



**ACTION:** Issuance of an Incidental Harassment Authorization to the Port of Kalama for the construction of the Kalama Marine Manufacturing and Export Facility during the 2016/2017 work season

**TYPE OF STATEMENT:** Environmental Assessment

**LEAD AGENCY:** U.S. Department of Commerce  
National Oceanic and Atmospheric Administration  
National Marine Fisheries Service

**RESPONSIBLE OFFICIAL:** Donna S. Wieting, Director  
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**LOCATION:** The Lower Columbia River near Kalama, Washington

**ABSTRACT:** This Environmental Assessment analyzes the environmental impacts of the National Marine Fisheries Service, Office of Protected Resources proposal to issue an Incidental Harassment Authorization to the Port of Kalama, for the taking, by harassment, of marine mammals, incidental to the construction of the Kalama Marine Manufacturing and Export Facility during the 2016/2017 work season.

**DATE:** October 2016

contained in the Biological Opinion also pertains to this action. Therefore, NMFS has determined that the issuance of an IHA for this activity would not lead to any effects to listed species beyond those considered in the consultation on the US Army Corps of Engineers issuance of a permit to authorize the proposed activity.

#### 1.4.2 Magnuson-Stevens Fishery Conservation and Management Act

Under the Magnuson-Stevens Fishery Conservation and Management Act (MSA; 16 U.S.C. 1801 et seq.), Federal agencies are required to consult with the Secretary of Commerce with respect to any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency which may adversely affect essential fish habitat (EFH) identified under the MSA. As part of the USACE consultation for its action, it has determined that coho and Chinook salmon habitat may be affected by the proposed action, but the effects are not expected to significantly modify the production capacity of that habitat and project will not adversely modify designated EFH for Pacific salmon (see Biological Assessment, Appendix E, SEPA DEIS). As the effects of the activities on EFH is being considered during a formal consultation between the USACE and NMFS, and as the proposed NMFS action of issuing an IHA to POK is not expected to change in the consultation, the discussion of effects that are contained in the Biological Opinion also pertains to this action. Therefore, NMFS has determined that the issuance of an IHA for this activity would not lead to any effects to EFH beyond those considered in the consultation on the USACE issuance of a permit to authorize the proposed activity.

#### 1.5 DOCUMENT SCOPE

This EA was prepared in accordance with NEPA (42 USC 4321, et seq.), CEQ Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500-1508) and NAO 216-6, “Environmental Review Procedures for Implementing the National Environmental Policy Act”. The analysis in this EA addresses potential impacts to the human environment and natural resources, specifically marine mammals and their habitat, resulting from NMFS’ proposed action to authorize incidental takes associated with the POK project. We analyze direct, indirect, and cumulative impacts related to authorizing incidental take of marine mammals under the MMPA. The scope of our analysis is limited to the decision for which we are responsible (i.e. whether or not to issue the IHA). This EA is intended to provide focused information on the primary issues and impacts of environmental concern, which is our issuance of the IHA authorizing the take of marine mammals incidental the POK’s activity, and the mitigation and monitoring measures to minimize the effects of that take. For these reasons, this EA does not provide a detailed evaluation of the effects to the elements of the human environment listed in Table 2 below.

**Table 2 Components of the human environment not requiring further evaluation**

<b>Biological</b>	<b>Physical</b>	<b>Socioeconomic / Cultural</b>
Amphibians	Air Quality	Commercial Fishing
Humans	Essential Fish Habitat	Military Activities
Non-Indigenous Species	Geography	Oil and Gas Activities
	Land Use	Recreational Fishing
	Oceanography	Shipping and Boating
	State Marine Protected Areas	National Historic Preservation Sites
	Federal Marine Protected	National Trails and

	Areas	Nationwide Inventory of Rivers
	National Estuarine Research Reserves	Low Income Populations
	National Marine Sanctuaries	Minority Populations
	Park Land	American Indian Religious Freedom Act
	Prime Farmlands	Indigenous Cultural Resources
	Wetlands	
	Wild and Scenic Rivers	Public Health and Safety
	Ecologically Critical Areas	Historic and Cultural Resources
	Districts, Sites, and Highways	

### 1.5.1 Other Factors Influencing the Scope of the Analysis

This EA provides analyses and evaluation of the potential noise impacts to the affected environment that would result from pile driving, dredging, and other construction sounds associated with the construction of the Kalama Marine Manufacturing and Export Facility. After conducting a review of the information and analyses for sufficiency and adequacy, NMFS incorporates by reference the relevant analyses within the following documents per 40 CFR 1502.21 and NAO 216-6 § 5.09(d):

- NMFS' notice of the proposed IHA in the *Federal Register* (81 FR 15064, 21 March 2016);
- *Request by Port of Kalama for an Incidental Harassment Authorization to Allow the Incidental Take of Marine Mammals from the Construction of the Kalama Manufacturing and Marine Export Facility* (BergerABAM 2015);
- *Kalama Manufacturing & Marine Export Facility Draft Environmental Impact Statement*, Cowlitz County and POK under the State of Washington's State Environmental Policy Act (SEPA DEIS), March, 2016, <http://kalamamfgfacilitysepa.com>;
- *Biological Assessment, Kalama Manufacturing and Marine Export Facility Project* (Appendix E of the SEPA DEIS, <http://kalamamfgfacilitysepa.com>).

On May 19, 2016 POK informed NMFS that it was unlikely that the project would proceed during the 2016 in-water work window, and requested that the authorization dates for the IHA be changed to cover the 2017 work window beginning September 1, 2017. On August 4, 2016, NMFS released its Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Guidance). This new guidance established new thresholds for predicting auditory injury, which equates to Level A harassment under the MMPA. In the **Federal Register** Notice (81 FR 51694), NMFS explained the approach it would take during a transition period, wherein we balance the need to consider this new best available science with the fact that some applicants have already committed time and resources to the development of analyses based on our previous guidance and have constraints that preclude the recalculation of take estimates, as well as where the action is in the agency's decision-making pipeline. In that Notice, we included a non-exhaustive list of factors that would inform the most appropriate approach for considering the new Guidance, including: the scope of effects; how far in the process the applicant has progressed; when the authorization is needed; the cost and complexity of the analysis; and the degree to which the guidance is expected to affect our

analysis. POK's original analysis considered the potential for Level A take (auditory injury [PTS]), but ultimately concluded that no Level A takes would occur due to mitigation monitoring and the implementation of shut down procedures if any marine mammals entered or approached the Level A harassment zone. POK utilized the alternative methodology provided by NMFS in the new Guidance to evaluate how it may affect the analysis. Based on the new Guidance, likely injury zones would increase in size for the two hearing groups that may be present in the project area. POK provided NMFS with an updated Monitoring Plan (available online at: <http://www.nmfs.noaa.gov/pr/permits/incidental/construction.html>), which increased the mitigation monitoring thresholds to avoid Level A harassment. More detail on the previously identified and updated mitigation monitoring zones is provided in Chapter 2 (see section 2.3.1 – Alternative 1 – Issuance of an IHA with Mitigation Measures).

Among other changes, the new Guidance established a dual metric for analysis: a peak (PK) sound pressure level (SPL) for impulsive sounds (e.g., impact pile driving) and a cumulative sound exposure level (SELcum) for both impulsive and non-impulsive (e.g., vibratory pile driving). Table 3 provides a summary of the thresholds established in the new Guidance for phocids and otariids (pinnipeds), which are anticipated to be located in the action area. As shown in Table 3, the thresholds established for phocids are lower than those established for otariids, so the updated analysis was based on the phocid pinniped thresholds. The new guidance does not affect the thresholds for behavioral disturbance (Level B harassment), and would not affect the extent of Level B harassment requested by POK. Therefore, the analysis of Level B harassment in the original application and Proposed Rule remains valid and is not discussed further. In addition, the peak sound pressure thresholds (218 dB for phocids and 232 dB for otariids) would not be exceeded during any project activities. The greatest single strike peak sound pressure levels would be generated during impact installation of steel piles and these sound levels would not exceed 207 dB (CALTRANS 2012). As noted in POK's application and Proposed Rule, it is anticipated that all steel piles will be driven with a vibratory hammer, and that it will not be necessary to impact drive or impact proof any of the steel piles. However, impact driving of steel piles is analyzed as a precaution in the event that this is required. As peak sound pressure thresholds would not be exceeded for either phocids or otariids, there is no further discussion of peak sound pressure levels.

## CHAPTER 2 – ALTERNATIVES INCLUDING THE PROPOSED ACTION

### 2.1 INTRODUCTION

As described in Chapter 1, the National Marine Fisheries Service (NMFS) Proposed Action is to issue an Incidental Harassment Authorization (IHA) to authorize the take of small numbers of marine mammals incidental to Port of Kalama (POK) proposed construction of the Kalama Marine Manufacturing and Export Facility. NMFS Proposed Action is triggered by POK's request for an IHA per the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1361 *et seq.*). In accordance with the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) Regulations, and Agency policies, NMFS is required to consider alternatives to the Proposed Action. This includes the no action and other reasonable course of action associated with authorizing incidental take of protected species. The evaluation of alternatives under NEPA assists NMFS with ensuring that any unnecessary impacts are avoided through an assessment of alternative ways to achieve the purpose and need for our Proposed Action that may result in less environmental harm. To warrant detailed evaluation under NEPA, an alternative must be reasonable along with meeting the stated purpose and need for the proposed action. For the purposes of this EA, an alternative will only meet the purpose and need if it satisfies the requirements under section 101(a)(5)(D) of the MMPA. Therefore, NMFS applied the following screening criteria to the alternatives to identify which alternatives to carry forward for analysis. Accordingly, an alternative must meet the following criteria to be considered "reasonable".

- The action must not violate any federal laws or regulations.
- The action is consistent with the goals and requirements of MMPA and its implementing regulations.
- The action includes NMFS authorization criteria, specifically:
  - Prescribing permissible methods of take
  - Addressing other means of effecting the least practicable adverse impact on the species or stocks of marine mammals and their habitat, paying particular attention to rookeries, mating grounds, and other areas of similar significance.
- The action includes proposed mitigation measures (including consideration of the following factors in relation to one another):
  - The manner in which, and the degree to which, the successful implementation of the measure is expected to minimize adverse impacts to marine mammals;
  - The proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and
  - The practicability of the measure for applicant implementation

Based on this evaluation, only one alternative was identified as reasonable and, along with the no-action alternative, is evaluated in detail. Section 2.4 presents alternatives considered but eliminated from further review.

### 2.2 DESCRIPTION OF THE PORT OF KALAMA'S PROPOSED ACTIVITIES

The objective of the proposed project by POK is the construction of the Kalama Manufacturing and Export Facility for the purposes of production and export of methanol along the lower Columbia River. The proposed action would require an IHA under the MMPA due to the construction of a new marine terminal and associated compensatory mitigation that are the in-water components of the proposed action. We presented a general overview of POK's proposed construction activities in our *Federal Register* notice of the proposed IHA (81 FR 15064, 21 March 2016). Also, POK's

application (BergerABAM) describes the construction activities in detail. We incorporate those descriptions by reference in this EA and briefly summarize them here.

### 2.2.1 SPECIFIED TIME AND SPECIFIED AREA

POK proposes to perform in-water construction activities between the dates of September 1, 2017 and January 31, 2018. The proposed in-water construction activities may occur during all daylight hours during the specified in-water work window. Some minor deviation from POK's requested dates of September 1 through January 31 is possible, depending on logistics, weather conditions, and contractor needs. Thus the proposed IHA, if issued, would be effective from September 1, 2017, to August 31, 2017, but would cover a maximum of 153 days of in-water construction activities.

The proposed action will take place on approximately 100 acres (including uplands) at the northern end of the Port of Kalama's North Port site (Lat. 46.049, Long. -122.874), located at approximately river mile 72 along the lower Columbia River along the east bank in Cowlitz County, Washington (Figure 1). The area of potential in-water impacts will extend by line of sight from the proposed action location to the nearest shoreline, and includes approximately 1,800 acres of tidally influenced river habitat (Figure 2).



Figure 1. Project Region

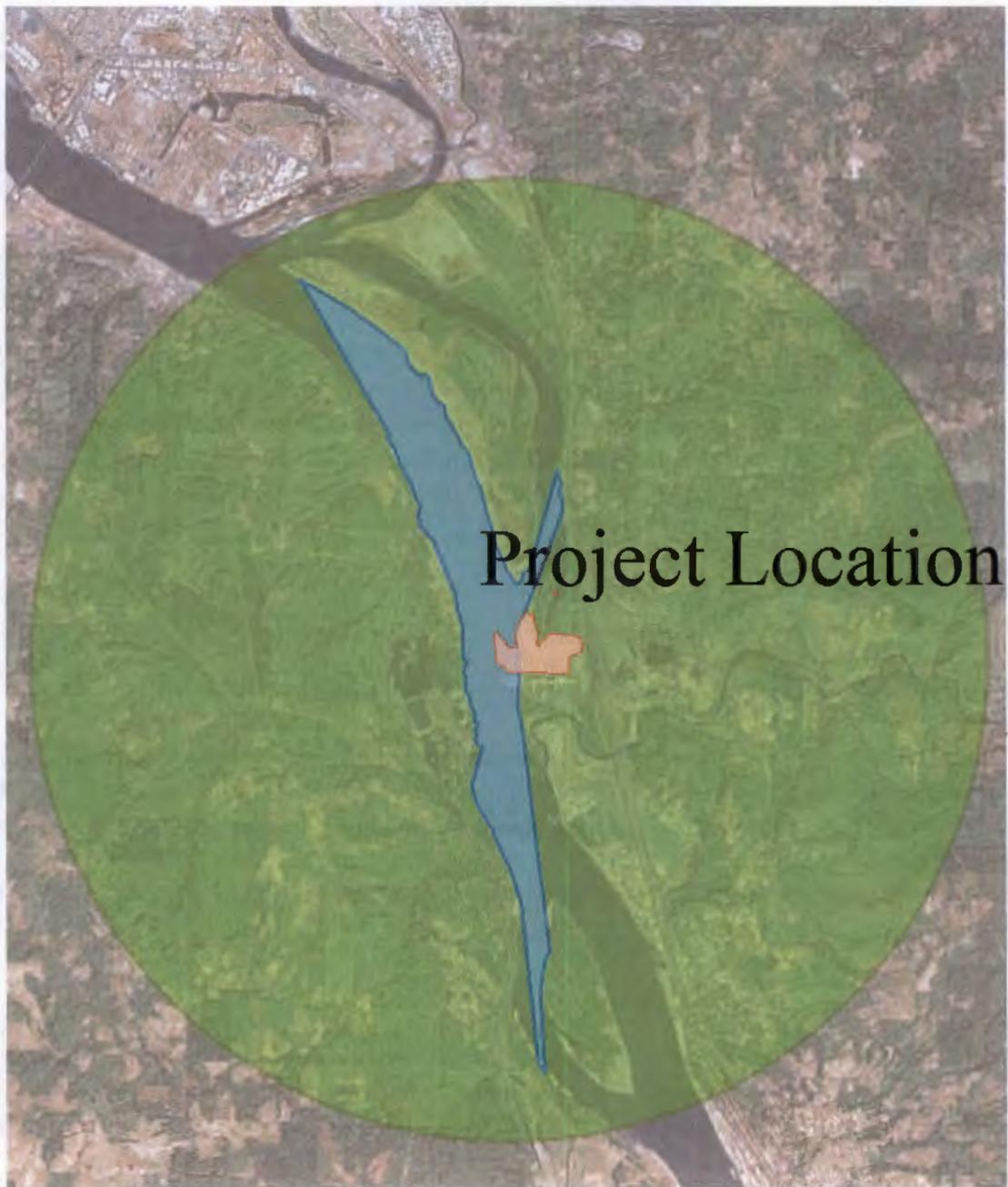


Figure 2. Project location along the lower Columbia River.

## 2.2.2 IN-WATER CONSTRUCTION ACTIVITIES

### Marine Terminal Construction

The proposed marine terminal will be located along the shoreline and will consist of a single berth to accommodate oceangoing tankers arriving from the Pacific Ocean via the Columbia River navigation channel and designed for methanol storage that will transport methanol to destination ports. The marine terminal will include a dock, a berth, loading equipment, utilities, and a stormwater system. The components are designed to support the necessary product transfer equipment and safely moor the vessels that may call at the proposed terminal. The marine terminal will provide sufficient clearances from the existing North Port dock and space that will be required

for vessel maneuvering during berthing and departure. The proposed terminal will accommodate vessels ranging in size from 45,000 to 127,000 DWT, which would include vessels measuring from approximately 600 to 900 feet in length and 106 to 152 feet in width. The Port expects to receive between 3 and 6 vessels per month at the new terminal for the purposes of exporting methanol. The berth may also be used for loading and unloading other types of cargo, vessel supply operations, as a lay berth, vessel moorage, and for topside vessel maintenance activities.

The dock structure will consist of an access trestle extending from the shoreline to provide vehicle, equipment, and emergency access to the dock. The trestle will be 34 feet wide by 365 feet long. From the access trestle, the berth face of the dock will extend approximately 530 feet downstream, and will consist of an 100 by 54-foot transition platform, a 370 by 36-foot berth trestle, and a 100 by 112-foot turning platform. The dock will be supported by precast 24-inch precast octagonal concrete piles supporting cast-in-place concrete pile caps, and precast, pre-stressed, haunched concrete deck panels. The dock will total approximately 45,000 square feet and includes 320 concrete piles and 16 steel pipe piles in total. The bottom of the superstructure will be located above the ordinary high water mark.

For vessel mooring, two 15-foot by 15-foot breasting dolphins will be constructed near the center of the berth trestle. Steel plates will bridge the short distance between the dock and dolphins. Each breasting dolphin will consist of seven, 24-inch precast, pre-stressed concrete battered piles supporting a cast-in-place concrete pile cap with mooring bollards.

Four 15-foot by 15-foot mooring dolphins will be constructed (2 upstream and 2 downstream of the platforms) for securing bow and/or stern lines. Each mooring dolphin will consist of twelve 24-inch octagonal diameter concrete piles supporting a cast-in-place concrete pile cap. The dolphins will be equipped with mooring bollards and electric capstans. Access to the mooring dolphins will be provided from the platform by trussed walkways with open grating surfaces. The walkways will be 3 feet wide with a combined length of 375 feet and will be supported by four 18-inch diameter steel pipe piles.

The fender system will consist of 9-foot by 9-foot ultra-high molecular weight polyethylene face panels with a super cone fender unit and two 12-inch diameter steel pipe fender piles. Below the fender panels, the fender piles will have 18-inch-diameter high-density polyethylene sleeves. Fender units will be placed on the dock face, two upstream and two downstream, and on the two breasting dolphins.

A small building will be constructed on a corner of the turning platform. The building will function as a shelter from the weather and a small lunch area for the dockworkers and as a place to store tools and supplies. A second small building will be constructed at the center of the dock, adjacent to the loading arms. The building will be used as an operations shack for the loading arms. Electricity and communications services will be provided to the pier buildings, but no water or sewer services would be provided.

Stormwater from the dock will be collected and conveyed to upland treatment and infiltration swale. The stormwater system will also accommodate stormwater from the existing North Port dock, which is currently infiltrated in an upland swale that will be removed for the development.

Since pile layout is conceptual, a 10 percent contingency has been added for the estimated number of concrete piles. This will accommodate potential revisions to the pile layout and configuration as the

structural design is finalized. The project may also require the installation of temporary piles during construction. Temporary piles are typically steel pipe or h-piles and will be driven with a vibratory hammer. These are placed and removed as necessary during the pile driving and overwater construction process. With the addition of the contingency, the proposed terminal will require the installation of approximately 320, 24-inch concrete piles; 12, 12-inch steel pipe piles; and 4, 18-inch steel pipe piles. Additional information regarding the specific design elements of the proposed project can be found in the application from the applicant.

Piles will be installed using vibratory and/or impact hammers (depending upon pile type, as described below), most likely operated from a barge. Piles will most likely be transported to the site and stored on site on a work barge. The contractor's water-based equipment will be a barge-mounted crane with pile-driving equipment and a materials barge with piles. At times, a second barge-mounted crane may be on site with an additional materials barge.

Concrete piles will be installed with an impact hammer. A bubble curtain will not be used during impact driving of concrete piles, as impact installation of concrete piles does not generate underwater sound pressure levels that are injurious to marine mammals. A conservative estimate is that up to a maximum of 6 to 8 piles will be impact-driven per day, with an estimated maximum of approximately 1,025 strikes per pile. Based on these estimates, it is assumed that up to approximately 8,200 strikes per day might be necessary to impact-drive concrete piles to their final tip elevation. Actual pile driving rates will vary, and a typical day will involve fewer piles and fewer strikes.

It is anticipated that all steel piles will be driven with a vibratory hammer, and that it will not be necessary to impact drive or impact proof any of the steel piles. If it does become necessary to impact-drive steel piles, a bubble curtain or similarly effective noise attenuation device will be employed to reduce the potential for effects from temporarily elevated underwater noise levels. In addition, the project may require the installation of temporary piles during construction. Temporary piles are typically steel pipe or h-piles and will be driven with a vibratory hammer. These are placed and removed as necessary during the pile driving and overwater construction process.

All pile installation will be conducted during the in-water work window (September 1 through January 31).

### **Berth Dredging**

The existing berth serving the Port's North Port Terminal will be extended downstream to accommodate vessel activities at the new dock. The extended berth area will be deepened to -48 feet Columbia River datum (CRD) with a 2-foot overdredge allowance consistent with the existing berth. The berth will extend at an angle from the edge of the Columbia River navigation channel to the berthing line at the face of the proposed dock. The footprint of the expanded berth will be approximately 18 acres, of which approximately 16 acres will require dredging to achieve the berth depth. Existing water depths in the proposed berth area vary from -50 feet CRD to -39 feet CRD. The total volume to be dredged the first year is approximately 126,000 cubic yards (cy).

Sediment characterization for dredged material placement suitability was conducted in February 2015 in accordance with the regional Sediment Evaluation Framework, and the sediments to be dredged were found to be suitable for any beneficial reuse. Dredged material will be placed upland at the project site to provide material for construction or for other uses, or it may be placed at existing authorized in-water and upland placement sites. The existing authorized (NWP-1994-462-1) in-water placement locations include: 1) flow lane placement to restore sediment at a deep scour

hole associated with a pile dike at RM 77.48 located on the Oregon side of the river; 2) flow lane placement to restore sediment at a deep scour hole associated with a pile dike at RM 75.63 located on the Washington side of the river; 3) beach nourishment at the Port's shoreline park (Louis Rasmussen Park) at RM 76; and 4) the Ross Island Sand and Gravel disposal site in Portland, Oregon. The anticipated upland placement sites include the South Port site located north of the CHS/TEMCO grain terminal at approximately RM 77 and the project site. Additional in-water and upland sites may be identified and permitted for dredge material placement for general Port maintenance dredging needs in the future.

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Dredging is a temporary construction activity, conducted in deep water, which would be expected to have only minor, localized, and temporary effects. No dredging would be conducted in shallow water habitats, and no shallow water habitat would be converted to deep water. Dredging operations may be completed using either hydraulic or mechanical (clamshell) dredging methods. A hydraulic dredge uses a cutter head on the end of an arm that is buried typically 3 to 6 feet deep in the river bottom and swings in a 250- to 300- foot arc in front of the dredge. Dredge material is sucked up through the cutter head and the pipes, and deposited via pipeline to the placement areas. The hydraulic dredge will also be used for placement of dredge material in the flow-lane, as beach nourishment, or at approved upland sites.

A mechanical dredge removes material by scooping it up with a bucket. Mechanical dredges include clamshell, dragline, and backhoe dredges. Mechanical dredging is performed using a bucket operated from a crane or derrick that is mounted on a barge or operated from shore. Sediment from the bucket is usually placed directly in an upland area or on a scow or bottom dump (split) barge. In-water placement of the material occurs through opening the bottom doors or splitting the barge. The process of splitting will be tightly controlled to minimize turbidity and the spread of material outside the placement area.

Upland placement will likely be completed through the use of a hydraulic pipeline. In this method, dredged material is pumped as slurry through a pipeline that floats on the water using pontoons, is submerged, or runs across dry land. Dredged material transported by hydraulic pipeline to an upland management site must be dewatered prior to final placement or rehandling. In this case, dewatering generally will be accomplished using settling ponds or overland flow. Settling ponds are sized based on the settling characteristics of the dredged material and the rate of dredging. Water from the sediments will be either infiltrated to the ground or will be discharged to the river through weirs already constructed at the disposal sites.

Several BMPs and conservation measures will be implemented to minimize environmental impacts during dredging, and these are described in the application.

### **Compensatory Mitigation Activities**

The applicant has incorporated mitigation activities as part of the proposed action. The applicant proposes three categories of activity: 1) pile removal; 2) construction of engineered log jams (ELJ); and 3) riparian and wetland buffer habitat restoration.

The Applicant will remove a portion of a row of existing timber piles now located in the freshwater intertidal backwater channel portion of the project site on Port property. The structure is a former trestle, and these piles may be treated with creosote. Piles are estimated to range between 12 and 14 inches in diameter at the mudline. A total of approximately 157 piles will be removed from the structure. There is a second timber pile structure in the backwater, which was previously proposed for removal. This structure is a USACE-owned pile dike, and will not be removed.

The proposed pile removal will restore a minimum of 123 square feet of benthic habitat, within an area approximately 2.05 acres in size. These piles, in their current configuration, affect the movement of water and sediment into and out of approximately 13 acres of this backwater area (CHE 2015). The removal of the piles will facilitate sediment transport and seasonal flushing of this backwater area, which will help improve water quality and maintain this area as an off-channel refuge for juvenile salmonids in the long term. The piles most likely will be removed by direct pulling. A vibratory hammer may also be used if necessary, and this request assumes that either method could be used.

In addition to the proposed pile removals, the applicant will install eight ELJs within the nearshore habitat along the Columbia River shoreline adjacent to the site. ELJs are a restoration and mitigation method that helps build high quality fish habitat, develops scour pools, and provides complex cover.

Each ELJ will measure approximately 20 x 20 feet and be composed of large-diameter untreated logs, logs with root wads attached, small wood debris, and boulders. Logs generally will have a minimum diameter of 20-inches and be 20 feet long. They will be anchored to untreated wood piles driven a minimum of 20 feet into the river stream bed and will be fastened to the piles by drilling holes in the wood and inserting 1-inch through-bolts for attaching chains to secure the wood to the piles. The structures will be installed at or near the mean lower low water mark using vibratory pile driving at low tides, so that the structures are regularly inundated but pile driving will not occur in water. The logs that comprise the structure will be further bolted together to create a complex crib structure with 2- to 3-inch interstitial spaces. These spaces may be filled with smaller wood debris and/or boulders to enhance structural complexity and capture free-floating wood from the Columbia River.

Small equipment operated from a barge will be used to construct the ELJs. Anchor piling will be installed either by a vibratory hammer, or will be pushed directly into the substrate with crane-mounted equipment. This request assumes that either method could be used. Logs and debris will be placed using crane-mounted equipment, or similar. Aquatic mitigation construction activities, including vibratory timber pile removal and installation of timber anchor piling outside of the wetted perimeter of the river, and would not generate levels of noise that would harass of marine mammals.

The Applicant also proposes to conduct riparian enhancement and invasive species management within an area approximately 1.41 acres in size along approximately 700 linear feet of the Columbia River shoreline at the site to further enhance riparian and shoreline habitat at the site. The applicant

also proposes to enhance approximately 0.58 acres of wetland buffer at the north end of the site to offset unavoidable wetland buffer impacts. The riparian and wetland buffer habitats will be enhanced by removing invasive species and installing native trees and shrubs that are common to this reach of the Columbia River shoreline and adjacent wetlands. Native plantings proposed for the riparian restoration include black cottonwood and a mix of native willow species including Columbia River willow (*Salix fluviatilis*), Pacific willow (*Salix lasiandra*), and Sitka willow (*Salix sitchensis*). Portions of the wetland buffer will be planted with black cottonwood. Invasive species management at the site will target locally common and aggressive invasive weed species, primarily Scotch broom and Himalayan blackberry (*Rubus armeniacus*). The restoration sites will be monitored and maintained for 5 years to document proper site establishment.

Aquatic habitat mitigation construction activities will most likely be conducted using cranes and similar equipment operated from one or more barges temporarily located within the backwater area. Because water depths are relatively shallow in the backwater area where pile removal will be conducted, equipment access to this area may be limited. A small barge will most likely be floated in on a high tide, grounding out if necessary as waters recede. Benthic habitats and native plant communities are not expected to be affected by the barge, as substrates are silt-dominated, and vegetation consists primarily of reed canary grass. If necessary, disturbed areas will be restored to their original or an improved condition after pile removal is complete.

## **2.3 DESCRIPTION OF ALTERNATIVES**

### **2.3.1 ALTERNATIVE 1 – ISSUANCE OF AN IHA WITH MITIGATION MEASURES**

The Proposed Action constitutes the Preferred Alternative. Under this alternative, we would issue an IHA (valid from September 1, 2017 – August 31, 2018) to POK allowing the incidental take, by harassment, of marine mammals subject to the mandatory mitigation and monitoring measures and reporting requirements set forth in the proposed IHA, subject to changes based on consideration of public comments.

#### **Marine Mammal Observers**

POK will employ qualified protected species observers (PSOs) to monitor to the 120 db threshold for vibratory pile driving, and to the 160 dB sound threshold for impact pile driving (Level B harassment zones) to record incidental takes of marine mammals due to the construction activities. In addition, PSOs will monitor to the thresholds for auditory injury (Level A harassment zones) in order to implement shut down procedures if any marine mammals approach or enter these zones (see Table 4 below) so that Level A takes are avoided. Qualifications for PSOs include:

- Visual acuity in both eyes (correction is permissible) sufficient for discernment of moving targets at the water's surface with ability to estimate target size and distance; use of binoculars may be necessary to correctly identify the target. Advanced education in biological science, wildlife management, mammalogy, or related fields (bachelor's degree or higher is required).
- Experience and ability to conduct field observations and collect data according to assigned protocols (this may include academic experience).
- Experience or training in the field identification of pinnipeds, including the identification of behaviors.
- Sufficient training, orientation, or experience with the construction operation to provide for personal safety during observations.

- Writing skills sufficient to prepare a report of observations including but not limited to the number and species of pinnipeds observed; dates and times when in-water construction activities were conducted; dates and times when in-water construction activities were suspended to avoid potential incidental injury from construction sound of pinnipeds observed within a defined shutdown zone; and pinniped behavior.
- Ability to communicate orally, by radio or in person, with project personnel to provide real-time information on pinnipeds observed in the area as necessary.

### **Mitigation Measures**

As described in Section 1.2, NMFS must prescribe the means of affecting the least practicable adverse impact on the species or stocks of marine mammals and their habitat. In order to do so, we must consider POK's proposed mitigation measures, as well as other potential measures. NMFS' evaluation of potential measures includes consideration of the following factors in relation to one another: (1) the manner in which, and the degree to which, we expect the successful implementation of the measure to minimize adverse impacts to marine mammals; (2) the proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and (3) the practicability of the measure for applicant implementation.

Any additional mitigation measure proposed by NMFS beyond what the applicant proposes should be able to or have a reasonable likelihood of accomplishing or contributing to the accomplishment of one or more of the following goals:

- Avoidance or minimization of marine mammal injury, serious injury, or death wherever possible;
- A reduction in the numbers of marine mammals taken (total number or number at biologically important time or location);
- A reduction in the number of times the activity takes individual marine mammals (total number or number at biologically important time or location);
- A reduction in the intensity of the anticipated takes (either total number or number at biologically important time or location);
- Avoidance or minimization of adverse effects to marine mammal habitat, paying special attention to the food base; activities that block or limit passage to or from biologically important areas; permanent destruction of habitat; or temporary destruction/disturbance of habitat during a biologically important time; and
- For monitoring directly related to mitigation, an increase in the probability of detecting marine mammals, thus allowing for more effective implementation of the mitigation.

To reduce the potential for disturbance from acoustic stimuli associated with the activities, POK has agreed to implement the following monitoring and mitigation measures for marine mammals. These include:

- POK would implement shutdown zones encompassing the Level A harassment zone for all pile driving activity (see Table 4). The shutdown zones provide a buffer for the Level A harassment (PTS/auditory injury) threshold but would also further avoid the risk of direct interaction between marine mammals and the equipment.
- POK would have a redundant monitoring system, in which one PSO would be stationed at the area of active pile driving, while two PSOs would be shore-based, as required to provide

complete observational coverage of the reduced disturbance zone for each pile driving/removal site. The former would be capable of providing comprehensive monitoring of the proposed shutdown zones. This PSO's first priority would be shutdown zone monitoring in prevention of injurious interaction, with a secondary priority of counting takes by Level B harassment in the disturbance zone. The additional shore-based PSOs would be able to monitor the same distances, but their primary responsibility would be counting of takes in the disturbance zone and communication with barge-based PSOs to alert them to pinniped presence in the action area.

- The shutdown and disturbance zones would be monitored throughout the time required to drive a pile. If a marine mammal is observed within the disturbance zone, a take would be recorded and behaviors documented. However, that pile segment would be completed without cessation, unless the animal approaches or enters the shutdown zone (Level A harassment zone), at which point all pile driving activities would be halted. Original monitoring zones are presented in Table 3 below (Note: 190 dB monitoring zone is no longer valid and the new Level A isopleths that have been calculated using the new Guidance are presented in Table 4.

**Table 3 – Original Distances to initial shutdown and disturbance monitoring zones for in-water sound in the Columbia River (from Draft EA).**

Pile type	Hammer type	Distance to monitoring zones (m) <sup>1</sup>		
		190 dB <sup>2</sup>	160 dB <sup>2</sup>	120 dB <sup>2</sup>
24in Concrete pile	Impact	10	117	N/A
18in Steel pipe pile	Vibratory	10	N/A	Line of Sight
18in Steel pipe pile	Impact	18	736	NA

<sup>1</sup> Monitoring zones based on a practical spreading loss model and data from Illinworth and Rodkin (2007). A minimum distance of 10 m is used for all shutdown zones, even if actual or initial calculated distances are less.

<sup>2</sup> All values unweighted and relative to 1 µPa.

**Table 4 – Updated Level A Isopleths (Level A harassment distances) Using NMFS New Technical Guidance**

Activity	Level A (PTS) Threshold	Isopleth (distance)
Impact-driving concrete piles	185 dB SEL <sub>cum</sub>	40 m (131 ft)
Impact-driving steel piles	185 dB SEL <sub>cum</sub>	252 m (828 ft)
Vibratory-driving steel piles	201 dB SEL <sub>cum</sub>	16.5 m (54 ft)

In addition, NOAA Fisheries and POK, together with other relevant regulatory agencies, have developed a number of mitigation measures designed to protect fish through prevention or minimization of turbidity and disturbance and introduction of contaminants, among other things. These measures have been prescribed under the authority of statutes other than the MMPA, and are not a part of this proposed rulemaking. However, because these measures minimize impacts to pinniped prey species (either directly or indirectly, by minimizing impacts to prey species' habitat), they are summarized briefly here. Additional detail about these measures may be found in POK's application. For pile driving, the applicant will implement the following best management practices:

- If steel piles require impact installation or proofing, a bubble curtain will be used for sound attenuation;
- If steel piles require impact installation or proofing, the contractor will be required to use soft start procedures. Soft start procedures require that the contractor provides an initial set of three strikes at reduced energy, followed by a thirty-second waiting period, then two subsequent reduced energy strike sets;
- Soft start shall be implemented at the start of each day's pile driving and at any time following cessation of impact pile driving for a period of thirty minutes or longer;
- Marine mammal monitoring will be conducted during all pile driving as described in Appendix B of the application.

### **Monitoring Measures**

POK proposes to conduct marine mammal monitoring during the present project, in order to implement the mitigation measures that require real-time monitoring and to satisfy the monitoring requirements of section 101(a)(5)(D).

The following measures would apply to visual monitoring:

- If the shutdown zone is obscured by fog or poor lighting conditions, pile driving would not be initiated until the entire shutdown zone is visible. Work that has been initiated appropriately in conditions of good visibility may continue during poor visibility.
- The shutdown zone would be monitored for the presence of pinnipeds before, during, and after any pile driving activity. The shutdown zone would be monitored for 30 minutes prior to initiating the start of pile driving. If pinnipeds are present within the shutdown zone prior to pile driving, the start of pile driving would be delayed until the animals leave the shutdown zone of their own volition, or until 15 minutes elapse without re-sighting the animal(s).
- Monitoring would be conducted using binoculars. When possible, digital video or still cameras would also be used to document the behavior and response of pinnipeds to construction activities or other disturbances.
- Each PSO would have a radio or cell phone for contact with other monitors or work crews. PSOs would implement shut-down or delay procedures when applicable by calling for the shut-down to the hammer operator.
- A GPS unit or electric range finder would be used for determining the observation location and distance to pinnipeds, boats, and construction equipment.

### **Reporting Measures**

POK would submit a draft report to NMFS within 90 days after the end of the in-water construction window. The report would describe the operations conducted and sightings of marine mammals near the operations. The report would provide full documentation of methods, results, and interpretation pertaining to all monitoring. The report must contain and summarize the following information:

- Dates, times, weather, and visibility conditions during all construction associated in-water work and marine mammal sightings;
- Species, number, location, distance from activity, behavior of any observed marine mammals, and any required shutdowns throughout all monitoring activities;
- An estimate of the number, by species, of marine mammals with exposures to sound energy levels greater than, or equal to, 160 dB for impact pile driving and 120 dB for vibratory pile driving.

- In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by the IHA, such as injury, serious injury, or mortality (*e.g.*, ship-strike, gear interaction, and/or entanglement), POK would immediately cease the specified activities and immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS. POK may not resume activities until we are able to review the circumstances of the prohibited take. The report must include the following information:
  - Time, date, and location (latitude/longitude) of the incident;
  - Name and type of vessel involved;
  - Vessel's speed during and leading up to the incident;
  - Description of the incident;
  - Status of all sound source use in the 24 hours preceding the incident;
  - Water depth;
  - Environmental conditions (*e.g.* wind speed and direction, Beaufort sea state, cloud cover, and visibility);
  - Description of all marine mammal observations in the 24 hours preceding the incident;
  - Species identification or description of the animal(s) involved;
  - Fate of the animal(s); and
  - Photographs or video footage of the animal(s) (if equipment is available).

In the event that POK discovers an injured or dead marine mammal, and the PSO determines that the cause of the injury or death is unknown and the death is relatively recent (*i.e.*, in less than a moderate state of decomposition as we describe in the next paragraph), POK would immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS. The report must include the same information identified in the paragraph above this section. Activities may continue while we review the circumstances of the incident. We would work with POK to determine whether modifications in the activities are appropriate.

In the event that POK discovers an injured or dead marine mammal, and the lead PSO determines that the injury or death is not associated with or related to the authorized activities (*e.g.*, previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), Lamont-Doherty would report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS within 24 hours of the discovery. POK would provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS. Activities may continue while we review the circumstances of the incident.

### **2.3.2 ALTERNATIVE 2 – NO ACTION ALTERNATIVE**

The No Action Alternative is the baseline against which the impacts of a proposed action are compared. For NMFS, denial of MMPA authorizations constitutes the NMFS No Action Alternative, which is consistent with our statutory obligation under the MMPA to grant or deny permit applications and to prescribe mitigation, monitoring and reporting with any authorizations. Under the No Action Alternative, there are two potential outcome scenarios. One is that the construction activities occur in the absence of an MMPA authorization. In this case, (1) POK would be in violation of the MMPA if takes occur, (2) mitigation, monitoring and reporting would not be prescribed by NMFS. Another outcome scenario is POK could choose not to proceed with their proposed activities. NMFS analyzed both possible outcomes under the No Action Alternative. We took this approach to meaningfully evaluate the primary environmental issues in light of the scope of

our authority to authorize take and prescribe mitigation to minimize impacts—the impact on marine mammals from these activities in the absence of protective measures.

The No Action Alternative was also evaluated in POKs SEPA DEIS and we incorporate that evaluation here. As noted in that evaluation, given the project site’s highway, rail, and waterfront access and the POK’s Comprehensive Scheme for Harbor improvements, it is expected that POK would pursue future industrial or marine terminal development of the site absent the proposed project. However, exact details of that development cannot be known at this time. Also, as noted in the SEPA DEIS, given the demand for methanol in global markets, the proposed project may be constructed on another site within the Pacific Northwest or at other locations in the world and could use natural gas or other feedstock, such as coal.

## **CHAPTER 3 – AFFECTED ENVIRONMENT**

The National Marine Fisheries Service (NMFS) reviewed all possible environmental, cultural, historical, social, and economic resources based on the geographic location associated with NMFS proposed action and alternatives and POKs request for an IHA. Based on this review, this section describes the affected environment and existing (baseline) conditions for select resource categories. As explained in Chapter 1, certain resource categories not affected by NMFS proposed action and alternatives were not be carried forward for further consideration or evaluation in this draft EA (See Table 2). Chapter 4 provides an analysis and description of environmental impacts associated with the affected environment.

### **3.1 PHYSICAL ENVIRONMENT**

As discussed in Chapter 1, NMFS' proposed action and alternatives relate only to the proposed issuance of an IHA for incidental take of marine mammals and not to the physical environment. Certain aspects of the physical environment are not relevant to our proposed action (see section 1.3.2 - Scope of Environmental Analysis).

#### **3.1.1 MARINE MAMMAL HABITAT**

We presented information on marine mammal habitat and the potential impacts to marine mammal habitat in our *Federal Register* notice of the proposed IHA (81 FR 15064, March 21, 20156). Also, POK presented more detailed information on the physical and geographical aspects of the South Atlantic Ocean environment, and potential impacts to the aquatic environment in the SEPA DEIS (2016). In summary, the aquatic habitat of the Columbia River at the project site provides habitat for a variety of benthic, epibenthic, and water column organisms including several special-status fish and marine mammals. Impacts to aquatic habitat associated with the proposed construction activities would consist of temporary water quality impacts and temporary noise impacts during construction as well as vessel traffic during operations (SEPA DEIS, 2016). Potential impacts associated with vessel traffic include potential ship strikes and vessel spills; however, in consideration of these potential impacts, it was determined that the proposed project would not result in significant adverse impacts on any plant or animal resources (SEPA DEIS, Sections 6.6.2.1; 6.6.2.2); and 8.4.3.4).

### **3.2 BIOLOGICAL ENVIRONMENT**

#### **3.2.1 MARINE MAMMALS**

We provide information on the possible or confirmed occurrence in the survey area in section 1.1.2 of this EA (Table 1), which includes the marine mammals most likely to be present in the action area. The *Federal Register* notice of the proposed IHA (81 FR 15064, March 21 20156) provided information on the stock, regulatory status, abundance, occurrence, seasonality, and hearing ability of the marine mammals in the action area. The POK's application and the SEPA DEIS also provided distribution, life history, and population size information for marine mammals within the action area. We incorporate those descriptions by reference and briefly summarize the information in Table 4.

**Table 4** - General information on marine mammals that could potentially occur in the proposed action area.

<b>Species</b>	<b>Regulatory Status<sup>1,2</sup></b>	<b>Species Abundance<sup>3</sup></b>
Harbor seal ( <i>Phoca vitulina ssp. richardsi</i> )	MMPA - ND ESA - NL	NA / 24,732
Stellar sea lion ( <i>Eumetopias jubatus</i> )	MMPA - D ESA - NL	36,551 <sup>4</sup> / 60,131- 74,448
California sea lion ( <i>Zalophus californianus</i> )	MMPA - ND ESA - NL	153,337 / 296,750

<sup>1</sup> MMPA - NDS = Not designated as “depleted” or a “strategic” stock; D = Designated as “depleted” and a “strategic” stock

<sup>2</sup> ESA - NL = Not listed (as either “threatened” or “endangered”)

<sup>3</sup> Abundance - all information from the 2014 NMFS Stock Assessment Report and is “Minimum Population Estimate” / Population Size (NA = Not Available)

<sup>4</sup> Eastern Stock, US Portion Only

## CHAPTER 4 – ENVIRONMENTAL CONSEQUENCES

The National Marine Fisheries Service (NMFS) reviewed all possible direct, indirect, cumulative, short-term, long-term, irreversible, and irretrievable impacts to protected species, their environment, associated with NMFS proposed action and alternatives. Based on this review, this section describes the potential environmental consequences for the physical and biological resources described in Chapter 3. The overall approach to this analysis included resource-specific impacts and analysis for individual stressors or multiple stressors, examination of protected species population-level impacts and consideration of mitigations to reduce identified potential impact. The Federal Register notice [81 FR 15064] requesting comments on the proposed IHA facilitates an analysis of these impacts due to our proposed issuance of an IHA but information is summarized within the following subsections.

### 4.1 EFFECTS OF ALTERNATIVE 1 – ISSUANCE OF AN IHA WITH MITIGATION MEASURES

Alternative 1 is the Preferred Alternative, where we would issue an IHA to the POK allowing the take by harassment, of marine mammals, incidental to the proposed in-water construction activities, subject to the mandatory mitigation and monitoring measures and reporting requirements set forth in the IHA, if issued. Potential effects of the proposed action were evaluated in our FR notice (81 FR 15604, March 21, 2016), in the POK's application, and in the SEPA DEIS. We incorporate those analyses here, and summarize the results in the sections below.

#### 4.1.1 IMPACTS TO MARINE MAMMAL HABITAT

NMFS' proposed action would have no additive or incremental effect on the physical environment beyond those resulting from the proposed in-water construction activities. The POK's proposed construction activity is located within an existing industrial site, and is not located within a marine sanctuary, wildlife refuge, a National Park, or other conservation area. The proposed activity would result in temporary water quality and noise impacts during construction and would minimally add to vessel traffic in the region during operation. The proposed construction activity would not result in substantial damage to aquatic habitat in the action area that might constitute marine mammal habitats.

We expect that the proposed construction activities would have no more than a temporary and minimal adverse effect on any fish or invertebrate species. Although there is a potential for injury to fish or marine life in close proximity to pile driving activities, we expect that the impacts of these activities on fish and other marine life specifically related to acoustic activities would be temporary in nature, negligible, and would not result in substantial impact to these species or to their role in the ecosystem.

#### 4.1.2 IMPACTS TO MARINE MAMMALS

We expect that POK's construction activity has the potential to take marine mammals by harassment, as defined by the MMPA. Acoustic stimuli generated by pile driving of piers (vibratory and/or impact pile driving would occur) may affect marine mammals in one or more of the following ways: behavioral disturbance, tolerance, masking of natural sounds, and temporary or permanent hearing impairment, or non-auditory physical effects.

Our *Federal Register* notice of proposed IHA ([81 FR 15064, March 21, 2016](#)), POK's application and in POK's draft environmental analysis (SEPA DEIS, 2016) provide detailed descriptions of

these potential effects of the proposed construction activity on marine mammals. We incorporate those discussions by reference here and summarize our consideration in the following sections.

The effects of noise on marine mammals are highly variable, ranging from minor and negligible to potentially significant, depending on the intensity of the source, the distances between the animal and the source, and the overlap of the source frequency with the animals' audible frequency. Nevertheless, monitoring and mitigation measures required by us for the POK's proposed activities would effectively reduce any significant adverse effects of these sound sources on marine mammals.

**Behavioral Disturbance:** The studies discussed in the *Federal Register* notice for the proposed IHA note that there is variability in the behavioral responses of marine mammals to noise exposure. It is important to consider context in predicting and observing the level and type of behavioral response to anthropogenic signals (Ellison, Southall, Clark, & Frankel, 2012). Based on this information, we expect that the proposed activities would result, at worst, in a temporary modification in behavior and/or temporary changes in animal distribution (Level B harassment) of certain marine mammals. We expect that behavioral disturbance resulting from exposure to underwater sound resulting from the activities associated with the project has the potential to impact marine mammals and comprises the only likely source of effects to marine mammals. We expect these impacts to be minor and do not anticipate measurable changes to the population or that the activity would have any impacts to rookeries, mating ground, or other areas of significance. The proposed activities are not anticipated to result in injury, serious injury, or mortality of any marine mammal species and none is proposed to be authorized.

**Hearing Impairment:** Marine mammals exposed to high intensity sound repeatedly or for prolonged periods can experience hearing threshold shift (Akamatsu et al.), which is the loss of hearing sensitivity at certain frequency ranges (Finneran, Carder, Schlundt, & Ridgway, 2005; Finneran & Schlundt, 2013; Finneran et al., 2000; Kastak & Schusterman, 1998; Kastak, Schusterman, Southall, & Reichmuth, 1999; C. E. Schlundt, J. J. Finneran, B. K. Branstetter, J. S. Trickey, & Jenkins, 2013; C. R. Schlundt, Finneran, Carder, & Ridgway, 2000).

Level A harassment (harassment resulting in injury or direct mortality) is not anticipated to occur as a result of the proposed action, as no marine mammals will be exposed to levels of noise above the injury threshold established by NMFS in the new acoustic Guidance..

In sum, we interpret these effects on all marine mammals as falling within the MMPA definition of B harassment. We expect these impacts to be minor because we do not anticipate measurable changes to the population or measurable impacts to rookeries, mating grounds, and other areas of similar significance.

The POK proposed a number of monitoring and mitigation measures for marine mammals as part of our evaluation for the Preferred Alternative. In consideration of the potential effects of the proposed seismic survey, we determined that the mitigation and monitoring measures described in section 2.3.1 of this EA would be appropriate for the preferred alternative to meet the Purpose and Need.

#### **4.2 EFFECTS OF ALTERNATIVE 2– NO ACTION ALTERNATIVE**

Under the No Action Alternative, NMFS would not issue an IHA to the POK. As a result, the POK would not receive an exemption from the MMPA prohibitions against the take of marine mammals.

NSF has stated that POK would not conduct the survey in the absence of an IHA. Thus, POK would not conduct the proposed construction activities and marine mammals present in the survey area would not be incidentally harassed. This alternative would eliminate any potential risk to the environment from the proposed construction activities. The impacts to the human environment resulting from the No Action alternative—no issuance of the proposed IHA—would be less than less than the Preferred Alternative.

#### **4.4 UNAVOIDABLE ADVERSE IMPACTS**

The POK application, our *Federal Register* notice of a proposed IHA, and other environmental analyses identified previously summarize unavoidable adverse impacts to marine mammals or the populations to which they belong or on their habitats, as well as subsistence uses of marine mammals, occurring in the proposed construction area. We incorporate those documents by reference and summarize the determination here.

We acknowledge that the IHA would potentially result in unavoidable adverse impacts. However, we do not expect the POK's activities to have adverse consequences on the viability of marine mammals in the region. We do not expect the marine mammal populations in that area to experience reductions in reproduction, numbers, or distribution that might appreciably reduce their likelihood of surviving and recovering in the wild. We expect that the numbers of individuals of all species taken by harassment would be small (relative to species or stock abundance), that the construction activities and the take resulting from these activities would have a negligible impact on the affected species or stocks of marine mammals, and that there would not be any relevant subsistence impacts.

#### **4.5 CUMULATIVE EFFECTS**

NEPA defines cumulative effects as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions” (40 CFR §1508.7). Cumulative impacts can result from individually minor but collectively significant actions that take place over a period of time.

Past, present, and reasonably foreseeable impacts to marine mammal populations include climate change; coastal development; marine pollution; and disease. These account for cumulative impacts to regional and worldwide populations of marine mammals, many of which are a small fraction of their former abundance. However, quantifying the biological costs for marine mammals within an ecological framework is a critical missing link to our assessment of cumulative impacts to marine mammals. Despite these regional and global anthropogenic and natural pressures, available trend information indicates that most local populations of marine mammals in the Pacific Ocean are stable or increasing (Caretta *et al.* 2013).

The proposed construction activity would add another, albeit temporary, activity to the aquatic environment in the action area for a comparatively short period of time. The POK's application and draft environmental analysis (SEPA DEIS, 2016) summarize the potential cumulative effects to within the activity area. This section incorporates those documents by reference and provides a brief summary of the human-related activities affecting the marine mammal species in the action area.

##### **4.5.1 CLIMATE CHANGE**

Global climate change could significantly affect marine resources. Possible impacts include temperature and rainfall changes and potentially rising sea level rises and changes to ocean

conditions. These changes, and the combined impact of warming, acidification, and deoxygenation, have been attributed to having a dramatic effect on the flora and fauna of the oceans with significant changes in distribution of populations and decline of sensitive species (Bijma et al., 2013). However, the precise effects of global climate change on the action area cannot be predicted at this time because the marine ecosystem is highly variable in its spatial and temporal scales.

#### **4.5.2 COASTAL DEVELOPMENT**

Urban and coastal development encompasses housing, businesses/industry, transportation infrastructure, streets and parking lots, domestic wastewater effluent, floating structures, and mixed zones. Coastal development not only displaces organisms that once used a particular site but also indirectly affects a much broader area through non-point source and point source pollution. However, POK's proposed project consists largely of development of an area that already supports a built environment, as it is in an existing industrial facility along the Columbia River. The proposed POK project will have a very limited cumulative effect on coastal development in the region.

#### **4.5.2 DISEASE**

Disease is common in many marine mammal populations and has been responsible for major die-offs worldwide, but such events are usually relatively short-lived. The POK's construction activities are not expected to affect the disease rate among marine mammals in the project vicinity.

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