ENVIRONMENTAL ASSESSMENT

Issuance of an Incidental Harassment Authorization to
the Port of Vancouver to Take Marine Mammals by Harassment Incidental
to Pile Driving in the Columbia River, WA

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ABSTRACT: The National Marine Fisheries Service (NMFS) proposes to issue an Incidental Harassment Authorization (IHA) to the Port of Vancouver, USA (Port) for the incidental taking of small numbers of marine mammals. The IHA would be valid for one year from the date of issuance and would authorize the take, by Level B harassment, of marine mammals incidental to pile driving associated with the Terminal 5 Bulk Potash Handling Facility in Vancouver, Washington.

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CHAPTER 1 PURPOSE OF AND NEED FOR ACTION

1.1 DESCRIPTION OF ACTION

On February 22, 2011, the National Marine Fisheries Service (NMFS), Office of Protected Resources received a request from the Port of Vancouver, USA (Port) to take[1], by Level B harassment[2] only, small numbers of marine mammals incidental to pile driving associated with the Terminal 5 Bulk Potash Handling Facility (Terminal 5) project in Vancouver, WA. After receipt of supplemental information, the application was determined complete on June 7, 2011. As such, NMFS proposes to issue an Incidental Harassment Authorization (IHA) pursuant to Section 101(a)(5)(A) and (D) of the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1371 *et seq*.), and the regulations governing the taking and importing of marine mammals (50 CFR Part 216).

1.1.1 Purpose and Need

The purpose and need of the action is to ensure compliance with the MMPA and its implementing regulations for the activities associated with the Terminal 5 project. The MMPA prohibits takes of all marine mammals in the U.S. (including territorial seas) with a few exceptions. Sections 101(a)(5)(A) and (D) of the MMPA direct the Secretary of Commerce to allow, upon request, the incidental, but not intentional, taking of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) if certain findings are made and regulations are issued or, if the taking is limited to harassment, notice of a proposed authorization is provided to the public for review.

Authorization for incidental takings may be granted for up to five years if NMFS finds that the taking will have a negligible impact on the species or stock(s), will not have an unmitigable adverse impact on the availability of the species or stock(s) for certain subsistence uses, and if the permissible methods of taking and requirements pertaining to the mitigation, monitoring, and reporting of such taking are set forth. NMFS has defined "negligible impact" in 50 CFR 216.103 as: "an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival."

NMFS' decision of whether or not to issue the Port an incidental take authorization requires an analysis of the issuance's effect on the human environment pursuant to the National Environmental Policy Act (NEPA). This Environmental Assessment (EA) contains that analysis and is intended to support NMFS' decision of whether or not to issue an IHA authorizing the incidental take of small numbers of marine mammals associated with the Terminal 5 project.

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1 Under the MMPA, "take" is defined as to "harass, hunt, capture, kill or collect, or attempt to harass, hunt, capture, kill or collect." [16 U.S.C. 1362(18)(A)].

2 "Harass" is defined by regulation (50 CFR §216.3) as "Any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing a disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but does not have the potential to injure a marine mammal or marine mammal stock in the wild (Level B harassment)."

1.1.2 Objectives of the Terminal 5 Project

As described in the application, the fundamental objective of the project is to construct and operate a bulk potash handling facility on the Columbia River. The facility would allow shipping of potash (salts containing potassium in water-soluble form) to global markets. More specifically, the facility would accept potash shipped by rail from mines in Saskatchewan, Canada, and then ship it to various international ports. On-site infrastructure is proposed to enable the unloading of rail cars into on-site storage and the conveyance of potash to vessels at a new berth to be constructed adjacent to the facility.

1.3 APPLICABLE LAWS AND NECESSARY FEDERAL PERMITS, LICENSES, AND ENTITLEMENTS

This section summarizes federal, state, and local permits, licenses, approvals, and consultation requirements necessary to implement the proposed action.

1.3.1 National Environmental Policy Act (NEPA)

NEPA was enacted in 1969 and its environmental review requirements set forth in section 102(C) are applicable to all "major" federal actions with the potential to result in significant effects on the quality of the human environment. A major federal action is an activity that is fully or partially funded, regulated, conducted, or approved by a federal agency. NMFS issuance of incidental take authorizations represents approval and regulation of activities. While NEPA does not dictate substantive requirements for permits, licenses, etc., it requires consideration of environmental issues in federal agency planning and decision making. The procedural provisions outlining federal agency responsibilities under NEPA are provided in CEQ's implementing regulations (40 CFR Parts 1500-1508).

NOAA has, through NOAA Administrative Order (NAO) 216-6, established agency procedures for complying with NEPA and the implementing regulations issued by CEQ. NAO 216-6 specifies that issuance of incidental take authorizations under the MMPA and ESA is among a category of actions that are generally exempted (categorically excluded) from further environmental review if they are tiered to a pre-existing programmatic environmental review, except under extraordinary circumstances. When a proposed action that would otherwise be categorically excluded is the subject of public controversy based on potential environmental consequences, has uncertain environmental impacts or unknown risks, establishes a precedent or decision in principle about future proposals, may result in cumulatively significant impacts, or may have an adverse effect upon endangered or threatened species or their habitats, preparation of an EA or EIS is required. NMFS has not prepared a programmatic NEPA analysis covering the proposed IHA. Since issuance of the IHA has the potential to adversely affect species protected under the MMPA, NMFS has decided to prepare an EA to evaluate the context and intensity of such impacts to determine whether or not they have the potential to be significant. This EA is prepared in accordance with NEPA, its implementing regulations, and NOAA 216-6.

1.3.1.1 Public Involvement

Under 50 CFR 216.104(b) of NMFS' implementing regulations for the MMPA, NMFS must, after deeming the application adequate and complete, publish in the *Federal Register* a notice of proposed IHA or receipt of a request for the implementation or re-implementation of regulations governing the incidental taking. Information gathered during the associated comment period is considered by NMFS in ensuring adequacy of preliminary determinations and proposed mitigation measures for IHAs. In accordance, a notice of receipt of application and proposed issuance of an IHA were published in the *Federal Register* on August 19, 2011 (76 FR 51947) and was made available for public review and comment for 30 days. Comments received on the proposed IHA were also used to develop the scope of this EA.

1.3.2 Endangered Species Act (ESA)

Section 7 of the ESA requires consultation with the appropriate federal agency (either NMFS or the U.S. Fish and Wildlife Service) for federal actions that "may affect" a listed species or critical habitat. NMFS' issuance of an authorization affecting ESA-listed species or designated critical habitat, directly or indirectly, is a federal action subject to these section 7 consultation requirements. Accordingly, NMFS is required to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any threatened or endangered species or result in destruction or adverse modification of critical habitat for such species. Section 7 requires federal agencies to use their authorities in furtherance of the purposes of the ESA by carrying out programs for the conservation of endangered and threatened species. Regulations specify the procedural requirements for these consultations (50 Part CFR 402).

1.3.3 Marine Mammal Protection Act (MMPA)

The MMPA prohibits takes of all marine mammals in the U.S. (including territorial seas) with a few exceptions. Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq*.) direct the Secretary of Commerce (Secretary) to allow, upon request, the incidental, but not intentional, taking of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) if certain findings are made and regulations are issued or, if the taking is limited to harassment, notice of a proposed authorization is provided to the public for review.

Authorization for incidental takings may be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), will not have an unmitigable adverse impact on the availability of the species or stock(s) for certain subsistence uses, and if the permissible methods of taking and requirements pertaining to the mitigation, monitoring, and reporting of such taking are set forth. NMFS has defined "negligible impact" in 50 CFR 216.103 as: "an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival."

Under the MMPA, harassment is defined as any act of pursuit, torment, or annoyance which has the potential to: (i) injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) disturb a marine mammal or marine mammal stock in the wild by

causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment). An IHA may be issued, except for activities that have the potential to result in serious injury or mortality (i.e., it may only authorize Level A and B harassment), for a period of no more than 1 year, following a 30-day public review period. Alternatively, regulations may be granted for a period of 5 years and may include takes by serious injury and mortality. Upon rulemaking (i.e., defining regulations), Letters of Authorization (LOAs) will be issued each year to the authorization holder. For both an IHA and regulations, authorization shall be granted if the Secretary finds that the taking will have a negligible impact on a species or stock, and that the IHA or regulations are prescribed setting forth the permissible methods of taking, the means of effecting the least practicable adverse impact, and requirements pertaining to monitoring and reporting. For authorizations associated with activities that could impact marine mammals in Arctic waters (waters north of 60ºN), the action agency must also consider means of effecting the least practicable adverse impact on the availability of the species for subsistence uses.

1.3.4 Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA)

Under the MSFCMA, Congress defined Essential Fish Habitat (EFH) as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. 1802(10)). The EFH provisions of the MSFCMA offer resource managers means to accomplish the goal of giving heightened consideration to fish habitat in resource management. NMFS Office of Protected Resources is required to consult with NMFS Office of Habitat Conservation for any action it authorizes (e.g., research permits), funds, or undertakes, or proposes to authorize, fund, or undertake that may adversely affect EFH. This includes renewals, reviews, or substantial revisions of actions.

NMFS Northwest Region concluded EFH consultation with the U.S. Army Corps of Engineers (the federal action agency for the Port's construction) and determined that the proposed action will degrade EFH due to elevated sound. However, NMFS also determined that the ESA Terms and Conditions in the Incidental Take Statement for the Biological Opinion are necessary and sufficient to avoid, mitigate, or offset the impact of the proposed action.

CHAPTER 2 ALTERNATIVES INCLUDING THE PROPOSED ACTION

This chapter describes the range of potential actions (alternatives) determined reasonable with respect to achieving the stated purpose and need for the proposed action, as well as alternatives eliminated from detailed study. This chapter also summarizes the expected outputs and any related mitigation of each alternative. One alternative is the "No Action" alternative where the proposed permit would not be issued. The No Action alternative is the baseline for the rest of the analyses. The Proposed Action alternative represents the activity proposed in the submitted application for a permit, with standard permit terms and conditions specified by NMFS.

2.1 ALTERNATIVE 1 – NO ACTION

Under the No Action alternative, NMFS would not issue an IHA to the Port authorizing the take of small numbers of marine mammals incidental to the specified activity. The Port would still be authorized to conduct the activity, as allowed for under their other federal and state permits; however, mitigation measures may or may not be implemented and illegal take of marine mammals could occur or the Port may choose not to conduct the activity.

2.2 ALTERNATIVE 2 – PROPOSED ACTION (Issuance of an IHA with Proposed Conditions)

Under the Proposed Action alternative, an IHA would be issued for takes of small numbers of marine mammals incidental to specified activities as proposed by the applicant, with the mitigation, monitoring, and reporting conditions contained within the Port's application and NMFS' proposed IHA *Federal Register* notice.

2.2.1 Action Area

The proposed activity would occur within the Lower Columbia River sub-basin. The Columbia River and its tributaries are the dominant aquatic system in the Pacific Northwest, originating in Canada's Rocky Mountains and flowing approximately 1,200 mi (1,931 km) to the Pacific Ocean. The proposed construction would take place at 5701 NW Lower River Road in Vancouver, Washington, about 3 mi (4.8 km) northwest of downtown Vancouver. The area is composed of submerged, tidal, nearshore, and upland lands along a 2,300-ft (701-m) long section on the north bank of the Columbia River. The proposed project site is centered around river mile 103.3, a reach of the Columbia River that is about 3,000 ft (914 m) wide on average and 43 mi (69 km) from the Bonneville Dam. A heavy industrial site, this area has been used since the 1940s for aluminum smelting as well as for the fabrication and outdoor storage of aluminum ingots, but is currently used for storage of windmill components.

2.2.2 Specified Activity

The in-water work for the Terminal 5 project is scheduled to commence on November 1, 2012 and the facility is scheduled to be operational by 2015. However, only pile driving has the potential to result in marine mammal take and this activity is expected to be complete by February 2013. In-water construction would include the installation of 203 steel piles and removal of previously installed piles using vibratory and impact pile driving. These piles would be necessary for construction of a ship loading system and marine berthing facilities. Pile driving results in elevated noise levels; therefore, this activity may impact marine mammals in the vicinity of the pile driver.

Approximately two piles would be installed per day over a 4-month period. Although the exact duration of pile driving would vary depending on the installation procedures and geotechnical conditions, the applicant estimates that each permanent pile would require between 2 and 3 hours of vibratory installation and between 1 and 2 hours of impact driving to install.

To the extent possible, all piles would be installed with an APE Model 200 (or similar) vibratory hammer; however, it may be necessary to seat a pile using an impact hammer. The temporary piles (18- to 24-in diameter) would be driven solely with a vibratory hammer. Should an impact hammer be necessary for finishing the installation of permanent piles, the Port would use a DELMAG D46-32 with 60-80 maximum blows per foot, a DELMAG D80 with 20-30 maximum blows per foot, or a similar model. In addition to pile installation, the Port would also remove the temporary piles using vibratory extraction or by pulling them directly with a crane. A pneumatic underwater chainsaw may be used if a pile breaks in the process, but associated noise is expected to be negligible.

Data from a California Department of Transportation (Caltrans) project and a Washington Department of Transportation project were used for the noise analysis (Caltrans, 2009; WSDOT, 2010b). Because there is a lack of information related to the size of the hammers and resulting sound levels for this size of pile installation, NMFS has determined that hydroacoustic data from the aforementioned projects are appropriate to use to estimate sound levels from the specified activity.

For background, sound is a mechanical disturbance consisting of minute vibrations that travel through a medium, such as air or water, and is generally characterized by several variables. Frequency describes the sound's pitch and is measured in hertz (Hz) or kilohertz (kHz), while sound level describes the sound's loudness and is measured in decibels (dB). Sound level increases or decreases exponentially with each dB of change. For example, 10 dB yields a sound level 10 times more intense than 1 dB, while a 20 dB level equates to 100 times more intense, and a 30 dB level is 1,000 times more intense. Sound levels are compared to a reference sound pressure (micro-Pascal) to identify the medium. For air and water, these reference pressures are "re: 20 μPa" and "re: 1 μPa," respectively. Sound levels in this document are referenced to 1 μPa, unless otherwise noted. Root mean square (RMS) is the quadratic mean sound pressure over the duration of an impulse. RMS is calculated by squaring all of the sound amplitudes, averaging the squares, and then taking the square root of the average (Urick, 1975). RMS accounts for both positive and negative values; squaring the pressures makes all values positive so that they may be accounted for in the summation of pressure levels (Hastings and Popper, 2005). This measurement is often used in the context of discussing behavioral effects, in part

because behavioral effects – which often result from auditory cues – may be better expressed through averaged units rather than by peak pressures.

The Port applied a practical spreading loss model to calculate sound propagation, which assumes that noise attenuates at a rate of 4.5 dB per doubling distance, and this attenuation rate increases to 10 dB per doubling distance beyond 0.6 mile (1 km) (WSDOT, 2010a). Using this model, the largest noise impact zone is expected to result from vibratory pile driving of 48- to 54-in (1,220- to 1,372-mm) steel pipe piles. It may take up to 7 miles (11 km) for underwater sound to attenuate to below 120 dB. Because of the project area's location on a river bend and across from Hayden Island, sound transmission would be stopped by land masses much earlier in certain directions. In-air sound from pile driving also has the potential to affect marine mammals. However, in-air sound is not a concern here because there are no pinniped haul-out sites near the project area.

Table 1. Maximum sound levels for impact and vibratory installation of steel piles.

Pile Diameter	Sound Level (single strike)[1] with Attenuation			Sound Level (vibratory)[1]
48- to 54-inch (1,220- to 1,372-mm)	199 dB_{PEAK}	187 dB_{RMS}	173 dB_{SEL}	174 dB_{RMS}

[1] DEA, 2011

In addition to pile installation, a total of 272 piles would also be removed using vibratory extraction or a crane. These consist of 95 temporary piles and 177 old wood piles upstream of Terminal 5. The 177 wood piles are located at Terminal 2, about two miles upstream from Terminal 5, and do not have much structural capacity. A pneumatic underwater chainsaw may be used if a pile breaks in the process, but associated noise is expected to be negligible. In-water noise from the pneumatic underwater chainsaw would be negligible. Above-water work would also be necessary to complete construction of each project component. There could be barges in the water to support construction activities; however, these would be concentrated in the direct vicinity of Terminal 5. Because pile removal and use of barges does not release loud sounds into the environment, marine mammal harassment from these activities is not anticipated. Construction activities that would take place on land are not expected to result in harassment of marine mammals because there are no marine mammal haul-out sites near the project area. The nearest known haul-out site is approximately 60 miles (97 km) away.

2.2.3 Mitigation Measures

In order to issue an IHA under section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to such activity, and other means of effecting the least practicable adverse impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for taking for certain subsistence uses.

With NMFS' guidance, the Port proposed a number of mitigation measures, designed to ensure the least practicable adverse impact on marine mammals:

(1) Temporal Restrictions

The Washington Department of Fish and Wildlife recommends an in-water work window of November 1 through February 28, annually. This in-water work window was designed to protect fish species, particularly salmonid eggs and fry. However, by limiting pile driving activities to this period of time, the peak sea lion run to and from Bonneville Dam would also be avoided. The Port plans to install all but five piles during the in-water work window. The five 54-in piles may be installed outside the in-water work window if they can be installed during low water periods under dry conditions.

(2) Limited Use of an Impact Hammer

All piles would be installed using a vibratory pile driver unless sufficient depth cannot be reached, at which point an impact hammer may be used. In the event that an impact hammer is necessary, an attenuation device, such as a bubble curtain, would be used to reduce hydroacoustic sound levels to avoid the potential for injury and reduce disturbance. With the use of these devices, hydroacoustic source levels are anticipated to be less than those presented in Table 1 above.

(3) Establishment of an Exclusion Zone

During all in-water impact pile driving, the Port would establish a preliminary marine mammal exclusion zone of 10 ft (3 m) around each pile, based on estimated source levels and sound propagation. The exclusion zone would be monitored by protected species observers for 20 minutes before, during, and 20 minutes after all impact pile driving to ensure that no marine mammals enter the 10 ft (3 m) radius. The purpose of this area would be to prevent Level A harassment (injury) of any marine mammal species.

(4) Pile Driving Shut Down and Delay Procedures

If a protected species observer (PSO) sees a marine mammal within or approaching the exclusion zone prior to the start of impact pile driving, the PSO would notify the on-site construction manager (or other authorized individual) who would then be required to delay pile driving until the marine mammal has moved outside of the exclusion zone or if the animal has not been resighted within 15 minutes. If a marine mammal is sighted within or on a path toward the exclusion zone during impact pile driving, pile driving would cease until that animal has cleared and is on a path away from the safety zone or 15 minutes has lapsed since the last sighting.

(5) Soft-Start Procedures

A “soft-start” technique would be used at the beginning of each pile installation to allow any marine mammal that may be in the immediate area to leave before the pile hammer reaches full energy. For vibratory pile driving, the soft-start procedure requires contractors to initiate noise from the vibratory hammer for 15 seconds at 40-60 percent reduced energy followed by a

1-minute waiting period. The procedure would be repeated two additional times before full energy is achieved. For impact hammering, contractors would be required to provide an initial set of three strikes from the impact hammer at 40 percent energy, followed by a 1-minute waiting period, then two subsequent three-strike sets. The soft-start procedure would be conducted prior to driving each pile if impact or vibratory hammering ceases for more than 30 minutes.

2.2.4 Monitoring Measures

In order to issue an IHA for an activity, section 101(a)(5)(D) of the MMPA states that NMFS must set forth "requirements pertaining to the monitoring and reporting of such taking". The MMPA implementing regulations at 50 CFR § 216.104 (a)(13) indicate that requests for IHAs must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present.

(1) Protected Species Observers

The Port would designate at least one biologically-trained, on-site individual, approved in advance by NMFS, to monitor the area for marine mammals 20 minutes before, during, and 20 minutes after all impact pile driving activities and call for shut down if any marine mammal is observed within or approaching the designated Level A harassment zone (preliminarily set at 10 ft [3 m]).

In addition, at least two NMFS-approved PSOs would conduct behavioral monitoring around Terminal 5 at least two days per week for the duration of the project to estimate take and evaluate the behavioral impacts that pile driving has on marine mammals out to the Level B harassment isopleths. For impact hammering, this distance is about 2,070 ft (631 m). For vibratory hammering, this estimated distance is about 7 mi (11 km); however, sound will dissipate before then (in about 6 mi [9.7 km]) due to the shape and configuration of the river.

(2) Equipment

PSOs would be provided with the equipment necessary to effectively monitor for marine mammals (for example, high-quality binoculars, compass, and range-finder) in order to determine if animals have entered into the exclusion zone or Level B harassment isopleth and to record species, behaviors, and responses to pile driving.

(3) Reporting

PSOs would be required to submit a report to NMFS within 120 days of expiration of the IHA or completion of pile driving, whichever comes first. The report would include data from marine mammal sightings (such as species, group size, and behavior), any observed reactions to construction, distance to operating pile hammer, and construction activities occurring at time of sighting.

2.2.5 Other Alternatives Considered but Eliminated

The Exploratorium worked with NMFS and the Northwest Regional Office to develop the above mitigation and monitoring measures needed to ensure their project resulted in the least practicable adverse impacts to marine mammals. The Port already agreed to keep almost all pile driving activities limited to the in-water work window of November 1 through February 28. Although this in-water work window was originally established to protect salmonids, it would also work to protect the pinnipeds' peak run to and from the Bonneville Dam. Therefore, adherence to this work window would help to reduce impacts to marine mammals. In so doing, no other alternatives were provided or analyzed because another in-water work window would not meet NMFS' purpose and need for effecting the least practical adverse impact to marine mammals and would have an increased impact on salmonids.

CHAPTER 3 AFFECTED ENVIRONMENT

This chapter presents baseline information necessary for consideration of the alternatives, and describes the resources that would be affected by the alternatives, as well as environmental components that would affect the alternatives if they were to be implemented. The effects of the alternatives on the environment are discussed in Chapter 4.

1.1 SOCIAL AND ECONOMIC ENVIRONMENT

Economic and social factors are listed in the definition of effects in the NEPA regulations. However, the definition of human environment states that "economic and social effects are not intended by themselves to require preparation of an EIS." An EA must include a discussion of a proposed action's economic and social effects when these effects are related to the natural or physical environment.

The Terminal 5 Bulk Potash Handling Facility would provide a means for distributing potash globally from Canada. Currently, portions of Terminal 5 are used to store wind turbine towers and are not providing any social benefits. Uses surrounding the Terminal 5 site are primarily industrial and would not be affected by the new facility. The construction of a facility would not have any negative economic or social impact as the current pier is not used to facilitate economic growth (e.g., not a shipping port).

NMFS's proposed action is to issue an IHA authorizing harassment of marine mammals within the action area. This part of the Columbia River is industrialized and does not support any marine mammal related businesses (such as the seal watching industry). There are no subsistence uses of marine mammals within the action area.

1.2 PHYSICAL ENVIRONMENT

The site is a heavy industrial site, which was used since the 1940s for aluminum smelting as well as for the fabrication and outdoor storage of aluminum ingots. The sediment adjacent to the project site was remediated in 2009 as part of the Alcoa Sediment Remediation project. Polychlorinated biphenyl (PCB) exceedances of project-specific cleanup standards were addressed during the remediation through dredging. The sediment adjacent to the project site achieved a clean closure designation after successful remediation. Areas adjacent to the Terminal 5 site are currently industrial and include the following: Clark Public Utilities River Road Generating Plant lies to the northeast, the Tidewater Barge Company lies to the west, and the Clark County Correctional Facility lies to the east. The Port's Terminal 4 property, to the east, is predominantly used for staging and distributing Subaru vehicles and for cargo storage.

1.3 BIOLOGICAL ENVIRONMENT

The Columbia River is a habitat for numerous aquatic and marine species, including birds, fish, and marine mammals, that are protected by a variety of environmental regulations. The Biological Evaluation for the Port's proposed project, incorporated here by reference, identifies and describes a variety of biologically important and protected species inhabiting the

action area (Anchor QEA, LLC, 2011). NMFS' proposed action of issuing an IHA would allow for the harassment of marine mammals, which is the focus of this section. Summary information is also provided on fish because EFH exists in and around the proposed action area.

1.3.1 Marine Mammals

Marine mammals with confirmed occurrences in the Columbia River are the Pacific harbor seal, California sea lion, and Steller sea lion.

Pacific Harbor Seals

Pacific harbor seals are found in the coastal and estuarine waters off Baja, California, north to British Columbia, west through the Gulf of Alaska, and in the Bering Sea. Harbor seals in the Columbia River are part of the Oregon/Washington coastal stock. The most recent NMFS' stock assessment report estimated this stock to be at least 22,380 individuals and the population is likely at carrying capacity and no longer increasing (NMFS, 2010a). The Oregon/Washington stock of Pacific harbor seals is not listed under the ESA nor considered depleted or strategic under the MMPA.

Harbor seals are infrequently observed as far upstream in the Columbia River as Vancouver. The nearest known haul-out is approximately 60 miles (97 km) downstream of the proposed project area. Since 2002, the Army Corps of Engineers has documented less than four harbor seals at Bonneville Dam (approximately 40 miles [64 km] from the proposed project area), and any harbor seals potentially within the proposed project area will likely be transiting to or from Bonneville Dam.

California Sea Lions

California sea lions reside throughout the Eastern North Pacific Ocean in shallow coastal and estuarine waters, ranging from Central Mexico to British Columbia, Canada. Their primary breeding range extends from Central Mexico to the Channel Islands in Southern California. The abundance of the U.S. stock is estimated to be 238,000 sea lions (NMFS, 2007). This stock is approaching carrying capacity and is reaching "optimum sustainable population" limits, as defined by the MMPA. California sea lions are not listed under the ESA nor considered depleted or strategic under the MMPA.

Historically, California sea lions have been the most frequently observed pinnipeds at Bonneville Dam, with the largest number (104) of individuals recorded in 2003. There are no California sea lion haul-outs within the proposed project area, so individuals present during construction would likely be passing through the area on their way to and from the Dam.

Steller Sea Lions

Steller sea lions reside along the North Pacific Rim from northern Japan to California, with centers of abundance and distribution in the Gulf of Alaska and Aleutian Islands, respectively. Steller sea lions in the Columbia River are part of the eastern distinct population

segment, which is listed as "threatened" under the ESA and designated as "depleted" under the MMPA. In April 2012, NMFS proposed removing eastern Steller sea lions from the endangered species list and is seeking public comment through mid-June. Steller sea lion critical habitat is not designated for the Columbia River. Since the 1970s, the average annual population growth rate has been three percent (NMFS, 2008).

Since 2002, observers have rarely seen Steller sea lions at Bonneville Dam, with less than 10 sea lions recorded in most years. However, since 2008, the numbers of Steller sea lions documented at the dam have increased steadily, to 75 individuals in 2010. The most recent stock assessment (NMFS, 2010b) cited 516 individuals as the population count for the entire state of Washington. No Steller sea lion haul-outs or haul-out habitat are known within the proposed project area and there are no Steller sea lion rookeries in Washington. Any Steller sea lions present during construction would likely be passing through the area.

1.3.2 Fish

The following listed species are expected to be in the proposed action: Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), chum salmon (*O. keta*), sockeye salmon (*O. nerka*), steelhead trout (*O. mykiss*), bull trout (*Salvelinus confluentus*), green sturgeon (*Acipenser medirostris*), and eulachon (*Thaelichthys pacificus*). Within the action area, designated critical habitat exists for all listed salmon, steelhead, and bull trout populations except for Lower Columbia River coho. Critical habitat has been proposed for eulachon. The proposed action area may be used as a migration corridor and rearing area for adult and juvenile fish. Spawning for most of the listed fish species occurs further upstream, but eulachon spawning may occur within the proposed action area. A detailed description of species information, presence, and critical habitat is provided in the Port's Biological Evaluation (Anchor QEA, LLC, 2011).

CHAPTER 4 ENVIRONMENTAL CONSEQUENCES

This chapter represents the scientific and analytic basis for comparison of the direct, indirect, and cumulative effects of the alternatives. Regulations for implementing the provisions of NEPA require consideration of both the context and intensity of a proposed action (40 CFR Parts 1500-1508).

4.1 EFFECTS OF ALTERNATIVE 1: No Action

Under the No Action alternative, NMFS would deny the Port an authorization to harass marine mammals incidental to pile driving during the Terminal 5 project. To conduct the activity and still avoid violation of the MMPA if no IHA is issued, the Port would have to continuously monitor a 6 mile (9.7 km) range during vibratory pile driving or a 2,070 ft (631 m) range during impact pile driving and shut down all pile driving operations whenever a marine mammal is sighted within these Level B harassment zones.

4.2 EFFECTS OF ALTERNATIVE 2: Issue IHA with Proposed Conditions

This section describes potential impacts to the human environment from issuance of an IHA allowing the harassment of marine mammals incidental to the Terminal 5 project.

4.2.1 Effects to the Social and Economic Environment

The proposed action is NMFS' issuance of an IHA to the Port authorizing the harassment of marine mammals incidental to pile driving associated with the Terminal 5 project. As described in Chapter 3, there is no commercial, recreational, or subsistence use of marine mammals within the action area. Therefore, the proposed issuance of an IHA is not anticipated to effect the social and economic environment.

4.2.2 Effects on the Physical Environment

The issuance of an IHA authorizing harassment to marine mammals would not affect the physical environment. The Port is authorized to conduct the construction project under numerous federal, state, and local permits. NMFS' authorization solely authorizes marine mammal harassment. With respect to marine mammal habitat, see section 4.3.4 below.

4.2.3 Effects on Marine Mammals

Pile driving at the Terminal 5 location may temporarily impact marine mammals within the action area due to elevated in-water noise levels. NMFS has prepared, supplemented, or adopted numerous EAs leading to Findings of No Significant Impact (FONSIs) for pile driving activities. The analysis of pile driving impacts to marine mammals and their environment under NEPA have been conducted to facilitate issuance of other IHAs. Examples of such EAs include:

1. *Environmental Assessment on the Authorization for the Harassment of Marine Mammals Incidental to the Seismic Retrofit of the Richmond-San Rafael Bridge, San Francisco Bay, CA Under Section 101(a)(5) of the Marine Mammal Protection Act* (1997);

2. *Environmental Assessment on the Authorization for the Harassment of Marine Mammals Incidental to Construction of the East Span of The San Francisco-Oakland Bridge Under Section 101(a)(5) of the Marine Mammal Protection Act* (2003);

3. *Environmental Assessment on the Authorization for the Harassment of Marine Mammals Incidental to Retrofitting Three Bridges at Humbolt Bay in Humbolt County, CA by the California Department of Transportation Under Section 101(a)(5) of the Marine Mammal Protection Act* (2005); and

4. *Environmental Assessment on the Authorization for the Harassment of Marine Mammals Incidental to the Exploratorium Relocation Project in San Francisco, CA Under Section 101(a)(5) of the Marine Mammal Protection Act (2010).*

Marine mammals are continually exposed to many sources of sound. Naturally occurring sounds such as lightning, rain, sub-sea earthquakes, and biological sounds (e.g., snapping shrimp, whale songs) are ubiquitous throughout the world's oceans. Marine mammals produce sounds in various contexts and use sound for various biological functions including, but not limited to: (1) social interactions; (2) foraging; (3) orientation; and (4) predator detection. Interference with producing or receiving these sounds may result in adverse impacts. In this EA, all sound pressure levels are referenced to 1 microPascal (re: 1 µPa) unless otherwise noted. Impacts from noise exposure are expected to be both auditory and behavioral, as described in the below sections. No pinniped haul-outs would be affected, as the closest haul-out is approximately 60 miles (97 km) away; therefore, in-air noise is not a concern for marine mammals.

Auditory Impacts

In mammals, high-intensity sound may rupture the eardrum, damage the small bones in the middle ear, or over-stimulate the electromechanical hair cells that convert the fluid motions caused by sound into neural impulses that are sent to the brain. Lower level exposures may cause a loss of hearing sensitivity, termed a threshold shift (TS) (Miller, 1974). Incidence of TS may be either permanent, referred to as permanent threshold shift (PTS), or temporary, referred to as temporary threshold shift (TTS).

PTS consists of non-recoverable physical damage to the sound receptors in the ear, which can include total or partial deafness, or an impaired ability to hear sounds in specific frequency ranges; PTS is considered Level A harassment. TTS is recoverable and is considered to result from temporary, non-injurious impacts to hearing-related tissues; TTS is considered Level B harassment. There are no empirical data for onset of PTS in any marine mammal; therefore, PTS-onset must be estimated from TTS-onset measurements and from the rate of TTS growth with increasing exposure levels above the level eliciting TTS-onset. PTS is presumed to be likely if the hearing threshold is increased by ≥ 40 dB (i.e., 40 dB of TTS). Due to proposed

mitigation measures and source levels, NMFS does not expect that marine mammals would be exposed to levels that could elicit PTS; therefore, it will not be discussed further.

TTS is the mildest form of hearing impairment that can occur during exposure to a loud sound (Kryter, 1985). While experiencing TTS, the hearing threshold rises and a sound must be louder in order to be heard. TTS can last from minutes or hours to, in cases of strong TTS, days. For sound exposures at or somewhat above the TTS-onset threshold, hearing sensitivity recovers rapidly following exposure. Few data on sound levels and durations necessary to elicit mild TTS have been obtained for marine mammals. Southall et al. (2007) considers a 6 dB TTS (i.e., baseline thresholds are elevated by 6 dB) sufficient to be recognized as an unequivocal deviation and thus a sufficient definition of TTS-onset. Because it is non-injurious, NMFS considers TTS as Level B harassment that is mediated by physiological effects on the auditory system; however, NMFS does not consider TTS-onset to be the lowest level at which Level B harassment may occur.

The amplitude, duration, frequency, temporal pattern, and energy distribution of a sound exposure all affect the amount of associated TS and the frequency range in which it occurs. As amplitude and duration of sound exposure increase, generally, so does the amount of TS and recovery time. Human non-impulsive noise exposure guidelines are based on exposures of equal energy (the same SEL) producing equal amounts of hearing impairment regardless of how the sound energy is distributed in time (NIOSH, 1998). Until recently, previous marine mammal TTS studies have also generally supported this equal energy relationship (Southall et al., 2007). Three newer studies, two by Mooney et al. (2009a, 2009b) on a single bottlenose dolphin either exposed to playbacks of Navy MFAS (mid-frequency active sonar) or octave-band noise (4–8 kHz) and one by Kastak et al. (2007) on a single California sea lion exposed to airborne octave-band noise (centered at 2.5 kHz), concluded that for all noise exposure situations the equal energy relationship may not be the best indicator to predict TTS onset levels. Generally, with sound exposures of equal energy, those that were quieter (lower sound pressure level [SPL]) with longer duration were found to induce TTS onset more than those of louder (higher SPL) and shorter duration. For intermittent sounds, less TS will occur than from a continuous exposure with the same energy (some recovery will occur between exposures) (Kryter et al., 1966). Additionally, though TTS is temporary, very prolonged exposure to sound strong enough to elicit TTS, or shorter-term exposure to sound levels well above the TTS threshold, can cause PTS, at least in terrestrial mammals (Kryter, 1985). These studies highlight the inherent complexity of predicting TTS-onset in marine mammals, as well as the importance of considering exposure duration when assessing potential impacts.

Sound exposures that elicit TTS in pinnipeds underwater have been measured in harbor seals, California sea lions, and northern elephant seals. As described in Southall (2007), Kastak and Schusterman (1996) reported a TTS of approximately 8 dB (measured underwater at 100 Hz) in a harbor seal following exposure to broadband airborn noise from nearby construction. Kastak et al. (1999) measured TTS of approximately 4-5 dB in all the aforementioned species of pinnipeds following 20-22 minutes of expsore to underwater 100 Hz to 2 kHz octave band noise (OBN). Subsequently, Kastak et al. (2005) made TTS measurements on the same subjects using 2.5 kHz OBN using higher sensation levels and longer durations. Cumulatively, these tests indicate that the harbor seal experienced a 6 dB TTS when exposed to 25 minutes of OBN with

an SPL of 152 dB re 1 microPa. The California sea lion experienced TTS-onset at 174 dB re 1 microPa.

As described above, it is difficult to predict if TTS in marine mammals could occur; however, expected received levels and duration of sound exposure can help determine TTS potential. The Port has indicated that piles would be primarily driven with a vibratory hammer, but has reserved the right to use an impact hammer should substrate resistance occur. Vibratory source levels are expected to range from 174 dB to a maximum of 199 dB with sounds potentially reaching NMFS Level A harassment threshold in a 10-ft radius around the sound source. Given that pinnipeds move to and from Bonneville Dam and are not likely to remain in any given area for a long period of time, and the mitigation measures that would be required by an IHA, duration of exposure to elevated sound levels is expected to be short (on the order of minutes). Therefore, NMFS has preliminarily determined that the potential for TTS is possible, but not likely.

Behavioral Impacts

Type and significance of marine mammal reactions to noise are likely to be dependent on a variety of factors including, but not limited to, the behavioral state (e.g., feeding, traveling, etc.) of the animal at the time it receives the stimulus, frequency of the sound, distance from the source, and the level of the sound relative to ambient conditions (Southall et al., 2007). Vibratory pile driving emits low-frequency broadband noise, all of which may be detectable by marine mammals within the action area. This section of the Columbia River is highly industrialized and masking of the pile driver by other vessels and anthropogenic noise near the proposed project area may make construction sounds difficult to hear at greater distances. Pinnipeds would likely also exhibit tolerance or habituation (as described in Richardson et al., 1995) to pile driving due to the amount of anthropogenic use already existing within the Columbia River.

There are limited data available on the effects of non-pulse noise (e.g., vibratory pile driving) on pinnipeds in-water; however, field and captive studies to date collectively suggest that pinnipeds do not strongly react to exposures of 90-140 dB re 1 µPa; no data exist from exposures at higher levels. Jacobs and Terhune (2002) observed wild harbor seal reactions to high-frequency acoustic harassment devices (ADH) around nine sites. Seals came within 44 m of the active ADH and failed to demonstrate any behavioral response when received SPLs were estimated at 120-130 dB. In a captive study (Kastelein et al., 2006), a group of seals were collectively subjected to non-pulse sounds of 8-16 kHz from an underwater data collection and communication network (ACME). Exposures of 80-107 dB did not induce strong behavioral responses; however, a single observation of 100-110 dB indicated an avoidance response. The seals returned to baseline conditions shortly following exposure. Southall et al. (2007) notes contextual differences between these two studies; the captive animals were not reinforced with food for remaining in the noise fields, whereas free-ranging subjects may have been more tolerant of exposures because of motivation to return to a safe location or approach enclosures holding prey items. While some pile driving for the Terminal 5 project would be vibratory, some piles may be driven or finished using an impact hammer (pulse noise). Southall et al. (2007) reviewed relevant data from studies involving pinnipeds exposed to pulse noise and concluded

that exposures of 150-180 dB generally have limited potential to induce avoidance behavior. Mitigation measures required by the IHA would exclude marine mammals from the area in which sound levels exceed 180 dB.

It is expected that marine mammals exposed to pile driving noise would be using the adjacent waters around the Terminal 5 project site for foraging or as a migration route to and from the Bonneville Dam. Any impacts to marine mammal behavior are expected to be temporary. First, animals may avoid the area around the hammer; thereby reducing exposure. Second, pile driving would not occur continuously throughout the day. The vibratory hammer would operate for about 2-3 hours per pile and the impact hammer would operate for about 1-2 hours per pile. The Port anticipates an average of two pilings would be driven per day, resulting in a total of 6-10 hours of pile driving within a 24-hour period. Any disturbance to marine mammals would likely be in the form of temporary avoidance or alteration of behavior near the pile driving location. In addition, because vibratory pile driving would be used as much as possible and the Level A harassment zone for impact pile driving would be relatively small, marine mammal injury or mortality is not anticipated. If an impact hammer proves necessary, PSOs would be on watch to implement pile driver shut down, a mitigation measure designed to prevent animals from being exposed to injurious sound levels. Finally, no pinniped haul-outs are found within 60 mi (97 km) of the Terminal 5 project site; therefore, no in-air noise impacts to pinnipeds are anticipated. For these reasons, any changes to marine mammal behavior are expected to be temporary and result in negligible impact to affected species and stocks.

Estimated Take by Harassment

NMFS typically proposes threshold sound levels to establish appropriate mitigation. Current NMFS practice regarding exposure of marine mammals to anthropogenic noise is that in order to avoid injury, (e.g., PTS), pinnipeds should not be exposed to impulsive sounds of 190 dB RMS or above. This level is considered precautionary as it is likely that more intense sounds would be required before injury actually occurs (Southall et al., 2007). Potential for behavioral harassment (Level B) is considered to have occurred when marine mammals are exposed to sounds at or above 160 dB RMS for impulse sounds (e.g., impact pile driving) and 120 dB RMS for non-pulse noise (e.g., vibratory pile driving), but below the aforementioned injury thresholds.

The estimated number of marine mammals that could be harassed was based on the Army Corps of Engineers' evaluation of pinniped predation on fish near the Bonneville Dam in 2010. Based on the 2010 Steller sea lion counts at Bonneville Dam, the Port initially requested a total take of 50 Steller sea lions. This number was reached based on the estimated 75 individuals that passed through the action area in 2010 during their migration to and from Bonneville Dam, for a total of 150 individual trips through the action area. Since all pile installation would occur between November 1 and February 28, the peak of the run in April and May would be avoided. Steller sea lion presence at the dam in January and February 2010 represented (conservatively) less than a third of the total run for the year. Therefore, the Port estimated that no more than one-third of the total run of Steller sea lions (approximately 25 individuals) could be exposed to Level B harassment. Since each individual could potentially be exposed on both the upstream and downstream trip, a total of 50 takes of Steller sea lions could occur. Upon further consultation with NMFS Northwest Regional Office, and in consideration of steadily increasing

numbers of Steller sea lions since 2008, NMFS proposed to increase the number of Steller sea lions that could be exposed to Level B harassment. This was based on the fact that abundance estimates increased three-fold between 2009 and 2010, and may continue. Therefore, it is reasonable to assume that 2,025 individuals may make the trip to and from the dam during the proposed activity (based on a conservative three-fold increase in 2011, 2012, and again in 2013). Considering the avoidance of the peak run and potential exposure during the upstream and downstream migration, NMFS proposed to authorize the incidental take, by Level B harassment only, of 1,350 Steller sea lions exposures (accounting for one-third of the total run – about 675 animals – traveling to and from the dam).

In addition, the Port requested authorization for Level B harassment of 60 California sea lion exposures (based on the same analysis that was applied for Steller sea lions) and six harbor seals (the maximum number of harbor seals documented at Bonneville Dam since 2002). These numbers take the proposed mitigation measures into consideration, but are conservative and represent the maximum number of animals expected to occur within the Level B harassment isopleth (Table 2).

Table 2. Modeled underwater distances to NMFS' marine mammal harassment threshold levels.

	Level A (190/180 dB)	Level B harassment (160 dB)	Level B harassment (120 dB)
Impact hammering with attenuation	10 ft (3 m)	2,070 ft (631 m)	n/a
Vibratory hammering (no attenuation)	n/a	n/a	7 mi (11 km)

4.2.4 Effects on Marine Mammal Habitat

A small area of shallow water habitat with silt/sand substrate would be shaded by the proposed structure, but this was minimized by placing the structure at a height which would allow for some light penetration and by lessening the width of the structure. A deep water area and shallow water area with riprap substrate would also be shaded, but these habitats provide few functions and are plentiful in the surrounding ecosystem. Pile installation and removal would result in some disturbance of the river substrate; however, this disturbance is expected to be local and temporary. Pile driving activities (i.e., temporary ensonification) may impact prey species and marine mammals by resulting in avoidance or abandonment of the area; however, these impacts are also expected to be local and temporary. Overall, the proposed activity is not expected to cause significant or long-term impacts on marine mammal habitat.

The Army Corps of Engineers, as the federal permitting agency for the construction of the proposed project, consulted with NMFS Northwest Region on section 7 and Essential Fish Habitat (EFH), under the ESA and Magnuson Stevens Fishery Conservation and Management Act, respectively. In summary, NMFS Northwest Region concluded that: (1) the Port's proposed action is not likely to jeopardize the continued existence of ESA-listed species or result in the destruction or adverse modification of their critical habitat; and (2) while the Port's proposed project will have an adverse effect on EFH for Pacific coast salmon, the ESA Terms

and Conditions in the incidental take statement of the Biological Opinion are necessary and sufficient to avoid, mitigate, or offset the impact of the proposed action.

4.3 SUMMARY OF COMPLIANCE WITH APPLICABLE LAWS, NECESSARY FEDERAL PERMITS, LICENSES, AND ENTITLEMENTS

As summarized below, NMFS has determined that the proposed activity is consistent with the purposes, policies, and applicable requirements of NEPA, ESA, MMPA, MSFCMA, and NMFS regulations. NMFS' issuance of the authorization would be consistent with the MMPA and ESA.

4.3.1 National Environmental Policy Act

In compliance with the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq*.), NMFS has prepared this EA analyzing the effects of the proposed action (i.e., issuance of an IHA) on the human environment. The EA will serve as the basis for preparing any Finding of No Significant Impact or Notice of Intent to prepare an Environmental Impact Statement.

4.3.2 Endangered Species Act

NMFS' Office of Protected Resources requested section 7 consultation under the ESA for issuance of a IHA due to the potential presence of Steller sea lions within the action area. NMFS Northwest Region completed consultation and issued a Biological Opinion concluding that the Port's action is not likely to jeopardize the continued existence of ESA-listed species or result in the destruction or adverse modification of critical habitat.

4.3.3 Marine Mammal Protection Act

The Port submitted an IHA application consistent with applicable issuance criteria in the MMPA and NMFS implementing regulations. In summary, NMFS has determined that the proposed action would result in short-term behavioral changes to marine mammals in-water (e.g., avoidance, change in behavioral patterns at time of exposure) in response to pile driving during the Terminal 5 project. The Port's specified activities would result in the incidental take of small numbers of marine mammals, by Level B harassment only, and the total taking would have a negligible impact on the affected species or stocks. The IHA will comply with all relevant MMPA requirements.

4.3.4 Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA)

Pacific coast salmon EFH exists in the proposed project area. The Army Corps of Engineers consulted with NMFS Northwest Region, who determined that the Port's project will have an adverse effect on EFH for Pacific coast salmon, but that the ESA Terms and Conditions in the incidental take statement of the Biological Opinion are necessary and sufficient to avoid, mitigate, or offset the impact of the proposed action.

4.4 MITIGATION AND MONITORING MEASURES

As required under the MMPA, NMFS considered mitigation to effect the least practicable adverse impact on marine mammals and developed a series of mitigation measures, as well as monitoring and reporting procedures, that would be required as part of its incidental harassment authorization. NMFS assisted with the development of the Port's proposed measures identified in the IHA application in preparation of the proposed IHA and considered comments received during the public comment period. NMFS has determined that the Port's proposed mitigation and monitoring measures are adequate to ensure negligible impact on affected marine mammal species and stocks and effect the least practicable adverse impact. The mitigation measures described in Chapter 2 were designed to eliminate the potential for injury and mortality and minimize harassment. Monitoring measures also described in Chapter 2 are designed to ensure that the Port would effectively detect animals and implement the required mitigation measures.

4.5 CUMULATIVE EFFECTS

Cumulative effects are defined as those that result from incremental impacts of a proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of which agency (federal or non-federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions that take place over a period of time.

This reach of the Columbia River is surrounded by industrial areas. The submerged and tidal lands that make up the nearby habitat are owned by the State of Washington and managed by the Port through a Port Management Agreement with the Washington State Department of Natural Resources. The City of Vancouver Shoreline Master Plan designation for this area is Urban High-Intensity and the area is zoned as heavy industrial land use. As described in Richardson et al. (1995), marine mammals are likely habituated and tolerant to a certain degree of anthropogenic disturbance, including noise. The Terminal 5 project is not likely to add an increment of disturbance which would cumulatively, when combined with other actions, result in significant adverse impacts to marine mammals.

4.5.1 Current Projects in Action Area

Issuance of an IHA to the Port is not related to other actions with individually insignificant, but cumulatively significant impacts. There are no known potential interrelated/interdependent actions associated with the proposed project.

4.5.2 Reasonably Foreseeable Future Actions (RFFAs)

Currently, the only reasonably foreseeable project planned for this portion of the Columbia River under NMFS authority is the Columbia River Crossing. This project involves construction activities for the Columbia River I-5 bridges, located at river mile 106, approximately three miles from the Terminal 5 action area. However, the Columbia River Crossing project is not expected to begin until after the Terminal 5 in-water pile driving activities are complete. Bridge construction activities would begin in 2013 and may be complete by 2017,

but the Federal Transit Administration and Federal Highway Administration have applied for a five-year rulemaking to authorize the incidental take of three species of marine mammals (harbor seal, California sea lion, and Steller sea lion). Any other future authorizations will have to undergo the same permitting process and will take the Terminal 5 project into consideration when addressing cumulative effects. Should NMFS receive an application from applicants requesting authorization to take marine mammals incidental to specified activities in the action area, NMFS would also consider cumulative impacts to the affected species or stock, as required under NEPA.

CHAPTER 5 List of Preparers and Agencies Consulted

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REFERENCES

Anchor QEA, LLC. 2011. Biological Evaluation: Port of Vancouver USA Terminal 5 Bulk Potash Handling Facility.

Caltrans. 2009. Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish.

Hastings, M.C. and Popper, A.N. 2005. Effects of sound on fish. Technical report for Jones and Stokes to California Department of Transportation, Sacramento, CA.

Jacobs, S. R. and J. M. Terhune. 2002. The effectiveness of acoustic harassment devices in the Bay of Fundy, Canada: seal reactions and a noise exposure model. Aquatic Mammals 28:147-158.

Kastak, D. and Schusterman, R.J. 1996. Temporary threshold shift in a harbor seal, *Phoca vitulina*. J. Acoust. Soc. Am. 106:1905-1908.

Kastak, D., R.J. Schusterman, B.L. Southall, and C.J. Reichmuth. 1999. Underwater temporary threshold shift induced by octave-band noise in three species of pinniped. J. Acoust. Soc. Am. 106:1142-1148.

Kastak, D., B.L. Southall, R.J. Schusterman, and C.R. Kastak. 2005. Underwater temporary threshold shift in pinnipeds: Effects of noise level and duration. J. Acoust. Soc. Am. 118:3154-3163.

Kastak, D., C. Reichmuth, et al. 2007. Onset, growth, and recovery of in-air temporary threshold shift in a California sea lion (Zalophus californianus). J. Acoust. Soc. Am. 122(5):2916-2924.

Kastelein, R., S. van der Huel, W. Verboom, R. Triesscheijn, and N. Jennings. 2006. The influence of underwater data transmission sounds on the displacement behaviour of captive harbour seals (*Phoca vitulina*). Mar Environ Res. 61(1):19-39.

Kryter, K. D. 1985. The effects of noise on man. 2nd edition. Orlando: Academic Press Inc., Publishers. 688 pp.

Kryter, K.D., W.D. Ward, J.D. Miller, and D.H. Eldredge. 1966. Hazardous exposure to intermittent and steady-state noise. J. Acoust. Soc. Am. 39(3):451-464.

Miller, J.D. 1974. Effects of noise on people. J. Acoust. Soc. Am. 56(3):729-764.

Mooney, T.A., Nachtigall, P.E., Breese, M., Vlachos, S., and Au, W.W.L. 2009a. Predicting temporary threshold shifts in a bottlenose dolphin (*Tursiops truncatus*): the effects of noise level and duration. J. Acoust. Soc. Am. 125:1816-1826.

Mooney, T.A., Nachtigall, P.E., and Vlachos, S. 2009b. Sonar-induced temporary hearing loss in dolphins. Biol. Lett. 5:565-567.

National Institute for Occupational Safety and Health (NIOSH). 1998. Criteria for a recommended standard. Occupational noise exposure. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service. Publication No. 98-126.

National Marine Fisheries Service (NMFS). 2007. Marine mammal stock assessment report for California sea lion (*Zalophus californianus californianus*): U.S. stock. October 30, 2007.

National Marine Fisheries Service (NMFS). 2010a. Marine mammal stock assessment report for harbor seal (Phoca vitulina richardsi): Oregon/Washington coast stock. January 15, 2011.

National Marine Fisheries Service (NMFS). 2010b. Marine mammal stock assessment report for Steller sea lion (*Eumetopias jubatus*): eastern U.S. stock. January 15, 2010.

Richardson, W.J., C.R. Greene, Jr., C.I. Malme, and D.H. Thomson. 1995. Marine mammals and noise. San Diego: Academic Press. 576 pp.

Southall, B.L., Bowles, A.E., Ellison, W.T., Finneran, J.J., Gentry, R.L., Greene, C.R. Jr., Kastak, D., Ketten, D.K., Miller, J.H., Nachtigall, P.E., Richardson, W.J., Thomas, J.A. and Tyack, P.L. 2007. Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendations. Special Issue of Aquatic Mammals 33(4):412-522.

Urick, R.J. 1975. Principles of Underwater Sound. New York: McGraw-Hill. 384 pp.

Washington State Department of Transportation (WSDOT). 2010a. Advanced Training Manual. Biological Assessment preparation for transportation projects. February 2010.

Washington State Department of Transportation (WSDOT). 2010b. Port Townsend Test Pile Project: Underwater Noise Monitoring Draft Final Report. November 10, 2010.