - Each PSO would meet the above list of qualifications for marine mammal observers to be considered qualified; or undergo training to meet the qualifications before the start of pile driving.
- Trained observers would be placed at two vantage points (i.e., see Figure 1-3 of this IHA) to monitor for marine mammals and implement shutdown/delay procedures when applicable by calling for the shutdown to the hammer operator.
- PSOs would use a hand-held GPS device or rangefinder to verify the required monitoring distance from the project site.
- PSOs would scan the waters within the Level A harassment and Level B harassment zones using binoculars (10x42 or similar) or spotting scopes (20-60 zoom or equivalent) and make visual observations of marine mammals present.
- For all pile driving, shutdown and disturbance zones would be monitored as follows:
    - Monitoring would take place from 30 minutes prior to initiation through 30 minutes post-completion of pile driving.
    - A minimum 15-meter Shutdown Zone will be implemented during all pile driving.
    - The Shutdown Zone for high-frequency cetaceans (e.g., harbor porpoises) only will increase to 50-meters during vibratory driving of steel pipe piles and steel sheets.

- During impact pile driving, the Shutdown Zone will increase to 100-meters for HF cetaceans (e.g., harbor porpoises) and phocid pinnipeds (e.g., harbor and elephant seals) only.
- During all pile driving, operations will cease if a marine mammal for which take has not been requested (e.g., all low- and mid-frequency cetaceans) is observed entering the bay. Pile driving will not resume until the marine mammal is confirmed beyond the Level B harassment zone or has not been re-detected for 15 minutes.
- If a Shutdown Zone is obscured by fog or other weather/sea conditions that restrict the observers' ability to observe, pile driving would not be initiated or would cease until the entire Shutdown Zone is visible so that monitoring may resume.
- Prior to the start of pile driving, the Shutdown Zone would be monitored for 30 minutes to ensure that the Shutdown Zone is clear of marine mammals. Pile driving would only commence once observers have declared the Shutdown Zone clear of marine mammals.
- If a marine mammal approaches or enters a Shutdown Zone, work would 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.

13.2 Reporting

- PSOs would use a marine mammal observation sheet to record the species, date, and time of any marine mammal sightings. Observers would also note the type of activity underway; marine mammal behavior; shutdown or delay procedures implemented; and any further communication between the observer and the contractor during pile driving.
- If an Observer detects any stranded, dead, or dying marine mammal species in the action area, regardless of known cause, the Corps (or Corps contractor) would report the incident to the Office of Protected Resources (OPR), NMFS (PR.ITP.MonitoringReports@noaa.gov and analystname@noaa.gov) and to the West Coast Marine Mammal Stranding Network (1-866-767-6114) as soon as feasible. If the death or injury was clearly caused by the specified activity, the Corps (or Corps contractor) would immediately cease the activities until NMFS OPR is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure compliance with the terms of this IHA. In-water work would not resume until notified by NMFS.
- The report of a stranded, dead, or dying marine mammal would include the following information:
    - Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);
    - Species identification (if known) or description of the animal(s) involved;
    - Condition of the animal(s) (including carcass condition if the animal is dead);
    - Observed behaviors of the animal(s), if alive;
    - If available, photographs or video footage of the animal(s); and

    - General circumstances under which the animal was discovered.
- If a marine mammal is observed in the Level B harassment zone or Level A harassment zone (*i.e., for harbor seals, Northern elephant seals, and harbor porpoises* <u>*only*</u>), but not approaching or entering the Shutdown Zone, a "take" would be recorded and the work would be allowed to proceed without cessation. Marine mammal behavior would be monitored and documented.
- Per NMFS Requirements, the marine mammal report would include the following details:
    - Dates and times (begin and end) of all marine mammal monitoring
    - Date and time that pile removal and/or installation begins and ends.
    - Construction activities occurring during each observation period.
        - The number and type of piles that were driven and the method (e.g., impact, vibratory, down-the-hole)
        - Total duration of driving time for each pile (vibratory driving) and number of strikes for each pile (impact driving)
    - Environmental conditions during monitoring periods (at beginning and end of PSO shift and whenever conditions change significantly), including Beaufort sea state and any other relevant weather conditions including cloud cover, fog, sun glare, and overall visibility to the horizon, and estimated observable distance.
    - Upon observation of a marine mammal, the following information would be recorded:
        - Name of PSO who sighted the animal(s) and PSO location and activity at time of sighting
        - Time of sighting
        - Marine mammal species
        - Estimated number of animals (min/max/best estimate)
        - Estimated number of animals by cohort (adults, juveniles, neonates, group composition, etc.)
        - Animal's closest point of approach and estimated time spent within the harassment zone
        - Marine mammal behavior patterns observed, including bearing and direction of travel,
        - 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.
    - Number of marine mammals detected within the harassment zones, by species
    - Detailed information about implementation of any mitigation (e.g., shutdowns and delays), a description of specific actions that ensued, and resulting changes in behavior of the animal(s), if any.

14.0 SUGGESTED MEANS OF COORDINATION

NMFS would 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 the Port of Garibaldi would be recorded each day of pile driving. Results of monitoring, including the information outlined in sighing forms (i.e., see Section 13), would be compiled into a final report. This report would be provided to NMFS within 90 days of the completion of monitoring or 60 calendar days prior to the requested issuance of any subsequent IHA for construction activity at the same location, whichever comes first. A final report would be prepared and submitted within 30 calendar days following receipt of any NMFS comments on the draft report. If no comments are received from NMFS within 30 calendar days of receipt of the draft report, the report would be considered final.

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