E 3510-22-P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[RTID 0648-XA694]

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Washington State Department of Transportation Purdy Bridge Rehabilitation Project, Pierce County, WA

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice; proposed incidental harassment authorization; request for comments on proposed authorization and possible renewal.

SUMMARY: NMFS has received a request from the Washington State Department of Transportation (WADOT) for authorization to take marine mammals incidental to the Purdy Bridge Rehabilitation Project in Pierce County, WA. Pursuant to the Marine Mammal Protection Act (MMPA), NMFS is requesting comments on its proposal to issue an incidental harassment authorization (IHA) to incidentally take marine mammals during the specified activities. NMFS is also requesting comments on a possible one-year renewal that could be issued under certain circumstances and if all requirements are met, as described in **Request for Public Comments** at the end of this notice. NMFS will consider public comments prior to making any final decision on the issuance of the requested MMPA authorizations and agency responses will be summarized in the final notice of our decision.

DATES: Comments and information must be received no later than **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

ADDRESSES: Comments should be addressed to Jolie Harrison, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service. Electronic comments should be sent to *ITP.Meadows@noaa.gov*.

Instructions: NMFS is not responsible for comments sent by any other method, to any other address or individual, or received after the end of the comment period. Comments received electronically, including all attachments, must not exceed a 25-megabyte file size. Attachments to electronic comments will be accepted in Microsoft Word or Excel or Adobe PDF file formats only. All comments received are a part of the public record and will generally be posted online at *https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act* without change. All personal identifying information (*e.g.*, name, address) voluntarily submitted by the commenter may be publicly accessible. Do not submit confidential business information or otherwise sensitive or protected information.

FOR FURTHER INFORMATION CONTACT: Dwayne Meadows, Ph.D., Office of Protected Resources, NMFS, (301) 427-8401. Electronic copies of the application and supporting documents, as well as a list of the references cited in this document, may be obtained online at: *https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act*. In case of problems accessing these documents, please call the contact listed above.

SUPPLEMENTARY INFORMATION:

Background

The MMPA prohibits the "take" of marine mammals, with certain exceptions. Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq*.) direct the Secretary of Commerce (as delegated to NMFS) to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical

region if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of a proposed incidental take authorization may be provided to the public for review.

Authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s) and will not have an unmitigable adverse impact on the availability of the species or stock(s) for taking for subsistence uses (where relevant). Further, NMFS must prescribe the permissible methods of taking and other "means of effecting the least practicable adverse impact" on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of the species or stocks for taking for certain subsistence uses (referred to in shorthand as "mitigation"); and requirements pertaining to the mitigation, monitoring and reporting of the takings are set forth.

The definitions of all applicable MMPA statutory terms cited above are included in the relevant sections below.

National Environmental Policy Act

To comply with the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq*.) and NOAA Administrative Order (NAO) 216-6A, NMFS must review our proposed action (*i.e.*, the issuance of an IHA) with respect to potential impacts on the human environment.

This action is consistent with categories of activities identified in Categorical Exclusion B4 (IHAs with no anticipated serious injury or mortality) of the Companion Manual for NOAA Administrative Order 216-6A, which do not individually or cumulatively have the potential for significant impacts on the quality of the human environment and for which we have not identified any extraordinary circumstances that would preclude this categorical exclusion. Accordingly, NMFS has preliminarily

determined that the issuance of the proposed IHA qualifies to be categorically excluded from further NEPA review.

We will review all comments submitted in response to this notice prior to concluding our NEPA process or making a final decision on the IHA request.

Summary of Request

On July 27, 2020, NMFS received an application from WADOT requesting an IHA to take small numbers of six species of marine mammals incidental to pile driving and removal associated with the Purdy Bridge Rehabilitation Project. The application was deemed adequate and complete on December 1, 2020. WADOT's request is for take of a small number of each species by Level B harassment. Neither WADOT nor NMFS expects serious injury or mortality to result from this activity and, therefore, an IHA is appropriate.

Description of Proposed Activity

Overview

The purpose of the project is to rehabilitate the two in-water support piers of the State Route 302 Purdy Bridge by removing the top 3 inches (7.5 centimeter (cm)) of decaying concrete on each support pier and replacing with fiberglass reinforced concrete. Twenty steel H piles and 44 sheetpiles will be driven to create a caisson-like dewatered structures around the bridge piers to allow the work to be completed. Once the work on the piers is completed the piles will be removed. A needle gun will be used to remove 3 inches (7.5 cm) of decayed concrete from the two in-water bridge piers. Pile driving/removal and concrete removal is expected to take no more than 20 days. Pile driving/removal would be by vibratory pile driving.

The pile driving/removal can result in take of marine mammals from sound in the water which results in behavioral harassment or auditory injury. Needle gun scraping from sound in the air may result in behavioral harassment of pinnipeds.

Dates and Duration

The work described here is scheduled for July 16, 2021 through February 15, 2022 as it is limited to this work window because of restrictions to protect ESA-listed salmonids. In-water activities will occur during daylight hours only.

Specific Geographic Region

The activities would occur in Henderson Bay, a small isolated bat of south Puget Sound near the unincorporated community of Purdy, WA, north of the city of Gig Harbor, WA (Figure 1). The Bay is oriented basically north-south with the Purdy Bridge spanning the bay where a sand spit narrows the width of the bay near its northern limit. North of the bridge is the Burley Lagoon, a 1.45 square kilometer (km^2) (0.56 square miles (mi^2)) shallow water lagoon with significant acreage used for commercial shellfishing. The width of Henderson Bay ranges from 0.3 to 5.8 kilometer (km) (0.2 to 3.6 miles (mi)), and depths range from 23 meter (m) (74 feet (ft)) Mean Lower Low Water (MLLW) to intertidal. Water depths near the bridge vary from exposed substrate at low tides to 5 m (15 ft) at high tide. The substrate in the area is gravels in a sand matrix which do not require impact pile driving.

Detailed Description of Specific Activity

Purdy Bridge is a continuous hollow-box girder bridge that is 170 m (550 ft) long and was built in 1937. It is two lanes wide and supported by four piers, two of which are in the water and will be repaired as part of this project. These two piers are 190 feet apart and seriously decayed. The purpose of the project is to rehabilitate the two in-water support piers by removing the top 3 inches (7.5 cm) of decaying concrete on each support pier and replacing with fiberglass reinforced concrete. Twenty steel H piles and 44 sheetpiles will be driven with a vibratory hammer to create a caisson-like dewatered structures around the bridge piers to allow the work to be completed.

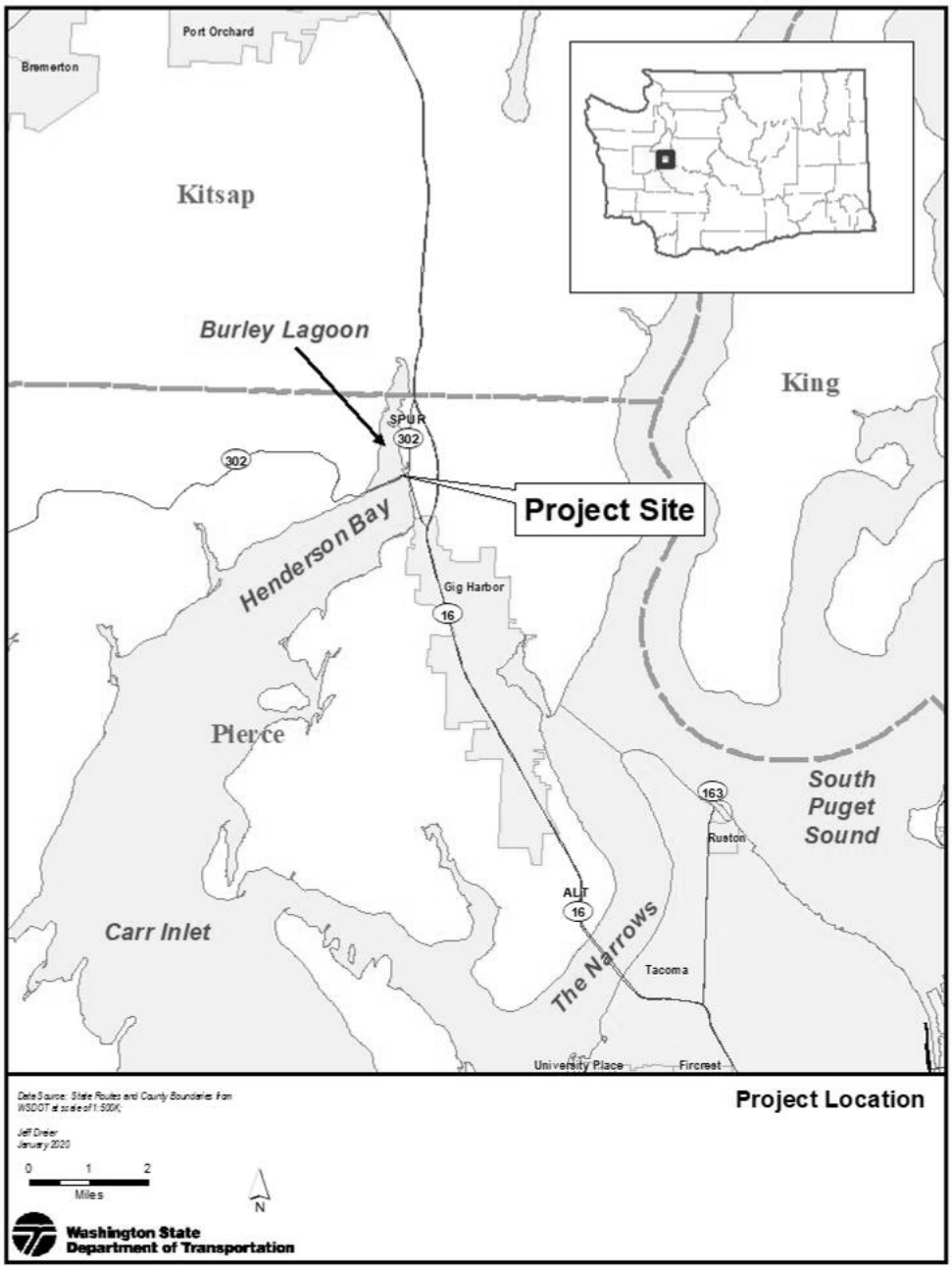

Figure 1-- Map of Proposed Project Area in Puget Sound, WA

Areas immediately surrounding the pier footings will be excavated to expose the footings and provide a stable base for any cofferdam system that may be required. The excavated area will be approximately 40 square m (430 square ft) for each pier column, based on a 1.5 m (5 ft) pad around the pier footing. Around each pier, 10 12-inch steel H piles will be installed with a vibratory hammer. Additional H piles will then be tacked horizontally (not hammered) onto the vertical H piles above the water level to create a flat supportive surface template to align the sheet piles. Using this template as a guide, 22 48-inch sheet piles will be driven with a vibratory hammer into the substrate immediately adjacent to each pier to form a temporary interlocked sheet pile wall to isolate the work area from the surrounding water.

Once these structures are in place, the rest of the containment system will be installed prior to removing marine growth and preparing the piers for repair. The pier columns will then be pressure washed to remove all existing marine growth. Next, the exposed concrete surface of each pier will be prepared by removing approximately 3 inches (7.5 cm) of the concrete on all four sides of the columns with a needle gun. Any potentially contaminated water from these procedures will be removed from the containment system and treated. Finally, the columns will be repaired with the placement of corrosion resistant fiberglass reinforcement. Forms will be installed and approximately 6 inches (15 cm) of concrete or grout will be placed to encapsulate the fiberglass reinforcement. A pigmented sealer will then be applied to all surfaces of the pier columns. Once the pier columns are repaired, the containment system will be removed, including vibratory pile removal to remove the H piles and sheetpiles. The earth removed around each column will be allowed to fill back naturally as part of the tidal process.

Pile driving/removal is expected to take no more than 14 days total; 9 days to install the containment system at the beginning of the project and 5 days for pile removal

at the end (Table 1). Needle gun use will be for no more than 4 hours per day over a maximum of 6 days.

The pile driving equipment will be deployed and operated from barges, on water. Materials will be delivered on barges.

Table 1. Summary of Pile Driving Activities

Method	Pile Type	Number of Piles	Minutes per pile	Piles per Day	Duration (days)
Vibratory Driving	Sheet	44	30	8	6
Vibratory Driving	H pile	20	30	8	3
Vibratory Removal	Sheet	44	15	16	3
Vibratory Removal	H pile	20	15	16	2

Proposed mitigation, monitoring, and reporting measures are described in detail later in this document (please see **Proposed Mitigation** and **Proposed Monitoring and Reporting**).

Description of Marine Mammals in the Area of Specified Activities

Sections 3 and 4 of the application summarize available information regarding status and trends, distribution and habitat preferences, and behavior and life history, of the potentially affected species. Additional information regarding population trends and threats may be found in NMFS's Stock Assessment Reports (SARs; *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments*) and more general information about these species (*e.g.*, physical and behavioral descriptions) may be found on NMFS's website (*https://www.fisheries.noaa.gov/find-species*).

Table 2 lists all species with expected potential for occurrence in the project area and summarizes information related to the population or stock, including regulatory status under the MMPA and Endangered Species Act (ESA) and potential biological

removal (PBR), where known. For taxonomy, we follow Committee on Taxonomy (2020). PBR is defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population (as described in NMFS's SARs). While no mortality is anticipated or authorized here, PBR and annual serious injury and mortality from anthropogenic sources are included here as gross indicators of the status of the species and other threats.

Marine mammal abundance estimates presented in this document represent the total number of individuals that make up a given stock or the total number estimated within a particular study or survey area. NMFS's stock abundance estimates for most species represent the total estimate of individuals within the geographic area, if known, that comprises that stock. For some species, this geographic area may extend beyond U.S. waters. All managed stocks in this region are assessed in NMFS's U.S. Pacific or Alaska SARs (*e.g.*, Caretta *et al*., 2020; Muto *et al*., 2020).

Table 2. Species That Spatially Co-occur with the Activity to the Degree That Take Is Reasonably Likely to Occur

Common name	Scientific name	Stock	ESA/MMPA status; Strategic (Y/N)[1]	Stock abundance (CV, N_{min}, most recent abundance survey)[2]	PBR	Annual M/SI[3]
Order Cetartiodactyla – Cetacea – Superfamily Mysticeti (baleen whales)						
Family Eschrichtiidae						
Gray Whale	*Eschrichtius robustus*	Eastern North Pacific	-, -, N	26,960 (0.05, 25,849, 2016)	801	138
Order Cetartiodactyla – Cetacea – Superfamily Odontoceti (toothed whales, dolphins, and porpoises)						
Family Delphinidae						
Short-beaked Common Dolphin	*Delphinus delphis*	California/Oregon/ Washington	-, -, N	969,861 (0.17, 839,325, 2014)	8393	>40
Family Phocoenidae (porpoises)						
Harbor porpoise	*Phocoena phocoena*	Washington Inland Waters	-, -, N	11,233 (0.37,	66	≥7.2

				8,308, 2015)		
Order Carnivora – Superfamily Pinnipedia						
Family Otariidae (eared seals and sea lions)						
California Sea Lion	*Zalophus californianus*	United States	-, -, N	257,606 (N/A, 233,515, 2014)	14,011	>321
Steller Sea Lion	*Eumetopias jubatus*	Eastern DPS	-, -, N	43,201 a (see SAR, 43,201, 2017)	2592	112
Family Phocidae (earless seals)						
Harbor Seal	*Phoca vitulina*	Southern Puget Sound	-, -, N	UNK (UNK, UNK, 1999)	UND	3.4

1 - Endangered Species Act (ESA) status: Endangered (E), Threatened (T)/MMPA status: Depleted (D). A dash (-) indicates that the species is not listed under the ESA or designated as depleted under the MMPA. Under the MMPA, a strategic stock is one for which the level of direct human-caused mortality exceeds PBR or which is determined to be declining and likely to be listed under the ESA within the foreseeable future. Any species or stock listed under the ESA is automatically designated under the MMPA as depleted and as a strategic stock.
2- NMFS marine mammal stock assessment reports online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments*. CV is coefficient of variation; Nmin is the minimum estimate of stock abundance. UNK –Unknown, UND – Undetermined.
3 - These values, found in NMFS's SARs, represent annual levels of human-caused mortality plus serious injury from all sources combined (*e.g.*, commercial fisheries, ship strike). Annual M/SI often cannot be determined precisely and is in some cases presented as a minimum value or range. A CV associated with estimated mortality due to commercial fisheries is presented in some cases.

Harbor seal, California sea lion, and Harbor porpoise spatially co-occur with the activity to the degree that take is reasonably likely to occur, and we have proposed authorizing take of these species. For gray whale, Steller sea lion, and short-beaked common dolphin, occurrence is such that take is possible, and we have proposed authorizing take of these species also. All species that could potentially occur in the proposed survey areas are included in WADOT's IHA application (see application, Table 3-1).

Transient killer whales (*Orcinus orca*) spatially co-occur with the activity to the degree that take is possible, while Southern Resident killer whales and humpback whales (*Megaptera novaeangliae*) are very rare visitors to the area. Work will be shutdown if any of these species approach the Level B harassment zone, so take is not requested for these species and they are not further discussed. Northern elephant seals (*Mirounga*

angustirostris) have been observed in Puget Sound but are not anticipated to occur in the project area and no take of this species is anticipated or requested.

Gray Whale

In the fall, gray whales migrate from their summer feeding grounds in the North Pacific and Arctic, heading south along the coast of North America to spend the winter in their breeding and calving areas off the coast of Baja California, Mexico. From mid-February to May, the Eastern North Pacific stock of gray whales can be seen migrating northward with newborn calves along the west coast of the U.S. During these migrations, gray whales will occasionally enter rivers and bays (including Puget Sound) along the coast but not in high numbers.

An exception to this is a few hundred whales that summer and feed along the Pacific coast between Kodiak Island, Alaska and northern California, referred to as the "Pacific Coast Feeding Group". A subset of this group can often be found throughout Puget Sound (Calambokidis *et al*., 2017). One individual was observed near the Purdy Bridge in June 2013 (TWM, 2020).

Short-beaked Common Dolphin

Common dolphins occur in temperate and tropical waters globally. They are abundant off California but the distribution of short-beaked common dolphins throughout the project region is highly variable and generally rare, apparently in response to oceanographic changes on both seasonal and interannual time scales (Heyning and Perrin 1994; Forney 1997; Forney and Barlow 1998). The Whale Museum database has some sightings of common dolphins in the area near the project, mostly in 2016 and 2017 (TWM, 2020).

Short-beaked common dolphins travel in large social pods and are generally associated with oceanic and offshore waters, prey-rich ocean upwellings, and underwater landscape features such as seamounts, continental shelves, and oceanic ridges. They

largely forage on schooling fish and squid. Calving takes place in winter months. Abundance of the CA/OR/WA stock short-beaked common dolphins has increased since large-scale surveys began in 1991.

Harbor Porpoise

Harbor porpoise occur along the US west coast from southern California to the Bering Sea (Carretta *et al.,* 2020). They rarely occur in waters warmer than 62.6 degrees Fahrenheit (17 degrees Celsius; Read, 1990). The Washington Inland Waters stock is found from Cape Flattery throughout Puget Sound and the Salish Sea region. In southern Puget Sound, harbor porpoise were common in the 1940s, but marine mammal surveys, stranding records since the early 1970s, and harbor porpoise surveys in the early 1990's indicated that harbor porpoise abundance had declined in southern Puget Sound (Carretta *et al.,* 2020). Annual winter aerial surveys conducted by the Washington Department of Fish and Wildlife from 1995 to 2015 revealed an increasing trend in harbor porpoise in Washington inland waters, including the return of harbor porpoise to Puget Sound (Carretta *et al.,* 2020). Seasonal surveys conducted in spring, summer, and fall 2013-2015 in Puget Sound and Hood Canal documented substantial numbers of harbor porpoise in Puget Sound. Observed porpoise numbers were twice as high in spring as in fall or summer, indicating a seasonal shift in distribution.

In most areas, harbor porpoise occur in small groups of just a few individuals. Harbor porpoise must forage nearly continuously to meet their high metabolic needs (Wisniewska *et al.,* 2016). They consume up to 550 small fish (1.2–3.9 inches [3–10 cm]; *e.g.* anchovies) per hour at a nearly 90 percent capture success rate (Wisniewska *et al.,* 2016).

California Sea Lion

California sea lions occur from Vancouver Island, British Columbia, to the southern tip of Baja California. They breed on the offshore islands of southern and

central California from May through July (Heath and Perrin, 2008). During the non-breeding season, adult and subadult males and juveniles migrate northward along the coast to central and northern California, Oregon, Washington, and Vancouver Island (Jefferson *et al.,* 1993). They return south the following spring (Heath and Perrin 2008, Lowry and Forney, 2005). Females and some juveniles tend to remain closer to rookeries (Antonelis *et al.,* 1990; Melin *et al.,* 2008).

Pupping occurs primarily on the California Channel Islands from late May until the end of June (Peterson and Bartholomew 1967). Weaning and mating occur in late spring and summer during the peak upwelling period (Bograd *et al.*, 2009). After the mating season, adult males migrate northward to feeding areas as far away as the Gulf of Alaska (Lowry *et al.,* 1992), and they remain away until spring (March–May), when they migrate back. Adult females generally remain south of Monterey Bay, California throughout the year, feeding in coastal waters in the summer and offshore waters in the winter, alternating between foraging and nursing their pups on shore until the next pupping/breeding season (Melin and DeLong, 2000; Melin *et al.,* 2008).

California sea lions regularly occur on rocks, buoys and other structures. Occurrence in the project area is expected to be common. Some 3,000 to 5,000 animals are estimated to move into Pacific Northwest waters of Washington and British Columbia during the fall (September) and remain until the late spring (May) when most return to breeding rookeries in California and Mexico (Jeffries *et al*., 2000). Peak counts of over 1,000 animals have been made in Puget Sound (Jeffries *et al*., 2000). The nearest documented California sea lion haul out site to the project site are on the Toliva Shoals Buoys, approximately 26 km (16 water miles) to the south (Jeffries *et al*., 2000). This haul out typically is used by less than 10 individuals at any one time.

Steller Sea Lion

Steller sea lions range along the North Pacific Rim from northern Japan to California, with centers of abundance and distribution in the Gulf of Alaska and Aleutian Islands. Large numbers of individuals widely disperse when not breeding (late May to early July) to access seasonally important prey resources (Muto *et al*., 2019). They were listed as threatened range-wide under the ESA on November 26, 1990 (55 FR 49204). Steller sea lions were subsequently partitioned into the western and eastern Distinct Population Segments (DPSs; western and eastern stocks) in 1997 (62 FR 24345, May 5, 1997). The western DPS breeds on rookeries located west of 144°W in Alaska and Russia, whereas the eastern DPS breeds on rookeries in southeast Alaska through California. The eastern DPS was delisted in 2013.

The eastern DPS is the only population of Steller's sea lions thought to occur in the project area. In Washington waters, numbers 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. 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 (Jeffries, *et al*. 2000). The nearest documented haul out site is also on the Toliva Shoals Buoys.

Harbor Seal

Harbor seals are found from Baja California to the eastern Aleutian Islands of Alaska (Harvey and Goley, 2011). The animals in the project area are part of the Southern Puget Sound stock. Harbor seals are the most common marine mammal species observed in the project area and are the only one that breeds and remains in the inland marine waters of Washington year-round (Calambokidis and Baird, 1994).

Harbor seals are central-place foragers (Orians and Pearson, 1979) and tend to exhibit strong site fidelity within season and across years, generally forage close to

haulout sites, and repeatedly visit specific foraging areas (Grigg *et al.,* 2012; Suryan and Harvey, 1998; Thompson *et al.,* 1998). Harbor seals in San Francisco Bay forage mainly within 7 mi (10 km) of their primary haulout site (Grigg *et al.,* 2012), and often within just 1–3 mi (1–5 km; Torok, 1994). Depth, bottom relief, and prey abundance also influence foraging location (Grigg *et al.,* 2012).

Harbor seals molt from May through June. Peak numbers of harbor seals haul out during late May to early June, which coincides with the peak molt. During both pupping and molting seasons, the number of seals and the length of time hauled out per day increase, from an average of 7 hours per day to 10–12 hours (Harvey and Goley, 2011; Huber *et al.,* 2001; Stewart and Yochem, 1994).

Harbor seals tend to forage at night and haul out during the day with a peak in the afternoon between 1 p.m. and 4 p.m. (Grigg *et al.,* 2012; London *et al.,* 2001; Stewart and Yochem, 1994; Yochem *et al.,* 1987). Tide levels affect the maximum number of seals hauled out, with the largest number of seals hauled out at low tide, but time of day and season have the greatest influence on haul out behavior (Manugian *et al.,* 2017; Patterson and Acevedo-Gutiérrez, 2008; Stewart and Yochem, 1994).

The closest haulout to the project area is the Rosedale Beach floats located 5.8 km (3.6 miles) to the southwest, but not in direct line-of-sight contact with the project location (see application Figure 3-1).

Marine Mammal Hearing

Hearing is the most important sensory modality for marine mammals underwater, and exposure to anthropogenic sound can have deleterious effects. To appropriately assess the potential effects of exposure to sound, it is necessary to understand the frequency ranges marine mammals are able to hear. Current data indicate that not all marine mammal species have equal hearing capabilities (*e.g.*, Richardson *et al.,* 1995; Wartzok and Ketten, 1999; Au and Hastings, 2008). To reflect this, Southall *et al.* (2007)

recommended that marine mammals be divided into functional hearing groups based on directly measured or estimated hearing ranges on the basis of available behavioral response data, audiograms derived using auditory evoked potential techniques, anatomical modeling, and other data. Note that no direct measurements of hearing ability have been successfully completed for mysticetes (*i.e.*, low-frequency cetaceans). Subsequently, NMFS (2018) described generalized hearing ranges for these marine mammal hearing groups. Generalized hearing ranges were chosen based on the approximately 65 decibel (dB) threshold from the normalized composite audiograms, with the exception for lower limits for low-frequency cetaceans where the lower bound was deemed to be biologically implausible and the lower bound from Southall *et al.* (2007) retained. Marine mammal hearing groups and their associated hearing ranges are provided in Table 3.

Table 3. Marine Mammal Hearing Groups (NMFS, 2018)

Hearing Group	Generalized Hearing Range*
Low-frequency (LF) cetaceans (baleen whales)	7 Hz to 35 kHz
Mid-frequency (MF) cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales)	150 Hz to 160 kHz
High-frequency (HF) cetaceans (true porpoises, *Kogia*, river dolphins, cephalorhynchid, *Lagenorhynchus cruciger* & *L. australis*)	275 Hz to 160 kHz
Phocid pinnipeds (PW) (underwater) (true seals)	50 Hz to 86 kHz
Otariid pinnipeds (OW) (underwater) (sea lions and fur seals)	60 Hz to 39 kHz
* Represents the generalized hearing range for the entire group as a composite (*i.e.*, all species within the group), where individual species' hearing ranges are typically not as broad. Generalized hearing range chosen based on ~65 dB threshold from normalized composite audiogram, with the exception for lower limits for LF cetaceans (Southall *et al*., 2007) and PW pinniped (approximation).	

The pinniped functional hearing group was modified from Southall *et al*. (2007) on the basis of data indicating that phocid species have consistently demonstrated an extended frequency range of hearing compared to otariids, especially in the higher frequency range (Hemilä *et al*., 2006; Kastelein *et al*., 2009; Reichmuth and Holt, 2013).

For more detail concerning these groups and associated frequency ranges, please see NMFS (2018) for a review of available information. Gray whales are low frequency cetaceans, short-beaked common dolphins are mid-frequency cetaceans, harbor porpoises are classified as high-frequency cetaceans, Harbor seals are in the phocid group, and Steller sea lions and California sea lions are otariids.

Potential Effects of Specified Activities on Marine Mammals and their Habitat

This section includes a summary and discussion of the ways that components of the specified activity may impact marine mammals and their habitat. The **Estimated Take** section later in this document includes a quantitative analysis of the number of individuals that are expected to be taken by this activity. The **Negligible Impact Analysis and Determination** section considers the content of this section, the **Estimated Take** section, and the **Proposed Mitigation** section, to draw conclusions regarding the likely impacts of these activities on the reproductive success or survivorship of individuals and how those impacts on individuals are likely to impact marine mammal species or stocks.

Acoustic effects on marine mammals during the specified activity can occur from vibratory pile driving and potentially from needle gun use. The effects of underwater noise from WADOT's proposed activities have the potential to result in Level A or Level B harassment of marine mammals in the action area. The effects of in-air noise from WADOT's proposed needle gun use have the potential to result in Level B harassment of pinnipeds in the action area.

Description of Sound Sources

The marine soundscape is comprised of both ambient and anthropogenic sounds. Ambient sound is defined as the all-encompassing sound in a given place and is usually a composite of sound from many sources both near and far (ANSI 1995). The sound level of an area is defined by the total acoustical energy being generated by known and

unknown sources. These sources may include physical (*e.g.*, waves, wind, precipitation, earthquakes, ice, atmospheric sound), biological (*e.g.*, sounds produced by marine mammals, fish, and invertebrates), and anthropogenic sound (*e.g.*, vessels, dredging, aircraft, construction).

The sum of the various natural and anthropogenic sound sources at any given location and time – which comprise "ambient" or "background" sound – depends not only on the source levels (as determined by current weather conditions and levels of biological and shipping activity) but also on the ability of sound to propagate through the environment. In turn, sound propagation is dependent on the spatially and temporally varying properties of the water column and sea floor, and is frequency-dependent. As a result of the dependence on a large number of varying factors, ambient sound levels can be expected to vary widely over both coarse and fine spatial and temporal scales. Sound levels at a given frequency and location can vary by 10-20 dB from day to day (Richardson *et al*., 1995). The result is that, depending on the source type and its intensity, sound from the specified activity may be a negligible addition to the local environment or could form a distinctive signal that may affect marine mammals.

Construction activities associated with the project would include vibratory pile driving, vibratory pile removal and needle guns. The sounds produced by these activities fall into one of two general sound types: impulsive and non-impulsive. Impulsive sounds (*e.g.*, explosions, gunshots, sonic booms, impact pile driving) are typically transient, brief (less than 1 second), broadband, and consist of high peak sound pressure with rapid rise time and rapid decay (ANSI, 1986; NIOSH, 1998; ANSI, 2005; NMFS, 2018). Non-impulsive sounds (*e.g.*, machinery operations such as drilling or dredging, vibratory pile driving, needle guns, and active sonar systems) can be broadband, narrowband or tonal, brief or prolonged (continuous or intermittent), and typically do not have the high peak sound pressure with raid rise/decay time that impulsive sounds do (ANSI 1995; NIOSH

1998; NMFS 2018). The distinction between these two sound types is important because they have differing potential to cause physical effects, particularly with regard to hearing (*e.g.*, Ward 1997 in Southall *et al*., 2007).

Vibratory pile hammers would be used on this project. Vibratory hammers install piles by vibrating them and allowing the weight of the hammer to push them into the sediment. Vibratory hammers produce significantly less sound than impact hammers. Peak Sound Pressure Levels (SPLs) may be 180 dB or greater, but are generally 10 to 20 dB lower than SPLs generated during impact pile driving of the same-sized pile (Oestman *et al*., 2009). Rise time is slower, reducing the probability and severity of injury, and sound energy is distributed over a greater amount of time (Nedwell and Edwards, 2002; Carlson *et al*., 2005).

Needle guns are a drill like tool that use a series of strong elongate metal chisels or "bristles" to scrape away material using high speed rotation up to 5000 revolution per minute. Sounds are produced by the tool motor as well as the scraping action of the tool on concrete. Peak SPLs are up to 112 dBA (OSHA, 2020).

The likely or possible impacts of WADOT's proposed activity on marine mammals could involve both non-acoustic and acoustic stressors. Potential non-acoustic stressors could result from the physical presence of the equipment and personnel; however, any impacts to marine mammals are expected to primarily be acoustic in nature. Acoustic stressors also include effects of heavy equipment operation during pile installation and removal.

Acoustic Impacts

The introduction of anthropogenic noise into the aquatic environment from pile driving and removal is the primary means by which marine mammals may be harassed from WADOT's specified activity. In general, animals exposed to natural or anthropogenic sound may experience physical and psychological effects, ranging in

magnitude from none to severe (Southall *et al*., 2007). Generally, exposure to pile driving and removal noise has the potential to result in auditory threshold shifts and behavioral reactions (*e.g.,* avoidance, temporary cessation of foraging and vocalizing, changes in dive behavior). Exposure to anthropogenic noise can also lead to non-observable physiological responses such an increase in stress hormones. Additional noise in a marine mammal's habitat can mask acoustic cues used by marine mammals to carry out daily functions such as communication and predator and prey detection. The effects of pile driving noise on marine mammals are dependent on several factors, including, but not limited to, sound type (*e.g.,* impulsive vs. non-impulsive), the species, age and sex class (*e.g.,* adult male vs. mom with calf), duration of exposure, the distance between the pile and the animal, received levels, behavior at time of exposure, and previous history with exposure (Wartzok *et al.,* 2003; Southall *et al*., 2007). Here we discuss physical auditory effects (threshold shifts) followed by behavioral effects and potential impacts on habitat.

NMFS defines a noise-induced threshold shift (TS) as a change, usually an increase, in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level (NMFS, 2018). The amount of threshold shift is customarily expressed in dB. A TS can be permanent or temporary. As described in NMFS (2018), there are numerous factors to consider when examining the consequence of TS, including, but not limited to, the signal temporal pattern (*e.g.,* impulsive or non-impulsive), likelihood an individual would be exposed for a long enough duration or to a high enough level to induce a TS, the magnitude of the TS, time to recovery (seconds to minutes or hours to days), the frequency range of the exposure (*i.e.,* spectral content), the hearing and vocalization frequency range of the exposed species relative to the signal's frequency spectrum (*i.e.,* how animal uses sound within the frequency band of the signal; *e.g.*, Kastelein *et al.,* 2014), and the overlap between the animal and the source (*e.g.,* spatial, temporal, and spectral).

Permanent Threshold Shift (PTS) - NMFS defines PTS as a permanent, irreversible increase in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level (NMFS 2018). Available data from humans and other terrestrial mammals indicate that a 40 dB threshold shift approximates PTS onset (see Ward *et al*., 1958, 1959; Ward, 1960; Kryter *et al.,* 1966; Miller, 1974; Ahroon *et al*., 1996; Henderson *et al*., 2008). PTS levels for marine mammals are estimates, with the exception of a single study unintentionally inducing PTS in a harbor seal (Kastak *et al.,* 2008), there are no empirical data measuring PTS in marine mammals, largely due to the fact that, for various ethical reasons, experiments involving anthropogenic noise exposure at levels inducing PTS are not typically pursued or authorized (NMFS, 2018).

Temporary Threshold Shift (TTS) - A temporary, reversible increase in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level (NMFS, 2018). Based on data from cetacean TTS measurements (see Southall *et al.,* 2007), a TTS of 6 dB is considered the minimum threshold shift clearly larger than any day-to-day or session-to-session variation in a subject's normal hearing ability (Schlundt *et al*., 2000; Finneran *et al*., 2000, 2002). As described in Finneran (2016), marine mammal studies have shown the amount of TTS increases with cumulative sound exposure level (SEL_{cum}) in an accelerating fashion: At low exposures with lower SEL_{cum}, the amount of TTS is typically small and the growth curves have shallow slopes. At exposures with higher SEL_{cum}, the growth curves become steeper and approach linear relationships with the noise SEL.

Depending on the degree (elevation of threshold in dB), duration (*i.e*., recovery time), and frequency range of TTS, and the context in which it is experienced, TTS can have effects on marine mammals ranging from discountable to serious (similar to those

discussed in auditory masking, below). For example, a marine mammal may be able to readily compensate for a brief, relatively small amount of TTS in a non-critical frequency range that takes place during a time when the animal is traveling through the open ocean, where ambient noise is lower and there are not as many competing sounds present. Alternatively, a larger amount and longer duration of TTS sustained during time when communication is critical for successful mother/calf interactions could have more serious impacts. We note that reduced hearing sensitivity as a simple function of aging has been observed in marine mammals, as well as humans and other taxa (Southall *et al.,* 2007), so we can infer that strategies exist for coping with this condition to some degree, though likely not without cost.

Currently, TTS data only exist for four species of cetaceans (bottlenose dolphin, beluga whale (*Delphinapterus leucas*), harbor porpoise, and Yangtze finless porpoise (*Neophocoena asiaeorientalis*)) and five species of pinnipeds exposed to a limited number of sound sources (*i.e.*, mostly tones and octave-band noise) in laboratory settings (Finneran, 2015). TTS was not observed in trained spotted (*Phoca largha*) and ringed (*Pusa hispida*) seals exposed to impulsive noise at levels matching previous predictions of TTS onset (Reichmuth *et al*., 2016). In general, harbor seals and harbor porpoises have a lower TTS onset than other measured pinniped or cetacean species (Finneran, 2015). The potential for TTS from impact pile driving exists. After exposure to playbacks of impact pile driving sounds (rate 2760 strikes/hour) in captivity, mean TTS increased from 0 dB after 15 minute exposure to 5 dB after 360 minute exposure; recovery occurred within 60 minutes (Kastelein *et al*., 2016). Additionally, the existing marine mammal TTS data come from a limited number of individuals within these species. No data are available on noise-induced hearing loss for mysticetes. For summaries of data on TTS in marine mammals or for further discussion of TTS onset thresholds, please see Southall *et al*. (2007), Finneran and Jenkins (2012), Finneran (2015), and Table 5 in NMFS (2018).

For this project, there would likely be pauses in activities producing the sound during each day. Given these pauses and that many marine mammals are likely moving through the action area and not remaining for extended periods of time, the potential for TS declines.

Behavioral Harassment - Exposure to noise from pile driving and removal and needle gun use also has the potential to behaviorally disturb marine mammals. Available studies show wide variation in response to underwater sound; therefore, it is difficult to predict specifically how any given sound in a particular instance might affect marine mammals perceiving the signal. If a marine mammal does react briefly to an underwater sound by changing its behavior or moving a small distance, the impacts of the change are unlikely to be significant to the individual, let alone the stock or population. However, if a sound source displaces marine mammals from an important feeding or breeding area for a prolonged period, impacts on individuals and populations could be significant (*e.g.*, Lusseau and Bejder, 2007; Weilgart, 2007; NRC, 2005).

Disturbance may result in changing durations of surfacing and dives, number of blows per surfacing, or moving direction and/or speed; reduced/increased vocal activities; changing/cessation of certain behavioral activities (such as socializing or feeding); visible startle response or aggressive behavior (such as tail/fluke slapping or jaw clapping); avoidance of areas where sound sources are located. Pinnipeds may increase their haul out time, possibly to avoid in-water disturbance (Thorson and Reyff, 2006). Behavioral responses to sound are highly variable and context-specific and any reactions depend on numerous intrinsic and extrinsic factors (*e.g.*, species, state of maturity, experience, current activity, reproductive state, auditory sensitivity, time of day), as well as the interplay between factors (*e.g.*, Richardson *et al.*, 1995; Wartzok *et al.*, 2003; Southall *et al.*, 2007; Weilgart, 2007; Archer *et al.*, 2010). Behavioral reactions can vary not only among individuals but also within an individual, depending on previous experience with

a sound source, context, and numerous other factors (Ellison *et al*., 2012), and can vary depending on characteristics associated with the sound source (*e.g*., whether it is moving or stationary, number of sources, distance from the source). In general, pinnipeds seem more tolerant of, or at least habituate more quickly to, potentially disturbing underwater sound than do cetaceans, and generally seem to be less responsive to exposure to industrial sound than most cetaceans. Please see Appendices B and C of Southall *et al*. (2007) for a review of studies involving marine mammal behavioral responses to sound.

Disruption of feeding behavior can be difficult to correlate with anthropogenic sound exposure, so it is usually inferred by observed displacement from known foraging areas, the appearance of secondary indicators (*e.g*., bubble nets or sediment plumes), or changes in dive behavior. As for other types of behavioral response, the frequency, duration, and temporal pattern of signal presentation, as well as differences in species sensitivity, are likely contributing factors to differences in response in any given circumstance (*e.g*., Croll *et al*., 2001; Nowacek *et al*., 2004; Madsen *et al*., 2006; Yazvenko *et al*., 2007). Whether or not foraging disruptions have the potential to incur fitness consequences is dependent upon the intensity and duration of the disturbance, the energetic requirements of the affected individuals, and the relationship between prey availability, foraging effort and success, and the life history stage of the animal.

In 2016, the Alaska Department of Transportation and Public Facilities (ADOT&PF) documented observations of marine mammals during construction activities (*i.e.,* pile driving) at the Kodiak Ferry Dock (80 FR 60636, October 7, 2015). In the marine mammal monitoring report for that project (ABR 2016), 1,281 Steller sea lions were observed within the Level B harassment zone during pile driving or drilling (*i.e.,* documented as Level B harassment take). Of these, 19 individuals demonstrated an alert behavior, 7 fled, and 19 swam away from the project site. All other animals (98 percent) were engaged in activities such as milling, foraging, or fighting and did not change their

behavior. In addition, two sea lions approached within 20 meters of active vibratory pile driving activities. Three harbor seals were observed within the disturbance zone during pile driving activities; none of them displayed disturbance behaviors. Fifteen killer whales and three harbor porpoise were also observed within the Level B harassment zone during pile driving. The killer whales were travelling or milling while all harbor porpoises were travelling. No signs of disturbance were noted for either of these species. Given the similarities in activities and habitat, we expect similar behavioral responses of marine mammals to WADOT's specified activity. That is, disturbance, if any, is likely to be temporary and localized (*e.g.,* small area movements).

Stress responses – An animal's perception of a threat may be sufficient to trigger stress responses consisting of some combination of behavioral responses, autonomic nervous system responses, neuroendocrine responses, or immune responses (*e.g.*, Selye 1950; Moberg 2000). In many cases, an animal's first and sometimes most economical (in terms of energetic costs) response is behavioral avoidance of the potential stressor. Autonomic nervous system responses to stress typically involve changes in heart rate, blood pressure, and gastrointestinal activity. These responses have a relatively short duration and may or may not have a significant long-term effect on an animal's fitness.

Neuroendocrine stress responses often involve the hypothalamus-pituitary-adrenal system. Virtually all neuroendocrine functions that are affected by stress – including immune competence, reproduction, metabolism, and behavior – are regulated by pituitary hormones. Stress-induced changes in the secretion of pituitary hormones have been implicated in failed reproduction, altered metabolism, reduced immune competence, and behavioral disturbance (*e.g.*, Moberg 1987; Blecha 2000). Increases in the circulation of glucocorticoids are also equated with stress (Romano *et al.*, 2004).

The primary distinction between stress (which is adaptive and does not normally place an animal at risk) and "distress" is the cost of the response. During a stress

response, an animal uses glycogen stores that can be quickly replenished once the stress is alleviated. In such circumstances, the cost of the stress response would not pose serious fitness consequences. However, when an animal does not have sufficient energy reserves to satisfy the energetic costs of a stress response, energy resources must be diverted from other functions. This state of distress will last until the animal replenishes its energetic reserves sufficient to restore normal function.

Relationships between these physiological mechanisms, animal behavior, and the costs of stress responses are well-studied through controlled experiments and for both laboratory and free-ranging animals (*e.g.*, Holberton *et al.*, 1996; Hood *et al.*, 1998; Jessop *et al.*, 2003; Krausman *et al.*, 2004; Lankford *et al.*, 2005). Stress responses due to exposure to anthropogenic sounds or other stressors and their effects on marine mammals have also been reviewed (Fair and Becker 2000; Romano *et al.*, 2002b) and, more rarely, studied in wild populations (*e.g.*, Romano *et al.*, 2002a). For example, Rolland *et al.* (2012) found that noise reduction from reduced ship traffic in the Bay of Fundy was associated with decreased stress in North Atlantic right whales. These and other studies lead to a reasonable expectation that some marine mammals will experience physiological stress responses upon exposure to acoustic stressors and that it is possible that some of these would be classified as "distress." In addition, any animal experiencing TTS would likely also experience stress responses (NRC, 2003), however distress is an unlikely result of this project based on observations of marine mammals during previous, similar projects in the area.

Masking - Sound can disrupt behavior through masking, or interfering with, an animal's ability to detect, recognize, or discriminate between acoustic signals of interest (*e.g.*, those used for intraspecific communication and social interactions, prey detection, predator avoidance, navigation) (Richardson *et al*., 1995). Masking occurs when the receipt of a sound is interfered with by another coincident sound at similar frequencies

and at similar or higher intensity, and may occur whether the sound is natural (*e.g.*, snapping shrimp, wind, waves, precipitation) or anthropogenic (*e.g.*, pile driving, shipping, sonar, seismic exploration) in origin. The ability of a noise source to mask biologically important sounds depends on the characteristics of both the noise source and the signal of interest (*e.g.*, signal-to-noise ratio, temporal variability, direction), in relation to each other and to an animal's hearing abilities (*e.g.*, sensitivity, frequency range, critical ratios, frequency discrimination, directional discrimination, age or TTS hearing loss), and existing ambient noise and propagation conditions. Masking of natural sounds can result when human activities produce high levels of background sound at frequencies important to marine mammals. Conversely, if the background level of underwater sound is high (*e.g.*, on a day with strong wind and high waves), an anthropogenic sound source would not be detectable as far away as would be possible under quieter conditions and would itself be masked. The Henderson Bay area contains mostly small recreational and commercial vessel traffic and background sound levels in the area are not excessively elevated.

Airborne Acoustic Effects - Pinnipeds that occur near the project site could be exposed to airborne sounds associated with pile driving and removal and needle gun use that have the potential to cause behavioral harassment, depending on their distance from pile driving activities. Cetaceans are not expected to be exposed to airborne sounds that would result in harassment as defined under the MMPA.

Airborne noise would primarily be an issue for pinnipeds that are swimming or hauled out near the project site within the range of noise levels elevated above the acoustic criteria. We recognize that pinnipeds in the water could be exposed to airborne sound that may result in behavioral harassment when looking with their heads above water. Most likely, airborne sound would cause behavioral responses similar to those discussed above in relation to underwater sound. For instance, anthropogenic sound could

cause hauled-out pinnipeds to exhibit changes in their normal behavior, such as reduction in vocalizations, or cause them to temporarily abandon the area and move further from the source. However, for pile-driving/removal these animals would previously have been 'taken' because of exposure to underwater sound above the behavioral harassment thresholds, which are in all cases larger than those associated with airborne sound. Thus, the behavioral harassment of these animals is already accounted for in the in-water estimates of potential take. Therefore, we do not believe that authorization of incidental take resulting from airborne sound from pile driving for pinnipeds is warranted. Since the needle gun will be used on days when there is no pile driving, behavioral harassment from its use could occur and is discussed below.

Marine Mammal Habitat Effects

WADOT's construction activities could have localized, temporary impacts on marine mammal habitat and their prey by increasing in-water sound pressure levels and slightly decreasing water quality. Increased noise levels may affect acoustic habitat (see *Masking* above) and adversely affect marine mammal prey in the vicinity of the project area (see discussion below). During vibratory pile driving or removal, elevated levels of underwater noise would ensonify the project area where both fishes and mammals occur and could affect foraging success. Additionally, marine mammals may avoid the area during construction, however, displacement due to noise is expected to be temporary and is not expected to result in long-term effects to the individuals or populations. Construction activities are of short duration and would likely have temporary impacts on marine mammal habitat through increases in underwater and airborne sound.

A temporary and localized increase in turbidity near the seafloor would occur in the immediate area surrounding the area where piles are installed or removed. In general, turbidity associated with pile installation is localized to about a 25-foot (7.6-meter) radius around the pile (Everitt *et al.* 1980). The sediments of the project site will settle out

rapidly when disturbed. Cetaceans are not expected to be close enough to the pile driving areas to experience effects of turbidity, and any pinnipeds could avoid localized areas of turbidity. Local strong currents are anticipated to disburse any additional suspended sediments produced by project activities at moderate to rapid rates depending on tidal stage. Therefore, we expect the impact from increased turbidity levels to be discountable to marine mammals and do not discuss it further.

In-water Construction Effects on Potential Foraging Habitat

The area likely impacted by the project is relatively small compared to the available habitat (*e.g.*, the impacted area is in the north of the bay only) of Henderson Bay and does not include any Biologically Important Areas or other habitat of known importance. The area is highly influenced by anthropogenic activities. The total seafloor area affected by pile installation and removal is a very small area compared to the vast foraging area available to marine mammals in the Henderson Bay and Puget Sound. At best, the impact area provides marginal foraging habitat for marine mammals and fishes. Furthermore, pile driving and removal at the project site would not obstruct movements or migration of marine mammals.

Avoidance by potential prey (*i.e.*, fish) of the immediate area due to the temporary loss of this foraging habitat is also possible. The duration of fish avoidance of this area after pile driving stops is unknown, but a rapid return to normal recruitment, distribution and behavior is anticipated. Any behavioral avoidance by fish of the disturbed area would still leave significantly large areas of fish and marine mammal foraging habitat in the nearby vicinity.

In-water Construction Effects on Potential Prey - Sound may affect marine mammals through impacts on the abundance, behavior, or distribution of prey species (*e.g.*, crustaceans, cephalopods, fish, zooplankton). Marine mammal prey varies by

species, season, and location. Here, we describe studies regarding the effects of noise on known marine mammal prey.

Fish utilize the soundscape and components of sound in their environment to perform important functions such as foraging, predator avoidance, mating, and spawning (*e.g.*, Zelick and Mann, 1999; Fay, 2009). Depending on their hearing anatomy and peripheral sensory structures, which vary among species, fishes hear sounds using pressure and particle motion sensitivity capabilities and detect the motion of surrounding water (Fay *et al.*, 2008). The potential effects of noise on fishes depends on the overlapping frequency range, distance from the sound source, water depth of exposure, and species-specific hearing sensitivity, anatomy, and physiology. Key impacts to fishes may include behavioral responses, hearing damage, barotrauma (pressure-related injuries), and mortality.

Fish react to sounds which are especially strong and/or intermittent low-frequency sounds, and behavioral responses such as flight or avoidance are the most likely effects. Short duration, sharp sounds can cause overt or subtle changes in fish behavior and local distribution. The reaction of fish to noise depends on the physiological state of the fish, past exposures, motivation (*e.g.*, feeding, spawning, migration), and other environmental factors. Hastings and Popper (2005) identified several studies that suggest fish may relocate to avoid certain areas of sound energy. Additional studies have documented effects of pile driving on fish, although several are based on studies in support of large, multiyear bridge construction projects (*e.g.*, Scholik and Yan, 2001, 2002; Popper and Hastings, 2009). Several studies have demonstrated that impulse sounds might affect the distribution and behavior of some fishes, potentially impacting foraging opportunities or increasing energetic costs (*e.g.*, Fewtrell and McCauley, 2012; Pearson *et al.*, 1992; Skalski *et al.*, 1992; Santulli *et al.*, 1999; Paxton *et al.*, 2017). However, some studies

have shown no or slight reaction to impulse sounds (*e.g.*, Pena *et al.*, 2013; Wardle *et al.*, 2001; Jorgenson and Gyselman, 2009; Cott *et al.*, 2012).

SPLs of sufficient strength have been known to cause injury to fish and fish mortality. However, in most fish species, hair cells in the ear continuously regenerate and loss of auditory function likely is restored when damaged cells are replaced with new cells. Halvorsen *et al.* (2012a) showed that a TTS of 4-6 dB was recoverable within 24 hours for one species. Impacts would be most severe when the individual fish is close to the source and when the duration of exposure is long. Injury caused by barotrauma can range from slight to severe and can cause death, and is most likely for fish with swim bladders. Barotrauma injuries have been documented during controlled exposure to impact pile driving (Halvorsen *et al.*, 2012b; Casper *et al.*, 2013).

The most likely impact to fish from pile driving and removal activities at the project area would be temporary behavioral avoidance of the area. The duration of fish avoidance of this area after pile driving stops is unknown, but a rapid return to normal recruitment, distribution and behavior is anticipated (Hastings and Popper, 2005, Popper and Hastings, 2009).

Construction activities, in the form of increased turbidity, have the potential to adversely affect forage fish in the project area. Forage fish form a significant prey base for many marine mammal species that occur in the project area. Increased turbidity is expected to occur in the immediate vicinity (on the order of 10 ft (3 m) or less) of construction activities. However, suspended sediments and particulates are expected to dissipate quickly within a single tidal cycle. Given the limited area affected and high tidal dilution rates any effects on forage fish are expected to be minor or negligible. Finally, exposure to turbid waters from construction activities is not expected to be different from the current exposure; fish and marine mammals in Henderson Bay are routinely exposed to substantial levels of suspended sediment from natural and anthropogenic sources.

In summary, given the short daily duration of sound associated with individual pile driving events and the relatively small areas being affected, pile driving activities associated with the proposed action are not likely to have a permanent, adverse effect on any fish habitat, or populations of fish species. Any behavioral avoidance by fish of the disturbed area would still leave significantly large areas of fish and marine mammal foraging habitat in the nearby vicinity. Thus, we conclude that impacts of the specified activity are not likely to have more than short-term adverse effects on any prey habitat or populations of prey species. Further, any impacts to marine mammal habitat are not expected to result in significant or long-term consequences for individual marine mammals, or to contribute to adverse impacts on their populations.

Estimated Take

This section provides an estimate of the number of incidental takes proposed for authorization through this IHA, which will inform both NMFS' consideration of "small numbers" and the negligible impact determination.

Harassment is the only type of take expected to result from these activities. Except with respect to certain activities not pertinent here, section 3(18) of 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).

Authorized takes would be by Level B harassment, as use of the acoustic source (*i.e.*, vibratory pile driving/removal and needle gun) has the potential to result in disruption of behavioral patterns for individual marine mammals. Based on the nature of the activity and the anticipated effectiveness of the mitigation measures (*i.e.*, shutdown) –

discussed in detail below in Proposed Mitigation section, Level A harassment is neither anticipated nor proposed to be authorized.

As described previously, no mortality is anticipated or proposed to be authorized for this activity. Below we describe how the take is estimated.

Generally speaking, we estimate take by considering: (1) acoustic thresholds above which NMFS believes the best available science indicates marine mammals will be behaviorally harassed or incur some degree of permanent hearing impairment; (2) the area or volume of water that will be ensonified above these levels in a day; (3) the density or occurrence of marine mammals within these ensonified areas; and, (4) and the number of days of activities. We note that while these basic factors can contribute to a basic calculation to provide an initial prediction of takes, additional information that can qualitatively inform take estimates is also sometimes available (*e.g.*, previous monitoring results or average group size). Below, we describe the factors considered here in more detail and present the proposed take estimate.

The effect of needle guns is unclear as we have not recently authorized take by this method in these circumstances. Given the relatively low source level for needle guns and small ensonified areas discussed below, there is some uncertainty about whether take will occur from this activity. However, in consideration of the applicant's request and the predicted source levels, we conservatively propose the authorization of some take for this project.

Acoustic Thresholds

NMFS recommends the use of acoustic thresholds that identify the received level of underwater sound above which exposed marine mammals would be reasonably expected to be behaviorally harassed (equated to Level B harassment) or to incur PTS of some degree (equated to Level A harassment). Thresholds have also been developed

identifying the received level of in-air sound above which exposed pinnipeds would likely be behaviorally harassed.

Level B Harassment for non-explosive sources – Though significantly driven by received level, the onset of behavioral disturbance from anthropogenic noise exposure is also informed to varying degrees by other factors related to the source (*e.g.*, frequency, predictability, duty cycle), the environment (*e.g.*, bathymetry), and the receiving animals (hearing, motivation, experience, demography, behavioral context) and can be difficult to predict (Southall *et al.,* 2007, Ellison *et al.*, 2012). Based on what the available science indicates and the practical need to use a threshold based on a factor that is both predictable and measurable for most activities, NMFS uses a generalized acoustic threshold based on received level to estimate the onset of behavioral harassment. NMFS predicts that marine mammals are likely to be behaviorally harassed in a manner we consider Level B harassment when exposed to underwater anthropogenic noise above received levels of 120 dB re 1 microPascal (μPa) (root mean square (rms)) for continuous (*e.g.,* vibratory pile-driving) and above 160 dB re 1 μPa (rms) for non-explosive impulsive (*e.g.*, impact pile driving) or intermittent (*e.g.*, scientific sonar) sources. For in-air sounds, NMFS predicts that harbor seals exposed above received levels of 90 dB re 20 μPa (rms) will be behaviorally harassed, and other pinnipeds will be harassed when exposed above 100 dB re 20 μPa (rms).

WADOT's proposed activity includes the use of continuous (vibratory pile-driving and removal in water and needle guns) in air sources, and therefore the 120 dB re 1 μPa (rms) threshold is applicable in water and the pinniped thresholds are applicable in air.

Level A harassment for non-explosive sources - NMFS' Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0) (Technical Guidance, 2018) identifies dual criteria to assess auditory injury (Level A

harassment) to five different marine mammal groups (based on hearing sensitivity) as a result of exposure to noise from two different types of sources (impulsive or non-impulsive). WADOT's activity includes the use of non-impulsive (vibratory pile driving/removal) sources.

These thresholds are provided in Table 4. The references, analysis, and methodology used in the development of the thresholds are described in NMFS 2018 Technical Guidance, which may be accessed at *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance*.

Table 4. Thresholds Identifying the Onset of Permanent Threshold Shift

	PTS Onset Acoustic Thresholds (Received Level)
Hearing Group	Non-impulsive
Low-Frequency (LF) Cetaceans	*Cell 2* $L_{E,LF,24h}$: 199 dB
Mid-Frequency (MF) Cetaceans	*Cell 4* $L_{E,MF,24h}$: 198 dB
High-Frequency (HF) Cetaceans	*Cell 6* $L_{E,HF,24h}$: 173 dB
Phocid Pinnipeds (PW) (Underwater)	*Cell 8* $L_{E,PW,24h}$: 201 dB
Otariid Pinnipeds (OW) (Underwater)	*Cell 10* $L_{E,OW,24h}$: 219 dB
Note: Cumulative sound exposure level (L_E) has a reference value of 1μPa^{2}s. In this Table, thresholds are abbreviated to reflect American National Standards Institute standards (ANSI 2013). The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The cumulative sound exposure level thresholds could be exceeded in a multitude of ways (*i.e.*, varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these acoustic thresholds will be exceeded.	

Ensonified Area

Here, we describe operational and environmental parameters of the activity that will feed into identifying the area ensonified above the acoustic thresholds, which include source levels and transmission loss coefficient.

The sound field in the project area is the existing background noise plus additional construction noise from the proposed project. Marine mammals are expected to be affected via sound generated by the primary components of the project (*i.e.*, vibratory pile driving and removal and needle guns).

Vibratory hammers produce constant sound when operating, and produce vibrations that liquefy the sediment surrounding the pile, allowing it to penetrate to the required seating depth. The actual durations of each installation method vary depending on the type and size of the pile.

In order to calculate distances to the Level A harassment and Level B harassment sound thresholds for piles of various sizes being used in this project, NMFS used acoustic monitoring data from other locations to develop source levels or the various pile types, sizes and methods (see Table 5). Source levels for the 48-inch sheetpiles come from the Caltrans compendium (2015) measurements of 24-inch steel sheetpiles supported by acoustic data from another project in Seattle, Washington that used 48-inch steel sheetpiles (Greenbusch Group, 2015), while the source data for H piles comes from the Caltrans (2015) compendium. Needle guns can produce sounds up to 112 dbA (OSHA, 2020) and we use that as the source level for that activity.

Table 5. Project Sound Source Levels

Method	Pile Type	Estimated Noise Level	Source
Vibratory Driving/ Removal	48-inch sheet	165 dB_{RMS}	CALTRANS 2015, Greenbusch Group 2015
Vibratory Driving/ Removal	12-inch H pile	150 dB_{RMS}	CALTRANS 2015

Note: SEL = single strike sound exposure level; dB peak = peak sound level; rms = root mean square.

Level B Harassment Zones

Transmission loss (TL) is the decrease in acoustic intensity as an acoustic pressure wave propagates out from a source. TL parameters vary with frequency, temperature, sea conditions, current, source and receiver depth, water depth, water chemistry, and bottom composition and topography. The general formula for underwater TL is:

TL = B * Log10 (R1/R2), where

TL = transmission loss in dB

B = transmission loss coefficient; for practical spreading equals 15

R1 = the distance of the modeled SPL from the driven pile, and

R2 = the distance from the driven pile of the initial measurement

The recommended TL coefficient for most nearshore environments is the practical spreading value of 15. This value results in an expected propagation environment that would lie between spherical and cylindrical spreading loss conditions, which is the most appropriate assumption for WADOT's proposed activity in the absence of specific modelling.

Using the equation above, underwater noise is predicted to fall below the behavioral effects threshold of 120 dB rms for marine mammals at distances of 1,000 or 10,000 m depending on the pile type(s) and methods (Table 6). It should be noted that based on the geography of Henderson Bay, sound will not reach the full distance of the Level B harassment isopleths in most directions. In-air needle gun noise is predicted to reach the phocid (harbor seal) threshold (90 dB) at 192 meters (629 feet), and the otariid threshold (100 dB) at 60 meters (200 feet).

Table 6. Level A and Level B Harassment Isopleths (m) for Each Pile Type and Hearing Group

Pile Type	Level A Harassment					Level B Harassment
	Low Frequency	Mid Frequency	High Frequency	Otariid	Phocid	

Sheet	31.8	2.8	47	19.3	1.4	10,000
H pile	3.2	0.3	4.7	1.9	0.1	1,000

Level A Harassment Zones

When the NMFS Technical Guidance (2016) was published, in recognition of the fact that ensonified area/volume could be more technically challenging to predict because of the duration component in the new thresholds, we developed a User Spreadsheet that includes tools to help predict a simple isopleth that can be used in conjunction with marine mammal density or occurrence to help predict takes. We note that because of some of the assumptions included in the methods used for these tools, we anticipate that isopleths produced are typically going to be overestimates of some degree, which may result in some degree of overestimate of take by Level A harassment. However, these tools offer the best way to predict appropriate isopleths when more sophisticated 3D modeling methods are not available, and NMFS continues to develop ways to quantitatively refine these tools, and will qualitatively address the output where appropriate. For stationary sources such as vibratory pile driving or removal using any of the methods discussed above, NMFS User Spreadsheet predicts the closest distance at which, if a marine mammal remained at that distance the whole duration of the activity, it would not incur PTS. Inputs used in the User Spreadsheet are reported in Table 7 and the resulting isopleths are reported in Table 6 for each of the work scenarios. Note that while the inputs for driving and removal of each type of pile are different, the resulting isopleths are the same because the total time per day (number of piles per day times minutes per pile) of pile driving is identical. Therefore Table 6 includes only a single row for each pile type. The above input scenarios lead to PTS isopleth distances (Level A thresholds) of less than 1 m to 47 m.

The Level A harassment zones identified in Table 6 are based upon an animal exposed to pile driving multiple piles per day. Considering duration of driving or removing each pile (up to 30 minutes) and breaks between pile installations (to reset equipment and move pile into place), this means an animal would have to remain within the small area estimated to be ensonified above the Level A harassment threshold for multiple hours. This is highly unlikely given marine mammal movement throughout the area.

Table 7. NMFS Technical Guidance User Spreadsheet Input to Calculate Level A Isopleths for a Combination of Pile Driving

Method	Pile Type	Source Level	Minutes per pile	Piles per Day
Vibratory Driving	Sheet	165 db RMS	30	8
Vibratory Driving	H pile	150 db RMS	30	8
Vibratory Removal	Sheet	165 db RMS	15	16
Vibratory Removal	H pile	150 db RMS	15	16

Note: Transmission Loss for all methods is 15 LogR and the weighting factor adjustment is 2.5.

Marine Mammal Occurrence and Take Calculation and Estimation

In this section we provide the information about the presence, density, or group dynamics of marine mammals that will inform the take calculations. The main source of density information for the area is the U.S. Navy's database used to establish baseline density estimates for their construction and testing and training activities in Puget Sound (U.S. Navy, 2019). The Navy database includes seasonal estimates of abundance where available and appropriate. Where such estimates existed, we used the larger density estimate for the fall or summer seasons, when this project is scheduled to occur. These density estimates are shown in Table 8. No density estimates exist for the rarer short-beaked common dolphin so we used more qualitative data on observations from The

Whale Museum's sightings database and project specific report to WADOT (TWM, 2020).

Table 8. Density of Marine Mammals Used to Calculate Expected Take

Species	Density #/ km^2
Harbor seal	3.91
California sea lion	0.2211
Steller sea lion	0.0478
Gray whale	0.000086
Short-beaked common dolphin	*
Harbor porpoise	0.86

* See text, no density estimate exists for short-beaked common dolphins

Here we describe how the information provided above is brought together to produce a quantitative take estimate. Given the geography of the project area, the area ensonified when driving or removing H piles is 1.36 km^2 (0.53 mi^2), the area ensonified when driving or removing sheetpiles is 17.9 km^2 (6.9 mi^2), and the area ensonified when using the needle gun is 0.06 km^2 (0.023 mi^2) for phocids and 0.01 km^2 (0.004 mi^2) for otariids. As noted above, there will be a total of 5 days driving or removing H piles, 9 days driving or removing sheetpiles, and 6 days of using the needle gun. For species with density estimates, the estimated take is calculated as the sum of the density times the area and days for each pile type/activity with the results for each activity added to give a total estimated take. Additional qualitative factors may be considered for species with small estimated take calculations (see below). Take by Level B harassment is proposed for authorization and summarized in Table 9.

Gray Whale

The Navy Marine Species Density Database (U.S. Navy 2019) estimates the density of gray whales in the Henderson Bay area as 0.000086/km^2. Based on this density estimate, the following number of gray whales may be present in the Level B harassment zones:

H piles: 0.000086/ km^2 * 1.36 km^2 * 5 days = 0.0005848

Sheetpiles: 0.000086/ km^2 * 17.9 km^2 * 9 days = 0.0138546

Total Estimated Take = 0.014 animals

The total represents less than one gray whale. In the event an individual enters the area and remains for some time and is harassed on multiple days, we are proposing authorization for Level B harassment of 10 gray whales. Because the Level A harassment zones are relatively small and we believe the PSO will be able to effectively monitor the Level A harassment zones, we do not anticipate or propose take by Level A harassment of gray whales.

Short-beaked Common Dolphin

As mentioned above, the Navy Marine Species Density Database (U.S. Navy 2019) does not provide an estimate of density of short-beaked common dolphins in the Henderson Bay area. The Whale Museum data indicate that common dolphins have been documented in waters adjacent to the project (TWM, 2020). Nearly all sightings were in 2016 and 2017 pointing out the variability and uncertainty of their presence. Short-beaked common dolphins often occur in groups; for the Puget Sound data groups consisted of no more than five individuals (Orca Network. 2020). Due to the low likelihood of occurrence an expectation of one group of five animals in the large level B harassment zone for sheetpiles per day is a reasonable representation of occurrence. With 9 days of sheetpiling maximum this equates to 45 level B takes. Because of the smaller size of the Level B harassment zones for the H-piles, we expect that one group of five animals over the course of the 5 work days with H piles is a reasonable representation of occurrence. We are thus proposing authorization for Level B harassment of 50 short-beaked common dolphins. Because the Level A harassment zones are relatively small and we believe the PSO will be able to effectively monitor the Level A harassment zones, we

do not anticipate or propose take by Level A harassment of short-beaked common dolphins.

Harbor Porpoise

The Navy Marine Species Density Database (U.S. Navy 2019) estimates the density of harbor porpoise in the Henderson Bay area as 0.86/km^2. Based on this density estimate, the following number of harbor porpoises may be present in the Level B harassment zones:

H piles: 0.86/ km^2 * 1.36 km^2 * 5 days = 5.848

Sheetpiles: 0.86/ km^2 * 17.9 km^2 * 9 days = 138.546

Total Estimated Take = 144.4 animals

We are proposing authorization for Level B harassment of 145 harbor porpoises. Because the Level A harassment zones are relatively small and we believe the PSO will be able to effectively monitor the Level A harassment zones, we do not anticipate or propose take by Level A harassment of harbor porpoises.

California Sea Lion

The Navy Marine Species Density Database (U.S. Navy 2019) estimates the density of California sea lions in the Henderson Bay area as 0.2211/km^2. Based on this density estimate, the following number of California sea lions may be present in the Level B harassment zones:

H piles: 0.2211/ km^2 * 1.36 km^2 * 5 days = 1.503

Sheetpiles: 0.2211/ km^2 * 17.9 km^2 * 9 days = 35.619

Needle gun: 0.2211/ km^2 * 0.01 km^2 * 6 days = 0.013

Total Estimated Take = 37.14 animals

We are proposing authorization for Level B harassment of 38 California sea lions. Because the Level A harassment zones are relatively small and we believe the PSO will

be able to effectively monitor the Level A harassment zones, we do not anticipate or propose take by Level A harassment of California sea lions.

Steller Sea Lion

The Navy Marine Species Density Database (U.S. Navy 2019) estimates the density of Steller sea lions in the Henderson Bay area as 0.0478/km^2. Based on this density estimate, the following number of Steller sea lions may be present in the Level B harassment zones:

H piles: 0.0478/ km^2 * 1.36 km^2 * 5 days = 0.325

Sheetpiles: 0.0478/ km^2 * 17.9 km^2 * 9 days = 7.70

Needle gun: 0.0478/ km^2 * 0.01 km^2 * 6 days = 0.007

Total Estimated Take = 8.03 animals

We are proposing authorization for Level B harassment of nine Steller sea lions. Because the Level A harassment zones are relatively small and we believe the PSO will be able to effectively monitor the Level A harassment zones, we do not anticipate or propose take by Level A harassment of Steller sea lions.

Harbor Seal

The Navy Marine Species Density Database (U.S. Navy 2019) estimates the density of harbor seal in the Henderson Bay area as 3.91/km^2. Based on this density estimate, the following number of harbor seals may be present in the Level B harassment zones:

H piles: 3.91/ km^2 * 1.36 km^2 * 5 days = 26.588

Sheetpiles: 3.91/ km^2 * 17.9 km^2 * 9 days = 629.901

Needle gun: 3.91/ km^2 * 0.06 km^2 * 6 days = 1.408

Total Estimated Take = 657.9 animals

We are proposing authorization for Level B harassment of 658 harbor seals.

Table 9. Proposed Authorized Amount of Taking, by Level A Harassment and Level B Harassment, by Species and Stock and Percent of Take by Stock

Species	Take Request	Percent of Stock
Harbor seal	658	*
California sea lion	38	< 0.1
Steller sea lion	9	< 0.1
Gray whale	10	0.4
Short-beaked common dolphin	50	< 0.1
Harbor porpoise	145	1.3

* There is no official estimate of stock size for this stock

Proposed Mitigation

In order to issue an IHA under section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to the activity, and other means of effecting the least practicable impact on the species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of the species or stock for taking for certain subsistence uses (latter not applicable for this action). NMFS regulations require applicants for incidental take authorizations to include information about the availability and feasibility (economic and technological) of equipment, methods, and manner of conducting the activity or other means of effecting the least practicable adverse impact upon the affected species or stocks and their habitat (50 CFR 216.104(a)(11)).

In evaluating how mitigation may or may not be appropriate to ensure the least practicable adverse impact on species or stocks and their habitat, as well as subsistence uses where applicable, we carefully consider two primary factors:

(1) The manner in which, and the degree to which, the successful implementation of the measure(s) is expected to reduce impacts to marine mammals, marine mammal species or stocks, and their habitat. This considers the nature of the potential adverse impact being mitigated (likelihood, scope, range). It further considers the likelihood that

the measure will be effective if implemented (probability of accomplishing the mitigating result if implemented as planned), the likelihood of effective implementation (probability implemented as planned); and

(2) The practicability of the measures for applicant implementation, which may consider such things as cost, impact on operations, and, in the case of a military readiness activity, personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

The following mitigation measures are proposed in the IHA:

- For in-water heavy machinery work other than pile driving/removal (*e.g.,* standard barges, *etc.*), and for needle gun work, if a marine mammal comes within 10 m, operations shall cease and vessels shall reduce speed to the minimum level required to maintain steerage and safe working conditions. This type of work could include the following activities: (1) Movement of the barge to or around the pile location; or (2) positioning of the pile on the substrate via a crane (*i.e.,* stabbing the pile);
- Conduct briefings between construction supervisors and crews and the marine mammal monitoring team prior to the start of all pile driving/removal activity and when new personnel join the work, to explain responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures;
- For those marine mammals for which Level B harassment take has not been requested, in-water pile installation/removal will shut down immediately if such species are observed within or entering the Level B harassment zone; and
- If take reaches the authorized limit for an authorized species, pile installation/removal will be stopped as these species approach the Level B harassment zone to avoid additional take.

The following mitigation measures would apply to WADOT's in-water construction activities.

- *Establishment of Shutdown Zones*- WADOT will establish shutdown zones for all pile driving and removal activities (Table 10). The purpose of a shutdown zone is generally to define an area within which shutdown of the activity would occur upon sighting of a marine mammal (or in anticipation of an animal entering the defined area). Shutdown zones typically vary based on the activity type and marine mammal hearing group (Table 4). Because the zones are small in this project, and WADOT seeks to simplify their monitoring, they have requested to establish shutdown zones of the same size that apply separately to cetaceans and pinnipeds, rather than having multiple size zones within each of these marine mammal groups corresponding to each hearing group. Therefore the shutdown zones are based on the largest Level A harassment zone within the cetacean and pinniped groups, respecitively, with an absolute minimum shutdown zone size of 10 m (33 ft).
- *Pile wake-up*- When removing piles WADOT will shake the pile slightly prior to removal to break the bond with surrounding sediment to avoid pulling out large blocks of sediment. Piles they will also be removed slowly to minimize turbidity.
- The placement of Protected Species Observers (PSOs) during all pile driving and removal activities (described in detail in the **Proposed Monitoring and Reporting** section) will ensure that the entire shutdown zone is visible during pile installation. Should environmental conditions deteriorate such that marine mammals within the entire shutdown zone would not be visible (*e.g.*, fog, heavy rain), pile driving and removal must be delayed until the PSO is confident marine mammals within the shutdown zone could be detected.

- *Monitoring for Level B Harassment*- WADOT will monitor the Level A and B harassment and shutdown zones. Monitoring zones provide utility for observing by establishing monitoring protocols for areas adjacent to the shutdown zones. Monitoring zones enable observers to be aware of and communicate the presence of marine mammals in the project area outside the shutdown zone and thus prepare for a potential halt of activity should the animal enter the shutdown zone. Placement of PSOs will allow PSOs to observe marine mammals within the Level B harassment zones that serve as monitoring zones.
- *Pre-activity Monitoring*- Prior to the start of daily in-water construction activity, or whenever a break in pile driving/removal of 30 minutes or longer occurs, PSOs will observe the shutdown and monitoring zones for a period of 30 minutes. The shutdown zone will be considered cleared when a marine mammal has not been observed within the zone for that 30-minute period. If a marine mammal is observed within the shutdown zone, a soft-start cannot proceed until the animal has left the zone or has not been observed for 15 minutes. When a marine mammal for which Level B harassment take is authorized is present in the Level B harassment zone, activities may begin and Level B harassment take will be recorded. If the entire Level B harassment zone is not visible at the start of construction, pile driving activities can begin. If work ceases for more than 30 minutes, the pre-activity monitoring of the shutdown zones will commence.
- Pile driving or removal must occur during daylight hours.

Based on our evaluation of the applicant's proposed measures, as well as other measures considered by NMFS, NMFS has preliminarily determined that the proposed mitigation measures provide the means effecting the least practicable impact on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Table 10. Shutdown Zones (radius in meters) By Pile Type, Activity and Hearing Group

Pile Type	Low Frequency	Mid Frequency	High Frequency	Otariid	Phocid
Sheet	50	50	50	20	20
H pile	10	10	10	10	10

Proposed Monitoring and Reporting

In order to issue an IHA for an activity, section 101(a)(5)(D) of the MMPA states that NMFS must set forth requirements pertaining to the monitoring and reporting of such taking. The MMPA implementing regulations at 50 CFR 216.104 (a)(13) indicate that requests for authorizations must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the proposed action area. Effective reporting is critical both to compliance as well as ensuring that the most value is obtained from the required monitoring.

Monitoring and reporting requirements prescribed by NMFS should contribute to improved understanding of one or more of the following:

- Occurrence of marine mammal species or stocks in the area in which take is anticipated (*e.g.*, presence, abundance, distribution, density);
- Nature, scope, or context of likely marine mammal exposure to potential stressors/impacts (individual or cumulative, acute or chronic), through better understanding of: (1) action or environment (*e.g.*, source characterization, propagation, ambient noise); (2) affected species (*e.g.*, life history, dive patterns); (3) co-occurrence of marine mammal species with the action; or (4) biological or behavioral context of exposure (*e.g.*, age, calving or feeding areas);

- Individual marine mammal responses (behavioral or physiological) to acoustic stressors (acute, chronic, or cumulative), other stressors, or cumulative impacts from multiple stressors;
- How anticipated responses to stressors impact either: (1) long-term fitness and survival of individual marine mammals; or (2) populations, species, or stocks;
- Effects on marine mammal habitat (*e.g.*, marine mammal prey species, acoustic habitat, or other important physical components of marine mammal habitat); and
- Mitigation and monitoring effectiveness.

Visual Monitoring

Marine mammal monitoring must be conducted in accordance with the Monitoring Plan and section 5 of the IHA. Marine mammal monitoring during pile driving and removal must be conducted by NMFS-approved PSOs in a manner consistent with the following:

- Independent PSOs (*i.e.*, not construction personnel) who have no other assigned tasks during monitoring periods must be used;
- Other PSOs may substitute education (degree in biological science or related field) or training for experience; and
- WADOT must submit PSO Curriculum Vitae for approval by NMFS prior to the onset of pile driving.

PSOs must have the following additional qualifications:

- Ability to conduct field observations and collect data according to assigned protocols;
- Experience or training in the field identification of marine mammals, including the identification of behaviors;
- Sufficient training, orientation, or experience with the construction operation to provide for personal safety during observations;

- Writing skills sufficient to prepare a report of observations including but not limited to the number and species of marine mammals observed; dates and times when in-water construction activities were conducted; dates, times, and reason for implementation of mitigation (or why mitigation was not implemented when required); and marine mammal behavior; and
- 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.

Up to four PSOs will be employed. PSO locations will provide an unobstructed view of all water within the shutdown zone, and as much of the Level A and Level B harassment zones as possible. PSO locations are as follows:

(1) At the pile driving/removal site or best vantage point practicable to monitor the shutdown zones and the small area north into Burley Lagoon;

(2) At Purdy Spit Park to monitor the Level B harassment zone near the project site in Henderson Bay; and

(3) For the smaller Level B harassment zone associated with H pile driving/removal, an additional PSOs will be located on the southeast end of the level B harassment zone (see Monitoring Plan Figure 4);

(4) For the larger Level B harassment zone associated with sheetpile driving/removal PSOs will be at the pile/driving removal site and Purdy Spit park as described above. Two additional PSOs will be located further south in Henderson Bay (see Monitoring Plan Figure 2): one at Kopachuck State Park to monitor the southern end of the Level B harassment zone and one further south at Penrose Point State Park to monitor the approaches into Henderson Bay, especially for killer and humpback whales and other large whales not authorized for take.

Monitoring will be conducted 30 minutes before, during, and 30 minutes after pile driving/removal activities. In addition, observers shall record all incidents of marine mammal occurrence, regardless of distance from activity, and shall document any behavioral reactions in concert with distance from piles being driven or removed. Pile driving activities include the time to install or remove a single pile or series of piles, as long as the time elapsed between uses of the pile driving or drilling equipment is no more than 30 minutes.

Reporting

A draft marine mammal monitoring report will be submitted to NMFS within 90 days after the completion of pile driving and removal activities, or 60 days prior to a requested date of issuance of any future IHAs for projects at the same location, whichever comes first. The report will include an overall description of work completed, a narrative regarding marine mammal sightings, and associated PSO data sheets. Specifically, the report must include:

- Dates and times (begin and end) of all marine mammal monitoring.
- Construction activities occurring during each daily observation period, including how many and what type of piles were driven or removed and by what method (*i.e.*, impact or vibratory and if other removal methods were used).
- Weather parameters and water conditions during each monitoring period (*e.g.,* wind speed, percent cover, visibility, sea state).
- The number of marine mammals observed, by species, relative to the pile location and if pile driving or removal was occurring at time of sighting.
- Age and sex class, if possible, of all marine mammals observed.
- PSO locations during marine mammal monitoring.

- Distances and bearings of each marine mammal observed to the pile being driven or removed for each sighting (if pile driving or removal was occurring at time of sighting).
- Description of any marine mammal behavior patterns during observation, including direction of travel and estimated time spent within the Level A and Level B harassment zones while the source was active.
- Number of individuals of each species (differentiated by month as appropriate) detected within the monitoring zone, and estimates of number of marine mammals taken, by species (a correction factor may be applied to total take numbers, as appropriate).
- Detailed information about any implementation of any mitigation triggered (*e.g.*, shutdowns and delays), a description of specific actions that ensued, and resulting behavior of the animal, if any.
- Description of attempts to distinguish between the number of individual animals taken and the number of incidences of take, such as ability to track groups or individuals.

If no comments are received from NMFS within 30 days, the draft final report will constitute the final report. If comments are received, a final report addressing NMFS comments must be submitted within 30 days after receipt of comments.

Reporting Injured or Dead Marine Mammals

In the event that personnel involved in the construction activities discover an injured or dead marine mammal, WADOT shall report the incident to the Office of Protected Resources (OPR), NMFS and to the regional stranding coordinator as soon as feasible. If the death or injury was clearly caused by the specified activity, WADOT must immediately cease the specified activities until NMFS is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure

compliance with the terms of the IHA. The IHA-holder must not resume their activities until notified by NMFS. The report must include the following information:

- Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);
- Species identification (if known) or description of the animal(s) involved;
- Condition of the animal(s) (including carcass condition if the animal is dead);
- Observed behaviors of the animal(s), if alive;
- If available, photographs or video footage of the animal(s); and
- General circumstances under which the animal was discovered.

Negligible Impact Analysis and Determination

NMFS has defined negligible impact as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival (50 CFR 216.103). A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (*i.e.*, population-level effects). An estimate of the number of takes alone is not enough information on which to base an impact determination. In addition to considering estimates of the number of marine mammals that might be "taken" through harassment, NMFS considers other factors, such as the likely nature of any responses (*e.g.*, intensity, duration), the context of any responses (*e.g.*, critical reproductive time or location, migration), as well as effects on habitat, and the likely effectiveness of the mitigation. We also assess the number, intensity, and context of estimated takes by evaluating this information relative to population status. Consistent with the 1989 preamble for NMFS's implementing regulations (54 FR 40338; September 29, 1989), the impacts from other past and ongoing anthropogenic activities are incorporated into this analysis via their impacts on the environmental baseline (*e.g.*,

as reflected in the regulatory status of the species, population size and growth rate where known, ongoing sources of human-caused mortality, or ambient noise levels).

To avoid repetition, the discussion of our analyses applies to all the species listed in Table 9, given that the anticipated effects of this activity on these different marine mammal stocks are expected to be similar. There is little information about the nature or severity of the impacts, or the size, status, or structure of any of these species or stocks that would lead to a different analysis for this activity. Pile driving activities have the potential to disturb or displace marine mammals. Specifically, the project activities may result in take, in the form of Level B harassment from underwater sounds generated from pile driving and removal and needle gun use. Potential takes could occur if individuals are present in the ensonified zone when these activities are underway.

Takes by Level B harassment would be in the form of behavioral disturbance and/or TTS. No mortality or PTS (Level A harassment) is anticipated given the nature of the activity and measures designed to minimize the possibility of injury to marine mammals. The potential for harassment is minimized through the construction method and the implementation of the planned mitigation measures (see **Proposed Mitigation** section).

The nature of the pile driving project precludes the likelihood of serious injury or mortality. Take would occur within a limited, confined area (north-central Henderson Bay) of the stock's range. Level A and Level B harassment will be reduced to the level of least practicable adverse impact through use of mitigation measures described herein, and as a result, as discussed above, Level A harassment is not anticipated to occur. Further the amount of take proposed to be authorized is extremely small when compared to stock abundance.

Behavioral responses of marine mammals to pile driving and needle gun use at the project site, if any, are expected to be mild and temporary. Marine mammals within

the Level B harassment zone may not show any visual cues they are disturbed by activities (as noted during modification to the Kodiak Ferry Dock) or could become alert, avoid the area, leave the area, or display other mild responses that are not observable such as changes in vocalization patterns. Given the short duration of noise-generating activities per day and that pile driving and removal would occur across three months, any harassment would be temporary. There are no other areas or times of known biological importance for any of the affected species.

In addition, it is unlikely that minor noise effects in a small, localized area of habitat would have any effect on the fitness of any individual or the stocks' ability to recover. In combination, we believe that these factors, as well as the available body of evidence from other similar activities, demonstrate that the potential effects of the specified activities will have only minor, short-term effects on individuals. The specified activities are not expected to impact rates of recruitment or survival and will therefore not result in population-level impacts.

In summary and as described above, the following factors primarily support our preliminary determination that the impacts resulting from this activity are not expected to adversely affect the species or stock through effects on annual rates of recruitment or survival:

- No mortality or Level A harassment is anticipated or authorized.
- No biologically important areas have been identified within the project area.
- For all species, Henderson Bay is a very small and peripheral part of their range.
- WADOT would implement mitigation measures such as shut downs and slow removal of piles to minimize turbidity and shaking the pile slightly prior to removal (wake up) to break the bond with surrounding sediment to avoid pulling out large blocks of sediment.

- Monitoring reports from similar work in Puget Sound have documented little to no effect on individuals of the same species impacted by the specified activities.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the proposed monitoring and mitigation measures, NMFS preliminarily finds that the total marine mammal take from the proposed activity will have a negligible impact on all affected marine mammal species or stocks.

Small Numbers

As noted above, only small numbers of incidental take may be authorized under section 101(a)(5)(D) of the MMPA for specified activities other than military readiness activities. The MMPA does not define small numbers and so, in practice, where estimated numbers are available, NMFS compares the number of individuals taken to the most appropriate estimation of abundance of the relevant species or stock in our determination of whether an authorization is limited to small numbers of marine mammals. When the predicted number of individuals to be taken is fewer than one third of the species or stock abundance, the take is considered to be of small numbers. Additionally, other qualitative factors may be considered in the analysis, such as the temporal or spatial scale of the activities.

The amount of take NMFS proposes to authorize is below one third of the estimated stock abundance for all stocks. For harbor seals there are no official estimates of the stock size. We do know the populations of harbor seals in Puget Sound are increasing and number at least 32,000 (Jeffries, 2013). We also know that harbor seals do not generally range over large areas (see above). Therefore, it is most likely that the number of harbor seal takes is a small number. For all stocks, these are all likely conservative estimates of percent of stock taken because they assume all takes are of

different individual animals which is likely not the case. Some individuals may return multiple times in a day, but PSOs would count them as separate takes if they cannot be individually identified.

Based on the analysis contained herein of the proposed activity (including the proposed mitigation and monitoring measures) and the anticipated take of marine mammals, NMFS preliminarily finds that small numbers of marine mammals will be taken relative to the population size of the affected species or stocks.

Unmitigable Adverse Impact Analysis and Determination

There are no relevant subsistence uses of the affected marine mammal stocks or species implicated by this action. Therefore, NMFS has determined that the total taking of affected species or stocks would not have an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence purposes.

Endangered Species Act

Section 7(a)(2) of the ESA (16 U.S.C. 1531 *et seq*.) requires that each Federal agency insure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat. To ensure ESA compliance for the issuance of IHAs, NMFS consults internally, in this case with the West Coast Region Protected Resources Division Office, whenever we propose to authorize take for endangered or threatened species.

No incidental take of ESA-listed species is proposed for authorization or expected to result from this activity. Therefore, NMFS has determined that formal consultation under section 7 of the ESA is not required for this action.

Proposed Authorization

As a result of these preliminary determinations, NMFS proposes to issue an IHA to the WADOT to conduct the Purdy Bridge Rehabilitation project in Pierce, WA from

July 16, 2021 through September 30, 2021, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated. A draft of the proposed IHA can be found at *https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act*.

Request for Public Comments

We request comment on our analyses, the proposed authorization, and any other aspect of this notice of proposed IHA for the proposed Purdy Bridge Rehabilitation project. We also request at this time comment on the potential renewal of this proposed IHA as described in the paragraph below. Please include with your comments any supporting data or literature citations to help inform decisions on the request for this IHA or a subsequent Renewal IHA.

On a case-by-case basis, NMFS may issue a one-time 1-year Renewal IHA following notice to the public providing an additional 15 days for public comments when (1) up to another year of identical, or nearly identical, activities as described in the **Description of Proposed Activity** section of this notice is planned or (2) the activities as described in the **Description of Proposed Activity** section of this notice would not be completed by the time the IHA expires and a Renewal would allow for completion of the activities beyond that described in the *Dates and Duration* section of this notice, provided all of the following conditions are met:

- A request for renewal is received no later than 60 days prior to the needed Renewal IHA effective date (recognizing that Renewal IHA expiration date cannot extend beyond one year from expiration of the initial IHA);
- The request for renewal must include the following:

(1) An explanation that the activities to be conducted under the requested Renewal IHA are identical to the activities analyzed under the initial IHA, are a subset of the activities, or include changes so minor (*e.g.*, reduction in pile size) that the changes

do not affect the previous analyses, mitigation and monitoring requirements, or take estimates (with the exception of reducing the type or amount of take); and

(2) A preliminary monitoring report showing the results of the required monitoring to date and an explanation showing that the monitoring results do not indicate impacts of a scale or nature not previously analyzed or authorized; and

- Upon review of the request for Renewal, the status of the affected species or stocks, and any other pertinent information, NMFS determines that there are no more than minor changes in the activities, the mitigation and monitoring measures will remain the same and appropriate, and the findings in the initial IHA remain valid.

Dated: December 14, 2020.

Donna S. Wieting,

Director, Office of Protected Resources,

National Marine Fisheries Service.

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