Request for an Incidental Harassment Authorization under the Marine Mammal Protection Act

Seattle Multimodal Project at Colman Dock
Year 2 Construction 2018-19

Washington State Department of Transportation
Ferries Division

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Submitted To:

National Marine Fisheries Service
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Cover: Southern Resident Killer Whales with Seattle skyline (October 2013) *(NOAA Northwest Fisheries Science Center, Candace Emmons)*

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Abbreviations and Acronyms

BMP	best management practices
CA-OR-WA	California-Oregon-Washington
CFR	Code of Federal Regulations
dB	decibels
DPS	Distinct Population Segment
DPS	dynamic positioning system
Ecology	Washington State Department of Ecology
ESA	Endangered Species Act
FHWA	Federal Highway Administration
FR	Federal Register
FTA	Federal Transit Administration
HPA	Hydraulic Project Approval
Hz	hertz
IHA	Incidental Harassment Authorization
IWC	International Whaling Commission
kHz	kilohertz
kJ	kilojoules(s)
km	kilometer(s)
m	meters
MATLAB	matrix laboratory
MLLW	Mean Low-Low Water
MHHW	Mean High-High Water
MM	mitigation measure
MMPA	Marine Mammal Protection Act of 1972
NMFS	National Marine Fisheries Service
NMML	National Marine Mammal Laboratory
NOAA	National Oceanographic Atmospheric Administration

NOAA/NMFS	National Oceanic Atmospheric Administration/National Marine Fisheries Service
NTU	nephelometric turbidity units
OHW	ordinary high water
OWC	overwater coverage
PSAMP	Puget Sound Ambient Monitoring Program
PSD	power spectral densities
PTS	permanent threshold shift
RCW	Revised Code of Washington
RL	Received Level
RMS	root mean square
SAR	Stock Assessment Report
SEL	Sound Exposure Level
SL	Source Level
SPCC	Spill Prevention, Control, and Countermeasures Plan
SPL	Sound Pressure Level
SSV	Sound Source Verification
TL	Transmission Loss
TTS	Temporary Threshold Shift
µPa	micro-Pascals
USFWS	United States Fish and Wildlife Service
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WSDOT	Washington State Department of Transportation
WSF	Washington State Department of Transportation Ferries Division
ZOE	Zone of Exclusion
ZOI	Zone of Influence

1.0 Description of the Activity

A detailed description of the specific activity or class of activities that can be expected to result in incidental taking of marine mammals.

1.1 Introduction

The Washington State Department of Transportation (WSDOT) Ferries Division (WSF) operates and maintains 19 ferry terminals and one maintenance facility, all of which are located in either Puget Sound or the San Juan Islands (Georgia Basin) (Figure 1-1). Since its creation in 1951, WSF has become the largest ferry system in the United States, operating 22 vessels on 10 routes with over 500 sailings each day.

Figure 1-1 Washington State Ferry System Route Map

To improve, maintain, and preserve the terminals, WSF conducts construction, repair and maintenance activities as part of its regular operations. One of these projects is the Seattle Multimodal Project at Colman Dock, and is the subject of this Incidental Harassment Authorization (IHA) request. This five-year project began in the fall of 2017, under the first of five consecutive IHAs. This application addresses the second year of construction (August 2018 to mid-February 2019).

The proposed project will occur in marine waters that support marine mammal species. The Marine Mammal Protection Act of 1972 (MMPA) prohibits the taking of marine mammals, which is defined as to "harass, hunt, capture or kill, or attempt to harass, hunt, capture or kill," except under certain situations. Section 101 (a)(5)(D) allows for the issuance of an IHA, provided an activity results in negligible impacts on marine mammals.

The project's timing and duration and specific types of activities may result in the incidental taking by acoustical harassment (Level A/B take) of marine mammals protected under the MMPA. WSDOT/WSF is requesting an IHA for 11 marine mammal species (Pacific harbor seal, Northern Elephant seal, California sea lion, Steller sea lion, killer whale, gray whale, Minke whale, harbor porpoise, Dall's porpoise, long-beaked common dolphin and bottlenose dolphin that may occur in the project vicinity.

1.2 Project Setting and Land Use

The Seattle Ferry Terminal at Colman Dock, serving State Route 519, is located on the downtown Seattle waterfront, in King County, Washington. The terminal services vessels from the Bainbridge Island and Bremerton routes, and is the most heavily used terminal in the WSF system. The Seattle terminal is located in Section 6, Township 24 North, Range 4 East, and is adjacent to Elliott Bay, tributary to Puget Sound (Figure 1-2). Land use in the area is highly urban, and includes business, industrial, the Port of Seattle container loading facility, residential, the Pioneer Square Historic District and local parks.

1.3 Project Description

The purpose of the Seattle Multimodal Project at Colman Dock is to preserve the transportation function of an aging, deteriorating and seismically deficient facility to continue providing safe and reliable service. The project will also address existing safety concerns related to conflicts between vehicles and pedestrian traffic and operational inefficiencies.

Key project elements include:

- Replacing and re-configuring the timber trestle portion of the dock;
- Replacing the main terminal building;
- Reconfiguring the dock layout to provide safer and more efficient operations;
- Replacing the vehicle transfer span and the overhead loading structures of Slip 3;
- Replacing vessel landing aids;
- Maintaining a connection to the Marion Street pedestrian overpass;
- Moving the current passenger only ferry (POF) slip temporarily to the north to make way for south trestle construction, and then constructing a new POF slip in the south trestle area.
- Mitigating for additional 5,400 square feet of overwater coverage;
- Capping contaminated sediments.

The project will reconfigure the dock while maintaining approximately the same vehicle holding capacity as current conditions. The construction will take approximately five years, and began in August 2017. The terminal will continue to operate during the construction.

The project will remove the northern timber trestle and replace a portion of it with a new concrete trestle (Figure 1-3). The area from Marion Street to the north edge of the property will not be rebuilt and after demolition will become a new area of open water. A section of fill contained behind a bulkhead underneath the northeast section of the dock will be removed. WSF will construct a new steel and concrete trestle from Columbia Street northward to Marion Street.

Figure 1-2 Location of Seattle Ferry Terminal

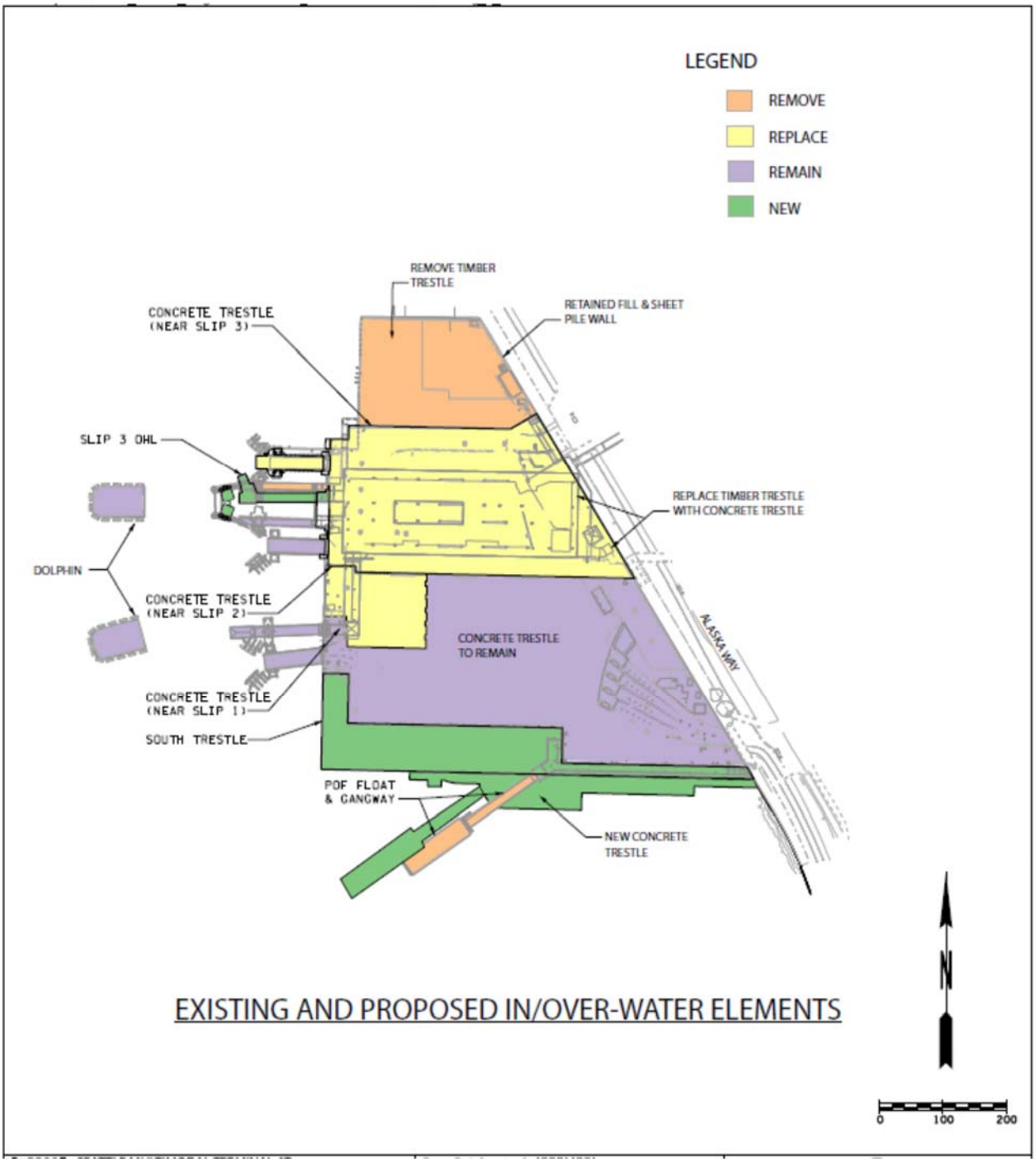

Figure 1-3 Existing/Proposed Construction Elements

The project will maintain the current King County Passenger Only Ferry (POF) functions on site, and address safety concerns related to pedestrian/vehicle conflicts at Yesler Street. A new covered pier, sized to accommodate POF passenger waiting and connected by a new overhead pedestrian bridge to the terminal building and the Marion Street Overpass, would be constructed along the south side of Colman Dock.

The reconfiguration would increase total permanent overwater coverage (OWC) by about 5,400 square feet (SF) (about 1.7% more than existing overwater coverage at the site), due to the new walkway from the POF facility to Alaskan Way and new stairways and elevators from the POF to the upper level of the terminal. Removal of at least 5,400 SF from Pier 48, a condemned timber structure, will serve as mitigation for the permanent OWC increase.

Construction of the reconfigured dock will narrow (reduce) the OWC along the shoreline (at the landward edge) by 180 linear feet at the north end of the site, while 30 linear feet of new trestle would be constructed along the shoreline at the south end of the site. The net reduction of OWC in the nearshore zone is 150 linear feet.

The project includes demolition of the existing terminal building and construction of a new terminal building. The new terminal building will be located along the west edge of the dock, spanning all three slips to handle passenger traffic more efficiently, and will connect to the Marion Street Overpass by an elevated deck.

The project includes reconstruction of the vehicle transfer span and the passenger overhead loading (OHL) structures of Slip 3, including new hydraulic systems. The new OHL would be wider than the existing OHL, to accommodate the increased walk-on passenger volumes.

Sediment beneath the terminal has been contaminated by the creosote-treated piles and other chemicals discharged to the environment over the years. A cap was installed to cover contaminated sediment on the south half of the site prior to trestle expansion in 1990. WSF will will place a new sediment cap to the north and south of the current cap during construction of the project to contain existing contamination. Stormwater management will be improved by the addition of Filterra treatment units in the southern portion of the terminal, which will remove oil and suspended solids. Project sheets are provided in Appendix E.

1.4 Regulatory Background

The effects of the project were analyzed pursuant to the National Environmental Policy Act and the federal co-lead agencies, the Federal Transit Administration (FTA) and the Federal Highway Administration (FHWA), issued a finding of no significant impact (FONSI) on November 5, 2015.

During the NEPA process, the project underwent formal Endangered Species Act (ESA) consultation with National Oceanographic and Atmospheric Administration (NOAA) Fisheries and the U.S. Fish and Wildlife Service. NOAA Fisheries issued a Biological Opinion on March 20, 2014 and USFWS issued a Biological Opinion on February 18, 2014. A re-initiation of the project was completed in 2017. USFW issued a Biological Opinion (01EWFW00-2013-F0262R001 X-Ref: OlEWFW00-2013-F-0262) on June 14, 2017 (USFW 2017), and NMFS issued a Biological Opinion (WCR-2016-5803) on June 26, 2017 NMFS 2017a).

An Incidental Harassment Authorization (IHA) for Year 1 (2017/18) of the Seattle Multimodal Project was issued on June 8, 2017 (NMFS 2017b). A revised IHA was issued on 11/28/17 (NMFS 2017f). On April 10, 2018, a re-initiation for humpback whale was submitted to NMFS in order to allow for Level B harassment take requests in future project years (NMFS 2018).

1.5 In-water Construction Details

In-water construction for the completed 2017-18 season (Table 1-1), and for the upcoming 2018-2019 season (Table 1-2) are provided below:

Table 1-1 2017-2018 In-water Construction Completed

Method	Pile type	Pile size (inch)	Season 1 Planned	Season 1 Completed	Comment
Vibratory removal	Timber	14	215	142	Fewer present than estimated for Pier 48 mitigation.
Vibratory removal	Steel	24	2	0	Postponed until future season.
Vibratory driving	Steel	24	101	160	Temporary piles. More needed than planned (24" piles removed are same piles).
Vibratory removal	Steel	24	101	160	Temporary piles (same piles removed).
Vibratory driving	Steel	30	17	8	Fewer needed.
Vibratory driving	Steel	36	205	275	More needed than planned (36" piles below noted as impacted are same piles).
Impact driving	Steel	30	14	8	Fewer needed.
Impact driving	Steel	36	201	275	More needed than planned.
Total Permanent Piles*			**236**	**291**	

Table 1-2 2018-2019 In-water Construction Planned

Permanent Structures	Permanent Installed	Permanent Removed
North Trestle Slip 3 Bridge Seat Slip 3 Overhead Loading Slip 3 Wingwall Slip 2/3 Inner Dolphin	(119) 36-inch steel (8) 30-inch steel (6) 36-inch steel (1) 108-inch steel	(22) 12-inch steel (925) 14-inch timber (19) 14-inch steel H (35) 24-inch steel (1) 30-inch steel
Temporary Structures	**Temporary Installed**	**Temporary Removed**
Slip 3 Overhead Loading Templates	(8) 24-inch steel (147) 24-inch steel	(8) 24-inch steel (147) 24-inch steel

*Numbers in parentheses indicate total quantity.

In-water construction methods include:

- (119) 36-inch permanent steel piles will be installed with a vibratory hammer, and then proofed with an impact hammer for the last 5-10 feet.
- (8) 30-inch steel piles and (6) 36-inch will be installed with a vibratory hammer.
- (1) 108-inch steel pile will be installed with a vibratory hammer.
- All existing 12-inch steel, 14-inch timber, 14-inch H, 24-inch steel and 30-inch steel piles will be removed with a vibratory hammer.
- (8) 24-inch Slip 3 Overhead loading temporary piles will be installed and removed with a vibratory hammer.
- (147) 24-inch temporary template piles will be installed and removed with a vibratory hammer (no proofing).

1.6 Pile Driving and Removal Techniques

Project vibratory hammer driving and removal, and impact hammer driving may affect marine mammals.

1.6.1 Vibratory Hammer Driving and Removal

Vibratory hammers are used in to drive piles where substrate conditions allow, and are also used to remove piles. When pile driving, the pile is placed into position using a choker and crane, and then vibrated between 1,200 and 2,400 vibrations per minute (Figure 1-4). 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 is being used for the project is an APE 400 King Kong (or equivalent) with a drive force of 361 tons.

Figure 1-4 Vibratory Hammer Driving a Steel Pile

1.6.2 Impact Hammer Installation

Impact hammers are used to install piles, especially when substrate conditions are difficult (such as glacial till) or when proofing (gathering load bearing data). 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). Figure 1-5 shows a pile being driven with an impact hammer.

Figure 1-5 Impact Hammer Driving a Steel Pile

1.7 Sound Levels and Noise Analysis

Under the NMFS Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Guidance) (NMFS 2016a), the calculation of Level A thresholds (permanent and temporary threshold shift) and Level B thresholds (harassment) are analyzed to understand the potential effects of in-water pile driving and removal noise on marine mammals for this project.

1.7.1 Source Levels

The source level for vibratory pile driving and removal of the 24- and 30-in steel pile is based on vibratory pile driving of the 30-in steel pile at Port Townsend (WSDOT 2010b). The unweighted SPL_{rms} source level at 10 m from the pile is 174 dB re 1 re 1 µPa.

The source level for vibratory pile driving of the 36-in steel piles is based on vibratory test pile driving of 36-in steel piles at Port Townsend in 2010 (Laughlin 2011). Recordings of vibratory pile driving were made at a distance of 10 m from the pile. The results show that the unweighted SPLrms for vibratory pile driving of 36-in steel pile was 177 dB re 1 µPa.

The source level for vibratory pile driving of the 108-in steel pile is based on measurements of 72-in steel piles vibratory driving conducted by CALTRANS. The unweighted SPLrms source level ranged between 170 and 180 dB re 1 µPa at 10 m from the pile (CALTRANS 2015). The value of 180 dB is chosen to be more conservative.

The source level for impact pile driving of the 36-in steel pile is based on impact test pile driving for the 36-in steel pile at Mukilteo in November 2006. Recordings of the impact pile driving that were made at a distance of 10 m from the pile were analyzed using Matlab. The results show that the unweighted source levels are 178 dB re 1 μPa^2-s for SELs and 193 dB re 1 µPa for SPLrms. The peak source level for impact pile driving of the 36-in steel pile is based on measurement conducted by CALTRANS for the same type and dimension of the pile, which is 210 dBpk re 1 µPa.

The source level for vibratory pile removal of 14-in timber pile is based measurements conducted at the Port Townsend Ferry Terminal during vibratory removal of a 12-inch timber pile by WSDOT (Laughlin 2011). The recorded source level is 152rms dB re 1 µPa at 16 m from the pile, with an adjusted source level of 155 dBrms re 1 µPa at 10 m.

The source levels for vibratory pile removal of 12-in steel and 14-in steel H piles are based on vibratory pile driving of 12-in steel pipe pile measured by CALTRANS. The unweighted source level is 155 dBrms re 1 µPa at 10 m.

A summary of source levels is presented in Table 1-2.

Table 1-3 Summary of Source Levels

Method	Pile type / size (inch)	SEL, dB re 1 µPa^2-s	SPL_{rms}, dB re 1 µPa	SPL_{pk}, dB re 1 µPa
Vibratory driving / removal	Steel, 24-in	174	174	-
Vibratory driving / removal	Steel, 30-in	174	174	-
Vibratory driving	Steel, 36-in	177	177	-
Impact pile driving (proof)	Steel, 36-in	178	193	210
Vibratory driving	Steel, 108-in	180	180	-
Vibratory removal	Timber, 14-in	155	155	-
Vibratory removal	Steel, 12-in	155	155	-
Vibratory removal	Steel H, 14-in	155	155	-

1.7.2 Distances to Harassment Zones

The Level B harassment ensonified areas for vibratory removal of the 14-in timber, 12-in steel, 14-in steel H, and 18-in concrete piles are based on the above source level of 155 dBrms re 1 µPa at 10 m, applying practical spreading loss of 15*log(R) for transmission loss calculation. The derived distance to the 120-dB Level B zone is 2,175 m.

For Level B harassment ensonified areas for vibratory pile driving and removal of the 24-in, 30-in, 36-in, and 108-in steel piles, the distance is based on measurements conducted during the year 1 Seattle multimodal project at Colman. The result showed that pile driving noise of two 36-in steel piles being concurrently driven was no longer detectable at a range of 5.4 miles (8.69 km). Therefore, the distance of 8,690 m is selected as the Level B harassment distance for vibratory pile driving and removal of the 24-in, 30-in, 36-in and 108-inch steel piles.

The Level B harassment ensonified area for impact pile driving of the 36-in steel piles is based on the above source level of 193 dBrms re 1 µPa at 14 m, applying practical spreading loss of 15*log(R) for transmission loss calculation. The derived distance to the 160-dB Level B zone is 1,585 m.

For Level A harassment, calculation is based on pile driving duration of each pile and the number of piles installed or removed per day, using NMFS optional spreadsheet.

Distances of ensonified area for different pile driving/removal activities for different marine mammal hearing groups is present in Table 1-3.

Table 1-4 Distances to Level A and B Zones

Pile type, size & pile driving method	Level A Injury zone (m)					Level B ZOI (m)
	LF cetacean	MF cetacean	HF cetacean	Phocid	Otariid	
Vibratory drive / removal, 24” & 30" steel piles, 8 piles/day, 20 min/pile	96.7	8.6	143.0	58.8	4.1	8,690
Vibratory removal 30” steel pile, 1 pile/day, 20 min/pile	24.2	2.1	35.7	14.7	1.0	8,960
Vibratory drive 36” steel pile, 8 piles/day, 20 min/pile	153.3	13.6	226.6	93.2	6.5	8,960
Impact drive (proof) 36” steel pile, 8 piles/day, 200 strikes/pile	887.7	31.6	1,057.4	475.1	34.6	2,219
Vibratory drive 108” steel pile, 1 pile/day, 120 min/pile	200.3	17.8	296.2	121.8	8.5	8,690
Vibratory remove 14” timber pile, 20 piles/day, 15 min/pile	8.0	0.7	11.8	4.8	0.3	2,175
Vibratory remove 12” steel pile, 11 piles/day, 20 min/pile	6.5	0.6	9.6	3.9	0.3	2,175
Vibratory remove 14” steel H pile, 10 piles/day, 20 min/pile	6.1	0.5	9.0	3.7	0.3	2,175

1.7.3 Exclusion Zones

Exclusion zones (shutdown zones) have been established in order to prevent injury and limit Level A take. For all marine mammals except harbor seal, Southern Resident killer whale and humpback whale, the shut-down zone is the Level A zone, but not less than 10 m. For harbor seal, a maximum of 60-m shutdown zone will be implemented if the Level A zone is bigger than 60 m, and a minimum 10-m shutdown zone will be implemented for harbor seal. For Southern Resident killer whale and humpback whale, the shutdown zone shall be the Level B ZOI boundary.

Table 1-5 Exclusion Zones

Pile type, size & pile driving method	Level A Injury zone (m)					Level B ZOI (m)*
	LF cetacean	MF cetacean	HF cetacean	Phocid	Otariid	
Vibratory drive / removal, 24” & 30" steel piles, 8 piles/day, 20 min/pile	96.7	10	143.0	60	10	8,690
Vibratory removal 30” steel pile, 1 pile/day, 20 min/pile	24.2	10	35.7	10	10	8,960
Vibratory drive 36” steel pile, 8 piles/day, 20 min/pile	153.3	13.6	226.6	60	10	8,960
Impact drive (proof) 36” steel pile, 8 piles/day, 200 strikes/pile	887.7	31.6	1,057.4	60	34.6	2,219
Vibratory drive 108” steel pile, 1 pile/day, 120 min/pile	200	17.8	296.2	60	10	8,690
Vibratory remove 14” timber pile, 20 piles/day, 15 min/pile	10	10	11.8	10	10	2,175
Vibratory remove 12” steel pile, 11 piles/day, 20 min/pile	10	10	10	10	10	2,175
Vibratory remove 14” steel H pile, 10 piles/day, 20 min/pile	10	10	10	10	10	2,175

*Southern Resident Killer Whale and Humpback Whale

1.7.4 Sound Source Verification of In-water Sound

Measurement of impact and vibratory in-water pile noise source levels, and far-field measurements of pile noise for some sizes/types of piles will be done during the project. Based on the results of this measurement, and in coordination with NMFS, Level A/B zones and the marine mammal monitoring plan may be adjusted.

1.7.5 Airborne Reference Sound Source Levels

While in-air sounds are not applicable to cetaceans, they are to pinnipeds, especially harbor seals when hauled out. Loud noises can cause hauled out seals to panic back into the water, leading to disturbance and possible injury to stampeded pups.

No unweighted in-air data is available for vibratory removal of 14-inch timber, vibratory driving/removal of 24-inch steel, or vibratory driving of 36-inch steel piles. Based on in-air measurements at the WSF Coupeville Ferry Terminal, vibratory driving of a 30-inch steel pile generated a maximum of 97 dB_{RMS} (unweighted) @ 15 m/50 ft. (Laughlin 2010b). It is assumed that in-air noise generated during vibratory driving or removal of all other project piles will generate the same source level (96.9 dB_{RMS}).

Based on in-air measurements during the Seattle Test Pile Project, impact pile driving of a 36-inch steel pile generated 111 dB dB_{RMS} (unweighted) @ 15m/50 ft. (WSDOT 2016b). It is assumed that in-air noise generated during impact driving of 30-inch diameter steel piles will generate the same source level (111 dB_{RMS}).

1.7.6 Vibratory and Impact Pile Driving Airborne Noise

NMFS has established an in-air noise disturbance threshold of 90 dB_{RMS} (unweighted) for harbor seals, and 100 dB_{RMS} (unweighted) for all other pinnipeds (sea lions).

Assuming the use of three hammers, 5 dB will be added to each in-air source level (Table 1-6). In-air thresholds will be reached at the following distances (Figure 1-9):

- Noise generated during vibratory installation and/or removal of hollow steel piles (103 dB_{RMS} (97 dB+ 5 dB) @ 15 m/50 ft. (WSDOT 2016)) will reach the harbor seal threshold at approximately 61 m/200 ft., and the other pinnipeds threshold at approximately 20 m/65 ft.
- 30- and 36-inch diameter steel pile impact driving (116 dB_{RMS} (111 dB+ 5 dB) @ 15 m/50 ft.) will reach the harbor seal threshold at approximately 305 m/1,000 ft., and the other pinnipeds threshold at approximately 98 m/320 ft.

The nearest documented harbor seal haulout to the Seattle Ferry Terminal is 10.6 km/6.6 miles west on Blakely Rocks (Figure 3-2), though harbor seals also make use of docks, buoys and beaches in the area. The nearest documented California sea lion haulout sites are 3 km/2 miles southwest of the Seattle Ferry Terminal (Figure 3-2), although sea lions also make use of docks and buoys in the area.

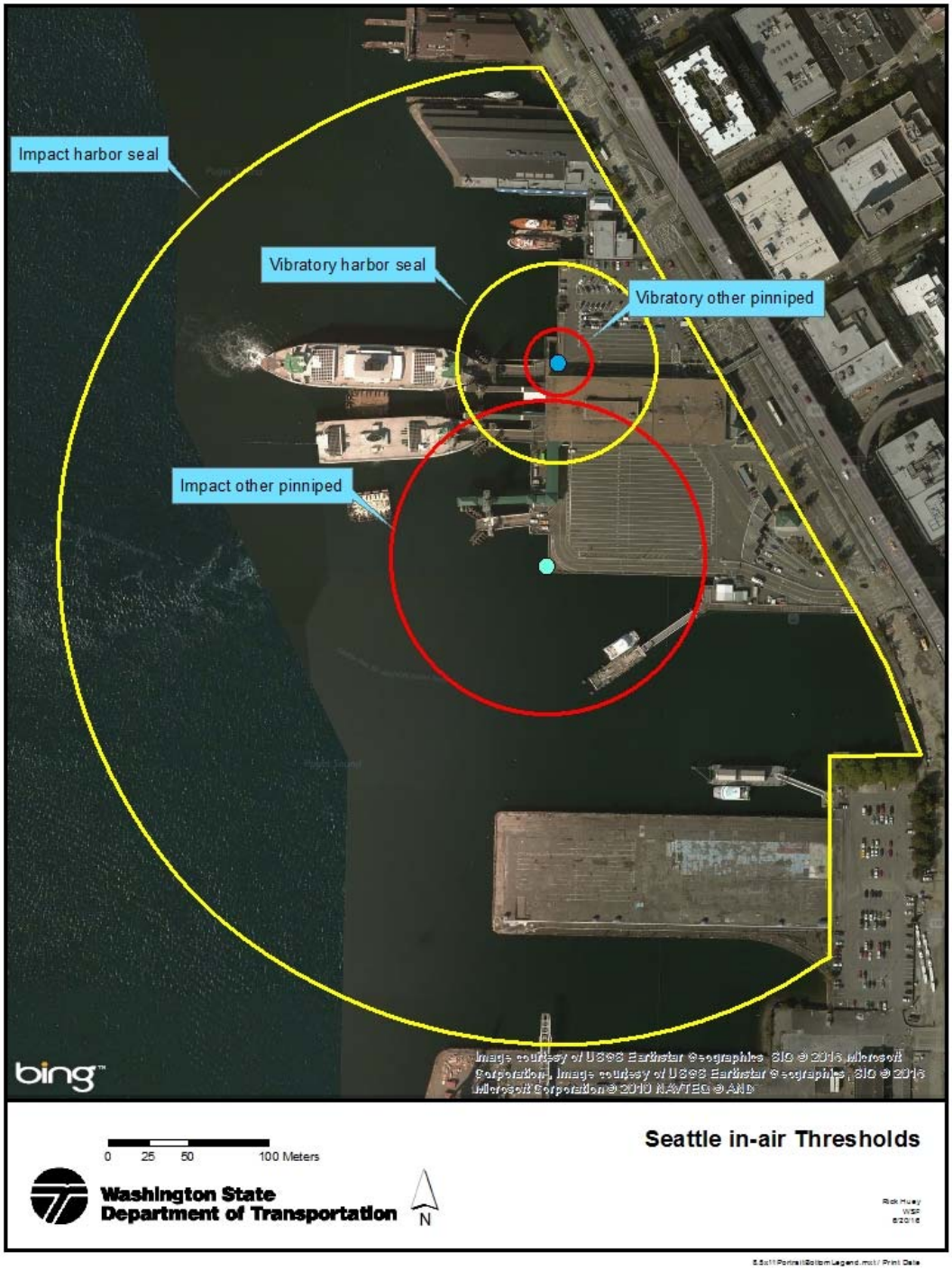

Figure 1-6 In-air construction noise threshold areas for pinnipeds

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2.0 Dates, Duration, and Region of Activity

The date(s) and duration of such activity and the specific geographical region where it will occur.

2.1 Dates

Due to NMFS and the U.S. Fish and Wildlife Service (USFWS) in-water work timing restrictions to protect ESA-listed salmonids, planned WSF in-water construction is limited each year to July 16 through February 15. For this project, in-water construction is planned to take place between August 1, 2018 and February 15, 2019.

2.2 Durations

The total worst-case durations for pile driving and removal is 114 days (Table 2-1).

Table 2-1 Pile Driving and Removal Durations

Method	Pile type	Pile size (inch)	Pile number	Piles /day	Minutes /pile	Duration (Days)
Vibratory drive	Steel (temporary)	24	147	8	20	18
Vibratory drive	Steel (Slip 3)	24	8	8	20	1
Vibratory drive	Steel	30	8	8	20	1
Vibratory drive	Steel	36	6	6	20	1
Vibratory drive	Steel	36	119*	8*	20	15*
Impact drive (proof)	Steel	36	119*	8*	300 strikes	15*
Vibratory drive	Steel	108	1	1	120	1
Subtotal						**37**
Vibratory remove	Timber	14	925	20	15	47
Vibratory remove	Steel	12	22	11	20	2
Vibratory remove	Steel H	14	19	10	20	2
Vibratory remove	Steel	24	35	8	20	5
Vibratory remove	Steel (Slip 3)	24	8	8	20	1
Vibratory remove	Steel (temporary)	24	147	8	20	19
Vibratory remove	Steel	30	1	1	20	1
Subtotal						**77**

2.3 Region of Activity

The proposed activities will occur at the Seattle Ferry Terminal at Colman Dock, located in the City of Seattle, Washington (see Figures 1-1 and 1-2).

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3.0 Species and Numbers of Marine Mammals in Area

This section is a combination of items 3 and 4 from NOAA's list of information required for an incidental take authorization. It provides:

> *The species and numbers of marine mammals likely to be found within the activity area.*
>
> *A description of the status, distribution, and seasonal distribution (when applicable) of the affected species or stocks of marine mammals likely to be affected by such activities.*

It also describes the ESA and MMPA status for each species. Possible ESA status designations include:

- Threatened: "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range."
- Endangered: "any species which is in danger of extinction throughout all or a significant portion of its range."
- Proposed: *candidate species* that were found to warrant listing as either threatened or endangered and are officially proposed as such in a *Federal Register* notice.
- Delisted: No longer listed under the ESA.
- Unlisted: Not currently listed under the ESA.

Possible MMPA status designations include:

- Strategic: a marine mammal stock for which the level of direct human-caused mortality exceeds the potential biological removal level; which, based on the best available scientific information, is declining and is likely to be listed as a threatened species under the ESA within the foreseeable future; or which is listed as a threatened or endangered species under the ESA, or is designated as depleted under the MMPA.
- Depleted: the Secretary, after consultation with the Marine Mammal Commission and the Committee of Scientific Advisors on Marine Mammals established under MMPA title II, determines that a species or population stock is below its optimum sustainable population; a State, to which authority for the conservation and management of a species or population stock is transferred under section 109, determines that such species or stock is below its optimum sustainable population; or a species or population stock is listed as a threatened or endangered species under the ESA.
- Non-depleted: a species or population stock is at or above its optimum sustainable population (NMFS 2013a).

3.1 Species Present

Eleven species of marine mammals can be found in the Seattle Ferry Terminal area (Table 3-1).

Table 3-1 Marine Mammal Species Potentially Present in Region of Activity

Species	ESA Status	MMPA Status	Timing of Occurrence	Frequency of Occurrence
Harbor Seal	Not listed	Non-depleted	Year-round	Common
Northern Elephant Seal	Unlisted	Non-depleted	Year-round	Occasional
California Sea Lion	Not listed	Non-depleted	August-April	Common
Steller Sea Lion	Delisted	Strategic/Depleted	August-April	Occasional
Killer Whale Southern Resident	Endangered	Depleted	September - May	Occasional
Killer Whale Transient	Not listed	Depleted	Year-round	Common
Gray Whale	Delisted	Unclassified	January-May	Occasional
Humpback whale (Central America DPS)	Endangered	Depleted	Year-round	Rare
Humpback whale (Mexico DPS)	Threatened	Depleted	Year-round	Occasional
Humpback whale (Hawaii DPS)	Not listed	Depleted	Year-round	Occasional
Minke Whale	Not listed	Non-depleted	September-January	Occasional
Harbor Porpoise	Not listed	Non-depleted	May-June peak	Common
Dall's Porpoise	Not listed	Non-depleted	October-February	Occasional
Long-beaked Common Dolphin	Not listed	Non-depleted	Year-round	Occasional
Bottlenose Dolphin	Not listed	Non-depleted	Year-round	Occasional

3.2 The Whale Museum Marine Mammal Sightings Data

The Whale Museum (TWM), located in Friday Harbor, San Juan Island, has the most extensive marine mammal sighting database for the Salish Sea (Georgia Basin/Strait of San Juan de Fuca/Puget Sound). TWM analyzed sightings data for the project area for the years 2010 to December 2016, in the August to February timeframe scheduled for this project.

In the analysis of sightings data, multiple reports of marine mammals in the same region on the same day may possibly be the same individuals; therefore, 'whale days' is used for southern resident killer whale (SRKW) sightings, and 'sighting days' is used for other marine mammals, rather than the number of sightings. A whale/sighting day is any day an SRKW/marine mammal is reported in a given area, regardless of the number of times they were reported that day.

Sightings data are assigned to a geographic quadrant, which are grid cells roughly 4.6 kilometers by 4.6 kilometers that were developed for reporting SRKW sightings before GPS units were readily available. Figure 3-1 shows the quadrants in the Seattle area, including the quadrants of interest for the project. The modeled Zone of Influence (ZOI; in red) intersects with the majority of three quadrants: 408-10.

As sightings are opportunistic and SRKW can travel large distances in a day (~100 miles), it is important to analyze this data set across a region, rather than just single quadrants.

The primary area of interest in the analysis are the ZOI quadrants; however, since the project will be conducted in 'Area 2: Puget Sound' of the designated SRKW critical habitat, it is appropriate to include analyses at that geographic scale. Since there is a good chance that whales will be missed within a specific quadrant, a larger area is analyzed as well for comparison to the project quadrant.

Because other marine mammals (to a lesser degree than whales), can also travel across multiple quadrants, a conservative analysis approach was also taken. Marine mammal sightings days reported will also be for the project quadrants and adjacent quadrants.

It should be noted that data for marine mammals other than SRKW, gray, humpback, and Transient killer whales (such as pinnipeds, porpoise and Minke) are collected in an opportunistic fashion. Pinnipeds and porpoise are probably present in the ZOI close to 365 days per year. The sightings data should be considered an absolute minimum number of sightings for those species in the area (TWM 2017).

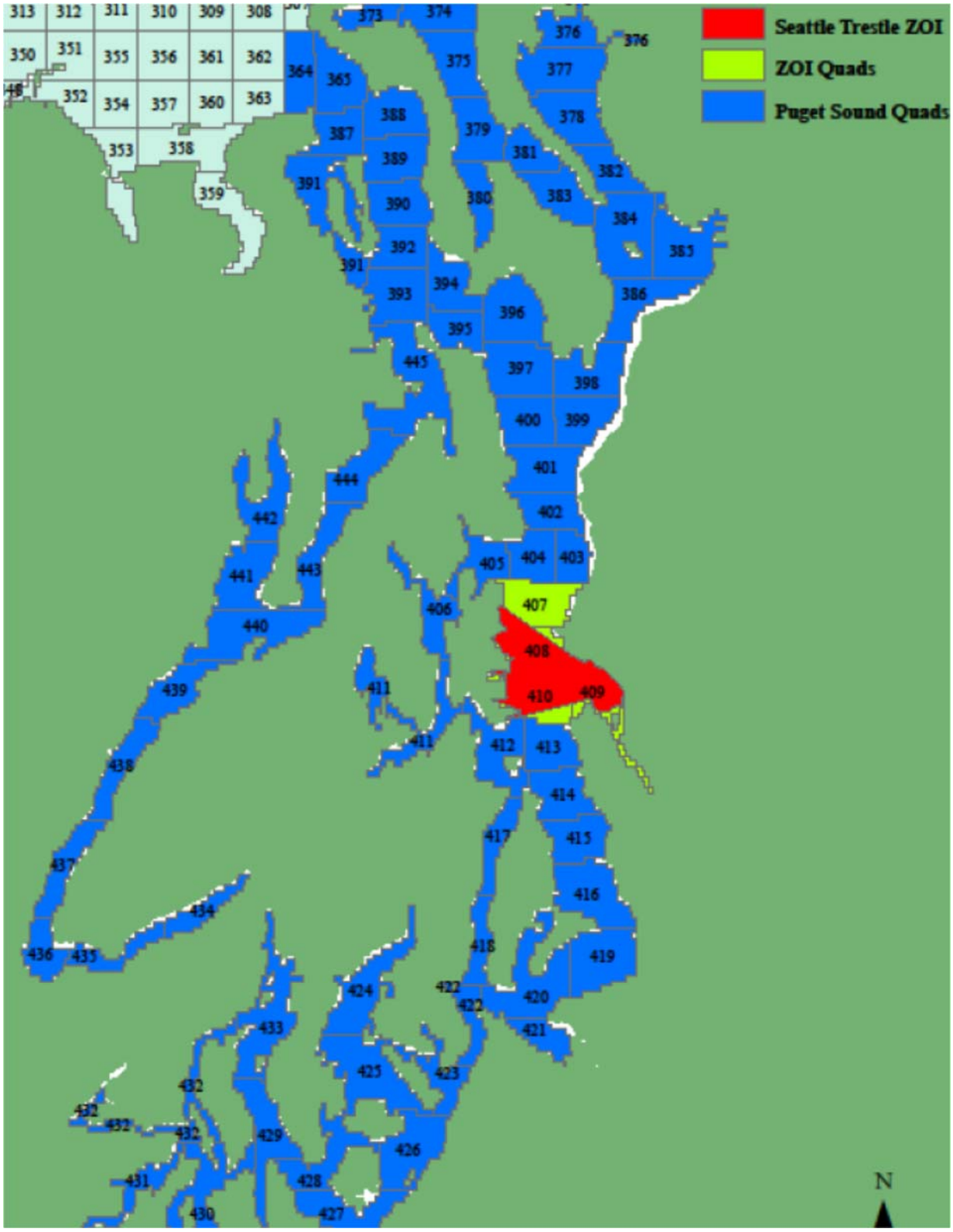

Figure 3-1 ZOI + Area Quads, not to scale

3.3 Pinnipeds

There are four species of pinnipeds that may be found in the Seattle Ferry Terminal area: harbor seal (*Phoca vitulina richardsi*), Northern Elephant seal (*Mirounga angustirostris*), California sea lion (*Zalophus californianus*) and Steller sea lion (*Eumetopias jubatus*).

3.3.1 Harbor Seal

There are three stocks in Washington's inland waters, the Hood Canal, Northern Inland Waters and Southern Puget Sound stocks. Seals belonging to the Northern Inland Waters Stock are present at the project site. Pupping seasons vary by geographic region. For central and southern Puget Sound region, pups are born from late June through September (WDFW 2009.). After October 1, all pups in the inland waters of Washington are weaned. Of the pinniped species that commonly occur within the region of activity, harbor seals are the most common and the only pinniped that breeds and remains in the inland marine waters of Washington year-round (Calambokidis and Baird 1994a).

3.3.1.1 Numbers

In 1999, 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). According to the 2014 Stock Assessment Report (SAR), the most recent estimate for the Washington Northern Inland Waters Stock is 11,036 (NMFS 2014a). No minimum population estimate is available. However, there are an estimated 32,000 harbor seals in Washington today, and their population appears to have stabilized (Jeffries 2013), so the estimate of 11,036 may be low.

3.3.1.2 Status

The Washington Inland Waters stock of harbor seals is "non-depleted" under the MMPA and "unlisted" under the ESA (NMFS 2014a).

3.3.1.3 Distribution

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 1944; Fisher 1952; Bigg 1969, 1981). They are not known to make extensive pelagic migrations, although some long-distance movements of tagged animals in Alaska (108 miles) and along the U.S. west coast (up to 342 miles) 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 to the Seattle Ferry Terminal is 10.6 km/6.6 miles west on Blakely Rocks (Figure 3-2), though harbor seals also make use of docks, buoys and beaches in the area. The level of use of this haulout during the fall and winter is unknown, but is

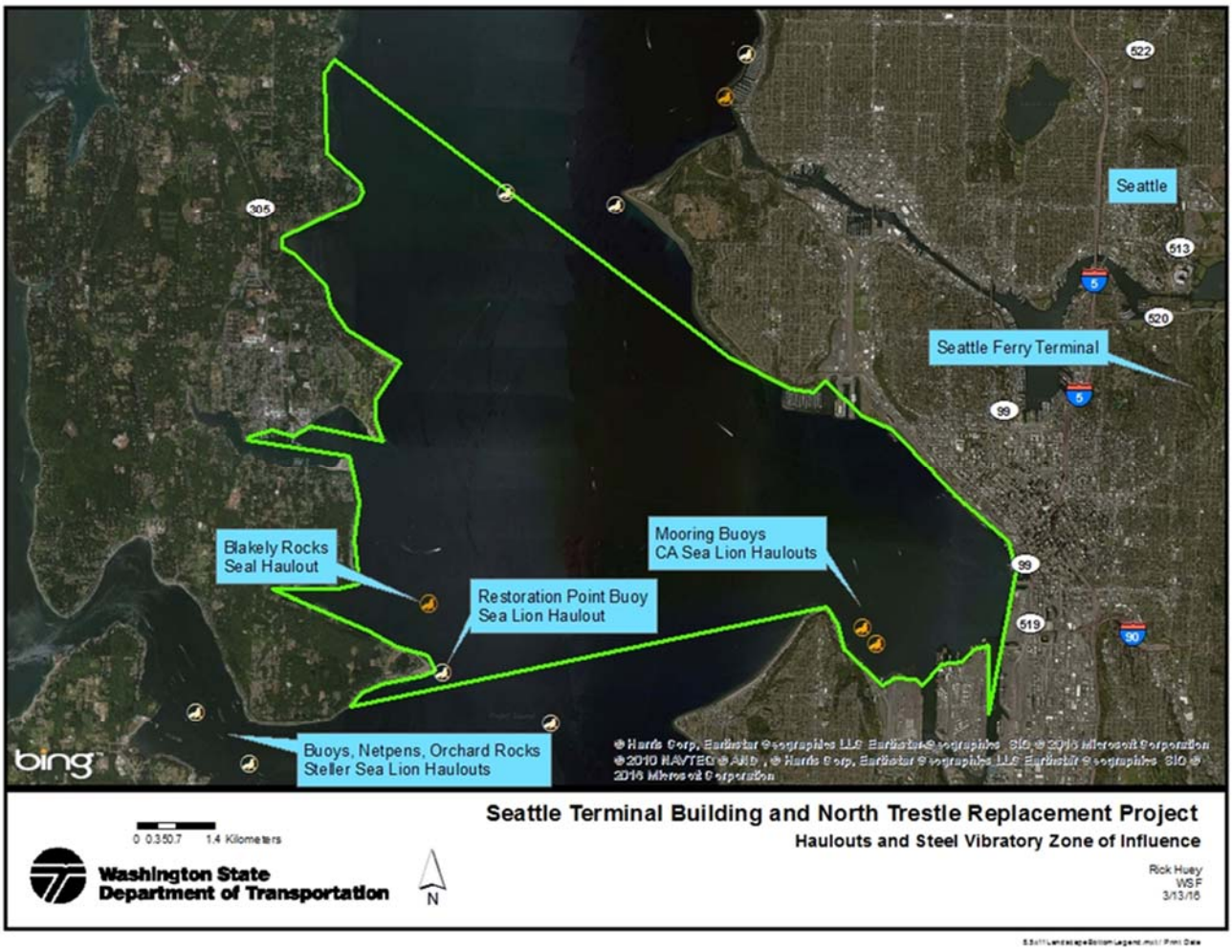

Figure 3-2 Pinniped haulouts in the Seattle project vicinity

expected to be much less as air temperatures become colder than water temperatures, which results in seals in general hauling out less (H. Huber pers. comm. 2010). Harbor seals are known to haul out on docks and beaches throughout the project area.

Density and Sightings

U.S. Navy Density Report

In the timeframe scheduled for this project, the report estimates the density of harbor seal in the Seattle area as a range between 0.550001 and 1.219000 animals/km^2 (U.S. Navy 2014).

WSF Projects

During the 2012 Seattle Slip 2 Batter Pile project, 6 harbor seals were observed during this one day project in the area that corresponds to the upcoming project ZOIs (WSDOT 2012).

During the 2016 Seattle Test Pile project, 56 harbor seals were observed over 10 days in the area that corresponds to the upcoming project ZOIs. The maximum number sighted during one day was 13 (WSDOT 2016c).

During the 99 monitoring days of the 2017/18 Seattle Multimodal Project, 813 harbor seals were observed in the project ZOI, and average of 8/day (WSDOT 2017/18).

Seattle Aquarium Project

During the 2012 Seattle Aquarium Pier 60 project, 281 harbor seals were observed over 29 days in the area that corresponds to the upcoming project ZOIs. The maximum number sighted during one day was 5 (HiKARI 2012).

Elliott Bay Seawall Project

According to the City of Seattle Elliott Bay Seawall Project (EBSP) Season 1, 2 and 3 Annual Reports, 327 harbor seals were observed over 163 days in an area that overlaps with the upcoming project ZOIs (Figure 3-3) (Seattle 2014/2015/2016).

The Whale Museum

For the years 2010 to 2016, in the August to February timeframe scheduled for this project, TWM (2017) reported 2 sightings days for harbor seals in the red and green quadrants shown in Figure 3-1. Pinnipeds are not reported at the same rate as large cetaceans, and harbor seals are present throughout the year in Puget Sound.

NMFS Stranding Data

From the years 2010-2016, in the timeframe scheduled for this project, there were 178 confirmed harbor seal strandings in the area that corresponds to the upcoming project ZOIs (NMFS 2016b/2017d). Strandings were highest in September and October, which corresponds with the expected mortality rate (12-26%) of seal pups (Steiger et.al. 1989), though some adults were also included in the strandings.

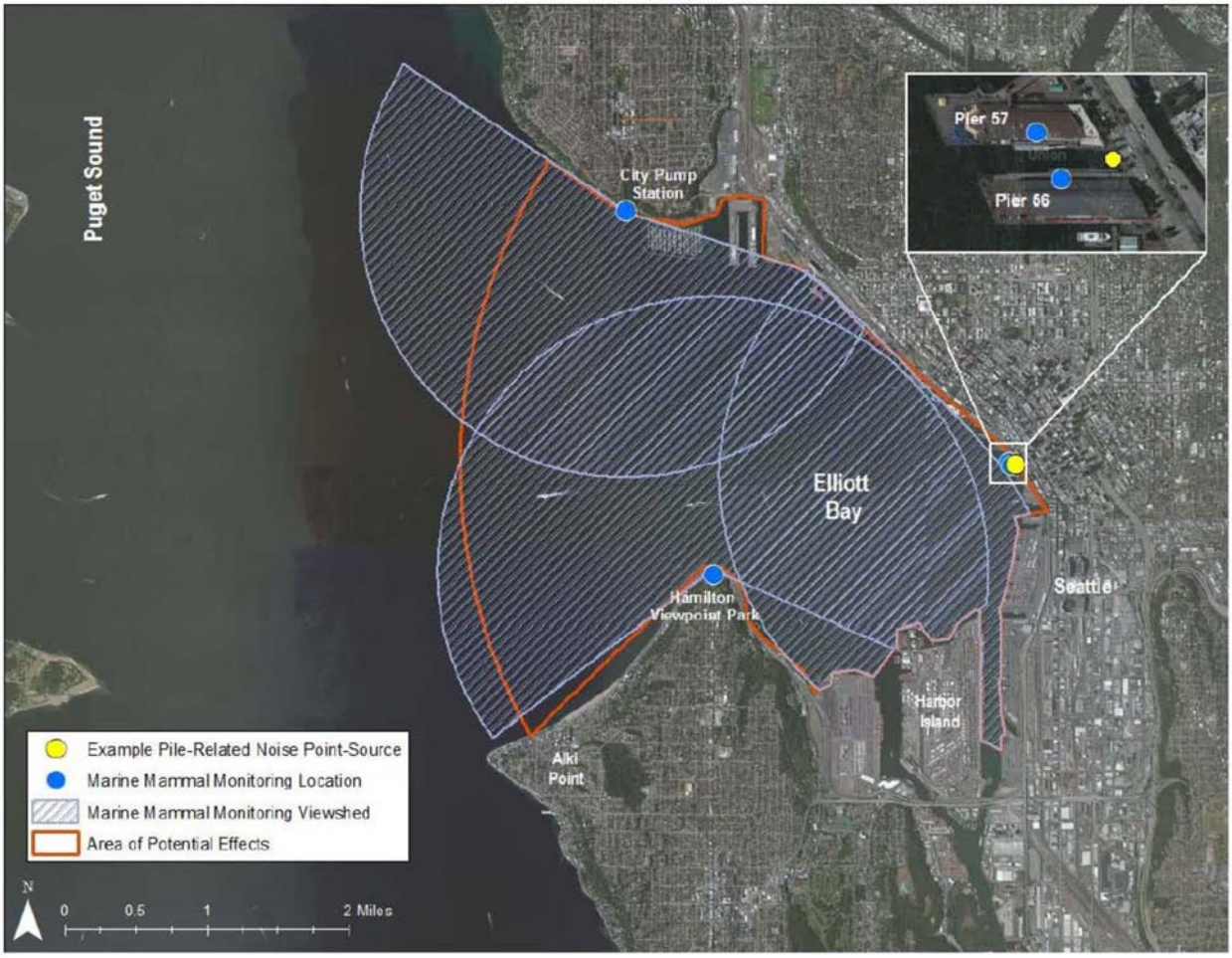

Figure 3-3 Elliot Bay Seawall Project ZOI and Monitoring

3.3.1 Northern Elephant Seal

The California breeding stock of northern elephant seal (*Mirounga angustirostris*) may be present near the project site.

3.3.1.1 Numbers

The California stock of Northern Elephant seal minimum population size is estimated very conservatively as 81,368 (NMFS 2015a). In Puget Sound and the Strait of San Juan de Fuca, 10 to 15 northern elephant seal pups are born each year on Whidbey, Protection, and Smith Islands, Dungeness Spit and Race Rocks. The population in the Salish Sea appears to be rising (Orca Network 2015a). Using a multiplier of 4.4 (NMFS 2015a) with the maximum pup count of 15, the Salish Sea population could be as large as 66 individuals.

3.3.1.2 Status

The California breeding stock of northern elephant seal is not considered a "depleted" or "strategic" stock under the MMPA, and is not ESA listed (NMFS 2015a).

3.3.1.3 Distribution

Northern Elephant seals breed and give birth in California (U.S.) and Baja California (Mexico), primarily on offshore islands, from December to March. Males feed near the eastern Aleutian Islands and in the Gulf of Alaska, and females feed further south. Adults return to land between March and August to molt, with males returning later than females. Adults return to their feeding areas again between their spring/summer molting and their winter breeding seasons (NMFS 2015a).

The closest documented Northern Elephant seal haulout is Protection Island (88.5 shoreline km/55 shoreline miles northwest of the Seattle Ferry Terminal)(WDFW 2000). Northern Elephant seals also use area beaches as haulouts, such as a female elephant seal who has been coming to a south Whidbey Island beach to rest while molting each spring for several years, and recently gave birth to a pup (Orca Network 2015a).

Density and Sightings

U.S. Navy Density Report

In the timeframe scheduled for this project, the report estimates the density of Northern Elephant seal in the Seattle area as a range between 0 and 0.000010 animals/ km^2 (U.S. Navy 2014).

WSF Projects

During the 2012 Seattle Slip 2 Batter Pile project, 0 Northern Elephant seals were observed during this one day project in the area that corresponds to the upcoming project ZOIs (WSDOT 2012).

During the 2016 Seattle Test Pile project, 0 Northern Elephant seals were observed over 10 days in the area that corresponds to the upcoming project ZOIs (WSDOT 2016c).

During the 99 monitoring days of the 2017/18 Seattle Multimodal Project, 0 Northern Elephant seals were observed in the project ZOI (WSDOT 2017/18).

WSF Non-project Sightings

WSF Protected Species Observer Burt Miller has made several non-work sightings. On April 6, 2015 a male Northern Elephant seal was sighted near Maury Island (14 miles south of the Seattle ZOI). On August 10, 2017 a Northern Elephant seal was sighted near Maury Island, and another on August 11, 2017 on south side of Alki Point (1.5 miles south of the Seattle ZOI). Possibly the same seal given the location and dates (Miller 2015/2017).

Seattle Aquarium Project

During the 2012 Seattle Aquarium Pier 60 project, 0 Northern Elephant seals were observed over 29 days in the area that corresponds to the upcoming project ZOIs (HiKARI 2012).

Elliott Bay Seawall Project

According to the City of Seattle Elliott Bay Seawall Project (EBSP) Season 1and 2 Annual Reports and the preliminary Season 3 data, 0 Northern Elephant seals were observed over 155 days in an area that overlaps with the upcoming project ZOIs (Seattle 2014/2015/2016).

The Whale Museum

For the years 2008 to 2014, in the August to February timeframe scheduled for this project, The Whale Museum (2016) reported one sightings day for elephant seals in the red and green quadrants shown in Figure 3-1.

For the years 2010 to 2016, in the August to February timeframe scheduled for this project, TWM (2017) reported zero sightings day for Northern Elephant seals in the red and green quadrants shown in Figure 3-1. Note that pinnipeds are not reported at the same rate as large cetaceans.

NMFS Stranding Data

From the years 2010-2016, in the timeframe scheduled for this project, there were 0 Northern Elephant seal strandings in the area that corresponds to the upcoming project ZOIs (NMFS 2016/2017).

3.3.2 California Sea Lion

California sea lions found in Washington inland waters are part of the U.S. stock, which begins at the U.S./Mexico border and extends northward into Canada.

3.3.2.1 Numbers

The minimum population size of the U.S. stock was estimated at 296,750 in 2011. More recent pup counts made in 2011 totaled 61,943, the highest recorded to date. Estimates of total population size based on these counts are currently being developed (NMFS 2015b). 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; J. Calambokidis pers. comm. 2008). Peak counts of over 1,000 animals have been made in Puget Sound (Jeffries et al. 2000).

Status
California sea lions are not as listed as depleted or strategic under the MMPA, or listed ESA listed (NMFS 2015b).

3.3.2.2 Distribution

California sea lions breed on islands off Baja Mexico and southern California, with males (primarily) migrating north to feed in the northern waters (Everitt et al. 1980). Females remain in the waters near their breeding rookeries. 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 (P. Gearin pers. comm. 2008). 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 (Seattle) and heavily used areas of central Puget Sound (P. Gearin et al. 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.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).

The nearest documented California sea lion haulout sites are 3 km/2 miles southwest of the Seattle Ferry Terminal (Figure 3-2), although sea lions also make use of docks and other buoys in the area.

Density and Sightings

U.S. Navy Density Report
In the timeframe scheduled for this project, the report estimates the density of California sea lion in the Seattle area as a range between 0.067601 and 0.12660 animals/km^2 (U.S. Navy 2014).

WSF Projects
During the 2012 Seattle Slip 2 Batter Pile project, 15 California sea lions were observed during this one-day project in the area that corresponds to the upcoming project ZOIs (WSDOT 2012).

During the 2016 Seattle Test Pile project, 12 California sea lions were observed over 10 days in the area that corresponds to the upcoming project ZOIs. The maximum number sighted during one day was 4 (WSDOT 2016c).

During the 99 monitoring days of the 2017/18 Seattle Multimodal Project, 1,047 California sea lions were observed in the project ZOI, an average of 11/day (WSDOT 2017/18).

Seattle Aquarium Project
During the 2012 Seattle Aquarium Pier 60 project, 382 California sea lions were observed over 29 days in the area that corresponds to the upcoming project ZOIs. The maximum number sighted during one day was 37 (HiKARI 2012).

Elliott Bay Seawall Project
According to the City of Seattle Elliott Bay Seawall Project (EBSP) Season 1, 2 and 3 Annual Reports, 997 California sea lions were observed over 163 days in an area that overlaps with the upcoming project ZOIs. The maximum number sighted during one day was 47 (Seattle 2014/2015/2016).

The Whale Museum
For the years 2010 to 2016, in the August to February timeframe scheduled for this project, TWM (2017) reported 0 sightings day for California sea lions in the red and green quadrants shown in Figure 3-1. Pinnipeds are not reported at the same rate as large cetaceans, and California sea lion is present throughout most of the in-water construction season.

NMFS Stranding Data
From the years 2010-2016, in the timeframe scheduled for this project, there were 9 California sea lion strandings in the area that corresponds to the upcoming project ZOIs (NMFS 2016b/2017d). Note that pinnipeds are not reported at the same frequency as large cetaceans.

3.3.3 Steller Sea Lion

The Eastern U.S. stock of Steller sea lion may be present near the project site.

3.3.3.1 Numbers

The Eastern U.S. stock of Steller sea lions is estimated to be 41,638, with a Washington minimum population estimate of 1,749 (NMFS 2016c). In Washington waters, Steller sea lion abundance varies seasonally, with a minimum estimate of 1,000 to 2,000 individuals present or passing through the Strait of Juan de Fuca in fall and winter months (S. Jeffries pers. comm. 2008).

Steller sea lion numbers in Washington State decline during the summer months, which corresponds 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 (P. Gearin pers. comm. 2008).

3.3.3.2 Status

The eastern stock of Steller sea lions are “depleted/strategic” under the MMPA and were “delisted” under the ESA on November 4, 2013 (78 FR 66140).

3.3.3.3 Distribution

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).

Steller sea lion abundances vary seasonally in Washington inland water, with a minimum estimate of 1,000 to 2,000 individuals present or passing through the Strait of Juan de Fuca in fall and winter months (S. Jeffries pers. comm. 2008). The number of haulout sites has increased in recent years. The nearest documented Steller sea lion haulout sites are 15 km/9 miles southwest of the Seattle Ferry Terminal (Figure 3-2).

Density and Sightings

U.S. Navy Density Report
In the timeframe scheduled for this project, the report estimates the density of Steller sea lion in the Seattle area as a range between 0.025101 and 0.036800 animals/ km^2 (U.S. Navy 2014).

WSF Projects
During the 2012 Seattle Slip 2 Batter Pile project, 0 Steller sea lions were observed during this one day project in the area that corresponds to the upcoming project ZOIs (WSDOT 2012).

During the 2016 Seattle Test Pile project, 0 Steller sea lions were observed over 10 days in the area that corresponds to the upcoming project ZOIs (WSDOT 2016c).

During the 99 monitoring days of the 2017/18 Seattle Multimodal Project, 54 Steller sea lions were observed in the project ZOI, and average of 0.6/day (WSDOT 2017/18).

Seattle Aquarium Project
During the 2012 Seattle Aquarium Pier 60 project, 60 Steller sea lions were observed over 29 days in the area that corresponds to the upcoming project ZOIs. The maximum number sighted during one day was 25 (HiKARI 2012).

However, volunteers, not professional biologists were used to gather this data, and may have misidentified California sea lions as Steller sea lions. In addition, over three seasons the Elliott Bay Seawall Project, using professional biologists; saw only 1 Steller sea lion (see below). Therefore, the 60 observations will be discounted.

Elliott Bay Seawall Project
According to the City of Seattle Elliott Bay Seawall Project (EBSP) Season 1, 2 and 3 Annual Reports, 3 Steller sea lions were observed over 163 days in an area that overlaps with the upcoming project ZOIs (Seattle 2014/2015/2016).

The Whale Museum
For the years 2010 to 2016, in the August to February timeframe scheduled for this project, TWM (2017) reported 1 sightings day for Steller sea lion in the red and green quadrants shown in Figure 3-1. Note that pinnipeds are not reported at the same rate as large cetaceans.

NMFS Stranding Data
From the years 2010-2016, in the timeframe scheduled for this project, there was 1 Steller sea lion stranding in the area that corresponds to the upcoming project ZOIs (NMFS 2016b/2017d).

3.4 Cetaceans

Seven cetacean species may be present in the Seattle Ferry Terminal area; Southern Resident and Transient killer whale (*Orcinus orca*), gray whale (*Eschrichtius robustus*), Minke whale (*Balaenoptera acutorostrata scammoni*), harbor porpoise (*Phocoena phocoena*), Dall's porpoise (*Phocoenoides dalli*) and long-beaked common dolphin (*Delphinus capensis*).

3.4.1 Killer Whale

The Eastern North Pacific Southern Resident (SRKW) and West Coast Transient (Transient) stocks of killer whale may be found near the project site. Killer whales are mid-frequency hearing range cetaceans (Southall et al. 2007).

3.4.1.1 Numbers

Southern Resident Stock

The Southern Residents live in three family groups known as the J, K and L pods. As of September 2017, the stock collectively numbered 76 individuals (J Pod=23, K Pod=18, L Pod=35) (Orca Network 2017).

On February 10, 2015, NOAA Fisheries announced a final rule that includes Lolita, a captive killer whale at the Miami Seaquarium, in the endangered species listing for the Southern Resident killer whale population. While technically this raises the total stock to 78, 77 will be used as Lolita is still captive.

West Coast Transient Stock

Transient killer whales generally occur in smaller (less than 10 individuals), less structured pods, though pods as large as 12 have occasionally been observed in Puget Sound. According to the Center for Whale Research (CWR 2015), they tend to travel in small groups of one to five individuals, staying close to shorelines, often near seal rookeries when pups are being weaned. The West Coast Transient stock, which includes individuals from California to southeastern Alaska, is has a minimum population estimate of 243 (NMFS 2013b). 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.

3.4.1.2 Status

Southern Resident Stock

The SRKW stock was declared "depleted/strategic" under the MMPA in May 2003 (68 FR 31980). On November 18, 2005, the SR stock was listed as "endangered" under the ESA (70 FR 69903). On November 29, 2006, NMFS published a final rule designating critical habitat for the SR killer whale 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 Southern Residents was published in January of

2008 (NMFS 2008a). On February 24, 2015, NOAA Fisheries announced a 12-month finding on a petition to revise the Critical Habitat Designation for the Southern Resident killer whale distinct population segment is warranted (still in process) (NMFS 2015c).

West Coast Transient Stock

The West Coast Transient stock is "non-depleted" under the MMPA, and "unlisted" under the ESA (NMFS 2013b).

Washington State Status

In Washington State, all killer whales that may be present in Washington waters (Southern Resident, West Coast Transient, and Offshore) were listed as a state candidate species in 2000. In April 2004, the State upgraded their status to a "state endangered species" (WDFW 2004).

3.4.1.3 Distribution

The SRKW and West Coast Transient stocks are both found within Washington inland waters. Individuals of both stocks have long-ranging movements and regularly leave the inland waters (Calambokidis and Baird 1994a).

Southern Resident Stock Distribution

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. SR 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).

Fall/Winter Distribution. In fall, all three 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 pods spend will over 50% of the winter months on the outer coast (NMFS 2014b). 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. In 2017, the Southern Residents spent less time in inland marine waters than previously recorded, which may be related to lack of prey (Orca Network 2017).

SRKW Density and Sightings

U.S. Navy Density Report

In the timeframe scheduled for this project, the report estimates the density of SRKW whales in the Seattle area as a range between 0.001461 and 0.020240 animals/ km^2 (U.S. Navy 2014).

WSF Projects

During the 2012 Seattle Slip 2 Batter Pile project, 0 SRKW were observed during this one day project in the area that corresponds to the upcoming project ZOIs (WSDOT 2012).

During the 2016 Seattle Test Pile project, 0 SRKW were observed over 10 days in the area that corresponds to the upcoming project ZOIs (WSDOT 2016c).

During the 99 monitoring days of the 2017/18 Seattle Multimodal Project, 148 SRKW (multiple sightings of some members of the 76 SRKWs) were observed in the project ZOI, and average of 1.5/day (WSDOT 2017/18).

Seattle Aquarium Project

During the 2012 Seattle Aquarium Pier 60 project, 27 orcas were observed over 29 days in the area that corresponds to the upcoming project ZOIs (HiKARI 2012). However, the orcas were not identified as SRKW or Transients.

Elliott Bay Seawall Project

According to the City of Seattle Elliott Bay Seawall Project (EBSP) Season 1, 2 and 3 Annual Reports, 7 killer whales were observed over 163 days in an area that overlaps with the upcoming project ZOIs (Seattle 2014/2015/2016).

By cross-referencing with the Orca Network sightings archives, and noting that J pod was in the San Juan Islands, it is assumed that the 2014 sighting was a Transient (Orca Network 2014). The February 5, 2016 sightings of 6 killer whales were confirmed as Transient killer whales (Orca Network 2016). The current assumption is that 0 SRKW were observed over the 163 days.

The Whale Museum

For the years 2010 to 2016, in the August to February timeframe scheduled for this project, TWM (2017) reported 72 whale days for SRKW in the red quadrants shown in Figure 3-1, with a high of 14 whale days in December of those years (Table 3-2).

Table 3-2. SRKW Whale Days by Year/Project Month

Year	Aug	Sept	Oct	Nov	Dec	Jan	Feb
2010	0	0	3	1	0	0	0
2011	0	0	1	2	0	1	6
2012	3	0	6	2	4	3	5
2013	1	2	2	2	10	3	1
2014	0	0	4	3	0	3	2
2015	4	2	2	8	3	3	2
2016	3	3	3	3	4	2	1
Totals	**11**	**7**	**21**	**21**	**21**	**15**	**17**
Average	**1.57**	**1.00**	**3.00**	**3.00**	**3.00**	**2.14**	**2.43**

TWM 2017

NMFS Stranding Data

From the years 2010-2016, in the timeframe scheduled for this project, there were 0 SRKW strandings in the area that corresponds to the upcoming project ZOIs (NMFS 2016b/2017d).

West Coast Transient Stock Distribution

The West Coast Transient stock occurs in California, Oregon, Washington, British Columbia, and southeastern Alaskan waters. Within the inland waters, they may frequent areas near seal rookeries when pups are weaned (Baird and Dill 1995).

West Coast Transients are documented year-round in Washington inland waters.

Transient Density and Sightings

U.S. Navy Density Report
In the timeframe scheduled for this project, the report estimates the density of Transient killer whales in the Seattle area as a range between 0.000575 and 0.002373 animals/ km^2 (U.S. Navy 2014).

WSF Projects
During the 2012 Seattle Slip 2 Batter Pile project, 0 Transients were observed during this one-day project in the area that corresponds to the upcoming project ZOIs (WSDOT 2012).

During the 2016 Seattle Test Pile project, 0 Transients were observed over 10 days in the area that corresponds to the upcoming project ZOIs (WSDOT 2016c). However, on February 5, 2016, a pod of up to 7 Transients were reported in the area that corresponds to the upcoming project ZOIs (Orca Network 2016). The Test Pile project observers were monitoring a small concrete impact driving ZOE/ZOI and were not in position to see the Transients that day.

During the 99 monitoring days of the 2017/18 Seattle Multimodal Project, 19 Transients were observed in the project ZOI, an average of 0.09/day (WSDOT 2017/18).

Seattle Aquarium Project
During the 2012 Seattle Aquarium Pier 60 project, 27 orcas were observed over 29 observation days in the area that corresponds to the upcoming project ZOIs (HiKARI 2012). However, the orcas were not identified as SRKW or Transients.

Elliott Bay Seawall Project
According to the City of Seattle Elliott Bay Seawall Project (EBSP) Season 1, 2 and 3 Annual Reports, 7 killer whales were observed over 163 days in an area that overlaps with the upcoming project ZOIs (Seattle 2014/2015/2016). By cross-referencing with the Orca Network sightings archives, it is assumed that one sighting was a Transient, and 6 were confirmed Transients (Orca Network 2014/2016).

The Whale Museum
For the years 2008 to 2014, in the August to February timeframe scheduled for this project, TWM (2015) reported 13 whale days for Transients in the red quadrants shown in Figure 3-1, with a high of 5 whale days in January of those years (Table 3-3).

Table 3-3. Transient Killer Whale Sightings Days 2008-2014

Aug	Sept	Oct	Nov	Dec	Jan	Feb
2	2	0	2	0	5	2

TWM 2015

For the years 2010 to 2016, in the August to February timeframe scheduled for this project, The Whale Museum (2017) reported 25 whale days for Transients in the red quadrants shown in Figure 3-1, with a high of 7 whale days in August of those years (Table 3-4).

Table 3-4. Transient Killer Whale Sightings Days 2010-2016

Aug	Sept	Oct	Nov	Dec	Jan	Feb
7	3	1	3	1	6	4

TWM 2017

Data from 2008-2016 show that Transient killer whale observations in the Seattle area have increased, starting in 2012 (Figure 3-4). Note that a sightings day indicates a sighting of any number of Transient killer whales on a given day, not the number of individuals observed (TWM 2015/17).

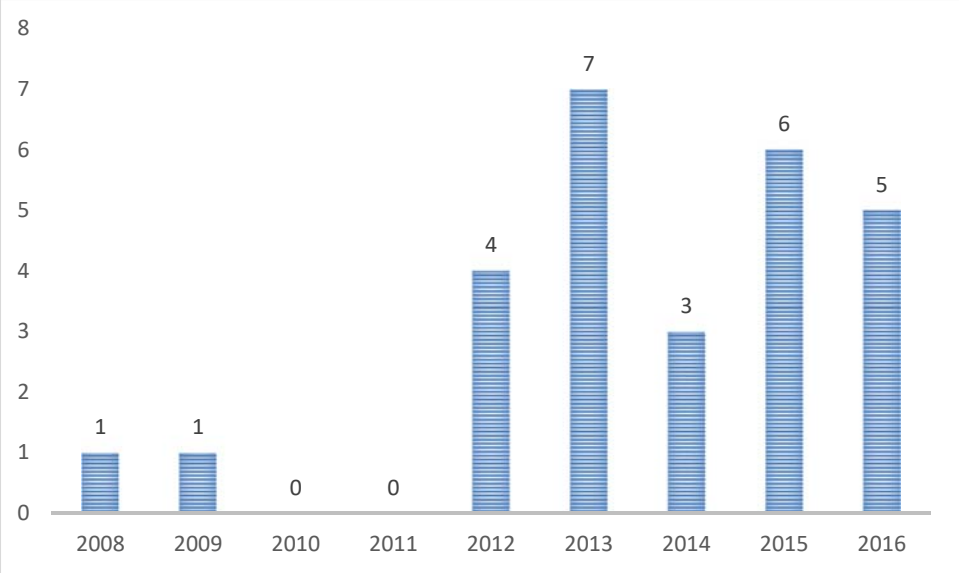

Figure 3-4 Seattle Area Transient Killer Sightings Days

NMFS Stranding Data

From the years 2010-2016, in the timeframe scheduled for this project, there were 0 Transient strandings in the area that corresponds to the upcoming project ZOIs (NMFS 2016b/2017d).

3.4.2 Gray Whale

The Eastern North Pacific gray whale may be found near the project site. Gray whales are low-frequency range cetaceans (Southall et al. 2007).

3.4.2.1 Numbers

The most recent population estimate for the Eastern North Pacific stock is 20,990 individuals (NMFS 2015d). 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. 1994b). 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. 2004a). Forty-eight individual gray whales were observed in Puget Sound and Hood Canal in 2004 and 2005 (Calambokidis 2007).

3.4.2.2 Status

The Eastern North Pacific stock of gray whales is "non-depleted" under the MMPA, and was "delisted" under the ESA in 1994 after a 5-year review by NOAA Fisheries. 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).

3.4.2.3 Distribution

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 (south Whidbey Island area) from March through May to feed on ghost shrimp (Weitkamp et al. 1992; Calambokidis pers. comm. 2006). The size of the group is 10-12 individuals, with some arriving as early as January and staying into July (Orca Network 2015b). 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. 1994b). The average tenure within Washington inland waters is 47 days and the longest stay was 112 days (J. Calambokidis pers. comm. 2008).

Density and Sightings

U.S. Navy Density Report

In the timeframe scheduled for this project, the report estimates the density of gray whales in the Seattle area as a range between 0.000002 and 0.00510 animals/ km^2 (U.S. Navy 2014).

WSF Projects

During the 2012 Seattle Slip 2 Batter Pile project, 0 gray whales were observed during this one-day project in the area that corresponds to the upcoming project ZOIs (WSDOT 2012).

During the 2016 Seattle Test Pile project, 0 gray whales were observed over 10 days in the area that corresponds to the upcoming project ZOIs (WSDOT 2016c).

During the 99 monitoring days of the 2017/18 Seattle Multimodal Project, 0 gray whales were observed in the project ZOI (WSDOT 2017/18).

Seattle Aquarium Project
During the 2012 Seattle Aquarium Pier 60 project, 0 gray whales were observed over 29 days in the area that corresponds to the upcoming project ZOIs (HiKARI 2012).

Elliott Bay Seawall Project
According to the City of Seattle Elliott Bay Seawall Project (EBSP) Season 1, 2 and 3 Annual Reports, 0 gray whales were observed over 163 days in an area that overlaps with the upcoming project ZOIs (Seattle 2014/2015/2016).

The Whale Museum
For the years 2008 to 2014, in the August to February timeframe scheduled for this project, TWM (2017) reported 5 sightings days for gray whale the red quadrants shown in Figure 3-1, with a high of 2 whale days in January of those years (Table 3-5).

Table 3-5. Gray Whale Sightings Days 2010-2016

Aug	Sept	Oct	Nov	Dec	Jan	Feb
1	0	0	1	0	2	1

TWM 2017

NMFS Stranding Data
From the years 2010-2016, in the timeframe scheduled for this project, there was 1 gray whale strandings in the area that corresponds to the upcoming project ZOIs (NMFS 2016b/2017d).

3.4.3 Humpback Whale
The California-Oregon-Washington (CA-OR-WA) stock of humpback whale may be found near the project site.

3.4.3.1 Numbers
The NMFS Stock Assessment Report abundance estimate is 1,918 individuals, and the minimum population estimate is 1,876 (NMFS 2016a). Humpback whales are low-frequency hearing range cetaceans (Southall et al. 2007).

3.4.3.2 Status
The CA-OR-WA stock of humpback whales is “depleted/strategic” under the MMPA, and “endangered” under the Endangered Species Conservation Act of 1969. This protection was transferred to the ESA in 1973. A recovery plan was adopted in 1991 (NMFS 1991). In 2016, NMFS revised the ESA listing for the humpback whale to identify 14 Distinct Population Segments (DPS), and listed one as threatened, four as endangered, and nine others as not warranted for listing. When a humpback whale is sighted in Washington inland waters (Puget Sound, Strait of Juan de Fuca, San Juan Islands) it is 43% likely to be from the unlisted Hawaii DPS, 42% likely to be from the threatened Mexico DPS, and 15% likely to be from the endangered Central American DPS (NMFS 2016b).

3.4.3.3 Distribution

Historically, humpback whales were common in inland waters of Puget Sound and the San Juan Islands (Calambokidis et al. 2004b). In the early 1900s, there was a commercial hunt for humpbacks in Georgia Strait that was probably responsible for their long disappearance from local waters (Osborne et al. 1988). Commercial hunts ended in the 1960's. Since the mid-1990s, sightings in Puget Sound have increased.

This stock calves and mates in coastal Hawaii, Mexico and Central America and migrates to southern British Columbia in the summer and fall to feed (NMFS 1991; Marine Mammal Commission 2003; Carretta et al. 2007b). 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.

Cascadia Research Collective (CRC) has been studying humpback whales along the US West Coast since 1986. In the early 2,000s, increasing numbers of humpback whales were sighted in Washington inland waters, and this trend increased in 2014 (Figure 3-1).

The return of humpback whales reflects the recovery of humpback whales from whaling, but it also exposes humpback whales to new risks. The Strait of Juan de Fuca is the primary route for shipping traffic coming and going from ports in Puget Sound and British Columbia, which may be seeing more traffic in coming years. This will expose humpback whales to increased threat of ship strikes and exposure to ship noise. Under a project with Washington Department of Fish and Wildlife and with support from NOAA CRC will be conducting surveys, tracking populations, and examining this risk (CRC 2017).

3.4.3.4 Density and Sightings

U.S. Navy Density Report

In the August – February in-water work window scheduled for this project, the report estimates the density of humpback whales in the Seattle area as a range between 0.000010 and 0.00070 animals/ km^2 (U.S. Navy 2014).

WSF Projects

During the 2012 Seattle Slip 2 Batter Pile project, zero humpback whales were observed during this one-day project (WSF 2012).

During the 2016 Seattle Test Pile project, zero humpback whales were observed over 10 days (WSF 2016).

During the 99 monitoring days of the 2017/18 Seattle Multimodal Project, 0 humpback whales were observed in the project ZOI (WSDOT 2017/18).

Seattle Aquarium Project

During the 2012 Seattle Aquarium Pier 60 project, zero humpback whales were observed over 29 days (HiKARI 2012).

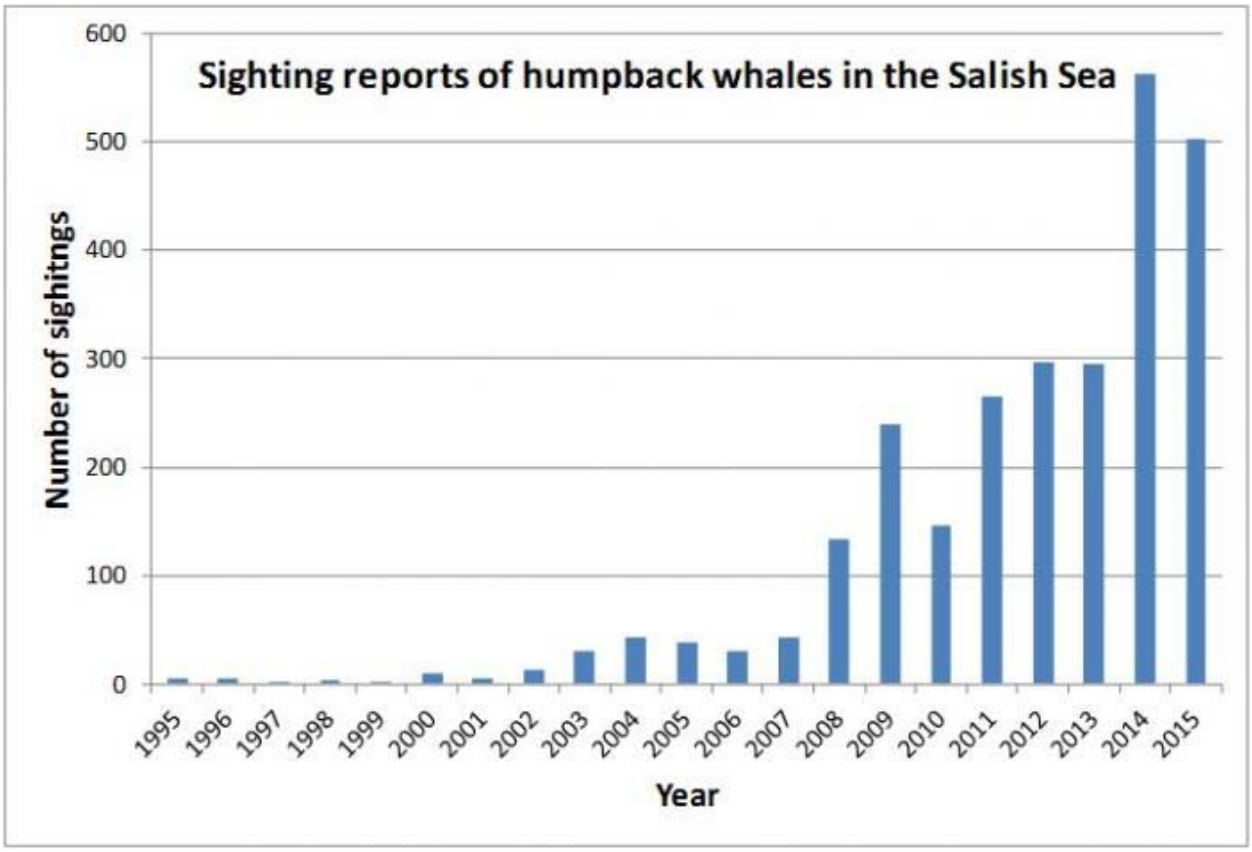

Figure 3-5 Humpback Sightings by Year

Elliott Bay Seawall Project

According to the City of Seattle Elliott Bay Seawall Project (EBSP) Season 1, 2 and 3 Annual Reports, three humpback whales were observed (two in one day) over 163 days (Seattle 2014/2015/2016).

The Whale Museum

For the years 2008 to 2014, in the in-water work window scheduled for this project, The Whale Museum reported six sightings days for humpback whale in the Seattle area, with a high of three whale days in August of those years (TWM 2015) (Table 3-1). Note that a sightings day indicates a sighting of any number of humpback whales on a given day, not the number of individuals observed.

Table 3-6 Humpback Sightings Days 2008-2014

Aug	Sept	Oct	Nov	Dec	Jan	Feb
3	1	1	1	0	0	0

For the years 2010 to 2016, in the in-water work window scheduled for this project, The Whale Museum reported 27 sightings days for humpback whale in the Seattle area, with a high of 11 whale days in August of those years (TWM 2017) (Table 3-2).

Table 3-7 Humpback Sightings Days 2010-2016

Aug	Sept	Oct	Nov	Dec	Jan	Feb
11	6	4	1	0	2	3

The Whale Museum data from 2008-2016 show that humpback whale observations in the Seattle area have increased, starting in 2012 (Figure 3-2) (TWM 2015/17).

NMFS Stranding Data

From the years 2010-2013, in the timeframe scheduled for this project, there were zero humpback whale strandings in the Seattle area (NMFS 2016c).

Based on this information, the possibility of encountering humpback whale during the Seattle project is moderate, depending on the actual work month.

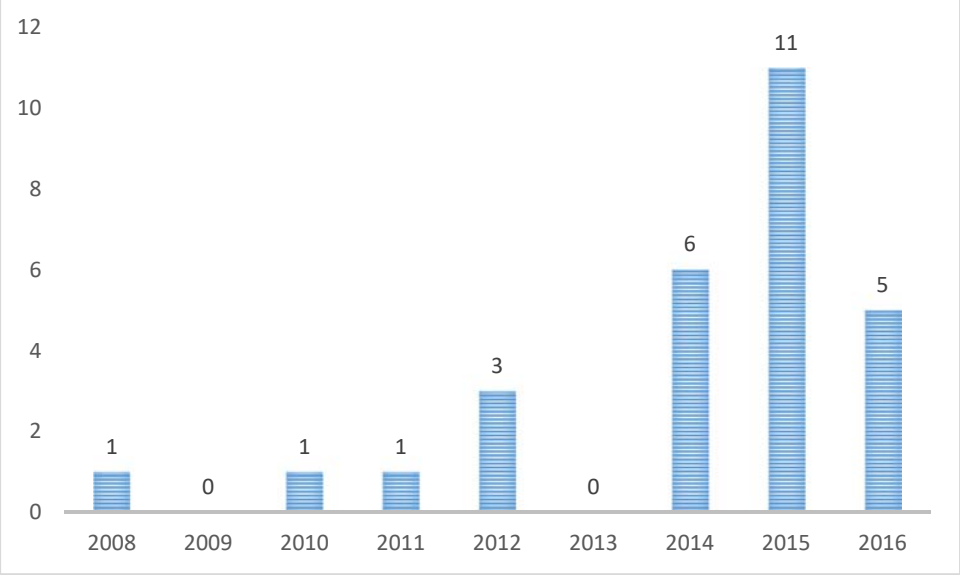

Figure 3-6 Seattle Area Humpback Sightings Days

3.4.1 Minke Whale

The California-Oregon-Washington (CA-OR-WA) stock of Minke whale may be found near the project site. Minke whales are low-frequency hearing range cetaceans (Southall et. al. 2007).

The CA-WA-OR stock is considered a resident stock (NMFS 2016d), and includes Minke whales within the inland Washington waters of Puget Sound and the San Juan Islands.

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 2016d).

3.4.1.1 Numbers

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). The minimum population estimate of Minke whales in the CA-OR-WA stock is 369 individuals (NMFS 2016d).

Over a 10-year period, 30 individuals were photo-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 photo-identified from around the San Juan Islands (Dorsey et al. 1990).

3.4.1.2 Status

Minke whales are classified as non-depleted under the MMPA, and are not listed under the ESA.

3.4.1.3 Distribution

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.

Density and Sightings

U.S. Navy Density Report

In the timeframe scheduled for this project, the report estimates the density of Minke whales in the Seattle area as a range between 0.0000010 and 0.00003 animal/km^2 (U.S. Navy 2015).

WSF Projects

During the 2012 Seattle Slip 2 Batter Pile project, 0 Minke whales were observed during this one-day project in the area that corresponds to the upcoming project ZOIs (WSDOT 2012).

During the 2016 Seattle Test Pile project, 0 Minke whales were observed over 10 days in the area that corresponds to the upcoming project ZOIs (WSDOT 2016c).

During the 99 monitoring days of the 2017/18 Seattle Multimodal Project, 0 Minke whales were observed in the project ZOI (WSDOT 2017/18).

Seattle Aquarium Project

During the 2012 Seattle Aquarium Pier 60 project, 0 Minke whales were observed over 29 days in the area that corresponds to the upcoming project ZOIs (HiKARI 2012).

Elliott Bay Seawall Project

According to the City of Seattle EBSP Season 1and 2 Annual Reports and the preliminary Season 3 data, no Minke whales were observed over 155 days in an area that overlaps with the upcoming project ZOIs (Seattle 2014/2015/2016).

The Whale Museum

For the years 2010 to 2016, in the August to February timeframe scheduled for this project, The Whale Museum (2017) reported two sightings days for Minke whale in the red quadrants shown in Figure 3-1, with one whale day each in November and February (Table 3-9).

Table 3-8 Minke Whale Sightings Days 2010-2016

Aug	Sept	Oct	Nov	Dec	Jan	Feb
0	0	0	1	0	0	1

NMFS Stranding Data

From the years 2010-2016, in the timeframe scheduled for this project, there were no Minke whale strandings in the area that corresponds to the upcoming project ZOIs (NMFS 2016b/2017d).

3.4.2 Harbor Porpoise

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). Harbor porpoise are high-frequency hearing range cetaceans (Southall et. al. 2007).

3.4.2.1 Numbers

The Washington Inland Waters Stock mean abundance estimate based on 2013 to 2015 aerial surveys conducted in the inside Washington waters and southern British Columbia is 11,233 harbor porpoises (NMFS 2017c). The minimum population estimate is 8,308.

No harbor porpoise 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 (D. Nysewander pers. comm. 2008; WDFW 2008; WDFW/Cascadia 2016). Recent systematic 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; WDFW/Cascadia 2016).

3.4.2.2 Status

The Washington Inland Waters Stock of harbor porpoise is "non-depleted" under MMPA, and "unlisted" under the ESA.

3.4.2.3 Distribution

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 Seattle area, although it is suspected that in some areas harbor porpoises migrate (based on seasonal shifts in distribution). Hall (2004; pers. comm. 2008) found harbor porpoises off Canada's southern

Vancouver Island to peak during late summer, while 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.

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 Seattle ZOIs range from 0 to 186 m/611 ft., with the majority of the ZOIs <150 m.

Density and Sightings

U.S. Navy Density Report

In the timeframe scheduled for this project, the report estimates the density of harbor porpoise in the Seattle area as a range between 0.061701 and 0.156000 animals/km^2 (U.S. Navy 2014).

WDFW Aerial Surveys

The Washington State Department of Fish and Wildlife (WDFW) has carried out annual winter aerial marine bird surveys for Washington inner marine waters every year from 1994 to the present (excluding 2007). In addition to marine birds, all marine mammal observations were recorded.

The survey results were used to estimate the winter mean densities of harbor porpoise by basin. The density of harbor porpoise in the Central Puget Sound (Seattle area) is estimated as a range between 0 and 0.58 animals/km^2 (Figure 3-5)(WDFW/Cascadia 2016).

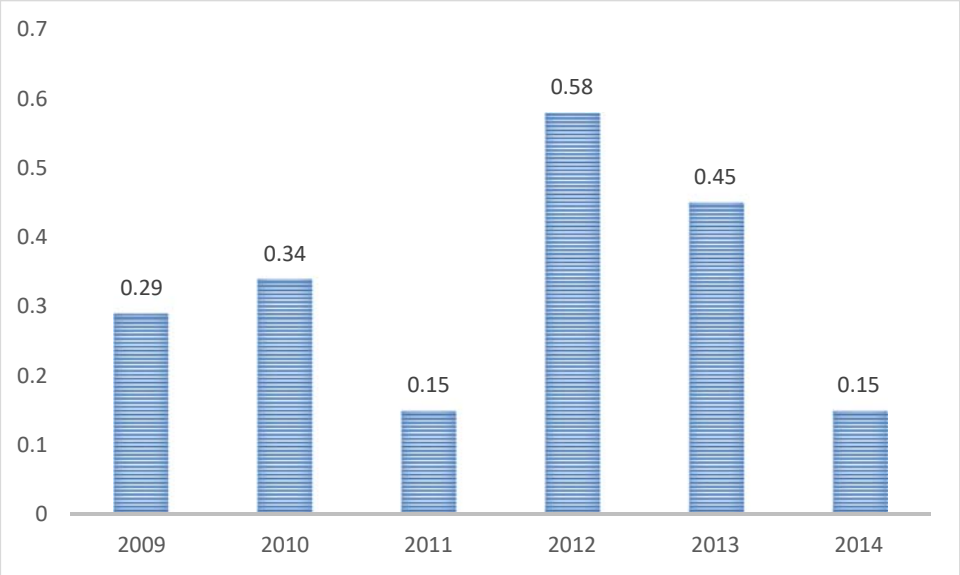

Figure 3-7 WDFW Harbor Porpoise Densities 2009-2014

WSF Projects

During the 2012 Seattle Slip 2 Batter Pile project, 0 harbor porpoise were observed during this one day project in the area that corresponds to the upcoming project ZOIs (WSDOT 2012).

During the 2016 Seattle Test Pile project, 0 harbor porpoise were observed over 10 days in the area that corresponds to the upcoming project ZOIs (WSDOT 2016c).

During the 99 monitoring days of the 2017/18 Seattle Multimodal Project, 288 harbor porpoise were observed in the project ZOI, an average of 3/day (WSDOT 2017/18).

Seattle Aquarium Project

During the 2012 Seattle Aquarium Pier 60 project, 5 harbor porpoise were observed over 29 days in the area that corresponds to the upcoming project ZOIs, with a maximum of 3 observed in one day (HiKARI 2012).

Elliott Bay Seawall Project

According to the City of Seattle Elliott Bay Seawall Project (EBSP) Season 1and 2 Annual Reports and the preliminary Season 3 data, 1 harbor porpoise was observed over 155 days in an area that overlaps with the upcoming project ZOIs (Seattle 2014/2015/2016).

The Whale Museum

For the years 2010 to 2016, in the August to February timeframe scheduled for this project, TWM (2017) reported 4 sightings day for harbor porpoise in the red quadrants shown in Figure 3-1 (Table 3-7). Note that smaller cetaceans are not reported at the same rate as large cetaceans.

Table 3-9. Harbor Porpoise Sightings Days 2010-2016

Aug	Sept	Oct	Nov	Dec	Jan	Feb
2	0	1	0	0	0	1

TWM 2017

NMFS Stranding Data

From the years 2010-2016, in the timeframe scheduled for this project, there were 7 harbor porpoise strandings in the area that corresponds to the upcoming project ZOIs (NMFS 2016b/2017d).

3.4.3 Dall's Porpoise

The California, Oregon, and Washington (CA-WA-OR) stock of Dall's porpoise may be found near the project site. Dall's porpoise are high-frequency hearing range cetaceans (Southall et. al. 2007).

3.4.3.1 Numbers

The most recent estimate of Dall's porpoise stock abundance is 25,750 (NMFS 2017g). 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. Prior to the 1940s, Dall's porpoises were not reported in Puget Sound. The most recent Washington's inland waters estimate is 900 animals (Calambokidis et al. 1997), though sightings have become rarer since then (WDFW/Cascadia 2016).

3.4.3.2 Status

The CA-WA-OR stock of Dall's porpoise is "non-depleted" under the MMPA, and "unlisted" under the ESA.

3.4.3.3 Distribution

Dall's porpoises are migratory and appear to have predictable seasonal movements driven by changes in oceanographic conditions (Green et al. 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 (Calambokidis pers. comm. 2006), but with different distributions throughout Puget Sound from winter to summer. The average winter group size is three animals (WDFW 2008).

Density and Sightings

U.S. Navy Density Report

In the timeframe scheduled for this project, the report estimates the density of Dall's porpoise in the Seattle area as a range between 0.018858 and 0.047976 animals/ km^2 (U.S. Navy 2014).

WSF Projects
During the 2012 Seattle Slip 2 Batter Pile project, 0 Dall's porpoise were observed during this one-day project in the area that corresponds to the upcoming project ZOIs (WSDOT 2012).

During the 2016 Seattle Test Pile project, 0 Dall's porpoise were observed over 10 days in the area that corresponds to the upcoming project ZOIs (WSDOT 2016c).

During the 99 monitoring days of the 2017/18 Seattle Multimodal Project, 0 Dall's porpoise were observed in the project ZOI (WSDOT 2017/18).

Seattle Aquarium Project
During the 2012 Seattle Aquarium Pier 60 project, 1 Dall's porpoise was observed over 29 days in the area that corresponds to the upcoming project ZOIs, with a maximum of 3 observed in one day (HiKARI 2012).

Elliott Bay Seawall Project
According to the City of Seattle Elliott Bay Seawall Project (EBSP) Season 1and 2 Annual Reports and the preliminary Season 3 data, 0 Dall's porpoise was observed over 155 days in an area that corresponds with the upcoming project ZOIs (Seattle 2014/2015/2016).

The Whale Museum
For the years 2010 to 2016, in the August to February timeframe scheduled for this project, TWM (2017) reported 0 sightings days for Dall's porpoise in the red quadrants shown in Figure 3-1. Note that smaller cetaceans are not reported at the same rate as large cetaceans.

NMFS Stranding Data
From the years 2010-2016, in the timeframe scheduled for this project, there were 0 Dall's porpoise strandings in the area that corresponds to the upcoming project ZOIs (NMFS 2016b/2017d).

3.4.1 Long-beaked Common and Bottlenose Dolphin

The California stock of Long-Beaked Common dolphin and the CA-WA-OR Offshore stock of Bottlenose dolphin may be found near the project site. Sightings of Common and Bottlenose dolphins have become more prevalent in Puget Sound. Dolphins are mid-frequency hearing range cetaceans (Southall et. al. 2007).

3.4.1.1 Numbers

The minimum population estimates are: Long-Beaked Common (101,305) and Bottlenose (1,924) (NMFS 2017h/2017i/2017j).

3.4.1.2 Status

These stocks are not listed as "depleted" under the MMPA, and are "unlisted" under the ESA (NMFS 2017h/2017i/2017j).

3.4.1.3 Distribution

Long-beaked common dolphins are present off the California coast. Bottlenose dolphins are found off the CA-WA-OR coasts, though they are more prevalent off the California coast (NMFS 2017h/2017i/2017j).

Density and Sightings

U.S. Navy Density Report
The report indicates that Long-Beaked Common dolphin and Bottlenose dolphin are not expected to occur in the project area (U.S. Navy 2015).

WSF Projects
During the 2012 Seattle Slip 2 Batter Pile project, 0 dolphins were observed during this one-day project in the area that corresponds to the upcoming project ZOIs (WSDOT 2012).

During the 2016 Seattle Test Pile project, 0 dolphins were observed over 10 days in the area that corresponds to the upcoming project ZOIs (WSDOT 2016c).

During the 99 monitoring days of the 2017/18 Seattle Multimodal Project, 2 common dolphins (an average of 0.02/day) and 4 bottlenose dolphins (an average of 0.04/day) were observed in the project ZOI. In addition, 29 unidentified dolphins and/or porpoises were observed, so the number of dolphins present in the area may be larger (WSDOT 2017/18).

Seattle Aquarium Project
During the 2012 Seattle Aquarium Pier 60 project, 0 dolphins were observed over 29 days in the area that corresponds to the upcoming project ZOIs (HiKARI 2012).

Elliott Bay Seawall Project
According to the City of Seattle EBSP Season 1and 2 Annual Reports and the preliminary Season 3 data, 0 dolphins were observed over 155 days in an area that overlaps with the upcoming project ZOIs (Seattle 2014/2015/2016).

The Whale Museum
For the years 2010 to 2016, in the August to February timeframe scheduled for this project, TWM (2017) reported 2 sightings days for common dolphin (there was no distinction between long-beaked and short-beaked common dolphin), and 0 Bottlenose dolphins in the red and green quadrants shown in Figure 3-1 (Table 3-10). Note that smaller cetaceans are not reported at the same rate as large cetaceans.

Table 3-10. Common Dolphin Sightings Days 2010-2016

Aug	Sept	Oct	Nov	Dec	Jan	Feb
2*	0	0	0	0	0	0

TWM 2017

Orca Network
Beginning on June 16, 2016, Short-Beaked Common dolphins were observed near Victoria, British Columbia. Over the following weeks, a pod of 15 to 20 Long-Beaked Common dolphins (including a calf) were observed in central and southern Puget Sound (Orca Network 2016).

NMFS Stranding Data

From the years 2010-2016, in the timeframe scheduled for this project, there were 0 confirmed strandings of dolphins in the area that corresponds to the upcoming project ZOIs (NMFS 2016b/2017d).

Cascadia Research Collective

Four to six Long-beaked Common dolphins have remained in Puget Sound since June 2016, and four animals with distinct markings have been seen multiple times and in every season of the year as of October 2017 (CRC 2017).

Between September 2017 and March 2018, a group of up to 5-6 Bottlenose dolphins was sighted in South Puget Sound (CRC 2017a/17b). It is assumed that this group is still present in the area.

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4.0 Status and Distribution of Affected Species or Stocks

A description of the status, distribution, and seasonal distribution (when applicable) of the affected species or stocks of marine mammals likely to be affected by such activities.

This section has been combined with Section 3.0.

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5.0 Type of Incidental Take Authorization Requested

The type of incidental taking authorization that is being requested (i.e., takes by harassment only, takes by harassment, injury and/or death), and the method of incidental taking.

Harassment is the primary means of take expected to result from these activities. Except with respect to certain activities not pertinent here, the MMPA defines "harassment" as: any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment].

As described previously in the Effects section, Level B Harassment is expected to occur and is proposed to be authorized in the numbers identified below. As described below, a small number of takes by Level A Harassment are being proposed to be authorized. The death of a marine mammal is also a type of incidental take. However, no mortality is anticipated or proposed to be authorized to result from this activity.

5.1 Incidental Take Authorization Request

Under Section 101 (a)(5)(D) of the MMPA, WSF requests an IHA from August 1, 2018 through February 15, 2019 for Level B and A take of 10 species of marine mammals described in this application during the terminal construction project at the Seattle Ferry Terminal.

The scheduled pile-driving and pile-removal activities discussed in this application will occur between August 1, 2018 and February 15, 2019.

5.2 Method of Incidental Taking

The method of incidental take is Level A and Level B acoustical take during active pile driving or removal activity.

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6.0 Number of Marine Mammals that May Be Affected

By age, sex, and reproductive condition (if possible), the number of marine mammals (by species) that may be taken by each type of taking identified in [Section 5], and the number of times such takings by each type of taking are likely to occur.

This section summarizes potential incidental take of marine mammals during Year Two (2018/19) of the Seattle project. Section 6.2 describes the methods used to calculate the estimated zones and Section 6.3 describes the potential incidental take for each marine mammal species. Section 6.4 provides the number of marine mammals by species for which take authorization is requested.

Due to in-water noise from impact pile driving, and vibratory pile driving and removal this project will incidentally take by Level A and/or B acoustical harassment small numbers of harbor seal, Northern elephant seal, California sea lion, Steller sea lion, Transient killer whale, gray whale, Minke whale, harbor porpoise, Dall's porpoise, long-beaked common dolphin and bottlenose dolphin.

With the exception of harbor seals and California sea lions, it is anticipated that all of the marine mammals that enter a Level B acoustical harassment ZOI will be exposed to pile driving noise only briefly as they are transiting the area. Only harbor seals and California sea lions are expected to forage and haul out in the Seattle project area with any frequency and could be exposed multiple times during the project.

6.1 Estimated Duration of Pile Driving

The total worst-case duration for pile installation and removal is 114 days (Table 2-1).

6.2 Estimated Takes

Incidental take for each species is estimated by the likelihood of a marine mammal being present within a Level A or Level B harassment zone during active pile driving or removal. The Level A calculation includes a duration component, along with an assumption (which can lead to overestimates in some cases) that animals within the zone stay in that area for the whole duration of the pile driving activity within a day.

When possible, species take estimates are based on observations during marine mammal monitoring in the Seattle project area, since these data provide the best information on distribution and presence of marine mammals that may be near the project area.

Takes were calculated as:

Take = ensonified area x average animal abundance in the area x pile driving days.

Navy and WDFW/Cascadia Research Collective species density estimates are used when local observation data is not available. The density estimate calculations are included in Appendix F. For some species, the Navy density estimates are based on older data that do not reflect current trends, and therefore Seattle project area observations are used if available.

All Level A takes were further adjusted by subtract animals that would occur within a 200 m exclusion zone (except for harbor seal where a 60-m exclusion zone would be implemented), where pile driving activities that could cause Level A injury would be suspended when an animal is observed to approach such a zone. Further, the number of Level B takes were adjusted to excluded those already counted for Level A takes.

For calculated take number less than 15, such as northern elephant seals, transient killer whales, gray whales, Minke whales, long-beaked common dolphins, short-beaked common dolphins, and bottlenose dolphins, takes numbers were adjusted to account for group encounter and the likelihood of encountering. Specifically, for northern elephant seal, take of 15 animals is estimated based on the likelihood of encountering this species during the project period.

For transient killer whale, takes of 30 animals is estimated based on the group size and the likelihood of encountering in the area. For Minke whale, takes of 8 animals each are estimated based on the likelihood of encountering.

For long-beaked common dolphin and bottlenose dolphin, take of 50 animals is estimated based on the group size and the likelihood of encountering in the area.

6.2.1 Harbor Seal

The harbor seal take estimate is based on the 2017/18 Seattle Multimodal Project sightings data (WSDOT 2017/18). Over 99 days, 813 harbor seals were observed, an average of 8 harbor seals/day.

Based on a total of 114 pile driving/removal days for the Year Two of the Seattle Multimodal Project, it is estimated that up to 912 harbor seals could be exposed to noise levels that constitute takes. Since 17 days of pile driving/removal would produce Level A zones beyond the shutdown zone (50 m), 136 harbor seals may experience Level A harassment.

WSF is requesting authorization for take of 912 harbor seals (136 Level A/776 Level B). It is assumed that this number will include multiple harassments of the same individual(s).

6.2.2 Northern Elephant Seal

The Navy Marine Species Density Database (U.S. Navy 2014) estimates the maximum density of Northern Elephant seal in the Seattle area as 0.00001 animals per square kilometer.

Based on the adjusted density calculation (Appendix F), WSF is requesting authorization for take of 15 Northern Elephant seals, all Level B. It is assumed that this number will include multiple harassments of the same individual(s).

6.2.3 California Sea Lion

The California sea lion take estimate is based on the 2017/18 Seattle Multimodal Project sightings data (WSDOT 2017/18). Over 99 days, 1,047 California sea lions were observed, an average of 11/day.

Based on a total of 114 pile driving/removal days for the Year Two of the Seattle Multimodal Project, it is estimated that up to 1,254 California sea lions could be exposed to noise levels that constitute takes. Since Level A zones for otarrids are small, no Level A take is requested.

WSF is requesting authorization for take of 1,254 California sea lions, all Level B. It is assumed that this number will include multiple harassments of the same individual(s).

6.2.4 Steller Sea Lion

The Navy Marine Species Density Database (U.S. Navy 2014) estimates the maximum density of Steller sea lion in the Seattle area as 0.04 animals per square kilometer.

Based on the density calculation (Appendix F), WSF is requesting authorization for take of 232 Steller sea lions, all Level B. It is assumed that this number will include multiple harassments of the same individual(s).

6.2.5 Southern Resident Killer Whale

Due to the critical status of SRKW, WSF is not requesting any take. If SRKW approach the any of the Zones during pile driving or removal, work will be paused until the SRKW exit the Zone.

6.2.6 Transient Killer Whale

The Navy Marine Species Density Database (U.S. Navy 2014) estimates the maximum density of Transient killer whale in the Seattle area as 0.002 animals per square kilometer.

Based on the density calculation (Appendix F), adjusted for group size and likelihood of encountering, WSF is requesting authorization for take of 30 Transient killer whales, all Level B. It is assumed that this number will include multiple harassments of the same individual(s).

6.2.7 Gray Whale

The Navy Marine Species Density Database (U.S. Navy 2014) estimates the maximum density of Gray whale in the Seattle area as 0.0051 animals per square kilometer.

Based on the density calculation (Appendix F), WSF is requesting authorization for take of 30 Gray whales, all Level B. It is assumed that this number will include multiple harassments of the same individual(s).

6.2.8 Humpback Whale

No humpback whale take is requested for Year 2. An ESA re-initiation is in process that will allow for take to be requested in future project years (NMFS 2018).

6.2.1 Minke Whale

The Navy Marine Species Density Database (U.S. Navy 2014) estimates the maximum density of Minke whale in the Seattle area as 0.00003 animals per square kilometer.

Based on the density calculation (Appendix F), adjusted for likelihood of encountering, WSF is requesting authorization for take of 8 Minke whales, all Level B. It is assumed that this number will include multiple harassments of the same individual(s).

6.2.2 Harbor Porpoise

WDFW/Cascadia Research Collective (2016) estimates the maximum density of harbor porpoise in the Seattle area as 0.058 animals per square kilometer.

Based on the density calculation (Appendix F), adjusted for likelihood of encountering, WSF is requesting authorization for take of 3,360 harbor porpoise, 10 Level A, 3,350 Level B. It is assumed that this number will include multiple harassments of the same individual(s).

6.2.3 Dall's Porpoise

The Navy Marine Species Density Database (U.S. Navy 2014) estimates the maximum density of Dall's porpoises in the Seattle area as 0.047976 animals per square kilometer.

Based on the density calculation (Appendix F), WSF is requesting authorization for take of 278 Dall's porpoise, 1 Level A, 277 Level B. It is assumed that this number will include multiple harassments of the same individual(s).

6.2.4 Long-beaked Common

The Long-beaked Common dolphin estimate is based on sightings data from Cascadia Research Collective. Four to six Long-beaked Common dolphins have remained in Puget Sound since June 2016, and four animals with distinct markings have been seen multiple times and in every season of the year as of October 2017 (CRC 2017).

Based on group size and likelihood of encountering, WSF is requesting authorization for Level B take of 50 Long-beaked Common dolphins. It is assumed that this number will include multiple harassments of the same individual(s).

6.2.5 Bottlenose Dolphin

The bottlenose dolphin estimate is based on sightings data from Cascadia Research Collective. Between September 2017 and March 2018, a group of up to 5-6 individuals was sighted in South Puget Sound (CRC 2017/18). It is assumed that this group is still present in the area.

Based on group size and likelihood of encountering, WSF is requesting authorization for Level B take of 50 bottlenose dolphins. It is assumed that this number will include multiple harassments of the same individual(s).

6.2.6 Summary of Estimated Takes

A summary of estimated marine mammal takes is listed in Table 6-1.

Table 6-1 Estimated Take Levels

Species	Estimated Level A take	Estimated Level B take	Estimated total take
Pacific harbor seal	136	776	912
Northern Elephant seal	0	15	15
California sea lion	0	1,254	1,254
Steller sea lion	0	232	232
Killer whale, SR	0	0	0
Killer whale, Transient	0	30	30
Gray whale	0	30	30
Minke whale	0	8	8
Harbor porpoise	10	3,350	3,360
Dall's porpoise	1	277	278
Long-Beaked Common dolphin	0	50	50
Bottlenose dolphin	0	50	50

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7.0 Anticipated Impact on Species or Stocks

The anticipated impact of the activity upon the species or stock of marine mammals.

WSF is requesting authorization for Level B acoustical harassment take of marine mammals as listed in Table 6-1. Any incidental takes will very likely be multiple takes of individuals, rather than single takes of unique individuals. The stock take calculations below assume takes of individual animals, instead of repeated takes of a smaller number of individuals; therefore, the stock take percentage calculations are very conservative.

These numbers in relation to the overall stock size of each species are summarized in Table 7-1. Because it may not be possible to identify whether a dolphin is a Long-Beaked or Short-Beaked, or a Bottlenose dolphin, the potential impact to all three stocks is analyzed as if all takes were from a single stock.

If incidental takes occur, it is expected to only result in short-term changes in behavior and potential temporary hearing threshold shift. These takes would be unlikely to have any impact on stock recruitment or survival and therefore, would have a negligible impact on the stocks of these species.

Table 7-1 Level B Acoustical Harassment Take Request Percent of Total Stock

Species	Stock Size	Take Request	Take Request % of Stock	20% of Stock
Pacific Harbor Seal	11,036	912	8.0	2,207
Northern Elephant Seal	81,368	15	0.02	16,274
California Sea Lion	296,750	1,254	0.43	59,350
Steller Sea Lion	41,638	232	0.51	8,328
Killer Whale, SR	76	0	0	15
Killer Whale, Transient	243	30	12.0	49
Gray Whale	20,990	30	0.14	4,198
Minke Whale	369	8	2.17	74
Harbor Porpoise	11,233	3,360	30.0	2,247
Dall's Porpoise	25,750	278	1.0	5,150
Long-Beaked Common Dolphin	101,305	50	0.05	20,261
Bottlenose Dolphin	1,924	50	2.6	385

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8.0 Anticipated Impact on Subsistence

The anticipated impact of the activity on the availability of the species or stocks of marine mammals for subsistence uses.

8.1 Subsistence Harvests by Northwest Treaty Indian Tribes

Historically, Pacific Northwest Native American tribes were known to hunt several species of marine mammals including harbor seals, Steller sea lions, northern fur seals, gray whales and humpback whales. More recently, several Pacific Northwest Native American tribes have promulgated tribal regulations allowing tribal members to exercise treaty rights for subsistence harvest of harbor seals and California sea lions (Carretta et al. 2007a).

The Makah Indian Tribe (Makah) has specifically passed hunting regulations for gray whales. However, the directed take of marine mammals (not just gray whales) for ceremonial and/or subsistence purposes was enjoined by the Ninth Circuit Court of Appeals in rulings against the Makah in 2002, 2003 and 2004 (Norberg pers. comm. 2007b; NMFS 2005). Currently, there are no authorized ceremonial and/or subsistence hunts for marine mammals in Puget Sound or the San Juan Islands (Norberg pers. comm. 2007b) with the possible exception of some coastal tribes who may allow a small number of directed take for subsistence purposes.

8.1.1 Harbor Seals

Tribal subsistence takes of this stock may occur, but no data on recent takes are available (NMFS 2014a). No impacts on the availability of the species or stocks to the Pacific Northwest treaty tribes are expected as a result of the proposed project.

8.1.2 California Sea Lions

Tribal subsistence takes of this stock may occur, but no data on recent takes are available (NMFS 2015d). No impacts on the availability of the species or stock to the Pacific Northwest treaty tribes are expected as a result of the proposed project.

8.1.3 Gray Whales

The Makah ceased whaling in the 1920s after commercial whaling decimated the Eastern North Pacific gray whale population (NMFS 2005). On June 16, 1994, gray whales were removed from the endangered species list after a determination that the population had "recovered to near its estimated original population size, and is neither in danger of extinction throughout all or a significant portion of its range, nor likely to again become endangered within the foreseeable future throughout all or a significant portion of its range" (59 FR 31094).

On May 5, 1995, the Makah formally notified the U.S. Government of its interest in resuming treaty ceremonial and subsistence harvest of Eastern North Pacific gray whales, asking the Department of Commerce to represent them in seeking approval from the International Whaling Commission (IWC) for an annual quota (NMFS 2005). On October 18, 1997, the IWC approved an aboriginal subsistence quota of 620 Eastern North Pacific gray whales (with an annual cap of 140) for the Russian Checotah people and the Makah (Angliss and Outlaw 2007; NMFS 2007b). The Makah successfully hunted one Eastern North Pacific gray whale on May 17, 1999 (NMFS 2005).

Whaling by the Makah was halted on December 20, 2002, when the Ninth Circuit Court of Appeals ruled that an environmental impact statement rather than an environmental assessment should have been prepared under the National Environmental Protection Act and that the Makah must comply with the process prescribed in the MMPA for authorizing take of marine mammals otherwise prohibited by a moratorium. This was further upheld by rulings in 2003 and 2004 (NMFS 2005).

In February 2005, NMFS received a request from the Makah for a waiver of the MMPA take moratorium to resume limited hunting of Eastern North Pacific gray whales. At a 2007 meeting of the IWC (59th Annual Meeting in Anchorage, Alaska), an aboriginal subsistence quota for gray whales was again approved for natives in Russia and 20 whales (four per year for 5 years) for the Makah. However, under the Ninth Circuit Court ruling the Makah must first obtain a waiver of the MMPA take moratorium before harvesting under their IWC quota (Norberg pers. comm. 2007b). A draft environmental impact statement (DEIS) to examine the alternatives for a decision to approve or deny the waiver was released for public comment in May 2008, but later terminated in May 2012 to begin developing a new DEIS because of substantial new scientific information. In March 2015, the new DEIS was released for public comment, which closed on July 31, 2015 (NMFS 2017e). No further information is available at this time.

However, any future hunts by the Makah would occur along the outer coast of Washington, not in the Puget Sound area. Therefore, the proposed activities would not interfere with any future hunt.

9.0 Anticipated Impact on Habitat

The anticipated impact of the activity upon the habitat of the marine mammal populations, and the likelihood of restoration of the affected habitat.

9.1 Introduction

Construction activities will have temporary impacts on marine mammal habitat by increased in-water and in-air sound pressure levels from pile driving and removal. Other potential temporary impacts are water quality (increases in turbidity levels) and prey species distribution. Best management practices (BMPs) and minimization practices used by WSF to minimize potential environmental effects from project activities are outlined in Section 11 - Mitigation Measures.

9.2 In-air Noise Disturbance to Haul Outs

The second season of the project is scheduled to begin September 1, 2018, and all harbor seal pups are weaned in this region of Puget Sound by October 1. Disturbance of pinnipeds hauled out near the project, and surfacing when swimming within the threshold distances is possible.

During vibratory pile driving and removal, temporary in-air disturbance will be limited to harbor seals swimming on the surface through the immediate terminal area, or hauled-out on beaches or boat ramps within 61 m/200 ft., and within 20 m/65 ft. for all other pinnipeds.

During impact pile driving, temporary in-air disturbance will be limited to harbor seals swimming on the surface through the immediate terminal area, or hauled-out on beaches or boat ramps within 305 m/1000 ft., and within 98 m/320 ft. for all other pinnipeds.

In-air noise from non-pile driving construction activities is not expected to cause in-air disturbance to pinnipeds, because the Seattle Ferry Terminal is currently subject to similar existing levels of in-air noise from ferry, boat, road and other noise sources.

9.3 Underwater Noise Disturbance

Distances to the Level A/B acoustical harassment thresholds are described in Section 1.6.4, Attenuation to NMFS Thresholds.

There are several short-term and long-term effects from noise exposure that may occur to marine mammals, including impaired foraging efficiency and its potential effects on movements of prey, harmful physiological conditions, energetic expenditures and temporary or permanent hearing threshold shifts due to chronic stress from noise (Southall et al. 2007). The majority of the research on underwater noise impacts on whales is associated with vessel and navy sonar disturbances and does not often address impacts from pile driving.

The threshold levels at which anthropogenic noise becomes harmful to killer whales are poorly understood (NMFS 2008b). Because whale occurrence is occasional near the project site, in-water noise impacts are localized and of short duration, any impact on individual cetaceans will be limited.

Pile removal and driving will expose marine mammals to potential Level A/B harassment. The Zones of Exclusion (ZOEs) will be monitored, and work ceased if any cetacean or pinniped approaches. Because there are no documented haul outs within the immediate project area, in-air pinniped disturbance will be limited to individuals transiting the construction area, or hauled out on nearby docks.

9.4 Water and Sediment Quality

Short-term turbidity is a water quality effect of most in-water work, including pile driving and removal. WSF must comply with state water quality standards during these operations by limiting the extent of turbidity in the immediate project area.

Roni and Weitkamp (1996) monitored water quality parameters during a pier replacement project in Manchester, Washington. The study measured water quality before, during and after pile removal and driving. The study found that construction activity at the site had "little or no effect on dissolved oxygen, water temperature and salinity", and turbidity (measured in nephelometric turbidity units [NTU]) at all depths nearest the construction activity was typically less than 1 NTU higher than stations farther from the project area throughout construction.

Similar results were recorded during pile removal operations at two WSF ferry facilities. At the Friday Harbor Ferry Terminal, localized turbidity levels within the regulatory compliance radius of 150 feet (from three timber pile removal events) were generally less than 0.5 NTU higher than background levels and never exceeded 1 NTU. At the Eagle Harbor Maintenance Facility, within 150 feet, local turbidity levels (from removal of timber and steel piles) did not exceed 0.2 NTU above background levels (WSF 2014). In general, turbidity associated with pile installation is localized to about a 25-foot radius around the pile (Everitt et al. 1980).

Cetaceans are not expected to be close enough to the Seattle Ferry Terminal to experience turbidity, and any pinnipeds will be transiting the terminal area and could avoid localized areas of turbidity. Therefore, the impact from increased turbidity levels is expected to be discountable to marine mammals.

9.5 Passage Obstructions

Pile driving and removal at the Seattle Ferry Terminal will not obstruct movements of marine mammals. Pile work at Seattle will occur within 500 ft. of the shoreline leaving 11 km/7 miles of Puget Sound for marine mammals to pass. Construction barges will be used during the project. The barges will be anchored and/spudded. No dynamic positioning system (DPS) will be used. In a previous concurrence letter for the Vashon Island Dolphin Replacement Project (NMFS 2008b), NMFS stated the following:

> Vessels associated with any project are primarily tug/barges, which are slow moving, follow a predictable course, do not target whales, and should be easily detected by whales when in transit. Vessel strikes are extremely unlikely and any potential encounters with Southern Residents [killer whales] are expected to be sporadic and transitory in nature.

Similarly, vessel strikes are unlikely for the proposed project.

9.6 Conclusions Regarding Impacts on Habitat

The most likely effects on marine mammal habitat from the proposed project are temporary, short duration noise and water quality effects. The direct loss of habitat available to marine mammals during construction due to noise, water quality impacts and construction activity is expected to be minimal. All cetacean species using habitat near the terminal will be transiting the terminal area.

Any adverse effects on prey species during project construction will be short term. Given the large numbers of fish and other prey species in Puget Sound, the short-term nature of effects on fish species and the mitigation measures to protect fish during construction (use of a vibratory hammer when possible, use of a bubble curtain during steel pile impact pile driving, BMPs, conducting work within the approved in-water work window), the Seattle project is not expected to have measurable effects on the distribution or abundance of potential marine mammal prey species.

Passage is not expected to be obstructed as a result of the proposed project. Any temporary obstruction due to barge placement will be localized and limited in duration, and a traveling barge is too slow to strike marine mammals.

10.0 Anticipated Impact of Loss or Modification of Habitat

The anticipated impact of the loss or modification of the habitat on the marine mammal populations involved.

The proposed project will not result in a significant permanent loss or modification of habitat for marine mammals or their food sources. The most likely effects on marine mammal habitat for the proposed project are temporary, short duration in-water noise, temporary prey (fish) disturbance, and localized, temporary water quality effects. The direct loss of habitat available to marine mammals during the project is expected to be minimal. These temporary impacts have been discussed in detail in Section 9.0, Anticipated Impact on Habitat.

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11.0 Mitigation Measures

The availability and feasibility (economic and technological) of equipment, methods, and manner of conducting such activity or other means of effecting the least practicable adverse impact upon the affected species or stocks, their habitat, and on their availability for subsistence uses, paying particular attention to rookeries, mating grounds, and areas of similar significance.

WSF activities are subject to federal, state and local permit regulations. WSF has developed and routinely uses the best guidance available (e.g., BMPs and mitigation measures) to avoid and minimize (to the greatest extent possible) impacts on the environment, ESA species, designated critical habitats and species protected under the MMPA.

The mitigation measures will be employed during all pile driving and removal, and other construction activities during the project. The language in each mitigation measure is included in the Contract Plans and Specifications and must be agreed upon by the contractor prior to any construction activities. Upon signing the contract, it becomes a legal agreement between the Contractor and WSF. Failure to follow the prescribed mitigation measures is a contract violation.

General mitigation measures used for all construction practices are listed first, followed by specific mitigation measures for pile related activities.

11.1 All Construction Activities

WSF performs all construction in accordance with the current WSDOT Standard Specifications for Road, Bridge, and Municipal Construction. Special Provisions contained in preservation and repair contracts are developed accordingly to address project specific site conditions, and by permitted work methods, and materials, and are used in coordination with the Standard Specifications. Mitigation measures include:

All construction equipment will comply with applicable equipment noise standards of the U.S. Environmental Protection Agency.

AWSF inspector will be on site during construction. The role of the inspector is to ensure contract compliance. The inspector and the contractor will have a copy of the Contract Plans and Specifications on site and will be aware of all requirements. The inspector will have knowledge of the environmental provisions and compliance of the project.

WSF will obtain Hydraulic Project Approval (HPA) from WDFW as appropriate and the contractor will follow the conditions of the HPA. HPA requirements will assumed as part of the contract document.

The contractor shall be responsible for the preparation of a Spill Prevention, Control and Countermeasures (SPCC) plan to be used for the duration of the project:

The SPCC plan is submitted to the Project Engineer prior to the commencement of any construction activities. The contractor maintains a copy of the SPCC plan, along with any updates, at the work site.

The SPCC plan shall identify construction planning elements and recognize potential spill sources at the site. The SPCC plan shall outline BMPs, responsive actions in the event of a spill or release and identify notification and reporting procedures. The SPCC plan shall also outline contractor management elements such as personnel responsibilities, project site security, site inspections and training.

- The SPCC will outline what measures shall be taken by the contractor to prevent the release or spread of hazardous materials, either found on site and encountered during construction but not identified in contract documents, or any hazardous materials that the contractor stores, uses, or generates on the construction site during construction activities. These items include, but are not limited to gasoline, oils and chemicals. Hazardous materials are defined in Revised Code of Washington (RCW) 70.105.010 under "hazardous substance."
- The contractor shall maintain, at the job site, the applicable spill response equipment and material designated in the SPCC plan.
- The contractor shall regularly check fuel hoses, oil drums, oil or fuel transfers valves, fittings, etc. for leaks, and shall maintain and store materials properly to prevent spills.
- No petroleum products, chemicals or other toxic or deleterious materials shall be allowed to enter surface waters.
- WSF will comply with water quality restrictions imposed by the Washington State Department of Ecology (Ecology) (Chapter 173-201A WAC), which specify a mixing zone beyond which water quality standards cannot be exceeded. Compliance with Ecology's standards is intended to ensure that fish and aquatic life are being protected to the extent feasible and practicable.
- Wash water resulting from washdown of equipment or work areas shall be contained for proper disposal, and shall not be discharged into state waters unless authorized through a state discharge permit.
- Equipment that enters the surface water shall be maintained to prevent any visible sheen from petroleum products appearing on the water.
- There shall be no discharge of oil, fuels, or chemicals to surface waters, or onto land where there is a potential for reentry into surface waters.
- No cleaning solvents or chemicals used for tools or equipment cleaning shall be discharged to ground or surface waters.
- The contractor shall regularly check fuel hoses, oil drums, oil or fuel transfer valves, fittings, etc. for leaks, and shall maintain and store materials properly to prevent spills.

11.2 Timing Windows

Timing restrictions are used to avoid in-water work when ESA-listed salmonids are most likely to be present. The combined work window for in-water work for the Seattle Ferry Terminal is July 16 through February 15. Actual construction activities are planned to take place from August 1, 2018 and February 15, 2019.

11.3 Pile Driving BMPs

BMPs to be employed during pile installation include:

- The vibratory hammer method will be used to the extent possible to drive steel piles to minimize noise levels.
- A bubble curtain or other noise attenuation device will be employed during impact installation or proofing of steel piles unless the piles are driven in the dry.
- Creosote-treated timber piling shall be replaced with non-creosote-treated piling.
- The contractor will be required to retrieve any floating debris generated during construction. Any debris in the containment boom will be removed by the end of the work day or when the boom is removed, whichever occurs first. Retrieved debris will be disposed of at an upland disposal site.
- Steel, plastic/steel, concrete, or ACZA-treated wood piling will be used. No creosote-treated timber piling will be used.

11.4 Pile Removal BMPs

The following pile removal mitigation measures are proposed by WSF to reduce impacts on marine mammals to the lowest extent practicable. For WSF's Construction Minimization Measures, see WSF Biological Assessment Reference Section 2.3. Additional BMPs that will be incorporated into the project include:

- The vibratory hammer method will be used to remove timber piles to minimize noise levels.
- Hydraulic water jets will not be used to remove piles.
- Marine mammal monitoring during vibratory pile removal will be implemented (see Section 11.5, Marine Mammal Monitoring).
- The crane operator will be instructed to remove piles slowly to minimize turbidity in the water as well as sediment disturbance.
- The operator will "wake up "the pile to break the bond with surrounding sediment by vibrating the pile slightly prior to removal. Waking up the pile avoids pulling out large blocks of sediment, which could cause the pile to break apart during the removal process, and usually results in little to no sediment attached to the pile during withdrawal.
- Extraction equipment will be kept out of the water, above the water line, to prevent creosote release into the water that could occur if the pile is pinched by extraction equipment below the water line.
- Piling will not be broken off intentionally by twisting, bending, or other deformation, to minimize any potential release of creosote into the water column.
- Treated wood will be contained during and after removal to preclude sediments and contaminated materials from entering the aquatic environment.

- The work surface on the barge deck or pier will include a containment basin for pile and any sediment removed during pulling. The basin will be constructed of durable plastic sheeting with sidewalls supported by hay bales or a support structure to contain all sediment. The containment basin shall be removed and disposed of in accordance with applicable federal and state regulations.
- The work surface shall be cleaned by properly disposing of sediment or other residues along with cut-off piling.
- Upon removal from the substrate, the pile shall be moved immediately from the water into the containment basin. The pile shall not be shaken, hosed-off, stripped or scraped off, left hanging to drip or any other action intended to clean or remove adhering material from the pile.
- Holes left when removing piling will be filled with clean sand or gravel. Sand or gravel used as fill material will be obtained from a commercial source that is free of contaminants.
- During removal of creosote-treated piles, containment booms and absorbent booms (or other oil-absorbent fabric) will be placed around the perimeter of the work area to capture wood debris, oil, and other materials that could inadvertently be released into marine waters. All accumulated debris will be collected daily and disposed of at an approved upland site.
- Removed creosote-treated piles will be disposed of in a manner that precludes their further use. Piles will be cut into manageable lengths (four feet or less) for transport and disposal in an approved upland location that meets the liner and leachate standards contained in the Washington Administrative Code (WAC), Chapter 173-304, Minimum Functional Standards. No reuse of treated wood will occur.
- Water quality will be monitored during pile removal. Work barges and dredged material disposal barges will not be allowed to ground out or rest on the substrate, or be over or within 25 feet of vegetated shallows (except where such vegetation is limited to state-designated noxious weeds).
- Barges will not be anchored over vegetated shallows for more than 24 hours.
- Demolition and construction materials shall not be stored where high tides, wave action, or upland runoff can cause materials to enter surface waters.

11.5 Safety Zone/Zone of Exclusion

WSF will establish Level A exclusion zones for all marine mammals (Table 11-1).

Table 11-1 Exclusion Zones

Pile type, size & pile driving method	Level A Injury zone (m)					Level B ZOI (m)*
	LF cetacean	MF cetacean	HF cetacean	Phocid	Otariid	
Vibratory drive / removal, 24" & 30" steel piles, 8 piles/day, 20 min/pile	96.7	10	143.0	60	10	8,690
Vibratory removal 30" steel pile, 1 pile/day, 20 min/pile	24.2	10	35.7	10	10	8,960
Vibratory drive 36" steel pile, 8 piles/day, 20 min/pile	153.3	13.6	226.6	60	10	8,960
Impact drive (proof) 36" steel pile, 8 piles/day, 200 strikes/pile	887.7	31.6	1,057.4	60	34.6	2,219
Vibratory drive 108" steel pile, 1 pile/day, 120 min/pile	200	17.8	296.2	60	10	8,690
Vibratory remove 14" timber pile, 20 piles/day, 15 min/pile	10	10	11.8	10	10	2,175
Vibratory remove 12" steel pile, 11 piles/day, 20 min/pile	10	10	10	10	10	2,175
Vibratory remove 14" steel H pile, 10 piles/day, 20 min/pile	10	10	10	10	10	2,175

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12.0 Arctic Subsistence Uses, Plan of Cooperation

Where the proposed activity would take place in or near a traditional Arctic subsistence hunting area and/or may affect the availability of a species or stock of marine mammal for Arctic subsistence uses, the applicant must submit either a plan of cooperation or information that identifies what measures have been taken and/or will be taken to minimize any adverse effects on the availability of marine mammals for subsistence uses. A plan must include the following:

(i) A statement that the applicant has notified and provided the affected subsistence community with a draft plan of cooperation;

(ii) A schedule for meeting with the affected subsistence communities to discuss proposed activities and to resolve potential conflicts regarding any aspects of either the operation or the plan of cooperation;

(iii) A description of what measures the applicant has taken an/or will take to ensure that proposed activities will not interfere with subsistence whaling or sealing; and

(iv) What plans the applicant has to continue to meet with the affected communities, both prior to and while conducting activity, to resolve conflicts and to notify the communities of any changes in the operation.

This section is not applicable. The proposed activities will take place in Washington State, specifically in Puget Sound. No activities will take place in or near a traditional Arctic subsistence hunting area.

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13.0 Monitoring and Reporting Plan

The suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species, the level of taking or impacts on populations of marine mammals that are expected to be present while conducting activities and suggested means of minimizing burdens by coordinating such reporting requirements with other schemes already applicable to persons conducting such activity. Monitoring plans should include a description of the survey techniques that would be used to determine the movement and activity of marine mammals near the activity site(s) including migration and other habitat uses, such as feeding.

13.1 Coordination

WSF will conduct briefings with the construction supervisors and the crew, and marine mammal observer(s) prior to the start of pier removal to discuss marine mammal monitoring protocol and requirement to halt work.

Prior to starting any pile driving or removal activity, the Orca Network and/or Center for Whale Research will be contacted to find out the location of the nearest marine mammal sightings. Daily sightings information can be found on the Orca Network Twitter site (https://twitter.com/orcanetwork), which will be checked several times a day.

The Orca Sightings Network consists of a list of over 600 (and growing) residents, scientists, and government agency personnel in the U.S. and Canada. Sightings are called or emailed into the Orca Network and immediately distributed to other sighting networks including: the Northwest Fisheries Science Center of NOAA Fisheries, the Center for Whale Research, Cascadia Research, the Whale Museum Hotline and the British Columbia Sightings Network.

'Sightings' information collected by the Orca Network includes detection by hydrophone. The SeaSound Remote Sensing Network is a system of interconnected hydrophones installed in the marine environment of Haro Strait (west side of San Juan Island) to study orca communication, in-water noise, bottomfish ecology and local climatic conditions. A hydrophone at the Port Townsend Marine Science Center measures average in-water sound levels and automatically detects unusual sounds. These passive acoustic devices allow researchers to hear when different marine mammals come into the region. This acoustic network, combined with the volunteer (incidental) visual sighting network allows researchers to document presence and location of various marine mammal species.

With this level of coordination in the region of activity, WSF will be able to get real-time information on the presence or absence of whales before starting any pile removal or driving.

13.2 Visual Monitoring

WSF has developed a monitoring plan that will collect sighting data for each marine mammal species observed during pile removal activities. Monitoring for marine mammal presence will take place 30 minutes before, during and 30 minutes after pile removal.

Marine mammal behavior, overall numbers of individuals observed, frequency of observation and the time corresponding to the daily tidal cycle will also be included. Qualified marine mammal observers will be present on site during pile removal. A monitoring plan is provided in Appendix E.

13.3 Reporting Plan

WSF will provide NMFS with a draft monitoring report within 90 days of the conclusion of monitoring. This report will detail the monitoring protocol, summarize the data recorded during monitoring and estimate the number of marine mammals that may have been harassed.

If comments are received from the Regional Administrator on the draft report, a final report will be submitted to NMFS within 30 days thereafter. If no comments are received from NMFS, the draft report will be considered to be the final report.

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14.0 Coordinating Research to Reduce and Evaluate Incidental Take

Suggested means of learning of, encouraging, and coordinating research opportunities, plans, and activities relating to reducing such incidental taking and evaluating its effects.

In-water noise generated by pile removal and driving at the project site is the primary issue of concern relative to local marine mammals. WSF has conducted research on sound propagation from vibratory and impact hammers, and plans on continuing that research to provide data and new technologies for future ferry terminal projects. Impact and vibratory noise will be monitored during the project, in order to collect further data.

As described in Section 13, WSF will coordinate with local marine mammal sighting networks (Orca Network and/or the Center for Whale Research) to gather information on the location of whales prior to initiating pile removal. Marine mammal monitoring will be conducted using ArcGIS Survey123 to collect information on presence of marine mammals within the ZOIs for this project. Marine mammal sightings will be shared with Orca Network and The Whale Museum.

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Appendix A

Seattle Test Pile Project Report

Appendix B

Seattle Test Pile Vibratory Pile Monitoring Technical Memo

Appendix C

The Whale Museum

Marine Mammal Sightings Report for Puget Sound and the Seattle Trestle Project Zones of Influence

Appendix D
Seattle Multimodal Project
Marine Mammal Monitoring Plan

Appendix E
Project Sheets