PROPOSED ACTION:	Issuance of an Incidental Harassment Authorization for Vashon Seismic Retrofit Project, Vashon, Washington.
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 Office of Protected Resources, National Marine Fisheries Service
FOR FURTHER INFORMATION:	Shane Guan National Marine Fisheries Service Office of Protected Resources Permits and Conservation Division 1315 East West Highway Silver Spring, MD 20910 301-427-8401
LOCATION:	Vashon Island, 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, pursuant to section 101(a)(5)(D) of the Marine Mammal Protection Act, to the Washington State Department of Transportation for the take of small numbers of marine mammals incidental to conducting the Vashon Seismic Retrofit Project in Vashon Island, Washington.
DATE:	February 2015

TABLE OF CONTENTS

LIST OF ACRONYMS AND ABBREVIATIONS

CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
dB	decibel
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
FONSI	Finding of No Significant Impact
ft	feet
FR	Federal Register
IHA	Incidental Harassment Authorization
m	meter
mi	miles
MMPA	Marine Mammal Protection Act
MSFCMA	Magnuson-Stevens Fishery Conservation Management Act
NAO	NOAA Administrative Order
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OMB	Office of Management and Budget
PSO	Protected Species Observer
PTS	Permanent hearing threshold shift
SAR	NMFS Marine Mammal Stock Assessment Report
TTS	Temporary hearing threshold shift
USFWS	US Fish and Wildlife Service
WSDOT	Washington State Department of Transportation
WSF	Washington State Ferry

Chapter 1 Introduction and Purpose and Need

1.1. Description of Proposed Action

The Marine Mammal Protection Act (MMPA) prohibits the incidental taking of marine mammals. The incidental take of a marine mammal falls under three categories: mortality, serious injury, or harassment, which includes injury and behavioral effects. The MMPA defines harassment as any act of pursuit, torment, or annoyance which: (1) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (2) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment). There are exceptions to the MMPA's prohibition on take, such as the authority at issue here for us to authorize the incidental taking of small numbers of marine mammals by harassment upon the request of a U.S. citizen provided we follow certain statutory and regulatory procedures and make determinations. This exception is discussed in more detail in Section 1.2.

We propose to issue an Incidental Harassment Authorization (IHA) to the Washington State Department of Transportation (WSDOT) under the MMPA for the taking of small numbers of marine mammals, incidental to WSDOT's Vashon Seismic Retrofit Project at the Washington State Ferry Terminal in Vashon Island, Washington. We do not have the authority to permit, authorize, or prohibit WSDOT's construction activities.

Our proposed action is a direct outcome of WSDOT requesting an IHA under Section 101(a)(5)(D) of the MMPA to take marine mammals, by harassment, incidental to conducting the Vashon Seismic Retrofit Project. Pile removal and pile driving activities associated with that Project have the potential to take, by harassment, marine mammals. WSDOT therefore requires an IHA for incidental take.

Our issuance of an IHA to WSDOT is a major federal action under the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) regulations in 40 CFR §§ 1500-1508, and NOAA Administrative Order (NAO) 216-6. Thus, we are required to analyze the effects of our proposed action.

This Environmental Assessment (EA), titled "*Issuance of an Incidental Harassment Authorization for Vashon Seismic Retrofit Project, Vashon, Washington*," (hereinafter, EA) addresses the potential environmental impacts of two alternatives, namely:

- Issue the Authorization to WSDOT under the MMPA for Level B harassment of marine mammals during WSDOT's seismic retrofit project, taking into account the prescribed means of take, mitigation measures, and monitoring requirements required in the Authorization; or
- Not issue an Authorization to WSDOT in which case, for the purposes of NEPA analysis only, we assume that the activities would proceed and cause incidental take, without the

mitigation and monitoring measures that would otherwise be prescribed in the Authorization.

1.1.1. Background on WSDOT's MMPA Application

On June 20, 2014, WSDOT submitted an application to NMFS for the taking of marine mammals incidental to the Vashon Seismic Retrofit Project at the Washington State Ferry Terminal in Vashon Island, Washington. NMFS determined that the application was adequate and complete on July 31, 2014. On December 15, 2014, WSDOT added a test pile drive and removal program to the Vashon Seismic Retrofit Project and submitted a revised IHA application. NMFS determined that the application with the test pile program was adequate on December 16, 2014.

The purpose of the Vashon Seismic Retrofit Project is to ensure the safe and reliable function of the Vashon Terminal in case of a significant earthquake. The Project will upgrade the seismic condition of the trestle by replacing part of the existing trestle in the nearshore, and installing seismic bracing along the perimeter of the remaining trestle. The proposed construction work would occur between August 1, 2015, and February 15, 2016. The following specific aspects of the proposed construction project are likely to result in the take of marine mammals: pile removal, and impact and vibratory pile driving.

1.1.2. Marine Mammals in the Action Area

The proposed construction project could adversely affect the following marine mammal species under NMFS jurisdiction:

- Harbor seal (*Phoca vitulina*)
- California sea lion (*Zalophus californianus*)
- Steller sea lion (*Eumetopias jubatus*)
- Killer whale (*Orcinus orca*)
- Gray whale (*Eschrichtius robustus*)
- Humpback whale (*Megaptera novaeangliae*)
- Minke whale (*Balaenoptera acutorostrata*)
- Harbor porpoise (*Phocoena phocoena*)
- Dall's porpoise (*P. dalli*)

1.2. Purpose and Need

The MMPA prohibits "takes" of marine mammals, with a number of specific exceptions. The applicable exception in this case is an authorization for incidental take of marine mammals in section 101(a)(5)(D) of the MMPA.

Section 101(a)(5)(D) of the MMPA directs the Secretary of Commerce (Secretary) to authorize, upon request, the incidental, but not intentional, taking of small numbers of marine mammals of a species or population stock, by United States citizens who engage in a specified activity (other

than commercial fishing) within a specified geographical region if we make certain findings and provide a notice of a proposed authorization to the public for review. Entities seeking to obtain authorization for the incidental take of marine mammals under our jurisdiction must submit such a request (in the form of an application) to us.

We have issued regulations to implement the Incidental Take Authorization provisions of the MMPA (50 CFR Part 216) and have produced Office of Management and Budget (OMB)-approved application instructions (OMB Number 0648-0151) that prescribe the procedures necessary to apply for authorizations. All applicants must comply with the regulations at 50 CFR § 216.104 and submit applications requesting incidental take according to the provisions of the MMPA.

Purpose: The primary purpose of our proposed action—the issuance of an Authorization to WSDOT—is to authorize (pursuant to the MMPA) the take of marine mammals incidental to WSDOT's proposed activities. The IHA, if issued, would exempt WSDOT from the take prohibitions contained in the MMPA.

To authorize the take of small numbers of marine mammals in accordance with Section 101(a)(5)(D) of the MMPA, we must evaluate the best available scientific information to determine whether the take would have a negligible impact on marine mammals or stocks and not have an unmitigable adverse impact on the availability of affected marine mammal species for certain subsistence uses. We cannot issue an IHA if it would result in more than a negligible impact on marine mammal species or stocks or if it would result in an unmitigable adverse impact on subsistence.

In addition, we must prescribe, where applicable, the permissible methods of taking and other means of effecting the least practicable impact on the species or stocks of marine mammals and their habitat (i.e., mitigation), paying particular attention to rookeries, mating grounds, and other areas of similar significance. If appropriate, we must prescribe means of effecting the least practicable impact on the availability of the species or stocks of marine mammals for subsistence uses. Authorizations must also include requirements or conditions pertaining to the monitoring and reporting of such taking, in large part to better understand the effects of such taking on the species. Also, we must publish a notice of a proposed Authorization in the *Federal Register* for public notice and comment.

The underlying purpose of this action is therefore to determine whether the take resulting from WSDOT's Vashon Seismic Retrofit Project would have a negligible impact on affected marine mammal species or stocks and would not have an unmitigable adverse impact on the availability of marine mammals for taking for subsistence uses, and to develop mitigation and monitoring measures to reduce the potential impacts.

Need: On December 15, 2014, WSDOT submitted an adequate and complete application demonstrating both the need and potential eligibility for issuance of an IHA in connection with

the activities described in section 1.1.1. We now have a corresponding duty to determine whether and how we can authorize take by Level B harassment incidental to the activities described in WSDOT's application. Our responsibilities under section 101(a)(5)(D) of the MMPA and its implementing regulations establish and frame the need for this proposed action.

Any alternatives considered under NEPA must meet the agency's statutory and regulatory requirements. Our described purpose and need guide us in developing reasonable alternatives for consideration, including alternative means of mitigating potential adverse effects. Thus, we are developing and analyzing alternative means of developing and issuing an Authorization, which may require the applicant to include additional mitigation and monitoring measures in order for us to make our determinations under the MMPA.

1.3. The Environmental Review Process

NEPA compliance is necessary for all "major" federal actions with the potential to significantly affect the quality of the human environment. Major federal actions include activities fully or partially funded, regulated, conducted, authorized, or approved by a federal agency. Because our issuance of an Authorization would allow for the taking of marine mammals consistent with provisions under the MMPA and incidental to the applicant's activities, we consider this as a major federal action subject to NEPA.

Under the requirements of NAO 216-6 section 6.03(f)(2)(b) for incidental harassment authorizations, we prepared this EA to determine whether the direct, indirect and cumulative impacts related to the issuance of an IHA for incidental take of marine mammals during the conduct of WSDOT's Vashon Seismic Retrofit Project at the Washington State Ferry Terminal in Vashon Island, Washington, could be significant. If we deem the potential impacts to be not significant, this analysis, in combination with other analyses incorporated by reference, may support the issuance of a Finding of No Significant Impact (FONSI) for the proposed Authorization.

1.3.1. Laws, Regulations, or Other NEPA Analyses Influencing the EA's Scope

We have based the scope of the proposed action and nature of the two alternatives considered in this EA on the relevant requirements in section 101(a)(5)(D) of the MMPA. Thus, our authority under the MMPA bounds the scope of our alternatives. We conclude that this analysis—when combined with the analyses in the following documents—fully describes the impacts associated with the proposed construction project with mitigation and monitoring for marine mammals. After conducting a review of the information and analyses for sufficiency and adequacy, we incorporate by reference the relevant analyses on WSDOT's proposed action as well as discussions of the affected environment and environmental consequences within the following documents, per 40 CFR §1502.21 and NAO 216-6 § 5.09(d):

- *Request for an Incidental Harassment Authorization under the Marine Mammal Protection Act: Vashon Trestle Seismic Retrofit* (WSDOT, 2014a),

- *Vashon Ferry Terminal Dolphin Replacement Project Biological Assessment. Washington State Ferries, Washington State Department of Transportation*. (WSF, 2007), and
- *Biological Assessment Reference. Washington State Ferries, Washington State Department of Transportation.* (WSF, 2014).

MMPA APPLICATION AND NOTICE OF THE PROPOSED AUTHORIZATION

The CEQ regulations (40 CFR § 1502.25) encourage federal agencies to integrate NEPA's environmental review process with other environmental reviews. We rely substantially on the public process for developing proposed Authorizations and evaluating relevant environmental information and provide a meaningful opportunity for public participation as we develop corresponding EAs. We fully consider public comments received in response to our publication of the notice of proposed Authorization during the corresponding NEPA process.

We considered WSDOT's proposed mitigation and monitoring measures and determined that they would help ensure that the Project would effect the least practicable impact on marine mammals. These measures include: (1) using pile driving energy attenuators (such as an air bubble curtain system) for all impact pile driving; (2) conducting in-water construction only during daylight hours, when visual monitoring of marine mammals can be conducted; (3) implementing a soft start for all impact and vibratory pile driving; and (4) implementing shutdown measures if a marine mammal within a zone of influence appears disturbed by the work activity. Through the MMPA process, we determined that, provided that WSDOT implements the required mitigation and monitoring measures, the impact of the Project on marine mammals would be, at worst, a temporary modification in behavior of small numbers of certain species of marine mammals that may be hauled out in the vicinity of the proposed activity.

We will also prepared a *Federal Register* notice (79 FR 78821; December 31, 2014) on the proposed activity and request that the public submit comments, information, and suggestions concerning WSDOT's request, the content of our proposed IHA, and potential environmental effects related to the proposed issuance of the Authorization. This EA incorporates by reference and relies on WSDOT's application (WSF, 2007; 2014).

In summary, the analyses referenced above support our conclusion that, with the incorporation of the proposed monitoring and mitigation measures, the issuance of an IHA to WSDOT for the Vashon Seismic Retrofit Project would not result in any significant direct, indirect, or cumulative impacts. Based on our MMPA analysis, the intermittent frequency and short duration of the harassment from the construction project would allow adequate time for the marine mammals to recover from potentially adverse effects. Furthermore, the referenced analyses concluded that additive or cumulative effects of the construction project on its own or in combination with other activities, are not expected to occur. Finally, the environmental analyses did not identify any significant environmental issues or impacts.

1.3.2. Scope of Environmental Analysis

Given the limited scope of the decision for which we are responsible (*i.e.*, issue the IHA including prescribed means of take, mitigation measures, and monitoring requirements, or not issue the IHA), this EA provides more focused information on the primary issues and impacts of environmental concern related specifically to our issuance of the IHA. This EA does not further evaluate effects to the elements of the human environment listed in Table 1, because previous environmental reviews (WSF, 2007; 2014) have shown that the issuance of an IHA for activities similar to WSDOT's proposed construction project would not significantly affect those components of the human environment. Moreover, those analyses are consistent with our MMPA analysis concluding that there would be no significant impacts to marine mammals.

Table 1. Components of the human environment not affected by our issuance of an IHA.

Biological	Physical	Socioeconomic / Cultural
Amphibians	Air Quality	Commercial Fishing
Humans	Essential Fish Habitat	Military Activities
Non-Indigenous Species	Geography	Oil and Gas Activities
Seabirds	Land Use	Recreational Fishing
	Oceanography	Shipping and Boating
	State Marine Protected Areas	National Historic Preservation Sites
	Federal Marine Protected Areas	National Trails and Nationwide Inventory of Rivers
	National Estuarine Research Reserves	Low Income Populations
	National Marine Sanctuaries	Minority Populations
	Park Land	Indigenous Cultural Resources
	Prime Farmlands	Public Health and Safety
	Wetlands	Historic and Cultural Resources
	Wild and Scenic Rivers	
	Ecologically Critical Areas	

1.3.3. Comments on the Draft EA

NAO 216-6 established NOAA procedures for complying with NEPA and the implementing NEPA regulations issued by the CEQ. Consistent with the intent of NEPA and the clear direction in NAO 216-6 to involve the public in NEPA decision-making, we released the Draft EA for public comment on the potential environmental impacts of our issuance of an IHA, as well as comment on the activities described in WSDOT's MMPA application and in the *Federal Register* notice (79 FR 78821; December 31, 2014) of the proposed IHA. During the 30-day public comment period, NMFS only received comments from the Marine Mammal Commission. All comments are addressed in the *Federal Register* notice for the issuance of the IHA.

1.4. Other Permits, Licenses, or Consultation Requirements

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

1.4.1. National Environmental Policy Act

Issuance of an Authorization is subject to environmental review under NEPA. NMFS may prepare an EA, an EIS, or determine that the action is categorically excluded from further review. While NEPA does not dictate substantive requirements for an Authorization, 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 §§ 1500-1508).

1.4.2. Marine Mammal Protection Act

The MMPA and its provisions that pertain to the proposed action are discussed above in section 1.2.

1.4.3. Endangered Species Act (ESA)

The humpback whale and the Southern Resident stock of killer whale are the only marine mammal species currently listed under the ESA that could occur in the vicinity of WSDOT's construction projects. Under section 7 of the ESA, the Federal Transit Administration (FTA) and WSDOT have consulted with NMFS West Coast Regional Office (WCRO) on the proposed Vashon Seismic Retrofit Project. WCRO issued a Biological Opinion in May 2015, which concludes that the proposed Vashon Seismic Retrofit Project may affect, but is not likely to adversely affect the listed marine mammal species and stocks.

The issuance of an IHA to WSDOT constitutes an agency action that authorizes an activity that may affect ESA-listed species and, therefore, is subject to section 7 of the ESA. As the effects of the activities on listed marine mammals were analyzed during a formal consultation between the FTA and NMFS, and as the underlying action has not changed from that considered in the consultation, the discussion of effects that are contained in the Biological Opinion and accompanying memo issued to the FTA in May 2015, pertains also to this action. Therefore, NMFS has determined that issuance of an IHA for this activity would not lead to any effects to listed marine mammal species apart from those that were considered in the consultation on FTA's action.

1.4.4. Magnuson-Stevens Fishery Conservation and Management Act

Under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), 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 MSFCMA. All WSF terminals are within Pacific groundfish, coastal pelagic, and Pacific salmon EFH.

Coastal pelagic fish are primarily associated with the open-ocean and coastal areas, and are not likely to occur near WSDOT terminals. NMFS has consulted on EFH with its West Coast Regional Office.

Chapter 2 Alternatives

2.1. Introduction

NEPA and the CEQ implementing regulations (40 CFR §§ 1500-1508) require consideration of alternatives to proposed major federal actions and NAO 216-6 provides NOAA policy and guidance on the consideration of alternatives to our proposed action. An EA must consider all reasonable alternatives, including the Preferred Alternative. It must also consider the No Action Alternative, even if it that alternative does not meet the stated purpose and need. This provides a baseline analysis against which we can compare the other alternatives.

To warrant detailed evaluation as a reasonable alternative, an alternative must meet our purpose and need. In this case, as we previously explained in Chapter 1 of this EA, an alternative only meets the purpose and need if it satisfies the requirements under section 101(a)(5)(D) the MMPA. We evaluated each potential alternative against these criteria; identified one action alternative along with the No Action Alternative; and carried these forward for evaluation in this EA. This chapter describes the alternatives and compares them in terms of their environmental impacts and their achievement of objectives.

As described in Section 1.2, the MMPA requires that we must prescribe the means of effecting the least practicable impact on the species or stocks of marine mammals and their habitat. In order to do so, we must consider WSDOT's proposed mitigation measures, as well as other potential measures, and assess how such measures could benefit the affected species or stocks and their habitat. Our 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 us 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.

Alternative 1 (the Preferred Alternative) includes a suite of mitigation measures intended to minimize potentially adverse interactions with marine mammals.

2.2. Description of WSDOT's Proposed Activities

WSDOT proposes to conduct Vashon Seismic Retrofit Project at the Washington State Ferry (WSF) Terminal in Vashon Island, Washington, to ensure the safe and reliable function of the Vashon Terminal in case of a significant earthquake.

Approximately 210-linear feet of the existing trestle in the nearshore will be replaced. Existing decking, 67 13-inch diameter creosote-treated timber piles and 39 30-inch diameter concrete-jacketed creosote-treated timber piles will be removed with a vibratory hammer. Fifty-three 24-inch diameter permanent hollow steel piles will be installed with a vibratory hammer for approximately the first 40 feet, and driven with an impact hammer for (approximately) the final 10 feet. Approximately forty-four 13-inch diameter temporary untreated timber piles will be installed with an impact hammer, to support the weight of a crane that will sit on the trestle to drive the permanent steel piles.

Seismic bracing will be installed at up to 11 locations, and will consist of a maximum of 66 24-inch diameter hollow steel piles installed with an impact hammer. Seismic bracing piles will be connected with concrete caps that tie each cluster of piles together.

Approximately fifty-two temporary 24-inch diameter hollow steel piles will be required to support temporary false-work and work trestles necessary to install the seismic braces concrete caps. Each work trestle will consist of approximately 6 piles. These piles will be driven with a vibratory hammer, and then proofed with an impact hammer to ensure they will bear the weight of the false-work and concrete caps.

In addition, one double walled, one Mandrel and one control pile (three total) will be driven to the east of the Vashon trestle during the Seismic Retrofit project in 2015 or 2016 as part of the test pile program. The goal is to test the drivability of these piles in harder soils, and to test the rate of noise attenuation.

2.2.1. Dates and Duration

WSDOT plans to conduct all in-water construction work activities during the period from August 1, 2015, to February 15, 2016.

The number of days it will take to complete the partial trestle replacement and install the seismic bracings depends on the difficulty in penetrating the substrate during pile installation. It is

assumed that only one vibratory or impact hammer will be in operation at a time. Durations are conservative, and the actual amount of time to install and remove piles will likely be less. Duration estimates of each of the pile driving/removal elements follow:

- For the partial trestle replacement:
    - Impact driving of temporary timber piles will take approximately 30 minutes per pile, with 3 piles installed per day over 17 days.
    - Vibratory driving of each permanent 24-inch steel pile will take approximately 60 minutes, followed by approximately 30 minutes of impact driving (approximately 600 strikes per pile), with 2-5 piles installed per day over 27 days.
    - Vibratory removal of temporary timber piles, and existing timber and concrete-jacketed timber piles will take approximately 30 minutes per pile, with 5-10 piles removed per day over 30 days.
- For the seismic braces:
    - Vibratory driving of each temporary 24-inch steel pile will take approximately 20 minutes, followed by approximately 10 minutes of impact proofing (approximately 60 strikes per pile), with 2-4 piles installed per day over 28 days.
    - Impact driving of permanent 24-inch steel piles will take approximately two hours per pile, requiring approximately 3,000 strikes per pile, with approximately 2-4 piles installed per day over 28 days.
    - Vibratory removal of temporary 24-inch steel piles will take approximately 30 minutes pile, with up to 3-10 piles removed per day over 20 days.

The maximum anticipated number of days for pile driving is 100. The maximum anticipated number of days for pile removal is 50. The worst-case time for pile installation and removal is 311 hours over 150 days.

2.2.2. Specified Geographic Region

The proposed activities will occur at the Vashon Ferry Terminal located in Vashon, Washington (Figure 1). The Vashon Ferry Terminal, serving State Route 160, is located at the north end of Vashon Island, in King County, Washington. The terminal is part of what is known as the Triangle Route between West Seattle (Fauntleroy terminal), Vashon Island and the Kitsap Peninsula (Southworth terminal). The Vashon terminal is located in Section 6, Township 23 North, Range 3 East, and is adjacent to Colvos Passage to the west and south, and the East

Passage to the east, both tributary to Puget Sound (Figure 1). Land use in the area is a mix of residential, business, small scale agriculture and Blake Island State Park, and local parks.

2.2.3. Detailed Description of Activities

The following construction sequence is anticipated:

- For the nearshore partial trestle replacement, work will proceed in stages as the crane advances away from the shore:
    - impact drive temporary timber piles,
    - vibratory/impact drive permanent 24- inch diameter hollow steel piles,
    - advance to next section,

- Temporary timber piles, and existing timber and concrete-jacketed timber piles will either be removed with a vibratory hammer as the crane advances away from shore, or will be removed after all permanent steel piles are installed, as the crane retreats towards the shore.

- When the partial trestle replacement is complete:
    - 67 13-inch diameter existing timber piles and 39 30-inch diameter existing concrete-jacketed timber piles will have been removed with a vibratory hammer.
    - 44 temporary 13-inch diameter timber piles will have been installed with an impact hammer, and removed with a vibratory hammer.
    - 53 permanent 24-inch hollow steel piles will have been installed with a vibratory and impact hammer.

- The seismic braces will be installed sequentially:
    - Vibratory drive/impact proof temporary 24-inch diameter hollow steel piles,
    - impact drive permanent 24-inch diameter hollow steel piles,
    - construct temporary false-work and concrete cap,
    - remove false-work,
    - remove temporary 24-inch diameter hollow steel piles with a vibratory hammer,
    - advance to next brace location.

- When the seismic braces are complete:
    - 52 temporary 24-inch diameter hollow steel piles will have been installed using a vibratory hammer/proofed with an impact hammer, and removed with a vibratory hammer.
    - 66 permanent 24-inch diameter hollow steel piles will have been installed with an impact hammer.

Detailed descriptions of these activities are provided below.

Vibratory Hammer Pile Driving and Removal

Vibratory hammers are commonly used in steel pile driving where sediments allow and involve the same vibratory hammer used in pile removal. The pile is placed into position using a choker and crane, and then vibrated between 1,200 and 2,400 vibrations per minute. The vibrations liquefy the sediment surrounding the pile allowing it to penetrate to the required seating depth, or to be removed. The type of vibratory hammer that will be used for the project will likely be an APE 400 King Kong (or equivalent) with a drive force of 361 tons.

Impact Hammer Pile Installation

Impact hammers are used to install plastic/steel core, wood, concrete, or steel piles. An impact hammer is a steel device that works like a piston. Impact hammers are usually large, though small impact hammers are used to install small diameter plastic/steel core piles. Impact hammers have guides (called a lead) that hold the hammer in alignment with the pile while a heavy piston moves up and down, striking the top of the pile, and drives it into the substrate from the downward force of the hammer on the top of the pile.

To drive the pile, the pile is first moved into position and set in the proper location using a choker cable or vibratory hammer. Once the pile is set in place, pile installation with an impact hammer can take less than 15 minutes under good conditions, to over an hour under poor conditions (such as glacial till and bedrock, or exceptionally loose material in which the pile repeatedly moves out of position).

Test Pile Program

One double walled, one Mandrel and one control pile (three total) will be driven to the east of the Vashon trestle during the Seismic Retrofit project in 2015 or 2016. The location shown on the sheet is approximate, as construction staging may require that it be moved. All test piles are 30” hollow steel. The control pile will use a bubble curtain for attenuation. No unattenuated strikes will be allowed. The test will take place in water –10 to –25 ft (-3 to -8 m) mean lower low water (MLLW). Piles will be driven approximately 40 ft (13 m) into the sediment. The test should be complete in one day, though two days are proposed in case of complications.

Piles will be impact driven and removed with a vibratory hammer. It is possible that some or all of the piles will not be able to be removed. In that case, the pile(s) will be cut below the mudline, and filled with sand to the natural grade.

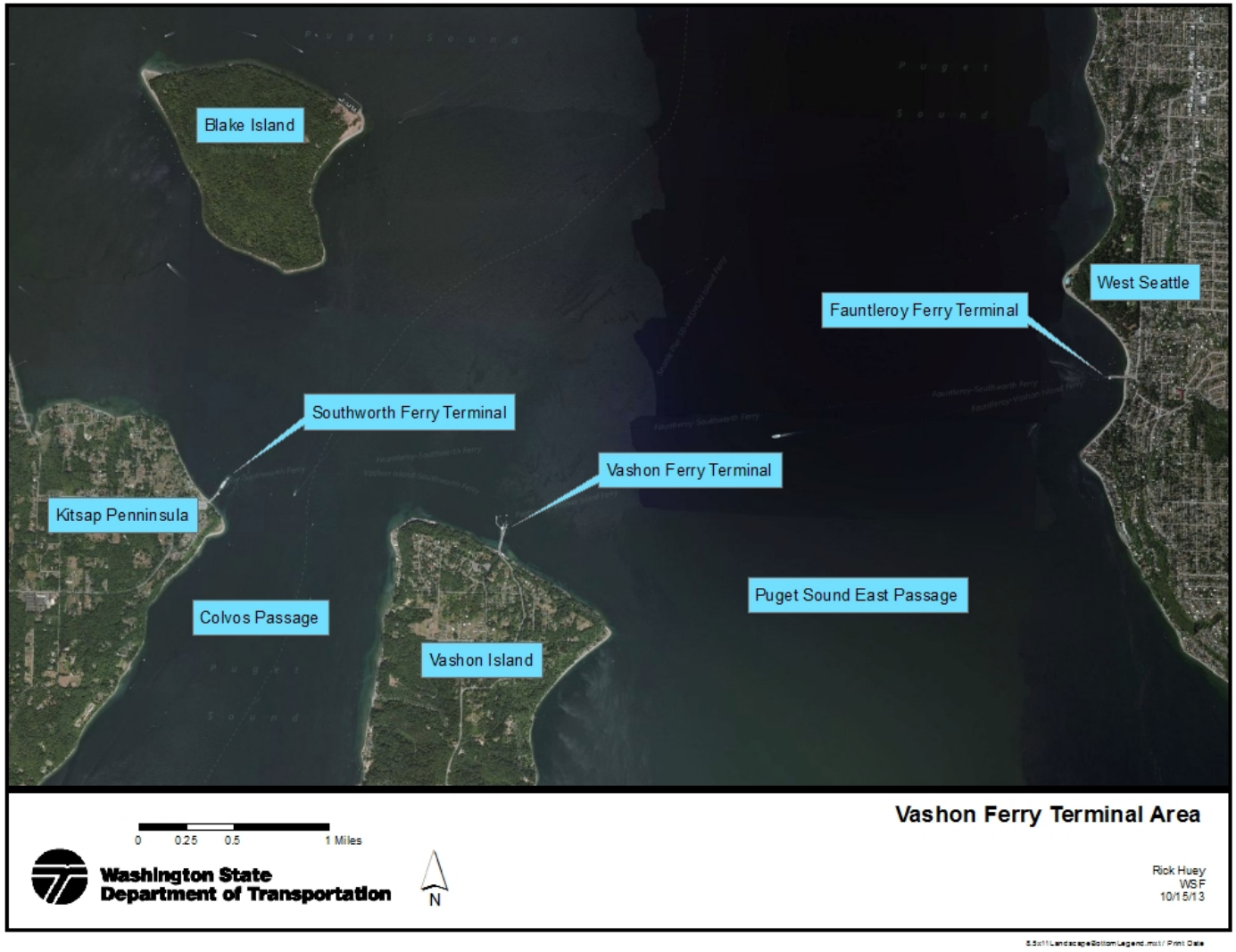

Figure 1. Proposed Project Location.

2.3. Description of Alternatives

2.3.1. Alternative 1 – Issuance of an Authorization with Mitigation Measures

The proposed action constitutes Alternative 1 and is the Preferred Alternative. Under this alternative, we would issue an IHA (valid from August 1, 2015, through July 31, 2016) to WSDOT allowing the incidental take, by Level B harassment, of nine species of marine mammals, subject to the mandatory mitigation and monitoring measures and reporting requirements set forth in the proposed IHA, if issued, along with any additions based on consideration of public comments.

PROPOSED MITIGATION MEASURES

For WSDOT's proposed Vashon Seismic Retrofit Project, WSDOT worked with NMFS and proposed the following mitigation measures to minimize the potential impacts to marine mammals in the Project vicinity. The primary purposes of these mitigation measures are to minimize sound levels from the activities, to monitor marine mammals within designated zones of influence corresponding to NMFS' current Level B harassment thresholds and, if marine mammals with the ZOI appear disturbed by the work activity, to initiate immediate shutdown or power down of the piling hammer, making it very unlikely potential injury or TTS to marine mammals would occur and ensuring that Level B behavioral harassment of marine mammals would be reduced to the lowest level practicable.

Use of Noise Attenuation Devices

Noise attenuation systems (i.e., bubble curtains) will be used during all impact pile driving of steel piles to dampen the acoustic pressure and reduce the impact on marine mammals. By reducing underwater sound pressure levels at the source, bubble curtains would reduce the area over which Level B harassment would occur, thereby potentially reducing the numbers of marine mammals affected. In addition, the bubble curtain system would reduce sound levels below the threshold for injury (Level A harassment), and thus eliminate the need for an exclusion zone for Level A harassment.

Time Restriction

Work would occur only during daylight hours, when visual monitoring of marine mammals can be conducted. In addition, all in-water construction will be limited to the period between August 1, 2015, and February 15, 2016.

Establishment of Exclusion Zone and Level B Harassment Zones of Influence

Before the commencement of in-water pile driving activities, WSDOT shall establish Level B behavioral harassment zones of influence (ZOIs) where received underwater sound pressure levels (SPLs) are higher than 160 dB (rms) and 120 dB (rms) re 1 µPa for impulse noise sources (impact pile driving) and non-impulses noise sources (vibratory pile driving and mechanic dismantling), respectively.

For the test pile program, because glacial till soils will be harder to drive through, the assumed attenuation will be 8-10 dB, the same bubble-curtain attenuation used in the current consultation. Based on the 2009 Vashon Test Pile, source levels for impact driving of 30" piles are 210 dB (peak), 181 dB (SEL), and 189 dB (rms) measured at 16 m (Pile P-8 Unmitigated) (WSDOT 2010).

The exclusion zones for Level A harassment and ZONs for Level B harassment are modeled based on in-water measurements during the WSF Bainbridge Island Ferry Terminal and presented in Table 2 below.

Table 2. Modeled Level A and Level B harassment zones for various pile driving activities

Pile Driving Methods	Distance to 190 dB* (m)	Distance to 180 dB (m)	Distance to 160 dB (m)	Distance to 121** dB (m)	ZOI number	ZOI size (km^2)
Vibratory pile driving / removal (24-in steel pile)	NA	NA	NA	5,500	ZOI-1	44 km^2
Vibratory pile driving / removal (13-in timber pile)	NA	NA	NA	2,000	ZOI-2	5.6 km^2
Vibratory pile removal (30-in steel pile)	NA	NA	NA	21,500	ZOI-3	151 km^2
Test impact pile driving (assume 8 dB reduction w/ attenuation devices)	4.0	19	402	NA	ZOI-4	0.4 km^2
Impact driving (24-in steel pile)	3.0	12	251	NA	ZOI-5	0.07 km^2
Impact pile driving (13-in timber)	NA	NA	46	NA	ZOI-6	1,769 m^2

* SPLs are dB re 1 µPa rms.
*Since the median ambient noise level at the Project area is 121 dB re 1 µPa (rms), this level will be used as the threshold for vibratory pile driving and removal.

Soft Start

A "soft-start" technique is intended to allow marine mammals to vacate the area before the pile driver reaches full power. Whenever there has been downtime of 30 minutes or more without pile driving, the contractor will initiate the driving with ramp-up procedures described below.

Soft start for vibratory hammers requires contractors to initiate hammer noise for 15 seconds at reduced energy followed by a 1-minute waiting period. The procedure will be repeated two additional times. Soft start for impact hammers requires contractors 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. Each day, WSDOT will use the soft-start technique at the beginning of pile driving or removal, or if pile driving or removal has ceased for more than one hour.

Shutdown Measures

WSDOT shall implement shutdown measures if a marine mammal is sighted approaching the Level A exclusion zone. In-water construction activities shall be suspended until the marine mammal is sighted moving away from the exclusion zone, or if the animal is not sighted for 30 minutes after the shutdown.

In addition, WSDOT shall implement shutdown measures if southern resident killer whales (SRKWs) are sighted within the vicinity of the project area and are approaching the Level B harassment zone (zone of influence, or ZOI) during in-water construction activities.

If a killer whale approaches the ZOI during pile driving or removal, and it is unknown whether it is a SRKW or a transient killer whale, it shall be assumed to be a SRKW and WSDOT shall implement the shutdown measure.

If a SRKW or an unidentified killer whale enters the ZOI undetected, in-water pile driving or pile removal shall be suspended until the whale exits the ZOI to avoid further level B harassment.

Further, WSDOT shall implement shutdown measures if the number of any allotted marine mammal takes reaches the limit under the IHA, if such marine mammals are sighted within the vicinity of the project area and are approaching the Level B harassment zone during in-water construction activities.

PROPOSED MONITORING AND REPORTING MEASURES

Proposed Monitoring Measures

WSDOT shall employee NMFS-approved protected species observers (PSOs) to conduct marine mammal monitoring for its Vashon Seismic Retrofit Project. The PSOs will observe and collect data on marine mammals in and around the project area for 30 minutes before, during, and for 30 minutes after all pile removal and pile installation work. If a PSO observes a marine mammal within a ZOI that appears to be disturbed by the work activity, the PSO will notify the work crew to initiate shutdown measures.

Monitoring of marine mammals around the construction site shall be conducted using high-quality binoculars (e.g., Zeiss, 10 x 42 power). Due to the different sizes of ZOIs from different pile driving/removal methods and pile sizes, ZOIs corresponding to a specific pile driving/removal methods listed in Table 2 will be monitored according to the following monitoring protocols at different locations.

- The required monitoring distances will be determined by using a range finder or hand-held global positioning system device.

- ZOI-1 will be monitored by one land-based biologist at the terminal work site, and one boat with a pilot and a biologist that will travel through the monitoring area.

- ZOI-2 will be monitored by one land-based biologist at the terminal work site, and one boat with a pilot and a biologist that will travel through the monitoring area.

- ZOI-3 will be monitored by five land-based biologists, and one boat with a pilot and a biologist that will travel through the monitoring area.

- ZOI-4 will be monitored by one land-based biologist at the terminal work site, and one boat with a pilot and a biologist that will travel through the monitoring area.

- ZOI-5 will be monitored by one land-based biologist at the terminal work site, and one boat with a pilot and a biologist that will travel through the monitoring area.

- ZOI-6 will be monitored by two land-based biologists from the terminal work site.

The geographic location of each ZOI is provided in maps of WSDOT's marine mammal monitoring plan.

Data collection during marine mammal monitoring will consist of a count of all marine mammals by species, a description of behavior (if possible), location, direction of movement, type of construction that is occurring, time that pile replacement work begins and ends, any acoustic or visual disturbance, and time of the observation. Environmental conditions such as weather, visibility, temperature, tide level, current, and sea state would also be recorded.

Reporting Measures

WSDOT would be required to submit weekly monitoring reports to NMFS that summarize the monitoring results, construction activities, and environmental conditions.

A final monitoring report would be submitted to NMFS within 90 days after completion of the construction work. This report would detail the monitoring protocol, summarize the data recorded during monitoring, and estimate the number of marine mammals that may have been harassed. NMFS would have an opportunity to provide comments on the report, and if NMFS has comments, WSDOT would address the comments and submit a final report to NMFS within 30 days.

In addition, NMFS would require WSDOT to notify NMFS' Office of Protected Resources and NMFS' Stranding Network within 48 hours of sighting an injured or dead marine mammal in the

vicinity of the construction site. WSDOT shall provide NMFS with the species or description of the animal(s), the condition of the animal(s) (including carcass condition, if the animal is dead), location, time of first discovery, observed behaviors (if alive), and photo or video (if available).

In the event that WSDOT finds an injured or dead marine mammal that is not in the vicinity of the construction area, WSDOT would report the same information as listed above to NMFS as soon as operationally feasible.

2.3.2. Alternative 2 – No Action Alternative

We are required to evaluate the No Action Alternative per CEQ NEPA regulations. The No Action Alternative serves as a baseline to compare the impacts of the Preferred and other Alternatives. Under the No Action alternative, we would not issue an IHA to WSDOT for the proposed construction project.

Under the No Action Alternative, WSDOT could choose not to proceed with their proposed activities or to proceed without an IHA. If they choose the latter, WSDOT would not be exempt from the MMPA prohibitions against the take of marine mammals and would be in violation of the MMPA if take of marine mammals occurs.

For purposes of this EA, we characterize the No Action Alternative as WSDOT not receiving an IHA and WSDOT conducting construction activities for its proposed Vashon Seismic Retrofit Project without the protective measures and reporting requirements required by an IHA under the MMPA. We take this approach to meaningfully evaluate the primary environmental issues—the impact on marine mammals from these activities in the absence of protective measures.

2.4. Alternatives Considered but Eliminated from Further Consideration

NMFS considered whether other alternatives could meet the purpose and need and support WSDOT's proposed construction project. An alternative that would allow for the issuance of an IHA with no required mitigation or monitoring was considered but eliminated from consideration, as it would not be in compliance with the MMPA and therefore would not meet the purpose and need. For that reason, this alternative is not analyzed further in this document. No other alternatives that would meet the purpose and need of the Project were identified.

Chapter 3 Affected Environment

This chapter describes existing conditions in the proposed action areas. Complete descriptions of the physical, biological, and social environment of the action area are contained in the documents listed in Section 1.3.1 of this EA. We incorporate those descriptions by reference and briefly summarize or supplement the relevant sections for marine mammals in the following subchapters.

3.1. Physical Environment

We are required to consider impacts to the physical environment under NOAA NAO 216-6. As discussed in Chapter 1, our proposed action and alternatives relate only to the authorization of 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 subchapter 1.3.2 - Scope of Environmental Analysis). Because of the requirements of NAO 216-6, we briefly summarize the physical components of the environment here.

3.2. Biological Environment

The primary component of the biological environment that would be impacted by the proposed action and alternatives would be marine mammals, which would be directly impacted by the authorization of incidental take. We briefly summarize this component of the biological environment here.

3.2.1. Marine Mammals

We provide information on the occurrence of marine mammals most likely present in the proposed activity areas in section 1.1.2 of this EA. The marine mammals most likely to be harassed incidental to conducting the Vashon Seismic Retrofit Project are: California sea lions, Pacific harbor seals, Steller sea lions, killer whales (Southern Resident and transient populations), gray whales, humpback whales, minke whales, harbor porpoises and Dall's porpoises. Only the Southern Resident killer whales and humpback whales are listed as endangered species under the Endangered Species Act (ESA).

3.2.1.1.California Sea Lions

The U.S. stock was estimated at 296,750 in the 2011 SAR (NMFS 2011b) and may be at carrying capacity, although more data are needed to verify that determination (Carretta *et al*. 2007a). Some 3,000 to 5,000 animals are estimated to move into northwest waters (both Washington and British Columbia) during the fall (September) and remain until the late spring (May) when most return to breeding rookeries in California and Mexico (Jeffries *et al*. 2000). Peak counts of over 1,000 animals have been made in Puget Sound (Jeffries *et al*. 2000).

In 2009 WSF replaced several dolphin structures at the Vashon terminal. Marine mammal monitoring was implemented during this project. Over 7 days of monitoring in November of 2009, four California sea lions swimming near the terminal (WSF 2009).

From November of 2012 to February of 2014, the U.S. Navy collected sightings data of California sea lions hauled-out on the Rich Passage float and buoy. In the September to February timeframe scheduled for this project, the Navy reported a total of 646 California sea lions over 14 days of observation, with a high of 110 on January 14, 2014 (U.S. Navy 2014).

According to the NMFS National Stranding Database, there were four confirmed California sea lion strandings in the Vashon area in 2010-13, in the September-February work window scheduled for this project (NMFS 2014a).

California sea lions are not listed as endangered or threatened under the ESA or as depleted under the MMPA. They are not considered a strategic stock under the MMPA, because total human-caused mortality, although unknown, is likely to be well less than the potential biological removal (PBR) (9,200) (NMFS 2011b).

California sea lions breed on islands off Baja Mexico and southern California with primarily males migrating north to feed in the northern waters (Everitt *et al*. 1980). Females remain in the waters near their breeding rookeries off California and Mexico. All age classes of males are seasonally present in Washington waters (WDFW 2000).

California sea lions were unknown in Puget Sound until approximately 1979 (Steiger and Calambokidis 1986). Everitt *et al*. (1980) reported the initial occurrence of large numbers at Port Gardner, Everett (northern Puget Sound) in the spring of 1979. The number of California sea lions using the Everett haulout numbered around 1,000. This haulout remains the largest in the state for sea lions in general and for California sea lions specifically. Similar sightings and increases in numbers were documented throughout the region after the initial sighting in 1979 (Steiger and Calambokidis 1986), including urbanized areas such as Elliott Bay near Seattle and heavily used areas of central Puget Sound (Gearin *et al*. 1986). In Washington, California sea lions use haulout sites within all inland water regions (WDFW 2000). The movement of California sea lions into Puget Sound could be an expansion in range of a growing population (Steiger and Calambokidis 1986).

California sea lions do not avoid areas with heavy or frequent human activity, but rather may approach certain areas to investigate. This species typically does not flush from a buoy or haulout if approached.

The nearest documented California sea lion haulout site to the Vashon ferry terminal is 7.8 km NW (WDFW 2000).

3.2.1.2.Pacific Harbor Seals

Harbor seals are members of the true seal family (Phocidae). There are three distinct west coast stocks: 1) inland waters of Washington State (including Hood Canal, Puget Sound, Georgia Basin and the Strait of Juan de Fuca out to Cape Flattery), 2) outer coast of Oregon and Washington, and 3) California (Carretta *et al*. 2007a).

Pupping seasons vary by geographic region. For the southern Puget Sound region, pups are born from late June through September (WDFW 2012a). After October 1 all pups in the inland waters of Washington are weaned.

Harbor seals are the most numerous pinniped in the inland marine waters of Washington (Calambokidis and Baird 1994). In the 2010 Stock Assessment Report (SAR)(NMFS 2011a),

Jeffries et al. (2003) recorded a mean count of 9,550 harbor seals in Washington's inland marine waters, and estimated the total population to be approximately 14,612 animals (including the Strait of Juan de Fuca). The population across Washington increased at an average annual rate of 10 percent between 1991 and 1996 (Jeffries *et al*. 1997) and is thought to be stable (Jeffries *et al*. 2003).

The nearest documented harbor seal haulout site to the Vashon ferry terminal is 9.7 km northwest. The number of harbor seals using the haulout is less than 100 (WDFW 2000).

Harbor seals have been observed hauled-out on a boat ramp to the east of the Vashon Ferry Terminal trestle, and on a beach to the west of the trestle (Stateler 2013, WSF 2009).

In 2009 WSF replaced several dolphin structures at the Vashon terminal. Marine mammal monitoring was implemented during this project. Over 7 days of monitoring in November of 2009, four harbor seals were observed near the terminal, three swimming and one hauled-out on the beach to the west of the trestle (WSF 2009).

According to the NMFS National Stranding Database, there were 38 confirmed harbor seal strandings in the Vashon area in 2010-2013, in the September-February work window scheduled for this project (NMFS 2014a).

Harbor seals are not "depleted" under the MMPA or listed as "threatened" or "endangered" under the ESA. Because there is no current estimate of minimum abundance, a potential biological removal (PBR) cannot be calculated for this stock. The previous estimate of PBR was 771 (Carretta *et al*. 2009). Human-caused mortality relative to PBR is unknown, but it is considered to be small relative to the stock size. The Washington Inland Waters stock of harbor seals is not classified as a "strategic" stock. The stock is also considered within its Optimum Sustainable Population level (Jeffries *et al*. 2003).

Harbor seals are the most numerous marine mammal species in Puget Sound. Harbor seals are non-migratory; their local movements are associated with such factors as tides, weather, season, food availability and reproduction (Scheffer and Slipp 1948; Fisher 1952; Bigg 1969, 1981). They are not known to make extensive pelagic migrations, although some long-distance movements of tagged animals in Alaska (174 km) and along the U.S. west coast (up to 550 km) have been recorded (Pitcher and McAllister 1981; Brown and Mate 1983; Herder 1983).

Harbor seals haul out on rocks, reefs and beaches, and feed in marine, estuarine and occasionally fresh waters. Harbor seals display strong fidelity for haulout sites (Pitcher and Calkins 1979; Pitcher and McAllister 1981).

The nearest documented harbor seal haulout site to the Vashon ferry terminal is 9.7 km northwest (Figure 3-1). The level of use of this haulout during the fall and winter is unknown, but is expected to be much less as air temperatures become colder than water temperatures resulting in seals in general hauling out less. Harbor seals may also use other undocumented haulout sites in the area.

Transient killer whales often forage to the east of Allen Bank for harbor seals (Sears 2013), which is within the project ZOI. NW Blake Island, just north of Vashon Island is a 'hot-spot' for seals that are prey for Transients (Stateler 2013).

3.2.1.3.Steller Sea Lions

Steller sea lions comprise two recognized management stocks (eastern and western), separated at 144º W longitude (Loughlin 1997). Only the eastern stock is considered in this application as the western stock occurs outside of the geographic area under consideration. Breeding rookeries for the eastern stock are located along the California, Oregon, British Columbia, and southeast Alaska coasts, but not along the Washington coast or in inland Washington waters (Angliss and Outlaw 2007). Steller sea lions primarily use haulout sites on the outer coast of Washington and in the Strait of Juan de Fuca along Vancouver Island in British Columbia. Only sub-adults or non-breeding adults may be found in the inland waters of Washington.

The eastern stock was estimated at 52,847 individuals in the 2012 SAR, and the most recent estimate for Washington state (including the outer coast) is 516 individuals (non-pups only) (NMFS 2012a). However, there are estimates that 1,000 to 2,000 individuals enter the Strait of Juan de Fuca during the fall and winter months.

Steller sea lion numbers in Washington State decline during the summer months, which correspond to the breeding season at Oregon and British Columbia rookeries (approximately late May to early June) and peak during the fall and winter months (WDFW 2000). A few Steller sea lions can be observed year-round in Puget Sound although most of the breeding age animals return to rookeries in the spring and summer.

Steller sea lions were listed as threatened range-wide under the ESA on November 26, 1990 (55 FR 49204). After division into two stocks, the western stock was listed as endangered under the ESA on May 4, 1997 and the eastern stock remained classified as threatened (62 FR 24345). In 2006 the NMFS Steller sea lion recovery team proposed removal of the eastern stock from listing under the ESA based on its annual rate of increase of approximately 3% since the mid-1970s. The eastern stock was delisted in November 2013.

On August 27, 1993, NMFS published a final rule designating critical habitat for the Steller sea lion. No critical habitat was designated in Washington. Critical habitat is associated with breeding and haulout areas in Alaska, California, and Oregon (NMFS 1993).

Steller sea lions are listed as depleted under the MMPA. Both stocks are classified as strategic. The PBR for this stock is 2,378 animals (NMFS 2012a).

Adult Steller sea lions congregate at rookeries in Oregon, California, and British Columbia for pupping and breeding from late May to early June (Gisiner 1985). Rookeries are usually located on beaches of relatively remote islands, often in areas exposed to wind and waves, where access by humans and other mammalian predators is difficult (WDFW 1993).

For Washington inland waters, Steller sea lion abundances vary seasonally with a minimum estimate of 1,000 to 2000 individuals present or passing through the Strait of Juan de Fuca in fall and winter months (S. Jeffries pers. comm. 2008b). The number of haulout sites has increased in recent years.

In 2009 WSF replaced several dolphin structures at the Vashon terminal. Marine mammal monitoring was implemented during this project. Over 7 days of monitoring in November of 2009, no Steller sea lions were observed (WSF 2009).

From November of 2012 to February of 2014, the U.S. Navy collected sightings data of Steller sea lions hauled-out on the Rich Passage float and buoy. In the September to February timeframe

scheduled for this project, the Navy reported a total of 48 Steller sea lions over 14 days of observation, with a high of 9 in January 14, 2014 (U.S. Navy 2014).

According to the NMFS National Stranding Database, there were no Steller sea lion strandings in the Vashon area in 2010-13 (NMFS 2014a).

3.2.1.4.Killer Whales

The killer whale (*Orcinus orca)* is the largest member of the dolphin family (Delphinidae) and occurs in most marine waters of the world. Killer whales are distinct among all cetaceans with their black-and-white coloration with characteristic gray or white saddle patches behind the dorsal fin and white eye patches. Killer whales live in family groups called pods, are highly social, and communicate with a highly developed acoustic sensory system that is also used to navigate and find prey (Ford 1989; Ford *et al*. 2000). Vocal communication is particularly advanced in killer whales and is an essential element of the species social structure (Wiles 2004; Krahn *et al*. 2004).

Two sympatric ecotypes of killer whales are found within the activity area: transient and resident. These types vary in diet, distribution, acoustic calls, behavior, morphology and coloration (Ford *et al*. 2000). The ranges of transient and resident killer whales overlap; however, little interaction and high reproductive isolation occurs among the two ecotypes (Barrett-Lennard 2000; Barrett-Lennard and Ellis 2001; Hoelzel *et al*. 2002 as cited in NMFS 2008a). Resident killer whales are primarily piscivorous, whereas transients primarily feed on marine mammals, especially harbor seals (Baird and Dill 1996). Resident killer whales also tend to occur in larger (10 to 60 individuals), stable family groups known as pods, whereas transients occur in smaller, less structured pods of two to six individuals (Center for Whale Research 2014).

Southern Resident Killer Whale

Two stocks of resident killer whales occur in Washington State: the Southern Resident (SRKW) and Northern Resident stocks. Southern Residents occur within the activity area, in the Strait of Juan de Fuca, Strait of Georgia, and in coastal waters off Washington and Vancouver Island, British Columbia. Northern Residents occur primarily in inland and coastal British Columbia and Southeast Alaska waters and rarely venture into Washington State waters. Little interaction (Ford et al. 2000) or gene flow (Barrett-Lennard 2000; Barrett-Lennard and Ellis 2001) is known to occur between the two resident stocks.

The Southern Residents live in three family groups known as the J, K and L pods. The entire Southern Resident population has been annually recorded since 1973 (Krahn *et al*. 2004). Individual whales are identified through photographs of unique saddle patch and dorsal fin markings. Each Southern Resident pod has a distinctive dialect of vocalizations (Ford 1989) and calls can travel 10 miles or more underwater. SRKW forage primarily on salmon, with Chinook salmon considered the major prey in the Puget Sound region in late spring through the fall. Other identified prey included chum salmon, other salmonids, herring, and rockfish (NMFS 2008a).

Small population numbers make Southern Residents vulnerable to inbreeding depression and catastrophic events such as disease or a major oil spill. Ongoing threats to Southern Residents include declining prey resources, environmental contaminants, noise and physical disturbance (Krahn *et al*. 2004; Wiles 2004). In Washington's inland waters, high levels of noise disturbance and potential behavior disruption are due to recreational boating traffic, private and commercial

whale watching boats and commercial vessel traffic (Wiles 2004). Other potential noise disturbance includes high output military sonar equipment and marine construction. Noise effects may include altered prey movements and foraging efficiency, masking of whale calls, and temporary hearing impairment (Krahn *et al*. 2004).

The Southern Resident stock was first recorded in a 1974 census, at which time the population comprised 71 whales. This population peaked at 97 animals in 1996, declined to 79 by 2001 (Center for Whale Research 2011), and then increased to 89 animals by 2006 (Carretta *et al*. 2007a). As of December 2013, the population collectively numbers 80 individuals: J pod has 25 members, K pod has 19 members, and L pod has 36 members (Center for Whale Research 2013).

The Southern Resident stock has decline from 97 individuals is due to a decrease in birth rates and an increase in mortalities, especially among the L pod (Krahn *et al*. 2004). There are a limited number of reproductive-age Southern Resident males, and several females of reproductive age are not having calves. Three major threats were identified in the ESA listing: reduced quantity and quality of prey; persistent pollutants that could cause immune or reproductive system dysfunction; and effects from vessels and sound (NMFS 2008a). Other threats identified were demographics, small population size, and vulnerability to oil spills. Previously, declines in the Southern Resident population were due to shooting by fishermen, whalers, sealers and sportsmen largely due to their interference with fisheries (Wiles 2004) and the aquarium trade, which is estimated to have taken a significant number of animals from 1967 to 1973 (Ford *et al*. 1995). According to the 2012 SAR, the PBR is 0.14 animals (NMFS 2012b).

The Southern Resident stock was declared depleted under the MMPA in May 2003 (68 FR 31980). At that time, NMFS announced preparation of a conservation plan to restore the stock to its optimal sustainable population. On November 18, 2005, the SRKW stock was listed as an endangered distinct population segment (DPS) under the ESA (70 FR 69903). On November 29, 2006, NMFS published a final rule designating critical habitat for the SRKW DPS. Both Puget Sound and the San Juan Islands are designated as core areas of critical habitat under the ESA, excluding areas less than 20 feet deep relative to extreme high water (71 FR 69054). A final recovery plan for SRKW was published in January of 2008 (NMFS 2008a).

In Washington State, killer whales were listed as a state candidate species in 2000. In April 2004, the State upgraded their status to a state endangered species.

Southern Residents are documented in coastal waters ranging from central California to the Queen Charlotte Islands, British Columbia (NMFS 2008a). They occur in all inland marine waters within the activity area. While in the activity area, resident killer whales generally spend more time in deeper water and only occasionally enter water less than 15 feet deep (Baird 2000). Distribution is strongly associated with areas of greatest salmon abundance, with heaviest foraging activity occurring over deep open water and in areas characterized by high-relief underwater topography, such as subsurface canyons, seamounts, ridges, and steep slopes (Wiles 2004).

Records from 1976 through 2006 document Southern Residents in the inland waters of Washington during the months of March through June and October through December, with the primary area of occurrence in inland waters north of Admiralty Inlet, located in north Puget Sound (The Whale Museum 2008a).

Beginning in May or June and through the summer months, all three pods (J, K and L) of Southern Residents are most often located in the protected inshore waters of Haro Strait (west of San Juan Island), in the Strait of Juan de Fuca, and Georgia Strait near the Fraser River. Historically, the J pod also occurred intermittently during this time in Puget Sound; however, records from The Whale Museum (2008a) from 1997 through 2007 show that J pod did not enter Puget Sound south of the Strait of Juan de Fuca from approximately June through August.

In fall, all three SRKW pods occur in areas where migrating salmon are concentrated such as the mouth of the Fraser River. They may also enter areas in Puget Sound where migrating chum and Chinook salmon are concentrated (Osborne 1999). In the winter months, the K and L pods spend progressively less time in inland marine waters and depart for coastal waters in January or February. The J pod is most likely to appear year-round near the San Juan Islands, and in the fall/winter, in the lower Puget Sound and in Georgia Strait at the mouth of the Fraser River.

SRKW are present in the Vashon Island area in November-January, coinciding with chum salmon runs, with peak sightings in November/December. SRKW whale commonly forage for salmon on the east side of Vashon Island. They tend to pass through the Vashon area, traveling at approximately 4 mph, rather than staying in the area (Sears 2013).

Ann Stateler of the Vashon Hydrophone Project (and a Vashon Island resident) has been observing whales in the area since 1994. Her observations since 2005 show that the broad window for SRKW presence in the Vashon area has been from October to March, with most encounters occurring between November and January. Prey samples collected by Mark Sears and NOAA researchers in local waters indicate that the SRKW are targeting Chum and Chinook salmon.

SRKW use all of the waterways surrounding Vashon/Maury Island: East Passage, Colvos Pass, Dalco Pass, waters off the north end between Blake and Vashon Islands. Sometimes the SRKW circumnavigate the island. SRKW visits to the Vashon area have been highly variable. Typically, members of all three pods are observed over a year, with the exception of 2006 when J Pod was not present for the first time since observations have been recorded.

In 2009 WSF replaced several dolphin structures at the Vashon terminal. Marine mammal monitoring was implemented during this project. Over 7 days of monitoring in November of 2009, no killer whales were observed (WSF 2009).

According to the NMFS National Stranding Database, there were no killer whale strandings in the Vashon area in 2010-13 (NMFS 2014a).

Transient Killer Whale

The West Coast Transient stock occurs in Washington State. This stock ranges from southern California to southeast Alaska and is distinguished from two other Eastern North Pacific transient stocks that occur further north, the AT1 and the “Gulf of Alaska transient stocks. This separation was based on variations in acoustic calls and genetic distinctness (Angliss and Outlaw 2007). West Coast transients primarily forage on harbor seals (Ford and Ellis 1999), but other species such as porpoises and sea lions are also taken (NMFS 2008a).

The West Coast Transient stock, which includes individuals from California to southeastern Alaska, was estimated to have a minimum number of 354 in the 2010 SAR (NMFS 2010).

Trends in abundance for the West Coast Transients were unavailable in the most recent stock assessment report (Angliss and Outlaw 2007). Human-caused mortality and serious injury are estimated to be zero animals per year and do not exceed the PBR, which is estimated at 3.5 animals (NMFS 2010).

The West Coast Transient stock is not designated as depleted under the MMPA or listed as "threatened or "endangered" under the ESA. Because the estimated level of human-caused mortality and serious injury (zero animals per year) does not exceed the PBR rate (3.5), the stock is not classified as strategic.

Within the inland waters, Transients may frequent areas near seal rookeries when pups are weaned (Baird and Dill 1995). West Coast Transients are documented intermittently year-round in Washington inland waters.

Transient sightings have become more common since the mid-2000's. Unlike the SRKW pods, Transients may be present in the area for hours as they hunt pinnipeds. Transients often forage to the east of Allen Bank, which is within the project ZOI. NW Blake Island, just north of Vashon Island is a 'hot-spot' for seals that are prey for Transients. Transients may be more present during September/October harbor seal pup weaning.

3.2.1.5.Gray Whales

The North Pacific gray whale (*Eschrichtius robustus*) stock is divided into two distinct geographically isolated stocks: eastern and western "Korean". Individuals in this region are part of the Eastern North Pacific stock. The majority of the Eastern North Pacific population spends summers feeding in the Bering and Chukchi Seas, but some individuals have been reported summering in waters off the coast of British Columbia, Southeast Alaska, Washington, Oregon and California (Rice et al. 1984; Angliss and Outlaw 2007). Gray whales migrate in the fall, south along the coast of North America to Baja California, Mexico to calve (Rice *et al*. 1981.) Gray whales are recorded in Washington waters during feeding migrations between late spring and autumn with occasional sightings during winter months (Calambokidis *et al*. 1994, 2002).

Early in the 20th century, it is believed that commercial hunting for gray whales reduced population numbers to below 2,000 individuals (Calambokidis and Baird 1994). Population surveys since the delisting estimate that the population fluctuates at or just below the carrying capacity of the species (~26,000 individuals) (Rugh *et al*. 1999; Calambokidis *et al*. 1994; Angliss and Outlaw 2007).

According to the 2011 SAR, the minimum population estimate of the Eastern North Pacific stock is 18,017 (NMFS 2011c). Within Washington waters, gray whale sightings reported to Cascadia Research and the Whale Museum between 1990 and 1993 totaled over 1,100 (Calambokidis et al. 1994). Abundance estimates calculated for the small regional area between Oregon and southern Vancouver Island, including the San Juan Area and Puget Sound, suggest there were 137 to 153 individual gray whales from 2001 through 2003 (Calambokidis *et al*. 2004b). Forty-eight individual gray whales were observed in Puget Sound and Hood Canal in 2004 and 2005 (Calambokidis 2007).

After listing of the species under the ESA in 1970, the number of gray whales increased dramatically resulting in their delisting in 1994. In 2001 NOAA Fisheries received a petition to relist the stock under the ESA, but it was determined that there was not sufficient information to warrant the petition (Angliss and Outlaw 2007). Since delisting under the ESA, the stock has not

been reclassified under the MMPA. The PBR for this stock is 360 animals per year (NMFS 2011c).

Gray whales migrate within 5 to 43 km of the coast of Washington during their annual north/south migrations (Green *et al*. 1995). Gray whales migrate south to Baja California where they calve in November and December, and then migrate north to Alaska from March through May (Rice et al. 1984; Rugh *et al*. 2001) to summer and feed. A few gray whales are observed in Washington inland waters between the months of September and January, with peak numbers of individuals from March through May. Peak months of gray whale observations in the area of activity occur outside the proposed work window of September through February. The average tenure within Washington inland waters is 47 days and the longest stay was 112 days.

Although typically seen during their annual migrations on the outer coast, a regular group of gray whales annually comes into the inland waters at Saratoga Passage and Port Susan from March through May to feed on ghost shrimp (Weitkamp *et al*. 1992). During this time frame they are also seen in the Strait of Juan de Fuca, the San Juan Islands, and areas of Puget Sound, although the observations in Puget Sound are highly variable between years (Calambokidis *et al*. 1994).

In 2009 WSF replaced several dolphin structures at the Vashon terminal. Marine mammal monitoring was implemented during this project. Over 7 days of monitoring in November of 2009, no gray whales were observed (WSF 2009).

According to the NMFS National Stranding Database, there were no gray whale strandings in the Vashon area in 2010-13 (NMFS 2014a).

3.2.1.6.Humpback Whales

Humpback whales (*Megaptera novaeangliae*) are wide-ranging baleen whales that can be found virtually worldwide. Recent studies have indicated that there are three distinct stocks of humpback whale in the North Pacific: California-Oregon-Washington (formerly Eastern North Pacific), Central North Pacific and Western North Pacific (NMFS 2011d).

The California-Oregon-Washington (CA-OR-WA) stock may be found near the project site. This stock calves and mates in coastal Central America and Mexico and migrates up the coast from California to southern British Columbia in the summer and fall to feed (NMFS 1991; Marine Mammal Commission 2003; Carretta *et al*. 2007a). Although infrequent, interchange between the other two stocks and the CA-OR-WA stock occurs in breeding areas (Carretta *et al*. 2007a). Few CA-OR-WA stock humpback whales are seen in Puget Sound, but more frequent sightings occur in the Strait of Juan de Fuca and near the San Juan Islands. Most sightings are in spring and summer. Humpback whales feed on krill, small shrimp-like crustaceans and various kinds of small fish.

According to the 2011 SAR, the 2007/2008 estimate of 2,043 humpback whales is the best estimate for abundance for this stock, though it does exclude some whales in Washington (Calambokidis *et al*. 2009).

As a result of commercial whaling, humpback whales were listed as "endangered" under the Endangered Species Conservation Act of 1969. This protection was transferred to the Endangered Species Act (ESA) in 1973. The species is still listed as “endangered”, and consequently the stock is automatically considered as a "depleted" and "strategic" stock under

the MMPA. A recovery plan was adopted in 1991 (NMFS 1991). The PBR for this stock is 11.3 animals per year (NMFS 2011d).

Historically, humpback whales were common in inland waters of Puget Sound and the San Juan Islands (Calambokidis *et al*. 2002). In the early part of this century, there was a productive commercial hunt for humpbacks in Georgia Strait that was probably responsible for their long disappearance from local waters (Osborne et al. 1988). Since the mid-1990s, sightings in Puget Sound have increased. Between 1996 and 2001, Calambokidis *et al*. (2002) recorded six individuals south of Admiralty Inlet (northern Puget Sound).

In 2009 WSF replaced several dolphin structures at the Vashon terminal. Marine mammal monitoring was implemented during this project. Over 7 days of monitoring in November of 2009, no humpback whales were observed (WSF 2009).

According to the NMFS National Stranding Database, there were no humpback whale strandings in the Vashon area in 2010-13 (NMFS 2014a).

3.2.1.7.Minke Whales

The northern minke whale (*Balaenoptera acutorostra*) is part of the Northern Pacific stock, which is broken into three management stocks: the Alaskan, California/Oregon/Washington, and the Hawaiian stock (NMFS 2008b). The California/Oregon/Washington management stock is considered a resident stock, which is unlike the other Northern Pacific stocks (NMFS 2008b). This stock includes minke whales within the inland Washington waters of Puget Sound and the San Juan Islands (Dorsey *et al*. 1990; Carretta *et al*. 2007b), which may be present in the project area.

Minke whales have small, dark sleek bodies and a small dorsal fin. These whales are often recognized by surfacing snout first and a shallow but visible “bushy” blow. Minke whales feed by side lunging into schools of prey and gulping in large amounts of water. Food sources typically consist of krill, copepods, and small schooling fish, such as anchovies, herring, mackerel, and sand lance (NMFS 2008b).

According to the 2011 SAR, the minimum population estimate of the CA/OR/WA stock is 202 (NMFS 2011e) and is likely no more than 600 (NE Pacific Minke Project 2014). Information on minke whale population and abundance is limited due to difficulty in detection. Conducting surveys for the minke whale is difficult because of their low profiles, indistinct blows, and tendency to occur as single individuals (Green *et al*. 1992). Over a 10-year period, 30 individuals were photographically identified in the U.S./Canada trans-boundary area around the San Juan Islands and demonstrated high site fidelity (Dorsey *et al*. 1990; Calambokidis and Baird 1994). In a single year, up to 19 individuals were photographically identified from around the San Juan Islands (Dorsey *et al*. 1990).

Minke whales are not listed under the ESA and are classified as non-depleted under the MMPA. The annual mortality due to fisheries and ship strikes is less than the potential biological removal, so they are not considered a strategic management stock under the MMPA (Carretta *et al*. 2007b). The PBR for this stock is two animals per year (NMFS 2011e).

Minke whales are reported in Washington inland waters year-round, although few are reported in the winter (Calambokidis and Baird 1994). Minke whales are relatively common in the San Juan

Islands and Strait of Juan de Fuca (especially around several of the banks in both the central and eastern Strait), but are relatively rare in Puget Sound.

In the 1980's minke whales were found in three main areas around the San Juan Islands; west of Shaw Island (Minke Lake), the San Juan Channel and the Strait of San Juan de Fuca (Salmon Bank). However, by the 1990's the first two areas were abandoned, and minke whales were only found in the Strait of Juan de Fuca, despite continued search efforts in the other areas. This coincided with a general decline of herring in the area, possibly associated with disturbance of adjacent herring spawning grounds. A qualitative change in the number of sea birds was also noted at this time. In more recent years (2005-2011), minke whales were found foraging in all three areas again, and bird numbers were also higher. But minke whales are still predominantly found on the banks in the Strait of Juan de Fuca (NE Pacific Minke Whale Project 2014).

In 2009 WSF replaced several dolphin structures at the Vashon terminal. Marine mammal monitoring was implemented during this project. Over 7 days of monitoring in November of 2009, no Minke whales were observed (WSF 2009).

According to the NMFS National Stranding Database, there were no Minke whale strandings in the Vashon area in 2010-13 (NMFS 2014a).

3.2.1.8.Harbor Porpoises

The Washington Inland Waters Stock of harbor porpoise may be found near the project site. The Washington Inland Waters Stock occurs in waters east of Cape Flattery (Strait of Juan de Fuca, San Juan Island Region, and Puget Sound).

According to the 2011SAR, the Washington Inland Waters Stock mean abundance estimate based on 2002 and 2003 aerial surveys conducted in the Strait of Juan de Fuca, San Juan Islands, Gulf Islands, and Strait of Georgia is 10,682 harbor porpoises (NMFS 2011f).

No harbor porpoises were observed within Puget Sound proper during comprehensive harbor porpoise surveys (Osmek *et al*. 1994) or Puget Sound Ambient Monitoring Program (PSAMP) surveys conducted in the 1990s (WDFW 2008). Declines were attributed to gill-net fishing, increased vessel activity, contaminants, and competition with Dall's porpoise.

However, populations appear to be rebounding with increased sightings in central Puget Sound (Carretta *et al*. 2007b) and southern Puget Sound (WDFW 2008). Recent systematic boat surveys of the main basin indicate that at least several hundred and possibly as many as low thousands of harbor porpoise are now present. While the reasons for this recolonization are unclear, it is possible that changing conditions outside of Puget Sound, as evidenced by a tripling of the population in the adjacent waters of the Strait of Juan de Fuca and San Juan Islands since the early 1990s, and the recent higher number of harbor porpoise mortalities in coastal waters of Oregon and Washington, may have played a role in encouraging harbor porpoise to explore and shift into areas like Puget Sound (Hanson *et. al*. 2011).

The Washington Inland Waters Stock of harbor porpoise is "non-depleted" under MMPA, and "unlisted" under the ESA. Because there is no current estimate of minimum abundance, a PBR cannot be calculated for this stock (NMFS 2011e).

Harbor porpoises are common in the Strait of Juan de Fuca and south into Admiralty Inlet, especially during the winter, and are becoming more common south of Admiralty Inlet. Little information exists on harbor porpoise movements and stock structure near the Vashon area,

although it is suspected that in some areas harbor porpoises migrate (based on seasonal shifts in distribution). Department of Fish and Wildlife's (WDFW) Puget Sound Ambient Monitoring Program (PSAMP) data show peaks in Washington waters to occur during the winter.

Hall (2004) found that the frequency of sighting of harbor porpoises decreased with increasing depth beyond 150 m with the highest numbers observed at water depths ranging from 61 to 100 m. Although harbor porpoises have been spotted in deep water, they tend to remain in shallower shelf waters (<150 m) where they are most often observed in small groups of one to eight animals (Baird 2003). Water depths within the Vashon ZOIs range from 0 to 246 m, with roughly 2/3 of the area within the ZOI falling within the 61-100 m depth where the highest number of harbor porpoises may be observed.

According to Vashon Island area whale specialist Mark Sears, harbor porpoise are seen in groups of 2-3, and occasionally in groups of 6-12, and numbers in the area peak in May/June (Sears 2013).

In 2009 WSF replaced several dolphin structures at the Vashon terminal. Marine mammal monitoring was implemented during this project. Over 7 days of monitoring in November of 2009, one harbor porpoise was observed (WSF 2009).

According to the NMFS National Stranding Database, there was one harbor porpoise stranding in the Vashon area in 2010-13, in the September-February work window scheduled for this project (NMFS 2013).

3.2.1.9.Dall's Porpoises

The California, Oregon, and Washington Stock of Dall's porpoise may be found near the project site. The most recent estimate of Dall's porpoise stock abundance is 42,000, based on 2005 and 2008 summer/autumn vessel-based line transect surveys of California, Oregon, and Washington waters (NMFS 2011g). Within the inland waters of Washington and British Columbia, this species is most abundant in the Strait of Juan de Fuca east to the San Juan Islands. The most recent Washington's inland waters estimate is 900 animals (Calambokidis *et al*. 1997). Prior to the 1940s, Dall's porpoises were not reported in Puget Sound.

The California, Oregon, and Washington Stock of Dall's porpoise is "non-depleted" under the MMPA, and "unlisted" under the ESA. The PBR for this stock is 257 Dall's porpoises per year (NMFS 2011f).

Dall's porpoises are migratory and appear to have predictable seasonal movements driven by changes in oceanographic conditions (Green *et al*. 1992, 1993), and are most abundant in Puget Sound during the winter (Nysewander et al. 2005; WDFW 2008). Despite their migrations, Dall's porpoises occur in all areas of inland Washington at all times of year, but with different distributions throughout Puget Sound from winter to summer. The Washington State Department of Fish and Wildlife's (WDFW) Puget Sound Ambient Monitoring Program (PSAMP) data show peaks in Washington waters to occur during the winter. The average winter group size is three animals (WDFW 2008).

In 2009 WSF replaced several dolphin structures at the Vashon terminal. Marine mammal monitoring was implemented during this project. Over 7 days of monitoring in November of 2009, no Dall's porpoise were observed (WSF 2009).

Dall's porpoise used to be more common that harbor porpoise in the Vashon area, though harbor porpoise is now more common. The usual observation in the Vashon area is a single Dall's porpoise, or a pair (Sears 2013).

According to the NMFS National Stranding Database, there were no Dall's porpoise strandings in the Vashon area in 2010-13 (NMFS 2013).

3.3. Social Environment

Because our proposed action and alternatives relate only to the authorization of incidental take of marine mammals, the components of the social environment are not relevant to our proposed action (see subchapter 1.3.2 - Scope of Environmental Analysis). Therefore, no further analysis of the social environment is required here.

Chapter 4 Environmental Consequences

This chapter of the EA analyzes the impacts of the two alternatives and addresses the potential direct, indirect, and cumulative impacts of our issuance of an IHA. WSDOT's application and other related environmental analyses identified previously facilitate this analysis.

Under the MMPA, we have evaluated the potential impacts of WSDOT's construction program activities in order to determine whether to authorize incidental take of marine mammals. Under NEPA, we have determined that an EA is appropriate to evaluate the potential significance of environmental impacts resulting from the issuance of an IHA.

4.1. Effects of Alternative 1 – Issuance of an IHA with Mitigation Measures

Alternative 1 is the Preferred Alternative, under which we would issue an IHA to WSDOT allowing the incidental take, by Level B harassment, of nine species of marine mammals from August 1, 2015, through July 31, 2016, subject to the mandatory mitigation and monitoring measures and reporting requirements set forth in the IHA, if issued. We would incorporate the mitigation and monitoring measures and reporting described earlier in this EA into a final IHA.

4.1.1. Impacts to Marine Mammal Habitat

No permanent impacts to marine mammal habitat are proposed to or would occur as a result of the proposed Project. The WSDOT's proposed Vashon Seismic Retrofit Project would not modify the existing habitat. Therefore, no restoration of the habitat would be necessary. A temporary, small-scale loss of foraging habitat may occur for marine mammals, if the marine mammals leave the area during pile extraction and driving activities.

Acoustic energy created during pile replacement work would have the potential to disturb fish within the vicinity of the pile replacement work. As a result, the affected area could temporarily lose foraging value to marine mammals. During pile driving, high noise levels may exclude fish from the vicinity of the pile driving. Hastings and Popper (2005) identified several studies that suggest fish will relocate to avoid areas of damaging noise energy. The acoustic frequency and intensity ranges that have been shown to negatively impact fish (FHWG 2008) and an analysis of the potential noise output of the proposed Project indicate that Project noise has the potential to cause temporary hearing loss in fish over a distance of approximately 42 meters from pile driving activity. If fish leave the area of disturbance, pinniped foraging habitat in that area may have temporarily decreased foraging value when piles are driven using impact hammering.

The duration of fish avoidance of this area after pile driving stops is unknown. However, the affected area represents an extremely small portion of the total foraging range of marine mammals that may be present in and around the project area.

Because of the short duration of the activities and the relatively small area of the habitat that may be affected, the impacts to marine mammals and the food sources that they utilize are not

expected to cause significant or long-term consequences for individual marine mammals or marine mammal populations.

4.1.2. Impacts to Marine Mammals

We expect that behavioral disturbance or displacement resulting from the activities associated with the Project have the potential to impact marine mammals. The majority of impacts are likely to occur from pile driving and pile removal activities. Pile driving and removal activities associated with the construction could cause pinniped behavioral modification and temporary displacement within the vicinity of the action area through: (1) noise generated from pile removal and pile driving; and (2) visual disturbance from construction activities and crew. These activities are not anticipated to result in injury, serious injury, or mortality of any marine mammal species and none is proposed to be authorized.

4.1.2.1.Acoustic Impacts

When considering the influence of various kinds of sound on the marine environment, it is necessary to understand that different kinds of marine life are sensitive to different frequencies of sound. Based on available behavioral data, audiograms have been derived using auditory evoked potentials, anatomical modeling, and other data, Southall et al. (2007) designate "functional hearing groups" for marine mammals and estimate the lower and upper frequencies of functional hearing of the groups. The functional groups and the associated frequencies are indicated below (though animals are less sensitive to sounds at the outer edge of their functional range and most sensitive to sounds of frequencies within a smaller range somewhere in the middle of their functional hearing range):

- Low frequency cetaceans (13 species of mysticetes): functional hearing is estimated to occur between approximately 7 Hz and 22 kHz (however, a study by Au *et al.*, (2006) of humpback whale songs indicate that the range may extend to at least 24 kHz);
- Mid-frequency cetaceans (32 species of dolphins, six species of larger toothed whales, and 19 species of beaked and bottlenose whales): functional hearing is estimated to occur between approximately 150 Hz and 160 kHz;
- High frequency cetaceans (eight species of true porpoises, six species of river dolphins, *Kogia*, the franciscana, and four species of cephalorhynchids): functional hearing is estimated to occur between approximately 200 Hz and 180 kHz; and
- Pinnipeds in Water: functional hearing is estimated to occur between approximately 75 Hz and 75 kHz, with the greatest sensitivity between approximately 700 Hz and 20 kHz.

As mentioned previously in this document, two marine mammal species (both of which are pinniped species) are likely to occur in the proposed seismic survey area. WSDOT and NMFS determined that in-water pile removal and pile driving during the Vashon Seismic Retrofit

Project has the potential to result in behavioral harassment of the marine mammal species and stocks in the vicinity of the proposed activity.

Marine mammals exposed to high-intensity sound repeatedly or for prolonged periods can experience hearing threshold shift (TS), which is the loss of hearing sensitivity at certain frequency ranges (Kastak et al. 1999; Schlundt et al. 2000; Finneran et al. 2002; 2005). TS can be permanent (PTS), in which case the loss of hearing sensitivity is unrecoverable, or temporary (TTS), in which case the animal's hearing threshold will recover over time (Southall et al. 2007). Since marine mammals depend on acoustic cues for vital biological functions, such as orientation, communication, finding prey, and avoiding predators, hearing impairment could result in the reduced ability of marine mammals to detect or interpret important sounds. Repeated noise exposure that causes TTS could lead to PTS.

Experiments on a bottlenose dolphin (*Tursiops truncates*) and beluga whale (*Delphinapterus leucas*) showed that exposure to a single watergun impulse at a received level of 207 kPa (or 30 psi) peak-to-peak (p-p), which is equivalent to 228 dB (p-p) re 1 μPa, resulted in a 7 and 6 dB TTS in the beluga whale at 0.4 and 30 kHz, respectively. Thresholds returned to within 2 dB of the pre-exposure level within 4 minutes of the exposure (Finneran *et al*. 2002). No TTS was observed in the bottlenose dolphin. Although the source level of one hammer strike for pile driving is expected to be much lower than the single watergun impulse cited here, animals being exposed for a prolonged period to repeated hammer strikes could receive more noise exposure in terms of sound exposure level (SEL) than from the single watergun impulse (estimated at 188 dB re 1 μPa2-s) in the aforementioned experiment (Finneran *et al*. 2002).

Chronic exposure to excessive, though not high-intensity, noise could cause masking at particular frequencies for marine mammals that utilize sound for vital biological functions (Clark *et al*. 2009). Masking is the obscuring of sounds of interest by other sounds, often at similar frequencies. Masking generally occurs when sounds in the environment are louder than, and of a similar frequency as, auditory signals an animal is trying to receive. Masking can interfere with detection of acoustic signals, such as communication calls, echolocation sounds, and environmental sounds important to marine mammals. Therefore, under certain circumstances, marine mammals whose acoustical sensors or environment are being severely masked could also be impaired.

Masking occurs at the frequency band which the animals utilize. Since noise generated from in-water vibratory pile removal and driving is mostly concentrated at low frequency ranges, it may have little effect on high-frequency echolocation sounds by odontocetes (toothed whales), which may hunt California sea lion and harbor seal. However, the lower frequency man-made noises are more likely to affect the detection of communication calls and other potentially important natural sounds, such as surf and prey noise. The noises may also affect communication signals when those signals occur near the noise band, and thus reduce the communication space of

animals (e.g., Clark *et al*. 2009) and cause increased stress levels (e.g., Foote *et al*. 2004; Holt *et al.* 2009).

Unlike TS, masking can potentially impact the species at community, population, or even ecosystem levels, as well as individual levels. Masking affects both senders and receivers of the signals and could have long-term chronic effects on marine mammal species and populations. Recent science suggests that low frequency ambient sound levels in the world's oceans have increased by as much as 20 dB (more than 3 times, in terms of SPL) from pre-industrial periods, and most of these increases are from distant shipping (Hildebrand 2009). All anthropogenic noise sources, such as those from vessel traffic and pile removal and driving, contribute to the elevated ambient noise levels, thus intensifying masking.

Nevertheless, the sum of noise from WSDOT's proposed Vashon Seismic Retrofit Project construction activities is confined to a limited area by surrounding landmasses; therefore, the noise generated is not expected to contribute to increased ocean ambient noise. In addition, due to shallow water depths in the project area, underwater sound propagation of low-frequency sound (which is the major noise source from pile driving) is expected to be poor.

Finally, in addition to TS and masking, exposure of marine mammals to certain sounds could lead to behavioral disturbance (Richardson *et al*. 1995), such as: changing durations of surfacing and dives, number of blows per surfacing, or moving direction and/or speed; reduced/increased vocal activities; changing/cessation of certain behavioral activities, such as socializing or feeding; visible startle response or aggressive behavior, such as tail/fluke slapping or jaw clapping; avoidance of areas where noise sources are located; and/or flight responses (e.g., pinnipeds flushing into water from haulouts or rookeries).

The biological significance of many of these behavioral disturbances is difficult to predict, especially if the detected disturbances appear minor. However, the consequences of behavioral modification could be expected to be biologically significant if the change affects growth, survival, or reproduction. Some of these types of significant behavioral modifications include:

- Drastic change in diving/surfacing patterns (such as those thought to be causing beaked whale strandings due to exposure to military mid-frequency tactical sonar);
- Habitat abandonment due to loss of desirable acoustic environment; and
- Cessation of feeding or social interaction.

The onset of behavioral disturbance from anthropogenic noise depends on both external factors (characteristics of noise sources and their paths) and the receiving animals (hearing, motivation, experience, demography), and is therefore difficult to predict (Southall *et al*. 2007).

The proposed project area is not a prime habitat for marine mammals, nor is it considered an area frequented by marine mammals. Therefore, behavioral disturbances that could result from

anthropogenic noise associated with WSDOT's construction activities are expected to affect only a small number of marine mammals on an infrequent and limited basis.

4.1.2.2.Visual Disturbance

The activities of workers in the project area may also cause behavioral reactions by marine mammals, such as pinnipeds flushing from the jetty or pier or moving farther from the disturbance to forage. There is a riprap breakwater that starts at the Alameda shoreline southeast of the proposed facility that harbor seals use as a haul-out site and to forage in the breakwater gap area. However, observations of the area show that it is unlikely that more than 10 to 20 individuals of harbor seals (or California sea lions) would be present in the project vicinity at any one time. Therefore, even if pinnipeds were flushed from the haul-out, a stampede is very unlikely, due to the relatively low number of animals onsite. In addition, proposed mitigation and monitoring measures would minimize the startle behavior of pinnipeds and prevent the animals from flushing into the water.

4.1.2.3.Estimated Take of Marine Mammals by Level B Incidental Harassment

As discussed above, in-water pile removal and pile driving (vibratory and impact) generate loud noises that could potentially harass marine mammals in the vicinity of WSDOT's proposed Vashon Seismic Retrofit Project.

Currently, NMFS uses 120 dB re 1 µPa and 160 dB re 1 µPa at the received levels for the onset of Level B harassment from non-impulse (vibratory pile driving and removal) and impulse sources (impact pile driving) underwater, respectively. Table 3 summarizes the current NMFS marine mammal take criteria.

Table 3. Current Acoustic Exposure Criteria for Non-explosive Sound Underwater

Criterion	Criterion Definition	Threshold
Level A Harassment (Injury)	Permanent Threshold Shift (PTS) (Any level above that which is known to cause TTS)	180 dB re 1 µPa (cetaceans) / 190 dB re 1 µPa (pinnipeds) root mean square (rms)
Level B Harassment	Behavioral Disruption (for impulse noises)	160 dB re 1 µPa (rms)
Level B Harassment	Behavioral Disruption (for non-impulse noise)	120 dB re 1 µPa (rms)

As explained above, exclusion zones and ZOIs will be established that encompass the areas where received underwater SPLs exceed the applicable thresholds for Level A and Level B harassment, respectively.

Incidental take for each species is estimated by determining the likelihood of a marine mammal being present within a ZOI during pile removal and pile driving. Expected marine mammal presence is determined by past observations and general abundance near the Vashon Ferry Terminal during the construction window. Typically, potential take is estimated by multiplying the area of the ZOI by the local animal density. This provides an estimate of the number of animals that might occupy the ZOI at any given moment. However, there are no density

estimates for any Puget Sound population of marine mammal. As a result, the take requests were estimated using local marine mammal data sets (e.g., Orca Network, state and federal agencies), opinions from state and federal agencies, and observations from Navy biologists.

Based on the estimates, approximately 1,919 Pacific harbor seals, 1,919 California sea lions, 644 Steller sea lions, 438 harbor porpoises, 136 Dall's porpoises, 54 killer whales (50 transient, 4 Southern Resident killer whales), 71 gray whales, 36 humpback whales, and 36 minke whales could be exposed to received sound levels that could result in takes from the proposed Vashon Seismic Retrofit Project. A summary of the estimated takes is presented in Table 4.

Table 4. Estimated numbers of marine mammals that may be exposed to received pile removal levels above 121 dB re 1 µPa (rms)

Species	Estimated marine mammal takes	Abundance	Percentage
Pacific harbor seal	1,919	14,612	13%
California sea lion	1,919	296,750	0.7%
Steller sea lion	644	63,160	1.0%
Harbor porpoise	438	10,682	4.0%
Dall's porpoise	136	42,000	0.3%
Killer whale, transient	50	521	9.6%
Killer whale, Southern Resident	4	85	4.7%
Gray whale	71	19,126	0.4%
Humpback whale	36	1,918	1.9%
Minke whale	36	478	7.5%

4.2. Effects of Alternative 2 – No Action Alternative

Under the No Action Alternative, we would not issue an IHA to WSDOT. As a result, WSDOT would not receive an exemption from the MMPA prohibitions against the take of marine mammals and would be in violation of the MMPA if take of marine mammals occurs.

The impacts to elements of the human environment resulting from the No Action Alternative—conducting the Vashon Seismic Retrofit Project in the absence of required protective measures for marine mammals under the MMPA—would be greater than those impacts resulting from Alternative 1, the Preferred Alternative.

4.2.1. Impacts to Marine Mammal Habitat

Under the No Action Alternative, the construction project would have no additional effects on the physical environment beyond those resulting from WSDOT's activities, which we evaluated earlier in this document (see Section 4.1.1). Even if there are no mitigation measures imposed, impacts to marine mammal habitat would be minimal at the action area. This Alternative would result in similar effects on the physical environment as Alternative 1.

4.2.2. Impacts to Marine Mammals

Under the No Action Alternative, WSDOT's activities could result in increased amounts of Level B harassment to marine mammals and possibly takes by injury (Level A harassment),

serious injury, or mortality due to the absence of mitigation and monitoring measures that would be required under the IHA. While it is difficult to provide an exact number of takes that might occur under the No Action Alternative, the numbers would be expected to be larger than those presented in Table 4 above, because WSDOT would not be required to follow mitigation measures to reduce the number of takes.

If the activities proceeded without the protective measures and reporting requirements required by a final Authorization under the MMPA, the direct, indirect, and cumulative effects on the human or natural environment of not issuing the IHA would include the following:

- Marine mammals within the construction project area could experience injury (Level A harassment) and potentially serious injury or mortality. If WSDOT is not required to use noise attenuation devices, the sound pressure levels during impact pile driving would be higher, and could potentially be loud enough to cause injury or worse to marine mammals. In addition, animals disturbed by the work activity that would be protected from additional harm by shutdown measures could suffer more severe harm if those mitigation measures are not in place;
- There could be increases in the number of behavioral responses because of the lack of mitigation measures required in the IHA. If WSDOT does not use soft starts while conducting the pile driving and removal activities, the incidental take of marine mammals would likely occur at higher levels than we have already identified and evaluated above, because animals would not be warned to leave the area before full power driving or removal occurs; and
- We would not be able to obtain the monitoring and reporting data needed to assess the anticipated impact of the activity upon the species or stock and to increase knowledge of the species, as required under the MMPA.

4.3. Compliance with Necessary Laws – Necessary Federal Permits

We have determined that the issuance of an IHA is consistent with the applicable requirements of the MMPA, MSFMCA, and our regulations. Please refer to Section 1.4 of this EA for more information.

4.4. Unavoidable Adverse Impacts

WSDOT's application and the other environmental analyses identified previously (WSF 2007) summarize unavoidable adverse impacts to marine mammals or to their populations to which they belong or on their habitats occurring in the proposed project area. We incorporated those documents by reference to include potential effects on other species.

We acknowledge that the incidental take authorized would potentially result in unavoidable adverse impacts to individual animals that would be harassed as a result of the Project. However, we do not expect WSDOT's activities to have adverse consequences on the viability of marine mammals in the Pacific Ocean or in Puget Sound, and 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 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) and that the proposed Vashon Seismic Retrofit Project and the take resulting from the proposed project activities would have a negligible impact on the affected species or stocks of marine mammals.

The MMPA requirement of ensuring the proposed action has no unmitigable adverse impact to subsistence uses does not apply here because there are no permitted subsistence uses of marine mammals in the region.

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 foreseeable impacts to marine mammal populations include the following: commercial whaling; climate change affecting the prey base and habitat quality as a result of global warming; ship strikes; fishing gear entanglement; exposure to biotoxins and the resulting bioburden; acoustic masking from anthropogenic noise; competition with commercial fisheries; and killer whale predation. These activities account for cumulative impacts to regional and worldwide populations of marine mammals, many of whom 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 in the marine environment and assessing cumulative effects on marine mammals (Clark *et al.*, 2009). 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 (Carretta *et al.*, 2013).

The proposed construction project would add another, albeit localized and temporary, activity in Washington coast. This activity would be limited to a small area in Vashon Island for a relatively short period of time. This section provides a brief summary of the human-related activities affecting the marine mammal species in the action area.

4.5.1. Ferry Terminal Construction

Beside the proposed Vashon Seismic Retrofit Project, WSDOT also performs other types of coastal construction activities. Between August 2010 and February 2011, WSDOT conducted pile driving activities associated with the Manette Bridge replacement in the city of Bremerton in Kitsap County. From November 2012 to February 2013, WSDOT's Washington State Ferry (WSF) replaced a cable-lift transfer span at the Port Townsend Ferry Terminal. In addition, WSF is also working on replacement of the dolphin structure at the Orcas Island and Friday

Harbor ferry terminals between September 2013 and February 2014. Furthermore, WSF is planning several other ferry terminal engineering projects, which include Mukilteo Multimodal Project, Seattle Terminal building and north trestle replacement, Spur/Anacortes Terminal tie-up slips dolphin and wingwall replacement, and Southworth Terminal timber trestle and terminal replacement, and Spur/Friday Harbor Terminal timber trestle and terminal replacement and Coupeville Terminal bridge timber towers preservation in the foreseeable future. Additionally, the U.S. Navy Base in Kitsap Washington is extending a pier in the Puget Sound region. These activities, however, are not expected to have significant impacts to the overall region environment as the activities involved are brief, localized, and of small scales. In addition, most of these projects will not be occurring concurrently.

4.5.2. Marine Pollution

Marine mammals are exposed to contaminants via the food they consume, the water in which they swim, and the air they breathe. Point and non-point source pollutants from coastal runoff, offshore mineral and gravel mining, at-sea disposal of dredged materials and sewage effluent, marine debris, and organic compounds from aquaculture are all lasting threats to marine mammals in the project area. The long-term impacts of these pollutants, however, are difficult to measure.

The persistent organic pollutants (POPs) tend to bioaccumulate through the food chain; therefore, the chronic exposure of POPs in the environment is perhaps of the most concern to high trophic level predators such as Southern Resident killer whales, Eastern Pacific gray whales, California sea lions, Pacific harbor seals, and Steller sea lions.

The WSDOT's construction and demolition activities associated with the Vashon Seismic Retrofit Project are not expected to cause increased exposure of POPs to marine mammals in the project vicinity due to the small scale and localized nature of the activities. Additionally, the WSDOT will use barges to carry out all construction debris and demolition material for proper disposal.

4.5.3. 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.

As recent as April 2010, five gray whales were found dead in Puget Sound. The die-off raised concerns among researchers who monitor gray whales and the health of marine mammals in the region. The total number of recent mortalities remains well below the peak numbers documented in big mortality year and the 5 that have died so far in 2010 is still under the average for an entire year. These mortalities are currently being investigated by scientists from the Northwest Marine Mammal Stranding Network including NMFS, Cascadia Research, Central Puget Sound Marine Mammal Stranding Network, and Washington Department of Fish and Wildlife.

4.5.4. Commercial and Private Marine Mammal Watching

Although marine mammal watching is considered by many to be a non-consumptive use of marine mammals with economic, recreational, educational and scientific benefits, it is not without potential negative impacts. One concern is that animals may become more vulnerable to vessel strikes once they habituate to vessel traffic (Swingle *et al.* 1993; Laist *et al*. 2001; Jensen and Silber 2004; Douglas *et al.* 2008). Another concern is that preferred habitats may be abandoned if disturbance levels are too high. Several recent research efforts have monitored and evaluated the impacts of people closely approaching, swimming, touching and feeding marine mammals and has suggested that marine mammals are at risk of being disturbed ("harassed"), displaced or injured by such close interactions. Researchers investigating the adverse impacts of marine mammal viewing activities have reported boat strikes, disturbance of vital behaviors and social groups, separation of mothers and young, abandonment of resting areas, and habituation to humans (Nowacek *et al.* 2001).

There are no known marine mammal watching operations based in the vicinity of the proposed action area. Marine mammal watching operations, however, especially killer whale watching operations, are common in the nearby Greater Puget Sound area, and thus marine mammals that occur in both the action area and the Puget Sound area could be adversely affected by such marine mammal watching operations over time. These cumulative adverse effects, however, are not expected to be significant.

4.5.5. Shipping

The Puget Sound is home to major Pacific Northwest shipping routes; literally thousands of vessels enter and leave the major ports of Washington State and British Colombia. In addition, to cargo ships, vacation cruise lines, and fishing vessels that travel on a regular basis throughout the region there are scores of recreational vehicles, ferry traffic, and whale watching boats. While long-term studies are needed to better understand the impact of vessel traffic on marine mammals like whales, short-term research has already begun and findings suggest that boat noise directly affects the behavior of marine mammals. Increased boat traffic not only has the potential to increase the likelihood of ship strike of marine mammals, it also contributes to increased ambient noise level. The proposed action area is mainly served by WSDOT ferries that shuttle among different city ports within the Puget Sound region. There is no increase in ferry services and number in the foreseeable future.

4.5.6. Commercial Fishing

Commercial fisheries may affect marine mammals indirectly by altering the quality of their habitat. The removal of large numbers of fish (both target and non-target or bycatch species) from a marine ecosystem can change the composition of the fish community, altering the abundance and distribution of prey available for marine mammals. In addition, by removing

large amounts of biomass, commercial fisheries compete with other consumers that depend on the target species for food, which can, in turn, increase competition between different piscivorous predators. Nevertheless, the proposed action area is a ferry terminal where no fishing activity is occurring. The proposed ferry terminal replacement will not change the current status quo of commercial fisheries in the Puget Sound area.

4.5.7. Climate Change

Global climate change could significantly affect the marine resources of the Northwest Pacific region. Possible impacts include temperature and rainfall changes and potentially rising sea levels and changes to ocean conditions. These changes may affect the coastal marine ecosystem in the proposed action area by increasing the vertical stratification of the water column and changing the intensity and rhythms of coastal winds and upwelling. Such modifications could cause ecosystem regime shifts as the productivity of the regional ecosystem undergoes various changes related to nutrients input and coastal ocean process (FWS 2011).

The precise effects of global climate change on the action area, however, cannot be predicted at this time because the coastal marine ecosystem is highly variable in its spatial and temporal scales.

4.5.8. Summary of Cumulative Effects

Although commercial harvest no longer takes place and existing subsistence harvest is set by quotas, scientific research activities, whale watching, coastal construction and development, marine pollution, and disease continue to result in some level of impact to marine mammal populations in the area. Nonetheless, the proposed construction work at the Vashon Ferry Terminal would only add negligible additional impacts to marine mammals in the project area due to the limited project footprint within the action area.

The pile driving and pile removal activities associated with the Vashon Seismic Retrofit Project are well planned to minimize impacts to the biological and physical environment of the areas by implementing mitigation and monitoring protocols. Therefore, NMFS has determined that the WSDOT's Vashon Seismic Retrofit Project would not have a significant cumulative effect on the human environment, provided that the mitigation and monitoring measures described in Sections 2.3.4 and 2.3.5 are implemented.

Chapter 5 List of Preparers and Agencies Consulted

Agencies Consulted

No other persons or agencies were consulted in preparation of this EA.

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