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

Anacortes Tie-up Slips Dolphin and Wingwall Replacement

Washington State Department of Transportation Ferries Division

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Submitted To:

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Cover: Minke whale 'Nick Jagger' photographed May 26, 2013 at Salmon Bank, San Juan Islands. Photo by Jill Hein. NE Pacific Minke Whale Project.

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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
Makah	Makah Indian Tribe
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
PSO	Protected Species Observer
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
USLM	Underwater Sound Level Meter
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 (Figure 1-1) 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 to replace the wingwalls and dolphins in the Tie-up Slip at the Anacortes ferry terminal. 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 Incidental Harassment Authorization (IHA), provided an activity results in negligible impacts to marine mammals and would not adversely affect subsistence use of these animals.

The project's timing, duration pile removal and 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 eleven marine mammal species that may occur in the project area.

1.2 Project Purpose and Need

The purpose of this project at the Anacortes ferry terminal is to replace the aging timber wingwalls and dolphins in Tie-up Slips 3 and 4 with standard steel and concrete designs. This will allow the ferries to safely moor at the terminal and provide the necessary protection of the terminal from the docking of ferries.

1.3 Project Setting and Land Use

The Anacortes ferry terminal, serving State Route 20, is located in the city of Anacortes, on Fidalgo Island, adjacent to Guemes Channel, Skagit County, Washington. Guemes Channel is tributary to the Georgia Basin. The terminal is located in Section 22, Township 35 North, Range 1 East (Figure 1-2). This is the primary terminal for all WSF ferry departures to the San Juan Islands and B.C.'s Vancouver Island. Land use in the area is a mix of residential, business, and local parks.

1.4 Project description

The project will replace the aging timber wingwalls and dolphins in Tie-up Slips 3 and 4 (Figures 1-3, 1-4 and 1-5) with standard steel and concrete designs (see attached Project Sheets). The aging timber facilities are beginning to deteriorate from combined docking operations, salt water infusion and wood rot organisms. The timber piles that will be permanently removed are listed below (Table 1-1).

Table 1-1 Timber piles to be removed

Structure	Number of Piles Removed
Slip 3 Wingwalls	46
Slip 3 Left Dolphin	35
Slip 3 Right Inner	35
Slip 3 Right Outer	51
Slip 4 Wing Dolphins	70
Slip 4 Right Outer	35
Total	**272**

WSF plans to re-use eight existing 36-inch steel piles (remove and relocate) and install 52 new permanent steel piles (24-, 30-, and 36-inch) with a vibratory hammer. In addition, WSF may install one temporary dolphin consisting of one 24-inch steel pile and/or the contractor may elect to temporarily install four 24-inch steel piles at the location of each dolphin and wingwall to be used as a pile driving template for the permanent piles (Table 1-2). These four temporary piles will be removed once the corresponding landing aid is completed, then installed at the location of the next structure, and completely removed at the end of the project. Between one and five temporary piles will be installed at any given time during the project.

Figure 1-2 Anacortes Ferry Terminal

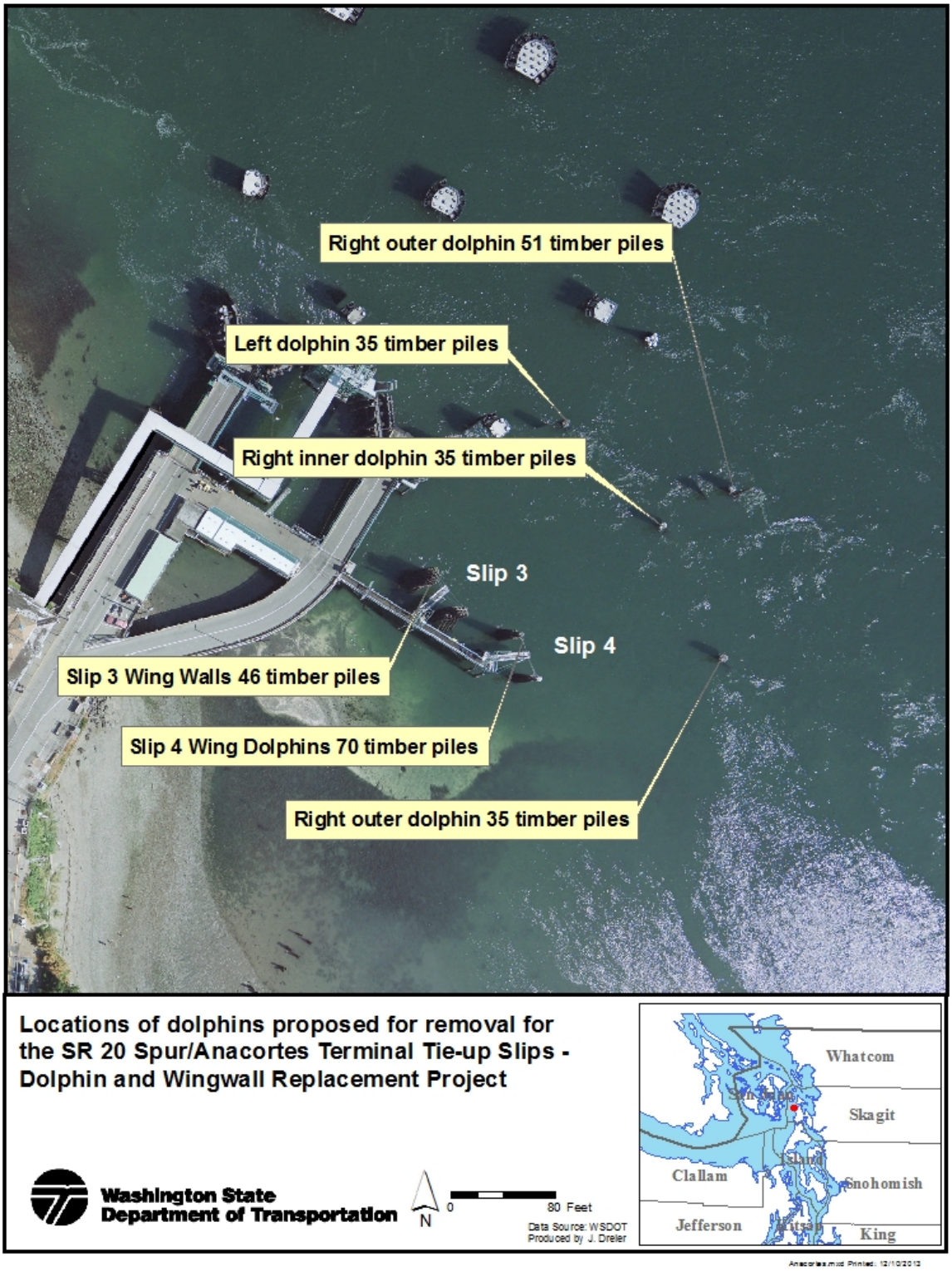

Figure 1-3 Dolphins to be Removed

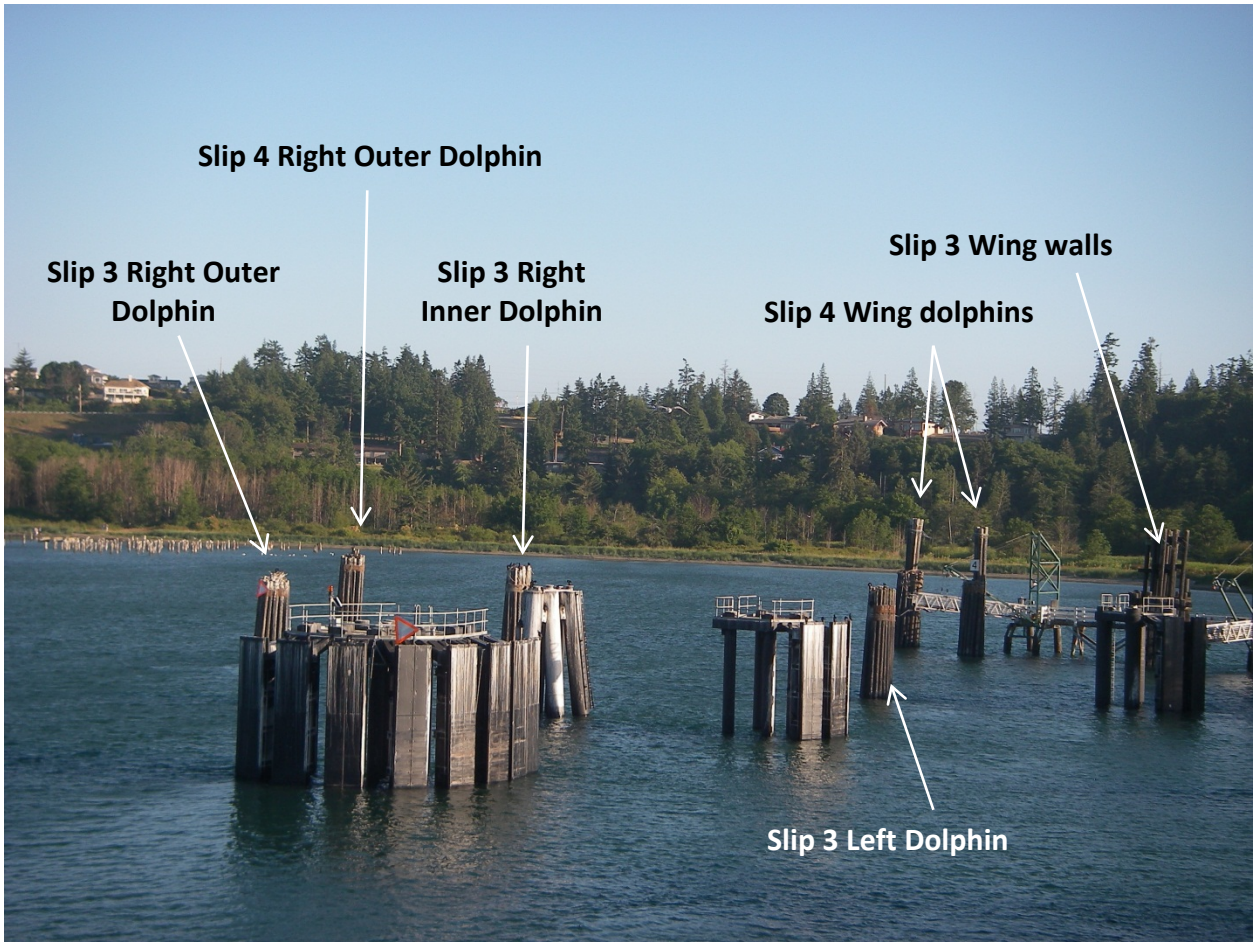

Figure 1-4 Timber Dolphins to be Replaced

Table 1-2 Project Piles to be Installed

Structure Name	Location	Depth (MLLW)	Existing Steel Piles	Temporary Steel Piles*	New Permanent Steel Piles			Total
			36”	24”	36”	30”	24”	
Dolphin 1	Slip 3 left intermediate	-28	-	4	1	4	-	**9**
Dolphin 2	Slip 3 right inner (double sided)	-28	-	4	2	4	-	**10**
Dolphin 3	Slip 3 right outer (double sided)	-30	-	4	10	6	-	**20**
Dolphin 4	Slip 4 right outer	-27	-	4	3	6	-	**13**
Wingwall 1	Slip 3	-28	8	-	-	-	4	**12**
Wingwall 2	Slip 4	-25	-	-	4	-	8	**16**
Temporary Dolphin	Protective Dolphin	-34	-	1	-	-	-	**1**
Total			**8**	**5**[1]	**20**	**20**	**12**	**81**

[1] No more than five temporary piles will be in place at any one time.

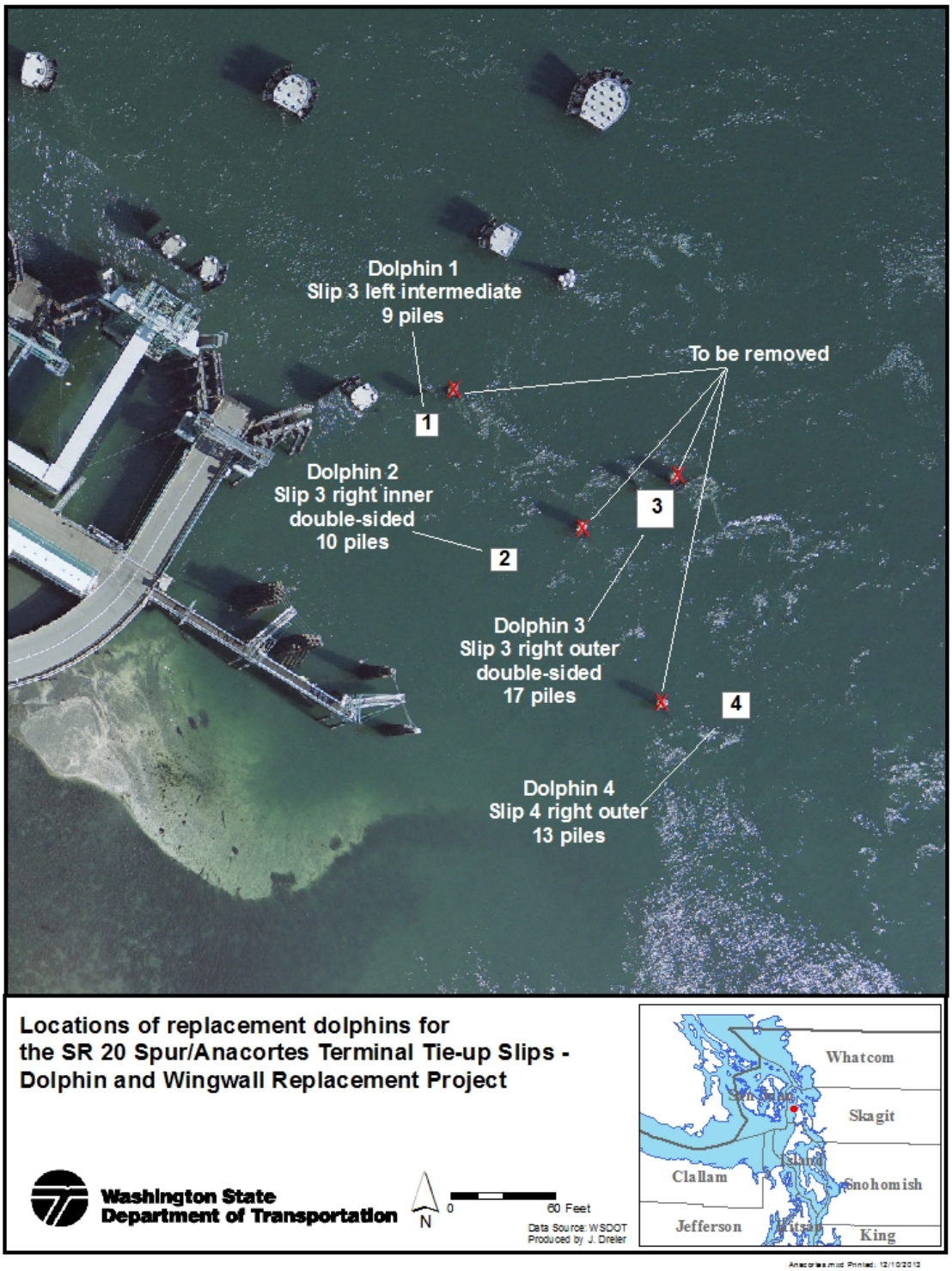

Figure 1-5 Replacement Dolphin Locations

In-water construction is planned to take place between September 2015 and February 2016. The on-site work will last approximately 135 days with pile removal and driving taking place over approximately 36 days. All work will occur in water depths between -25 and -34 feet MLLW.

A vibratory hammer will be used for pile removal and driving. No impact pile driving or proofing is necessary. Existing timber piles may also be removed by direct pull. Pile driving and removal will be conducted from a barge containing a derrick, crane, and other necessary equipment. The barge will be anchored and/or spudded. No barge dynamic positioning system (DPS) will be used on this project.

1.4.1 Construction Sequence

The following construction activities are anticipated:

- Remove three 35-pile dolphins, one 51-pile dolphin, 70 piles associated with wing-dolphins, and 46 piles associated with wingwalls. These piles will be removed with a vibratory hammer or by direct pull and clamshell removal.
- If necessary, vibratory pile-drive one to five 24-inch steel piles for use as a temporary template at each structure location.
- Vibratory pile-drive up to six 30-inch steel piles and up to ten 36-inch steel piles for each new dolphin.
- Place precast concrete diaphragm on new dolphins.
- Attach fender panel to new fender pile.
- Remove temporary piles.
- At Slip 3 wingwalls, vibratory pile-drive up to four 24-inch steel piles (two per wingwall).
- At Slip 4 wingwalls, vibratory pile-drive and up to four 24-inch steel piles (two per wingwall), and eight 36-inch steel piles (four per wingwall).
- Attach rubber fenders between plumb piles.

Approximately 441 tons of creosote-treated timbers will be removed from the marine environment. The total mudline footprint of the existing dolphins is 258 square feet (ft^2). The total mudline footprint of the new dolphins will be 263 ft^2, an increase of five square feet. However, the footprint of the new steel dolphins will be more open, allowing fish movement between the piles. The new dolphins and wingwalls will have 52 piles, compared to the existing structures, which have 272 tightly clustered piles with no space between them.

1.5 Project Elements

The proposed project has two elements involving noise production that may impact marine mammals, and one that will not:

1. Vibratory Hammer Removal
2. Direct Pull and Clamshell Removal
3. Vibratory Hammer Installation

1.5.1 Vibratory Hammer Pile Removal

Vibratory hammer extraction is a common method for removing timber piling. A vibratory hammer is a large mechanical device mostly constructed of steel (weighing 5 to 16 tons) that is suspended from a crane by a cable. It is attached to a derrick and positioned on the top of a pile. The pile is then unseated from the sediments by engaging the hammer, creating a vibration that loosens the sediments binding the pile, and then slowly lifting up on the hammer with the aid of the crane.

Once unseated, the crane will continue to raise the hammer and pull the pile from the sediment. When the pile is released from the sediment, the vibratory hammer is disengaged and the pile is pulled from the water and placed on a barge for transfer upland. Figure 1-6 shows a timber pile being removed with a vibratory hammer. Vibratory removal will take approximately 10 to 15 minutes per pile, depending on sediment conditions.

The piling will be loaded onto the barge or into a container and disposed of offsite in accordance with State of Washington Administrative Code (WAC) 173-304 Minimum Functional Standards for Solid Waste Handling and mitigation measures in Section 11.0, Mitigation Measures.

1.5.2 Direct Pull and Clamshell Pile Removal

Older timber pilings are particularly prone to breaking at the mudline because of damage from marine borers and vessel impacts, and must be removed because they can interfere with the installation of new pilings. In some cases, removal with a vibratory hammer is not possible if the pile is too fragile to withstand the hammer force.

Broken or damaged piles may be removed by wrapping the piles with a cable and pulling them directly from the sediment with a crane. If the piles break below the waterline, the pile stubs may be removed with a clamshell bucket, a hinged steel apparatus that operates like a set of steel jaws. The bucket will be lowered from a crane and the jaws will grasp the pile stub as the crane pulls up. The broken piling and stubs will be loaded onto the barge for off-site disposal. Clamshell removal will be used only if necessary. Direct pull and clamshell removal do not produce noise that could impact marine mammals.

1.5.3 Vibratory Hammer Pile Installation

Vibratory hammers are commonly used in steel pile installation where sediments allow and may involve the same vibratory hammer used in pile extraction. The pile is placed into position using a choker and crane, and then vibrated between 1,200 and 2,400 vibrations per minute (Figure 1-7). The vibrations liquefy the sediment surrounding the pile allowing it to penetrate to the required seating depth. 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 1-6 Vibratory Hammer Removing a Timber Wingwall Pile

Figure 1-7 Vibratory Hammer Driving a Steel Wingwall Pile

1.6 Sound Levels

1.6.1 Reference In-water Vibratory Sound Source Levels

The project includes vibratory removal of 13-inch timber piles, 24- and 36-inch steel piles, and vibratory driving of 24-, 30-, and 36-inch steel piles.

1.6.1.1 Pile Removal

No data is available for removal of 13-inch timber piles. Based on in-water measurements at the WSF Port Townsend Ferry Terminal (Laughlin 2011), removal of 12-inch timber piles generated 149 to 152 dB_{RMS} with an overall average RMS value of 150 dB_{RMS} measured at 16 meters. A worst-case noise level for vibratory removal of 13-inch timber piles will be 152 dB_{RMS} at 16 m.

No data is available for vibratory removal of 24- and 36-inch steel piles. For this analysis, the in-water measurements of vibratory driving of 24- and 36-inch steel piles will be used to estimate the in-water noise levels associated with vibratory removal.

1.6.1.2 Pile Driving

Based on in-water measurements at the WSF Friday Harbor Ferry Terminal, vibratory pile driving of a 24-inch steel pile generated 162 dB_{RMS} measured at 10 meters (Laughlin 2010).

Based on in-water measurements during a vibratory test pile at the WSF Port Townsend Ferry Terminal, vibratory pile driving of a 30-inch steel pile generated 170 dB_{RMS} (overall average), with the highest measured at 174 dB_{RMS} measured at 10 meters (Laughlin 2011b). A worst-case noise level for vibratory driving of 30-inch steel piles will be 174 dB_{RMS} at 10 m.

Based on in-water measurements at the Port Townsend ferry terminal, vibratory pile driving of a 36-inch pile measured at 10 m generated 172 dB_{RMS} (overall average), with the highest measured at 177 dB_{RMS} (Laughlin 2011). A worst-case noise level for vibratory driving of 36-inch steel piles will be 177 dB_{RMS} at 10 m (Table 1-1).

Table 1-3 Vibratory Source Levels

Source	Noise Level
Removal of 13" timber pile	152 dB_{RMS} @ 16m
Removal/driving of 24" steel pile	162 dB_{RMS} @ 10m
Driving of 30" steel pile	174 dB_{RMS} @ 10m
Removal/driving of 36" steel pile	177 dB_{RMS} @ 10m

1.6.2 In-water Background Noise

Background noise is the sound level absent of the proposed activity (pile driving in this case) while ambient sound levels are absent of human activity (NMFS 2009). Various factors contribute to background noise levels in marine waters: ship traffic, fishing boat depth sounders, waves, wind, rainfall, current fluctuations, chemical composition and biological sound sources (e.g., marine mammals, fish, shrimp) (Carr et al. 2006). Background noise levels are compared to the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) threshold levels designed to protect marine mammals to determine the zone of influence for noise sources.

The threshold value for Level B acoustical harassment of marine mammals exposed to continuous noise sources is120 dB_{RMS}. If background noise levels exceed 120 dB_{RMS}, for example 130 dB_{RMS}, then animals would not be exposed to "harassment level" sounds at less than 130 dB_{RMS} as those sounds no longer dominate; they are essentially part of the background. In this example, the 130 dB_{RMS} isopleth becomes the new project threshold for Level B take of marine mammals.

In-water background noise data taken within the functional hearing group of relevant species is available for the Anacortes ferry terminal area (Table 1-1) (WSDOT 2014/see attached Compendium Report). This data was collected and plotted as a Cumulative Distribution Function (CDF) during daytime hours per NMFS guidelines (NMFS 2009).

Table 1-4 Anacortes Underwater Daytime Background Noise

Frequency Range	Functional Hearing Group	Species	50% Daytime CDF (dB_{RMS})
7 Hz to 20 kHz	Low-frequency Cetaceans	Gray, humpback, minke	133
75 Hz to 20 kHz	Pinnipeds	Seals, sea lions	125
150 Hz to 20 kHz	Mid-frequency Cetaceans	Killer whale	124
200 Hz to 20 kHz	High-frequency Cetaceans	Porpoise, dolphin	123

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1.6.3 Underwater Transmission Loss

Underwater transmission loss has been described by Burgess et al. (2005):

> As sound propagates away from its source, several factors act to change its amplitude. These factors include the spreading of the sound over a wider area (spreading loss), losses to friction between water or sediment particles that vibrate with the passing sound wave (absorption), scattering and reflections from boundaries and objects in the sound's path, and constructive and destructive interference with one or more reflections of the sound off the surface or seafloor. The sound level that one would actually measure at any given distance from the source includes all these effects, and is called the received level. Received levels differ in dimensions from source levels, and the two cannot be directly compared. Received levels of underwater sound are usually presented in dB re 1 micro-Pascal (μPa), whereas the idealized source level at a distance of 1 m from the source is presented in dB re 1 μPa-m. The sum of all propagation and loss effects on a signal is called the transmission loss.

Transmission loss (TL) is characterized by the following equation:

$$TL = B*\log_{10}(R) + C*R$$

Where **B** represents the logarithmic (predominantly spreading) loss, **C** the linear (scattering and absorption) loss, and **R** the range from the source in meters.

Transmission-loss parameters vary with frequency, temperature, sea conditions, source depth, receiver depth, water depth, water chemistry, and bottom composition and topography. Logarithmic loss **B** is typically between 10 dB (10 Log R cylindrical spreading) and 20 dB (20 Log R spherical spreading). Linear loss **C** has several physical components, including absorption in seawater, absorption in the sub-bottom, scattering from inhomogeneities in the water column

and from surface and bottom roughness, and (for RMS levels of transient pulses) temporal pulse-spreading (Greeneridge 2007). Linear loss is also a function of frequency and is less a factor in the lower frequencies in which pile driving sounds dominate. Further, linear loss is site-specific, which is why there is no generally accepted **C** value for estimating linear loss in the broadband.

NMFS requires that the 15 Log R practical (or semi-cylindrical) spreading model, without considering for linear loss, be used to estimate distances to marine mammal noise thresholds.

1.6.4 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.

Vibratory pile removal and driving will produce the highest in-air construction noise levels during this project. No unweighted in-air source level data is available for 13-inch timber, and 24 and 36-inch steel vibratory pile removal and driving. Unweighted in-air measurements of vibratory driving of a 30-inch steel pile ranged from 95-98 dB RMS @ 50 ft. (Laughlin 2010b), which will be used for all pile sizes for this project.

1.6.5 Attenuation to NMFS Thresholds

NMFS has established disturbance and injury noise thresholds for marine mammals (Table 1-1). Determining the area(s) exceeding each threshold level (the zone of influence [ZOI]/zone of exclusion [ZOE]) is necessary to estimate the number of animals for the Level B acoustical harassment take request, and to establish a monitoring area. No Level A take is requested for this project.

Table 1-5 Marine mammal thresholds

Marine Mammals	Airborne Noise from Marine Construction Activity Level at which Pinniped Haul-out Disturbance has been Documented	Vibratory Pile Driving Disturbance Threshold	Impact Pile Driving Disturbance Threshold	Injury Threshold
Cetaceans	N/A	120 dB_{RMS}	160 dB_{RMS}	180 dB_{RMS}
Pinnipeds	90 dB_{RMS} (unweighted) for harbor seals 100 dB_{RMS} (unweighted) for all other pinnipeds re: 20 µPa	120 dB_{RMS}	160 dB_{RMS}	190 dB_{RMS}

1.6.5.1 Vibratory Pile Driving (In-water Noise)

To simplify this analysis, the conservative 123 dB_{RMS} Anacortes underwater background will be used to establish the vibratory removal and driving ZOIs.

The NOAA/NMFS practical spreading model (sound transmission loss of 4.5dB per doubling distance) was used to determine the distance where underwater sound will attenuate to the background level. The ZOIs are defined below, shown in Figure 1-6, and summarized in Table 8:

- 152 dB_{RMS} at 16 meters (13-inch timber pile removal) = 1.6 km/1.0 mi
- 162 dB_{RMS} at 10 meters (24-inch steel pile removal/driving) = 4.0 km/2.5 mi
- 174 dB_{RMS} at 10 meters (30-inch steel pile driving) = 26 km/16 mi
- 177 dB_{RMS} at 10 meters (36-inch steel pile removal/driving) = 40 km/25 mi

For 30- and 36-inch piles, land is reached in approximately 11 miles maximum.

During the project, in-water measurements of vibratory pile driving will be taken to determine if the vibratory ZOIs needs to be modified.

Table 1-6 Distances to vibratory ZOIs

Noise Source	Distance
Removal of 13” timber pile	1.6 km/1.0 mi
Removal/driving of 24” steel pile	4.0 km/2.5 mi
Driving of 30” steel pile	26 km/16 mi
Removal/driving of 36” steel pile	40 km/25 mi

1.6.5.2 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 ZOE or a pinniped entering a 190 dB ZOE. 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.

1.6.5.3 Vibratory Pile Removal and 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.

No unweighted in-air source level data is available for 12-inch timber piles, or 24- and 36-inch steel piles. Unweighted in-air measurements of vibratory driving of a 30-inch steel pile ranged from 95-98 dB RMS @ 50 ft. (Laughlin 2010b), which will be used for all pile sizes being used on this project.

The distance from pile removal/driving to the thresholds was calculated using a spherical spreading loss of 6 dB per doubling of distance from the noise source. The distance to the 90 dB threshold is 30 m/100 ft., and the distance to the 100 dB threshold is 10 m/32 ft. (Figure 1-8).

The closest documented harbor seal haulout to the Anacortes terminal is Burrows Island (approximately 4.3/2.7 mi SW). The closest Steller sea lion haul out site to the Anacortes terminal are the Bird Rocks (approximately 6.5 km/4.0 mi SW) (Fig. 3-1). Temporary in-air disturbance will be limited to harbor seals swimming on the surface through the immediate terminal area within 30 m/100 ft. of pile removal/driving, and all other pinnipeds within 10 m/32 ft. of pile removal/driving (Fig. 1-9).

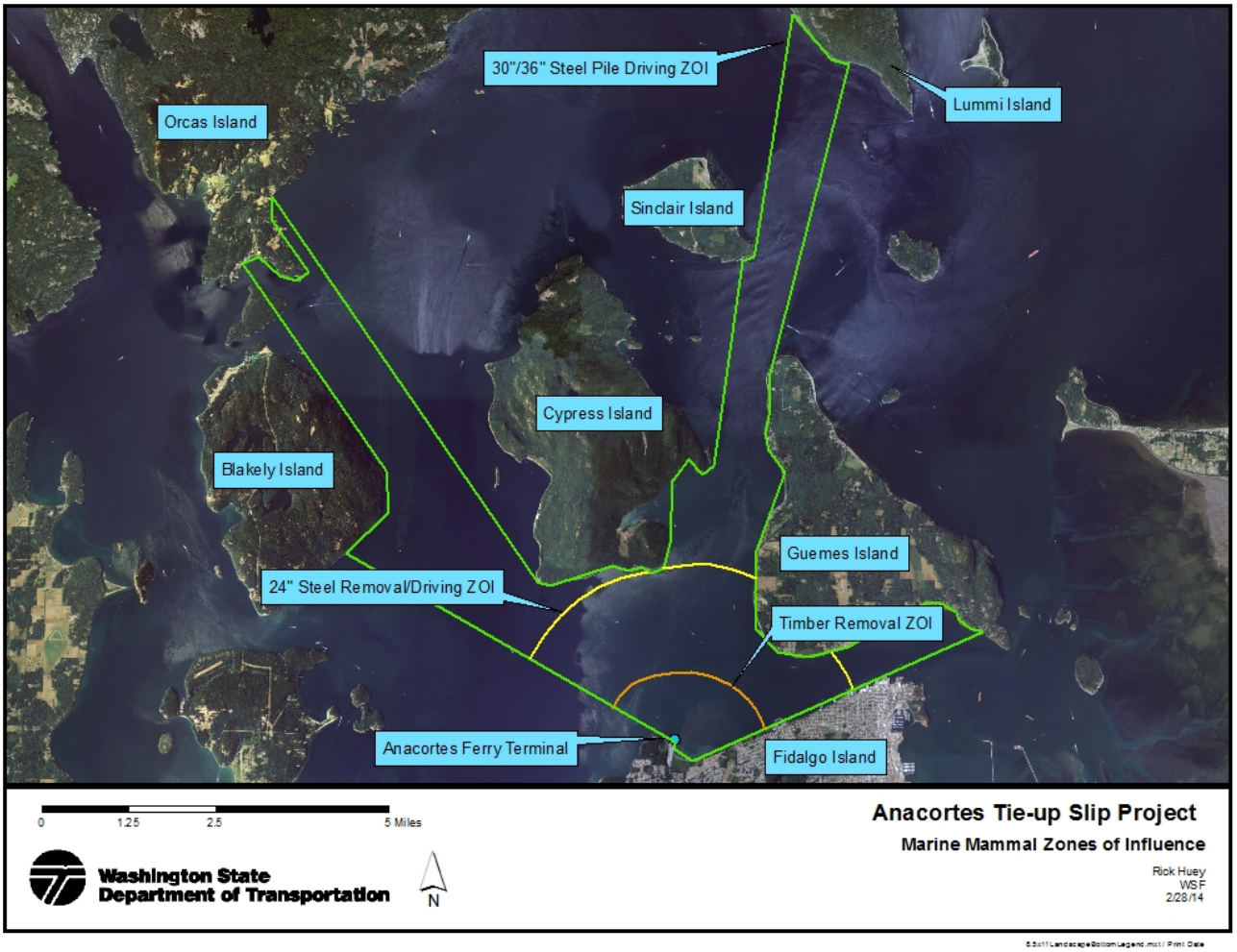

Figure 1-8 Anacortes Project ZOIs

Figure 1-9 Pinniped In-air Disturbance Areas

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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 September 1, 2015 and February 15, 2016.

2.2 Duration

Duration estimates of each of the pile driving elements follow:

- The daily construction window for pile removal or driving will begin no sooner than 30 minutes after sunrise to allow for initial marine mammal monitoring, and will end 30 minutes before sunset to allow for post-construction marine mammal monitoring.

- Vibratory pile removal of the existing timber piles will take approximately 10 to 15 minutes per pile. Vibratory removal will take less time than driving, because piles are vibrated to loosen them from the soil, and then pulled out with the vibratory hammer turned off. Assuming the worst case of 15 minutes per pile (with no direct pull or clamshell removal), removal of 272 piles at the Anacortes terminal will take 68 hours over nine days of pile removal (Table 2-1).

- Vibratory pile driving of the steel piles will take approximately 20 minutes per pile, with three to five piles installed per day. Assuming 20 minutes per pile, and three piles per day, driving of 81 piles at the Anacortes terminal will take 27 hours over 27 days.

The total worst-case time for pile removal is nine days, and 27 days for pile installation. The actual number of pile-removal/driving days is expected to be less.

Table 2-1 Worst case pile removal/driving durations

Removal/Driving	Number of Piles	Time	Days
Pile Removal	272	68 hrs.	9
Pile Driving	81	27 hrs.	27

2.3 Region of Activity

The proposed activities will occur at the Anacortes ferry terminal located in Anacortes, Washington (see Figures 1-1 and 1-2). The terminal is adjacent to Guemes Channel, tributary to the Georgia Basin.

3.0 Species and Numbers of Marine Mammals in Area

The species and numbers of marine mammals likely to be found within the activity area.

Section 3.0 has been combined with Section 4.0. Section 3.0 requires a discussion of the species and numbers of marine mammals in the area. Section 4.0 requires a discussion of the status and distribution of the stock(s) and specifically:

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.

Each requested topic in Section 4.0 (status, distribution, and seasonal distribution [if known]) has been clearly marked as a subheading in Section 3.0 for ease of finding relevant information while consolidating the species-specific information into one place to avoid searching for information between similar chapters.

3.1 Species Present

Eleven species of marine mammals are commonly found in the project area (Table 3-1).

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

Species	ESA Status	MMPA Status	Work Window Sept–Feb	Non-work Window Mar–Aug
Harbor Seal	Not listed	Non-depleted	Yes	Yes
California Sea Lion	Not listed	Non-depleted	Yes (males only)	Yes (males only until end of May)
Northern Elephant Seal	Not listed	Non-depleted	Yes	Yes
Steller Sea Lion	Not listed	Depleted	Yes, rare	Yes, rare
Harbor Porpoise	Not listed	Non-depleted	Yes	Yes
Dall's Porpoise	Not listed	Non-depleted	Yes	Yes
Pacific White-sided dolphin	Not listed	Non-depleted	Yes	No
Killer Whale	Endangered (Southern Resident)	Depleted	Yes	Yes
Gray Whale	Delisted	Unclassified	Yes	Yes
Humpback Whale	Endangered	Depleted	Yes	Yes
Minke Whale	Not listed	Non-depleted	Yes	Yes

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 Georgia Basin. WSF requested that TWM analyze the data for the project area for the years 2008 to 2013, in the September to February timeframe scheduled for this project.

In the analysis of sightings data, multiple reports of marine mammals in the same region on the same day may possibly be the same individuals; therefore 'whale days' is used for 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 Rosario Strait area, including the quadrants of interest for the Anacortes project. The ZOI (in yellow) intersects with ten quadrants: 189, 199, 208-212, 214-215, and 219.

As sightings are opportunistic and SRKW can travel large distances in a day (~100 miles), it is important to analyze this data set across a region, rather than just single quadrants. Therefore the analysis focused on the following areas: the quadrants intersecting the Anacortes ZOI (quadrants 189, 199, 208-212, 214-215, and 219), the ZOI quadrants plus the bays to the east (quadrants 189, 199-215, and 219), and the area including and east of Rosario Strait (quadrants 147-148, 189, 195-215, and 218-223).

The primary area of interest in the analysis is the ZOI quadrants; however, since the project will be conducted in 'Area 1: Core Summer' 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. In this case, the larger areas include the bays to the east of the quadrants in question (i.e. Fidalgo Bay, Samish Bay, Padilla Bay, Bellingham Bay) as the whales would most likely have had to pass through the quadrants of concern to reach the more easterly areas. This area was called 'ZOI Quads and Bays'.

The cells in Rosario Strait were also included in the analysis since if the whales were seen passing north or south through Rosario Strait, it is likely that they also visited the quadrants of concern. Rosario Strait is bound to the south by a line connecting Point Colville (Lopez Island) to Rosario Head (Fidalgo Island) and is bound to the north by a line connecting the northern tip of Lummi Island, the eastern tip of Puffin Island, and Point Thompson (Orcas Island). Any quadrants that fell inside those boundaries were included in the analysis. This area was called 'East of Rosario'.

Because killer whale, and to a lesser degree other marine mammals, can travel across multiple quads, a conservative approach was taken when discussing this data in the species sections below. Marine mammal whale or sightings days reported will be for all of the project area quads: ZOI, Eastern Bays and Rosario Strait.

It should be noted that data for marine mammals other than SRKW, grey, 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 2014).

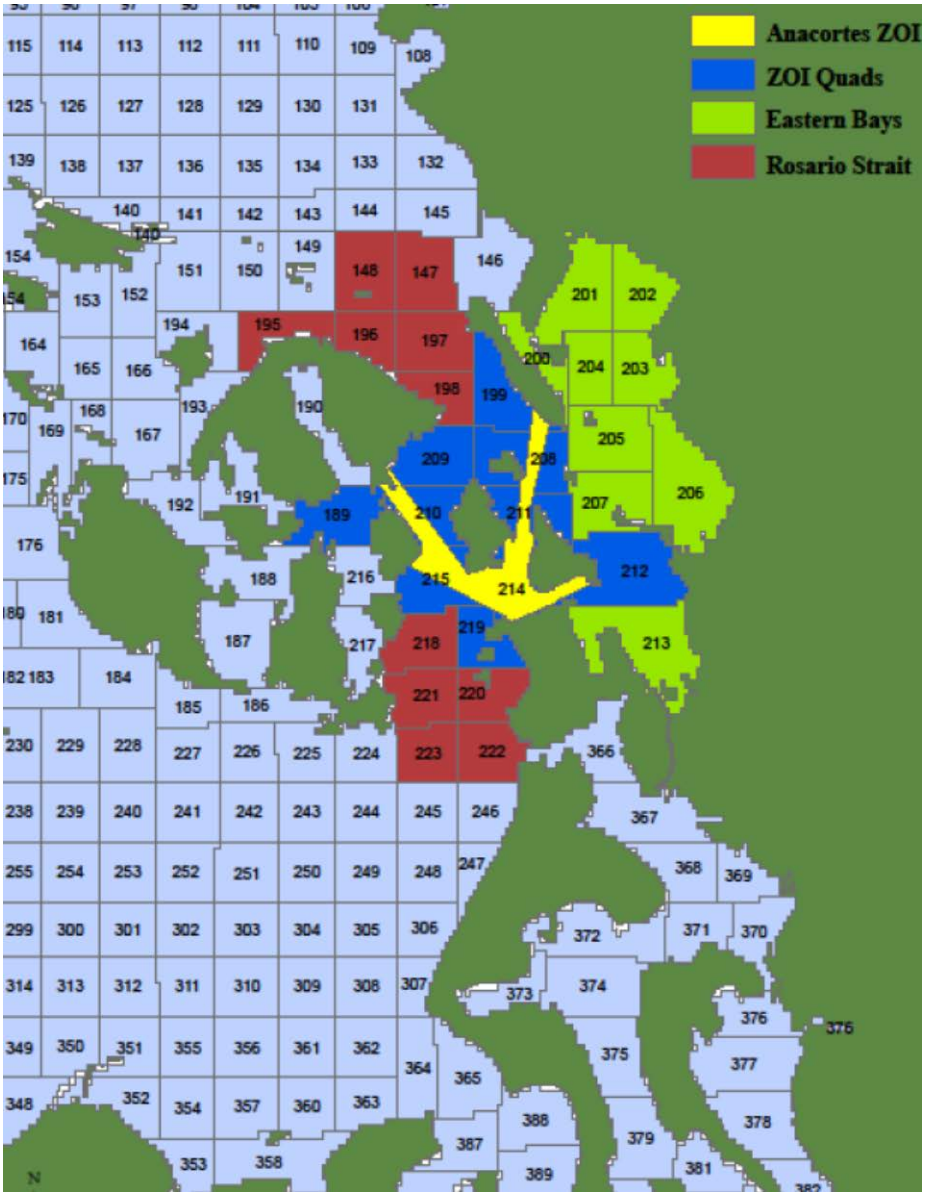

Figure 3-1 ZOI + Area Quads

3.3 Pinnipeds

Four species of pinnipeds that may be found in the project area: harbor seal (*Phoca vitulina richardsi*), California sea lion (*Zalophus californianus*), Steller sea lion (*Eumetopias jubatus*) and Elephant seal (. Harbor seals are the most common and the only pinniped that breeds and remains in Puget Sound year-round.

3.3.1 Harbor Seal

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

Pupping seasons vary by geographic region. For the northern Puget Sound/Georgia Basin region, pups are born from late June through August (NMFS 2014a). After October 1 all pups in the inland waters of Washington are weaned.

Harbor seals, like all pinnipeds, communicate both on land and underwater. Harbor seals have the broadest auditory bandwidth of the pinnipeds, estimated by Southall et al. (2007) as between 75 hertz (Hz) and 75 kilohertz (kHz) for "functional" in-water hearing and between 75 Hz and 30 kHz for "functional" in-air hearing. Hearing capabilities for harbor seals in-water are 25 to 30 dB better than in-air (Kastak and Schusterman 1998).

3.3.1.1 Numbers

Harbor seals are the most numerous pinniped in the inland marine waters of Washington (Calambokidis and Baird 1994). In the 2010 Stock Assessment Report (SAR)(NMFS 2011a), Jeffries et al. (2003) recorded a mean count of 9,550 harbor seals in Washington's inland marine waters, and estimated the total population to be approximately 14,612 animals (including the Strait of Juan de Fuca). The population across Washington increased at an average annual rate of 10 percent between 1991 and 1996 (Jeffries et al. 1997) and is thought to be stable (Jeffries et al. 2003).

3.3.1.2 Status

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

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 1948; Fisher 1952; Bigg 1969, 1981). They are not known to make extensive pelagic migrations, although some long-distance movements of tagged animals in Alaska (174 km) and along the U.S. west coast (up to 550 km) have been recorded (Pitcher and McAllister 1981; Brown and Mate 1983; Herder 1983).

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

The closest documented harbor seal haulout to the Anacortes terminal is approximately 2.0 miles SW. This and additional haulouts are shown in Figure 3-2. Three seal haulouts are within the ZOI, and three more are near the ZOI. The number of harbor seals using these haulouts is less than 100 each (WDFW 2000).

The level of use of these haulouts 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). Harbor seals may also use beaches and other undocumented haulout sites in the area.

In 2012 WSF repaired wingwalls and dolphins at the Anacortes terminal. Over 2 days of monitoring in February of 2012, 25 harbor seals were observed within the same 30”/36” vibratory ZOI area that was calculated for this project (Fig. 3-2/3-3) (WSF 2012).

For the years 2008 to 2013, in the September to February timeframe scheduled for this project, The Whale Museum reported 25 sightings days for harbor seals in the project quads shown in Figure 3-1(TWM 2014).

According to the NMFS National Stranding Database, there were eight confirmed harbor seal strandings in San Juan Co. in 2013, in the September-February work window scheduled for this project (NMFS 2014b).

Table 3-2 Harbor seal Sightings Days 2008-2013

Sept	Oct	Nov	Dec	Jan	Feb
18	6	0	1	0	0

TWM 2014

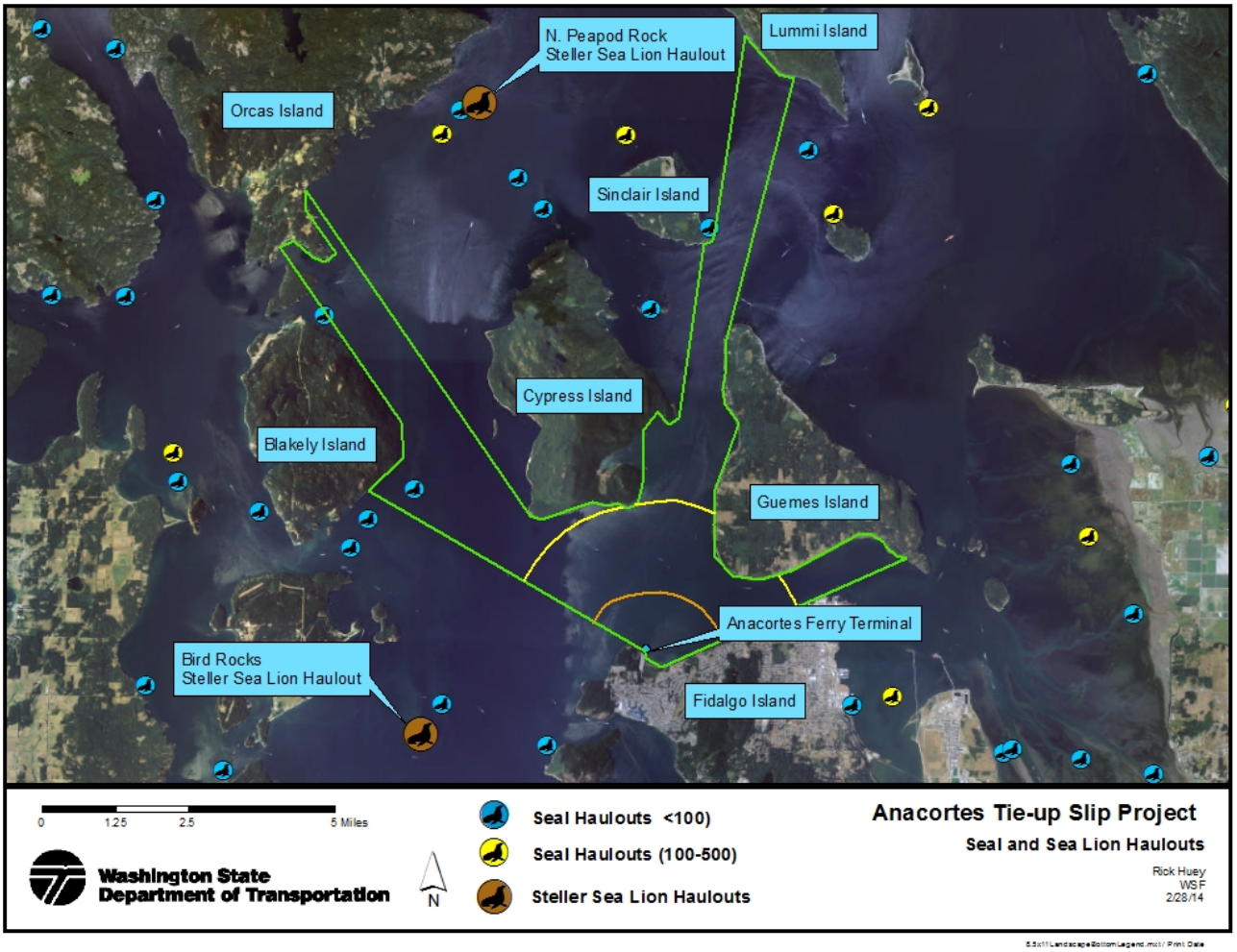

Figure 3-2 Anacortes Area Haulout Sites

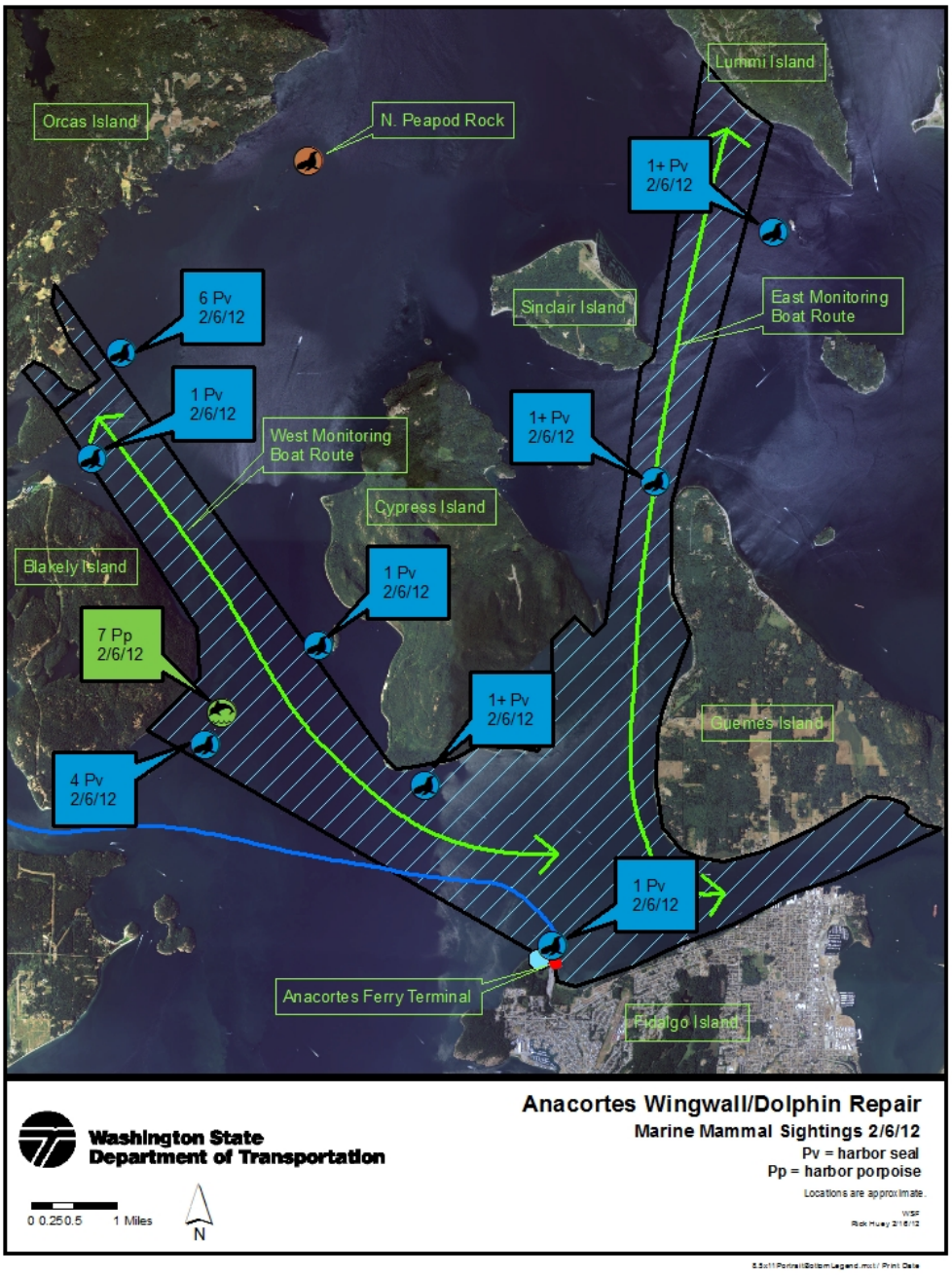

Figure 3-3 February 6, 2012 Sightings

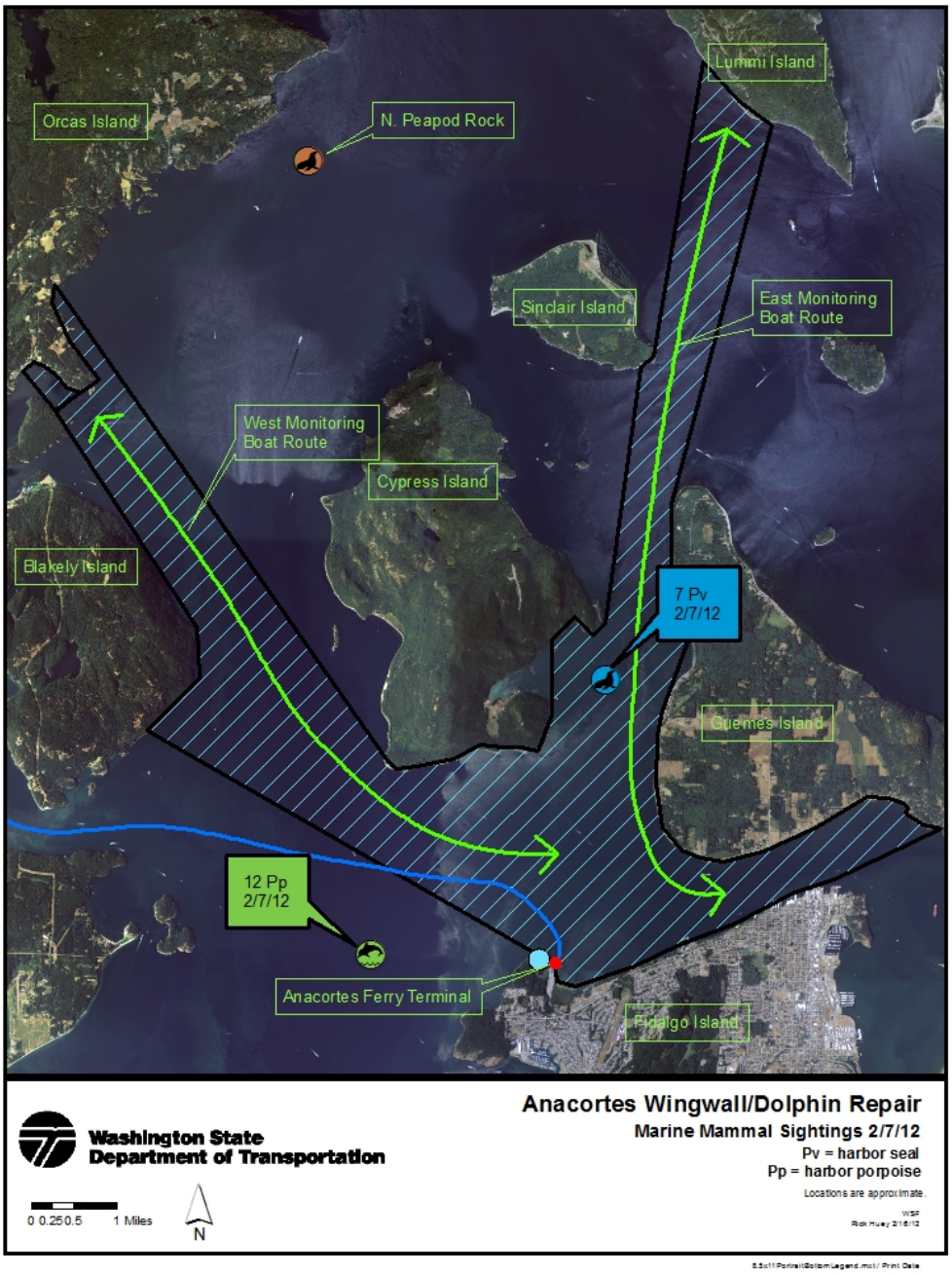

Figure 3-4 February 7, 2012 Sightings

3.3.2 California Sea Lion

Washington California sea lions occur within the geographic boundaries of the U.S. stock, which begins at the U.S./Mexico border and extends northward into Canada, and may be present in the project area.

California sea lions (*Zalophus californianus*) are members of the family Otariidae or eared seals (sea lions and fur seals). The breeding areas of the California sea lion are on islands located in southern California, western Baja California and the Gulf of California (Carretta et al. 2007b). Numbers

3.3.2.1 Numbers

The U.S. stock was estimated at 296,750 in the 2011 SAR (NMFS 2011b) and may be at carrying capacity (Carretta et al. 2007a). Some 3,000 to 5,000 animals are estimated to move into northwest waters (both Washington and British Columbia) during the fall (September) and remain until the late spring (May) when most return to breeding rookeries in California and Mexico (Jeffries et al. 2000; J. Calambokidis pers. comm. 2008). Peak counts of over 1,000 animals have been made in Puget Sound (Jeffries et al. 2000).

3.2.2.2 Status

California sea lions are not depleted under the MMPA or listed under the ESA. They are not considered a strategic stock under the MMPA, because total human-caused mortality, although unknown, is likely to be below the PBR of 9,200 (NMFS 2011b).

3.3.2.2 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 haulout numbered around 1,000. This haulout remains the largest in the state for sea lions in general and for California sea lions specifically (P. Gearin pers. comm. 2008). Similar sightings and increases in numbers were documented throughout the region after the initial sighting in 1979 (Steiger and Calambokidis 1986), including urbanized areas such as Elliott Bay near Seattle and heavily used areas of central Puget Sound (P. Gearin et al. 1986). In Washington, California sea lions use haulout sites within all inland water regions (WDFW 2000). The movement of California sea lions into Puget Sound could be an expansion in range of a growing population (Steiger and Calambokidis 1986).

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

There are no documented California sea lion haulout sites near the project area (WDFW 2000), though California sea lions may use undocumented haulout sites, and have been observed in the project area.

In 2012 WSF repaired wingwalls and dolphins at the Anacortes terminal. Over 2 days of monitoring in February of 2012, no California sea lions were observed within the same 30"/36" vibratory ZOI area that was calculated for this project (Fig. 3-2/3-3) (WSF 2012).

For the years 2008 to 2013, in the September to February timeframe scheduled for this project, The Whale Museum reported two sightings days for California sea lion in the project quads shown in Figure 3-1(Table 3-3)(TWM 2014).

According to the NMFS National Stranding Database, there was one confirmed California sea lion strandings in San Juan Co. in 2013, in the September-February work window scheduled for this project (NMFS 2014b).

Table 3-3 California sea lion Sightings Days 2008-2013

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

TWM 2014

3.3.3 Steller Sea Lion

There are two Steller sea lion (*Eumetopias jubatus*) management stocks; eastern and western, separated at 144º W longitude (Loughlin 1997). The eastern stock may be present in the project area.

Breeding rookeries for the eastern stock are located along the California, Oregon, British Columbia, and southeast Alaska coasts, but not along the Washington coast or in inland Washington waters (Angliss and Outlaw 2007). Steller sea lions primarily use haulout sites on the outer coast of Washington and in the Strait of Juan de Fuca along Vancouver Island in British Columbia. Only sub-adults or non-breeding adults may be found in the inland waters of Washington (Pitcher et al. 2007; P. Gearin pers. comm. 2008).

3.3.3.1 Numbers

The eastern stock was estimated at 52,847 individuals in the 2012 SAR, and the most recent estimate for Washington state (including the outer coast) is 516 individuals (non-pups only) (NMFS 2012a). However, there are estimates that 1,000 to 2,000 individuals enter the Strait of Juan de Fuca during the fall and winter months (Jeffries pers. comm. 2008b).

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).

3.3.3.2 Status

Steller sea lions are listed as depleted under the MMPA. Both stocks are classified as strategic. The PBR for this stock is 2,378 animals (NMFS 2012a). Steller sea lions were listed as threatened range-wide under the ESA in 1990 (55 FR 49204), and delisted in November 2013 (CFR 2013).

3.3.3.3 Distribution

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

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

The closest Steller sea lion haulout sites to the Anacortes terminal are the Bird Rocks (approximately 6.5 km/4.0 mi SW), and North Peapod Rock, approximately 17 km/10 mi NW (Fig. 3-2). The number of Steller sea lions using the Bird Rocks is less than 10, and the number using the North Peapod rock is less than 50 (NMFS 2012b). Neither are within the ZOIs.

In 2012 WSF repaired wingwalls and dolphins at the Anacortes terminal. Over 2 days of monitoring in February of 2012, no Steller sea lions were observed within the same 30”/36” vibratory ZOI area that was calculated for this project (Fig. 3-2/3-3) (WSF 2012).

For the years 2008 to 2013, in the September to February timeframe scheduled for this project, The Whale Museum reported five sightings days for Steller sea lions in the project quads shown in Figure 3-1(Table 3-4)(TWM 2014).

According to the NMFS National Stranding Database, there were no Steller sea lion strandings in Sam Juan Co. in 2013, in the September-February work window scheduled for this project (NMFS 2014b).

Table 3-4 Steller sea lion ‘sightings days’ 2008-2013

Sept	Oct	Nov	Dec	Jan	Feb
3	2	0	0	0	0

TWM 2014

3.3.4 Northern Elephant Seal

The California breeding stock of Elephant seal (*Mirounga angustirostris*) may be present in the project area (Carretta et al. 2007a).

Northern elephant seals are the largest pinniped found in Washington marine waters. Populations of northern elephant seals in the U.S. and Mexico are the result of a few hundred survivors remaining after hunting nearly led to the species' extinction (Stewart et al. 1994). Northern elephant seals breed and give birth primarily on islands off of California and Mexico from December through March (Stewart and Huber 1993; Carretta et al. 2007a). Typically, juveniles form new colonies and one or more females join to result in new haulout and rookery sites (Bonnell et al. 1991).

3.3.4.1 Numbers

The California stock was estimated at 124,000 individuals in 2005 (NMFS 2007). Once nearly extirpated, the West Coast population of this species has had a remarkable comeback. By the early 1990s, this species was once again considered abundant and stable within its range in the eastern North Pacific (Campbell 1987; Calambokidis and Baird 1994). Based on current trends and pup counts in California, the population of northern elephant seals appears to remain stable (Carretta et al. 2007b).

Abundance estimates for inland Washington waters are not available due to the infrequency of sightings and the low numbers encountered (J. Calambokidis pers. comm. 2008). Rough estimates suggest less than 100 individuals use the area annually (S. Jeffries pers. comm. 2008a).

3.3.4.2 Status

Northern elephant seals are not depleted under the MMPA or listed under the ESA. Annual human caused mortality is 60 animals, much less than the PBR for this stock of 4,382 (NMFS 2007).

3.3.4.3 Distribution

Breeding rookeries are located on beaches and islands in California and Mexico (Jeffries et al. 2000). Historically, after their winter breeding season and annual molt cycles, individuals dispersed northward along the Oregon and Washington coasts and were present only on a seasonal basis. However, a few individuals are now found in Washington inland waters year-round.

Haulout areas are not as predictable as for the other species of pinnipeds. In total, WDFW has identified seven haulout sites in inland Washington waters used by this species. A few individuals use Smith/Minor Islands (23 km/14 mi SW of the Anacortes terminal), and beaches at Protection Island (45 km/28 mi km SW of the Anacortes terminal) (WDFW 2000). Typically these sites have only two to ten adult males and females, but pupping has occurred at all of these sites over the past ten years (S. Jeffries pers. comm. 2008a). A single individual has been observed hauled out at American Camp on San Juan Island (NPS 2012), and at Shaw Island County Park on Shaw Island (Miller 2012).

In 2012 WSF repaired wingwalls and dolphins at the Anacortes terminal. Over 2 days of monitoring in February of 2012, no Northern Elephant seals were observed (Fig. 3-2/3-3) within the same 30"/36" vibratory ZOI area that was calculated for this project (WSF 2012).

For the years 2008 to 2013, in the September to February timeframe scheduled for this project, The Whale Museum reported no sightings days for Northern Elephant seals in the project quads shown in Figure 3-1(TWM 2014).

According to the NMFS National Stranding Database, there were no Northern Elephant seal strandings in San Juan Co. in 2013, in the September-February work window scheduled for this project (NMFS 2014b).

3.4 Cetaceans

Seven cetacean species may be present in the project area; killer whale, gray whale, humpback whale, minke whale, harbor porpoise, Dall's porpoise and Pacific White-sided Dolphin.

3.4.1 Killer Whale

The killer whale (*Orcinus orca)* is the largest member of the dolphin family (Delphinidae) and occurs in most marine waters of the world (Rice 1998 as cited in NMFS 2008a). Killer whales are distinct among all cetaceans with their black-and-white coloration with characteristic gray or white saddle patches behind the dorsal fin and white eye patches. Killer whales live in family groups called pods, are highly social, and communicate with a highly developed acoustic sensory system that is also used to navigate and find prey (Ford 1989; Ford et al. 2000). Vocal communication is particularly advanced in killer whales, and is an essential element of the species social structure (Wiles 2004; Krahn et al. 2004).

Two sympatric ecotypes of killer whales are found within the activity area: transient and resident. These types vary in diet, distribution, acoustic calls, behavior, morphology and coloration (Baird 2000 as cited in NMFS 2008a; Ford et al. 2000). The ranges of transient and resident killer whales overlap; however, little interaction and high reproductive isolation occurs among the two ecotypes (Barrett-Lennard 2000; Barrett-Lennard and Ellis 2001; Hoelzel et al. 2002 as cited in NMFS 2008a). Resident killer whales are primarily piscivorous, whereas transients primarily feed on marine mammals, especially harbor seals, though sea lions and porpoises are also taken (Baird and Dill 1996;NMFS 2008a).

Resident killer whales also tend to occur in larger (10 to 60 individuals), stable family groups known as pods, whereas transients occur in smaller, less structured pods of up to five individuals (Center for Whale Research 2013).

The West Coast Transient stock may be present in the project area. This stock ranges from southern California to southeast Alaska and is distinguished from two other Eastern North Pacific transient stocks that occur further north, the AT1 and the "Gulf of Alaska transient stocks. This separation is based on variations in acoustic calls and genetic distinctness (Angliss and Outlaw 2007).

Two stocks of resident killer whales can occur in Washington State: the Southern Resident (SRKW) and Northern Resident stocks. Southern Residents occur within the project area, in the Strait of Juan de Fuca, Strait of Georgia, and in coastal waters off Washington and Vancouver Island, British Columbia. Northern Residents occur primarily in inland and coastal British Columbia and Southeast Alaska waters and rarely venture into Washington State waters. Little interaction (Ford et al. 2000) or gene flow (Barrett-Lennard 2000; Barrett-Lennard and Ellis 2001; Hoelzel et al. 2004 as cited in Krahn et al. 2004) is known to occur between the two resident stocks.

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

Killer whales are mid-frequency cetaceans (Southall et al. 2007) with an estimated auditory bandwidth of 50 Hz to 100 kHz and peak sensitivity around 15 kHz (73 CFR 41318). Killer whale hearing is well developed for the species' complex underwater communication structure. However, SRKW are highly vocal while transients limit their use of vocalization and may travel silently, apparently to avoid being detected by marine mammal prey (Deecke et al. 2005 as cited in 73 CFR 41318).

Small population numbers make SRKW vulnerable to inbreeding depression and catastrophic events such as disease or a major oil spill. Ongoing threats to Southern Residents include declining prey resources, environmental contaminants, noise and physical disturbance (Krahn et al. 2004; Wiles 2004). In Washington's inland waters, high levels of noise disturbance and potential behavior disruption are due to recreational boating traffic, private and commercial whale watching boats and commercial vessel traffic (Wiles 2004). Other potential noise disturbance includes high output military sonar equipment and marine construction. Noise effects may include altered prey movements and foraging efficiency, masking of whale calls, and temporary hearing impairment (Krahn et al. 2004).

3.4.1.1 Numbers

West Coast Transient Stock

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

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

Southern Resident Stock

The SRKW stock was first recorded in a 1974 census, at which time the population comprised 71 whales. This population peaked at 97 animals in 1996, declined to 79 by 2001 (Center for Whale Research 2011), and then increased to 89 animals by 2006 (Carretta et al. 2007a). As of September 2013, the population collectively numbers 80 individuals: J pod has 26 members, K pod has 19 members, and L pod has 35 members (Center for Whale Research 2014).

The SRKW stock has declined in the past 10 years due to a decrease in birth rates and an increase in mortalities, especially among the L pod (Krahn et al. 2004). There are a limited number of reproductive-age SRKW males, and several females of reproductive age are not having calves. Three major threats were identified in the ESA listing: reduced quantity and quality of prey; persistent pollutants that could cause immune or reproductive system dysfunction; and effects from vessels and sound (NMFS 2008a). Other threats identified were demographics, small population size, and vulnerability to oil spills.

Previously, declines in the SRKW population were due to shooting by fishermen, whalers, sealers and sportsmen largely due to their interference with fisheries (Wiles 2004) and the aquarium trade, which is estimated to have taken 58 animals from 1965 to 1975, 13 of which died during capture. Only one SRKW remains alive in captivity, at the Miami Seaquarium (CWR 2014).
Status

Killer whales are protected under the MMPA of 1972. The West Coast Transient stock is not listed under the ESA or designated as depleted under the MMPA. Because the estimated level of human-caused mortality and serious injury (zero animals per year) does not exceed the PBR rate (3.5), the stock is not classified as strategic.

The Southern Resident stock was declared depleted under the MMPA in May 2003 (68 FR 31980). According to the 2012 SAR, the PBR is 0.14 animals (NMFS 2012c). At that time, NMFS announced preparation of a conservation plan to restore the stock to its optimal sustainable population.

On November 18, 2005, the SRKW stock was listed as an endangered distinct population segment (DPS) under the ESA (70 FR 69903). On November 29, 2006, NMFS published a final rule designating critical habitat for the SRKW DPS. Both Puget Sound and the San Juan Islands are designated as core areas of critical habitat under the ESA, excluding areas less than 20 feet deep relative to extreme high water (71 FR 69054). A final recovery plan for SRKW was published in January of 2008 (NMFS 2008a).

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

3.4.1.2 Distribution

The West Coast Transient and the Southern Resident 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).

West Coast Transient Stock

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).

Southern Resident Stock

Southern Residents are documented in coastal waters ranging from central California to the Queen Charlotte Islands, British Columbia (NMFS 2008a). They occur in all inland marine waters within the activity area (Figure 3-5). While in the activity area, resident killer whales generally spend more time in deeper water and only occasionally enter water less than 15 feet deep (Baird 2000). Distribution is strongly associated with areas of greatest salmon abundance, with heaviest foraging activity occurring over deep open water and in areas characterized by high-relief underwater topography, such as subsurface canyons, seamounts, ridges, and steep slopes (Wiles 2004).

3.4.1.3 Seasonal Distribution

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

SRKW Seasonal Distribution

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

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

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

In 2012 WSF repaired wingwalls and dolphins at the Anacortes terminal. Over 2 days of monitoring in February of 2012, no SR or transient killer whales were observed within the same 30”/36” vibratory ZOI area that was calculated for this project (Fig. 3-2/3-3) (WSF 2012).

For the years 2008 to 2013, in the September to February timeframe scheduled for this project, The Whale Museum reported 71 whale days for SRKW and 20 whale days for transient killer whale in the project quads shown in Figure 3-1(TWM 2014). Table 3-5 presents SRKW ‘whale days’ by year/month. SRKW has been present in the project quads every year from 1990-2012,

except for the year 2010 when there were no sightings. Averages would be higher than shown if 2010 was excluded. Table 3-6 presents Transient killer whale sightings data, which is not as robust as SRKW data, and so is not presented by year.

According to the NMFS National Stranding Database, there were no SRKW or transient killer whale strandings in San Juan Co. in 2013, in the September-February work window scheduled for this project (NMFS 2014b).

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

Year	Sept	Oct	Nov	Dec	Jan	Feb
2008	4	3	0	2	1	0
2009	34	0	0	2	2	0
2010	0	0	0	0	0	0
2011	7	0	0	0	0	4
2012	10	0	0	0	0	2
Totals	**55**	**3**	**0**	**4**	**3**	**6**
Average	**11**	**0.6**	**0.0**	**0.8**	**0.6**	**1.2**

TWM 2014

Table 3-6 Transient Killer Whale Sightings Days 2008-2013

Sept	Oct	Nov	Dec	Jan	Feb
14	0	0	6	0	0

TWM 2014

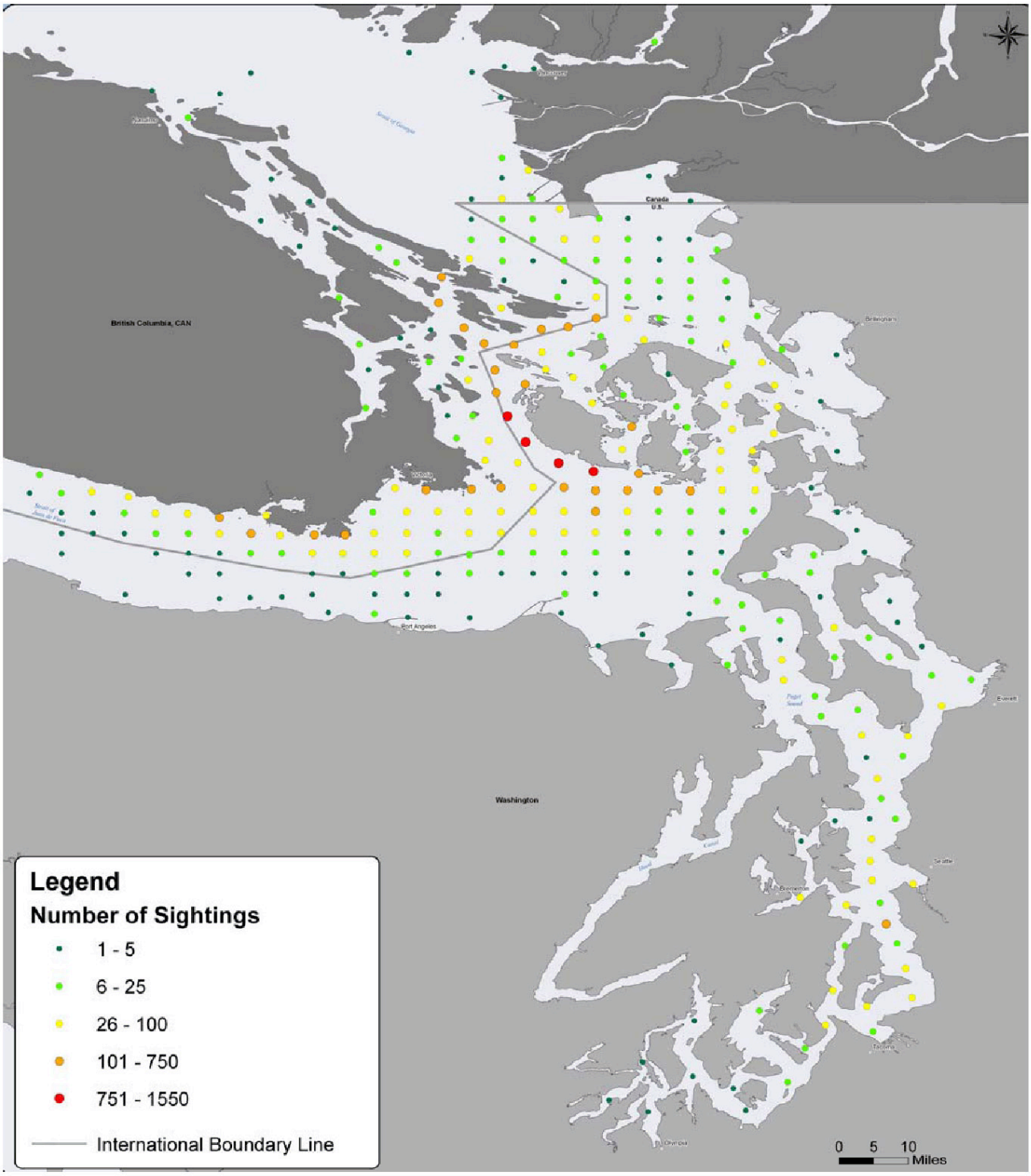

Figure from the Recovery Plan for Southern Resident Killer Whales (NMFS 2008a).

Figure 3-5 Distribution of SRKW (groups) 1990-2005

3.4.2 Gray Whale

The North Pacific gray whale (*Eschrichtius robustus*) stock is divided into two distinct geographically isolated stocks: eastern and western "Korean". The Eastern North Pacific stock may be present in the project area.

The majority of the Eastern North Pacific population spends summers feeding in the Bering and Chukchi Seas, but some individuals have been reported summering in waters off the coast of British Columbia, Southeast Alaska, Washington, Oregon and California (Rice et al. 1984; Angliss and Outlaw 2007). Gray whales migrate south in the fall, along the coast of North America to Baja California, Mexico to calve (Rice et al. 1981.) Gray whales are recorded in Washington waters during feeding migrations between late spring and autumn with occasional sightings during winter months (Calambokidis et al. 1994, 2002).

Gray whales are low-frequency cetaceans. No direct measurements of auditory capacity have been conducted for these large whales, but hearing sensitivity has been estimated from various studies or observations of behavioral responses, vocalization frequencies used most, body size, ambient noise levels, and cochlear morphometry.

Like other baleen whales, humpback whales are low-frequency cetaceans. A generalized auditory bandwidth of 7 Hz to 22 kHz has been estimated for all baleen whales (Southall et al. 2007).

3.4.2.1 Numbers

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

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

3.4.2.2 Status

After listing of the species under the ESA in 1970, the number of gray whales increased dramatically resulting in their delisting in 1994. In 2001 NOAA Fisheries received a petition to relist the stock under the ESA, but it was determined that there was not sufficient information to warrant the petition (Angliss and Outlaw 2007). Since delisting under the ESA, the stock has not been reclassified under the MMPA. The PBR for this stock is 360 animals per year (NMFS 2011c).

3.4.2.3 Distribution

Gray whales migrate within 5 to 43 km of the coast of Washington during their annual north/south migrations (Green et al. 1995). Gray whales migrate south to Baja California where they calve in November and December, and then migrate north to Alaska from March through May (Rice et al. 1984; Rugh et al. 2001) to summer and feed. A few gray whales are observed in Washington inland waters between the months of September and January, with peak numbers of individuals from March through May (J. Calambokidis pers. comm. 2007). Peak months of gray whale observations in the area of activity occur outside the proposed work window of September through February. The average tenure within Washington inland waters is 47 days and the longest stay was 112 days (J. Calambokidis pers. comm. 2007).

Although typically seen during their annual migrations on the outer coast, a regular group of gray whales annually comes into the inland waters at Saratoga Passage and Port Susan from March through May to feed on ghost shrimp (Weitkamp et al. 1992; J. Calambokidis pers. comm. 2006). During this time frame they are also seen in the Strait of Juan de Fuca, the San Juan Islands, and areas of Puget Sound, although the observations in Puget Sound are highly variable between years (Calambokidis et al. 1994).

In 2012 WSF repaired wingwalls and dolphins at the Anacortes terminal. Over 2 days of monitoring in February of 2012, no Gray whales were observed within the same 30”/36” vibratory ZOI area that was calculated for this project (Fig. 3-2/3-3) (WSF 2012).

For the years 2008 to 2013, in the September to February timeframe scheduled for this project, The Whale Museum reported one sightings day for gray whale in the project quads shown in Figure 3-1(Table 3-7)(TWM 2014).

According to the NMFS National Stranding Database, there were no gray whale strandings in San Juan Co. in 2013, in the September-February work window scheduled for this project (NMFS 2014b).

Table 3-7 Gray Whale Sightings Days 2008-2013

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

TWM 2014

3.4.3 Humpback Whale

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

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

Like other baleen whales, humpback whales are low-frequency cetaceans. A generalized auditory bandwidth of 7 Hz to 22 kHz has been estimated for all baleen whales (Southall et al. 2007).

3.4.3.1 Numbers

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

3.4.3.2 Status

As a result of commercial whaling, humpback whales were listed as "endangered" under the Endangered Species Conservation Act of 1969. This protection was transferred to the Endangered Species Act (ESA) in 1973. The species is still listed as “endangered”, and consequently the stock is automatically considered as a "depleted" and "strategic" stock under the MMPA. A recovery plan was adopted in 1991 (NMFS 1991). The PBR for this stock is 11.3 animals per year (NMFS 2011d).

3.4.3.3 Distribution

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

In 2012 WSF repaired wingwalls and dolphins at the Anacortes terminal. Over 2 days of monitoring in February of 2012, no Humpback whales were observed within the same 30”/36” vibratory ZOI area that was calculated for this project (Fig. 3-2/3-3) (WSF 2012).

For the years 2008 to 2013, in the September to February timeframe scheduled for this project, The Whale Museum reported three sightings days for Humpback whale in the project quads shown in Figure 3-1(Figure 3-8)(TWM 2014).

According to the NMFS National Stranding Database, there were no Humpback whale strandings in San Juan Co. in 2013, in the September-February work window scheduled for this project (NMFS 2014b).

Table 3-8 Humpback Whale Sightings Days 2008-2013

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

TWM 2014

3.4.4 Minke Whale

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

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

Like other baleen whales, humpback whales are low-frequency cetaceans. A generalized auditory bandwidth of 7 Hz to 22 kHz has been estimated for all baleen whales (Southall et al. 2007).

3.4.4.1 Numbers

According to the 2010 SAR, the minimum population estimate of the CA/OR/WA stock is 202 (NMFS 2011e) and is likely no more than 600 (NE Pacific Minke Project 2014). Information on minke whale population and abundance is limited due to difficulty in detection (Green et al. 1991). Conducting surveys for the minke whale is difficult because of their low profiles, indistinct blows, and tendency to occur as single individuals (Green et al. 1992). Over a 10-year period, 30 individuals were photographically identified in the transboundary area around the San Juan Islands and demonstrated high site fidelity (Dorsey et al. 1990; Calambokidis and Baird 1994). In a single year, up to 19 individuals were photographically identified from around the San Juan Islands (Dorsey et al. 1990).

3.4.4.2 Status

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

3.4.4.3 Distribution

Minke whales are reported in Washington inland waters year-round, although few are reported in the winter (Calambokidis and Baird 1994). Minke whales are relatively common in the San Juan Islands and Strait of Juan de Fuca (especially around several of the banks in both the central and eastern Strait), but are relatively rare in Puget Sound.

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

In 2012 WSF repaired wingwalls and dolphins at the Anacortes terminal. Over 2 days of monitoring in February of 2012, no minke whales were observed within the same 30”/36” vibratory ZOI area that was calculated for this project (Fig. 3-2/3-3) (WSF 2012).

For the years 2008 to 2013, in the September to February timeframe scheduled for this project, The Whale Museum reported one sightings day for minke whale in the project quads shown in Figure 3-1(Table 3-9)(TWM 2014).

According to the NMFS National Stranding Database, there were no minke whale strandings in San Juan Co. in 2013, in the September-February work window scheduled for this project (NMFS 2014b).

Table 3-9 Minke Whale Sightings Days 2008-2013

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

TWM 2014

3.4.5 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 with an estimated auditory bandwidth of 200 Hz to 180 kHz (Southall et. al. 2007).

3.4.5.1 Numbers

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

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

However, populations appear to be rebounding with increased sightings in central Puget Sound (Carretta et al. 2007b) and southern Puget Sound (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).

3.4.5.2 Status

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

3.4.5.3 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 Anacortes 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 (Figures 3-6/3-7).

Hall (2004) found that the frequency of sighting of harbor porpoises decreased with increasing depth beyond 150 m with the highest numbers observed at water depths ranging from 61 to 100 m. Although harbor porpoises have been spotted in deep water, they tend to remain in shallower shelf waters (<150 m) where they are most often observed in small groups of one to eight animals (Baird 2003). Water depths within the Anacortes ZOIs range from 0 to 117 m, with roughly 1/3 of the ZOI area within the 61-100 m depth where the highest number of harbor porpoises may be observed.

The Pacific Biodiversity Institute's (PBI) Harbor Porpoise Project has been collecting data on harbor porpoise presence in north Puget Sound and the San Juan Islands area since 2007. Methods include C-pod passive hydro-acoustic detection, land-based volunteer observers and opportunistic sightings.

From December 2009-December 2010, 105 hours of observations were made by PBI volunteers over 32 days at Burrows Pass, approximately one mile SW of the ferry terminal (Figure 3-8). Harbor porpoise were present for 42 of those 105 hours, generally in groups of two to four. The largest group observed was 10. Observations suggest a seasonal variation, with harbor porpoise more present in fall and winter, though this study was not robust enough to confirm the variation (PBI 2011).

In June-August 2012, a C-pod located in Guemes Channel (Figure 3-6) detected harbor porpoise 34 out of 40 days, from one to seven hours per day. In November-December 2012, harbor porpoise was detected 25 out of 37 days, one to four hours per day. Land-based observers located at SE Point on Guemes Island (Figure 3-6) observed harbor porpoise 31out of 58 days in August-November 2013, with the most observations occurring in September. Opportunistic sightings in Rosario Strait (Figure 3-6) from May 2011-November 2012 indicate harbor porpoise present each month, with large aggregations present during some months (Figure 3-7) (PBI 2014). For the months scheduled for this project, the average large aggregate is 17 individuals.

In 2012 WSF repaired wingwalls and dolphins at the Anacortes terminal. Over 2 days of monitoring in February of 2012, 19 harbor porpoise were observed within or near the same 30"/36" vibratory ZOI area that was calculated for this project (Fig. 3-8/3-9) (WSF 2012).

For the years 2008 to 2013, in the September to February timeframe scheduled for this project, The Whale Museum reported 15 sightings days for harbor porpoise in the project quads shown in Figure 3-1(Table 3-10)(TWM 2014).

According to the NMFS National Stranding Database, there were no harbor porpoise strandings in San Juan Co. in 2013, in the September-February work window scheduled for this project (NMFS 2014b).

Figure 3-6 PBI Harbor Porpoise Observations Areas

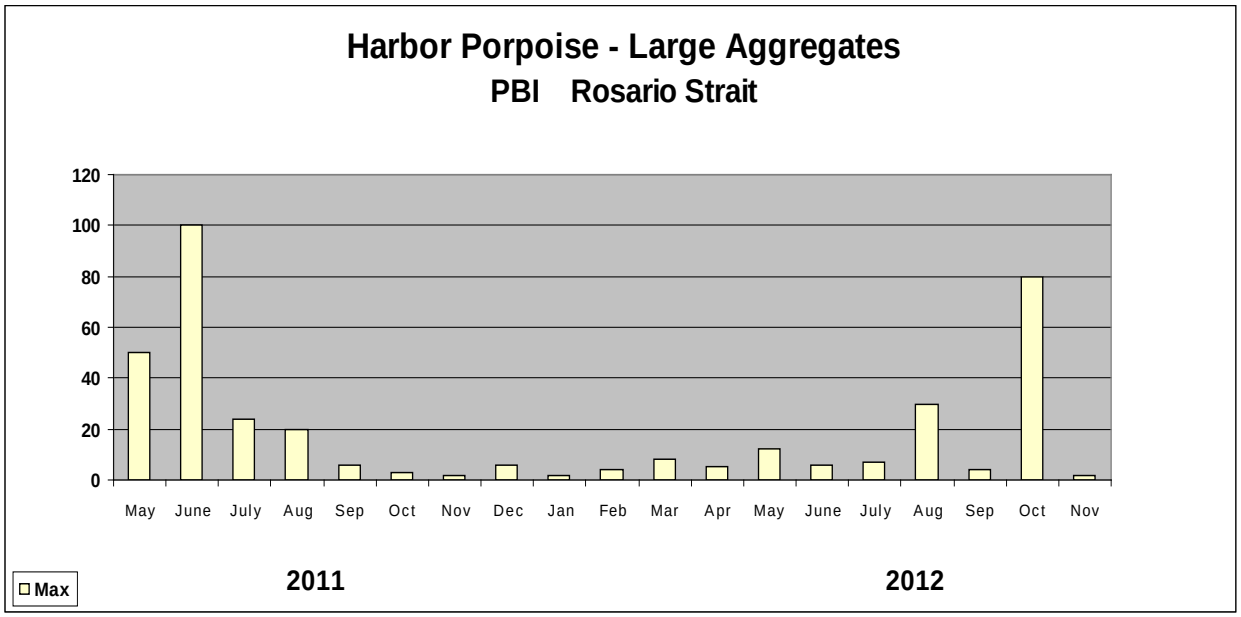

Figure 3-7 Harbor Porpoise - Large Aggregates (PBI 2014)

Table 3-10 Harbor Porpoise Sightings Days 2008-2013

Sept	Oct	Nov	Dec	Jan	Feb
5	4	5	0	0	1

TWM 2014

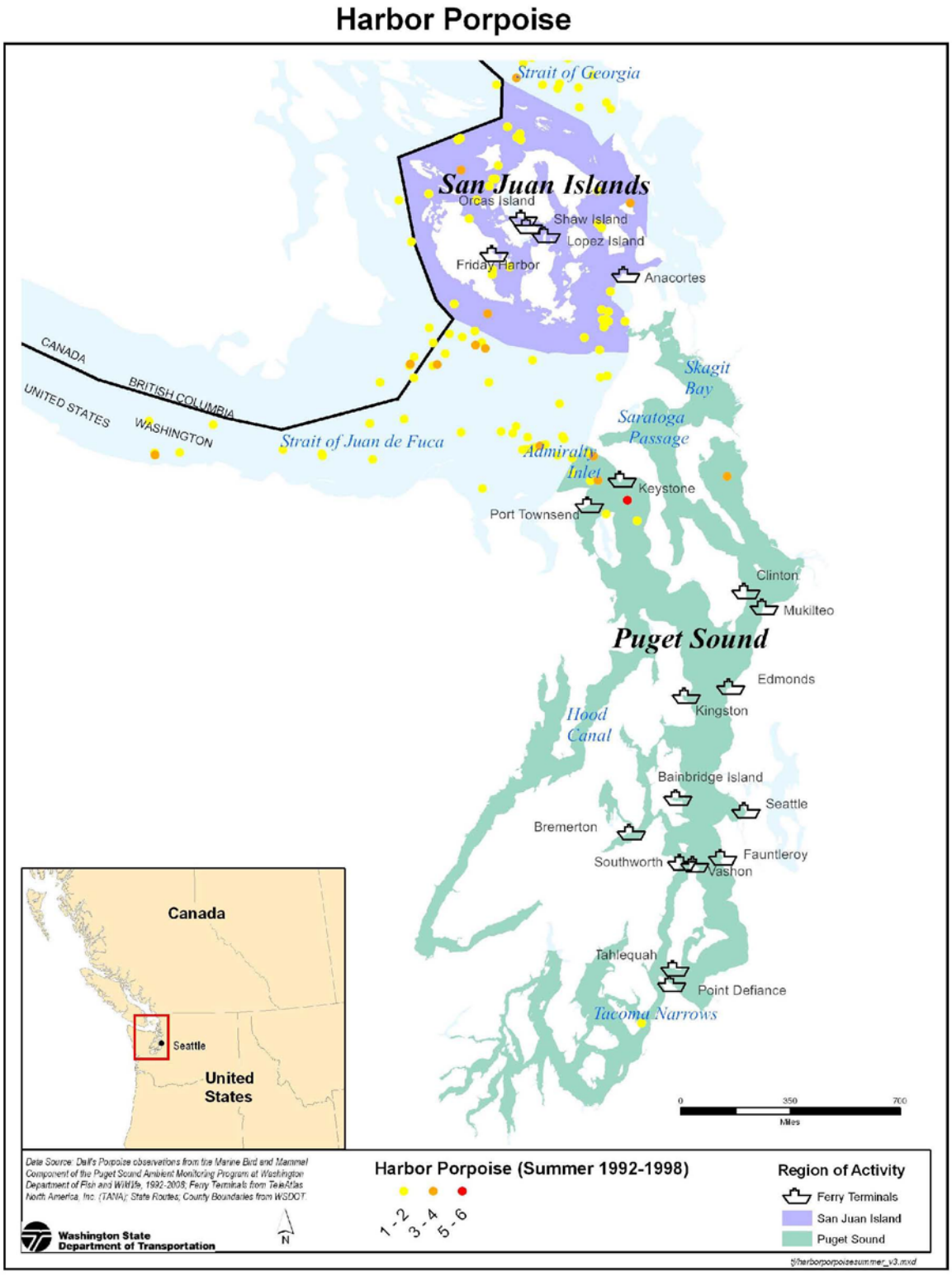

Figure 3-8 Harbor Porpoise Summer Sightings (groups) (WDFW 2008)

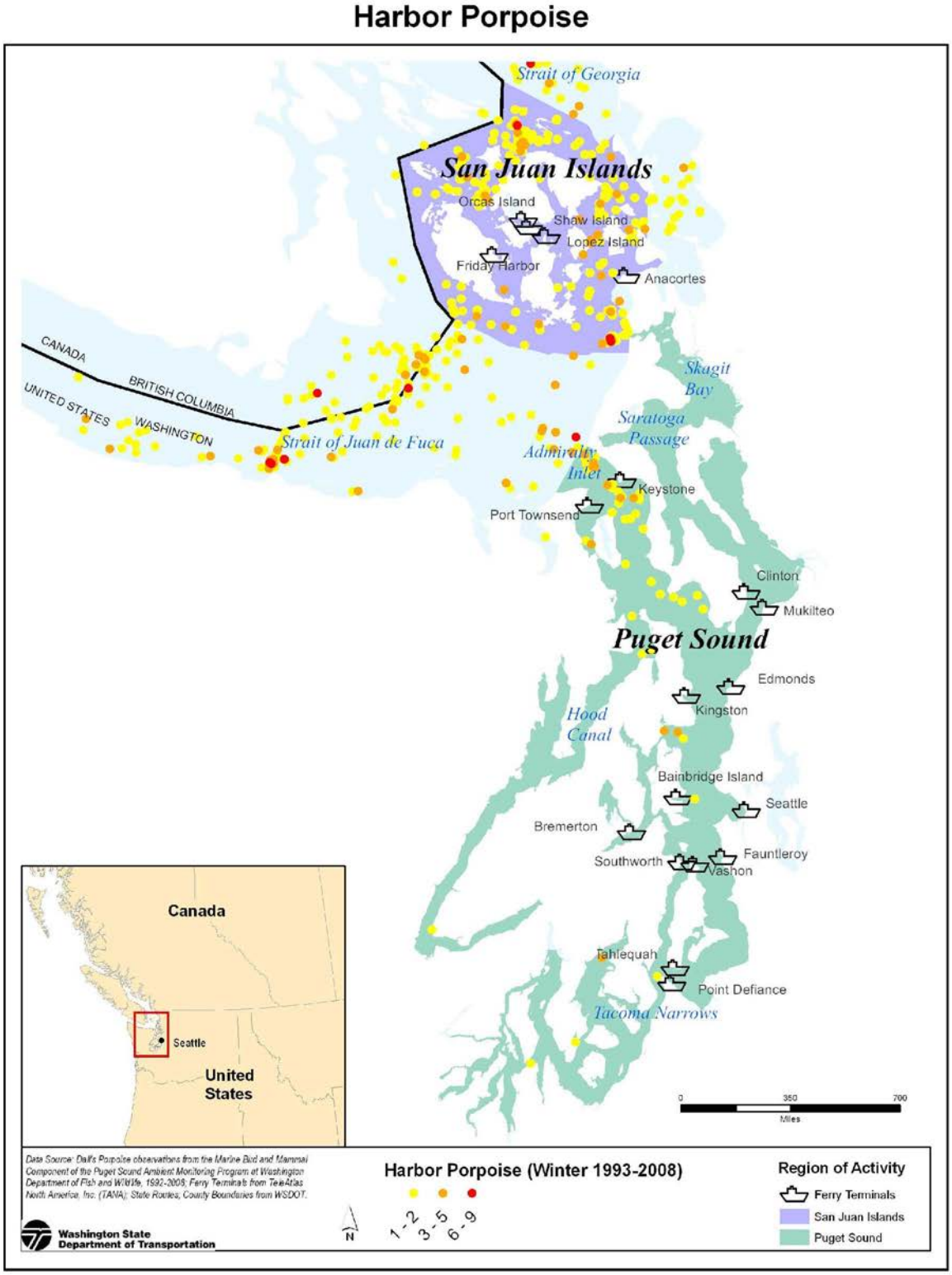

Figure 3-9 Harbor Porpoise Winter Sightings (groups) (WDFW 2008)

3.4.6 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 with an estimated auditory bandwidth of 200 Hz to 180 kHz (Southall et. al. 2007).

3.4.6.1 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 2011g). Within the inland waters of Washington and British Columbia, this species is most abundant in the Strait of Juan de Fuca east to the San Juan Islands. The most recent Washington's inland waters estimate is 900 animals (Calambokidis et al. 1997). Prior to the 1940s, Dall's porpoises were not reported in Puget Sound.

3.4.6.2 Status

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

3.4.6.3 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 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 (Figures 3-10/3-11). The average winter group size is three animals (WDFW 2008).

Dall's porpoise are generally found in deeper waters than harbor porpoise. Water depths within the Anacortes ZOI are generally shallower than Dall's porpoise may prefer.

In 2012 WSF repaired wingwalls and dolphins at the Anacortes terminal. Over 2 days of monitoring in February of 2012, no Dall's porpoise were observed within or near the same 30"/36" vibratory ZOI area that was calculated for this project (Fig. 3-2/3-3) (WSF 2012).

For the years 2008 to 2013, in the September to February timeframe scheduled for this project, The Whale Museum reported one sightings day for Dall's porpoise in the project quads shown in Figure 3-1(Table 3-11)(TWM 2014).

According to the NMFS National Stranding Database, there were no Dall's porpoise strandings in San Juan Co. in 2013, in the September-February work window scheduled for this project (NMFS 2014b).

Table 3-11 Dall's Porpoise Sightings Days 2008-2013

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

TWM 2014

3.4.7 Pacific White-sided Dolphin

Pacific white-sided dolphins (*Lagenorhynchus obliquidens*) are divided into northern and southern stocks comprising two discrete, non-contiguous areas: 1) waters off California, Oregon, and Washington; and 2) Alaskan waters (Carretta et al. 2007b). The CA/OR/WA stock may be present in the project area.

Pacific white-sided dolphins are occasionally seen in the northernmost part of the Strait of Georgia and in western Strait of Juan de Fuca, but are generally only rare visitors to this area (Calambokidis and Baird 1994). This species is rarely seen in Puget Sound. Pacific white-sided dolphins have been documented primarily in deep, off-shore areas (Green et al. 1992, 1993; Calambokidis et al. 2004a).

Pacific white-sided dolphins are mid-frequency cetaceans with an estimated auditory bandwidth of 150 Hz to 160 kHz (Southall et al. 2007).

3.4.7.1 Numbers

The California, Oregon, and Washington stock mean abundance estimate based on the two most recent ship surveys is 25,233 Pacific white-sided dolphins (Forney 2007). This abundance estimate is based on two summer/autumn shipboard surveys conducted within 300 nautical miles of the coasts of California, Oregon, and Washington in 2001 and 2005 (Barlow 2003, Forney 2007). Surveys in Oregon and Washington coastal waters resulted in an estimated abundance of 7,645 animals (Forney 2007).

Fine-scale surveys in Olympic Coast slope waters and the Olympic Coast National Marine Sanctuary resulted in an estimated abundance of 1,196 and 1,432 animals, respectively (Forney 2007), but there are no population estimates for Washington's inland waters. During aerial surveys of Washington inland waters conducted under WDFW's PSAMP program between 1992 and 2008, only a single group of three Pacific white-sided dolphins was observed (summer 1995 in the Strait of Juan de Fuca), although Osborne et al. (1988) states they are regularly reported in the Strait of Juan de Fuca and Haro Strait. There are few records for Puget Sound.

3.4.7.2 Status

Pacific white-sided dolphins are classified as non-depleted under the MMPA, and are not listed under the ESA. The PBR for this stock is 193 dolphins per year (NMFS 2011h).

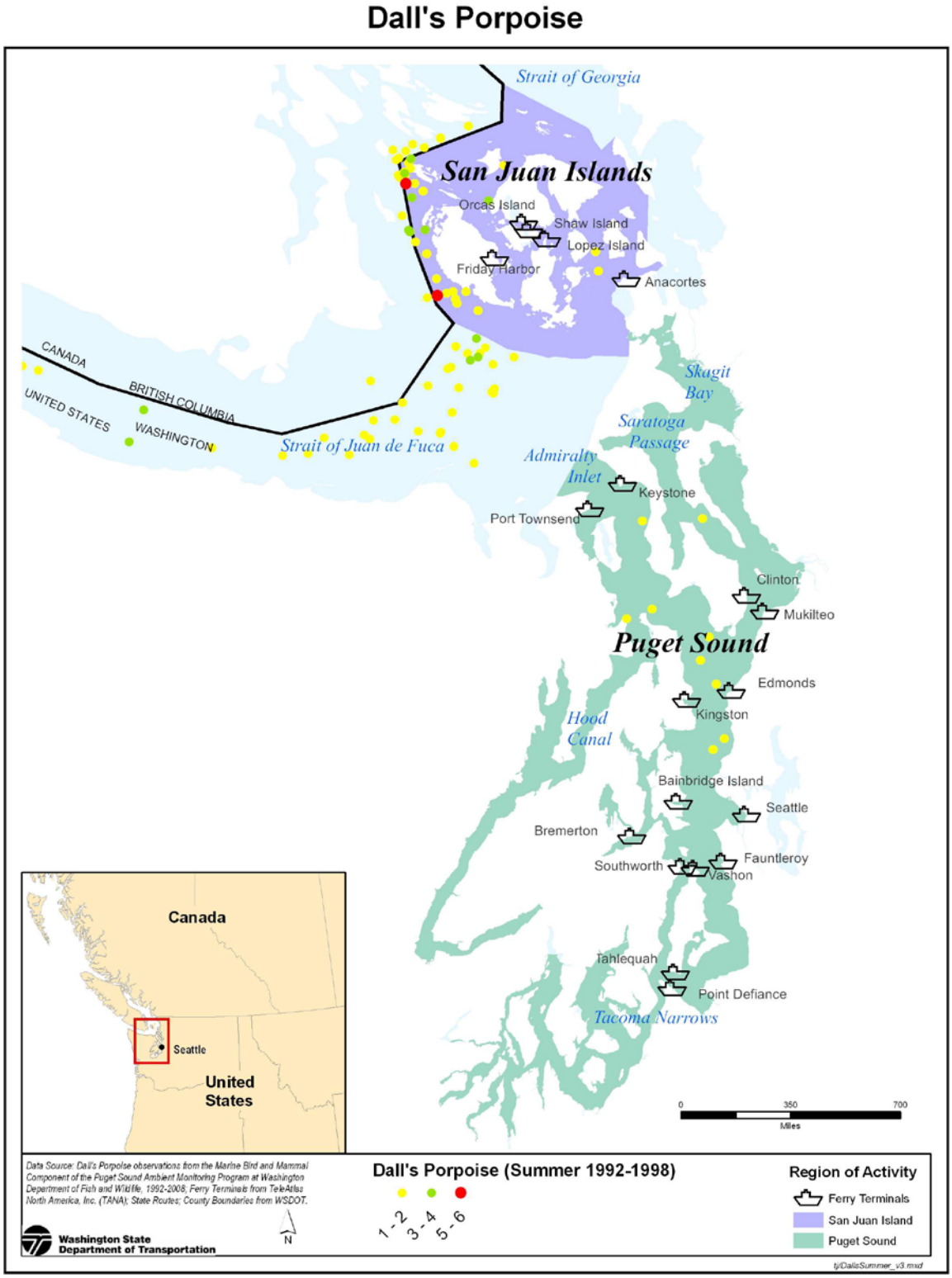

Figure 3-7 **Dall's Porpoise Summer Sightings (groups) (WDFW 2008)**

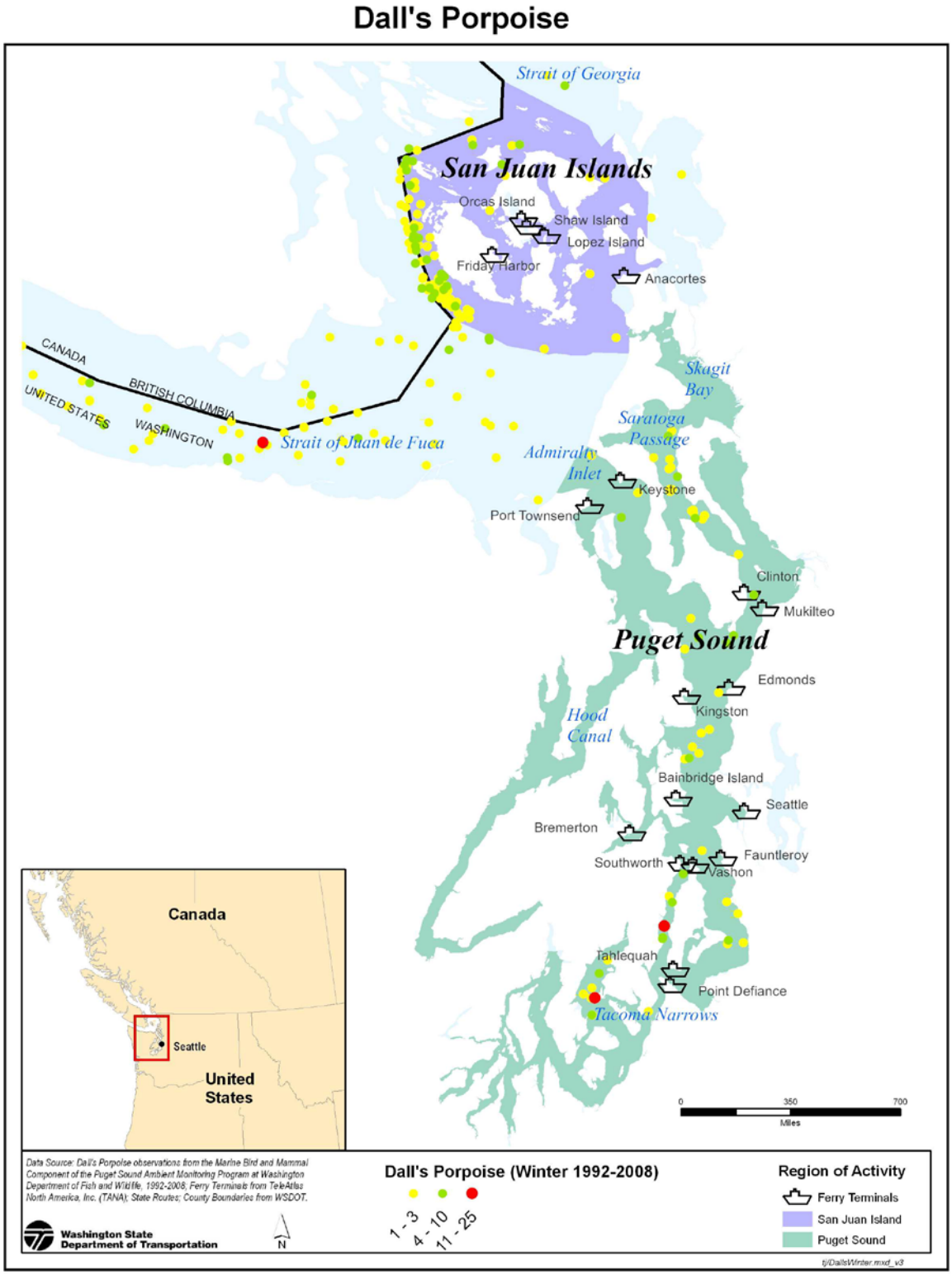

Figure 3-8 **Dall's Porpoise Winter Sightings (groups) (WDFW 2008)**

3.4.7.3 Distribution

The Pacific white-sided dolphin is primarily a pelagic species that feeds along the continental slope or the shelf edge (Green et al. 1993; Calambokidis et al. 2004a).

Sighting patterns from aerial and shipboard surveys conducted in California, Oregon, and Washington at different times of the year (Green et al. 1992, 1993; Barlow 1995; Forney et al. 1995) suggest seasonal north-south movements, with animals found primarily off California during the colder water months and shifting northward into Oregon and Washington as water temperatures increase in late spring and summer (Green et al. 1992).

Pacific white-sided dolphins have been reported to be regular summer and fall inhabitants of the Strait of Juan de Fuca and San Juan Islands (specifically Haro Strait) (Osborne et al. 1988), but are extremely rare in Puget Sound. A super-pod of over 1,000 was reported in Haro Strait in November 2013 (CBC 2013). The average pod size for Pacific white-sided dolphins is 10-100 (NMFS 2014c).

In 2012 WSF repaired wingwalls and dolphins at the Anacortes terminal. Over 2 days of monitoring in February of 2012, no Pacific White-sided dolphins were observed within or near the same 30”/36” vibratory ZOI area that was calculated for this project (Fig. 3-2/3-3) (WSF 2012).

For the years 2008 to 2013, in the September to February timeframe scheduled for this project, The Whale Museum reported three sightings days for Pacific white-sided dolphin in the project quads shown in Figure 3-1(Table 3-12) (TWM 2014).

According to the NMFS National Stranding Database, there were no Pacific white-sided dolphin strandings in San Juan Co. in 2013, in the September-February work window scheduled for this project (NMFS 2014b).

Table 3-12 Pacific White-sided Dolphin Sightings Days 2008-2013

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

TWM 2014

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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. Each required topic (status, distribution, and seasonally distribution) has been clearly marked as a subheading in Section 3.0 for ease of finding relevant information.

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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.

5.1 Incidental Take Authorization Request

Under Section 101 (a)(5)(D) of the MMPA, WSF requests that the permit be issued September 1, 2015 and be active for one year, until August 31, 2016, for Level B incidental take (behavioral harassment) of the marine mammals described in this application during the replacement of wingwalls and dolphins during the Anacortes project. The purpose of a full year permit is in case there are any unforeseen events during construction that would require some work be finished during the next in-water work window, but before the permit expires.

Specifically, the requested authorization is for incidental harassment of any marine mammal that might enter the 123 dB underwater background ZOIs during active vibratory pile removal and driving.

5.2 Method of Incidental Taking

The method of incidental take is Level B acoustical harassment of any marine mammal occurring within the 123 dB underwater background ZOIs during vibratory pile removal driving.

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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 construction activities from WSF's anticipated projects described in Section 1.2 of this IHA. Section 6.2 describes the methods used to calculate 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 vibratory hammer source levels, this IHA application will incidentally take by Level B acoustical harassment small numbers of harbor seals, California sea lions, Steller sea lions, Elephant seals, killer whales, gray whales, humpback whales, minke whales, harbor porpoise, Dall's porpoise and Pacific White-sided dolphin. With the exception of harbor seals and California sea lions, it is anticipated that all of the marine mammals that enter a Level B acoustical harassment ZOI will be exposed to vibratory hammer noise only briefly as they are transiting the area. Only harbor seals and California sea lions are expected to forage and haulout in the Anacortes ZOI with any frequency and could be exposed multiple times during a project.

6.1 Estimated Duration of Pile Driving

As stated in Section 2.0, a worst-case scenario for the Anacortes project assumes that it may take 95 hours over 36 days to remove and install the piles (Table 2-1). The actual number of hours and days is expected to be less.

6.2 Estimated Zones of Influence

The distances to the NMFS thresholds for Level B (harassment) take for vibratory pile removal and driving were presented in Section 1.6.6. The Anacortes ZOIs were calculated from these distances (Figure 1-6 and 1-7). Distances are summarized below.

Table 6-1 In-water/In-air Threshold Distances

Vibratory Pile Type/Method	Source Level	Threshold	ZOI Distance	In-air Distance
12-inch timber removal	152 dB_{RMS}	123 dB_{RMS}	1.6 km/1.0 mi	----------
24-inch steel removal/driving	162 dB_{RMS}	123 dB_{RMS}	4.0 km/2.5 mi	----------
30-inch steel driving	174 dB_{RMS}	123 dB_{RMS}	26 km/16 mi	----------
36-inch steel driving	177 dB_{RMS}	123 dB_{RMS}	40 km/25 mi	----------
All piles/in-air	98 dB_{RMS}*	90 dB_{RMS}**	----------	30 m/100 ft.
All piles/in-air	98 dB_{RMS}*	100 dB_{RMS}***	----------	10 m/32 ft.

*In-air **harbor seals ***other pinnipeds

For 30- and 36-inch piles, land is reached in approximately 11 miles maximum.

The closest documented harbor seal haulout to the Anacortes terminal is approximately 2.0 miles SW. This and additional haulouts are shown in Figure 3-2. Three seal haulouts are within the ZOI, and three more are near the ZOI. There are no documented California sea lion haulout sites near the project area, though California sea lions may use undocumented haulout sites, and have been observed in the project area. The closest Steller sea lion haul out site to the Anacortes terminal are the Bird Rocks (approximately 6.5 km/4.0 mi SW), and the North Peapod Rock haulout (approximately 17 km\10 mi NW) (Fig. 3-1).

Temporary in-air disturbance will be limited to harbor seals swimming on the surface through the immediate terminal area within 30 m/100 ft. of pile removal/driving, and all other pinnipeds within 10 m/32 ft. of pile removal/driving (Fig. 3-2).

6.3 Estimated Incidental Takes

Incidental take is calculated for each species by estimating the likelihood of a marine mammal being present within a ZOI during active pile removal/driving. Expected marine mammal presence is determined by past observations and general abundance near the Anacortes ferry terminal during the construction window. Ideally, potential take is estimated by multiplying the area of the ZOI by the local animal density. This provides an estimate of the number of animals that might occupy the ZOI at any given moment. However, there are no density estimates for any Puget Sound population of marine mammal.

As a result, the take requests were estimated using local marine mammal data sets, and information from state and federal agencies. All haulout and observation data available are summarized in Section 3. Project duration is presented in Section 2.

The calculation for marine mammal exposures is estimated by:

Exposure estimate = N (number of animals) * XX days of pile removal/driving activity

For some species, it is assumed that they may be present every day of pile removal/driving. Other species will be present occasionally, therefore less than 36 days is used in those calculations. For all of the calculations, it is assumed that this number will include multiple harassments of the same individual(s).

Estimates include Level B acoustical harassment during vibratory pile removal and driving. All estimates are conservative, as pile removal/driving will not be continuous during the work day.

6.3.1 Harbor Seal

Based on the WSF 2012 sightings data, and the size of the ZOIs, it is assumed that up to 25 harbor seals may be present, and may forage regularly in the ZOIs.

Exposure estimate = 25 animals * 36 days of pile removal/driving activity

Therefore, WSF is requesting authorization for Level B acoustical harassment of 900 harbor seals.

6.3.2 California Sea Lion

Based on the size of the ZOIs, and the Whale Museum sightings days, it is assumed that as many as 5 California sea lions may be present, and may forage regularly in the ZOIs.

Exposure estimate = 5 animals * 36 days of pile removal/driving activity

Therefore, WSF is requesting authorization for Level B acoustical harassment take of 180 California sea lions.

6.3.3 Steller Sea Lion

Based on the size of the ZOIs, and the Whale Museum sightings days, it is assumed that as many as 10 Steller sea lions may be present, and may forage regularly in the ZOIs.

Exposure estimate = 10 * 36 days of pile removal/driving activity

Therefore, WSF is requesting authorization for Level B acoustical harassment take of 360 Steller sea lions.

6.3.1 Northern Elephant Seal

Elephant seals have been observed hauled out in the San Juan Islands, but the likelihood of an elephant seal entering an active Level B ZOI is low. However, because they spend large amounts of time below the water surface where they are cannot be detected, it is assumed that as many as two Northern Elephant seals may be present, and may forage regularly in the ZOIs.

Exposure estimate = 2 * 36 days of pile removal/driving activity

Therefore, WSF is requesting authorization for Level B acoustical harassment take of 72 Northern Elephant seals.

6.3.2 Southern Resident Killer Whale

Due to the status of SRKW, NMFS is limiting Level B harassment to 'unintentional take' of 5% of the stock per year (Guan 2014). As of December 31, 2013, the official SRKW population is 80, and 5 percent of the stock is 4 individuals.

Therefore, WSF is requesting authorization for Level B acoustical harassment 'unintentional take' of 4 SRKW.

To ensure that project take does not exceed 5%, the following monitoring steps will be implemented (see Appendix A – Monitoring Plan):

- The intent of monitoring is to prevent any take of SRKW.
- If SRKW approach the ZOIs during vibratory pile removal or driving, work will be paused until the SRKW exit the ZOIs.
- If killer whale approach the ZOIs during vibratory pile removal or driving, and it is unknown whether they are SRKW or Transient, it shall be assumed they are SRKW and work will be paused until the whales exit the ZOIs.

- If SRKW enter the ZOIs undetected, up to four unintentional Level B harassment takes are requested. Work will be paused until the SRKW exit the ZOIs to avoid further Level B harassment take.
- The four unintentional Level B harassment takes will be used only if necessary.

6.3.3 Transient Killer Whale

Based on the Whale Museum sightings days, it is assumed that a pod size of 5 may be present up to 14 days ('sightings' days) and may forage in the ZOIs.

Exposure estimate = 5 * 14 days

Therefore, WSF is requesting authorization for Level B acoustical harassment take of 70 transient killer whales.

6.3.4 Gray Whale

Based on the Whale Museum sightings days, it is assumed that one Gray whale may be present, and may forage in the ZOIs.

Exposure estimate = 1 * 36 days of pile removal/driving activity

Therefore, WSF is requesting authorization for Level B acoustical harassment take of 36 gray whales.

6.3.5 Humpback Whale

Based on the Whale Museum sightings days, it is assumed that three Humpback whales may be present, and may forage in the ZOIs. It is assumed that if a humpback whale enters the ZOIs, it will not remain, but may be present in the ZOIs for 10 days as it forages in the area.

Exposure estimate = 3 * 10 days of pile removal/driving activity

Therefore, WSF is requesting authorization for Level B acoustical harassment take of 30 Humpback whales.

6.3.6 Minke Whale

Based on the Whale Museum sightings days, it is assumed that one minke whale may be present, and may forage in the ZOIs. It is assumed that if a minke whale enters the ZOIs, it will not remain, but may be present in the ZOIs for 10 days as it forages in the area.

Exposure estimate = 1 * 10 days of pile removal/driving activity

Therefore, WSF is requesting authorization for Level B acoustical harassment take of 10 minke whales.

6.3.7 Harbor Porpoise

Based on the PBI Large Aggregates data, it is assumed that an average pod size of 17 Harbor porpoise may be present, and may forage in the ZOIs.

Exposure estimate = 17 * 36 days of pile removal/driving activity

Therefore, WSF is requesting authorization for Level B acoustical harassment take of 612 Harbor porpoise.

6.3.8 Dall's Porpoise

It is assumed that an average winter group size of three Dall's porpoise may be present, and may forage in the ZOIs.

Exposure estimate = 3 * 36 days of pile removal/driving activity

Therefore, WSF is requesting authorization for Level B acoustical harassment take of 108 Dall's porpoise.

6.3.9 Pacific White-sided Dolphin

It is assumed that a pod size of 10 Pacific white-sided dolphins may be present, and may forage in the ZOIs.

Exposure estimate = 10 * 36 days of pile removal/driving activity

Therefore, WSF is requesting authorization for Level B acoustical harassment take of 360 Pacific White-Sided dolphins.

6.4 Number of Takes for Which Authorization is Requested

The total number of takes for which for Level B acoustical harassment take authorization is requested is presented in the table below:

Table 6-2 Level B Acoustical Harassment Take Request

Species	Take Request
Harbor Seal	900
California Sea Lion	180
Steller Sea Lion	360
Northern Elephant Seal	72
SR Killer Whale	4
Transient Killer Whale	70
Gray Whale	36
Humpback Whale	30
Minke Whale	10
Harbor Porpoise	612
Dall's Porpoise	108
Pacific White-sided Dolphin	360

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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.

7.1 Introduction

For the Anacortes project, the total number of pile removal and driving hours is estimated not to exceed 95 hours over 36 days (Table 2-1). These activities generate sounds that exceed Level B disturbance thresholds to local marine mammals.

WSF is requesting authorization for Level B acoustical harassment take of 900 harbor seals, 180 California sea lions, 360 Steller sea lions, 72 Northern Elephant seals, 4 SR killer whales, 70 Transient killer whales, 36 gray whales, 108 humpback whales, 612 harbor porpoise, 108 Dall's porpoise and 360 Pacific White-sided dolphins (Table 7-1).

These numbers in relation to the overall stock size of each species, and the effect that Level B acoustical harassment could have to individual recruitment or survival within each stock of marine mammal, are discussed below, and summarized in Table 7-1. Citations for stock size were provided in section 3.0 Species and Numbers of Marine Mammals in the Area.

7.2 Harbor Seal

The inland Washington waters stock is estimated at 14,612 (NMFS 2011a). This application requests incidental take of up to 900 individuals, or 6 percent of the stock.

7.3 California Sea Lion

The U.S. stock was estimated at 296,750 (NMFS 2011b). This application requests incidental take of up to 180 individuals, or 0.06 percent of the stock.

7.4 Steller Sea Lion

The eastern stock of Steller sea lions is estimated to be 52,847. This application requests incidental take of up to 360 individuals, or 0.7 percent of the stock.

7.5 Northern Elephant Seal

The California stock was estimated at 124,000 individuals in 2005. This application requests incidental take of up to 72 individuals, or 0.06 percent of the stock.

7.6 Killer Whale

The SR stock is at 80. This application requests incidental take of up to 4 SRKW, or 5 percent of the stock.

The West Coast Transient stock is estimated at 354. This application requests incidental take of up to 70 individuals, or 20 percent of the stock.

7.7 Gray Whale

The North Pacific Gray whale stock is estimated at 18,017. This application requests incidental take of up to 36 individuals, or 0.2 percent of the stock.

7.8 Humpback Whale

The California-Oregon-Washington (CA-OR-WA) stock of minke whale is estimated at 2,043. This application requests incidental take of up to 30 individuals, or 1.5 percent of the stock.

7.9 Minke Whale

The California-Oregon-Washington (CA-OR-WA) stock of humpback whale is estimated at 202-600. This application requests incidental take of up to 10 individuals, or 1.7-5 percent of the stock.

7.10 Harbor Porpoise

The Washington Inland Waters Stock of harbor porpoise is estimated to be 10,682. This application requests incidental take of up to 612 individuals, or 5.7 percent of the stock.

7.11 Dall's Porpoise

The California, Oregon, and Washington stock is estimated to be 42,000. This application requests of incidental take of up to 180 individuals, or 0.3 percent of the stock.

7.12 Pacific White-sided Dolphin

The California, Oregon, and Washington stock estimate is 25,233 Pacific white-sided dolphins . This application requests of incidental take of up to 360 individuals, or 1.4 percent of the stock.

7.13 Anticipated Impact on Stocks

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

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

Species	Stock Size	Take Request	Take Request % of Stock
Harbor Seal	14,612	900	6.0
California Sea Lion	296,750	180	0.06
Steller Sea Lion	52,847	360	0.7
Northern Elephant Seal	124,000	72	0.06
SR Killer Whale	81	4	5.0
Transient Killer Whale	354	70	20
Gray Whale	18,017	36	0.2
Humpback Whale	2,043	30	1.5
Minke Whale	202-600	10	1.7-5
Harbor Porpoise	10,682	612	5.7
Dall's Porpoise	42,000	108	0.3
Pacific White-sided Dolphin	25,233	360	1.4

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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.

This issue is only applicable to activities taking place in and around Alaska. *There are no relevant subsistence uses of marine mammals implicated by this action.*

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 through increases in-water sound pressure levels and in-air noise from pile removal and driving. Other potential temporary changes are water quality (primarily through 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 11.0 Mitigation Measures.

9.2 In-air Noise Disturbance to Haulouts

In-air noise from vibratory pile removal and driving is estimated to reach the behavioral threshold at 30 m/100 ft. for harbor seals and 10 m/32 ft. for all other pinnipeds. No documented haulout sites are within the in-air disturbance threshold distances, though pinnipeds may be hauled out on a nearby beach. The project is scheduled to begin September 1, 2015. For the northern Puget Sound region, pups are born from late June through August. After October 1 all pups in the inland waters of Washington are weaned. Disturbance of pinnipeds hauled out near the project, and surfacing when swimming within the threshold distances is possible.

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

9.3 In-water Noise Disturbance

NMFS is currently using an in-water noise disturbance threshold of 120 dB_{RMS} for pinnipeds and cetaceans for continuous noise sources, and 160 dB_{RMS} for impact noise sources. This project is applying a 123 dB_{RMS} underwater background for vibratory pile removal and driving. The distances to the Level B acoustical harassment thresholds are described in section 1.6.5 Attenuation to NMFS Thresholds.

There are several short-term and long-term effects from noise exposure that may occur to marine mammals, including impaired foraging efficiency, 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 NMFS (2008a) states that the threshold levels at which anthropogenic noise becomes harmful to killer whales are poorly understood. Because marine mammal occurrence is transient near the Anacortes ferry terminal, and in-water noise impacts are localized and of short duration, any impact on individual marine mammals will be limited.

9.4 Water and Sediment Quality

Short-term turbidity is a water quality effect of most in-water work, including 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 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 (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, local turbidity levels (from removal of timber and steel piles) did not exceed 0.2 NTU above background levels. 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 Anacortes 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 removal and driving operations at the Anacortes ferry terminal will not obstruct movements of marine mammals. The operations at Anacortes will occur within 152 m/500 ft. of the shoreline, leaving 3.2 km/2.0 miles of Puget Sound for marine mammals to pass.

A construction barge will be used during the project. The barge will be anchored and/or 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 utilizing habitat near the terminal will be transiting the terminal area.

For the most part, 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 to the maximum extent possible, BMPs, operating outside the fish window), the proposed 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 occur within the existing Anacortes ferry terminal operational footprint and is not expected to 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 and in-air noise, prey (fish) disturbance, 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. 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 [MMs]) to avoid and minimize impacts on the environment, ESA species, designated critical habitats and species protected under the MMPA.

The MMs will be employed during all pile removal and driving during the Anacortes project. The language in each MM 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 MMs is a contract violation.

General MMs used for all construction practices are listed first (Section 11.1, All Construction Activities), followed by specific MMs for pile related activities (Section 11.2, Pile Removal and Installation). The MMs listed under Section 11.1 apply to different activities and are, therefore, listed additional times where appropriate. Specific MMs have been developed to reduce the potential for harassment to marine mammals; these are described beginning in Section 11.2.3.

11.1 All Construction Activities

All WSF construction is performed in accordance with the current WSDOT Standard Specifications for Road, Bridge, and Municipal Construction. Special Provisions in preservation, repair and capital contracts are used in conjunction with, and supersede, any conflicting provisions of the Standard Specifications.

WSF policy and construction administration practice is to have a WSF inspector on site during construction. The role of the inspector is to ensure contract compliance. The inspector and the contractor each have a copy of the Contract Plans and Specifications on site and are aware of all requirements. The inspector is also trained in environmental provisions and compliance.

MMs include:

- Projects and associated construction activities will be designed so potential impacts on species and habitat are avoided and minimized to the extent practicable.
- The contractor will be advised that eelgrass beds are protected under state and federal law. When work will occur near eelgrass beds, WSF will provide plan sheets showing eelgrass boundaries to the contractor. The contractor shall exercise extreme caution when working in the area indicated on the plans as “Eelgrass Beds.” The contractor shall adhere to the following restrictions during the life of the contract. The contractor shall not:

- Place derrick spuds or anchors in the area designated as "Eelgrass."
- Shade the eelgrass beds for a period of time greater than 3 consecutive days during the growing season (generally March through September).
- Allow debris or any type of fuel, solvent, or lubricant in the water.
- Perform activities which could cause significant levels of sediment to contaminate the eelgrass beds.
- Conduct activities that may cause scouring of sediments within the eelgrass beds or other types of sediment transfer out of or into the eelgrass beds.
- Any damage to eelgrass beds or substrates supporting eelgrass beds that results from a contractor's operations will be repaired at the contractor's expense.

- WSF will obtain Hydraulic Project Approval (HPA) from WDFW as appropriate and the contractor will follow the conditions of the HPA. HPA requirements are listed in the contract specifications for the contractor to agree to prior to construction, and the HPA is attached to the contract such that conditions of the HPA are made part of the contract.
- WSF will comply with water quality restrictions imposed by Ecology (Chapter 173-201A WAC), which specifies a 150 ft. 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 practical.
- 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. SPCC requirements include:
  - The plan shall be submitted to the Project Engineer prior to the commencement of any construction activities. A copy of the plan with any updates will be maintained at the work site by the contractor.
  - 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, fresh cement, lime or concrete, chemicals, or other toxic or deleterious materials shall be allowed to enter surface waters.

- 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.
- All construction equipment will comply with applicable equipment noise standards of the U.S. Environmental Protection Agency, and all construction equipment will have noise control devices no less effective than those provided on the original equipment.

11.1.1 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 Anacortes project is July 16 through February 15. Actual construction activities are planned to take place from September 1, 2015 and February 15, 2016.

11.2 Pile Removal and Driving

The vibratory hammer method will be used to remove and drive piles to minimize noise levels. Marine mammal monitoring during vibratory pile removal will be employed for the Level B ZOIs.

11.2.1 Marine Mammal Monitoring

11.2.1.1 Coordination

WSF will conduct briefings between the construction supervisors and the crew and Protected Species Observer(s) (PSO) prior to the start of pile-driving activity, marine mammal monitoring protocol and operational procedures.

Prior to the start of pile driving, the Orca Network and/or Center for Whale Research will be contacted to find out the location of the nearest marine mammal sightings. 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 driving.

11.2.1.2 Visual Monitoring

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

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 PSOs will be present on site during pile driving. A monitoring plan is provided in Appendix A.

11.2.1.3 Soft Start

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

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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 the Georgia Basin. 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 Monitoring Plan

WSF has developed a marine mammal monitoring plan for this project. The monitoring plan is explained in Section 11.2.2, and provided in Appendix A.

13.2 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 vibratory pile removal and driving at the Anacortes ferry terminal is the primary issue of concern for local marine mammals during this project. WSF has conducted research on sound propagation from vibratory and impact hammers, and plans on continuing that research to provide data for future ferry projects.

Since 2008, WSF has supported research by the University of Washington Applied Physics Lab and School of Mechanical Engineering. Research has focused on measuring and modeling in-water noise from pile driving, the development of a prototype underwater sound level meter (USLM) that can provide real-time measurements of vibratory and impact pile driving in-water noise, and attenuation of impact pile driving noise. The USLM will be used during this project to make adjustments to the ZOIs (see attached USLM Plan).

WSF plans to 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 driving. Marine mammal monitoring will be conducted to collect information on presence of marine mammals within the ZOIs for this project.

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Appendix A

Marine Mammal Monitoring Plan

Anacortes Ferry Terminal
Tie-up Slip Project
Marine Mammal Monitoring Plan

March 20, 2014

In accordance with the April 2014, Washington State Ferries Anacortes Ferry Terminal Tie-up Slip Incidental Harassment Authorization Request, marine mammal monitoring will be implemented during this project.

Qualified Protected Species Observers (PSO) will be present on site at all times during pile removal and driving. Marine mammal behavior, overall numbers of individuals observed, frequency of observation, and the time corresponding to the daily tidal cycle will be recorded.

This project includes vibratory removal of and driving of timber and steel piles. For vibratory pile removal and driving, no injury will occur (SL sounds are less than 180 dB_{RMS}), and so will result in a Level B acoustical harassment ZOIs only.

For vibratory removal and driving, distances to the ZOIs are:

- 152 dB_{RMS} at 16 meters (12-inch timber pile removal) = 1.6 km/1.0 mi
- 162 dB_{RMS} at 10 meters (24-inch steel pile removal/driving) = 4.0 km/2.5 mi
- 174 dB_{RMS} at 10 meters (30-inch steel pile driving) = 26 km/16 mi
- 177 dB_{RMS} at 10 meters (36-inch steel pile removal/driving) = 40 km/25 mi

For 30- and 36-inch piles, land is reached in approximately 11 miles maximum (Figure 1). Measurements of in-water noise levels produced by vibratory removal and driving will be taken with the Underwater Sound Level Meter (see attached USLM plan) during the project. Project ZOIs may be adjusted based on these measurements.

Monitoring to Estimate Take Levels

WSF proposes the following Marine Mammal Monitoring Plan in order to estimate project Level B acoustical harassment take levels in the ZOIs:

- To verify the required monitoring distance, the vibratory Level B acoustical harassment ZOIs will be determined by using a range finder or hand-held global positioning system device.
- The vibratory Level B acoustical harassment ZOIs will be monitored for the presence of marine mammals 30 minutes before, during, and 30 minutes after any pile driving activity.
- Monitoring will be continuous unless the contractor takes a significant break; then the 30 minutes before, during, and 30 minutes monitoring sequence will begin again.
- If marine mammals are observed, their location within the ZOIs, and their reaction (if any) to pile-driving activities will be documented.

- During vibratory timber removal, and 24" steel vibratory pile driving and removal, one land-based PSO will monitor the area from the terminal work site, and one boat with a driver and a PSO will travel through the monitoring area (Figure 2).
- During 30/36" vibratory pile driving, one land-based PSO will monitor the area from the terminal work site, and two boats with two drivers and two PSOs will travel through the monitoring area (Figure 3).

Monitoring to Comply with SRKW Take Levels

To ensure that project take does not exceed 5 percent SRKW unintentional take in the ZOIs, the following monitoring steps will be implemented:

- The intent of monitoring is to prevent any take of SRKW.
- If SRKW approach the ZOIs during vibratory pile driving, work will be paused until the SRKW exit the ZOIs.
- If killer whale approach the ZOIs, and it is unknown whether they are SRKW or transient, it shall be assumed they are SRKW and work will be paused until the whales exit the ZOIs.
- If SRKW enter the ZOIs undetected, up to 4 'unintentional' Level B harassment takes are requested. Work will be paused until the SRKW exit the ZOIs to avoid further Level B harassment take.
- The four unintentional Level B harassment takes will be used only if necessary.

Minimum Qualifications for PSOs

- Visual acuity in both eyes (correction is permissible) sufficient for discernment of moving targets at the water's surface with ability to estimate target size and distance. Use of binoculars may be necessary to correctly identify the target.
- Advanced education in biological science, wildlife management, mammalogy or related fields (Bachelor's degree or higher) is preferred, but not required.
- Experience or training in the field identification of marine mammals (cetaceans and pinnipeds).
- Sufficient training, orientation or experience with the construction operation to provide for personal safety during observations.
- Ability to communicate orally, by radio or in person, with project personnel to provide real time information on marine mammals observed in the area as necessary.
- Experience and ability to conduct field observations and collect data according to assigned protocols (this may include academic experience).
- Writing skills to prepare a report that includes number/type of marine mammals observed; marine mammal behavior in the area during construction, dates/times of observations; dates/times when in-water construction was conducted; dates/times when marine mammals were present near or within the ZOIs; dates/times when in-water construction was suspended to avoid SRKW take.

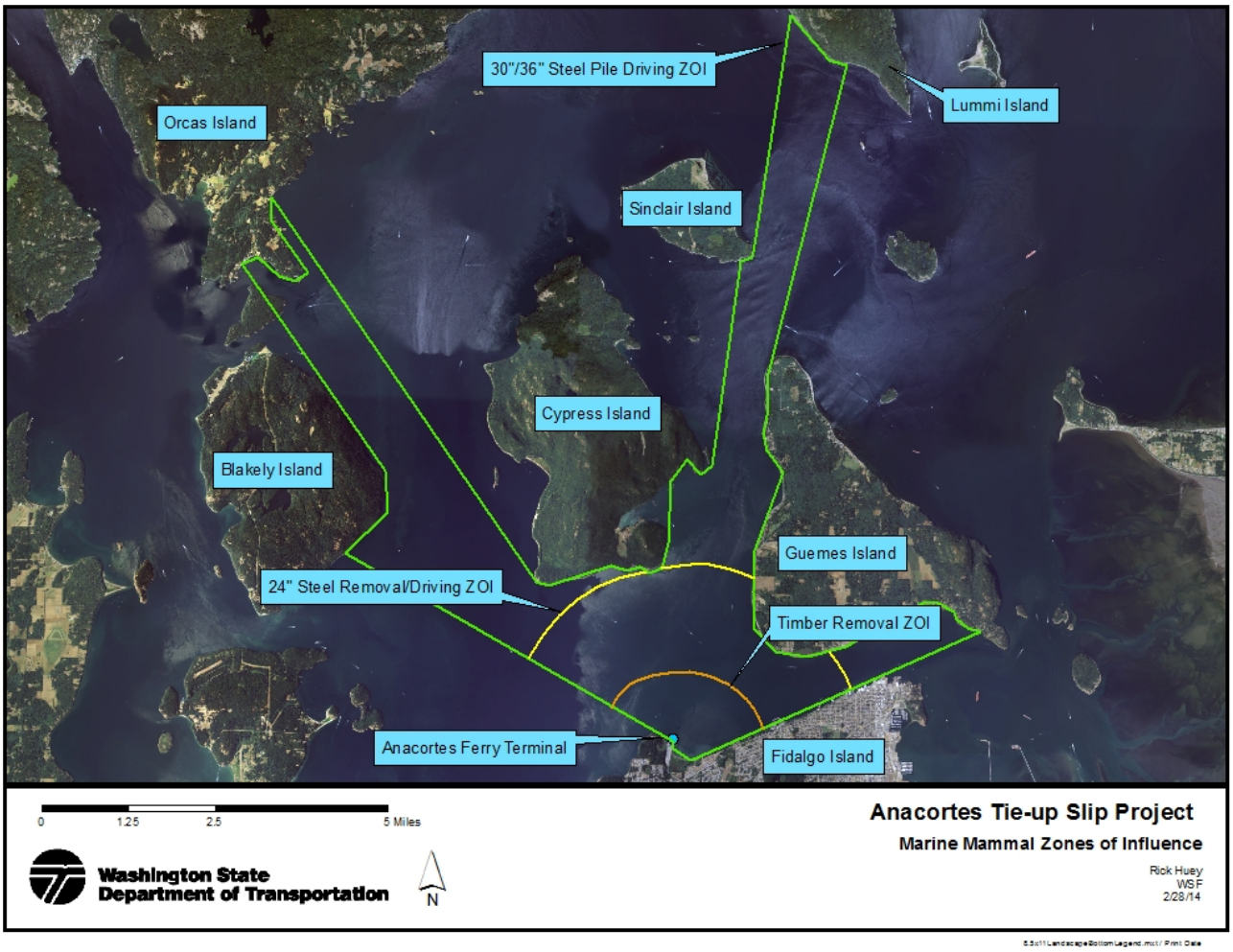

Figure 1 – Anacortes Tie-up Slip Project Vibratory ZOIs

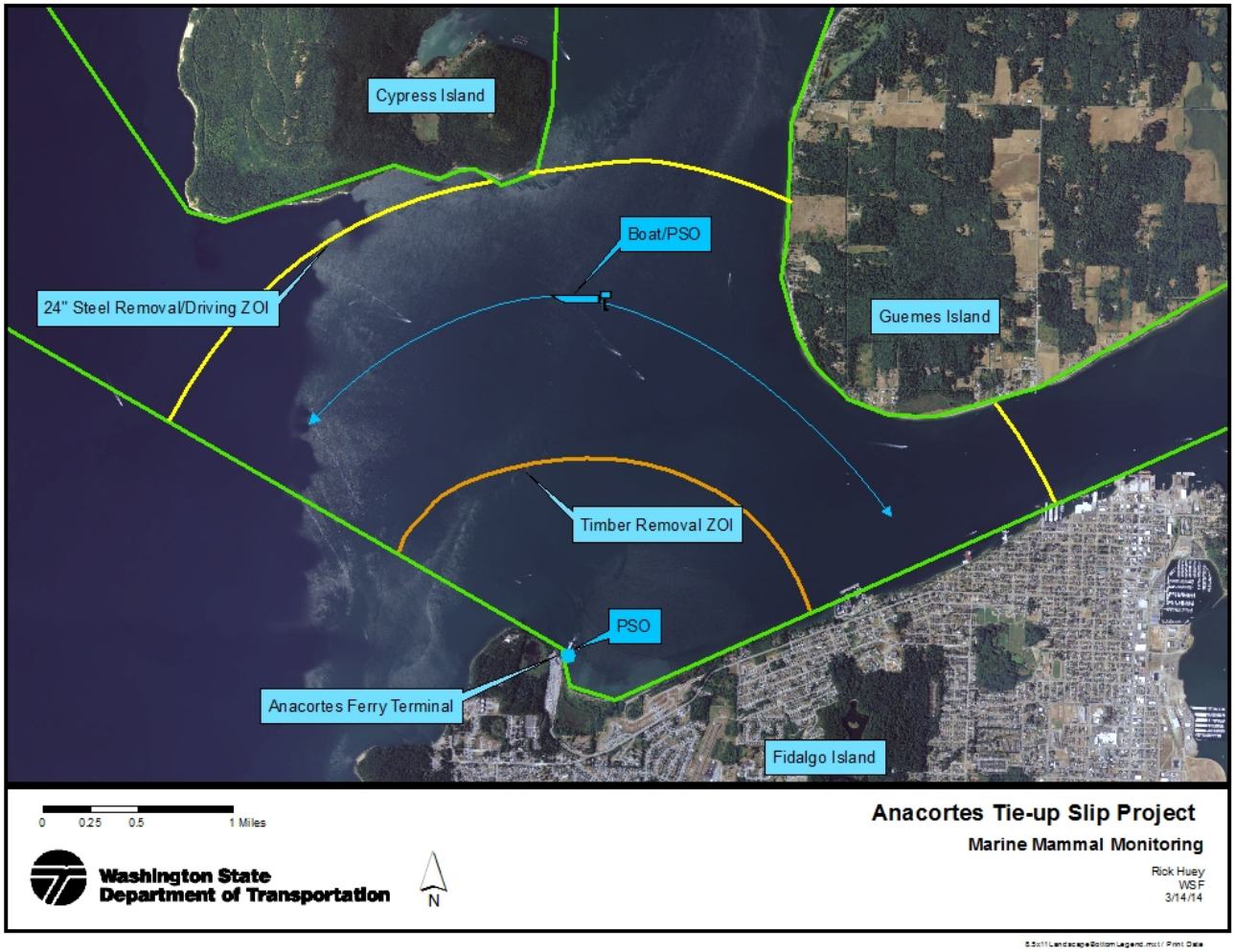

Figure 2 – Timber and 24” Steel Marine Mammal Monitoring

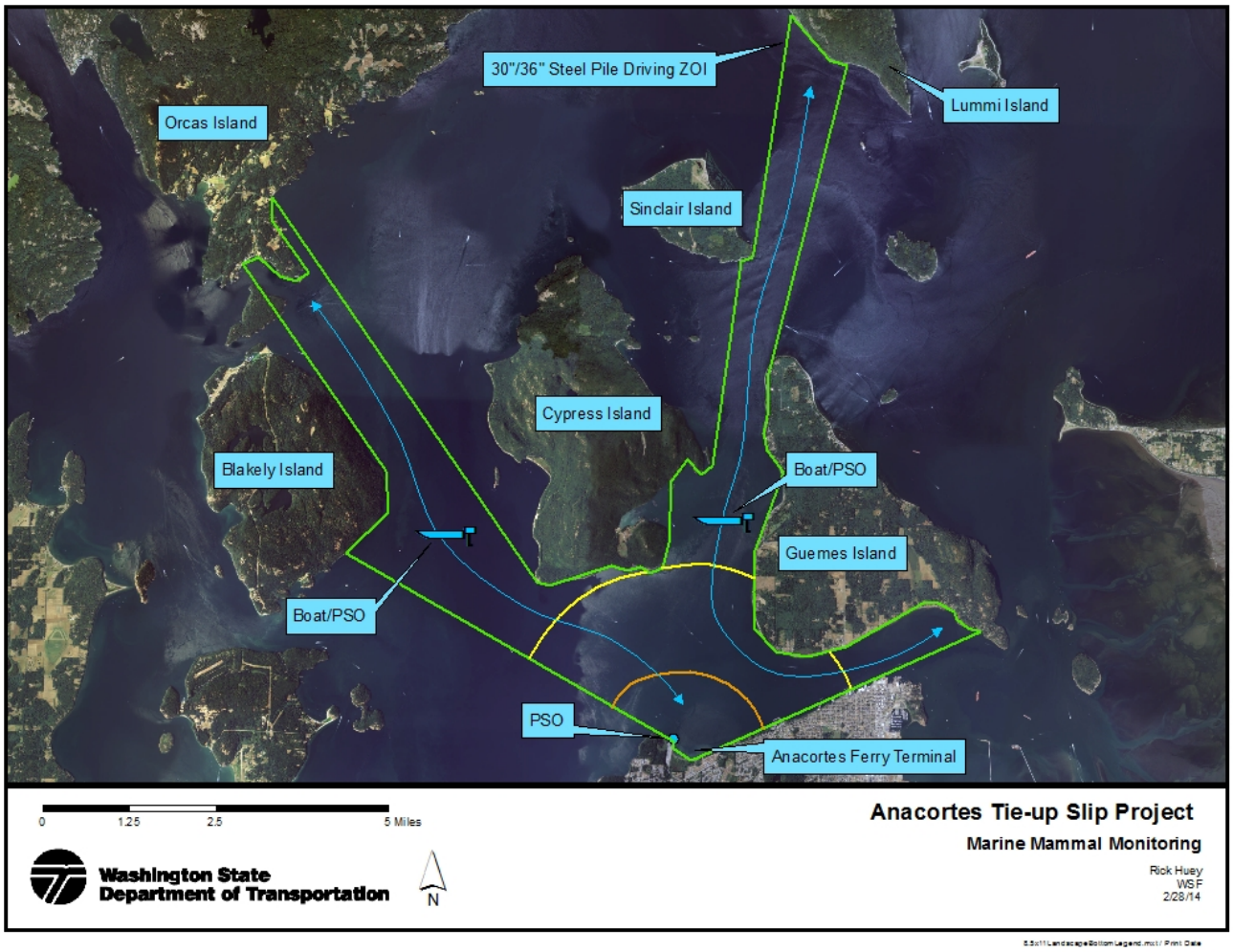

Figure 3 – 30/36" Marine Mammal Monitoring