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

Mukilteo Multimodal Project Phase 2
Washington State Department of Transportation
Ferries Division

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Submitted To:

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Note: Thanks to Jim Laughlin of WSDOT for providing pile driving data, and Shane Guan of NMFS for analyzing the data to provide site specific threshold zones for this project.

Cover: Gray Whale off Gedney Island (April 2015) (Steve Smith)

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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
FR	Federal Register
HPA	Hydraulic Project Approval
Hz	hertz
IHA	Incidental Harassment Authorization
IWC	International Whaling Commission
kHz	kilohertz
kJ	kilojoules(s)
km	kilometer(s)
m	meters
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 Fisheries	National Oceanic Atmospheric Administration/National Marine Fisheries Service
NTU	nephelometric turbidity units
OHW	ordinary high water
PBR	Potential Biological Removal

PSAMP	Puget Sound Ambient Monitoring Program
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
TL	Transmission Loss
TTS	Temporary Threshold Shift
µPa	micro-Pascals
UHMW	Ultra High Molecular Weight
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 (U.S.), operating 28 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 relocation of the Mukilteo Ferry Terminal, and is the subject of this Incidental Harassment Authorization (IHA) request. The proposed project will occur in marine waters that support several 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 and would not adversely affect subsistence use of these animals.

The project's timing and duration and specific types of activities (such as pile driving) may result in the incidental taking by acoustical harassment (Level B take) of marine mammals protected under the MMPA. WSDOT/WSF is requesting an IHA for nine marine mammal species (harbor seal, Elephant seal, California sea lion, Steller sea lion, southern resident killer whale, transient killer whale, harbor porpoise, Dall's porpoise, gray whale, humpback whale) that may occur in the vicinity of the project.

1.2 Project Purpose and Need

The WSDOT/WSF and the Federal Transit Administration (FTA) are proposing the Mukilteo Multimodal Project to improve the operations and facilities serving the mainland terminus of the Mukilteo-Clinton ferry route in Washington State. The ferry route is part of State Route (SR) 525, the major transportation corridor crossing Possession Sound, the portion of Puget Sound that separates Island County (Whidbey Island) from the central Puget Sound mainland. In 2011, the Mukilteo-Clinton route was WSF's busiest route for vehicle traffic and had the third highest total annual ridership, serving almost four million total riders.

The purpose of the Mukilteo Multimodal Project is to provide safe, reliable, and effective service and connection for general-purpose transportation, transit, high occupancy vehicles (HOV), pedestrians, and bicyclists traveling between Island County and the Seattle/Everett metropolitan area and beyond. The Mukilteo Ferry Terminal has not had significant improvements for almost 30 years and needs key repairs. The existing facility is deficient in a number of aspects, such as safety, multimodal connectivity, capacity, and the ability to support the goals of local and regional long-range transportation and comprehensive plans. The project is intended to:

- Reduce conflicts, congestion, and safety concerns for pedestrians, bicyclists, and motorists by improving local traffic and safety at the terminal and the surrounding area that serves these transportation needs.
- Provide a terminal and supporting facilities with the infrastructure and operating characteristics needed to improve the safety, security, quality, reliability, efficiency, and effectiveness of multimodal transportation.
- Accommodate future demand projected for transit, HOV, pedestrian, bicycle, and general-purpose traffic.

1.3 Project Setting and Land Use

The Mukilteo Ferry Terminal is located in the City of Mukilteo, Snohomish County, Washington. The terminal is located in Township 28 North, Range 4 East, Section 3, in Possession Sound. The new terminal would be approximately 1,700 feet (ft.) east of the existing terminal in Township 28N, Range 4E, Section 33 (Figure 1-2). Land use in the Mukilteo area is a mix of residential, commercial, industrial, and open space and/or undeveloped lands.

1.4 Project Description

WSF is proposing to relocate the Mukilteo Ferry Terminal approximately one-third of a mile east of the existing terminal. The Mukilteo terminal has not had significant improvements since the early 1980s and components of the facility are aging and do not meet current seismic standards. The current terminal layout makes it difficult for passengers to get in and out of the terminal and contributes to traffic congestion, safety concerns and conflicts between vehicle and pedestrian traffic. The new terminal will improve operations and multimodal connections and safety.

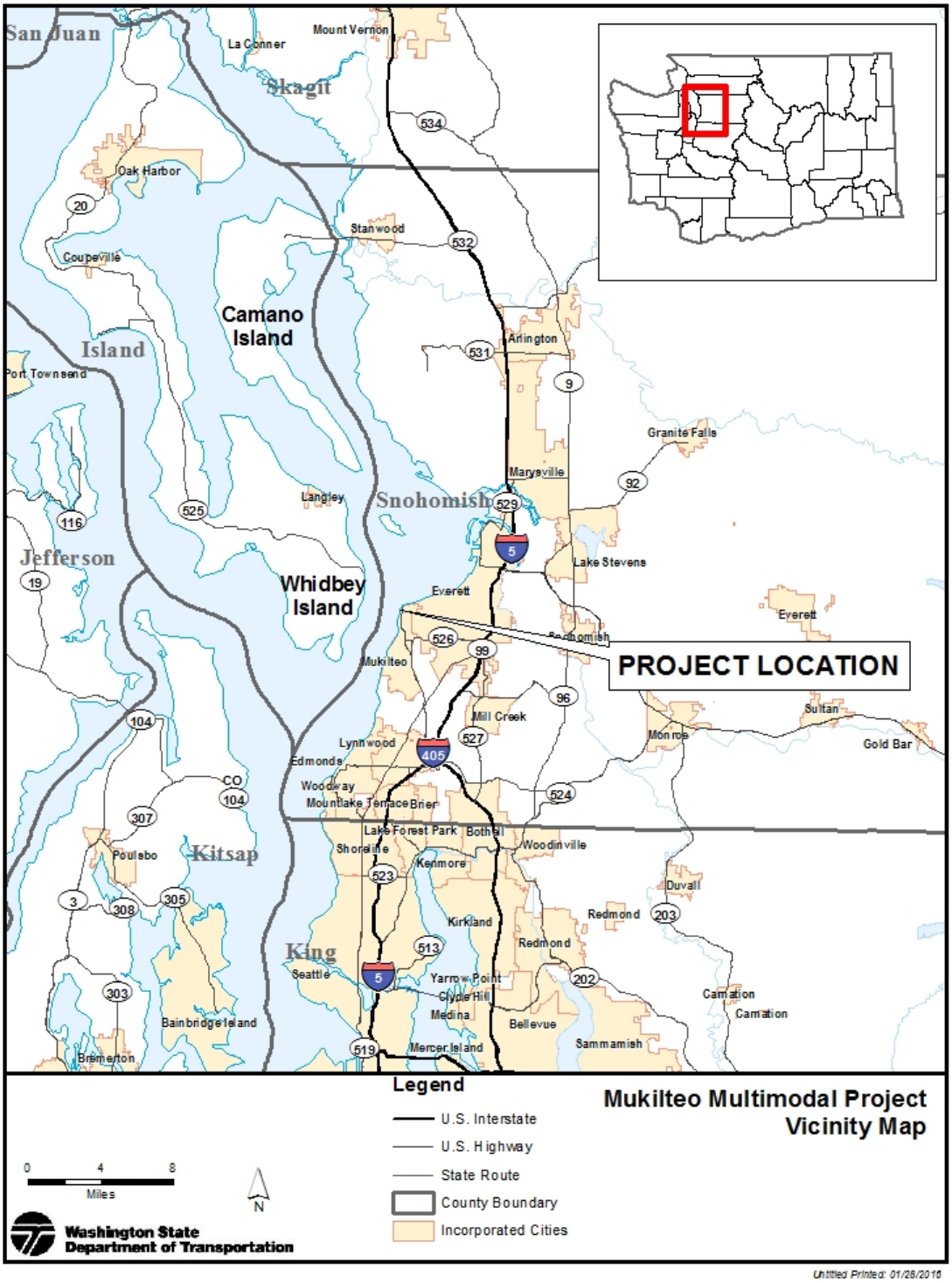

Figure 1-2 Location of Mukilteo Ferry Terminal

During the NEPA Environmental Impact Statement (EIS) 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 July 13, 2014 and USFWS issued a Biological Opinion on July 8, 2013 The FTA issued a Record of Decision (ROD) for the Mukilteo Multimodal Project (project) in August 2014. Project changes resulted in a re-initiation of the ESA consultations, which is currently in process.

After the ROD was issued, WSDOT continued design development of the Selected Alternative and obtained a number of federal, state and local permits based upon the project footprint. In the first phase of construction (Phase 1), the permits allowed WSDOT to demolish the former tank farm pier and dredge a navigation channel in preparation for the new terminal facility while continuing to work on real property administration and construction funding. As engineering studies advanced detailed design development and led to some beneficial changes: refinement of some facility features, changes to structural materials, and improvements to construction techniques and contract phasing.

In February 2016, WSF completed the removal of the former tank farm pier and navigation channel dredging. Phase 2 of the project will begin in summer 2017 and include construction of new passenger and maintenance building, a supervisor's building, four new tollbooths and a new transit center. The new terminal is expected to be open for service in 2019. The existing terminal will be removed after the new terminal is in operation.

1.4.1 Project Details

Project sheets are provided in Appendix A. Note that the sheets show the existing pier demolition and dredging, which has been completed, and the existing Mukilteo ferry terminal (that will be addressed in a future IHA application). A summary of the project in-water pile work details is provided in the Durations section, Table 2-1.

1.5 Pile Driving and Removal Techniques

The proposed project has two elements involving noise production that may affect marine mammals: vibratory hammer driving and removal, and impact hammer driving.

1.5.1 Vibratory Hammer Driving and Removal

Vibratory hammers are commonly used in steel pile driving where sediments allow and involve the same vibratory hammer used in pile removal. The pile is placed into position using a choker and crane, and then vibrated between 1,200 and 2,400 vibrations per minute (Figure 1-3). The vibrations liquefy the sediment surrounding the pile allowing it to penetrate to the required seating depth, or to be removed. The type of vibratory hammer that will be used for the project will likely be an APE 400 King Kong (or equivalent) with a drive force of 361 tons.

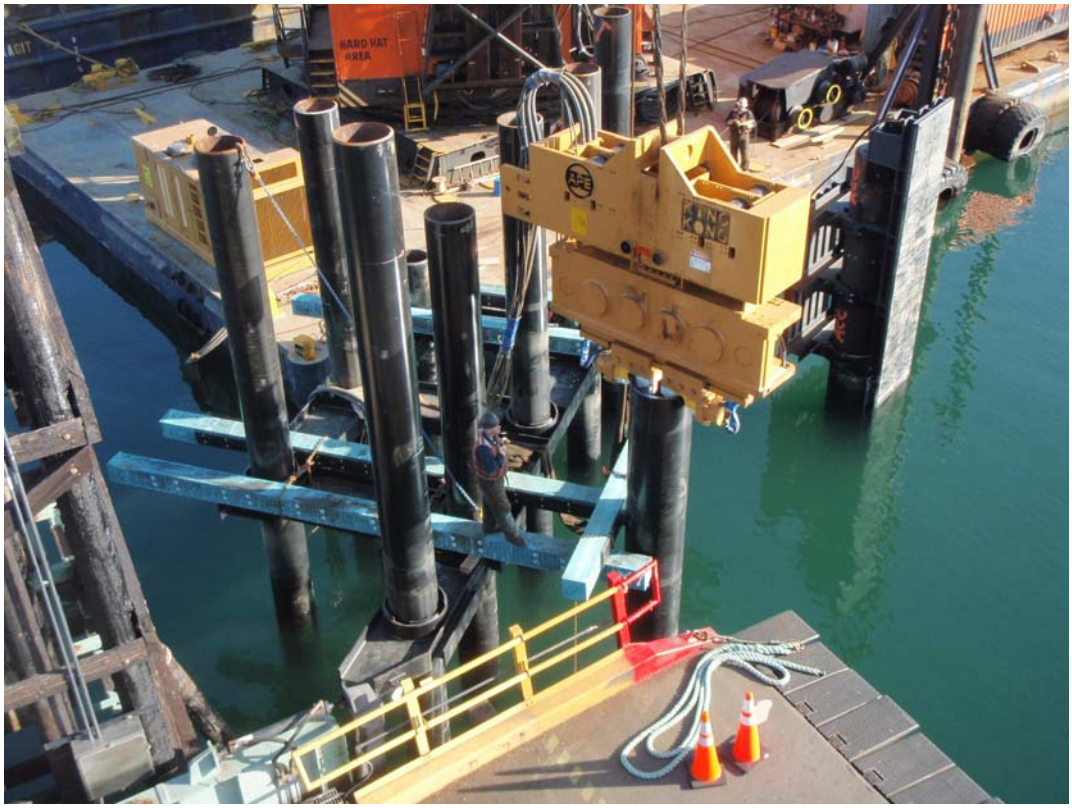

Figure 1-3 Vibratory Hammer Driving a Steel Pile

1.5.2 Impact Hammer Installation

Impact hammers are used to install plastic/steel core, wood, concrete, or steel piles. An impact hammer is a steel device that works like a piston. Impact hammers are usually large, though small impact hammers are used to install small diameter plastic/steel core piles.

Impact hammers have guides (called a lead) that hold the hammer in alignment with the pile while a heavy piston moves up and down, striking the top of the pile, and drives it into the substrate from the downward force of the hammer on the top of the pile.

To drive the pile, the pile is first moved into position and set in the proper location using a choker cable or vibratory hammer. Once the pile is set in place, pile installation with an impact hammer can take less than 15 minutes under good conditions, to over an hour under poor conditions (such as glacial till and bedrock, or exceptionally loose material in which the pile repeatedly moves out of position). Figure 1-4 shows a pile being driven with an impact hammer.

Figure 1-4 Impact Hammer Driving a Steel Pile

1.6 Source Levels

The project includes vibratory pile driving and removal of 24-, 30-, and 36-inch (in) steel piles, vibratory driving of 78- and 120-in steel shaft, vibratory driving of steel H-piles, vibratory driving and removal of steel sheet piles, and impact pile driving and proofing of 24- and 30-in steel piles. Source levels of the above pile driving activities are based on measurements of the same material types and same or similar dimensions of piles measured at Mukilteo or elsewhere:

- The source level for vibratory pile driving and removal of the 24-in steel pile is based on vibratory test pile driving of the same pile at the Friday Harbor (WSDOT, 2010a). The unweighted SPL_{rms} source level at 10 m from the pile is 162 dB re 1 re 1 µPa. We consider that using vibratory pile installation source level as a proxy for vibratory pile removal is conservative.
- The source level for vibratory pile driving and removal of the 30-in steel pile is based on vibratory pile driving of the same 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 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 SPL_{rms} for vibratory pile driving of 36-in steel pile was 177 dB re 1 µPa.
- Source level for vibratory pile driving of the 78- and 120-in steel shaft is based on measurements of 72-in steel piles vibratory driving conducted by CALTRANS. The unweighted SPL_{rms} source level ranged between 170 and 180 dB re 1 µPa at 10 m from the pile (CALTRANS 2012). The value of 180 dB is chosen to be more conservative.
- The source level for vibratory sheet pile driving and removal is based on measurements at the Elliott Bay Seawall Project. The unweighted SPL_{rms} source level is 164 dB re 1 re 1 µPa at 10 m from the pile (Greenbusch, 2015).
- The source level for impact pile driving of the 24-in steel piles are based on impact test pile driving of the same steel pile during the Vashon Acoustic Monitoring by WSDOT (Laughlin, 2015). The unweighted back-calculated source levels at 10 m are 174 dB re 1 μPa^2-s for single strike SEL (SEL_{ss}) and 189 dB re 1 µPa for SPL_{rms}.
- The source level for impact pile driving of the 30-in steel pile are 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 SEL_{ss} and 193 dB re 1 µPa for SPL_{rms}.

A summary of source levels from different pile driving and pile removal activities is provided in Table 4.

Table 1-1 Source Levels

Method	Pile type / size (inch)	SEL (SEL_{ss} for impact pile driving), dB re 1 μPa^2-s	SPL_{rms}, dB re 1 μPa^2
Vibratory driving / removal	Steel, 24-in	162	162
Vibratory driving / removal	Steel, 30-in	174	174
Vibratory driving	Steel, 36-in	177	177
Vibratory driving	Steel shaft, 78-in	180	180
Vibratory driving	Steel shaft, 120-in	180	180
Vibratory driving	Steel H-pile, 12-in	150	150
Vibratory driving / removal	Steel sheet	164	164
Impact driving	Steel, 24-in	174	189
Impact driving	Steel, 30-in	178	193

Under the NMFS' Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Guidance), dual criteria are used to assess marine mammal auditory injury (Level A harassment) as a result of noise exposure (NMFS 2016). The dual criteria under the Guidance provide onset thresholds in instantaneous peak SPLs (L_{pk}) as well as 24-hr cumulative sound exposure levels (SEL_{cum} or L_E) that could cause PTS to marine mammals of different hearing groups. The peak SPL is the highest positive value of the noise field, log transformed to dB in reference to 1 µPa.

$$L_{pk} = \max\left\{10\log 10\left(\frac{p(t)}{p_{ref}}\right)^2\right\} \quad (1)$$

where $p(t)$ is acoustic pressure in pascal or micropascal, and p_{ref} is reference acoustic pressure equal to 1 µPa.

The cumulative SEL is the total sound exposure over the entire duration of a given day's pile driving activity, specifically, pile driving occurring within a 24-hr period.

$$L_E = 10\log_{10}\left(\int_{t_1}^{t_2}\left(\frac{p(t)}{p_{ref}}\right)^2 dt\right) \quad (2)$$

where $p(t)$ is acoustic pressure in pascal or micropascal, p_{ref} is reference acoustic pressure equals to 1 µPa, t_1 marks the beginning of the time, and t_2 the end of time.

For onset of Level B harassment, NMFS continues to use the root-mean-square (rms) sound pressure level (SPL_{rms}) at 120 dB re 1 µPa and 160 dB re 1 µPa as the received levels from non-impulse (vibratory pile driving and removal) and impulse sources (impact pile driving) underwater, respectively. The SPL_{rms} for pulses (such as those from impact pile driving) should contain 90 percent of the pulse energy, and is calculated by

$$SPL_{rms} = 10\log_{10}\left(\frac{1}{T}\int_{t_1}^{t_2}\left(\frac{p(t)}{p_{ref}}\right)^2 dt\right) \quad (3)$$

where $p(t)$ is acoustic pressure in pascal or micropascal, p_{ref} is reference acoustic pressure equals to 1 µPa, t_1 marks the beginning of the time, and t_2 the end of time. In the case of an impulse noise, t_1 marks the time of 5 percent of the total energy window, and t_2 the time of 95 percent of the total energy window.

Table 1-2 summarizes the current NMFS marine mammal take criteria.

Table 1-2 Current Acoustic Exposure Criteria for Non-explosive Sound Underwater

Hearing Group	PTS Onset Thresholds		Behavioral Thresholds	
	Impulsive	Non-impulsive	Impulsive	Non-impulsive
Low-Frequency (LF) Cetaceans	$L_{pk,flat}$: 219 dB $L_{E,LF,24h}$: 183 dB	$L_{E,LF,24h}$: 199 dB	$L_{rms,flat}$: 160 dB	$L_{rms,flat}$: 120 dB
Mid-Frequency (MF) Cetaceans	$L_{pk,flat}$: 230 dB $L_{E,MF,24h}$: 185 dB	$L_{E,MF,24h}$: 198 dB		
High-Frequency (HF) Cetaceans	$L_{pk,flat}$: 202 dB $L_{E,HF,24h}$: 155 dB	$L_{E,HF,24h}$: 173 dB		
Phocid Pinnipeds (PW Underwater)	$L_{pk,flat}$: 218 dB $L_{E,PW,24h}$: 185 dB	$L_{E,PW,24h}$: 201 dB		
Otariid Pinnipeds (OW Underwater)	$L_{pk,flat}$: 232 dB $L_{E,OW,24h}$: 203 dB	$L_{E,OW,24h}$: 219 dB		

* Dual metric acoustic thresholds for impulsive sounds: Use whichever results in the largest isopleth for calculating PTS onset. If a non-impulsive sound has the potential of exceeding the peak sound pressure level thresholds associated with impulsive sounds, these thresholds should also be considered.

Note: Peak sound pressure (Lpk) has a reference value of 1 µPa, and cumulative sound exposure level (LE) has a reference value of 1µPa2s. In this Table, thresholds are abbreviated to reflect American National Standards Institute standards (ANSI 2013). However, peak sound pressure is defined by ANSI as incorporating frequency weighting, which is not the intent for this Technical Guidance. Hence, the subscript "flat" is being included to indicate peak sound pressure should be flat weighted or unweighted within the generalized hearing range. The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The cumulative sound exposure level thresholds could be exceeded in a multitude of ways (*i.e.*, varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these acoustic thresholds will be exceeded.

1.6.1 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 24-inch steel vibratory pile driving. Based on in-air measurements at the Coupeville Ferry Terminal, vibratory driving of a 30-inch steel pile generated a maximum of 96.9 dB_{RMS} (unweighted) @ 50 ft. (Laughlin 2010b). It is assumed that in-air noise generated during vibratory driving of 24- and 36-inch diameter steel piles, 120-inch diameter drilled steel shaft, steel H-piles, and steel sheet piles will generate the same source level (96.9 dB RMS). It is also assumed that vibratory removal of these piles will generate the same source level.

Based on in-air measurements at the WSF Port Townsend Ferry Terminal, impact pile driving of a 24-inch steel pile generated 110 dB dB_{RMS} (unweighted) @ 50 ft. (Laughlin 2013). It is assumed that in-air noise generated during impact driving of 30-inch diameter steel piles will generate the same source level (110 dB RMS).

1.6.2 Attenuation to NMFS Thresholds

Estimating Injury Zones

Calculation and modeling of applicable ensonified zones are based on source measurements of comparable types and sizes of piles driven by different methods (impact vs. vibratory hammers) as described above. As mentioned earlier, isopleths for injury zones are based on cumulative SEL (L_E) criteria.

For peak SPL (L_{pk}), distances to marine mammal injury thresholds were calculated using a simple geometric spreading model using a transmission loss coefficient of 15:

$$SL_{Measure} = EL + 15\log_{10}\left(R - D_{Measure}\right) \quad (4)$$

where $SL_{Measure}$ is the measured source level in dB re 1 µPa, EL is the specific received level of threshold, $D_{Measure}$ is the distance (m) from the source where measurements were taken, and R is the distance (radius) of the isopleth to the source in meters.

For cumulative SEL (L_E), distances to marine mammal exposure thresholds were computed using spectral modeling that incorporates frequency specific absorption. First, representative pile driving sounds recorded during test pile driving with impact and vibratory hammers were used to generate power spectral densities (PSDs), which describe the distribution of power into frequency components composing that sound, in 1-Hz bins. Parseval's theorem, which states that the sum of the square of a function is equal to the sum of the square of its transform, was applied to ensure that all energies within a strike (for impact pile driving) or a given period of time (for vibratory pile driving) were captured through the fast Fourier transform, an algorithm that converts the signal from its original domain (in this case, time series) to a representation in frequency domain. For impact pile driving, broadband PSDs were generated from SPL_{rms} time series with a time window that contains 90 percent of each pulse energy. For vibratory pile driving, broadband PSDs were generated from a series of continuous 1-second SEL. Broadband PSDs were then adjusted based on weighting functions of marine mammal hearing groups

(Finneran 2016) by using the weighting function as a band-pass filter. For impact pile driving, cumulative exposures (E_{sum}) were computed by multiplying the single rms pressure squared by rms pulse duration for the specific strike, then by the number of strikes (provided in Table 1) required to drive one pile, then by the number of piles to be driven in a given day, as shown in the equation below:

$$E_{sum} = \sum_{i=1}^{N} p_{rms,i}^2 \tau_i N_s \quad (5)$$

where $p_{rms,i}$ is the rms pressure, τ is the rms pulse duration for the specific strike, N_s is the anticipated number of strikes (provided in Table 1) needed to install one pile, and N is the number of total piles to be installed.

For vibratory pile driving, cumulative exposures were computed by summing 1-second noise exposure by the duration needed to drive on pile (provided in Table 1), then by the number of piles to be driven in a given day, as shown in the equation below:

$$E_{sum} = \sum_{i=1}^{N} E_{1s,i} \Delta t_i \quad (6)$$

where E_{1s} is the 1-second noise exposure, and Δt is the duration (provided in Table 1) need to install 1 pile by vibratory piling.

Frequency-specific transmission losses, $TL(f)$, were then computed using practical spreading along with frequency-specific absorption coefficients that were computed with nominal seawater properties (*i.e.*, salinity = 35 psu, pH = 8.0) at 15ºC at the surface by

$$TL(f) = 15\log_{10}(R) + \alpha(f)R/1000 \quad (7)$$

where $a(f)$ is dB/km, and R is the distance (radius) of the specific isopleth to the source in meters. For broadband sources such as those from pile driving, the transmission loss is the summation of the frequency-specific results.

Approach to Estimate Behavioral Zones

As mentioned earlier, isopleths to Level B behavioral zones are based on root-mean-square SPL (SPL_{rms}) that are specific for impulse (impact pile driving) and non-impulse (vibratory pile driving) sources. Distances to marine mammal behavior thresholds were calculated using a simple geometric spreading equation as shown in Equation (4).

A summary of the measured and modeled harassment zones is provided in Table 5. The maximum distance is 20,500 m from the source, since this is where landmass intercepts underwater sound propagation.

Table 5. Distances to Harassment Zones.

Pile type, size & pile driving method	Injury zone (m)					Behavior zone (m)
	LF cetacean	MF cetacean	HF cetacean	Phocid	Otariid	
Vibratory removal, 24-in steel pile, 3 piles/day	10	10	55	10	10	6,040
Vibratory driving, 24-in steel pile, 3 piles/day	175	45	995	85	10	6,040
Vibratory removal, 30-in steel pile, 2 piles/day	55	10	345	25	10	20,500*
Vibratory removal, 30-in steel pile, 7 piles/day	125	35	725	55	10	20,500*
Vibratory driving, 30-in steel pile, 3 piles/day	175	45	995	85	10	20,500*
Vibratory driving, 36-in steel pile, 3 piles/day	175	45	995	85	10	20,500*
Vibratory driving, 78-in steel shaft, 1 pile/day	126	11	186	77	5	20,500*
Vibratory driving, 120-in steel shaft, 1 pile/day	126	11	186	77	5	20,500*
Vibratory driving, steel 12-in H-pile, 10 piles/day	4	1	6	2	0	1,000
Vibratory driving, steel sheet, 3 piles/day	14	1	21	9	1	8,577
Vibratory removal, steel sheet, 6 piles/day	23	2	33	14	1	8,577
Impact proofing, 24-in steel pile, 3 piles/day	135	10	75	35	10	875
Impact driving, 30-in steel pile, 3 piles/day	1,065	10	505	225	10	1,585
Impact proofing, 30-in steel pile, 5 piles/day	355	10	175	75	10	1,585

* Landmass intercepts at a distance of 20,500m from project area.

1.6.2.1 In-Water Noise Measurements During Construction

During in-water project construction, in-water noise measurements of vibratory pile removal and impact driving will be taken to determine if the ZOEs/ZOIs need to be modified. If the ZOEs/ZOIs are modified, the marine mammal monitoring program will be adjusted to ensure that injury is prevented, and harassment take is adequately monitored. This could result in either a larger or a smaller monitoring effort, as appropriate.

1.6.2.2 Safety Zone/Zone of Exclusion

The purpose of the safety zone/Zone of Exclusion (ZOE) is to ensure that noise-generating activities are shut down before Level A (injury) take occurs from cetaceans entering a 180 dB ZOI or a pinniped entering a 190 dB ZOI while impact pile driving is active.

During impact hammering of 30-inch diameter steel piles, Level A take (for cetaceans) can occur out to 160 m/525 ft. (the distance to the 180 dB isopleth). During impact hammering of 30-inch steel piles, a 160 m/525 ft. radius safety zone/ZOE will be fully monitored and impact hammering will shut down at the approach of any marine mammal to this zone (see Section 11.2.4, Marine Mammal Monitoring). The ZOE associated with impact hammering of 24-inchdiameter steel piles with likewise be monitored. There is no Level A take during vibratory hammering, because source energy levels do not exceed the 180 dB cetacean or the 190 dB pinniped injury thresholds.

1.6.2.3 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).

The project includes vibratory driving/removal of 24-inch diameter steel piles and steel sheet piles. The project also includes vibratory driving of 30- and 36-inch diameter steel piles, a 120-inch diameter drilled steel shaft, and steel H-piles. Impact pile driving of 24- and 30-inch diameter steel piles will also be conducted.

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, H-piles, and sheet piles (96.9 dB at 50 feet) will reach the harbor seal threshold at approximately 34 m/111 ft., and is below the other pinnipeds threshold.
- 24-inch and 30-inch diameter steel pile impact driving (110 dBRMS at 50 feet) will reach the harbor seal threshold at approximately 152 m/500 ft., and the other pinnipeds threshold at approximately 48 m/158 ft.

The nearest documented harbor seal haul-out site to the Mukilteo Ferry Terminal is 5.0 miles north at the entrance to the Gedney Island Marina (Figure 3-2). The closest documented California sea lion haul out sites to the Mukilteo Ferry Terminal are 3.5 miles northeast on the Everett Harbor buoys (Figure 3-2). The number of California sea lions using the buoys is less than 20 (WDFW 2000).

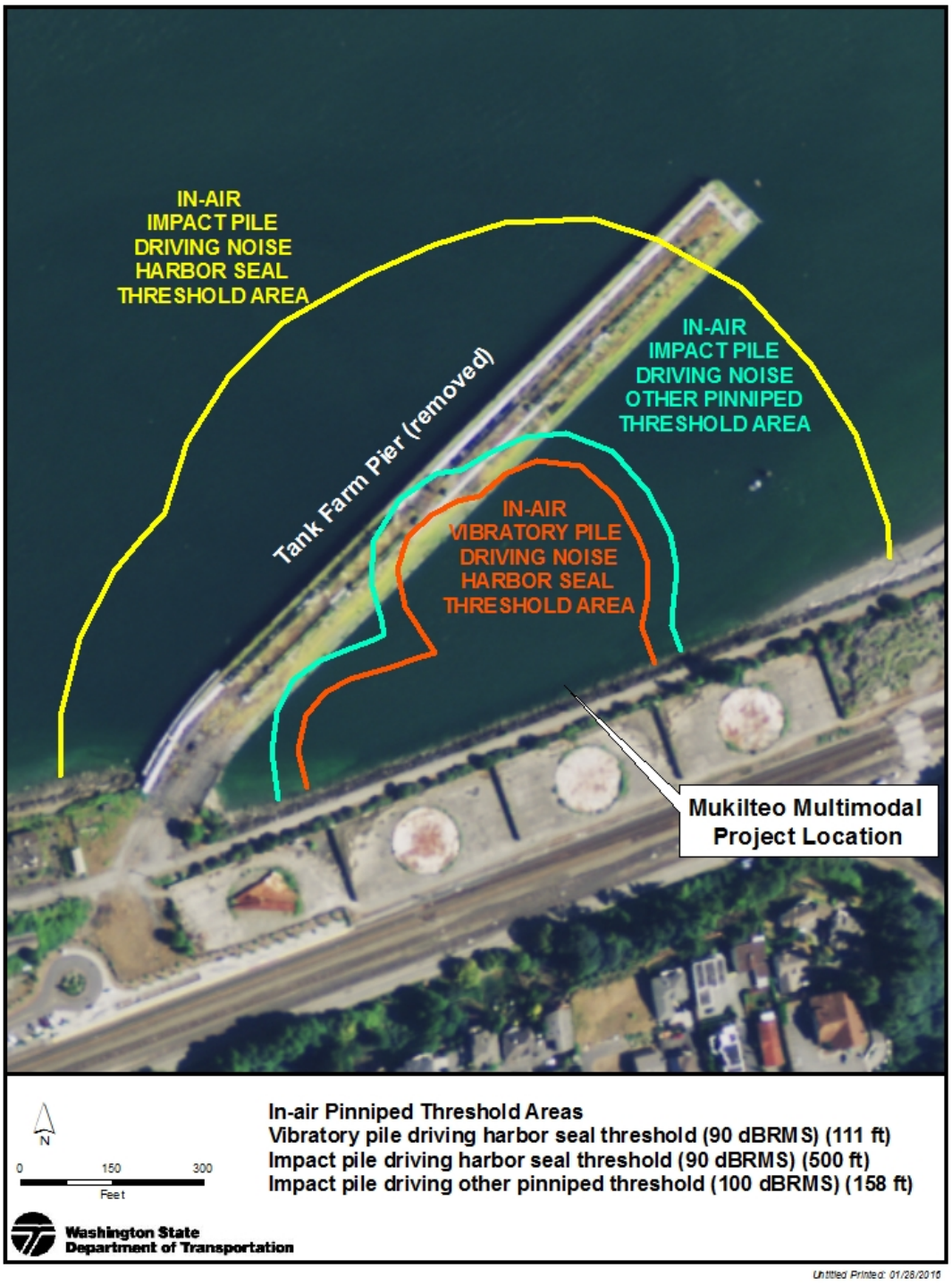

Figure 1-5 In-air construction noise threshold areas for pinnipeds

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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, 2017 and February 15, 2018.

2.2 Duration

- Vibratory driving of 24-inch temporary steel pile and steel piles for a public fishing pier. Installation of each pile will take approximately 60 minutes, 3 piles installed per day, with 117 piles installed over 39 days.
- Vibratory removal of 69 temporary 24-inch diameter steel piles. This will take approximately 15 minutes per pile, with 3 piles removed per day over 23 days.
- Vibratory driving of 40 30-inch steel piles. This will take approximately 60 minutes per pile, with 3 piles installed per day over 14 days.
- Vibratory removal of 2 30-inch test steel piles. This will take approximately 15 minutes per pile, with both piles removed in 1 day.
- Vibratory removal of 7 30-inch inner dolphin steel piles. This will take approximately 15 minutes per pile, with all 7 piles removed in 1 day.
- Vibratory driving of 6 36-inch steel piles. This will take approximately 60 minutes per pile, with 3 piles installed per day over 2 days.
- Vibratory driving of 2 78-inch diameter drilled steel shafts. This will take approximately 60 minutes to install in one day.
- Vibratory driving of a 120-inch diameter drilled steel shaft. This will take approximately 60 minutes to install in one day.
- Vibratory driving of 139 steel H-piles. This will take approximately 30 minutes per pile, with 10 piles installed per day over 14 days.
- Vibratory driving of 90 temporary steel sheet piles. This will take approximately 30 minutes per pile, with 3 sheet piles installed per day over 30 days.
- Vibratory removal of 90 temporary steel sheet piles. This will take approximately 15 minutes per pile, with 6 piles removed per day over 15 days.
- Impact driving (proofing; 300 strikes per pile) of 68 temporary 24-inch diameter steel piles. This will take approximately 15 minutes per pile, with 3 piles installed per day over 23 days.

- Impact driving (proofing; 300 strikes per pile) of 5 30-inch diameter steel piles. This will take approximately 15 minutes per pile, with all 5 piles installed in 1 day.
- Impact driving with 3000 strikes per pile of 25 30-inch diameter steel piles. This will take approximately 15 minutes per pile, with 3 piles installed per day over 9 days.

Figure 2-1 Pile Durations

Method	Pile type	Pile size (inch)	Pile number	Duration (min./sec.) per pile (vibratory) or Strikes per pile (impact)	Duration (days)
Vibratory driving	Steel	24	117	60/3600	39
Vibratory removal	Steel	24	69	15/900	23
Vibratory driving	Steel	30	40	60/3600	14
Vibratory removal	Steel	30	2	30/1800	1
Vibratory removal	Steel	30	7	15/1800	1
Vibratory driving	Steel	36	6	60/3600	2
Vibratory driving	Steel shaft	78	2	60/3600	2
Vibratory driving	Steel shaft	120	1	60/3600	1
Vibratory driving	Steel H-pile	12	139	30/1800	14
Vibratory driving	Steel sheet	-	90	30/1800	30
Vibratory removal	Steel sheet	-	90	15/900	15
Impact proofing	Steel	24	68	300	23
Impact driving	Steel	30	25	3000	9
Impact proofing	Steel	30	5	300	1
Total					175

2.3 Region of Activity

The proposed activities will occur at the Mukilteo Ferry Terminal located in the City of Mukilteo, 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

Nine species of marine mammals may be found in the Mukilteo 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
California Sea Lion	Not listed	Non-depleted	August-April	Common
Steller Sea Lion	Delisted	Strategic/Depleted	August-April	Common
Northern Elephant Seal	Unlisted	Non-depleted	Year-round	Rare
Killer Whale Southern Resident	Endangered	Depleted	September - May	Infrequent
Killer Whale Transient	Not listed	Depleted	Year-round	Infrequent
Gray Whale	Delisted	Unclassified	January-May	Occasional
Humpback Whale	Endangered	Depleted	September-May	Occasional
Harbor Porpoise	Not listed	Non-depleted	May-June peak	Occasional
Dall's Porpoise	Not listed	Non-depleted	October-February	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). WSF requested that TWM analyze sightings data for the project area for the years 2010 to 2015, in the August to February timeframe scheduled for this project (Appendix C).

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 Mukilteo area, including the quadrants of interest for the project. The Zone of Influence (ZOI; in red) intersects with six quadrants: 381-386.

As sightings are opportunistic and SRKW can travel large distances in a day (approximately100 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 is 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 single quadrants. TWM included waters directly to the north of the quadrants as reports of SRKW travelling through Deception Pass are rare, so the whales most likely would have had to pass through the quadrants of concern to reach the more northerly areas. TWM designated this area as "Island County".

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 Mukilteo ZOI quadrants and the Island County 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 2016).

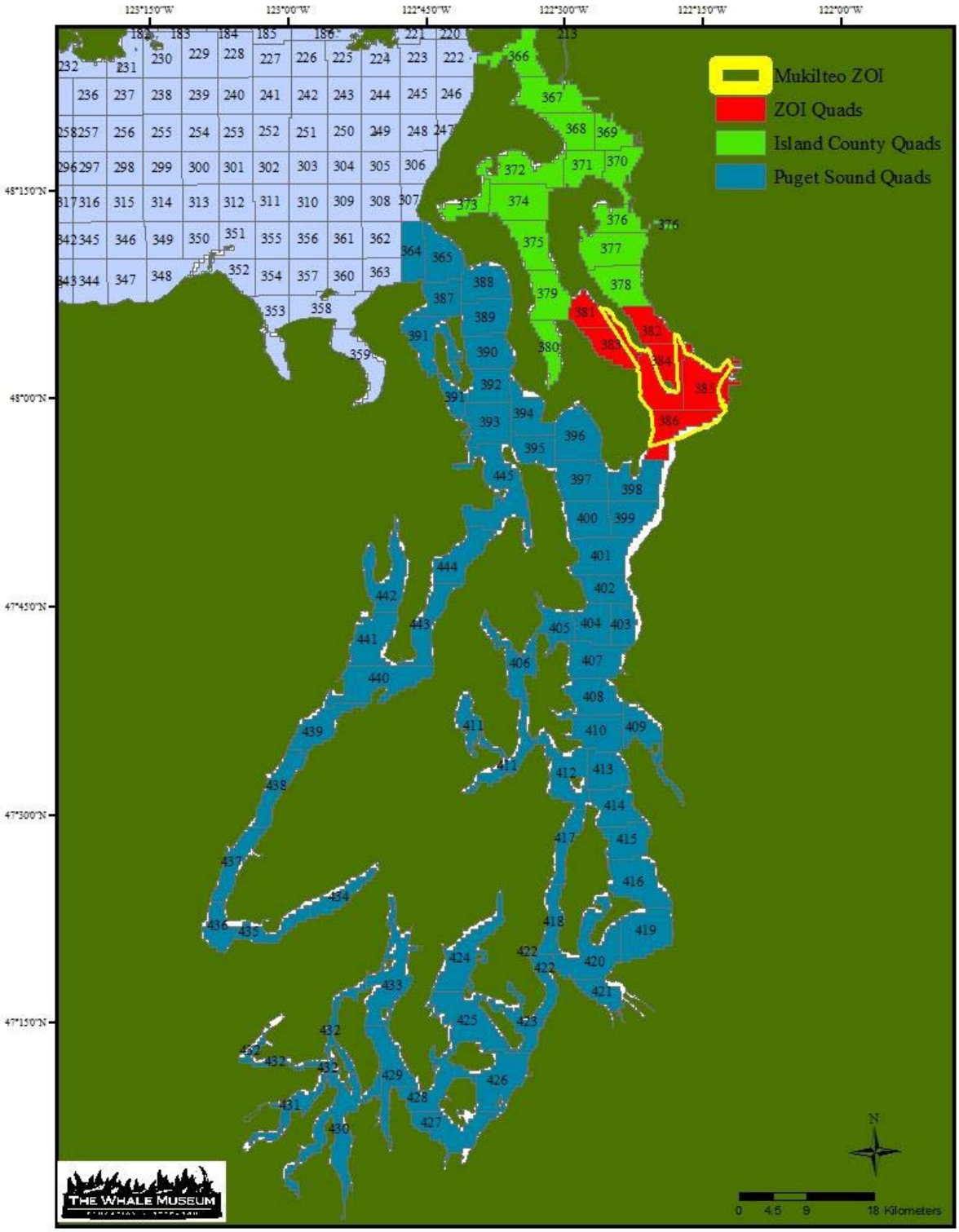

Figure 3-1 ZOI + Area Quads

3.3 Pinnipeds

There are four species of pinnipeds that may be found in the Mukilteo 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 the northern Puget Sound region, pups are born from late June through August (WDFW 2012). 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 1994).

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.

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 haul out sites (Pitcher and Calkins 1979; Pitcher and McAllister 1981). The nearest documented harbor seal haul out site to the Mukilteo ferry terminal is 5.0 miles north at the entrance to the Gedney Island Marina (Figure 3-2). The level of use of this haul out during the fall and winter is unknown, but is expected to be much less, as air temperatures become colder than water temperatures resulting in seals in general hauling out less (H. Huber pers. comm. 2010).

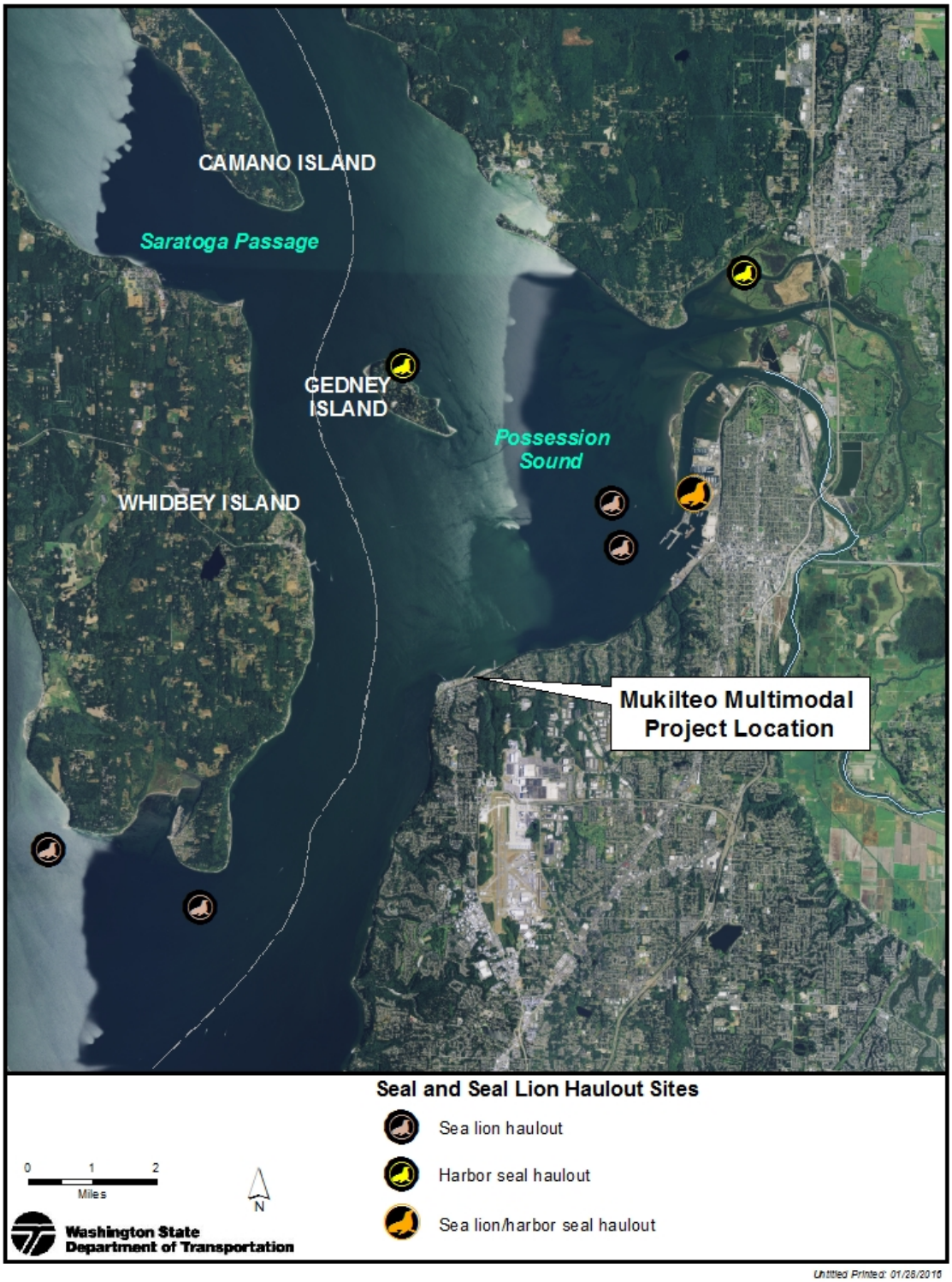

Figure 3-2 Pinniped haulouts in the Mukilteo project vicinity

Project-specific Observations

From August to November 2015, WSF conducted marine mammal monitoring during tank farm pier removal at the Mukilteo Multimodal Project. During 51 days of monitoring, 367 harbor seals were observed within the ZOI, with a one-day high of 26 individuals on October 8, 2015 (Table 3-2).

Table 3-2 Harbor Seal Sightings Days 2010-2015

Source of Sightings	Location	Dates	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Mukilteo Multimodal Project (2015)	Mukilteo ZOI	August-November 2015	8*	11*	26*	20*	-	-	-
U.S. Navy (2016)	Naval Station Everett	2012-2015	41	31	35	20	21	24	21
The Whale Museum (2016)	Mukilteo ZOI and Island County Quadrants	2010-2015	0	0	2	0	1	0	0

*Highest daily number of observations per month

From 2012 to 2015, the U.S. Navy collected sightings data of pinnipeds hauled out or swimming in the vicinity of the log rafts and security fences at Naval Station Everett (located 3.5 miles northeast of the Mukilteo Multimodal Project site). In the August to February timeframe scheduled for this project, the Navy reported a monthly average of 103 harbor seals, with a high single survey count of 379 in September 2013 (U.S. Navy 2016) (Figure 3-3).

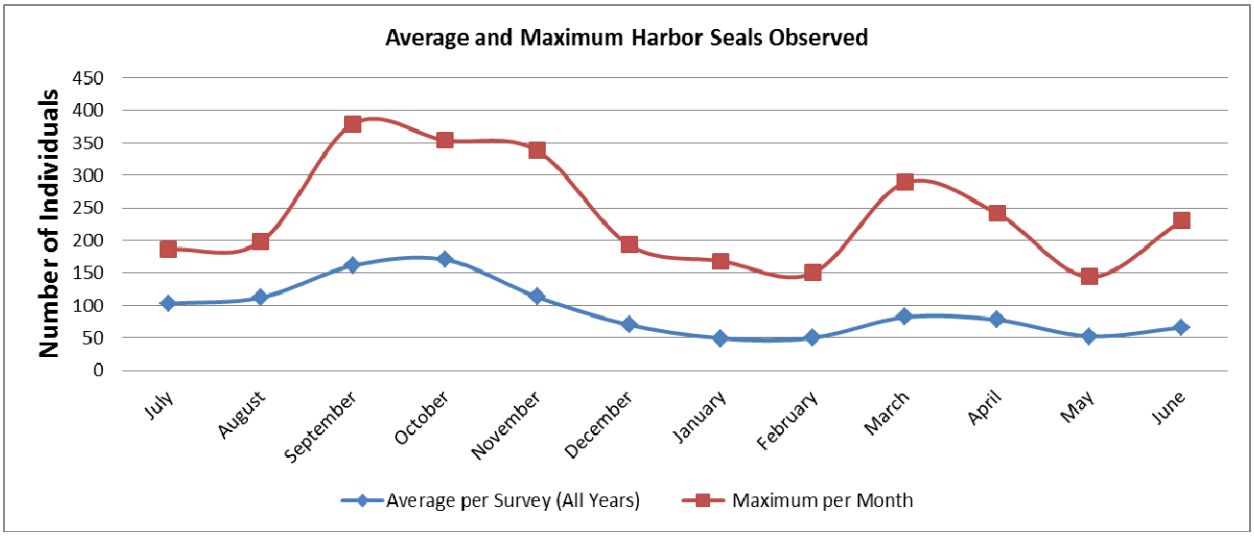

Figure 3-3 Average and maximum harbor seal counts by month at Naval Station Everett 2012-2015 (U.S. Navy 2016)

For the years 2010 to 2015, in the August to February timeframe scheduled for this project, The Whale Museum (2016) reported no sightings of harbor seals in the Mukilteo ZOI quadrants (red) and three sightings days in the Island County quadrants (green) shown in Figure 3-1 (Table 3-2). It should be noted that pinnipeds are not reported at the same rate as large cetaceans, and harbor seals are likely present throughout the year in Puget Sound.

According to the NMFS National Stranding Database, there were several confirmed harbor seal strandings in the Mukilteo and Island County areas between 2010 and 2014, in the August-February work window scheduled for this project (Figure 3-4) (NMFS 2016).

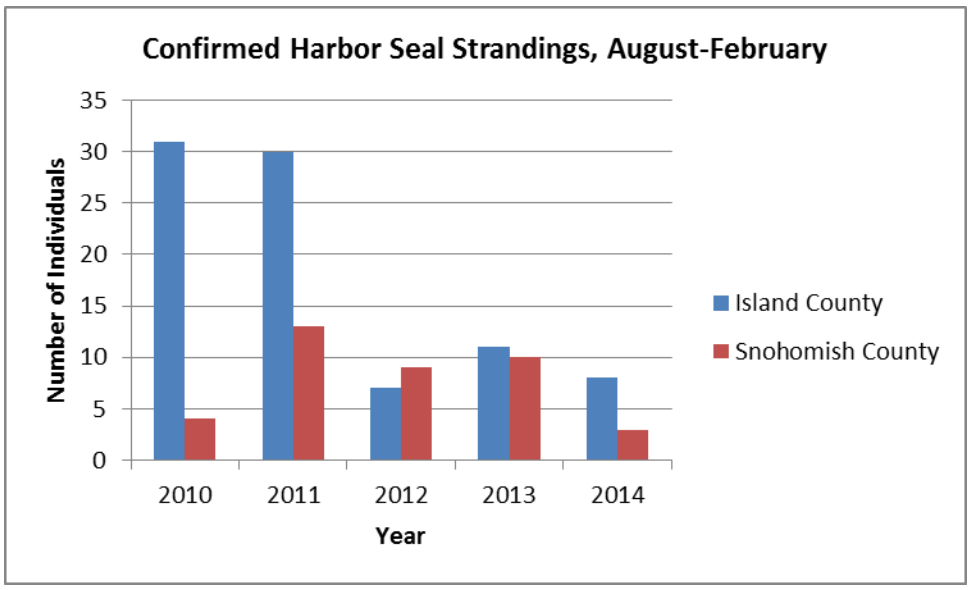

Figure 3-4 Confirmed harbor seal strandings during the August to February work window

The Navy Marine Species Density Database (U.S. Navy 2014) estimates the density of harbor seals in the Mukilteo area as 2.2 animals per square kilometer.

3.3.2 Northern Elephant Seal

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

3.3.2.1 Numbers

The California stock of northern elephant seal minimum population size is estimated very conservatively as 81,368 (NMFS 2015c). 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 2015c) with the maximum pup count of 15, the Salish Sea population could be as large as 66 individuals.

3.3.2.2 Status

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

3.3.2.3 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 2015c).

The closest documented northern elephant seal haul out is Protection Island (30 miles northwest of the ferry terminal).

Elephant seals also use area beaches as haul outs, such as a female elephant seal that has been coming to a south Whidbey beach to rest while molting each spring for several years, and recently gave birth to a pup. Male elephant seals have also been observed in Puget Sound, as far south as Vashon Island (Miller 2015 personal comm. 4/6/15).

Project-specific Observations

From August to November 2015, WSF conducted marine mammal monitoring during tank farm pier removal at the Mukilteo Multimodal Project. During 51 days of monitoring, no northern elephant seals were observed within the ZOI.

For the years 2010 to 2015, in the August to February timeframe scheduled for this project, The Whale Museum (2016) reported zero sightings of northern elephant seals in the Mukilteo ZOI quadrants nor the other areas of Puget Sound. It should be noted that pinnipeds are not reported at the same rate as large cetaceans.

According to the NMFS National Stranding Database, there were two confirmed northern elephant seal strandings in the Mukilteo and Island County areas between 2010 and 2014, in the August-February work window scheduled for this project (NMFS 2016).

The Navy Marine Species Density Database (U.S. Navy 2014) estimates the density of northern elephant seals in the Mukilteo area as 0.00001 animals per square kilometer.

3.3.3 California Sea Lion

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

3.3.3.1 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 2015d). 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).

The nearest documented California sea lion haul out sites to the Mukilteo ferry terminal are 3.5 miles northeast on the Everett Harbor buoys (Figure 3-3). The number of California sea lions using the buoys is less than 20 (WDFW 2000).

3.3.3.2 Status

California sea lions are not listed as endangered or threatened under the ESA or as depleted under the MMPA. They are not considered a strategic stock under the MMPA, because total human-caused mortality, although unknown, is likely to be well less than the PBR (9,200) (NMFS 2015d).

3.3.3.3 Distribution

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

California sea lions were unknown in Puget Sound until approximately 1979 (Steiger and Calambokidis 1986). Everitt et al. (1980) reported the initial occurrence of large numbers at Port Gardner, Everett (northern Puget Sound) in the spring of 1979. The number of California sea lions using the Everett haul out 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 near Seattle and heavily used areas of central Puget Sound (P. Gearin et al. 1986). In Washington, California sea lions use haul out sites within all inland water regions (WDFW 2000). The movement of California sea lions into Puget Sound could be an expansion in range of a growing population (Steiger and Calambokidis 1986).

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

Project-specific Observations

From August to November 2015, WSF conducted marine mammal monitoring during tank farm pier removal at the Mukilteo Multimodal Project. During 51 days of monitoring, 345 California sea lions were observed within the ZOI, with a one-day high of 30 individuals on October 22, 2015 (Table 3-3).

From 2012 to 2015, the U.S. Navy collected sightings data of pinnipeds hauled out or swimming in the vicinity of the log rafts and security fences at Naval Station Everett (located 3.5 miles northeast of the Mukilteo Multimodal Project site). In the August to February timeframe scheduled for this project, the Navy reported a monthly average of 50 California sea lions, with a high single survey count of 132 in October 2014 (U.S. Navy 2016) (Table 3-3; Figure 3-4).

Table 3-3 California Sea Lion Sightings Days 2010-2015

Source of Sightings	Location	Dates	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Mukilteo Multimodal Project (2015)	Mukilteo ZOI	August-November 2015	6*	17*	30*	16*	-	-	-
US Navy (2016)	Naval Station Everett	2012-2015	39	31	35	20	22	25	21
The Whale Museum (2016)	Mukilteo ZOI and Island County Quadrants	2010-2015	0	0	0	1	1	4	3

*Highest daily number of observations per month

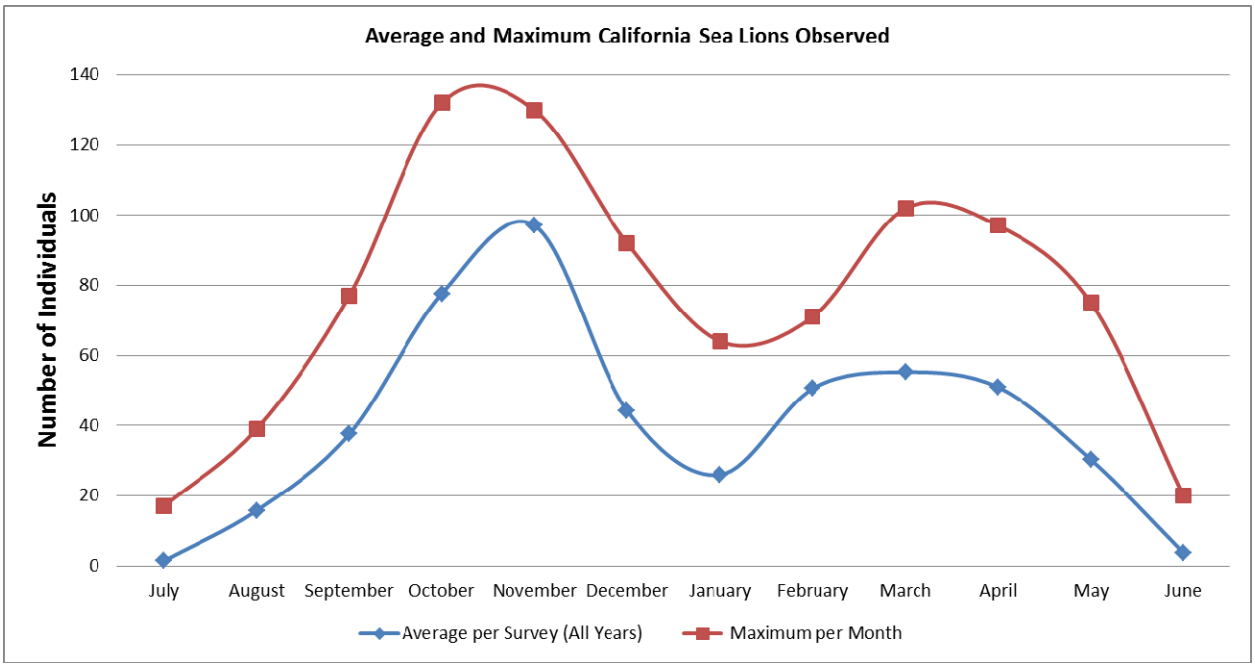

Figure 3-5 Average and maximum California sea lion counts by month at Naval Station Everett, 2012-2015 (U.S. Navy 2016)

For the years 2011 to 2015, in the August to February timeframe scheduled for this project, The Whale Museum reported one sightings day for California sea lions in the Mukilteo ZOI quadrants (red) and eight sightings days in the Island County quadrants (green) shown in Figure 3-1 (TWM 2016) (Table 3-3). It should be noted that pinnipeds are not reported at the same rate as large cetaceans.

According to the NMFS National Stranding Database, there were five confirmed California sea lion strandings in the Mukilteo and Island County areas between 2010 and 2014, during the August-February work window scheduled for this project (NMFS 2016).

The Navy Marine Species Density Database (U.S. Navy 2014) estimates the density of California sea lions in the Mukilteo area as 0.13 animals per square kilometer.

3.3.4 Steller Sea Lion

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

3.3.4.1 Numbers

The eastern U.S. stock of Steller sea lions is estimated to be within the range of 60,131 and 74,448 based on pup counts, and a Washington minimum population estimate of 1,749 (NMFS 2014b). In Washington waters, Steller sea lion abundances vary 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 correspond to the breeding season at Oregon and British Columbia rookeries (approximately late May to early June) and peak during the fall and winter months (WDFW 2000). A few Steller sea lions can be observed year-round in Puget Sound although most of the breeding age animals return to rookeries in the spring and summer (P. Gearin pers. comm. 2008).

3.3.4.2 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).

3.3.4.3 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). Rookeries are usually located on beaches of relatively remote islands, often in areas exposed to wind and waves, where access by humans and other mammalian predators is difficult (WDFW 1993).

For Washington inland waters, Steller sea lion abundances vary seasonally with a minimum estimate of 1,000 to 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 haul out sites has increased in recent years.

Project-specific Observations

From August to November 2015, WSF conducted marine mammal monitoring during tank farm pier removal at the Mukilteo Multimodal Project. During 51 days of monitoring, one Steller sea lion was observed within the ZOI on November 3, 2015 (Table 3-4).

For the years 2011 to 2015, in the August to February timeframe scheduled for this project, The Whale Museum reported no sightings days for Steller sea lions in the Mukilteo ZOI quadrants (red) and three sightings days in the Island County quadrants (green) shown in Figure 3-1 (TWM 2016) (Table 3-4). It should be noted that pinnipeds are not reported at the same rate as large cetaceans.

Table 3-4 Steller Sea Lion Sightings Days 2010-2015

Source of Sightings	Location	Dates	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Mukilteo Multimodal Project (2015)	Mukilteo ZOI	August-November 2015	0	0	0	1	-	-	-
The Whale Museum (2016)	Mukilteo ZOI and Island County Quadrants	2010-2015	1	0	0	1	1	0	0

According to the NMFS National Stranding Database, there was one confirmed northern elephant seal stranding in the Island County area between 2010 and 2014, in the August-February work window scheduled for this project (NMFS 2016).

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

3.4 Cetaceans

Eleven cetacean species may be present in the Mukilteo terminal area; killer whale (Southern Resident and Transient), gray whale, humpback whale, Minke whale, Bryde's whale, common bottlenose dolphin, long-beaked common dolphin, Risso's dolphin, Pacific white-sided dolphin, harbor porpoise and Dall's porpoise.

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 December 31, 2015, the stock collectively numbers 84 individuals (CWR 2016).

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 82, 81 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 (NMFS 2013c). 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).

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 23, 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 (NMFS 2015a).

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 (*Orcinus orca*) 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 1994).

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).

Records from 1976 through 2013 document Southern Residents in the inland waters of Washington during the months of March through June and October through December, with the primary area of occurrence in inland waters north of Admiralty Inlet, located in north Puget Sound (Orca Network 2015b).

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 2014c). 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.

Southern Resident Project-specific Observations

From August to November 2015, WSF conducted marine mammal monitoring during tank farm pier removal at the Mukilteo Multimodal Project. During 51 days of monitoring, no SRKW were observed within the ZOI.

For the years 2010 to 2014, in the August to February timeframe scheduled for this project, The Whale Museum reported 134 whale days for SRKW in the Mukilteo ZOI quadrants (red) and the Island County quadrants (green) shown in Figure 3-1, with a high of 7 whale days in December and February of those years (TWM 2016) (Table 3-6).

Table 3-5 SRKW Whale Days by Year/Project Month

Year	Aug	Sept	Oct	Nov	Dec	Jan	Feb
2010	0	0	0	2	0	0	0
2011	0	0	0	0	2	0	3
2012	0	0	2	2	3	1	0
2013	0	0	2	0	0	2	0
2014	1	0	0	0	2	2	4
Totals	**1**	**0**	**4**	**4**	**7**	**5**	**7**
Average	**0.2**	**0**	**0.8**	**0.8**	**1.4**	**1.0**	**1.4**

TWM 2016

According to the NMFS National Stranding Database, there were no killer whale strandings in the Mukilteo and Island County areas between 2010 and 2014 (NMFS 2016).

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 intermittently year-round in Washington inland waters.

Transient Project-specific Observations

Transient sightings have become more common since mid-2000. Unlike the SRKW pods, Transients may be present in the area for hours as they hunt pinnipeds.

From August to November 2015, WSF conducted marine mammal monitoring during tank farm pier removal at the Mukilteo Multimodal Project. During 51 days of monitoring, 12 transient killer whales were observed: 8 on August 13, and 4 on August 24, 2015 (Table 3-6).

For the years 2010 to 2015, in the August to February timeframe scheduled for this project, The Whale Museum reported 45 sightings days for Transient killer whale in the Mukilteo quadrants (red) and the Island County quadrants (green) shown in Figure 3-1, with a high of 14 sightings days in August of those years (TWM 2016) (Table 3-6).

According to the NMFS National Stranding Database, there were no killer whale strandings in the Mukilteo area in 2010-14 (NMFS 2016).

Table 3-6 Transient Killer Whale Sightings Days 2010-2015

Source of Sightings	Location	Dates	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Mukilteo Multimodal Project (2015)	Mukilteo ZOI	August-November 2015	2	0	0	0	-	-	-
The Whale Museum (2016)	Mukilteo ZOI and Island County Quadrants	2010-2015	14	8	0	0	8	10	5

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 2015e). Within Washington waters, gray whale sightings reported to Cascadia Research and the Whale Museum between 1990 and 1993 totaled over 1,100 (Calambokidis et al. 1994). Abundance estimates calculated for the small regional area between Oregon and southern Vancouver Island, including the San Juan Area and Puget Sound, suggest there were 137 to 153 individual gray whales from 2001 through 2003 (Calambokidis et al. 2004a). Forty-eight individual gray whales were observed in Puget Sound and Hood Canal in 2004 and 2005 (Calambokidis pers. comm. 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, and some are arriving as early as January and staying into July (Orca Network 2015c). During this time frame they are also seen in the Strait of Juan de Fuca, the San Juan Islands, and areas of Puget Sound, although the observations in Puget Sound are highly variable between years (Calambokidis et al. 1994). The average tenure within Washington inland waters is 47 days and the longest stay was 112 days (J. Calambokidis pers. comm. 2007).

Project-specific Observations

From August to November 2015, WSF conducted marine mammal monitoring during tank farm pier removal at the Mukilteo Multimodal Project. During 51 days of monitoring, no gray whales were observed within the ZOI.

For the years 2010 to 2015, in the August to February timeframe scheduled for this project, The Whale Museum reported 68 sightings days for gray whale in the Mukilteo ZOI and Island County quadrants shown in Figure 3-1, with a high of 52 sightings days in December of those years (Table 3-7) (TWM 2016).

Table 3-7 Gray Whale Sightings Days 2010-2015

Source of Sightings	Location	Dates	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Mukilteo Multimodal Project (2015)	Mukilteo ZOI	August-November 2015	0	0	0	0	-	-	-
The Whale Museum (2016)	Mukilteo ZOI and Island County Quadrants	2010-2015	0	0	0	0	0	16	52

According to the NMFS National Stranding Database, there was one confirmed gray whale stranding in the Island County area between 2010 and 2014, in the August-February work window scheduled for this project (NMFS 2016).

The Navy Marine Species Density Database (U.S. Navy 2014) estimates the density of gray whales in the Mukilteo area as a range of 0.000001 to 0.0051 animals per square kilometer.

3.4.3 Humpback Whale

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

3.4.3.1 Numbers

The SAR abundance estimate is 1,918 individuals. The minimum population estimate is 1,918 (NMFS 2014d).

3.4.3.2 Status

The California-Oregon-Washington 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).

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, a commercial hunt for humpbacks in Georgia Strait 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 Central America and Mexico and migrates up the coast from California to southern British Columbia in the summer and fall to feed (NMFS 1991; Marine Mammal Commission 2003; Carretta et al. 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.

Project-specific Observations

From August to November 2015, WSF conducted marine mammal monitoring during tank farm pier removal at the Mukilteo Multimodal Project. During 51 days of monitoring, one humpback whale was observed within the ZOI on November 4, 2015.

For the years 2010 to 2015, in the August to February timeframe scheduled for this project, The Whale Museum reported 12 sightings days for humpback whale in the Mukilteo ZOI quadrants (red) and the Island County quadrants (green) shown in Figure 3-1, with a high of 6 sightings days in August of those years (Table 3-8)(TWM 2016).

Table 3-8 Humpback Whale Sightings Days 2010-2015

Source of Sightings	Location	Dates	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Mukilteo Multimodal Project (2015)	Mukilteo ZOI	August-November 2015	0	0	0	1	-	-	-
The Whale Museum (2016)	Mukilteo ZOI and Island County Quadrants	2010-2015	6	0	4	2	0	0	0

According to the NMFS National Stranding Database, there were no humpback whale strandings in the Mukilteo and Island County areas between 2010 and 2014 (NMFS 2016).

The Navy Marine Species Density Database (U.S. Navy 2014) estimates the density of humpback whales in the Mukilteo area as a range between 0 and 0.00014 animals per square kilometer.

3.4.4 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).

3.4.4.1 Numbers

The Washington Inland Waters Stock mean abundance estimate based on 2002 and 2003 aerial surveys conducted in the Strait of Juan de Fuca, San Juan Islands, Gulf Islands, and Strait of Georgia is 10,682 harbor porpoises (NMFS 2011b). No minimum population estimate is available.

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

3.4.4.2 Status

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

3.4.4.3 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 Mukilteo 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 (Figure 3-6).

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).

Project-specific Observations

From August to November 2015, WSF conducted marine mammal monitoring during tank farm pier removal at the Mukilteo Multimodal Project. During 51 days of monitoring, 7 harbor porpoise were observed within the ZOI, with a one-day high of 3 individuals on November 4, 2015 (Table 3-9).

For the years 2010 to 2015, in the August to February timeframe scheduled for this project, The Whale Museum reported one sightings day for harbor porpoise in the Mukilteo ZOI and Island County quadrants shown in Figure 3-1 (Table 3-9)(TWM 2016). It should be noted that small cetaceans are not reported at the same rate as larger cetaceans.

Table 3-9 Harbor Porpoise Sightings Days 2010-2015

Source of Sightings	Location	Dates	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Mukilteo Multimodal Project (2015)	Mukilteo ZOI	August-November 2015	3	1	0	1	-	-	-
The Whale Museum (2016)	Mukilteo ZOI and Island County Quadrants	2010-2015	0	0	0	0	1	0	0

According to the NMFS National Stranding Database, there were several confirmed harbor porpoise strandings in the Island County area between 2010 and 2014, in the August-February work window scheduled for this project (Figure 3-9) (NMFS 2016).

The Navy Marine Species Density Database (U.S. Navy 2014) estimates the density of harbor porpoises in the Mukilteo area as a range between 0.15 and 2.11 animals per square kilometer.

According to Evenson, et al. (2016), the maximum harbor porpoise density in central Puget Sound (which includes the project ZOIs) is 0.58 animals per square kilometer.

3.4.5 Dall's Porpoise

The California, Oregon, and Washington 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).

3.4.5.1 Numbers

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

3.4.5.2 Status

The California, Oregon, and Washington Stock of Dall's porpoise is "non-depleted" under the MMPA, and "unlisted" under the ESA.

Harbor Porpoise

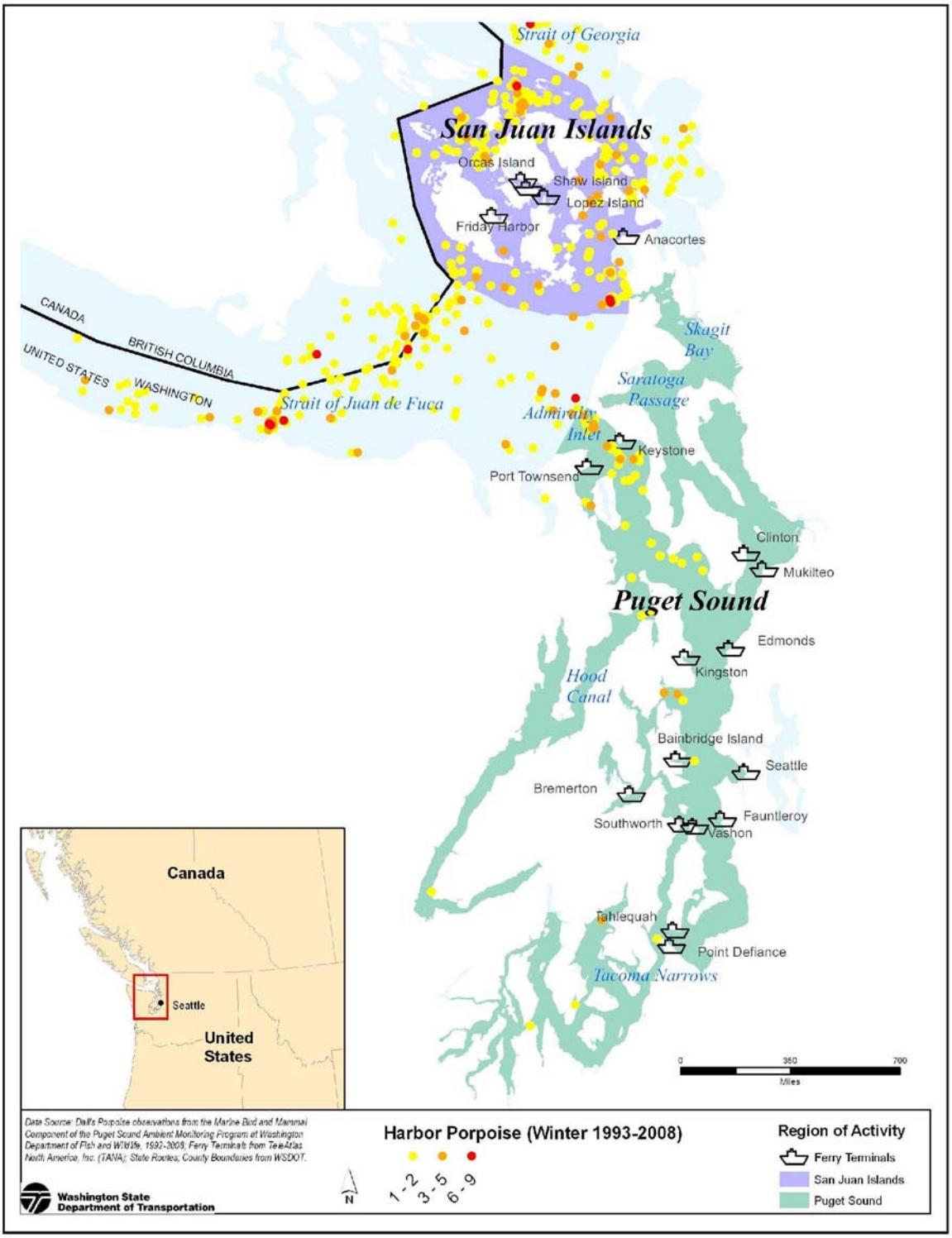

Figure 3-6 Harbor Porpoise Winter Sightings (groups) (WDFW 2008)

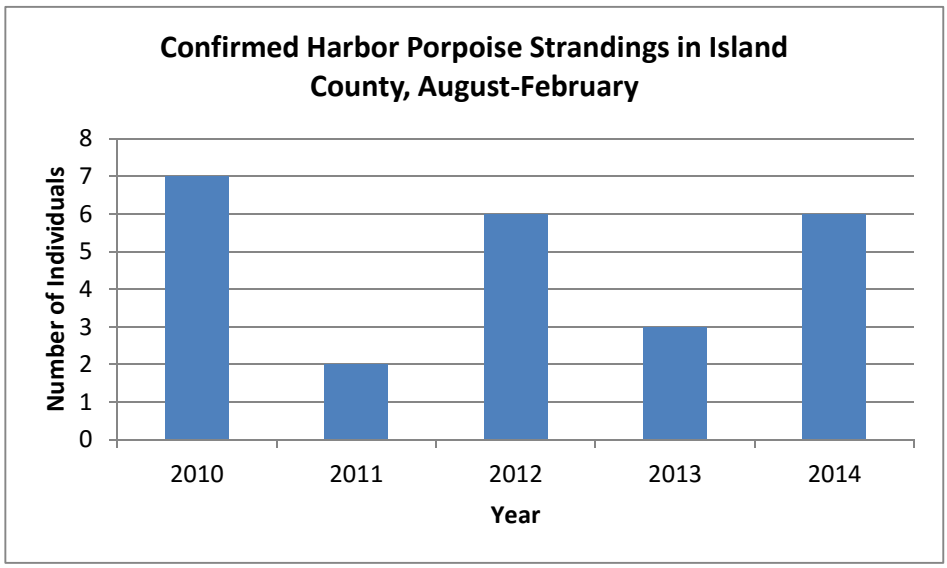

Figure 3-7 Harbor porpoise strandings August-February (NMFS 2016)

3.4.5.3 Distribution

Dall's porpoises are migratory and appear to have predictable seasonal movements driven by changes in oceanographic conditions (Green et al. 1992, 1993), and are most abundant in Puget Sound during the winter (Nysewander et al. 2005; WDFW 2008). Despite their migrations, Dall's porpoises occur in all areas of inland Washington at all times of year (Calambokidis pers. comm. 2006), but with different distributions throughout Puget Sound from winter to summer. The WDFW PSAMP data show peaks in Washington waters to occur during the winter (Figure 3-8). The average winter group size is three animals (WDFW 2008).

Project-specific Observations

From August to November 2015, WSF conducted marine mammal monitoring during tank farm pier removal at the Mukilteo Multimodal Project. During 51 days of monitoring, no Dall's porpoise were observed within the ZOI.

For the years 2010 to 2015, in the August to February timeframe scheduled for this project, The Whale Museum reported four sightings days for Dall's porpoise in the Mukilteo ZOI and Island County quadrants shown in Figure 3-1, with a high of three sightings days in December of those years (Table 3-11)(TWM 2016). It should be noted that small cetaceans are not reported at the same rate as larger cetaceans.

Table 3-10 Dall's Porpoise Sightings Days 2010-2015

Source of Sightings	Location	Dates	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Mukilteo Multimodal Project (2015)	Mukilteo ZOI	August-November 2015	0	0	0	0	-	-	-
The Whale Museum (2016)	Mukilteo ZOI and Island County	2010-2015	0	1	0	0	3	0	0

According to the NMFS National Stranding Database, there were no confirmed Dall's porpoise strandings in the Mukilteo and Island County areas between 2010 and 2014, in the August-February work window scheduled for this project (NMFS 2016).

The Navy Marine Species Density Database (U.S. Navy 2014) estimates the density of Dall's porpoises in the Mukilteo area as a range between 0 and 0.55 animals per square kilometer.

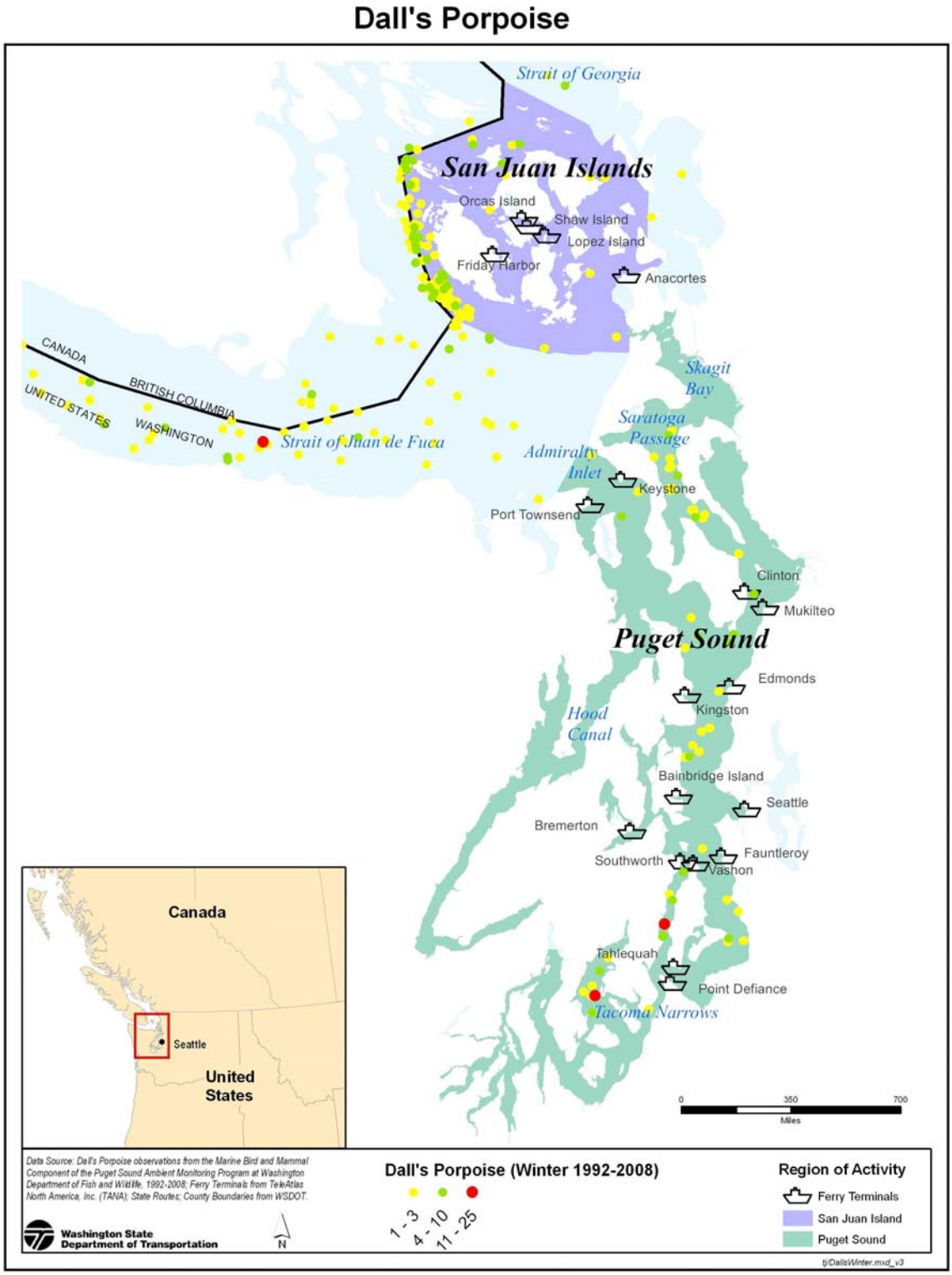

Figure 3-8 Dall's Porpoise Winter Sightings (groups) (WDFW 2008)

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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.

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] (50 C.F.R, Part 216, Subpart A, Section 216.3-Definitions).

Level A is the more severe form of harassment because it may result in injury or death, whereas Level B only results in disturbance *without* the potential for injury. (B. Norberg pers. comm. 2007a).

5.1 Incidental Take Authorization Request

Under Section 101 (a)(5)(D) of the MMPA, WSF requests an IHA from August 1, 2017, and July 31, 2018 for Level B incidental take (behavioral harassment) of the marine mammals described in this application during the terminal construction project at the Mukilteo Ferry Terminal.

The requested authorization is for incidental harassment of any 9 species of marine mammal that might enter the Level A or B harassment zones during pile driving or removal

The scheduled pile-driving and pile-removal activities discussed in this application will occur between August 1, 2017, and February 15, 2018.

5.2 Method of Incidental Taking

The method of incidental take is Level A and B acoustical harassment of any marine mammal occurring within the harassment zones generated during pile driving or removal.

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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 the Mukilteo project. Section 6.2 describes the methods used to calculate the estimated Level A and B 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 the pile driving and removal, this IHA application requests incidental Level A and B take of small numbers of harbor seal, Northern elephant seal, California sea lion, Steller sea lion, southern resident killer whale, transient killer whale, gray whale, humpback whale, harbor porpoise and Dall's porpoise. 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 Mukilteo ZOI with any frequency and could be exposed multiple times during a project.

6.1 Take Requests

Incidental take is estimated for each species by estimating 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.

For all marine mammal species except harbor seals, California sea lions, and northern elephant seals, estimated takes are calculated based on ensonified area for a specific pile driving activity multiplied by the marine mammal density in the action area, multiplied by the number of pile driving (or removal) days. In most cases, marine mammal density data are from the U.S. Navy Marine Species Density Database (Navy 2015). Harbor porpoise density is based on a recent study by Jefferson et al. (2016) for the Eastern Whidbey area near the Mukilteo Ferry Terminal. Take calculations are provided in Appendix D.

Harbor seal, northern elephant seal, and California sea lion takes are based on observations in the Mukilteo area, since these data provide the best information on distribution and presence of these species that are often associated with nearby haulouts.

The Level A take total was further adjusted by subtracting animals expected to occur within the exclusion zones, where pile driving activities are suspended when an animal is observed in or approaching the zone (see Mitigation section). Further, the number of Level B takes was adjusted to exclude those already counted for Level A takes.

6.1.1 Harbor Seal

From August to November 2015, WSF conducted marine mammal monitoring during tank farm pier removal at the Mukilteo Multimodal Project. During 51 days of monitoring, 367 harbor seals were observed, an average of 7 per day (WSDOT 2016). With an estimated 175 days of pile work, this would result in 1,225 takes (7 X 175).

WSF is requesting authorization for Level B acoustical harassment take of 1,225 harbor seals. It is assumed that this number will include multiple harassments of the same individual(s).

Since 9 days would involve impact pile driving of 30-in piles with Level A harassment zones beyond the required shutdown zones (225 m vs 160 m shutdown zone), we consider that 63 harbor seals exposed during these 9 days would experience Level A harassment.

6.1.2 California Sea Lion

From August to November 2015, WSF conducted marine mammal monitoring during tank farm pier removal at the Mukilteo Multimodal Project. During 51 days of monitoring, 345 California sea lions were observed, an average of 7 per day (WSDOT 2016). With an estimated 175 days of pile work, this would result in 1,225 takes (7 X 175).

WSF is requesting authorization for Level B acoustical harassment of 2,363 California sea lions. It is assumed that this number will include multiple harassments of the same individual(s).

Since the Level A harassment zones of otarids are all very small (max. 10 m), it is not likely that any sea lions would be taken by Level A harassment. Therefore, all California sea lion takes estimated here are expected to be by Level B harassment.

6.1.3 California Sea Lion

Northern elephant seal is not common in the Mukilteo Multimodal Project area, however, their presence has been observed in Edmonds area just south of Mukilteo (Orca Network 2017).

Therefore, a potential take of 20 animals by Level B harassment during the project period is requested. Since northern elephant seal is very uncommon in the project area, we do not consider it likely that any elephant seal would be taken by Level A harassment.

WSF is requesting authorization for Level B acoustical harassment of 20 northern elephant seals. It is assumed that this number will include multiple harassments of the same individual(s).

6.1.4 Harbor Porpoise

The method used in take estimates does not account for single individuals being taken multiple times during the entire project period of 175 days. Therefore, the percent of marine mammals that are likely to be taken for a given population would be far less than the ratio of numbers of animals taken divided by the population size.

For harbor porpoise, the estimated incidences of takes at 6,759 animals would be 60.2% of the population, if each single take were a unique individual. However, this is highly unlikely because the results of telemetry and photo-identification studies in Washington waters have demonstrated that harbor porpoise shows site fidelity to small areas for periods of time that can

extend between seasons (Hanson et al. 1999; Hanson 2007a, 2007b). Based on studies by Jefferson et al. (2016), harbor porpoise abundance in the East Whidbey region, which is adjunct to the Mukilteo Ferry Terminal construction, is 497, and harbor porpoise abundance in the entire surrounding area of North Puget Sound is 1,798.

6.1.5 Southern Resident Killer Whale

For Southern Resident killer whales, potential takes based on density calculation showed that 4 animals could be exposed to noise levels for Level B harassment. However, mitigation measures prescribed below will prevent such takes.

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

Table 6-1 Estimated Takes and Stock Percentage

Species	Estimated Level A take	Estimated Level B take	Estimated total take	Stock Abundance	Stock Percentage
Pacific harbor seal	63	1,162	1,225	11,036	11.1%
California sea lion	0	1,225	1,225	296,750	0.41%
Northern elephant seal	0	20	20	179,000	0.01%
Steller sea lion	0	232	232	71,562	0.32%
Killer whale, transient	0	21	21	243	8.64%
Killer whale, Southern Resident	0	0	0	78	0%
Gray whale	0	45	45	20,990	0.21%
Humpback whale	0	6	6	1,918	0.31%
Harbor porpoise	61	6,698	6,759	11,233	60.2%
Dall's porpoise	4	417	421	25,750	1.63%

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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 take authorization 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 assume takes of individual animals, instead of repeated takes of a smaller number; therefore the stock take percentage calculations are very conservative.

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.

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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, but not limited to 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 2007b). 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 2007b). 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 2007b). 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 2007b). 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).

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. 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, and is currently in public comment (NMFS 2015b).

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 project is scheduled to begin September 1, 2017, 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 34 m/111 ft.

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 152 m/500 ft., and within 48 m/158 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 Mukilteo 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

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 2008). Because whale occurrence is occasional near the project site, in-water noise impacts are localized and of short duration, any impact on individual cetaceans and pinnipeds will be limited. Pile removal and driving will expose marine mammals to potential take. The Zones of Exclusion (ZOEs) will be monitored, and work ceased if any marine mammals approaches the ZOEs. Because there are no documented haul outs within the immediate project area, pinniped disturbance will be limited to individuals transiting the project area.

9.4 Water and Sediment Quality

Short-term turbidity is a water quality effect of most in-water work, pile driving. WSF must comply with state water quality standards during these operations by limiting the extent of turbidity to 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 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 Mukilteo 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 Mukilteo Ferry Terminal will not obstruct movements of marine mammals. Pile work at Mukilteo will occur within 500 ft. of the shoreline leaving 2.6 of Puget Sound for marine mammals to pass. A construction barge may be used during the project. The barge 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 Mukilteo Multimodal 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 activities at the Mukilteo ferry terminal. 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 (Section 11.1, All Construction Activities), followed by specific mitigation measures for pile related activities (Section 11.2, Pile Removal and Installation). The mitigation measures listed under Section 11.1 apply to different activities and are, therefore, listed additional times where appropriate.

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 used in conjunction with, and supersede, any conflicting provisions of the Standard Specifications. Mitigation measures include:

- All construction equipment will comply with applicable equipment noise standards of the U.S. Environmental Protection Agency.
- A WSF 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 Mukilteo Ferry Terminal is July 16 through February 15. Actual construction activities are planned to take place from August 1, 2017 and February 15, 2018.

11.3 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 employed for the Level B ZOI (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.

11.4 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.

11.5 Safety Zone/Zone of Exclusion

Before the commencement of in-water construction activities, which include impact pile driving and vibratory pile driving and pile removal, WSDOT shall establish Level A harassment zones where received underwater SPLs or SEL_{cum} could cause PTS (see above).

WSDOT shall also establish Level B harassment zones where received underwater SPLs are higher than 160 dB_{rms} and 120 dB_{rms} re 1 µPa for impulse noise sources (impact pile driving) and non-impulses noise sources (vibratory pile driving and pile removal), respectively.

WSDOT shall establish a maximum 160-m Level A exclusion zone for all marine mammals except low-frequency baleen whales. For Level A harassment zones that are smaller than 160 m from the source, WSDOT shall establish exclusion zones that correspond to the estimated Level A harassment distances, but shall not be less than 10 m. For low-frequency baleen whales, WSDOT shall establish exclusion zones that correspond to the actual Level A harassment distances, but shall not be less than 10 m.

A summary of exclusion zones is provided in Table 7.

Figure 11-1 Exclusion Zones

Pile type, size & pile driving method	Injury zone (m)				
	LF cetacean	MF cetacean	HF cetacean	Phocid	Otariid
Vibratory removal, 24-in steel pile, 3 piles/day	10	10	55	10	10
Vibratory removal, 30-in steel pile, 2 piles/day	55	10	160	25	10
Vibratory removal, 30-in steel pile, 7 piles/day	125	35	160	55	10
Vibratory driving, 24-, 30- & 36-in steel pile, 3 piles/day	175	45	160	85	10
Vibratory driving, 78-, 120-in steel shaft, 1 pile/day	126	11	160	77	10
Vibratory driving, steel 12-in H-pile, 10 piles/day	4	1	6	2	1
Vibratory driving, steel sheet, 3 piles/day	14	1	21	9	1
Vibratory removal, steel sheet, 6 piles/day	23	2	33	14	1
Impact proofing, 24-in steel pile, 3 piles/day	135	10	75	35	10
Impact driving, 30-in steel pile, 3 piles/day	1,065	10	160	160	10
Impact proofing, 30-in steel pile, 5 piles/day	355	10	160	75	10

NMFS-approved protected species observers (PSO) shall conduct an initial survey of the exclusion zones to ensure that no marine mammals are seen within the zones before pile driving or removal of a pile segment begins. If marine mammals are found within the exclusion zone, pile driving of the segment would be delayed until they move out of the area. If a marine mammal is seen above water and then dives below, the contractor would wait 30 minutes. If no marine mammals are seen by the observer in that time it can be assumed that the animal has moved beyond the exclusion zone.

If pile driving of a segment ceases for 30 minutes or more and a marine mammal is sighted within the designated exclusion zone prior to commencement of pile driving, the observer(s) must notify the pile driving operator (or other authorized individual) immediately and continue to monitor the exclusion zone. Operations may not resume until the marine mammal has exited the exclusion zone or 30 minutes have elapsed since the last sighting.

11.6 Soft Start

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

Soft start for impact hammers requires contractors to provide an initial set of three strikes from the impact hammer at 40 percent energy, followed by a 1-minute waiting period, then two subsequent three-strike sets. Each day, WSDOT will use the soft-start technique at the beginning of impact pile driving, or if pile driving has ceased for more than 30 minutes.

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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 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 C.

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 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

Project Sheets

Provided electronically

Appendix B

The Whale Museum Marine Mammal Sightings Report for the Mukilteo Multimodal Project

Provided electronically

Appendix C
Marine Mammal Monitoring Plan
Provided electronically

Appendix D
Mukilteo Take Calculations

Provided electronically