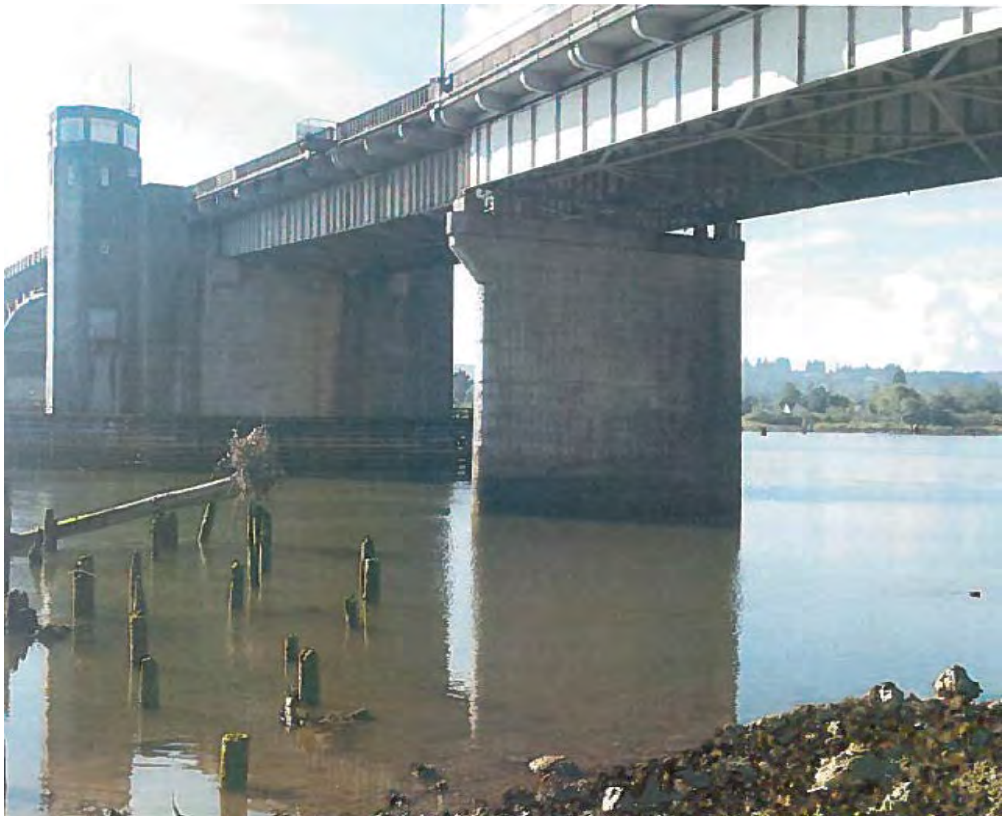
# Request for an Incidental Harassment Authorization Under the Marine Mammal Protection Act

# US 101/Chehalis River Bridge-Scour Repair Washington State Department of Transportation

**November 2016**
**Revised July 2017**



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**Appendix A Plan Sheets**

**Appendix B Marine Mammal Monitoring Plan**

# Abbreviations and Acronyms

| | |
|---|---|
| BMP | best management practices |
| CA-OR-WA | California-Oregon-Washington |
| CFR | Code of Federal Regulations |
| dB | decibels |
| DPS | Distinct Population Segment |
| DPS | dynamic positioning system |
| Ecology | Washington State Department of Ecology |
| ESA | Endangered Species Act |
| FR | Federal Register |
| HPA | Hydraulic Project Approval |
| Hz | hertz |
| IHA | Incidental Harassment Authorization |
| IWC | International Whaling Commission |
| kHz | kilohertz |
| kJ | kilojoules(s) |
| km | kilometer(s) |
| m | meters |
| MLLW | Mean Low-Low Water |
| MHHW | Mean High-High Water |
| MM | mitigation measure |
| MMPA | Marine Mammal Protection Act of 1972 |
| NMFS | National Marine Fisheries Service |
| NMML | National Marine Mammal Laboratory |
| NOAA | National Oceanographic Atmospheric Administration |
| NOAA Fisheries | National Oceanic Atmospheric Administration/National Marine Fisheries Service |
| NTU | nephelometric turbidity units |
| OHW | ordinary high water |
| PBR | Potential Biological Removal |

| | |
|---|---|
| PSAMP | Puget Sound Ambient Monitoring Program |
| RCW | Revised Code of Washington |
| RL | Received Level |
| RMS | root mean square |
| SAR | Stock Assessment Report |
| SEL | Sound Exposure Level |
| SL | Source Level |
| SPCC | Spill Prevention, Control, and Countermeasures Plan |
| SPL | Sound Pressure Level |
| TL | Transmission Loss |
| TTS | Temporary Threshold Shift |
| µPa | micro-Pascals |
| UHMW | Ultra High Molecular Weight |
| USFWS | United States Fish and Wildlife Service |
| WAC | Washington Administrative Code |
| WDFW | Washington Department of Fish and Wildlife |
| WSDOT | Washington State Department of Transportation |
| WSF | Washington State Department of Transportation Ferries Division |
| ZOE | Zone of Exclusion |
| ZOI | Zone of Influence |

# 1.0 Description of the Activity

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

## 1.1 Introduction

The Washington State Department of Transportation (WSDOT) maintains over three thousand bridges throughout the state. To improve, maintain, and preserve the bridges, WSDOT conducts construction, repair and maintenance activities as part of its regular operations. One of these projects is the scour repair at the U.S. 101 Chehalis River Bridge in Aberdeen, Washington, and is the subject of this Incidental Harassment Authorization (IHA) request. The proposed project will occur at the mouth of the Chehalis River where it enters Grays Harbor estuarine waters that support several marine mammal species. The Marine Mammal Protection Act of 1972 (MMPA) prohibits the taking of marine mammals, which is defined as to "harass, hunt, capture or kill, or attempt to harass, hunt, capture or kill," except under certain situations. Section 101 (a) (5)(D) allows for the issuance of an IHA, provided an activity results in negligible impacts on marine mammals and would not adversely affect subsistence use of these animals.

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

## 1.2 Project Purpose and Need

The purpose of the U.S. 101 Chehalis River Bridge Project is to make the foundation stable for calculated scour depths, protect the foundation from further scour by removing debris, filling the scour void under Pier 14 with cementitious material (to protect the pilings from marine borers), and filling the scour hole and protecting the pier with scour resistant material.

## 1.3 Project Setting and Land Use

The U.S. 101 Chehalis River Bridge is located in the City of Aberdeen, Grays Harbor County, Washington (Figure 1-1). The bridge is located in Township 17 North, Range 9 West, Section 9, where the Chehalis River enters Grays Harbor. Land use in the Aberdeen area is a mix of residential, commercial, industrial, and open space and/or undeveloped lands (Figure 1-2).

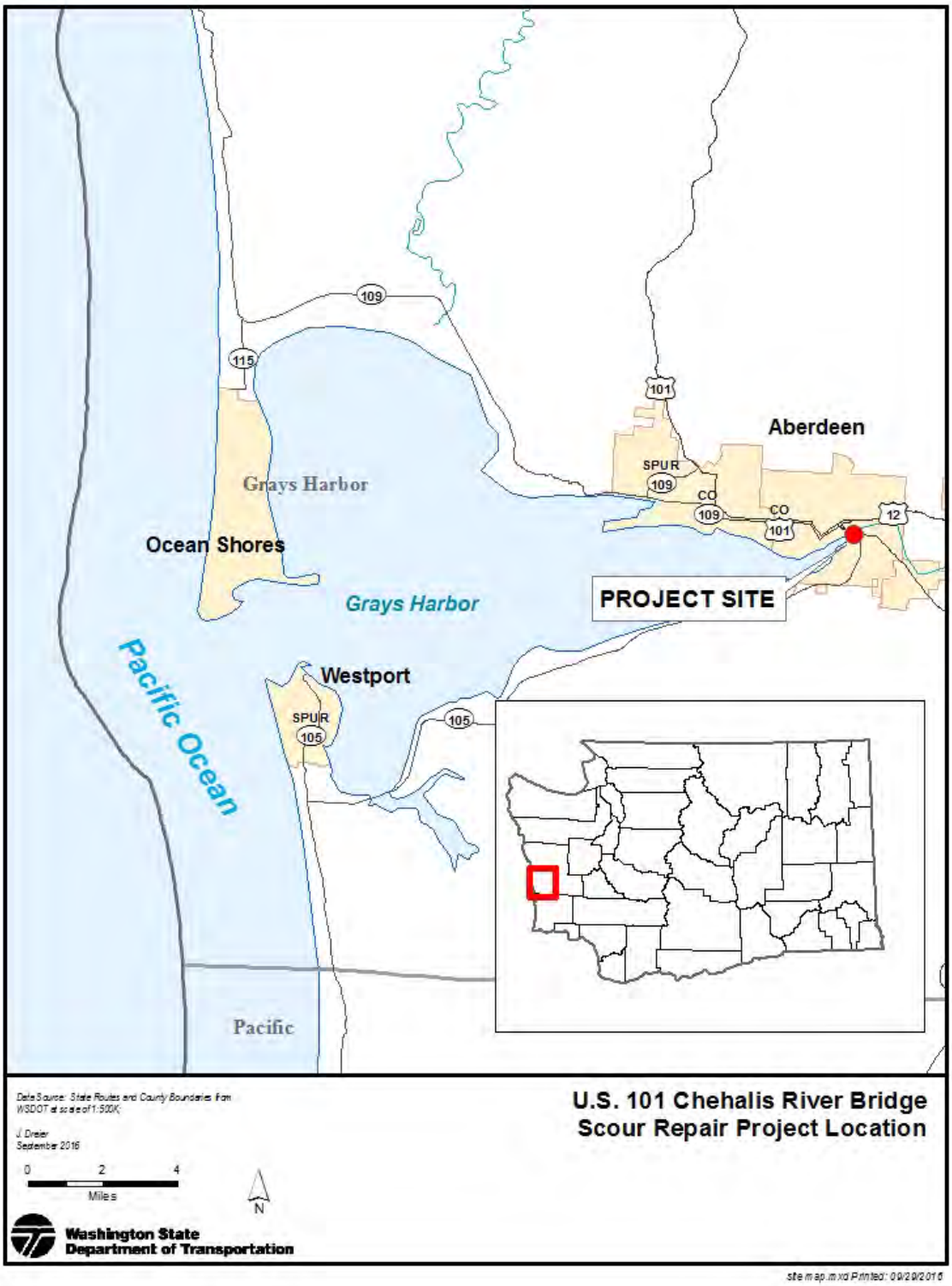


**Figure 1-1. Project location**

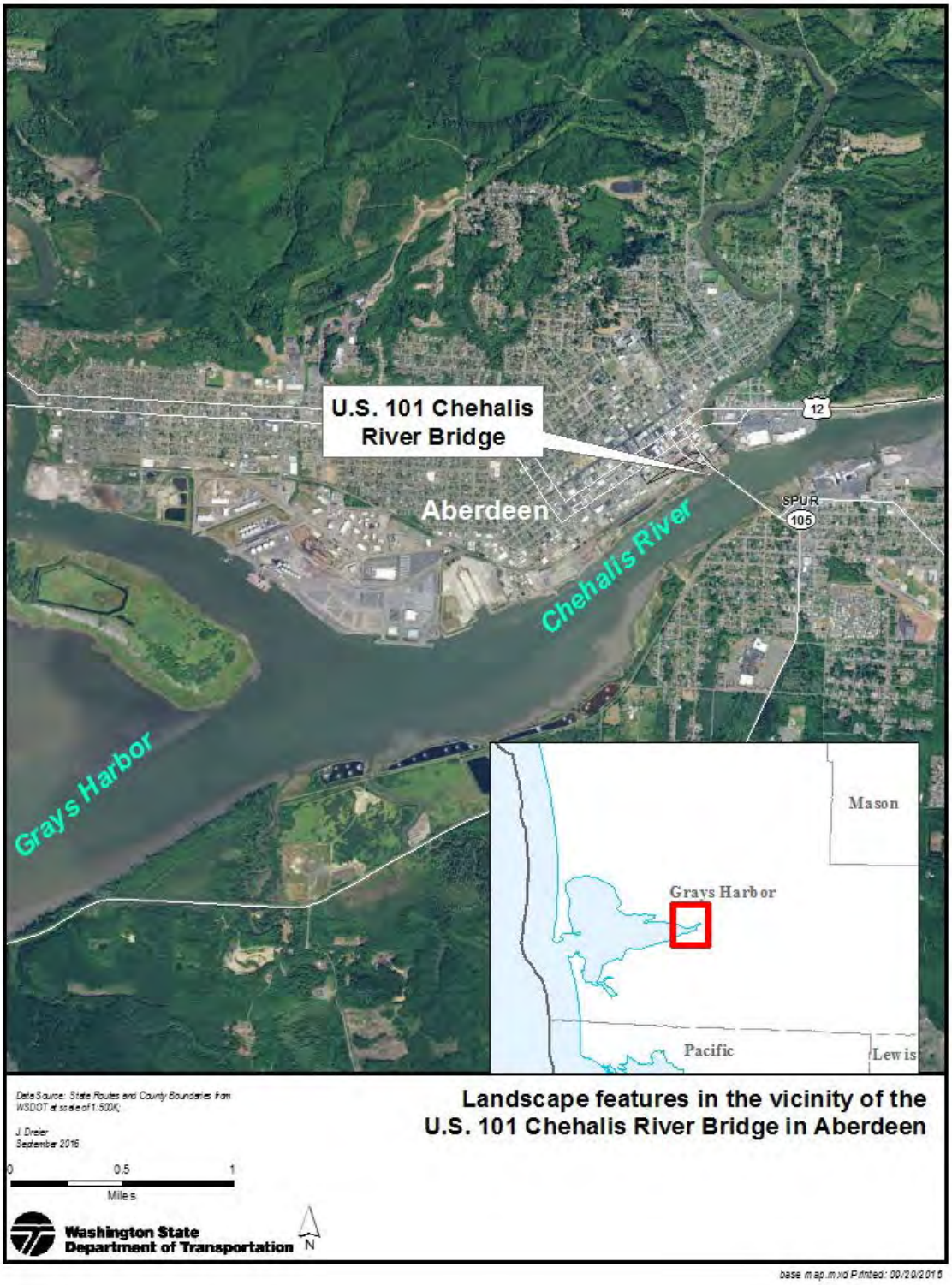


**Figure 1-2. Landscape features is the vicinity of the project site.**

## 1.4 Project Description

WSDOT is proposing to repair an area of scour associated with Pier 14 of the U.S. 101 Chehalis River Bridge (Figures 1-3 and 1-4). The bridge foundation at Pier 14 is "scour critical" due to the bridge foundation being unstable for calculated scour depths. The southwest quadrant of Pier 14 is undermined by scour void as much as 8 feet deep, and some of the untreated timber pilings have been directly exposed to river/estuary water since 2008. Marine borers may weaken enough pilings to require more extensive pier repair if this project is not built in the near future. In addition, the footing and seal are exposed at the other three quadrants of Pier 14.


**Figure 1-3. Activities associated with scour repair are limited to Pier 14.**

**Figure 1-4. Pier 14 is located on the north side of the bridge.**

In preparation for conducting the repair, tugboats will tow a barge with spuds or flexifloat (portable modular interlocking flotation system with spuds that requires less draft) supporting a crane, vibratory pile driver, dragline, clamshell bucket, and manlift to Pier 14. Tugboats will also tow a second flexifloat or barge with spuds to the bridge to deliver materials and other equipment at various times.

Debris around and under Pier 14 will be removed with a crane, dragline, and/or clamshell bucket, under the direction of divers who will be attaching the debris for removal.

After debris removal, a steel template will be located adjacent to or attached to Pier 14. The template will likely be constructed using six steel H piles which will be installed using a vibratory hammer. Using the template as a guide, 44 sheet piles will be driven with a vibratory hammer into the substrate to form a temporary interlocked sheet pile wall shoring system around the pier (Table 1-1). After the sheet piles have been installed, the template will be removed.

**Table 1-1 Scour Repair Pile Summary**

| Method | Pile Type | Estimated Noise Level | Number of Piles | Minutes per pile | Piles per day | Total Minutes | Duration (Hours) | Duration (10-hour work days) |
|---|---|---|---|---|---|---|---|---|
| Vibratory Driving | Sheet | In-water: 165 $dB_{RMS}$* In-air: 96.9 dB | 44 | 30 | 10 | 1320 | 22 | 5 |
| Vibratory Driving | H pile | In-water: 150 $dB_{RMS}$* In-air: 96.9 dB | 6 | 30 | 6 | 180 | 3 | 1 |
| Vibratory Removal | Sheet | In-water: 165 $dB_{RMS}$ In-air: 96.9 dB | 44 | 30 | 10 | 1320 | 22 | 5 |
| Vibratory Removal | H pile | In-water: 150 $dB_{RMS}$ In-air: 96.9 dB | 10 | 30 | 6 | 180 | 3 | 1 |
| **Total** | | | | | | 3000 | 50 | 12.0 |

* CalTrans Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish. 2015.

Once the shoring system is in place, cementitious material will be tremie pumped[1] underwater inside the shoring system to fill the voids between the riverbed and the pier seal. This material will protect the untreated wood pier piling from marine borers. Following installation of the cementitious sealing material, the shoring system may be removed with a vibratory hammer. The final steps will be the placement of scour resistant material, such as rip rap, on and around the pier and in the scour hole to protect the pier from future erosion.

Due to National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) in-water work timing restrictions to protect ESA-listed salmonids, planned WSDOT in-water construction is limited to July 16 through February 15. For this project, in-water construction is planned to take place between July 16, 2018 and September 30, 2018.

## 1.5 Project Elements

The proposed project includes vibratory hammer driving and removal creating elevated in-water and in-air noise that may impact marine mammals.

### 1.5.1 Vibratory Hammer Driving and Removal

Vibratory hammers are commonly used in steel pile driving where sediments allow and involve the same vibratory hammer used in pile removal. The pile is placed into position using a choker

[1] Gravity-fed tremie placement is generally used for wet shaft construction. In this method, the concrete is introduced into the hole, starting at the bottom, using a water tight tremie (tube). The concrete is fed by pump or bucket into the tremie and falls by gravity and continuously placed until the shaft is full.

and crane, and then vibrated between 1,200 and 2,400 vibrations per minute (Figure 1-5). The vibrations liquefy the sediment surrounding the pile allowing it to penetrate to the required seating depth, or to be removed.


**Figure 1-5 Vibratory hammer driving a steel sheet pile**

## 1.6 Sound Levels

### 1.6.1 Reference Underwater Vibratory Sound Source Levels

The project includes vibratory driving and removal of six steel H piles and 44 sheet piles. Based on in-water measurements at the Elliot Bay Seawall Project, vibratory pile driving of steel sheet piles generated 165 dB RMS measured at 10 meters (The Greenbush Group 2015). It is assumed that vibratory removal of sheet piles will generate the same source level (165 dB RMS).

According to CalTrans (2015), vibratory driving and removal of steel H piles generated 150 dB RMS measured at 10 meters.

### 1.6.2 Background Noise

Background noise is the sound level absent of the proposed activity (vibratory 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.

For example, 120 $dB_{RMS}$ is the threshold value for Level B acoustical harassment of marine mammals exposed to continuous noise sources. However, 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. Similarly, if background sound levels are less than the threshold value for Level B acoustical harassment of marine mammals exposed to continuous noise sources, then the 120 $dB_{RMS}$ threshold level is used to determine the harassment zone of influence.

In-water background sound data taken with the functional hearing group of relevant species is not available for the U.S. 101 Chehalis River Bridge area. The Grays Harbor Navigation Improvement Project Supplemental EIS Statement (USACOE 2014) determined the estimated ambient noise level of 123 $dB_{RMS}$; however, it was based on the mid-range of ambient noise levels in Puget Sound. Given that no ambient noise measurements are available, this analysis will use an estimated ambient noise level of 120 $dB_{RMS}$.

### 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 in-homogeneities 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 has requested 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.

No unweighted in-air data is available for vibratory driving of steel sheet piles or H piles. Based on in-air measurements at the Coupeville Ferry Terminal, vibratory driving of a 30-inch steel pile generated a maximum of 96.9 $dB_{RMS}$ (unweighted) at 50 ft. (Laughlin 2010). It is assumed that in-air noise generated during vibratory driving steel sheet piles and H piles will generate the same source level (96.9 $dB_{RMS}$). It is also assumed that vibratory removal of these piles will generate the same source level.

### 1.6.5 Attenuation to NMFS Thresholds

NMFS has established harassment and injury noise thresholds for marine mammals (Table 1-2). 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.

#### 1.6.5.1 Vibratory Pile Driving and Removal of Steel Sheet Piles (Underwater Noise)

To simplify this analysis, the 120 $dB_{RMS}$ estimated underwater background sound level will be used to establish the vibratory driving disturbance ZOI. The NOAA/NMFS practical spreading model (sound transmission loss of 4.5 dB per doubling distance) was used to determine the distance where underwater noise will attenuate to the 120 $dB_{RMS}$ background sound level. The injury ZOEs were determined using the NMFS (2016a) calculator (Figure 1-6).

**Table 1-2. Marine Mammal Injury and Disturbance Thresholds for Underwater and Airborne Noise**

| Marine Mammals | Level at which Pinniped Haul-out Disturbance has been Documented | Vibratory Pile Driving In-water Disturbance Threshold | Vibratory Pile Driving In-water Injury Threshold |
|---|---|---|---|
| Low-frequency cetaceans | N/A | 120 $dB_{RMS}$ | 199 dB $SEL_{cum}$ |
| Mid-frequency cetaceans | N/A | 120 $dB_{RMS}$ | 198 dB $SEL_{cum}$ |
| High frequency cetaceans | N/A | 120 $dB_{RMS}$ | 173 dB $SEL_{cum}$ |
| Phocid pinnipeds | 90 $dB_{RMS}$ (unweighted) for harbor seals | 120 $dB_{RMS}$ | 201 dB $SEL_{cum}$ |
| Otariid pinnipeds | 100 $dB_{RMS}$ (unweighted) for all other pinnipeds re: 20 µPa | 120 $dB_{RMS}$ | 219 dB $SEL_{cum}$ |

STEP 3: SOURCE-SPECIFIC INFORMATION

| | |
|---|---|
| Source Level (RMS SPL) | 165 |
| Activity Duration (hours) within 24-h period | 5 |
| Activity Duration (seconds) | 18000 |
| 10 Log (duration) | 42.55 |
| Propagation (xLogR) | 15 |
| Distance of source level measurement (meters)* | 10 |

*Unless otherwise specified, source levels are referenced 1 m from the source.

| Marine Mammal Hearing Group |
|---|
| **Low-frequency (LF) cetaceans**: baleen whales |
| **Mid-frequency (MF) cetaceans**: dolphins, toothed whales, beaked whales, bottlenose whales |
| **High-frequency (HF) cetaceans**: true porpoises, *Kogia*, river dolphins, cephalorhynchid, *Lagenorhynchus cruciger* & *L. australis* |
| **Phocid pinnipeds (PW)**:true seals |
| **Otariid pinnipeds (OW)**:sea lions and fur seals |

RESULTANT ISOPLETHS

| Hearing Group | Low-Frequency Cetaceans | Mid-Frequency Cetaceans | High-Frequency Cetaceans | Phocid Pinnipeds | Otariid Pinnipeds |
|---|---|---|---|---|---|
| $SEL_{cum}$ Threshold | 199 | 198 | 173 | 201 | 219 |
| PTS Isopleth to threshold (meters) | **36.9** | **3.3** | **54.6** | **22.4** | **1.6** |

**Figure 1-6. National Marine Fisheries Service (2016a) calculator showing injury thresholds associated with vibratory pile driving of steel sheet piles.**

The underwater ZOI and ZOEs for vibratory driving of steel sheet piles are defined below, and shown in Figures 1-7 and 1-8:

- ZOI-1: the distance where noise generated by steel sheet pile vibratory driving/removal (165 $dB_{RMS}$ at 10 meters) attenuates to the 120 $dB_{RMS}$ background/harassment threshold level for **all marine mammals** = 10,000 meters/6.21 miles. The area of this ZOI is 2.13 square kilometers.
- ZOE-1: the 199 dB $SEL_{cum}$ **low-frequency cetacean** injury threshold for vibratory driving/removal of steel sheet piles (165 $dB_{RMS}$ at 10 meters) = 36.9 m/121 ft.
- ZOE-2: the 198 dB $SEL_{cum}$ **mid-frequency cetacean** injury threshold for vibratory driving/removal of steel sheet piles (165 $dB_{RMS}$ at 10 meters) = 3.3 m/11 ft.
- ZOE-3: the 173 dB $SEL_{cum}$ **high-frequency cetacean** injury threshold for vibratory driving/removal of steel sheet piles (165 $dB_{RMS}$ at 10 meters) = 54.6 m/179 ft.
- ZOE-4: the 201 dB $SEL_{cum}$ **phocid pinniped** injury threshold for vibratory driving/removal of steel sheet piles (165 $dB_{RMS}$ at 10 meters) = 22.4 m/74 ft.
- ZOE-5: the 219 dB $SEL_{cum}$ **otariid pinniped** injury threshold for vibratory driving/removal of steel sheet piles (165 $dB_{RMS}$ at 10 meters) = 1.6 m/6 ft.


**Figure 1-7. Sheet pile ZOI-1**

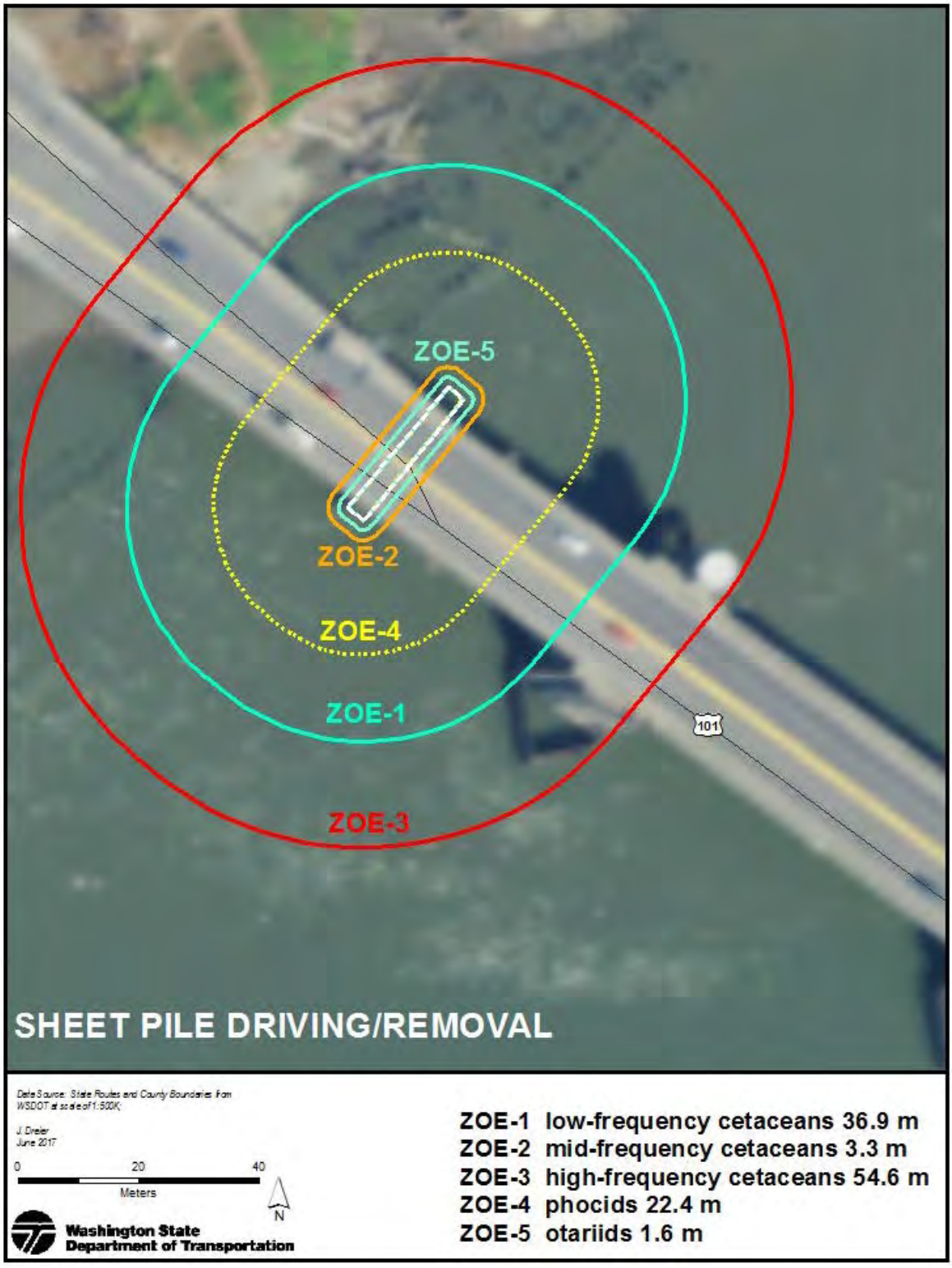


**Figure 1-8. Sheet pile ZOEs 1-5**

### 1.6.5.2 Vibratory Pile Driving and Removal of Steel H Piles (Underwater Noise)

To simplify this analysis, the 120 $dB_{RMS}$ underwater background sound level will be used to establish the vibratory driving disturbance ZOI. The NOAA/NMFS practical spreading model (sound transmission loss of 4.5 dB per doubling distance) was used to determine the distance where underwater noise will attenuate to the 120 $dB_{RMS}$ background sound level. The injury ZOEs were determined using the NMFS (2016a) calculator (Figure 1-9).

**STEP 3: SOURCE-SPECIFIC INFORMATION**

| | |
|---|---|
| Source Level (RMS SPL) | 150 |
| Activity Duration (hours) within 24-h period | 3 |
| Activity Duration (seconds) | 10800 |
| 10 Log (duration) | 40.33 |
| Propagation (xLogR) | 15 |
| Distance of source level measurement (meters)* | 10 |

*Unless otherwise specified, source levels are referenced 1 m from the source.

| Marine Mammal Hearing Group |
|---|
| **Low-frequency (LF) cetaceans**: baleen whales |
| **Mid-frequency (MF) cetaceans**: dolphins, toothed whales, beaked whales, bottlenose whales |
| **High-frequency (HF) cetaceans**: true porpoises, *Kogia*, river dolphins, cephalorhynchid, *Lagenorhynchus cruciger* & *L. australis* |
| **Phocid pinnipeds (PW)**:true seals |
| **Otariid pinnipeds (OW)**:sea lions and fur seals |

**RESULTANT ISOPLETHS**

| Hearing Group | Low-Frequency Cetaceans | Mid-Frequency Cetaceans | High-Frequency Cetaceans | Phocid Pinnipeds | Otariid Pinnipeds |
|---|---|---|---|---|---|
| $SEL_{cum}$ Threshold | 199 | 198 | 173 | 201 | 219 |
| PTS Isopleth to threshold (meters) | **2.6** | **0.2** | **3.9** | **1.6** | **0.1** |

**Figure 1-9. National Marine Fisheries Service (2016a) calculator showing injury thresholds associated with vibratory pile driving of steel H piles.**

The underwater ZOI and ZOEs for vibratory driving of steel H piles are defined below, and shown in Figure 1-10:

- ZOI-2: the distance where noise generated by steel H pile vibratory driving/removal (150 $dB_{RMS}$ at 10 meters) attenuates to the 120 $dB_{RMS}$ background/harassment threshold level for **all marine mammals** = 1,000 meters/3,280 ft. The area of this ZOI is 0.67 square kilometer.
- ZOE-6: the 199 dB $SEL_{cum}$ **low-frequency cetacean** injury threshold for vibratory driving/removal of steel H piles (150 $dB_{RMS}$ at 10 meters) = 2.6 m/9 ft.
- ZOE-7: the 198 dB $SEL_{cum}$ **mid-frequency cetacean** injury threshold for vibratory driving/removal of steel H piles (150 $dB_{RMS}$ at 10 meters) = 0.2 m/1 ft.
- ZOE-8: the 173 dB $SEL_{cum}$ **high-frequency cetacean** injury threshold for vibratory driving/removal of steel H piles (150 $dB_{RMS}$ at 10 meters) = 3.9 m/13 ft.
- ZOE-9: the 201 dB $SEL_{cum}$ **phocid pinniped** injury threshold for vibratory driving/removal of steel H piles (150 $dB_{RMS}$ at 10 meters) = 1.6 m/6 ft.
- ZOE-10: the 219 dB $SEL_{cum}$ **otariid pinniped** injury threshold for vibratory driving/removal of steel H piles (150 $dB_{RMS}$ at 10 meters) = 0.1 m/1 ft.


**Figure 1-10. ZOI-2, and ZOEs 6-10**

### 1.6.5.3 Safety Zone/Zone of Exclusion

The purpose of the safety zone/ZOE is to ensure that noise-generating activities are shut down before Level A (injury) take occurs from:

- low-frequency cetaceans entering the 199 dB $SEL_{cum}$ ZOE
- mid-frequency cetaceans entering the 198 dB $SEL_{cum}$ ZOE
- high-frequency cetaceans entering the 173 dB $SEL_{cum}$ ZOE
- phocid pinnipeds entering the 201 dB $SEL_{cum}$ ZOE, and
- otariid pinnipeds entering the 219 dB $SEL_{cum}$ ZOE while vibratory pile driving is active.

Sheet Piles. During vibratory driving of steel sheet piles, Level A take (for high-frequency cetaceans) can occur out to 54.6 m/179 ft. (the distance to the 173 dB $SEL_{cum}$ isopleth [ZOE-3]). During vibratory pile driving, a 54.6 m/179 ft. radius safety zone/ZOE will be fully monitored and vibratory driving will shut down at the approach of any cetaceans to this zone (see Appendix B, Marine Mammal Monitoring Plan).

During vibratory driving of steel sheet piles, Level A take (for pinnipeds) can occur out to 22.4 m/74 ft. (the distance to the 201 dB $SEL_{cum}$ isopleth [ZOE-4]). During vibratory pile driving, a 22.4 m/74 ft. radius safety zone/ZOE will be fully monitored and vibratory driving will shut down at the approach of any pinniped to this zone (see Appendix B, Marine Mammal Monitoring Plan).

H Piles. All ZOEs associated with vibratory driving of steel H piles are less than 10 m from pile driving activities. To simplify monitoring during vibratory driving of H piles, a 10 m/33 ft. radius safety zone/ZOE will be fully monitored and vibratory driving will shut down at the approach of any marine mammal to this zone (see Appendix B, Marine Mammal Monitoring Plan).

### 1.6.5.4 Vibratory Pile Driving In-air Noise

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

The project includes vibratory driving/removal of steel sheet piles and H piles. In-air noise generated during vibratory installation and/or removal of these piles (96.9 dB at 50 feet) will reach the phocid (harbor seal) threshold (90 dB) at approximately 33.7 meters/110 feet, and is below the otariid (sea lion) threshold (100 dB). Although in-air noise levels are below the otariid threshold level, the 90 dB threshold area will be monitored for all pinnipeds.

The nearest documented harbor seal haul out site to the U.S. 101 Chehalis River Bridge is a low-tide haul out located 7.0 miles to the west. California sea lions occasionally haul out on docks in the Westport marina approximately 15 miles west of the project location; however, there are no documented California sea lion or other otariid haul out sites elsewhere in Grays Harbor.

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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 WSDOT in-water construction is limited to July 16 through February 15. For this project, in-water construction is planned to take place between July 16, 2018 and September 30, 2018.

## 2.2 Duration

The total worst-case time for pile installation and removal is 50 hours over 12 days (Table 1-1).

- The daily construction window for pile removal and driving will begin no sooner than 30 minutes after sunrise to allow for initial marine mammal monitoring, and will end 30 minutes prior to sunset to allow for post-pile removal and driving marine mammal monitoring.
- Vibratory driving of each steel sheet pile will take approximately 30 minutes per pile, 10 sheet piles installed per day, with 44 sheet piles installed over 5 days.
- Vibratory driving of each steel H pile will take approximately 30 minutes per pile, with six piles installed in one day.
- Vibratory removal of 44 steel sheet piles will take approximately 30 minutes per pile, with all piles removed in 5 days.
- Vibratory removal of each steel H pile will take approximately 30 minutes per pile, with six piles removed in one day.
- It is likely that the actual hours of vibratory pile driving and will be less.

## 2.3 Region of Activity

The proposed activities will occur at the U.S. 101 Chehalis River Bridge located in the City of Aberdeen, Washington (see Figures 1-1 and 1-2).

# 3.0 Species and Numbers of Marine Mammals in Area

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

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

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

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

Possible MMPA status designations include:

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

## 3.1 Species Present

Five species of marine mammals may be found in the U.S. 101 Chehalis River Bridge Project area (Table 3-1).

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

| Species | Frequency Hearing Group | ESA Status | MMPA Status | Timing of Occurrence | Frequency of Occurrence |
|---|---|---|---|---|---|
| Harbor Seal | phocid | Not listed | Non-depleted | Year-round | Common |
| California Sea Lion | otariid | Not listed | Non-depleted | August-April | Common |
| Steller Sea Lion | otariid | Delisted | Strategic/Depleted | August-April | Occasional |
| Gray Whale | low-frequency | Delisted | Unclassified | January-May | Occasional |
| Harbor Porpoise | high-frequency | Not listed | Non-depleted | May-June peak | Common |

## 3.2 Pinnipeds

There are three species of pinnipeds that may be found in the U.S. 101 Chehalis River Bridge area: harbor seal (*Phoca vitulina richardsi*), California sea lion (*Zalophus californianus*) and Steller sea lion (*Eumetopias jubatus*).

### 3.2.1 Harbor Seal

Harbor seals in Grays Harbor are part of the Oregon/Washington Coast Stock. In Grays Harbor, pups are born from mid-April through July (WDFW 2012). Of the pinniped species that commonly occur within the region of activity, harbor seals are the most common and the only pinniped that breeds and remains in the inland marine waters of Washington year-round (Calambokidis and Baird 1994).

#### 3.2.1.1 Numbers

In 1999, Jeffries et al. (2003) recorded a mean count of 9,550 harbor seals in Washington's inland marine waters, and estimated the total population to be approximately 14,612 animals (including the Strait of Juan de Fuca). According to the 2014 Stock Assessment Report, the most recent (2003) estimate for the Oregon/Washington Coast Stock is 24,732 (NMFS 2014a). No minimum population estimate is available. However, there are an estimated 32,000 harbor seals in Washington today, and their population appears to have stabilized (Jeffries 2013), so the Oregon/Washington Coast Stock estimate may be low.

#### 3.2.1.2 Status

The Oregon/Washington Coast stock of harbor seals is "non-depleted" under the MMPA and "unlisted" under the ESA.

### 3.2.1.3 Distribution

Harbor seals are the most numerous marine mammal species in Grays Harbor (Jeffries, et al. 2000). Harbor seals are non-migratory; their local movements are associated with such factors as tides, weather, season, food availability and reproduction (Scheffer and Slipp 1944; Fisher 1952; Bigg 1969, 1981). They are not known to make extensive pelagic migrations, although some long-distance movements of tagged animals in Alaska (108 miles) and along the U.S. west coast (up to 342 miles) have been recorded (Pitcher and McAllister 1981; Brown and Mate 1983; Herder 1983).

Harbor seals haul out on rocks, reefs and beaches, and feed in marine, estuarine and occasionally fresh waters. Harbor seals display strong fidelity for haul out sites (Pitcher and Calkins 1979; Pitcher and McAllister 1981). The nearest documented harbor seal haul out site to the US 101 Chehalis River Bridge is a low-tide haul out located 7.0 miles to the west (Figure 3-1). According to Jeffries, et al. (2000), all haul outs in Grays Harbor are associated with tidal flats; at high tide it is assumed that these animals are foraging elsewhere in the estuary.

**Project-specific Observations**

The Navy Marine Species Density Database (U.S. Navy 2014) estimates the density of harbor seals in the waters offshore of Grays Harbor as 0.279 animals per square kilometer. There are no harbor seal density estimates for Grays Harbor.

In 1989, an estimated 3,700 harbor seals occurred in Grays Harbor (USACOE 1989). More recently, Jeffries et al. (2000) identified 44 harbor seal haul outs in Grays Harbor and provided very rough estimates of the number of seals at each site. Twenty-seven haul outs had less than 100 animals; 16 haul outs had 100-500 animals; and two haul outs were reported to support over 500 animals. According to Calambokidis (pers. comm. 2016), this data likely represent the best estimate of harbor seal numbers in Grays Harbor. Using median numbers of each haul out estimate range, there are an estimated 7,150 harbor seals in Grays Harbor. Based on the area of the estuary, the density estimate is 29.4 harbor seals per square kilometer.

According to the NMFS National Stranding Database, there were several confirmed harbor seal strandings in Grays Harbor between 2006 and 2015 (Figure 3-2) (NMFS 2016b). These numbers suggest that numbers of harbor seals in Grays Harbor peak in spring and early summer.

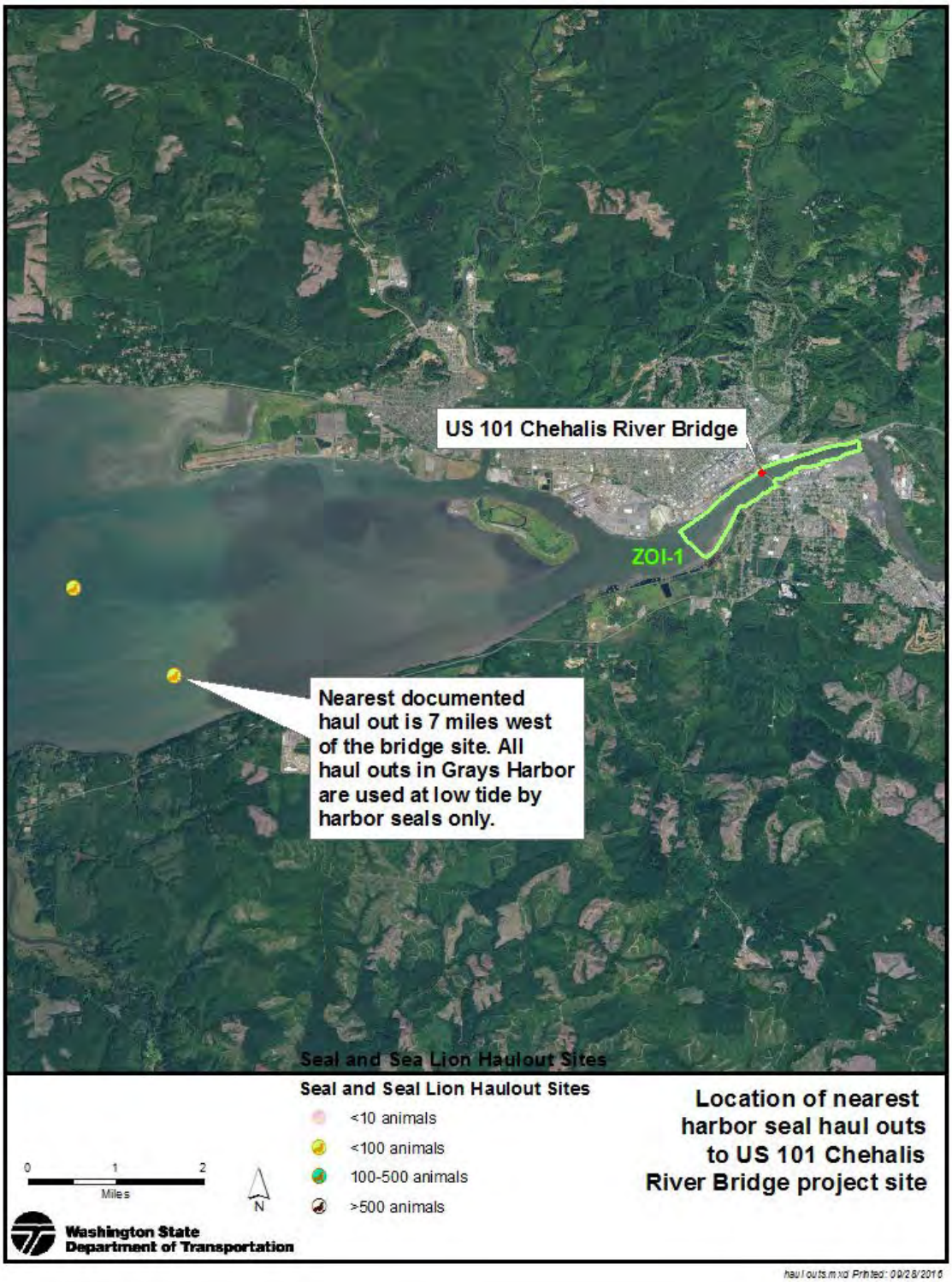


**Figure 3-1. Harbor seal haul outs in the US 101 Chehalis River Bridge project vicinity**

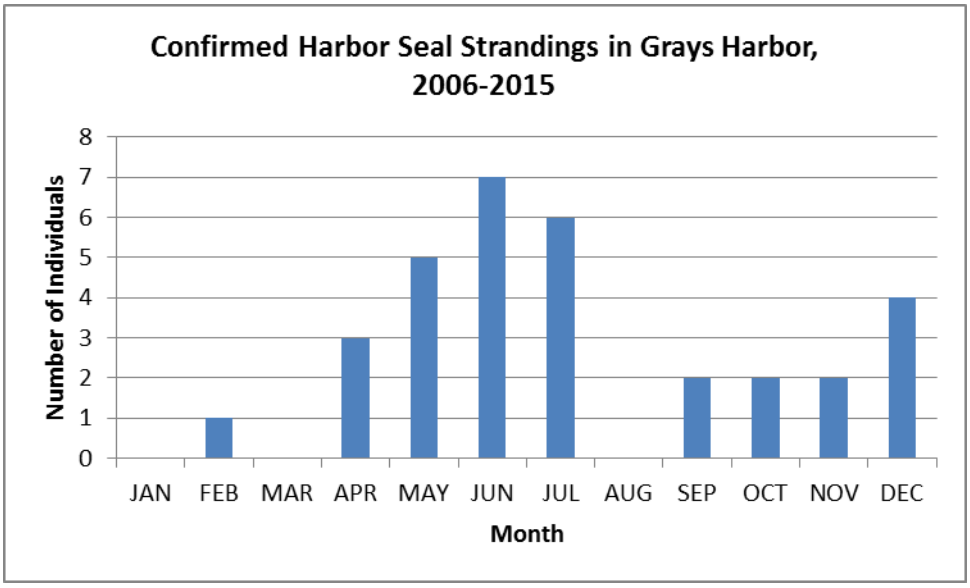


**Figure 3-2. Confirmed harbor seal strandings in Grays Harbor.**

### 3.2.2 California Sea Lion

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

#### 3.2.2.1 Numbers

The minimum population size of the U.S. stock was estimated at 296,750 in 2011. More recent pup counts made in 2011 totaled 61,943, the highest recorded to date. Estimates of total population size based on these counts are currently being developed (NMFS 2015b). Some 3,000 to 5,000 animals are estimated to move into northwest waters (both Washington and British Columbia) during the fall (September) and remain until the late spring (May) when most return to breeding rookeries in California and Mexico (Jeffries et al. 2000; J. Calambokidis pers. comm. 2008). Peak counts of over 1,000 animals have been made in Puget Sound (Jeffries et al. 2000).

The nearest documented California sea lion haul out sites to the U.S. 101 Chehalis River Bridge project site are at Split Rock, 35 miles north of the entrance to Grays Harbor; and at the mouth of the Columbia River, 46 miles south of the entrance to Grays Harbor (Jeffries, et al. 2000). A few California sea lions may haul out on docks and buoys in the vicinity of the Westport marina, located 15 miles west of the project site.

#### 3.2.2.2 Status

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

#### 3.2.2.3 Distribution

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

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

**Project-specific Observations**

According to the NMFS National Stranding Database, there were 10 confirmed California sea lion strandings in Grays Harbor between 2006 and 2015 (NMFS 2016b).

No density estimates are available for Grays Harbor. Because only 10 strandings have been documented between 2006 and 2015 (NMFS 2016b), and no haul outs have been identified, it is expected that the density of California sea lions in Grays Harbor is low. The Navy Marine Species Density Database (U.S. Navy 2014) estimates the density of California sea lions in the waters offshore of Grays Harbor as ranging from 0.020 to 0.033 animals per square kilometer in summer and fall. The higher estimate will be used as a surrogate for Grays Harbor.

### 3.2.3 Steller Sea Lion

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

#### 3.2.3.1 Numbers

The eastern U.S. stock of Steller sea lions is estimated to be within the range of 60,131 and 74,448 based on pup counts, and a Washington minimum population estimate of 1,749 (NMFS 2014b). In Washington waters, Steller sea lion abundances vary seasonally with a minimum estimate of 1,000 to 2,000 individuals present or passing through the Strait of Juan de Fuca in fall and winter months (S. Jeffries pers. comm. 2008).

Steller sea lion numbers in Washington State decline during the summer months, which correspond to the breeding season at Oregon and British Columbia rookeries (approximately late May to early June) and peak during the fall and winter months (Jeffries, et al. 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).

#### 3.2.3.2 Status

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

#### 3.2.3.3 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).

The nearest documented Steller sea lion haul out sites to the U.S. 101 Chehalis River Bridge project site are at Split Rock, 35 miles north of the entrance to Grays Harbor; and at the mouth of the Columbia River, 46 miles south of the entrance to Grays Harbor (Jeffries, et al. 2000). A few Steller sea lions may haul out on buoys in the vicinity of the Westport marina, located 15 miles west of the project site.

**Project-specific Observations**

According to the NMFS National Stranding Database, there were four confirmed Steller sea lion stranding in Grays Harbor between 2006 and 2015 (NMFS 2016b).

No density estimates are available for Grays Harbor. Because only four strandings have been documented between 2006 and 2015 (NMFS 2016b), and no haul outs have been identified, it is expected that the density of Steller sea lions in Grays Harbor is low. The Navy Marine Species Density Database (U.S. Navy 2014) estimates the density of Steller sea lions in the waters offshore of Grays Harbor as 0.0145 animals per square kilometer. This estimate will be used as a surrogate for Grays Harbor.

## 3.3 Cetaceans

Two cetacean species may be present in the immediate vicinity of the U.S. 101 Chehalis River Bridge: gray whale and harbor porpoise.

### 3.3.1 Gray Whale

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

#### 3.3.1.1 Numbers

The most recent population estimate for the Eastern North Pacific stock is 20,990 individuals (NMFS 2015c).

#### 3.3.1.2 Status

The Eastern North Pacific stock of gray whales is “non-depleted” under the MMPA, and was “delisted” under the ESA in 1994 after a 5-year review by NOAA Fisheries. In 2001 NOAA Fisheries received a petition to relist the stock under the ESA, but it was determined that there was not sufficient information to warrant the petition (Angliss and Outlaw 2007).

### 3.3.1.3 Distribution

During summer and fall, most whales in the Eastern North Pacific population feed in the Chukchi, Beaufort and northwestern Bering Seas. An exception to this is the relatively small number of whales (approximately 200) that summer and feed along the Pacific coast between Kodiak Island, Alaska and northern California (Calambokidis et al. 2012), referred to as the "Pacific Coast Feeding Group" (NMFS 2015c).

**Project-specific Observations**

Gray whales were seen consistently in Grays Harbor during 1996 surveys; at least 27 different whales used the harbor, most of them for extended periods (Calambokidis and Guan 1997). Between 1998 and 2010, gray whale numbers peaked in spring and fall in a study area that included waters inside Grays Harbor and coastal waters along the south Washington coast (Calambokidis, et al. 2012) (Figure 3-3).

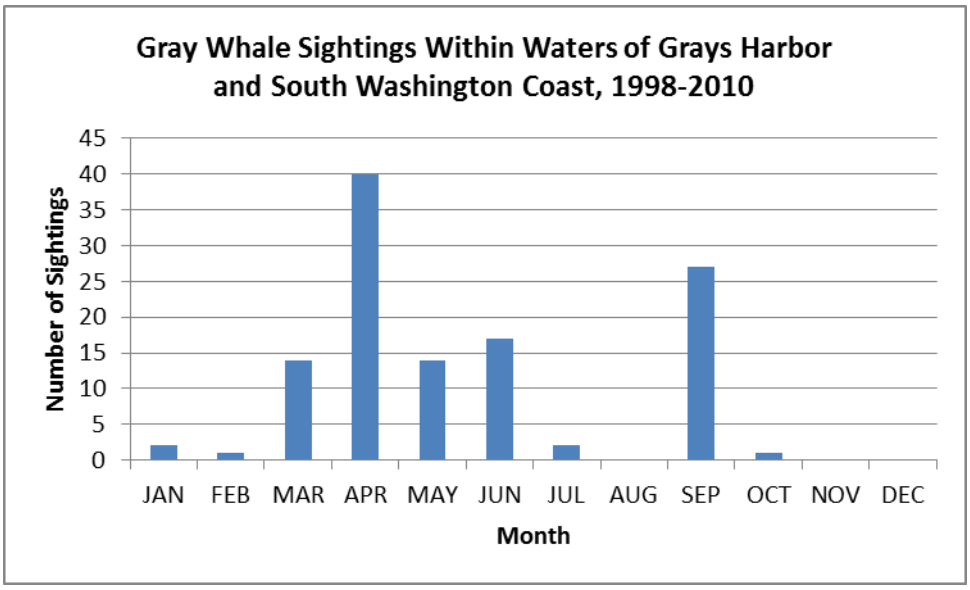


**Figure 3-3. Gray whale sightings in Grays Harbor and south Washington coast.**

According to the NMFS National Stranding Database, there were no confirmed gray whale stranding in Grays Harbor between 2006 and 2015 (NMFS 2016b).

No density estimates are available for Grays Harbor. The Navy Marine Species Density Database (U.S. Navy 2014) estimates the density of gray whales in nearshore waters near Grays Harbor as 0.04857 animals per square kilometer in winter and spring; and 0.00045 animals per square kilometer in summer and fall. According to counts conducted by Calambokidis, et al. (2012), 29 gray whales were observed over a 12-year period during the months of July through September (the proposed period of project activities). Based on this data, an average of 2.25 gray whales may be present in Grays Harbor/south Washington coast during the three-month period, resulting in a conservative density estimate of 0.12 animals per square kilometer. This estimate will be used for Grays Harbor.

### 3.3.2 Harbor Porpoise

The Northern Oregon/Washington Coast Stock of harbor porpoise may be found near the project site. This stock occurs in waters from Lincoln City, Oregon to Cape Flattery Washington. Harbor porpoise are high-frequency hearing range cetaceans (Southall et. al. 2007).

#### 3.3.2.1 Numbers

The Northern Oregon/Washington Coast Stock abundance estimate based on 2010 and 2011 aerial surveys conducted between Cape Blanco, Oregon and Cape Flattery, Washington is 21,487 harbor porpoises (NMFS 2014c). The minimum population estimate is 15,123 harbor porpoises.

#### 3.3.2.2 Status

The Northern Oregon/Washington Coast Stock of harbor porpoise is "non-depleted" under MMPA, and "unlisted" under the ESA.

#### 3.3.2.3 Distribution

Little information exists on harbor porpoise movements and stock structure in Grays Harbor, although it is suspected that in some areas harbor porpoises migrate (based on seasonal shifts in distribution). For instance 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 3-7 and 3-8).

Hall (2004) found that the frequency of sighting of harbor porpoises decreased with increasing depth beyond 150 m with the highest numbers observed at water depths ranging from 61 to 100 m. Although harbor porpoises have been spotted in deep water, they tend to remain in shallower shelf waters (<150 m) where they are most often observed in small groups of one to eight animals (Baird 2003).

**Project-specific Observations**

According to the NMFS National Stranding Database, there were 7 confirmed harbor porpoise strandings in Grays Harbor between 2006 and 2015 (Figure 3-4) (NMFS 2016b).

The Navy Marine Species Density Database (U.S. Navy 2014) estimates the density of harbor porpoises in the waters offshore of Grays Harbor as a range between 0.69 and 1.67 animals per square kilometer. According to Evenson, et al. (2016), the maximum harbor porpoise density in the Strait of Juan de Fuca (approximately 105 miles north of Grays Harbor) in 2014 was 0.768 animals per square kilometer. The higher density estimate for waters offshore of Grays Harbor (1.67) will be used for this analysis.

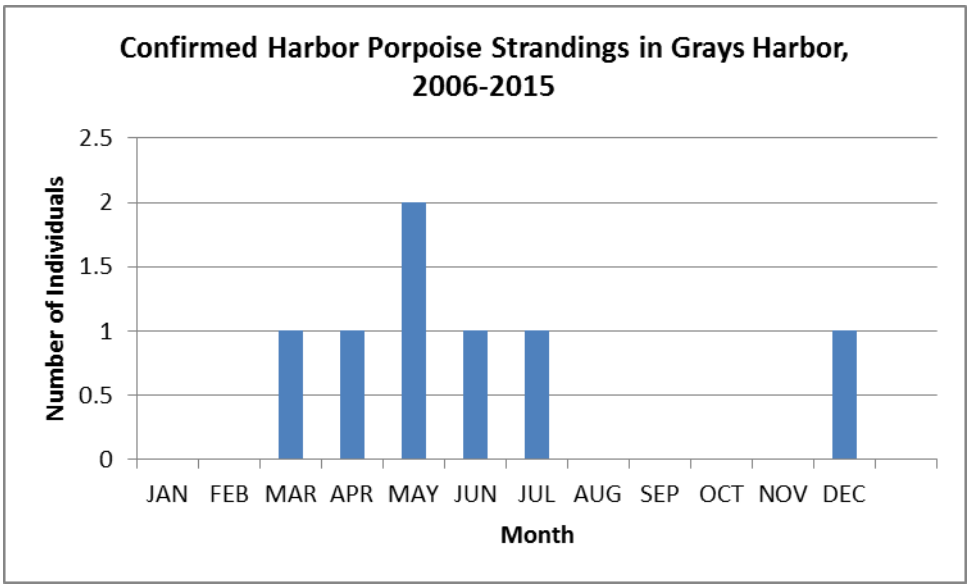


**Figure 3-4. Harbor porpoise strandings in Grays Harbor (NMFS 2016b).**

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# 4.0 Status and Distribution of Affected Species or Stocks

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

This section has been combined with Section 3.0.

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# 5.0 Type of Incidental Take Authorization Requested

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

The MMPA defines "harassment" as:

> any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment] (50 C.F.R, Part 216, Subpart A, Section 216.3-Definitions).

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

## 5.1 Incidental Take Authorization Request

Under Section 101 (a)(5)(D) of the MMPA, WSDOT requests an IHA from July 16, 2018 through February 15, 2019 for Level B incidental take (behavioral harassment) of the marine mammals described in this application during the scour repair project at the U.S. 101 Chehalis River Bridge.

The requested authorization is for incidental harassment of any five species of marine mammal that might enter the 120 dB background/disturbance threshold ZOI during active vibratory pile driving or removal activity.

The scheduled pile-driving and pile-removal activities discussed in this application will occur between July 16, 2018 and September 30, 2018.

## 5.2 Method of Incidental Taking

The method of incidental take is Level B acoustical harassment of any marine mammal occurring within the 120 dB background/disturbance threshold ZOIs during active vibratory pile driving or removal activity.

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# 6.0 Number of Marine Mammals that May Be Affected

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

This section summarizes potential incidental take of marine mammals during the U.S. 101 Chehalis River Bridge project. Section 6.2 describes the methods used to calculate the estimated ZOI and Section 6.3 describes the potential incidental take for each marine mammal species. Section 6.4 provides the number of marine mammals by species for which take authorization is requested.

Due to the vibratory pile driving and removal source levels, this IHA application will incidentally take by Level B acoustical harassment small numbers of harbor seal, California sea lion, Steller sea lion, gray whale, and harbor porpoise. With the exception of harbor seals and California sea lions, it is anticipated that all of the marine mammals that enter a Level B acoustical harassment ZOIs will be exposed to pile driving noise only briefly as they are transiting the area. Only harbor seals and California sea lions are expected to forage and haul out in the project ZOIs with any frequency and could be exposed multiple times during a project.

## 6.1 Estimated Duration of Pile Driving

Durations are provided below, and summarized in Table 6-1. The actual number of hours is expected to be less.

- Vibratory driving of each steel sheet pile will take approximately 30 minutes per pile, 10 sheet piles installed per day, with 44 sheet piles installed over five days.
- Vibratory driving of each steel H pile will take approximately 30 minutes, with six piles installed in one day.
- Vibratory removal of 44 steel sheet piles will take approximately 30 minutes per pile, with all piles removed over 5 days.
- Vibratory removal of each steel H pile will take approximately 30 minutes, with six piles removed in one day.

**Table 6-1. Worst Case Pile Durations**

| Method | Steel Pile Diameter (Inches) | Number of Piles | Minutes per pile | Minutes | Piles per day | Duration (Hours) | Duration (Days) |
|---|---|---|---|---|---|---|---|
| Vibratory Driving | Sheet | 44 | 30 | 1320 | 10 | 22 | 5 |
| Vibratory Driving | H pile | 6 | 30 | 180 | 6 | 3 | 1 |
| Vibratory Removal | Sheet | 44 | 30 | 1320 | 10 | 22 | 5 |
| Vibratory Removal | H pile | 6 | 30 | 180 | 6 | 3 | 1 |
| **Total** | | | | 3000 | | 50 | 12.0 |

## 6.2 Estimated Zones of Influence/Zones of Exclusion

Distances to the NMFS threshold for Level A (injury) and Level B (harassment) take for vibratory installation and removal were presented in Section 1.6.6, Attenuation to NMFS Thresholds:

- ZOI-1: the distance where noise generated by steel sheet pile vibratory driving/removal (165 $dB_{RMS}$ at 10 meters) attenuates to the 120 $dB_{RMS}$ background/harassment threshold level for all marine mammals = 10,000 meters/6.21 miles
- ZOE-1: the 199 dB SELcum low-frequency cetacean injury threshold for vibratory driving/removal of steel sheet piles (165 dBRMS at 10 meters) = 36.9 m/121 ft.
- ZOE-2: the 198 dB SELcum mid-frequency cetacean injury threshold for vibratory driving/removal of steel sheet piles (165 dBRMS at 10 meters) = 3.3 m/11 ft.
- ZOE-3: the 173 dB SELcum high-frequency cetacean injury threshold for vibratory driving/removal of steel sheet piles (165 dBRMS at 10 meters) = 54.6 m/179 ft.
- ZOE-4: the 201 dB SELcum phocid pinniped injury threshold for vibratory driving/removal of steel sheet piles (165 dBRMS at 10 meters) = 22.4 m/74 ft.
- ZOE-5: the 219 dB SELcum otariid pinniped injury threshold for vibratory driving/removal of steel sheet piles (165 dBRMS at 10 meters) = 1.6 m/6 ft.
- ZOI-2: the distance where noise generated by steel H pile vibratory driving/removal (150 $dB_{RMS}$ at 10 meters) attenuates to the 120 $dB_{RMS}$ background/harassment threshold level for all marine mammals = 1,000 m/3,280 ft.
- ZOE-6: the 199 dB $SEL_{cum}$ low-frequency cetacean injury threshold for vibratory driving/removal of steel H piles (150 $dB_{RMS}$ at 10 meters) = 2.6 m/9 ft.

- ZOE-7: the 198 dB $SEL_{cum}$ mid-frequency cetacean injury threshold for vibratory driving/removal of steel H piles (150 $dB_{RMS}$ at 10 meters) = 0.2 m/1 ft.
- ZOE-8: the 173 dB $SEL_{cum}$ high-frequency cetacean injury threshold for vibratory driving/removal of steel H piles (150 $dB_{RMS}$ at 10 meters) = 3.9 m/13 ft.
- ZOE-9: the 201 dB $SEL_{cum}$ phocid pinniped injury threshold for vibratory driving/removal of steel H piles (150 $dB_{RMS}$ at 10 meters) = 1.6 m/6 ft.
- ZOE-10: the 219 dB $SEL_{cum}$ otariid pinniped injury threshold for vibratory driving/removal of steel H piles (150 $dB_{RMS}$ at 10 meters) = 0.1 m/1 ft.

The nearest documented harbor seal haul out site to the US 101 Chehalis River Bridge is a low-tide haul out located 7.0 miles to the west (Figure 3-1). The nearest documented California sea lion haul out sites to the project site are at Split Rock, 35 miles north of the entrance to Grays Harbor; and at the mouth of the Columbia River, 46 miles south of the entrance to Grays Harbor (Jeffries, et al. 2000). A few California sea lions may haul out on docks and buoys in the vicinity of the Westport marina, located 15 miles west of the project site.

During vibratory pile driving and removal, temporary in-air disturbance will be limited to harbor seals swimming on the surface through the immediate bridge area, or hauled-out on beaches or man-made structures within 33.7 m/110ft.

## 6.3 Estimated Incidental Takes

Incidental take is estimated for each species by estimating the likelihood of a marine mammal being present within a ZOI during active pile driving or removal. Expected marine mammal presence is determined by past observations and general abundance near the U.S. 101 Chehalis River Bridge during the construction window. Typically, potential take is estimated by multiplying the area of the ZOIs by the local animal density. This provides an estimate of the number of animals that might occupy the ZOI at any given moment. There are two sources of density estimates available, the U.S. Navy Marine Species Density Report (2014), and the WDFW density estimates for harbor porpoise (2016). These density estimates will be used to calculate takes, unless site-specific data is available that supports a different take estimate approach.

As a result, the take requests were estimated using local marine mammal data sets (e.g., state and federal agencies), opinions from state and federal agencies, observations from local area whale specialists, and best professional judgment.

The calculation for marine mammal exposures is estimated by:

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

All estimates are conservative. A summary of underwater noise durations per ZOI is provided in Table 6-2.

**Table 6-2. ZOI Area/Days Present**

| ZOI | Pile Type | Hammer Type | ZOI Area (approximate $km^2$) | Days ZOI Present |
|---|---|---|---|---|
| ZOI-1 | Sheet pile | Vibratory | 2.13 | 10 |
| ZOI-2 | H-pile | Vibratory | 0.67 | 2 |

### 6.3.1 Harbor Seal

Based on counts of harbor seals at 44 low-tide haul outs in Grays Harbor by Jeffries, et al. 2000), the estimated density of harbor seals in the U.S. 101 Chehalis River Bridge project area is 29.4 animals per square kilometer. Based on this density estimate, the following number of harbor seals may be present in the ZOIs:

- ZOI-1 (2.13 $km^2$) exposure estimate: 63 animals * 10 days of pile activity = 630
- ZOI-2 (0.67 $km^2$) exposure estimate: 20 animals * 2 days of pile activity = 40

WSDOT is requesting authorization for Level B acoustical harassment take of 670 harbor seals. It is assumed that this number will include multiple harassments of the same individual(s).

### 6.3.2 California Sea Lion

The Navy Marine Species Density Database (U.S. Navy 2014) estimates the density of California sea lions in the waters offshore of Grays Harbor as 0.033 animals per square kilometer. This estimate will be used as a surrogate for Grays Harbor. Based on this density estimate, the following number of California sea lions may be present in the ZOI:

- ZOI-1 (2.13 $km^2$) exposure estimate: 1 animal * 10 days of pile activity = 10
- ZOI-2 (0.67 $km^2$) exposure estimate: 1 animal * 2 days of pile activity = 2

WSDOT is requesting authorization for Level B acoustical harassment of 12 California sea lions. It is assumed that this number will include multiple harassments of the same individual(s).

### 6.3.3 Steller Sea Lion

The Navy Marine Species Density Database (U.S. Navy 2014) estimates the density of Steller sea lions in the waters offshore of Grays Harbor as 0.0145 animals per square kilometer. This estimate will be used as a surrogate for Grays Harbor. Based on this density estimate, the following number of Steller sea lions may be present in the ZOI:

- ZOI-1 (2.13 $km^2$) exposure estimate: 1 animal * 10 days of pile activity = 10
- ZOI-2 (0.67 $km^2$) exposure estimate: 1 animal * 2 days of pile activity = 2

WSDOT is requesting authorization for Level B acoustical harassment of 12 Steller sea lions. It is assumed that this number will include multiple harassments of the same individual(s).

### 6.3.4 Gray Whale

According to counts conducted by Calambokidis, et al. (2012), 29 gray whales were observed over a 12-year period during the months of July through September (the proposed period of project activities). Based on this data, an average of 2.25 gray whales may be present in Grays Harbor/south Washington coast during the three-month period, resulting in a conservative density estimate of 0.12 animals per square kilometer. This estimate will be used for Grays Harbor. Based on the highest density estimate, the following number of gray whales may be present in the ZOI:

- ZOI-1 (2.13 $km^2$) exposure estimate: 1 animal * 10 days of pile activity = 10
- ZOI-2 (0.67 $km^2$) exposure estimate: 1 animal * 2 days of pile activity = 2

WSDOT is requesting authorization for Level B acoustical harassment of 12 gray whales. It is assumed that this number will include multiple harassments of the same individual(s).

### 6.3.5 Harbor Porpoise

The Navy Marine Species Density Database (U.S. Navy 2014) estimates the density of harbor porpoises in the waters offshore of Grays Harbor as a range between 0.69 and 1.67 animals per square kilometer. According to Evenson, et al. (2016), the maximum harbor porpoise density in the Strait of Juan de Fuca (approximately 105 miles north of Grays Harbor) in 2014 was 0.768 animals per square kilometer. The higher density estimate for waters offshore of Grays Harbor (1.67) will be used for this analysis. Based on this density estimate, it is assumed that the following number of harbor porpoise may be intermittently in the ZOI:

- ZOI-1 (2.13 $km^2$) exposure estimate: 4 animals * 10 days of pile activity = 40
- ZOI-2 (0.67 $km^2$) exposure estimate: 2 animals * 2 days of pile activity = 4

WSDOT is requesting authorization for Level B acoustical harassment take of 44 harbor porpoises. It is assumed that this number will include multiple harassments of the same individual(s).

## 6.4 Number of Takes for Which Authorization is Requested

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

**Table 6-3 Level B Acoustical Harassment Take Requests**

| Species | Take Request |
|---|---|
| Harbor Seal | 670 |
| California Sea Lion | 12 |
| Steller Sea Lion | 12 |
| Gray Whale | 12 |
| Harbor Porpoise | 44 |

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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.*

WSDOT is requesting authorization for Level B acoustical harassment take of marine mammals as listed in Table 6-1. Any incidental takes will very likely be multiple takes of individuals, rather than single takes of unique individuals. The stock take calculations below assume takes of individual animals, instead of repeated takes of a smaller number; therefore, the stock take percentage calculations are very conservative. The take request for each species is well below the 20 percent-of-stock threshold.

These numbers in relation to the overall stock size of each species are summarized in Table 7-1.

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

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

| Species | Stock Size | Take Request | Take Request % of Stock | 20% of Stock |
|---|---|---|---|---|
| Harbor Seal | 24,732 | 670 | 2.71 | 4,946 |
| California Sea Lion | 296,750 | 12 | 0.00 | 59,350 |
| Steller Sea Lion | 60,131 | 12 | 0.02 | 12,026 |
| Gray Whale | 20,990 | 12 | 0.05 | 4,198 |
| Harbor Porpoise | 21,487 | 44 | 0.20 | 4,297 |

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# 8.0 Anticipated Impact on Subsistence

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

## 8.1 Subsistence Harvests by Northwest Treaty Indian Tribes

Historically, Pacific Northwest Native American tribes were known to hunt several species of marine mammals including, but not limited to harbor seals, Steller sea lions, northern fur seals, gray whales and humpback whales. More recently, several Pacific Northwest Native American tribes have promulgated tribal regulations allowing tribal members to exercise treaty rights for subsistence harvest of harbor seals and California sea lions (Carretta et al. 2007a).

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

### 8.1.1 Harbor Seals

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

### 8.1.2 California Sea Lions

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

### 8.1.3 Gray Whales

The Makah ceased whaling in the 1920s after commercial whaling decimated the Eastern North Pacific gray whale population (NMFS 2007). On June 16, 1994, gray whales were removed from the endangered species list after a determination that the population had “recovered to near its estimated original population size and is neither in danger of extinction throughout all or a significant portion of its range, nor likely to again become endangered within the foreseeable future throughout all or a significant portion of its range” (59 FR 31094).

On May 5, 1995, the Makah formally notified the U.S. Government of its interest in resuming treaty ceremonial and subsistence harvest of Eastern North Pacific gray whales, asking the Department of Commerce to represent them in seeking approval from the International Whaling

Commission (IWC) for an annual quota (NMFS 2007). On October 18, 1997, the IWC approved an aboriginal subsistence quota of 620 Eastern North Pacific gray whales (with an annual cap of 140) for the Russian Checotah people and the Makah (Angliss and Outlaw 2007; NMFS 2007). The Makah successfully hunted one Eastern North Pacific gray whale on May 17, 1999 (NMFS 2005).

Whaling by the Makah was halted on December 20, 2002, when the Ninth Circuit Court of Appeals ruled that an environmental impact statement rather than an environmental assessment should have been prepared under the National Environmental Protection Act and that the Makah must comply with the process prescribed in the MMPA for authorizing take of marine mammals otherwise prohibited by a moratorium. This was further upheld by rulings in 2003 and 2004 (NMFS 2007). At a 2007 meeting of the IWC (59th Annual Meeting in Anchorage, Alaska), an aboriginal subsistence quota for gray whales was again approved for natives in Russia and 20 whales (four per year for 5 years) for the Makah. But under the Ninth Circuit Court ruling the Makah must first obtain a waiver of the MMPA take moratorium before harvesting under their IWC quota (Norberg pers. comm. 2007b).

In February 2005, NMFS received a request from the Makah for a waiver of the MMPA take moratorium to resume limited hunting of Eastern North Pacific gray whales. A draft environmental impact statement (DEIS) to examine the alternatives for a decision to approve or deny the waiver was released for public comment in May 2008, but later terminated in May 2012 to begin developing a new DEIS because of substantial new scientific information. In March 2015 the new DEIS was released, and is currently in public comment (NMFS 2015a).

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

# 9.0 Anticipated Impact on Habitat

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

## 9.1 Introduction

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

## 9.2 In-air Noise Disturbance to Haul Outs

Disturbance of pinnipeds hauled out near the project, and surfacing when swimming within the threshold distances is possible.

During vibratory pile driving and removal, temporary in-air disturbance will be limited to harbor seals swimming on the surface through the immediate area, or hauled-out on shorelines within 33.7 m/110 ft. Although in-air noise levels are below the otariid threshold level, the 90 dB threshold area will be monitored for all pinnipeds.

In-air noise from non-pile driving construction activities is not expected to cause in-air disturbance to pinnipeds, because the loudest pieces of non-pile driving equipment proposed for the project will not likely be operating concurrently. None of the non-pile driving equipment proposed for the project generates noise that exceeds the 90 dB harassment threshold for phocid pinnipeds.

## 9.3 Underwater Noise Disturbance

NMFS is currently using an in-water noise disturbance threshold of 120 $dB_{RMS}$ for pinnipeds and cetaceans for continuous noise sources, unless the site-specific background noise is higher than 120 $dB_{RMS}$. In that case, the higher background becomes the threshold. The distance to the Level B acoustical harassment thresholds is described in Section 1.6.4, Attenuation to NMFS Thresholds.

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

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

limited. Pile removal and driving will expose marine mammals to potential Level B harassment. The vibratory pile driving ZOEs will be monitored, and work ceased if any marine mammals approaches the ZOEs. Because there are no documented haul outs within the immediate project area, pinniped disturbance will be limited to individuals transiting the ZOI.

## 9.4 Water and Sediment Quality

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

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

Similar results were recorded during pile removal operations at two Washington State Ferries (WSF) facilities. At the Friday Harbor terminal, localized turbidity levels within the regulatory compliance radius of 150 feet (from three timber pile removal events) were generally less than 0.5 NTU higher than background levels and never exceeded 1 NTU. At the Eagle Harbor maintenance facility, within 150 feet, local turbidity levels (from removal of timber and steel piles) did not exceed 0.2 NTU above background levels (WSF 2014). In general, turbidity associated with pile installation is localized to about a 25-foot radius around the pile (Everitt et al. 1980). It is expected that river and tidal currents will result in increased turbidity downstream from project activities. The distance affected by project-generated turbidity will depend on river flow and tide conditions, but will probably exceed 25 feet.

Cetaceans are not expected to be close enough to the U.S. 101 Chehalis River Bridge to experience turbidity, and any pinnipeds will be transiting the bridge area and could avoid localized areas of turbidity. Therefore, the impact from increased turbidity levels is expected to be discountable to marine mammals.

## 9.5 Passage Obstructions

Pile driving and removal at the U.S. 101 Chehalis River Bridge will not obstruct movements of marine mammals. Pile work at Pier 14 will occur within 40 meters (131 feet) of the shoreline leaving 310 meters (1,017 feet) of the Chehalis River for marine mammals to pass. A construction barge may be used during the project. The barge will be anchored and/spudded. No dynamic positioning system (DPS) will be used. In a previous concurrence letter for the Vashon Island Dolphin Replacement Project (NMFS 2008), 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 bridge will be likely transiting the area.

Any adverse effects on prey species during project construction will be short term. Given the large numbers of fish and other prey species in Grays Harbor, the short-term nature of effects on fish species and the mitigation measures to protect fish during construction (use of a vibratory hammer, BMPs, conducting work within the approved in-water work 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 with tugs is too slow to strike marine mammals.

# 10.0 Anticipated Impact of Loss or Modification of Habitat

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

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

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# 11.0 Minimization 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.*

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

The minimization measures will be employed during all pile driving activities at the U.S. 101 Chehalis River Bridge site. The language in each measure is included in the Contract Plans and Specifications and must be agreed upon by the contractor prior to any construction activities. Upon signing the contract, it becomes a legal agreement between the Contractor and WSDOT. Failure to follow the prescribed measures is a contract violation.

General measures used for all construction practices are listed first (Section 11.1, All Construction Activities), followed by specific measures for pile related activities (Section 11.2, Pile Removal and Installation). The measures listed under Section 11.1 apply to different activities and are, therefore, listed additional times where appropriate.

## 11.1 All Construction Activities

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

- All construction equipment will comply with applicable equipment noise standards of the U.S. Environmental Protection Agency, and all construction equipment will have noise control devices no less effective than those provided on the original equipment.
- WSDOT will have a WSDOT inspector on site during construction. The role of the inspector is to ensure contract compliance. The inspector and the contractor will have a copy of the Contract Plans and Specifications on site and will be aware of all requirements. The inspector will also be trained in environmental provisions and compliance.
- WSDOT will obtain Hydraulic Project Approval (HPA) from WDFW as appropriate and the contractor will follow the conditions of the HPA. HPA requirements will be listed in the contract specifications, and will be a legal requirement of the contract.
- The contractor shall be responsible for the preparation of a Spill Prevention, Control and Countermeasures (SPCC) plan to be used for the duration of the project:
- The SPCC plan 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, chemicals or other toxic or deleterious materials shall be allowed to enter surface waters.
- WSDOT will comply with water quality restrictions imposed by the Washington State Department of Ecology (Ecology) (Chapter 173-201A WAC), which specify a mixing zone beyond which water quality standards cannot be exceeded. Compliance with Ecology's standards is intended to ensure that fish and aquatic life are being protected to the extent feasible and practicable.
- Wash water resulting from washdown of equipment or work areas shall be contained for proper disposal, and shall not be discharged into state waters unless authorized through a state discharge permit.
- Equipment that enters the surface water shall be maintained to prevent any visible sheen from petroleum products appearing on the water.
- There shall be no discharge of oil, fuels, or chemicals to surface waters, or onto land where there is a potential for reentry into surface waters.
- No cleaning solvents or chemicals used for tools or equipment cleaning shall be discharged to ground or surface waters.

## 11.2 Timing Windows

Timing restrictions are used to avoid in-water work when ESA-listed salmonids are most likely to be present. The combined work window for in-water work for the U.S. 101 Chehalis River Bridge is July 16 through February 15. Actual construction activities are planned to take place from July 16, 2018 and September 30, 2018.

## 11.3 Pile Removal BMPs

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

- Marine mammal monitoring during vibratory pile removal will be employed for the Level B ZOI (see Section 11.5, Marine Mammal Monitoring).
- The crane operator will be instructed to remove piles slowly to minimize turbidity in the water as well as sediment disturbance.
- The operator will "wake up" the pile to break the bond with surrounding sediment by vibrating the pile slightly prior to removal. Waking up the pile avoids pulling out large blocks of sediment, and usually results in little to no sediment attached to the pile during withdrawal.
- Barges will not be anchored over vegetated shallows for more than 24 hours.
- Demolition and construction materials shall not be stored where high tides, wave action, or upland runoff can cause materials to enter surface waters.

## 11.4 Pile Driving BMPs

BMPs to be employed during pile installation include:

- The contractor will be required to retrieve any floating debris generated during construction. Retrieved debris will be disposed of at an upland disposal site.
- Steel sheet piles and H piles will be used. No creosote-treated timber piling will be used.

## 11.5 Safety Zone/Zone of Exclusion

The purpose of the safety zone/ZOE is to ensure that noise-generating activities are shut down before Level A (injury) take occurs from:

- low-frequency cetaceans entering the 199 dB $SEL_{cum}$ ZOE
- mid-frequency cetaceans entering the 198 dB $SEL_{cum}$ ZOE
- high-frequency cetaceans entering the 173 dB $SEL_{cum}$ ZOE
- phocid pinnipeds entering the 201 dB $SEL_{cum}$ ZOE, and
- otariid pinnipeds entering the 219 dB $SEL_{cum}$ ZOE while vibratory pile driving is active.

Sheet Piles. During vibratory driving of steel sheet piles, Level A take (for high-frequency cetaceans) can occur out to 86.6 m/284 ft. (the distance to the 173 dB $SEL_{cum}$ isopleth [ZOE-4]). During vibratory pile driving, an 86.6 m/284 ft. radius safety zone/ZOE will be fully monitored and vibratory driving will shut down at the approach of any marine mammal to this zone (see Appendix B, Marine Mammal Monitoring Plan).

H Piles. During vibratory driving of steel H piles, Level A take (for high-frequency cetaceans) can occur out to 5.5 m/18 ft. (the distance to the 173 dB $SEL_{cum}$ isopleth [ZOE-9]). There are four other ZOEs within 5.5 meters; however, they range between 0.2 and 3.7 meters out from the pile being driven. To simplify monitoring during vibratory driving of H piles, a 10 m/33 ft. radius safety zone/ZOE will be fully monitored and vibratory driving will shut down at the approach of any marine mammal to this zone (see Appendix B, Marine Mammal Monitoring Plan

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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. No activities will take place in or near a traditional Arctic subsistence hunting area.

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# 13.0 Monitoring and Reporting Plan

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

## 13.1 Coordination

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

## 13.2 Visual Monitoring

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

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

## 13.3 Reporting Plan

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

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

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# 14.0 Coordinating Research to Reduce and Evaluate Incidental Take

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

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

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

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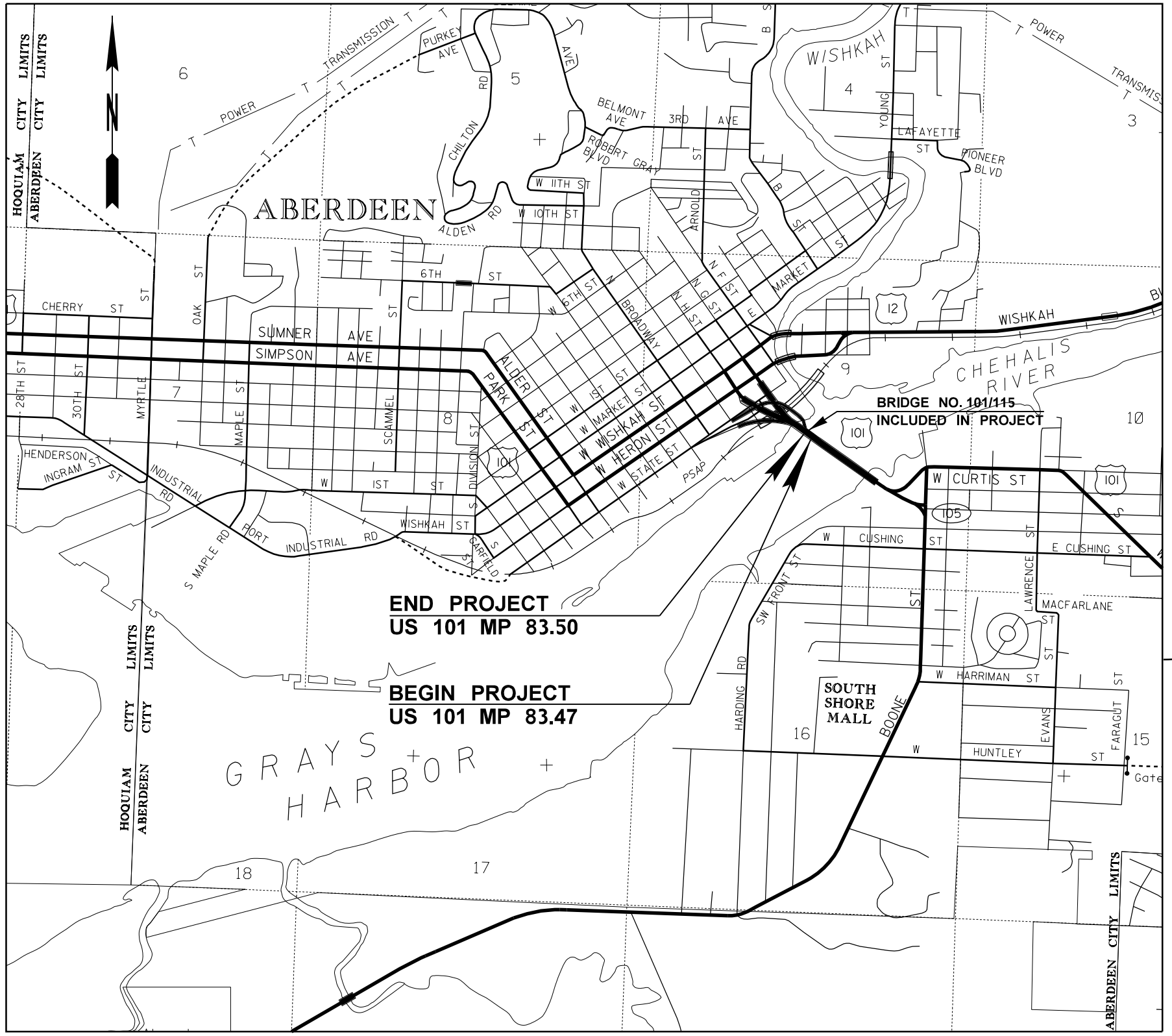
# Appendix A
# Plan Sheets

# T. 17 N., R. 9 W., W.M.

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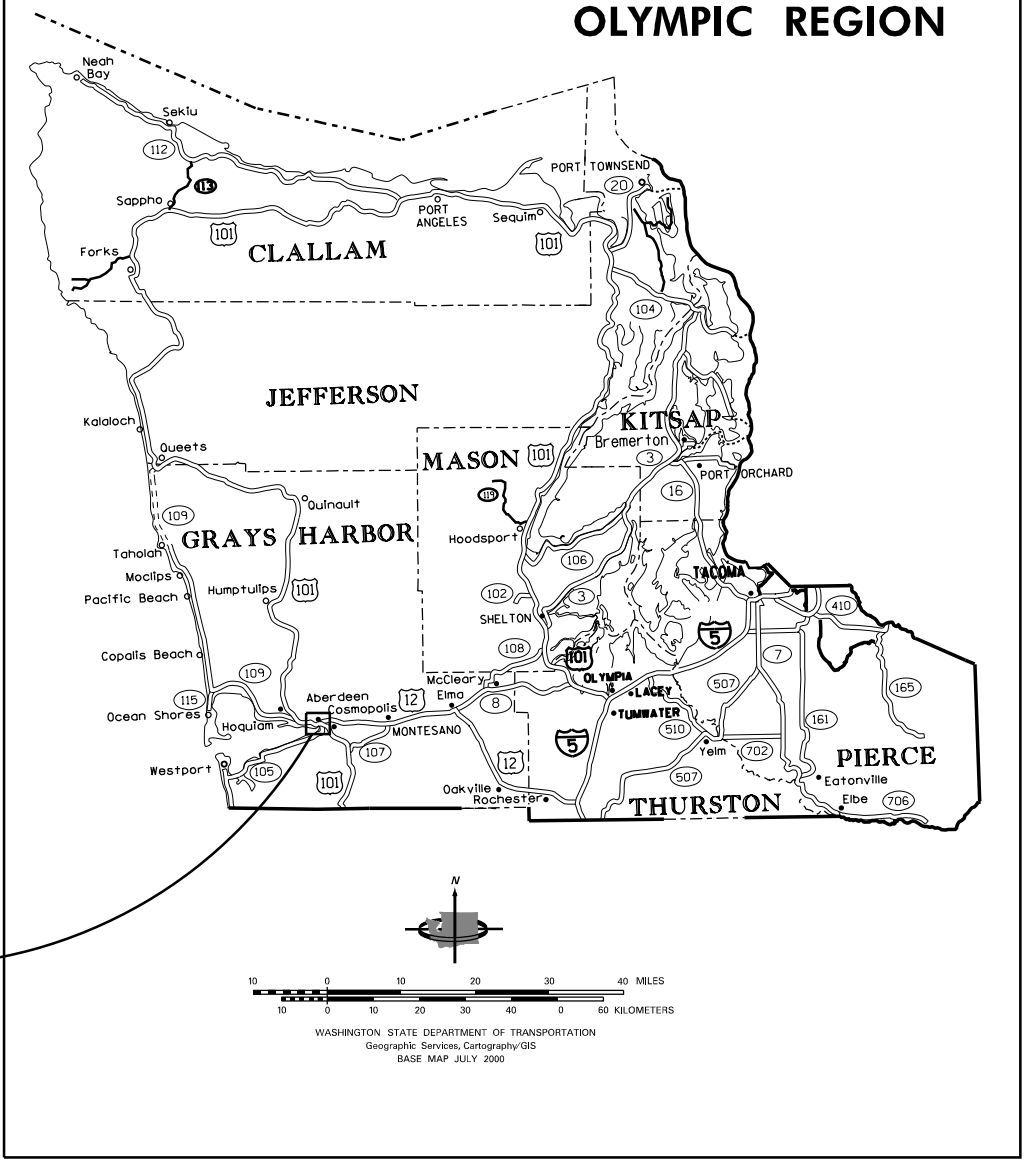


WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
Geographic Services, Cartography/GIS
BASE MAP JULY 2000

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Washington State Department of Transportation

**US 101**
**CHEHALIS RIVER BRIDGE**
**SCOUR REPAIR**

**VICINITY MAP**

# T. 17 N., R. 9 W., W.M.
## SECTION 9

CHEHALIS RIVER

STATE STREET

F STREET

RIVER STREET

QWEST
BURIED TELEPHONE CABLE
RIVER CROSSING SIGN

DNR AQUATIC EASEMENT

EXISTING HIGHWAY
R/W BOUNDARY

FLOOD
EBB

PILING

US 101

PERMANENT
IMPACT AREAS

STEEL
DRAW SPAN

STEEL
DRAW SPAN

PIER 12

PIER 13

PIER 14

PIER 15

PIER 16

PIER 17

PIER 18

BEGIN PROJECT
US 101 MP 83.47

EXISTING BRIDGE
NO. 101/115

END PROJECT
US 101 MP 83.50

DNR AQUATIC EASEMENT

0 50 100
SCALE IN FEET

## LEGEND

- EXISTING MANHOLE
- EXISTING PILE
- EXISTING UTILITY POLE
- EXISTING DOWN GUY ANCHOR
- EXISTING FENCE
- EXISTING SANITARY SEWER LINE
- DEACTIVATED SANITARY SEWER LINE
- EXISTING WATER LINE
- EXISTING DITCH

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Washington State
Department of Transportation

**US 101**
**CHEHALIS RIVER BRIDGE**
**SCOUR REPAIR**

**SCOUR REPAIR PLAN**

Plot 1

PLAN REF NO
**SC1**

SHEET 1 OF 1 SHEETS

# T. 17 N., R. 9 W., W.M.
## SECTION 9

CHEHALIS RIVER

FLOOD

EBB

STATE STREET

F STREET

RIVER STREET

QWEST
BURIED TELEPHONE CABLE
RIVER CROSSING SIGN

APPROXIMATE LIMITS
OF BARGE USE

EXISTING HIGHWAY
R/W BOUNDARY

US 101

STEEL
DRAW SPAN

STEEL
DRAW SPAN

PILING

PILING

PILING

PILING

PILING

PIER 12

PIER 13

PIER 14

PIER 15

PIER 16

PIER 17

PIER 18

310 FT.

220 FT.

END PROJECT
US 101 MP 83.50

BEGIN PROJECT
US 101 MP 83.47

EXISTING BRIDGE
NO. 101/115

0 50 100
SCALE IN FEET

## LEGEND

- EXISTING MANHOLE
- EXISTING PILE
- EXISTING UTILITY POLE
- EXISTING DOWN GUY ANCHOR
- EXISTING FENCE
- EXISTING SANITARY SEWER LINE
- DEACTIVATED SANITARY SEWER LINE
- EXISTING WATER LINE
- EXISTING DITCH

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| CHECKED BY | S. HARDY | | | |
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JOB NUMBER

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Washington State
Department of Transportation

# US 101
# CHEHALIS RIVER BRIDGE
# SCOUR REPAIR

## BARGE USE PLAN

Plot 1

PLAN REF NO
BU1

SHEET 1 OF 1 SHEETS

# Appendix B
# Marine Mammal Monitoring Plan

## U.S. 101 Chehalis River Bridge Scour Repair Project
## Marine Mammal Monitoring Plan

October 2016
Revised June 2017

In accordance with the October 2016, Washington State Department of Transportation U.S. 101 Chehalis River Bridge Project Incidental Harassment Authorization Request, marine mammal monitoring will be implemented during this project.

Qualified Protected Species Observers (PSOs) 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.

The project includes vibratory driving and removal of steel sheet piles and H piles. Distances to in-water injury and harassment thresholds (based on NMFS 2016 guidance) are provided below:

- ZOI-1: the distance where noise generated by steel sheet pile vibratory driving/removal (165 $dB_{RMS}$ at 10 meters) attenuates to the 120 $dB_{RMS}$ background/harassment threshold level for **all marine mammals** = 10,000 meters/6.21 miles
- ZOE-1: the 199 dB $SEL_{cum}$ **low-frequency cetacean** injury threshold for vibratory driving/removal of steel sheet piles (165 $dB_{RMS}$ at 10 meters) = 36.9 m/121 ft.
- ZOE-2: the 198 dB $SEL_{cum}$ **mid-frequency cetacean** injury threshold for vibratory driving/removal of steel sheet piles (165 $dB_{RMS}$ at 10 meters) = 3.3 m/11 ft.
- ZOE-3: the 173 dB $SEL_{cum}$ **high-frequency cetacean** injury threshold for vibratory driving/removal of steel sheet piles (165 $dB_{RMS}$ at 10 meters) = 54.6 m/179 ft.
- ZOE-4: the 201 dB $SEL_{cum}$ **phocid pinniped** injury threshold for vibratory driving/removal of steel sheet piles (165 $dB_{RMS}$ at 10 meters) = 22.4 m/74 ft.
- ZOE-5: the 219 dB $SEL_{cum}$ **otariid pinniped** injury threshold for vibratory driving/removal of steel sheet piles (165 $dB_{RMS}$ at 10 meters) = 1.6 m/6 ft.
- ZOI-2: the distance where noise generated by steel H pile vibratory driving/removal (150 $dB_{RMS}$ at 10 meters) attenuates to the 120 $dB_{RMS}$ background/harassment threshold level for **all marine mammals** = 1,000 m/3,280 ft.
- ZOE-6: the 199 dB $SEL_{cum}$ **low-frequency cetacean** injury threshold for vibratory driving/removal of steel H piles (150 $dB_{RMS}$ at 10 meters) = 2.6 m/9 ft.
- ZOE-7: the 198 dB $SEL_{cum}$ **mid-frequency cetacean** injury threshold for vibratory driving/removal of steel H piles (150 $dB_{RMS}$ at 10 meters) = 0.2 m/1 ft.
- ZOE-8: the 173 dB $SEL_{cum}$ **high-frequency cetacean** injury threshold for vibratory driving/removal of steel H piles (150 $dB_{RMS}$ at 10 meters) = 3.9 m/13 ft.
- ZOE-9: the 201 dB $SEL_{cum}$ **phocid pinniped** injury threshold for vibratory driving/removal of steel H piles (150 $dB_{RMS}$ at 10 meters) = 1.6 m/6 ft.

- ZOE-10: the 219 dB $SEL_{cum}$ **otariid pinniped** injury threshold for vibratory driving/removal of steel H piles (150 $dB_{RMS}$ at 10 meters) = 0.1 m/1 ft.

### Monitoring to Estimate Level B Take Levels and Prevent Level A Take

WSDOT proposes the following Marine Mammal Monitoring Plan in order to prevent Level A injury take in the ZOEs, and to estimate Level B harassment take in the ZOIs:

- Sheet Piles (Cetaceans). During vibratory driving of steel sheet piles, Level A take (for high-frequency cetaceans) can occur out to 54.6 m/179 ft. (the distance to the 173 dB SELcum isopleth [ZOE-3]). During vibratory pile driving, a 54.6 m/179 ft. radius safety zone/ZOE will be fully monitored and vibratory driving will shut down at the approach of any **cetacean** to this zone.
- Sheet Piles (Pinnipeds). During vibratory driving of steel sheet piles, Level A take (for pinnipeds) can occur out to 22.4 m/74 ft. (the distance to the 201 dB SELcum isopleth [ZOE-4]). During vibratory pile driving, a 22.4 m/74 ft. radius safety zone/ZOE will be fully monitored and vibratory driving will shut down at the approach of any **pinniped** to this zone.
- H Piles. All ZOEs associated with vibratory driving of steel H piles are less than 10 m from pile driving activities. To simplify monitoring during vibratory driving of H piles, a 10 m/33 ft. radius safety zone/ZOE will be fully monitored and vibratory driving will shut down at the approach of **any marine mammal** to this zone.
- To verify the required monitoring distance, the ZOEs and ZOIs will be determined by using a range finder or hand-held global positioning system device.
- The ZOEs and ZOIs will be monitored for the presence of marine mammals 30 minutes before, during, and 30 minutes after any pile removal activity.
- Monitoring will be continuous unless the contractor takes a significant break, in which case, monitoring will be required 30 minutes prior to restarting pile removal.
- If marine mammals are observed, their location within the ZOIs, and their reaction (if any) to pile removal or driving activities will be documented.

### Minimum Qualifications for Protected Species Observers

Qualifications for PSOs include:

- 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.
- 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 sufficient to prepare a report of observations that would include such information as the number and type of marine mammals observed; the behavior of marine mammals in the project area during construction, dates and times when observations were conducted; dates and times when in water construction activities were conducted; dates and times when marine mammals were present at or within the Level B acoustical harassment ZOI; dates and times when pile driving or removal was paused due to the presence of marine mammals.

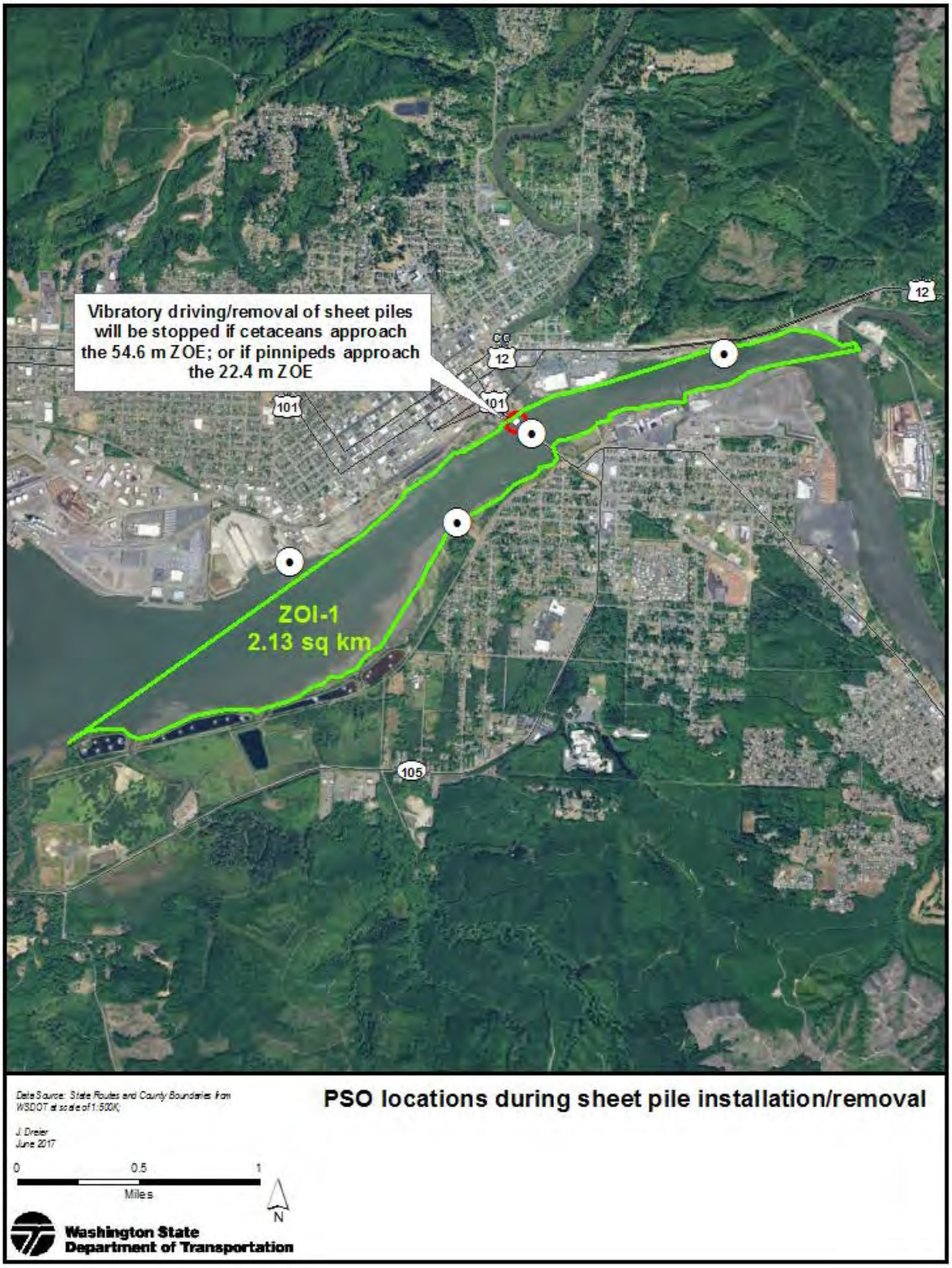


**Figure 1 – Monitoring locations during vibratory driving/removal of steel sheet piles.**


**Figure.2 – Monitoring locations during vibratory driving/removal of steel H piles.**