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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[RTID 0648-XR043]

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Astoria Waterfront Bridge Replacement Phase 2 Project

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

ACTION: Notice; issuance of incidental harassment authorization.

SUMMARY: In accordance with the regulations implementing the Marine Mammal Protection Act (MMPA) as amended, notification is hereby given that NMFS has issued an incidental harassment authorization (IHA) to the City of Astoria to incidentally harass, by Level A and Level B harassment, marine mammals during construction activities associated with Phase Two of the Astoria Waterfront Bridge Replacement project in Astoria, OR.

DATES: This Authorization is effective from December 9, 2019 through December 8, 2020.

FOR FURTHER INFORMATION CONTACT: Leah Davis, 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/national/marine-mammal-protection/incidental-take-authorizations-construction-activities*. 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 such 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 such takings are set forth.

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

Summary of Request

On June 3, 2019 NMFS received a request from the City of Astoria (City) for an IHA to take marine mammals incidental to pile driving and construction work in Astoria, Oregon. The application was deemed adequate and complete on October 17, 2019. The City's request was for take of a small number of California sea lion (*Zalophus californianus*) and harbor seal (*Phoca*

vitulina richardii) by Level A and Level B harassment, and a small number of Steller sea lion (*Eumetopias jubatus*) by Level B harassment only. Neither the City nor NMFS expects serious injury or mortality to result from this activity, and, therefore, an IHA is appropriate.

This IHA covers one year of a larger, two-year project that involves removal and replacement of six bridges on the Astoria, Oregon waterfront. NMFS previously issued an IHA to the City for removal and replacement of three bridges (83 FR 19243, May 2, 2018). The City complied with all the requirements (*e.g.*, mitigation, monitoring, and reporting) of the previous IHA and information regarding their monitoring results may be found in the Monitoring and Mitigation Section. The monitoring report exposed the need for clarification of monitoring requirements, specifically those involving Protected Species Observer (PSO) coverage of Level A and Level B zones. NMFS clarified those requirements with the applicant.

Description of the Specified Activity

The City of Astoria, Oregon proposes to remove and replace three bridges connecting 6th, 8th, and 10th Streets with waterfront piers near the mouth of the Columbia River. The bridges are currently supported by decayed timber piles. Among all three bridges, an estimated 150 timber piles will be removed as will other timber structural elements and concrete footings. The contractor will install 65 temporary 36-inch steel casings to help guide the installation of 65 permanent 24-inch steel piles. Pile driving and removal activities will be conducted using a vibratory and impact hammer. The contractor may need to conduct preboring inside of the temporary casings using a vibratory hammer and a 14-inch H-pile to prepare the new pile sites. In the event that preboring is not effective, the contractor may conduct down-the-hole drilling inside of the 36-inch piles to prepare the site for the permanent piles. It is unlikely that the contractor will need to conduct down-the-hole drilling, as it was not necessary during Phase 1.

However, in the event that down-the-hole drilling is required, this activity has been analyzed in regard to both potential impulsive and continuous characteristics (Reyff and Heyvaert, 2019) as described in the **Federal Register** notice for the proposed IHA (84 FR 59773; November 6, 2019).) The roadway and railway superstructures will also be replaced, and a temporary, above-water work platform will be created for the construction. The use of vibratory and impact hammers for pile driving and site preparation is expected to produce underwater sound at levels that may result in behavioral harassment or auditory injury of marine mammals. Human presence and use of general construction equipment may also lead to behavioral harassment of sea lions hauled out along the riverbank below the bridges.

The impacted area extends outward from the three bridge sites to a maximum distance of 21.54km (13.28 mi). The project will occur over one year beginning in December 2019, with in-water activities expected to occur over an estimated 21 days during the months of December through April. Work will occur during daylight hours.

A detailed description of the planned project is provided in the **Federal Register** notice for the proposed IHA (84 FR 59773; November 6, 2019). Since that time, no changes have been made to the planned construction activities. Therefore, a detailed description is not provided here. Please refer to that **Federal Register** notice for the description of the specific activity.

Comments and Responses

A notice of NMFS' proposal to issue an IHA to the City was published in the **Federal Register** on November 6, 2019 (84 FR 59773). That notice described, in detail, the City's proposed activity, the marine mammal species that may be affected by the activity, the anticipated effects on marine mammals and their habitat, proposed amount and manner of take, and proposed mitigation, monitoring and reporting measures. During the 30-day public comment

period, NMFS received a comment letter from the Marine Mammal Commission (Commission); the Commission's recommendations and our responses are provided here, and the comments have been posted online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-takeauthorizations-construction-activities.*

Comment 1: The Commission stated that harbor seal takes were underestimated given a haulout within the Level B harassment zone (Desdemona Sands) that is larger than a haulout that boarders the Level B harassment zone which was used to estimate take. Based on information NMFS received from the Oregon Department of Fish and Wildlife (ODFW), NMFS estimates that up to 6,400 harbor seals may haul out at Desdemona Sands. As such, the Commission recommends that NMFS authorize the taking of 6,400 individual harbor seals to be taken no more than 21 times each rather than 1,197 harbor seal takes.

Response: NMFS concurs and is authorizing Level B harassment take of up to 6,400 *individuals.* A portion of those individuals will likely be taken on multiple days, but no more than 21 days. For additional information, please see the *Estimated Take* section, below.

Comment 2: The Commission recommends that NMFS obtain more recent pinniped haul-out count data from WDFW and ODFW before processing any additional authorizations for activities occurring in the Columbia River.

Response: When NMFS receives another application for an IHA at a location on the Columbia River we will contact these agencies.

Comment 3: The Commission states that NMFS' standard 7-decibel (dB) source level reduction when bubble curtains are to be used during pile driving is not appropriate because bubble curtains that are placed immediately around the pile do not achieve consistent reductions in sound levels because they cannot attenuate ground-borne sound. The Commission recommends

that NMFS consult with the relevant experts regarding the appropriate source level reduction factor to use to minimize far-field effects on marine mammals for all relevant incidental take authorizations and, until the experts have been consulted, refrain from using a source level reduction factor when bubble curtains are to be implemented.

Response: NMFS appreciates the Commission's input and directs the reader to our recent response to a similar comment, which can be found at 84 FR 64833 (November 25, 2019).

Comment 4: The Commission recommends that NMFS condition the final authorization to stipulate that pile driving and removal can occur during daylight hours only and include those conditions consistently in all **Federal Register** notices, draft authorizations, and final authorizations that do not involve activities occurring during nighttime.

Response: The **Federal Register** notice for the proposed action (84 FR 59773, November 6, 2019) did not include a description of the time of day that the activity would take place. NMFS has noted below, in the *Changes from Proposed IHA to Final IHA* section, that the applicant has indeed clarified their intention for pile driving to occur during daylight hours. NMFS agrees that the **Federal Register** notice for a proposed action should detail whether an activity will take place during daylight hours only, or whether an activity may, or will, take place at night. NMFS bases its determinations on how an applicant describes their activities and expects that an applicant will carry out a project as it is described in the associated application and **Federal Register** notices. Additionally, NMFS includes here a requirement that "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." This requirement implies that a shutdown zone should either be visible due to daylight, or an applicant must

illuminate the shutdown zone to allow sufficient visibility. Therefore, NMFS does not agree that it is necessary to stipulate that the activity may only occur during daylight hours.

Comment 5: The Commission recommends that NMFS (1) update its various templates for **Federal Register** notices and draft authorizations to reflect all standard measures and (2) conduct a more thorough review of the notices, draft authorizations, and final authorizations to ensure accuracy, completeness, and consistency.

Response: NMFS thanks the Commission for its recommendation. NMFS makes every effort to keep templates up-to-date and read notices thoroughly prior to publication and will continue this effort to publish the best possible product for public comment.

Comment 6: The Commission recommends that NMFS refrain from issuing renewals for any authorization and instead use its abbreviated **Federal Register** notice process.

Response: NMFS appreciates the streamlining achieved by the use of abbreviated **Federal Register** notices and intends to continue using them for proposed IHAs that include minor changes from previously issued IHAs, but which do not satisfy the renewal requirements. However, we believe our method for issuing renewals meets statutory requirements and maximizes efficiency, and we plan to continue considering requests for renewals.

Comment 7: The Commission recommends that NMFS stipulate that a renewal is a one-time opportunity in all **Federal Register** notices requesting comments on the possibility of a renewal, on its webpage detailing the renewal process, and in all draft and final authorizations that include a term and condition for a renewal.

Response: NMFS thanks the Commission for its recommendation. Currently, **Federal Register** notices announcing proposed IHAs and the potential for a Renewal state, in the SUMMARY section, "NMFS is also requesting comments on a possible *one-year* renewal that could be issued

under certain circumstances and if all requirements are met." Further, no notice for any additional Renewal is included in the **Federal Register** Notice for proposed Renewals, so the current process already ensures that only one Renewal will be issued.

Comment 8: The Commission recommends that NMFS ensure that action proponents have met all renewal requirements prior to proposing to issue a renewal in the *Federal Register*, and follow the renewal process of informing all commenters on the original authorization of the opportunity to submit additional comments on the proposed renewal.

Response: NMFS carefully considers whether applicants meet the criteria for a renewal upon request. NMFS will ensure that the Commission is contacted alongside other persons who commented on the initial IHA on all future proposed IHA Renewals, but notes that the Commission itself has consistently informally contacted NMFS regarding proposed IHAs and Renewals upon the **Federal Register** notice being posted for public inspection, the day prior to formal publication and the beginning of the public comment period, or the first day of the formal comment period without notification of upcoming proposed IHA from NMFS.

Changes from the Proposed IHA to Final IHA

The most substantive change, which is described above and in the *Estimated Take* section, is the increase in the take numbers for harbor seals, though we note here that these changes do not affect our negligible impact or small numbers determinations. The **Federal Register** notice for the proposed IHA mistakenly noted that in-water demolition work would begin in November 2019. Rather, in-water demolition work will begin in December 2019. The proposed notice also did not explicitly state that pile driving will occur during daylight hours only, which has been stated above in this notice. Additionally, there is a chance that harbor porpoise could be present in the project area, which was not discussed in the proposed **Federal**

Register notice. However, harbor porpoise are not expected to occur within the Level A or Level B harassment zones for the reasons explained in the *Description of Marine Mammals in the Area of Specified Activities* section, below. Slight modifications were made to the mitigation measures; please see the *Mitigation Measures* section for additional information. Additionally, minor changes were made to Tables 3, 5, 6, 7, 13 and 14.

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 1 lists all species with expected potential for occurrence in Astoria and summarizes information related to the population or stock, including regulatory status under the MMPA and ESA and potential biological removal (PBR), where known. For taxonomy, we follow Committee on Taxonomy (2016). 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. For Steller sea lion (*Eumetopias jubatus*) the stock abundance is the best estimate of pup and non-pup counts, which have not been corrected to account for animals at sea during abundance surveys. All managed stocks in this region are assessed in NMFS's U.S. 2018 SARs (*e.g.*, Caretta *et al*. 2019). All values presented in Table 1 are the most recent available at the time of publication and are available in the 2018 SARs (Caretta *et al*. 2019, Muto *et al*. 2019).

Table 1: Species with expected potential for occurrence in Astoria.

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 Balaenopteridae (rorquals)						
Humpback whale	*Megaptera novaeangliae*	*Central North Pacific*	*-, -, Y*	*10,103 (0.300, 7,891, 2006)*	*83*	*26*
Humpback whale	*Megaptera novaeangliae*	*California/Oregon/Washington*	*-, -, Y*	*2,900 (0.05, 2,784, 2014)*	*16.7*	*>= 40.2*
Harbor porpoise	*Phocoena phocoena*	*Northern OR/ WA Coast*	*-, -, N*	*21,487 (0.44, 15,123, 2011)*	*151*	*≥3.0*
Order Carnivora – Superfamily Pinnipedia						
Family Otariidae (eared seals and sea lions)						
California sea lion	*Zalophus californianus*	U.S.	-, -, N	257,606 (N/A, 233,515, 2014)	14,011	>=321
Steller sea lion	*Eumetopias jubatus*	Eastern U.S.	-, -, N	41,638 (See SAR, 41,638, 2015)	2498	108

Family Phocidae (earless seals)						
Pacific harbor seal	*Phoca vitulina richardii*	Oregon/ Washington Coast	-, -, N	Unknown (Unknown, Unknown, 1999)	Undetermined	10.6

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: www.nmfs.noaa.gov/pr/sars/. CV is coefficient of variation; Nmin is the minimum estimate of stock abundance.

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.

NOTE - *Italicized species are not expected to be taken or proposed for authorization*

All species that could potentially occur in the proposed survey areas are included in Table 1. However, the temporal and spatial occurrence of humpback whales and harbor porpoises is such that take is not expected to occur, and they are not discussed further beyond the explanation provided here. Humpback whales occasionally enter the Columbia River to feed (Calambokidis, *et al*., 2017), however their presence is rare. They were not observed during Phase 1 of the City's project (OBEC Consulting Engineers. 2019), and are not expected during Phase 2. Harbor porpoises are regularly observed in the ocean ward waters near the mouth of the Columbia River and are known to occur there year-round. Porpoise abundance peaks when anchovy (*Engraulis mordax*) abundance in the river and nearshore are highest, which is usually between April and August (Litz *et al.* 2008). Harbor porpoise take is not expected because the in-water work is expected to be complete prior to April (unless the entire IWWP extension is exercised), and the ensonified area is contained within the Columbia River. Additionally, harbor porpoise were not observed during Phase 1 of the City's project (OBEC Consulting Engineers. 2019)

A detailed description of the of the species likely to be affected by the project, including brief introductions to the species and relevant stocks as well as available information regarding

population trends and threats, and information regarding local occurrence, were provided in the **Federal Register** notice for the proposed IHA (84 FR 59773; November 6, 2019); since that time, we are not aware of any changes in the status of these species and stocks; therefore, detailed descriptions are not provided here. Please refer to that **Federal Register** notice for these descriptions. Please also refer to NMFS' website (https://www.fisheries.noaa.gov/find-species) for generalized species accounts.

Potential Effects of Specified Activities on Marine Mammals and their Habitat

Underwater noise from impact and vibratory pile driving and site preparation, as well as potential down-the-hole drilling activities associated with Phase Two of the Astoria Waterfront Bridge Replacement Project have the potential to result in harassment of marine mammals in the vicinity of the action area. The **Federal Register** notice for the proposed IHA (84 FR 59773; November 6, 2019) included a discussion of the potential effects of such disturbances on marine mammals and their habitat, therefore that information is not repeated in detail here; please refer to the Federal Register notice (84 FR 59773; November 6, 2019) for that information.

Estimated Take

This section provides an estimate of the number of incidental takes authorized 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 primarily be by Level B harassment, as use of the vibratory and impact pile hammers, potential drill, and other construction equipment has the potential to result in disruption of behavioral patterns for individual marine mammals. There is also some potential for auditory injury (Level A harassment) to California sea lions and harbor seals because they are more likely to occur closer to the project site, particularly considering the small, nearby California sea lion haulout. Auditory injury is unlikely to occur to other groups, and the proposed mitigation and monitoring measures are expected to minimize the severity of such taking to the extent practicable.

As described previously, no mortality or serious injury 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.

Acoustic Thresholds

Using the best available science, NMFS has developed 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 μPa (rms) for continuous (*e.g.*, vibratory pile-driving, drilling) and above 160 dB re 1 μPa (rms) for non-explosive impulsive (*e.g.*, seismic airguns) 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).

The City's proposed activity includes the use of continuous (vibratory pile driving, preboring and potential down-the-hole drilling) and impulsive (impact pile driving and potential

down-the-hole drilling) sources, and therefore the 120 and 160 dB re 1 μPa (rms) are applicable for in-water noise.

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). The City's proposed activities include the use of impulsive (impact hammers, potential down-the-hole drilling) and non-impulsive (vibratory hammers, potential down-the-hole drilling) sources.

These thresholds are provided in the Table 2. 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 2. Thresholds identifying the onset of Permanent Threshold Shift

	PTS Onset Acoustic Thresholds* **(Received Level)**	
Hearing Group	**Impulsive**	**Non-impulsive**
Low-Frequency (LF) Cetaceans	*Cell 1* $L_{pk,flat}$: 219 dB $L_{E,LF,24h}$: 183 dB	*Cell 2* $L_{E,LF,24h}$: 199 dB
Mid-Frequency (MF) Cetaceans	*Cell 3* $L_{pk,flat}$: 230 dB $L_{E,MF,24h}$: 185 dB	*Cell 4* $L_{E,MF,24h}$: 198 dB
High-Frequency (HF) Cetaceans	*Cell 5* $L_{pk,flat}$: 202 dB $L_{E,HF,24h}$: 155 dB	*Cell 6* $L_{E,HF,24h}$: 173 dB
Phocid Pinnipeds (PW) (Underwater)	*Cell 7* $L_{pk,flat}$: 218 dB $L_{E,PW,24h}$: 185 dB	*Cell 8* $L_{E,PW,24h}$: 201 dB
Otariid Pinnipeds (OW) (Underwater)	*Cell 9* $L_{pk,flat}$: 232 dB	*Cell 10* $L_{E,OW,24h}$: 219 dB

	$L_{E,OW,24h}$: 203 dB	

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

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

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.,* impact pile driving, vibratory pile driving and removal, site preparation). The maximum (underwater) area ensonified above the thresholds for behavioral harassment referenced above is 21.53km (13.38 mi) into the river channel during vibratory installation/removal of the 36-inch temporary steel casings, though this distance does not account for tide levels. There is a chance that pile installation work could be done during low tides, where exposed sand bars could significantly reduce the Level B ZOI.

The project includes vibratory removal of timber piles, vibratory and impact pile installation of steel pipe piles and site preparation using a vibratory hammer and H-pile. Source levels of pile installation/removal activities and site preparation are based on reviews of

measurements of the same or similar types and dimensions of piles available in the literature. Source levels for each pile size and driving method are presented in Table 3. Source levels for vibratory installation and removal of piles of the same diameter are assumed to be the same.

The source level for vibratory removal of timber piles is from in-water measurements generated by the Greenbusch Group (2018) from the Seattle Pier 62 project (83 FR 39709; April 10, 2018). Hydroacoustic monitoring results from Pier 62 determined unweighted rms ranging from 140 dB to 169 dB. NMFS analyzed source measurements at different distances for all 63 individual timber piles that were removed at Pier 62 and normalized the values to 10 m. The results showed that the median is 152 dB SPLrms.

Table 3. Sound source levels for in-water activities.

Pile size/type	Method	Source level (at 10m)			Literature source
		dB RMS	dB SEL[c]	dB peak	
14-inch Timber	Vibratory	152			The Greenbusch Group, Inc (2018)
14-inch Steel H-pile	Vibratory	150[a]			CalTrans (2015)
24-inch Steel Pipe	Vibratory	162			WSDOT (2010)
	Impact	187[b]	171[b]	200[b]	Loughlin (2005)
36-inch Steel Pipe	Vibratory	170			CalTrans (2015)

[a] Source level from 12-inch steel H-pile.
[b] Includes 7dB reduction from use of bubble curtain.
[c] Sound exposure level (dB re 1 μPa^2-sec)

It is anticipated that the contractor may employ two crews during construction to keep the project on schedule. This could result in concurrent use of a vibratory hammer and an impact

hammer, however, the contractor will not operate two of the same hammer type concurrently. The hammers would be operated at two different bridges. The ensonified zones would likely overlap during concurrent use, but the multiple-source decibel addition method (Table 4) does not result in significant increases in the noise source when an impact hammer and vibratory hammer are operated at the same time, because the difference in noise source levels (Table 3) between the two hammers is greater than 10dB.

Table 4. Multiple-source decibel addition.

When two decibel values differ by:	Add the following to the higher level
0-1 dB	3 dB
2 - 3 dB	2 dB
4 - 9 dB	1 dB
> 10 dB	0 dB

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:

$TL = B * Log_{10} (R_1/R_2)$,

where

TL = transmission loss in dB

B = transmission loss coefficient

R_1 = the distance of the modeled SPL from the driven pile, and

R_2 = the distance from the driven pile of the initial measurement

Absent site-specific acoustical monitoring with differing measured transmission loss, a practical spreading value of 15 is used as the transmission loss coefficient in the above formula.

Site-specific transmission loss data for Astoria are not available, therefore the default coefficient of 15 is used to determine the distances to the Level A and Level B harassment thresholds.

Table 5. In-water activity source levels and distances to Level B harassment thresholds.

Pile Size/Type	Method	Source Level at 10 m (dB re 1 µPa rms)	Level B Threshold (dB re 1 µPa rms)	Propagation (xLogR)	Distance to Level B Threshold (m)	Level B Harassment Ensonified Area (km^2)
14-inch Timber	Vibratory	152	120	15	1,359.4	3.2
14-inch Steel H-pile	Vibratory	150	120	15	1,000.0	1.8
24-inch Steel Pipe	Vibratory	162	120	15	6,309.6	55.3
	Impact	187	160	15	631.0	0.8
36-inch Steel Pipe *(and down-the-hole drilling, as necessary)*	Vibratory	170	120	15	21,544.4	212.3

In-Air Disturbance during General Construction Activities—Behavioral disturbance (Level B harassment take) may occur incidental to the use of construction equipment during general construction that is proposed in the dry, above water, or inland within close proximity to the river banks. These construction activities are associated with the removal and construction of the rail superstructures, removal of the existing concrete foundations, construction of abutment wingwalls, and the construction of a temporary work platform. Possible equipment and sound source levels are included in Table 1 of the **Federal Register** notice for the draft IHA (84 FR 59773; November 6, 2019). Using the Spherical Spreading Loss Model (20logR), a maximum sound source level of 93 dB RMS at 20 m, sound levels in-air would attenuate below the 90dB RMS Level B harassment threshold for harbor seals at 28 m, and below the 100 dB RMS threshold for all other pinnipeds at 9 m. Harbor seals are not expected to occur within 28m of the activity as there are no nearby haulouts, and are, therefore, not expected to be harassed by in-air sound. Additionally, the City is proposing a 10 m shutdown zone (Table 13) for all construction

work to prevent injury from physical interaction with equipment. The City would therefore shut down equipment before hauled out sea lions could be acoustically harassed by the sound produced. No Level B harassment is expected to occur due to increased sounds from roadway construction. However, sea lions may be disturbed by the presence of construction equipment and increased human presence during above-water construction.

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 Level A harassment take. 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 pile driving, NMFS User Spreadsheet predicts the distance at which, if a marine mammal remained at that distance the whole duration of the activity, it would incur PTS. Inputs entered in the User Spreadsheet (Table 6) and the resulting isopleths are reported below (Table 7).

Table 6. User spreadsheet input parameters used for calculating Level A harassment isopleths.

Pile Size and Installation Method	Spreadsheet Tab Used	Weighting Factor Adjustment (kHz)	Source Level at 10 m	Number of Piles Within 24-h Period	Duration to Drive Single Pile (minutes)	Number of Strikes Per Pile	Propagation (xLogR)	Distance From Source Level Measurement (meters)
14-inch Timber Vibratory	A.1) Vibratory pile driving	2.5	152dB RMS SPL	50	20		15	10
14-inch Steel H-Pile	A.1) Vibratory pile driving	2.5	150dB RMS SPL	36	25		15	10
24-inch Steel Vibratory	A.1) Vibratory pile driving	2.5	162dB RMS SPL	18	20		15	10
36-inch Steel Vibratory	A.1) Vibratory pile driving	2.5	170dB RMS SPL	36	8		15	10
24-inch Steel Impact *(and down-the-hole drilling, if necessary)*	E.1) Impact pile driving	2	171dB SEL/ 200 PK SPL	23		500	15	10

The applicant may conduct down-the-hole drilling, however a separate analysis is not provided for that activity, as it is was not necessary in Phase 1 of the project, and is not expected to be necessary in Phase 2. Should drilling be necessary, the Level B harassment zone will be considered to be the same as that calculated for vibratory installation/removal of 36-inch steel piles, as that Level B harassment zone is clipped in all directions, and therefore is the most conservative a Level B harassment zone could be. A conservative Level B harassment zone is of

particular importance due to the fact that the duration of drilling, should it be necessary, is unknown. The applicant will consider the Level A harassment zone for down-the-hole drilling to be the same as the Level A harassment zones calculated for impact pile driving of the 24-inch steel piles. These are the largest Level A harassment zones.

Table 7. Calculated distances to Level A harassment isopleths.

Pile Size and Installation Method	Level A Harassment Zone (m)	
	Phocids	**Otariids**
14-inch Timber Vibratory	6.8	0.5
14-inch Steel H-Pile	4.7	0.3
24-inch Steel Vibratory	16	1.1
36-inch Steel Vibratory	47	3.3
24-inch Steel Impact *(and down-the-hole drilling, if necessary)*	431.5	31.4

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, and how it is brought together with the information provided above to produce a quantitative take estimate. Estimated takes of each species were calculated using information provided by the Oregon Department of Fish and Wildlife (Bryan Wright, pers. comm., August and November 2019), Washington Department of Fish and Wildlife (WDFW, 2014) and the Marine Mammal Commission (Tiff Brookens, pers. comm., March 2018).

Harbor Seal

As noted in the *Comments and Responses* section, above, estimated Level B harassment take of harbor seal was modified based on a comment from the Commission and additional information from ODFW.

The closest harbor seal haulout and pupping area is Desdemona Sands, which is downstream of the Astoria-Megler Bridge. Numbers of harbor seals hauled out at Desdemona Sands have been reported to reach into the thousands (Profita, 2015). While specific counts were unavailable, ODFW advised that the highest counts of harbor seals are in late winter/early spring (over 6,000 at Desdemona Sands in February) (Bryan Wright, pers. comm., November 2019). However, ODFW also provided a harbor seal count of 1,918 non-pups at Desdemona Sands from May 2014 (most recent ODWF survey), and described these as year-round residents. We would expect that the harbor seal counts would decrease from 6,400 individuals on either end of the late winter/ early spring period (as low as 1,918 during the summer). Up to 6,400 individuals could be taken on in-water workdays during the late winter/early spring months, but we do not expect that many takes on every in-water work day.

Because there is such a high variability in potential instances of Level B harassment take, NMFS is not authorizing a specific number of instances of Level B harassment take of harbor seals. Rather, NMFS is authorizing Level B harassment take of up to 6,400 *individuals.* A portion of those individuals will likely be taken on multiple days, but none to exceed 21 days. Most individuals will be taken notably fewer times, as NMFS does not expect that number of individuals to haul out at Desdemona Sands for the majority of the in-water work period.

Additionally, while harbor seals are unlikely to occur in the Level A harassment zone during vibratory pile driving (based on Phase 1 monitoring), the applicant is concerned that if a few animals occurred in the Level A harassment zone during impact pile driving, they may need to shut down more frequently than is practical, given the IWWP restrictions previously discussed. As such, NMFS is proposing to observe a shutdown zone that is smaller than the Level A isopleth for impact pile driving and to issue small numbers of Level A harassment take

of harbor seals (Table 11). This proposed take would avoid potentially excessive shut downs should a small group of harbor seals enter the project area on each day while impact pile driving activities (or down-the-hole drilling, as necessary) are underway. The Level A harassment take calculation for harbor seals authorizes instances of take, rather than individuals that will be taken as done for the Level B harassment take calculation for harbor seals. Level A harassment take of harbor seals was calculated by multiplying a group of two animals by 14 in-water work days. Level A takes may only occur during the subset of in-water work days when the applicant conducts impact pile driving (or down-the-hole drilling, as required), as the shutdown zone contains the entire Level A harassment zone for all other in-water work activities.

Steller Sea Lion

Counts of Steller sea lions at the East Mooring Basin are typically in the single digits (B. Wright, pers. comm., March 2018), while the average number of Steller sea lions observed at the South Jetty during the in-water work period (including the possible extension) from 2000-2014, was 272 animals (WDFW, 2014). When the applicant consulted ODFW for more recent Steller sea lion data, ODFW advised that there were only three more recent surveys, none of which occurred during the IWWP months (Bryan Wright, pers. comm., September 2019). The Level B harassment zones for Phase 2 extend far beyond the calculated zones for Phase 1, approaching the South Jetty. Therefore, NMFS expects that that average daily count from the South Jetty provides an appropriate daily count to calculate potential Steller sea lion Level B harassment take during Phase 2. Note the calculation is based on the average daily count, not the maximum. The maximum daily count was 606 animals, in the month of April. Considering that work will only occur in April if the entire IWWP extension is exercised, and the large difference between

the maximum daily count and the average daily count, NMFS believes that using the maximum daily count would greatly overestimate potential take.

For Phase 1 Level B harassment take calculations of Steller sea lions, daily estimates were based off of observations at Bonneville Dam and Willamette Falls, as these animals must transit past Astoria at some point in their travels from the Pacific to the upper Columbia River (83 FR 19243, May 2, 2018). The daily count was 67 animals, 63 at Bonneville Dam and four at Willamette Falls. However, NMFS believes that South Jetty estimates are more appropriate and more conservative for Phase 2 take calculations, given the larger Level B harassment zones, some of which extend downriver close to the South Jetty.

Level B harassment take was calculated by multiplying the daily counts of Steller sea lions by days of in-water activity (Table 8).

Steller sea lions do not haul out near the construction sites and would only be potentially harassed if they are transiting through the Level B harassment zone during the in-water work period (including the extension, if applicable). Steller sea lions are not expected to occur within the calculated Level A harassment zone for otariids (Table 7). No Level A harassment takes of Steller sea lions are proposed nor expected to be authorized.

Table 8. Level B harassment take calculation for Steller sea lion.

Species	Maximum Average/ Daily Count	Days of In-water Activity[b]	Total take (Level B)
Steller sea lion	272[a]	21	5,712

[a] Average number of Steller sea lions observed at the South Jetty during the in-water work period (including the possible extension) from 2000-2014 (WDFW, 2014).
[b] Includes in-water activity for the entire project

California Sea Lion

Aerial surveys of the East Mooring Basin in Astoria from 2011 to 2018 (Bryan Wright, pers. comm., August 2019) were used to calculate in-water Level B harassment take of California sea lions, as in Phase 1 of this activity (83 FR 19243, May 2, 2018). The data provided to NMFS by ODFW included the maximum California sea lion count observed on a single day for each month throughout the survey period. These maximum counts at the East Mooring Basin ranged from 0 California sea lions on a single day in July 2017 to 3,834 on a single day in March 2016. A "daily average maximum" for each IWWP month (Table 9) was calculated by averaging the maximum counts on a single day for each survey month provided by ODFW. In addition to ODFW aerial surveys, the City conducted opportunistic surveys of pinnipeds at the bridge sites in December 2017. A maximum of four California sea lions were observed in the water surrounding the bridges and piers. Additional California sea lions were heard vocalizing from the riverbanks under the bridges but the exact number of sea lions could not be determined.

Table 9. Daily average maximum number of California sea lions at East Mooring Basin for IWWP months, including the potential extension.

Month	Daily Average Maximum [a]
November	141
December	135
January	408
February	893
March	1191
April	982

[a] Daily average maximum was calculated using data from aerial surveys of the East Mooring Basin in Astoria from 2011 to 2018 (Bryan Wright, pers. comm., 2019).

California sea lions are the most commonly observed marine mammal in the area, and are known to haul out on the riverbanks and structures near the bridges, as described above. California sea lions may be harassed by underwater sound resulting from vibratory pile removal and impact pile driving (at the distances listed above) as well as airborne sound resulting from

roadway and railway demolition and construction. As such, California sea lions may be subject to harassment throughout the duration of Phase 2 of the project.

NMFS is proposing to authorize 1,056 Level B harassment takes of California sea lions associated with above-water construction activities taking place during the above-water work period, not including the IWWP extension (May to October). Level B harassment takes of California sea lions from above-water activities were calculated by multiplying the maximum estimate from the City's 2017 opportunistic surveys at the bridge sites (16 animals) by the estimated 11 days of work per month during the above-water work period.

NMFS is proposing to authorize 25,011 Level B harassment takes of California sea lions associated with in-water and above-water work during the IWWP. The City expects approximately 21 in-water work days across Phase 2 of the project. However, because the exact construction schedule is unknown, there are uncertainties in how many of the estimated work days will occur during each month. Therefore, estimated Level B harassment take during the IWWP (Table 10) is calculated by multiplying the highest daily average maximum (Table 9) during the IWWP months (including the potential extension) by the estimated 21 in-water work days. California sea lions exposed to in-air sound above Level B harassment threshold during the IWWP are expected to have already been taken by in-water activity, and therefore already be included in the take calculation.

Total California sea lion Level B harassment takes (Table 10) are calculated as the sum of above-water work period and IWWP takes.

Table 10. Level B harassment take calculation of California sea lion.

Work Period	Daily Average Maximum[b]	Potential Number of Workdays	Takes Per Month
IWWP[a]	1191	21	25011
May	16	11	176

June	16	11	176
July	16	11	176
August	16	11	176
September	16	11	176
October	16	11	176
		Total	26,067

[a] IWWP includes the potential extension, as the month of March has the highest daily average maximum count.
[b] Daily average maximums during above-water work months are estimates from the City's opportunistic surveys at the Phase 1 bridge sites in December 2017.

Only 4204 Level B harassment takes of California sea lion were reported for Phase 1; however, the Phase 2 project area is much larger than the area within which marine mammals were reported in Phase 1. Therefore, NMFS expects California sea lion take to be higher for Phase 2 than was reported in the monitoring report for Phase 1.

As discussed above, the City estimates that approximately 16 California sea lions haul out near the project sites based on opportunistic surveys conducted in December 2017. Frequent construction shutdowns are of concern to the applicant, as there is a limited IWWP imposed by the Oregon Department of Fish and Wildlife and, therefore, the proposed mitigation zone does not entirely contain the area within the Level A harassment isopleth for impact pile driving. The applicant has requested Level A harassment takes of California sea lions, as the animals that haulout nearby may enter the Level A harassment zone as they transit between the haulouts and their feeding areas in the Columbia River.

NMFS is proposing to issue 224 Level A harassment takes of California sea lions (Table 11). The Level A harassment takes are calculated by multiplying the 16 animals that haulout near the project site (City of Astoria December 2017 surveys) by 14 in-water work days. Level A takes may only occur during the subset of in-water work days when the applicant conducts impact pile driving (or down-the-hole drilling, as required), as the shutdown zone contains the entire Level A harassment zone for all other in-water work activities.

Table 11. Level A harassment take calculation of harbor seal and California sea lion.

Species	Daily count	Estimated number of in-water work days	Level A harassment take
Harbor seal	2	14	28
California sea lion	16[a]	14	224

[a] December 2017 survey estimates of California sea lions by the City at Phase 1 bridge sites.

Table 12. Total Level A and Level B take proposed for authorization.

Common Name	Stock	Level A harassment take	Level B harassment take	Total Take	Stock abundance	Percent of stock
Harbor seal	Oregon/Washington Coast	28	6,400	6,428	24,732[a]	26.0
Steller sea lion	Eastern U.S.	0	5,712	5,712	41,638	13.7
California sea lion	U.S.	224	26,067	26,291	257,606	10.2

[a] As noted in Table 3, there is no current estimate of abundance available for the Oregon/Washington Coast stock of harbor seal. The abundance estimate from 1999, included here, is the most recent.

Mitigation Measures

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 such activity, and other means of effecting the least practicable impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such 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 such 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.

In addition to the measures described later in this section, the City will employ the following standard mitigation measures:

- The City shall conduct briefings between construction supervisors and crews, marine mammal monitoring team, and City staff prior to the start of all construction work, and when new personnel join the work, in order 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 and drilling will shut down immediately if such species are observed within or on a path towards the monitoring zone (i.e., Level B harassment zone); and

- If observed take reaches the authorized limit for an authorized species, pile installation will be stopped as these species approach the Level B harassment zone to avoid additional take.

The following measures would apply to the City's mitigation requirements:

Establishment of Shutdown Zones- For all pile driving/removal and drilling activities, the City will establish appropriate shutdown zones. The purpose of a shutdown zone is generally to define an area within which shutdown of activity would occur upon sighting of a marine mammal (or in anticipation of an animal entering the defined area). These shutdown zones would be used to prevent incidental Level A exposures from pile driving and removal for Steller sea lions, and to reduce the potential for such take of harbor seals and California sea lions. During all pile driving and removal activities, as well as above-water construction, a minimum shutdown zone of 10m would be enforced (Table 13) for all species to prevent physical injury from interaction with construction equipment. Additionally, a shutdown zone of 32m will be enforced for Steller sea lions during impact pile driving to reduce the likelihood of Level A harassment take (Table 13). The placement of Protected Species Observers (PSOs) during all pile driving and drilling activities (described in detail in the *Monitoring and Reporting Section*) will ensure shutdown zones are visible when they are on site. When PSOs are not on site, the Oregon Department of Transportation (ODOT) inspector will be responsible for ensuring that activities shut down if a marine mammal enters the shutdown zone.

Table 13. Shutdown zones.

Construction Activity	Shutdown Zone (m)		
	Harbor seal	Steller sea lion	California sea lion

All Vibratory Pile Driving/Removal and Site Preparation	50	10	10
24-inch Steel Impact Pile Driving *(and down-the-hole drilling, as necessary)*		32	
Above-water Construction	10	10	

Establishment of Monitoring Zones for Level B Harassment – The City would establish monitoring zones to correlate with Level B harassment zones or zones of influence. These are areas where SPLs are equal to or exceed the 160 dB rms threshold for impact driving and the 120 dB rms threshold during vibratory driving and site preparation. For airborne noise, these thresholds are 90 dB RMS re 20µPa for harbor seals and 100 db RMS re: 20µPa for all other pinnipeds. 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 cease of activity should the animal enter the shutdown zone. The proposed monitoring zones are described in Table 14. Placement of PSOs on the shorelines around the Columbia River allow PSOs to observe marine mammals within the project site, however, due to the size of the Level B harassment zone during some activities, not all Level B harassment takes will be visible to PSOs. Level B harassment exposures will be recorded and extrapolated based upon the number of observed takes, the percentage of the Level B zone that was not visible to PSOs, and the number of construction days when PSOs were not onsite.

Table 14. Marine Mammal Monitoring Zones

Construction Activity	Monitoring Zone (m)

Above-water Construction	28 (harbor seal only)
14-inch Timber Vibratory	1,360
14-inch Steel H-Pile	1,000
24-inch Steel Vibratory	6,310
36-inch Steel Vibratory *(and down-the-hole drilling, as necessary)*	21,545
24-inch Steel Impact	635

Soft Start - The use of soft-start procedures are believed to provide additional protection to marine mammals by providing warning and/or giving marine mammals a chance to leave the area prior to the hammer operating at full capacity. For impact driving, an initial set of three strikes would be made by the hammer at 40 percent energy, followed by a 1-minute wait period, then two subsequent 3-strike sets at 40 percent energy, with 1-minute waiting periods, before initiating continuous driving. Soft start would be implemented at the start of each day's impact pile driving and at any time following cessation of impact pile driving for a period of thirty minutes or longer. Soft start is not required during vibratory pile driving and removal activities.

Pre-Activity Monitoring - Prior to the start of daily in-water construction activity, or whenever a break in pile driving/removal or site preparation 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 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 been confirmed to have left the zone or has not been observed for 15 minutes. If the Level B harassment zone has been observed for 30 minutes and non-permitted species are not observed within the zone, soft start procedures can commence and work can continue even if visibility becomes impaired within the Level B monitoring zone. When a marine mammal permitted for Level B harassment take is present in the Level B harassment zone, activities may begin and Level B take will be recorded. As stated above, if the entire Level B

zone is not visible at the start of construction, piling or drilling activities can begin. If work ceases for more than 30 minutes, the pre-activity monitoring of both the Level B and shutdown zone will commence.

Pile driving energy attenuator- Use of a marine pile-driving energy attenuator (i.e., air bubble curtain system) will be implemented by the City during impact pile driving of all steel pipe piles. The use of sound attenuation will reduce SPLs and the size of the zones of influence for Level A harassment and Level B harassment. The City's FAHP permit describes the performance standards for the bubble curtain system.

Poor Visibility- 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.

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.

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);
- Mitigation and monitoring effectiveness.

Marine Mammal Visual Monitoring

Monitoring shall be conducted by NMFS-approved observers. Trained observers shall be placed at the best vantage point(s) practicable to monitor for marine mammals, and will

implement shutdown or delay procedures when applicable through communication with the equipment operator. Observer training must be provided prior to project start, and shall include instruction on species identification (sufficient to distinguish the species in the project area), description and categorization of observed behaviors and interpretation of behaviors that may be construed as being reactions to the specified activity, proper completion of data forms, and other basic components of biological monitoring, including tracking of observed animals or groups of animals such that repeat sound exposures may be attributed to individuals (to the extent possible).

Monitoring would be conducted 30 minutes before, during, and 30 minutes after pile driving/removal and drilling 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/removal and drilling 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 equipment is no more than 30 minutes.

Three PSOs will be on-site the first day and every third day thereafter during vibratory hammer installation/removal and site preparation at each bridge. One observer will be stationed at the best practicable land-based vantage point to observe the Shutdown Zone and a portion of the Level A and Level B harassment zones. One observer will be stationed along the north bank of the river at the Washington State Department of Transportation Rest Area: Dismal Nitch. One observer will be stationed at the best practicable land-based vantage point to observe the remainder of the Level A and Level B harassment zones. Likely locations include the 6th Street viewing platform and the Pier 12 parking lot. If vibratory installation of the 36-inch casings occurs, this observer will be positioned along the north bank of the river downstream of the

project site within the Chinook County Park. The ODOT on-site inspector will be trained in species identification and monitoring protocol and will be on-site during all vibratory removal and installation activities to confirm that no species enter the Shutdown Zones when PSOs are not onsite.

Two PSOs will be on-site the first day of impact pile driving at each bridge, and every third day thereafter. One observer will be stationed at the best practicable land-based vantage point to observe the Shutdown Zone and a portion of the Level A and Level B harassment zones. One observer will be stationed at the best practicable land-based vantage point to observe the remainder of the Level A and Level B harassment zones. Likely locations include the 6th Street viewing platform, the Pier 12 parking lot, or the Washington State Department of Transportation Rest Area: Dismal Nitch on the north bank of the river. The ODOT on-site inspector will be trained in species identification and monitoring protocol and will be on-site during all impact pile driving activities to confirm that no species enter the respective Shutdown Zones when PSOs are not onsite.

PSOs would scan the waters using binoculars, and/or spotting scopes, and would use a handheld GPS or range-finder device to verify the distance to each sighting from the project site. All PSOs would be trained in marine mammal identification and behaviors and are required to have no other project-related tasks while conducting monitoring. In addition, monitoring will be conducted by qualified observers, who will be placed at the best vantage point(s) practicable to monitor for marine mammals and implement shutdown/delay procedures when applicable by calling for the shutdown to the hammer operator. The City would adhere to the following observer qualifications:

(i) Independent observers (i.e., not construction personnel) are required.

(ii) At least one observer must have prior experience working as an observer.

(iii) Other observers may substitute education (degree in biological science or related field) or training for experience.

(iv) The City must submit observer CVs for approval by NMFS.

Additional standard observer qualifications include:

- 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 and times when in-water construction activities were suspended to avoid potential incidental injury from construction sound of marine mammals observed within a defined shutdown zone; 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.

A draft marine mammal monitoring report would be submitted to NMFS within 90 days after the completion of site preparation and pile driving and removal activities. It will include an overall description of work completed, a narrative regarding marine mammal sightings, and associated PSO data sheets. Specifically, the report must include:

- Date and time that monitored activity begins or ends;

- Construction activities occurring during each observation period;
- Weather parameters (*e.g.*, percent cover, visibility);
- Water conditions (*e.g.*, sea state, tide state);
- Species, numbers, and, if possible, sex and age class of marine mammals;
- Description of any observable marine mammal behavior patterns, including bearing and direction of travel and distance from pile driving activity;
- Distance from pile driving activities to marine mammals and distance from the marine mammals to the observation point;
- Locations of all marine mammal observations;
- Other human activity in the area; and
- An extrapolation of the estimated takes by Level B harassment based on the number of observed exposures within the Level B harassment zone, the percentage of the Level B harassment zone that was not visible, and the days when monitoring did not occur.

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.

In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by the IHA (if issued), such as an injury, serious injury or mortality, the City would immediately cease the specified activities and report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, and the West Coast Regional Stranding Coordinator. The report would include the following information:

- Description of the incident;

- Environmental conditions (*e.g.*, Beaufort sea state, visibility);
- Description of all marine mammal observations in the 24 hours preceding the incident;
- Species identification or description of the animal(s) involved;
- Fate of the animal(s); and
- Photographs or video footage of the animal(s) (if equipment is available).

Activities would not resume until NMFS is able to review the circumstances of the prohibited take. NMFS would work with the City to determine what is necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. The City would not be able to resume their activities until notified by NMFS via letter, email, or telephone.

In the event that the City discovers an injured or dead marine mammal, and the lead PSO determines that the cause of the injury or death is unknown and the death is relatively recent (*e.g.*, in less than a moderate state of decomposition as described in the next paragraph), the City would immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, and the NMFS West Coast Stranding Hotline and/or by email to the West Coast Regional Stranding Coordinator. The report would include the same information identified in the paragraph above. Activities would be able to continue while NMFS reviews the circumstances of the incident. NMFS would work with the City to determine whether modifications to the activities are appropriate.

In the event that the City discovers an injured or dead marine mammal and the lead PSO determines that the injury or death is not associated with or related to the activities authorized in the IHA (*e.g.*, previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), the City would report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, and the NMFS West Coast

Stranding Hotline and/or by email to the West Coast Regional Stranding Coordinator, within 24 hours of the discovery. The City would provide photographs, video footage (if available), or other documentation of the stranded animal sighting to NMFS and the Marine Mammal Stranding Network.

Phase 1 Monitoring Report

The City's monitoring report from Phase 1 of the project (OBEC, 2019) was frequently consulted in the NMFS evaluation of the City's proposed activities and requested take for Phase 2 of the project. The Phase 1 monitoring report indicated recorded take of California sea lions and harbor seals (Table 18). Steller sea lions were not observed during Phase 1 (Table 15), however, due to their known presence in the area, Level B harassment take was still requested for Phase 2 activities. Additionally, as mentioned above, the calculated Level B harassment zones were significantly smaller for Phase 1 than for Phase 2.

Table 15. Phase 1 monitoring results.

Species	Number of takes recorded by PSOs	Estimated takes on days PSOs not present	Total estimated Level B harassment takes	Authorized Level B harassment take number	Percent of authorized takes that occurred
California sea lion	604	3600 (240 x 15 days)	4204	33,736	12.5
Steller sea lion	0	0	0	5,360	0
Pacific harbor seal	53	270 (18 x 15 days)	323	4,560	7.1

Level A take was not requested nor authorized for Phase 1 activities, so the City used the calculated Level A isopleth as the shutdown zone to prevent Level A take. Shutdowns occurred on three days during Phase 1 activities. In all instances, shutdowns occurred when one or more California sea lion entered the shutdown zone. The Phase 1 and Phase 2 monitoring reports will

provide useful information for analyzing impacts to marine mammals for potential future projects in the lower Columbia River.

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).

Pile driving/removal and drilling activities associated with the project as outlined previously, have the potential to disturb or displace marine mammals. Specifically, the specified activities may result in take, in the form of Level A harassment and Level B harassment from underwater sounds generated from pile driving and removal. Potential takes could occur if

individuals of these species are present in zones ensonified above the thresholds for Level A or Level B harassment, identified above, when these activities are underway.

The takes from Level A and Level B harassment would be due to potential behavioral disturbance, TTS, and PTS. No mortality is anticipated given the nature of the activity. Level A harassment is only anticipated for California sea lion and harbor seal. The potential for Level A harassment is minimized through the construction method and the implementation of the planned mitigation measures (see *Proposed Mitigation* section).

Effects on individuals that are taken by Level B harassment, on the basis of reports in the literature as well as monitoring from other similar activities, including Phase 1 of the City's project, will likely be limited to reactions such as increased swimming speeds, increased surfacing time, or decreased foraging (if such activity were occurring) (*e.g.*, Thorson and Reyff 2006; HDR, Inc. 2012; Lerma 2014; ABR 2016; OBEC, 2019). Most likely for pile driving, individuals will simply move away from the sound source and be temporarily displaced from the areas of pile driving and drilling, although even this reaction has been observed primarily only in association with impact pile driving. Though some individual pinnipeds (especially harbor seals) could be expected to be taken over multiple days, the effects of the exposure are expected to be relatively minor, would not occur to any one individual across more than 21 days at the most, and therefore are not expected to result in impacts on reproduction or survival. The pile driving activities analyzed here are similar to Phase 1 activities and numerous other construction activities conducted in the Pacific Northwest, which have taken place with no known long-term adverse consequences from behavioral harassment. Level B harassment will be reduced to the level of least practicable adverse impact through use of mitigation measures described herein and, if sound produced by project activities is sufficiently disturbing, animals are likely to simply

avoid the area while the activity is occurring. While vibratory driving (and potential drilling) associated with the proposed project may produce sound at distances of many kilometers from the project site, the project site itself is located on a busy waterfront and in a section of the Columbia River with high amounts of vessel traffic. Therefore, we expect that animals disturbed by project sound would simply avoid the area and use more-preferred habitats.

In addition to the expected effects resulting from authorized Level B harassment, we anticipate that California sea lions and harbor seals may sustain some limited Level A harassment in the form of auditory injury. However, animals in these locations that experience PTS would likely only receive slight PTS, i.e. minor degradation of hearing capabilities within regions of hearing that align most completely with the frequency range of the energy produced by pile driving, i.e. the low-frequency region below 2 kHz, not severe hearing impairment or impairment in the regions of greatest hearing sensitivity. If hearing impairment occurs, it is most likely that the affected animal would lose a few decibels in its hearing sensitivity, which in most cases is not likely to meaningfully affect its ability to forage and communicate with conspecifics. As described above, we expect that marine mammals would be likely to move away from a sound source that represents an aversive stimulus, especially at levels that would be expected to result in PTS, given sufficient notice through use of soft start.

The project also is not expected to have significant adverse effects on affected marine mammals' habitat. The project activities would not modify existing marine mammal habitat for a significant amount of time. The activities may cause some fish to leave the area of disturbance, thus temporarily impacting marine mammals' foraging opportunities in a limited portion of the foraging range; but, because of the short duration of the activities and the relatively small area of the habitat that may be affected, the impacts to marine mammal habitat are not expected to cause

significant or long-term negative consequences. Other than feeding and the haulout areas previously described, the project area does not include any areas or times of particular biological significance for the affected species.

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 serious injury is anticipated or authorized;
- No serious injury is anticipated or authorized;
- The Level A harassment exposures are anticipated to result only in slight PTS, within the lower frequencies associated with pile driving;
- The anticipated incidents of Level B harassment would consist of, at worst, temporary modifications in behavior that would not result in fitness impacts to individuals;
- The area impacted by the specified activity is very small relative to the overall habitat ranges of all species;
- The activity is expected to occur over 21 or fewer in-water work days.

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 Sections 101(a)(5)(A) and (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. Additionally, other qualitative factors may be considered in the analysis, such as the temporal or spatial scale of the activities.

Up to 26.0 percent of the individuals in the harbor seal stock may be taken. When the number of takes of Steller sea lion and California sea lion are compared to the stock abundance, they represent 13.7 and 10.2 percent, respectively – however, the number of takes requested is based on the number of estimated exposures, not necessarily the number of individuals exposed, which could be fewer given that pinnipeds may remain in the general area of the project sites and the same individuals may be harassed multiple times over multiple days, rather than numerous individuals harassed once.

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 (ESA)

Section 7(a)(2) of the Endangered Species Act of 1973 (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 NMFS West Coast Region Protected Resources Division Office, whenever we propose to authorize take for endangered or threatened species.

No incidental take of ESA-listed marine mammals is authorized or expected to result from issuance of this IHA. Therefore, NMFS has determined that formal consultation under Section 7 of the ESA is not required for this action.

Authorization

NMFS has issued an IHA to the City of Astoria for the incidental take of marine mammal due to in-water and above-water construction work associated with Phase Two of the Astoria Waterfront Bridge Replacement project in in Astoria, OR from December 9, 2019 to December 8, 2020, provided the previously mentioned mitigation, monitoring and reporting requirements are incorporated.

Dated: December 9, 2019.

Donna S. Wieting,

Director, Office of Protected Resources,

National Marine Fisheries Service.

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