



This document is scheduled to be published in the Federal Register on 08/30/2017 and available online at <https://federalregister.gov/d/2017-18349>, and on [FDsys.gov](https://www.fdsys.gov)

BILLING CODE 3510-22-P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648-XF457

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to the Central Bay Operations and Maintenance Facility Project

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

ACTION: Notice; Issuance of an 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 San Francisco Water Emergency Transportation Authority (WETA) to incidentally harass, by Level A and Level B harassment, marine mammals during in-water construction activities associated with the Central Bay Operations and Maintenance Facility Project in Alameda, CA.

DATES: This Authorization is valid from August 1, 2017 through July 31, 2018.

FOR FURTHER INFORMATION CONTACT: Laura McCue, Office of Protected Resources, NMFS, (301) 427-8401. Electronic copies of the applications and supporting documents, as well as a list of the references cited in this document, may be obtained online at: www.nmfs.noaa.gov/pr/permits/incidental/construction.htm. In case of problems accessing these documents, please call the contact listed above.

SUPPLEMENTARY INFORMATION:

Background

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 authorization is provided to the public for review.

An authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant), and if the permissible methods of taking and requirements pertaining to the mitigation, monitoring and reporting of such takings are set forth.

NMFS has defined “negligible impact” in 50 CFR 216.103 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.

The MMPA states that the term “take” means to harass, hunt, capture, kill or attempt to harass, hunt, capture, or kill any marine mammal.

Except with respect to certain activities not pertinent here, 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).

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 incidental harassment authorization) with respect to environmental consequences on the human environment.

This action is consistent with categories of activities identified in CE B4 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 determined that the issuance of the IHA qualifies to be categorically excluded from further NEPA review and signed a Categorical Exclusion memo in August 2017.

Summary of Request

On May 3, 2017, NMFS received a request from WETA for an IHA to take marine mammals incidental to pile driving and removal in association with the Central Bay Operations and Maintenance Facility Project (Project) in Alameda, California. WETA's request is for take of seven species by Level A and Level B harassment. Neither WETA nor NMFS expect mortality to result from this activity and, therefore, an IHA is appropriate.

This is the second year of a 2-year project. In-water work associated with the second year of construction is expected to be completed within 22 days. This proposed IHA is for the second phase of construction activities (August 1, 2017 through November 30, 2017). WETA received authorization for take of marine mammals incidental to these same activities for the first phase of construction in 2016 (80 FR 10060; February 25, 2015). In addition, similar construction and pile driving activities in San Francisco Bay have been authorized by NMFS in the past. These

projects include construction activities at the San Francisco Ferry Terminal (81 FR 43993, July 6, 2016); Exploratorium (75 FR 66065, October 27, 2010); Pier 36 (77 FR 20361, April 4, 2012); and the San Francisco-Oakland Bay Bridge (71 FR 26750, May 8, 2006; 72 FR 25748, August 9, 2007; 74 FR 41684, August 18, 2009; 76 FR 7156, February 9, 2011; 78 FR 2371, January 11, 2013; 79 FR 2421, January 14, 2014; and 80 FR 43710, July 23, 2015). This IHA is valid from August 1, 2017, through July 31, 2018.

Description of the Specified Activity

Overview

WETA is constructing a Central Bay Operations and Maintenance Facility to serve as the central San Francisco Bay base for WETA's ferry fleet, Operations Control Center (OCC), and Emergency Operations Center (EOC). The Project will provide maintenance services such as fueling, engine oil changes, concession supply, and light repair work for WETA ferry boats operating in the central San Francisco Bay. In addition, the project will be the location for operational activities of WETA, including day-to-day management and oversight of services, crew, and facilities. In the event of a regional disaster, the facility will also function as an EOC, serving passengers and sustaining water transit service for emergency response and recovery. A detailed description of the planned construction project is provided in the *Federal Register* notice for the proposed IHA (82 FR 29486; June 29, 2017). Since that time, no changes have been made to the planned 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's proposal to issue an IHA to WETA was published in the *Federal Register* on 82 FR 29486; June 29, 2017). That notice described, in detail, WETA's activity, the

marine mammal species that may be affected by the activity, and the anticipated effects on marine mammals. During the 30-day public comment period, NMFS received a letter from the Marine Mammal Commission and a group of private citizens. The Marine Mammal Commission noted they look forward to working with NMFS regarding rounding in take estimation.

Comment 1: The group of private citizens recommend reviewing the construction process to ensure the maximum number of pilings is installed each day.

Response: NMFS has reviewed the number of pilings that were proposed by WETA and while the goal is to install as many piles per day as possible, it was determined that the duration and number of piles were the most realistic scenario for this project. A total of 22 days of construction is expected, which NMFS considers to be short and will not have excessive impacts to marine mammals.

Comment 2: The group of private citizens recommend that NMFS conduct more primary research on TTS and PTS thresholds in marine mammals using a study design that NMFS finds appropriate.

Response: As required, NMFS used the best available science available when determining acoustic impacts to marine mammals from WETA's construction project. Any new research on marine mammal TTS and PTS thresholds will be considered in future authorizations.

Comment 3: The group of private citizens recommend that NMFS require enhanced and continued monitoring even after pier construction and into ferry operations and further recommend that NMFS encourage WETA to install a second floating platform for harbor seals.

Response: NMFS believes that the monitoring proposed by WETA is sufficient to not only document take, but to also increase our knowledge of the species during project activities.

Additional research on harbor seal use of the haul out or associated harbor seal activities, or construction of a second is not required for the WETA Central Bay project.

Description of Marine Mammals in the Area of the Specified Activity

There are seven marine mammal species that may inhabit or may likely transit through the waters nearby the project area, and are expected to potentially be taken by the specified activity. These include the Pacific harbor seal (*Phoca vitulina*), California sea lion (*Zalophus californianus*), northern elephant seal (*Mirounga angustirostris*), northern fur seal (*Callorhinus ursinus*), harbor porpoise (*Phocoena phocoena*), gray whale (*Eschrichtius robustus*), and bottlenose dolphin (*Tursiops truncatus*). Multiple additional marine mammal species may occasionally enter the activity area in San Francisco Bay but would not be expected to occur in shallow nearshore waters of the action area. Guadalupe fur seals (*Arctocephalus philippii townsendi*) generally do not occur in San Francisco Bay, however, there have been recent sightings of this species due to an El Niño event. Only single individuals of this species have occasionally been sighted inside San Francisco Bay, and their presence near the action area is considered unlikely. No takes are requested for this species, and a shutdown zone will be in effect for this species if observed approaching the Level B harassment zone. Although it is possible that a humpback whale (*Megaptera novaeangliae*) may enter San Francisco Bay and find its way into the project area during construction activities, their occurrence is unlikely, since humpback whales very rarely enter the San Francisco Bay area. No takes are requested for this species, and a delay and shutdown procedure will be in effect for this species if observed approaching the Level B harassment zone.

Table 1 lists all species with expected potential for occurrence in San Francisco Bay near Alameda Point and summarizes information related to the population or stock, including

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 are included here as gross indicators of the status of the species and other threats.

A detailed description of the of the species likely to be affected by WETA's 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 (82 FR 29486; June 29, 2017); 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 (www.nmfs.noaa.gov/pr/species/mammals/) for generalized species accounts.

Species that could potentially occur in the proposed survey areas, but are not expected to have reasonable potential to be harassed by in-water construction, include extralimital species, which are species that do not normally occur in a given area but for which there are one or more occurrence records that are considered beyond the normal range of the species (e.g., humpback whales and Guadalupe fur seal). All other species in Table 1 may occur in the project area and we therefore have authorized take for them.

Table 1. Marine Mammals Potentially Present in the Vicinity of Alameda Point.

Species	Stock	ESA/MMPA status; Strategic (Y/N) ¹	Stock abundance (CV, N _{min} , most recent abundance survey) ²	PBR ³	Relative occurrence in San Francisco Bay; season of occurrence
Order Cetartiodactyla – Cetacea – Superfamily Odontoceti (toothed whales, dolphins, and porpoises)					
Family Phocoenidae (porpoises)					

Harbor porpoise (<i>Phocoena phocoena</i>)	San Francisco-Russian River	-; N	9,886 (0.51; 6,625; 2011)	66	Common
Order Cetartiodactyla – Cetacea – Superfamily Odontoceti (toothed whales, dolphins, and porpoises)					
Family Delphinidae (dolphins)					
Bottlenose dolphin ⁴ (<i>Tursiops truncatus</i>)	California coastal	-; N	453 (0.06; 346; 2011)	2.4	Rare
Order Cetartiodactyla – Cetacea – Superfamily Odontoceti (toothed whales, dolphins, and porpoises)					
Family Eschrichtiidae					
Gray whale (<i>Eschrichtius robustus</i>)	Eastern N. Pacific	-; N	20,990 (0.05; 20,125; 2011)	624	Rare
Order Cetartiodactyla – Cetacea – Superfamily Mysticeti (baleen whales)					
Family Balaenopteridae					
Humpback whale (<i>Megaptera novaeangliae</i>)	California/ Oregon/ Washington stock	T ⁵ ; S	1,918 (0.05; 1,876; 2014)	11	Unlikely
Order Carnivora – Superfamily Pinnipedia					
Family Otariidae (eared seals and sea lions)					
California sea lion (<i>Zalophus californianus</i>)	U.S.	-; N	296,750 (n/a; 153,337; 2011)	9,200	Common
Guadalupe fur seal ⁵ (<i>Arctocephalus philippii townsendi</i>)	Mexico to California	T; S	20,000 (n/a; 15,830; 2010)	91	Unlikely
Northern fur seal (<i>Callorhinus ursinus</i>)	California stock	-;N	14,050 (n/a; 7,524; 2013)	451	Unlikely
Family Phocidae (earless seals)					
Harbor seal (<i>Phoca vitulina</i>)	California	-; N	30,968 (n/a; 27,348; 2012)	1,641	Common; Year-round resident
Northern elephant seal (<i>Mirounga angustirostris</i>)	California breeding stock	-; N	179,000 (n/a; 81,368; 2010)	4,882	Rare

¹ESA 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 (see footnote 3) 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.

²CV is coefficient of variation; N_{min} is the minimum estimate of stock abundance. In some cases, CV is not applicable. For certain stocks, abundance estimates are actual counts of animals and there is no associated CV. The most recent abundance survey that is reflected in the abundance estimate is presented; there may be more recent surveys that have not yet been incorporated into the estimate.

³Potential biological removal, 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 size (OSP).

⁴Abundance estimates for these stocks are greater than eight years old and are, therefore, not considered current. PBR is considered undetermined for these stocks, as there is no current minimum abundance estimate for use in calculation. We nevertheless present the most recent abundance estimates and PBR values, as these represent the best available information for use in this document.

⁵The humpback whales considered under the MMPA to be part of this stock could be from any of three different DPSs. In CA, it would be expected to primarily be whales from the Mexico DPS but could also be whales from the Central America DPS.

Potential Effects of the Specified Activity on Marine Mammals and their Habitat

The effects of underwater noise from WETA's pile driving and removal activities for the Central Bay Operations and Maintenance Project have the potential to result in behavioral harassment of marine mammals in the vicinity of the action area. The *Federal Register* notice for the proposed IHA (82 FR 29486; June 29, 2017) included a discussion of the effects of anthropogenic noise on marine mammals, therefore that information is not repeated here; please refer to that *Federal Register* notice for that information.

Estimated Take by Incidental Harassment

This section provides an estimate of the number of incidental takes authorized through this IHA, which informed both NMFS' consideration of whether the number of takes is "small" 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 are by Level A and Level B harassment, in the form of disruption of behavioral patterns for individual marine mammals resulting from exposure to vibratory and impact pile driving and removal, and potential permanent threshold shift (PTS) for harbor seals that may transit through the Level A zone to their haulout. Based on the nature of the activity and

the anticipated effectiveness of the mitigation measures (*i.e.*, bubble curtain, soft start, *etc.* – discussed in detail below in *Mitigation* section), Level A harassment is neither anticipated nor proposed to be authorized for all other species.

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

Described in the most basic way, 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. Below, we describe these components 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).

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.*, 2011). 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 decibels (dB) re 1 microPascal (μ Pa) (root mean square (rms)) for continuous (*e.g.*, vibratory pile-driving, drilling) and above 160 dB re 1 μ Pa (rms) for non-explosive impulsive (*e.g.*, seismic airguns) or intermittent (*e.g.*, scientific sonar) sources.

WETA's proposed activities include the use of continuous (vibratory pile driving) and impulsive (impact pile driving) sources, and therefore the 120 and 160 dB re 1 μ Pa (rms) are applicable.

Level A harassment for non-explosive sources - NMFS' Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Technical Guidance 2016) 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). WETA's proposed activity includes the use of impulsive (impact pile driving) and non-impulsive (vibratory pile driving) sources.

These thresholds were developed by compiling and synthesizing the best available science and soliciting input multiple times from both the public and peer reviewers to inform the final product, and are provided in the table below. The references, analysis, and methodology used in the development of the thresholds are described in NMFS 2016 Technical Guidance, which may be accessed at <http://www.nmfs.noaa.gov/pr/acoustics/guidelines.htm>.

Table 2. Thresholds Identifying the Onset of Permanent Threshold Shift.

	PTS Onset Acoustic Thresholds* (Received Level)
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Hearing Group	Impulsive	Non-impulsive
Low-frequency cetaceans	<i>Cell 1</i> Lpk,flat: 219 dB LE,LF,24h: 183 dB	<i>Cell 2</i> LE,LF,24h: 199 dB
Mid-frequency cetaceans	<i>Cell 3</i> Lpk,flat: 230 dB LE,MF,24h: 185 dB	<i>Cell 4</i> LE,MF,24h: 198 dB
High-frequency cetaceans	<i>Cell 5</i> Lpk,flat: 202 dB LE,HF,24h: 155 dB	<i>Cell 6</i> LE,HF,24h: 173 dB
Phocid Pinnipeds (underwaters)	<i>Cell 7</i> Lpk,flat: 218 dB LE,PW,24h: 185 dB	<i>Cell 8</i> LE,PW,24h: 201 dB
Otariid Pinnipeds (underwater)	<i>Cell 9</i> Lpk,flat: 232 dB LE,OW,24h: 203 dB	<i>Cell 10</i> LE,OW,24h: 219 dB

¹NMFS 2016

Ensonified Area

Here, we describe operational and environmental parameters of the activity that will feed into identifying the area ensonified above the acoustic thresholds.

Pile driving and removal generates underwater noise that can potentially result in disturbance to marine mammals in the project area. 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:

$$TL = B * \log_{10}(R_1/R_2), \text{ where}$$

R_1 = the distance of the modeled sound pressure level (SPL) from the driven pile, and

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

This formula neglects loss due to scattering and absorption, which is assumed to be zero here.

The degree to which underwater sound propagates away from a sound source is dependent on a variety of factors, most notably the water bathymetry and presence or absence of reflective or absorptive conditions including in-water structures and sediments. Spherical spreading occurs in

a perfectly unobstructed (free-field) environment not limited by depth or water surface, resulting in a 6 dB reduction in sound level for each doubling of distance from the source ($20 \log[\text{range}]$). Cylindrical spreading occurs in an environment in which sound propagation is bounded by the water surface and sea bottom, resulting in a reduction of 3 dB in sound level for each doubling of distance from the source ($10 \log[\text{range}]$). A practical spreading value of 15 is often used under conditions, such as at the Central Bay operations and maintenance facility, where water increases with depth as the receiver moves away from the shoreline, resulting in an expected propagation environment that would lie between spherical and cylindrical spreading loss conditions. Practical spreading loss (4.5 dB reduction in sound level for each doubling of distance) is assumed here.

Underwater Sound – The intensity of pile driving and removal sounds is greatly influenced by factors such as the type of piles, hammers, and the physical environment in which the activity takes place. A number of studies, primarily on the west coast, have measured sound produced during underwater pile driving projects. These data are largely for impact driving of steel pipe piles and concrete piles as well as vibratory driving of steel pipe piles.

In order to determine reasonable source levels and their associated effects on marine mammals that are likely to result from vibratory or impact pile driving or removal at the Project area, we considered existing measurements from similar physical environments (e.g., substrate of bay mud and water depths ranging from 14 to 38 feet).

Level A isopleths (Table 3)

The values used to calculate distances at which sound would be expected to exceed the Level A thresholds for impact driving of and 36-inch (in) and 42-in piles include peak values of 210 dB and anticipated SELs for unattenuated impact pile-driving of 183 dB, and peak values of 203 dB and SEL values of 177 for 24-in piles (Caltrans 2015a). Bubble curtains will be used

during the installation of these piles, which is expected to reduce noise levels by about 10 dB rms (Caltrans 2015a), which are the values used in Table 3. Vibratory driving source levels include 175 dB RMS for 42-in piles, 170 dB RMS for 36-in piles, 160 dB RMS for 24-in piles, and 150 dB RMS for 14-in H piles (Caltrans 2015a). The inputs for the user spreadsheet from NMFS' Guidance are as follows: for impact driving, 450 strikes per pile with 3 piles per day for 24-in piles, and 600 strikes per pile with 2 piles per day for 36-in and 42-in piles. The total duration for vibratory driving of 14-in, 24-in, 36-in, and 42-in piles were all approximately 10 minutes (0.166666, 0.1708333 hours, 0.16666 hours, and 0.177777 hours, respectively).

Table 3. Expected Pile-Driving Noise Levels and Distances of Level A Threshold Exceedance with Impact and Vibratory Driver.

Project Element Requiring Pile Installation	Source Levels at 10 meters (dB)			Distance to Level A Threshold in meters				
	Peak	SEL	RMS	Phocids	Otariids	LF* Cetaceans	MF* Cetaceans	HF* Cetaceans
42-in steel piles – Vibratory Driver	-	-	175	11.3	0.8	18.5	1.6	27.4
42-in steel piles – Impact Driver (BCA) ¹	200	173	-	130	9.5	243	8.6	289.4
36-in Steel Piles – Vibratory Driver	-	-	170	5	0.4	8.2	0.7	12.2
36-in Steel Piles – Impact Driver (BCA) ¹	200	173	-	130	9.5	243	8.6	289.4
24-in Steel Piles – Vibratory Driver	-	-	160	1.1	0.1	1.8	0.2	2.7
24-in Steel Piles – Impact Driver (BCA) ¹	193	167	-	56	4.1	104.6	3.7	124.6
14-in H-piles – Vibratory Driver	-	-	150	0.2	0	0.4	0	0.6
14-in H-piles – Vibratory Extraction	-	-	150	0.2	0	0.4	0	0.6

*Low frequency (LF) cetaceans, Mid frequency (MF) cetaceans, High frequency (HF) cetaceans

¹Bubble curtain attenuation (BCA). A bubble curtain will be used for impact driving and is assumed to reduce the source level by 10dB. Therefore, source levels were reduced by this amount for take calculations.

Level B isopleths (Table 4)

Approximately 15 steel piles, 42-in in diameter, will be installed, with approximately 2 installed per day over 8 days. The source level for this pile size during impact driving came from

the Caltrans summary table (Caltrans 2015a) for “loudest” values for 36 in piles at approximately 10 m depth.

Approximately 6 steel piles, 36-in in diameter, will be installed, with approximately 2 installed per day over 3 days. The source level for this pile size during impact driving came from the Caltrans summary table (Caltrans 2015a) for “typical” values for 36 in piles at approximately 10 m depth.

Approximately 8 steel piles, 24-in in diameter, will be installed, with approximately 3 installed per day over 3 days. The source level for this pile size during impact driving came from the Caltrans summary table (Caltrans 2015a) for 24 in piles at approximately 5 meter depth. The source level for this pile size during vibratory driving came from the Caltrans table for the Trinidad Pier Reconstruction project (Caltrans 2015a).

Approximately 20 14-in H piles (10 temporary and 10 permanent), with approximately 5 installed or removed per day over 8 days. The source level for this pile size during impact and vibratory driving came from the Caltrans summary table (Caltrans 2015a) for 10 in H piles.

Tables 3 and 4 show the expected underwater sound levels for pile driving activities and the estimated distances to the Level A (Table 3) and Level B (Table 4) thresholds.

When 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 will result in some degree of overestimate of Level A 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 WETA's Project), 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, and the resulting isopleths are reported below.

Table 4. Expected Pile-Driving Noise Levels and Distances of Level B Threshold Exceedance with Impact and Vibratory Driver.

Project Element Requiring Pile Installation	Source Levels at 10 m (dB rms)	Distance to Level B Threshold, in meters	Area of Potential Level B Threshold Exceedance in square kilometers) ¹
		160/120 dB RMS (Level B) ¹	
42-in steel piles- Vibratory Driver	175	46,416	12.97
42-in steel piles- Impact Driver (BCA) ¹	183 ²	341	0.27
36-in Steel Piles – Vibratory Driver	170	21,544	12.97
36-in Steel Piles – Impact Driver (BCA) ²	183 ²	341	0.27
24-in Steel Piles – Vibratory Driver	160	4,642	4.92
24-in Steel Piles – Impact Driver (BCA) ²	180 ²	215	0.13
14-in H Piles- Vibratory Driver	150	1,000	1.01
14-in H Piles – Vibratory Extraction	150	1,000	1.01

¹For underwater noise, the Level B harassment (disturbance) threshold is 160 dB for impulsive noise and 120 dB for continuous noise.

²Bubble curtain attenuation (BCA). A bubble curtain will be used for impact driving and is expected to reduce the source level by 10dB

Marine Mammal Occurrence

In this section we provide the information about the presence, density, or group dynamics of marine mammals that will inform the take calculations.

At-sea densities for marine mammal species have been determined for harbor seals and California sea lions in San Francisco Bay based on marine mammal monitoring by Caltrans for the San Francisco-Oakland Bay Bridge Project from 2000 to 2015 (Caltrans 2016); all other estimates here are determined by using observational data taken during marine mammal monitoring associated with the Richmond-San Rafael Bridge retrofit project, the San Francisco-Oakland Bay Bridge (SFOBB), which has been ongoing for the past 15 years, and anecdotal observational reports from local entities.

Take Calculation and Estimation

Here we describe how the information provided above is brought together to produce a quantitative take estimate.

All estimates are conservative and include the following assumptions:

- All pilings installed at each site would have an underwater noise disturbance equal to the piling that causes the greatest noise disturbance (*i.e.*, the piling farthest from shore) installed with the method that has the largest zone of influence (ZOI). The largest underwater disturbance (Level B) ZOI would be produced by vibratory driving steel piles; therefore take estimates were calculated using the vibratory pile-driving ZOIs. The ZOIs for each threshold are not spherical and are truncated by land masses on either side of the project area, which would dissipate sound pressure waves.
- Exposures were based on an estimated total of 22 work days. Each activity ranges in amount of days needed to be completed.
- In the absence of site specific underwater acoustic propagation modeling, the practical spreading loss model was used to determine the ZOI.
- All marine mammal individuals potentially available are assumed to be present within the relevant area, and thus incidentally taken;
- An individual can only be taken once during a 24-hour period; and,

- Exposures to sound levels at or above the relevant thresholds equate to take, as defined by the MMPA.

The estimation of marine mammal takes typically uses the following calculation:

For California sea lions: Level B exposure estimate = D (density) * Area of ensonification * Number of days of noise generating activities.

For harbor seals: Level B exposure estimate = ((D * area of ensonification) + 15) * number of days of noise generating activities.

For all other marine mammal species: Level B exposure estimate = N (number of animals) in the area * Number of days of noise generating activities.

To account for the increase in California sea lion density due to El Niño, the daily take estimated from the observed density has been increased by a factor of 10 for each day that pile driving or removal occurs.

There are a number of reasons why estimates of potential instances of take may be overestimates of the number of individuals taken, assuming that available density or abundance estimates and estimated ZOI areas are accurate. We assume, in the absence of information supporting a more refined conclusion, that the output of the calculation represents the number of individuals that may be taken by the specified activity. In fact, in the context of stationary activities such as pile driving and in areas where resident animals may be present, this number represents the number of instances of take that may accrue to a smaller number of individuals, with some number of animals being exposed more than once per individual. While pile driving and removal can occur any day throughout the in-water work window, and the analysis is conducted on a per day basis, only a fraction of that time (typically a matter of hours on any given day) is actually spent pile driving/removal. The potential effectiveness of mitigation

measures in reducing the number of takes is typically not quantified in the take estimation process. For these reasons, these take estimates may be conservative, especially if each take is considered a separate individual animal, and especially for pinnipeds.

Description of Marine Mammals in the Area of the Specified Activity.

Harbor Seals

Monitoring of marine mammals in the vicinity of the SFOBB has been ongoing for 15 years; from those data, Caltrans has produced at-sea density estimates for Pacific harbor seal of 0.83 animals per square kilometer for the fall season (Caltrans 2016). Since the construction of the new pier that is currently being used as a haul out for harbor seals, there are additional seals that need to be taken into account for the take calculation. The average number of seals that use the haulout at any given time is 15 animals; therefore, we would add an additional 15 seals per day. Using this density and the additional 15 animals per day, the potential average daily take for the areas over which the Level B harassment thresholds may be exceeded are estimated in Table 5.

Table 5. Take Calculation for Harbor Seal.

Activity	Pile type	Density	Area (km ²)	Number of days of activity	Take estimate
Vibratory driving	36-in and 42-in steel pile	0.83 animal/km ²	12.97	3; 8	77; 206
Vibratory driving	24-in steel pile	0.83 animal/km ²	4.92	3	57
Vibratory driving and removal	14-in steel H piles	0.83 animal/km ²	1.01	8	127

A total of 467 harbor seal takes are estimated for 2017 (Table 7). Because seals may traverse the Level A zone when going to and from the haul out that is approximately 300 m from the project area, it would not be practicable to shutdown every time. Therefore 18 Level A takes are requested for this species by assuming 1.6 harbor seals per day over 11 days of impact

driving of 36-in and 42-in piles may enter the zone (see the *Description of Marine Mammals in the Area of the Specified Activity* for information on seal occurrence per day). If the 18 Level A takes have been met, WETA will then shutdown for all harbor seals within the Level A zones (Table 8). There will be two marine mammal observers (MMO) monitoring the zone in the most advantageous locations to spot marine mammals to initiate a shutdown to avoid take by Level A harassment.

California sea lion

Monitoring of marine mammals in the vicinity of the SFOBB has been ongoing for 15 years; from those data, Caltrans has produced at-sea density estimates for California sea lion of 0.09 animal per square kilometer for the post-breeding season (Caltrans 2016). Using this density, the potential average daily take for the areas over which the Level B harassment thresholds may be exceeded is estimated in Table 6.

Table 6. Take Calculation for California Sea Lion.

Activity	Pile type	Density	Area (km ²)	Number of days of activity	Take Estimate [^]
Vibratory driving	36-in and 42-in steel pile	0.09 animal/km ²	12.97	3; 8	35; 93
Vibratory driving	24-in steel pile	0.09 animal/km ²	4.92	3	13
Vibratory driving	14-in steel H piles	0.09 animal/km ²	1.01	8	7

* All California sea lion estimates were multiplied by 10 to account for the increased occurrence of this species due to El Niño.

[^]Total take number is 149, not 148 because we round at the end, whereas here, it shows rounding per day.

All California sea lion estimates were multiplied by 10 to account for the increased occurrence of this species due to El Niño. A total of 149 California sea lion takes is estimated for 2017 (Table 7). Level A take is not expected for California sea lion based on area of ensonification and density of the animals in that area.

Northern elephant seal

Monitoring of marine mammals in the vicinity of the SFOBB has been ongoing for 15 years; from those data, Caltrans has produced an estimated at-sea density for northern elephant seal of 0.03 animal per square kilometer (Caltrans 2016). Most sightings of northern elephant seal in San Francisco Bay occur in spring or early summer, and are less likely to occur during the periods of in-water work for this project (June through November). As a result, densities during pile driving and removal for the proposed action would be much lower. Therefore, we estimate that it is possible that a lone northern elephant seal may enter the Level B harassment area once per week during pile driving or removal, for a total of 18 takes in 2017 (Table 7). Level A take of Northern elephant seal is not requested, nor is it authorized because although one animal may approach the large Level B zones, it is not expected that it will continue in the area of ensonification into the Level A zone. Further, if the animal does approach the Level A zone, construction will be shut down.

Northern fur seal

During the breeding season, the majority of the worldwide population is found on the Pribilof Islands in the southern Bering Sea, with the remaining animals spread throughout the North Pacific Ocean. On the coast of California, small breeding colonies are present at San Miguel Island off southern California, and the Farallon Islands off central California (Carretta *et al.*, 2014). Northern fur seal are a pelagic species and are rarely seen near the shore away from breeding areas. Juveniles of this species occasionally strand in San Francisco Bay, particularly during El Niño events, for example, during the 2006 El Niño event, 33 fur seals were admitted to the Marine Mammal Center (TMMC 2016). Some of these stranded animals were collected from shorelines in San Francisco Bay. Due to the recent El Niño event, northern fur seals were observed in San Francisco bay more frequently, as well as strandings all along the California

coast and inside San Francisco Bay (TMMC, personal communication); a trend that may continue this summer through winter if El Niño conditions occur. Because sightings are normally rare; instances recently have been observed, but are not common, and based on estimates from local observations (TMMC, personal communication), it is estimated that ten northern fur seals will be taken in 2017 (Table 7). Level A take is not requested or authorized for this species.

Harbor porpoise

In the last six decades, harbor porpoises were observed outside of San Francisco Bay. The few harbor porpoises that entered were not sighted past central Bay close to the Golden Gate Bridge. In recent years, however, there have been increasingly common observations of harbor porpoises in central, north, and south San Francisco Bay. Porpoise activity inside San Francisco Bay is thought to be related to foraging and mating behaviors (Keener 2011; Duffy 2015).

According to observations by the Golden Gate Cetacean Research team as part of their multi-year assessment, over 100 porpoises may be seen at one time entering San Francisco Bay; and over 600 individual animals are documented in a photo-ID database. However, sightings are concentrated in the vicinity of the Golden Gate Bridge and Angel Island, north of the project area, with lesser numbers sighted south of Alcatraz and west of Treasure Island (Keener 2011).

Harbor porpoise generally travel individually or in small groups of two or three (Sekiguchi 1995).

Monitoring of marine mammals in the vicinity of the SFOBB has been ongoing for 15 years; from those data, Caltrans has produced an estimated at-sea density for harbor porpoise of 0.021 animal per square kilometer (Caltrans 2016). However, this estimate would be an overestimate of what would actually be seen in the project area since it is a smaller area than the monitoring area of SFOBB. In order to estimate a more realistic take number, we assume it is

possible that a small group of individuals (five harbor porpoises) may enter the Level B harassment area on as many as two days of pile driving or removal, for a total of ten harbor porpoise takes per year (Table 7). It is possible that harbor porpoise may enter the Level A harassment zone for high frequency cetaceans; however, 2 MMOs will be monitoring the area and WETA would implement a shutdown for the entire zone if a harbor porpoise (or any other marine mammal) approaches the Level A zone; therefore Level A take is not being requested, nor authorized for this species.

Gray whale

Historically, gray whales were not common in San Francisco Bay. The Oceanic Society has tracked gray whale sightings since they began returning to San Francisco Bay regularly in the late 1990s. The Oceanic Society data show that all age classes of gray whales are entering San Francisco Bay, and that they enter as singles or in groups of up to five individuals. However, the data do not distinguish between sightings of gray whales and number of individual whales (Winning 2008). Caltrans Richmond-San Rafael Bridge project monitors recorded 12 living and two dead gray whales in the surveys performed in 2012. All sightings were in either the central or north Bay; and all but two sightings occurred during the months of April and May. One gray whale was sighted in June, and one in October (the specific years were unreported). It is estimated that two to six gray whales enter San Francisco Bay in any given year. Because construction activities are only occurring during a maximum of 22 days in 2017, it is estimated that two gray whales may potentially enter the area during the construction period, for a total of 2 gray whale takes in 2017 (Table 7).

Bottlenose dolphin

Since the 1982-83 El Niño, which increased water temperatures off California, bottlenose dolphins have been consistently sighted along the central California coast (Carretta *et al.*, 2008). The northern limit of their regular range is currently the Pacific coast off San Francisco and Marin County, and they occasionally enter San Francisco Bay, sometimes foraging for fish in Fort Point Cove, just east of the Golden Gate Bridge. Members of this stock are transient and make movements up and down the coast, and into some estuaries, throughout the year. Bottlenose dolphins are being observed in San Francisco bay more frequently in recent years (TMMC, personal communication). Groups with an average group size of five animals enter the bay and occur near Yerba Buena Island once per week for a two week stint and then depart the bay (TMMC, personal communication). Assuming groups of five individuals may enter San Francisco Bay approximately three times during the construction activities, and may enter the ensonified area once per week over the two-week stint, for a total of 30 takes of bottlenose dolphins. Additionally, in the summer of 2015, a lone bottlenose dolphin was seen swimming in the Oyster Point area of South San Francisco (GGCR 2016). We estimate that this lone bottlenose dolphin may be present in the project area each day of construction, an additional 22 takes. The 30 takes for a small group, and the 22 takes for the lone bottlenose dolphin equate to 52 bottlenose dolphin takes for 2017 (Table 7).

Table 7. Calculations for Incidental Take Estimation.

Pile Type	Pile-Driver Type	# of driving Days	Estimated Take by Level B Harassment						
			Harbor Seal	CA Sea Lion ¹	Northern Elephant Seal ²	Harbor Porpoise ²	Gray Whale ²	Northern fur seal ²	Bottlenose dolphin
42-in steel pile	Vibratory ³	8	77	35	NA	NA	NA	NA	8
36-in steel	Vibratory ³	3	206	93	NA	NA	NA	NA	3
24-in steel piles	Vibratory ³	3	57	13	NA	NA	NA	NA	3

14-in steel H pile	Vibratory	8	127	7	NA	NA	NA	NA	8
Project Total (2017)		22	467	149 [^]	18 ²	10 ²	2 ²	10 ²	52*

¹ To account for potential El Niño conditions, take calculated from at-sea densities for California sea lion has been increased by a factor of 10.

²Take is not calculated by activity type for these species with a low potential to occur, only a yearly total is given.

³Piles of this type may also be installed with an impact hammer, which would reduce the estimated take.

*Total take includes an additional 30 takes to account for a transitory group of dolphins that may occur in the project area over the course of the project.

[^]Total take number is 149, not 148 because we round at the end, whereas here, it shows rounding per day.

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 balance 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 – which considers the nature of the potential adverse impact being mitigated (likelihood, scope, range), as well as the likelihood that the measure will be effective if implemented; and the likelihood of effective implementation, 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.

Measurements from similar pile driving events were coupled with practical spreading loss to estimate zones of influence (ZOI; see *Estimated Take by Incidental Harassment*); these values were used to develop mitigation measures for pile driving and removal activities at the Project area. The ZOIs effectively represent the mitigation zone that would be established around each pile to prevent Level A harassment to marine mammals, while providing estimates of the areas within which Level B harassment might occur. In addition to the specific measures described later in this section, WETA would conduct briefings between construction supervisors and crews, marine mammal monitoring team, and WETA staff prior to the start of all pile driving activity, and when new personnel join the work, in order to explain responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures.

Monitoring and Shutdown for Construction Activities

The following measures would apply to WETA's mitigation through shutdown and disturbance zones:

Shutdown Zone – For all pile driving activities, WETA will establish a shutdown zone intended to contain the area in which SPLs equal or exceed the auditory injury criteria for cetaceans and pinnipeds. The purpose of a shutdown zone is 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), thus preventing injury of marine mammals (as described previously under *Potential Effects of the Specified Activity on Marine Mammals*, serious injury

or death are unlikely outcomes even in the absence of mitigation measures). Modeled radial distances for shutdown zones are shown in Table 8. However, a minimum shutdown zone of 30 meters will be established during all pile driving activities, regardless of the estimated zone.

Table 8. Shutdown Zones for Impact and Vibratory Pile Driving.

Hearing Group	Impact Pile Driving Shutdown Distance (meters)	Vibratoy Pile Driving Shutdown Distance (meters)
Phocid (Harbor seal) ¹	30 ¹	30
Phocid (Northern elephant seal)	130	30
Otariids and MFC*	30	30
LFC and HFC*	300	30

¹A minimum shut down zone of 30 meters is established for Pacific harbor seal, in the event that all Level A take authorized for this species is used (18), an exclusion zone of 130 meters for 42- and 36-in piles, and an exclusion zone of 60 meters for 24-in piles will be used for the remainder of impact pile driving.

*MFC= Mid-frequency cetacean, LFC= Low-frequency cetacean, HFC= High-frequency cetacean

Disturbance Zone – Disturbance zones are the areas in which SPLs equal or exceed 160 and 120 dB rms (for impulse and continuous sound, respectively). Disturbance zones provide utility for monitoring conducted for mitigation purposes (*i.e.*, shutdown zone monitoring) by establishing monitoring protocols for areas adjacent to the shutdown zones. Monitoring of disturbance zones enables observers to be aware of and communicate the presence of marine mammals in the project area but outside the shutdown zone and thus prepare for potential shutdowns of activity. However, the primary purpose of disturbance zone monitoring is for documenting instances of Level B harassment; disturbance zone monitoring is discussed in greater detail later (see *Monitoring and Reporting*). Nominal radial distances for disturbance zones are shown in Table 4.

Given the size of the disturbance zone for vibratory pile driving, it is impossible to guarantee that all animals would be observed or to make comprehensive observations of fine-scale behavioral reactions to sound, and only a portion of the zone (*e.g.*, what may be reasonably observed by visual observers stationed within the bay) would be observed. In order to document observed instances of harassment, monitors record all marine mammal observations, regardless

of location. The observer's location, as well as the location of the pile being driven, is known from a GPS. The location of the animal is estimated as a distance from the observer, which is then compared to the location from the pile. It may then be estimated whether the animal was exposed to sound levels constituting incidental harassment on the basis of predicted distances to relevant thresholds in post-processing of observational and acoustic data, and a precise accounting of observed incidences of harassment created. This information may then be used to extrapolate observed takes to reach an approximate understanding of actual total takes.

Monitoring Protocols – Monitoring would be conducted before, during, and after pile driving and vibratory removal activities. In addition, observers shall record all instances of marine mammal occurrence, regardless of distance from activity, and shall document any behavioral reactions in concert with distance from piles being driven. Observations made outside the shutdown zone will not result in shutdown; that pile segment would be completed without cessation, unless the animal approaches or enters the shutdown zone, at which point all pile driving activities would be halted. Monitoring will take place from 30 minutes prior to initiation through thirty minutes post-completion of pile driving and removal activities. 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 equipment is no more than 30 minutes. Please see the Monitoring Plan (www.nmfs.noaa.gov/pr/permits/incidental/construction.htm), developed by WETA in agreement with NMFS, for full details of the monitoring protocols.

The following additional measures apply to visual monitoring:

- (1) 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. A minimum of

two observers will be required for all pile driving/removal activities. MMO requirements for construction actions are as follows:

- (a) Independent observers (*i.e.*, not construction personnel) are required;
 - (b) At least one observer must have prior experience working as an observer;
 - (c) Other observers (that do not have prior experience) may substitute education (undergraduate degree in biological science or related field) or training for experience;
 - (d) Where a team of three or more observers are required, one observer should be designated as lead observer or monitoring coordinator. The lead observer must have prior experience working as an observer; and
 - (e) NMFS will require submission and approval of observer CVs.
- (2) Qualified MMOs are trained biologists, and need the following additional minimum qualifications:
- (a) Visual acuity in both eyes (correction is permissible) sufficient for discernment of moving targets at the water's surface with ability to estimate target size and distance; use of binoculars may be necessary to correctly identify the target;
 - (b) Ability to conduct field observations and collect data according to assigned protocols
 - (c) Experience or training in the field identification of marine mammals, including the identification of behaviors;
 - (d) Sufficient training, orientation, or experience with the construction operation to provide for personal safety during observations;
 - (e) 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

(f) 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.

(3) Prior to the start of pile driving activity, the shutdown zone will be monitored for thirty minutes to ensure that it is clear of marine mammals. Pile driving will only commence once observers have declared the shutdown zone clear of marine mammals; animals will be allowed to remain in the shutdown zone (*i.e.*, must leave of their own volition) and their behavior will be monitored and documented. The shutdown zone may only be declared clear, and pile driving started, when the entire shutdown zone is visible (*i.e.*, when not obscured by dark, rain, fog, *etc.*). In addition, if such conditions should arise during impact pile driving that is already underway, the activity would be halted.

(4) If a marine mammal approaches or enters the shutdown zone during the course of pile driving operations, activity will be halted and delayed until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone or fifteen minutes have passed without re-detection of small cetaceans and pinnipeds, and thirty minutes for gray whales. Monitoring will be conducted throughout the time required to drive a pile.

(5) Using delay and shut-down procedures, if a species for which authorization has not been granted (including but not limited to Guadalupe fur seals and humpback whales) or if a species for which authorization has been granted but the authorized takes are met, approaches or is observed within the Level B harassment zone, activities will shut down immediately and not restart until the animals have been confirmed to have left the area.

Soft Start

The use of a soft start procedure is believed to provide additional protection to marine mammals by warning or providing a chance to leave the area prior to the hammer operating at full capacity, and typically involves a requirement to initiate sound from the hammer at reduced energy followed by a waiting period. This procedure is repeated two additional times. It is difficult to specify the reduction in energy for any given hammer because of variation across drivers and, for impact hammers, the actual number of strikes at reduced energy will vary because operating the hammer at less than full power results in “bouncing” of the hammer as it strikes the pile, resulting in multiple “strikes.” For impact driving, we require an initial set of three strikes from the impact hammer at reduced energy, followed by a 30-second waiting period, then 2 subsequent 3-strike sets. Soft start will be required at the beginning of each day’s impact pile driving work and at any time following a cessation of impact pile driving of 30 minutes or longer.

Sound Attenuation Devices

Two types of sound attenuation devices will be used during impact pile-driving: bubble curtains and pile cushions. WETA will employ the use of a bubble curtain during impact pile-driving, which is assumed to reduce the source level by 10 dB. WETA will also employ the use of 12-in-thick wood cushion block on impact hammers to attenuate underwater sound levels.

We have carefully evaluated WETA’s planned mitigation measures and considered their effectiveness in past implementation to determine whether they are likely to effect the least practicable impact on the affected marine mammal species and stocks and their habitat.

Any mitigation measure(s) we prescribe should be able to accomplish, have a reasonable likelihood of accomplishing (based on current science), or contribute to the accomplishment of one or more of the general goals listed below:

- (1) Avoidance or minimization of injury or death of marine mammals wherever possible (goals 2, 3, and 4 may contribute to this goal);
- (2) A reduction in the number (total number or number at biologically important time or location) of individual marine mammals exposed to stimuli expected to result in incidental take (this goal may contribute to 1, above, or to reducing takes by behavioral harassment only);
- (3) A reduction in the number (total number or number at biologically important time or location) of times any individual marine mammal would be exposed to stimuli expected to result in incidental take (this goal may contribute to 1, above, or to reducing takes by behavioral harassment only);
- (4) A reduction in the intensity of exposure to stimuli expected to result in incidental take (this goal may contribute to 1, above, or to reducing the severity of behavioral harassment only);
- (5) Avoidance or minimization of adverse effects to marine mammal habitat, paying particular attention to the prey base, blockage or limitation of passage to or from biologically important areas, permanent destruction of habitat, or temporary disturbance of habitat during a biologically important time; and
- (6) For monitoring directly related to mitigation, an increase in the probability of detecting marine mammals, thus allowing for more effective implementation of the mitigation.

Based on our evaluation of WETA's planned measures, as well as any other potential measures considered by NMFS, NMFS has determined that the planned mitigation measures provide the means of effecting the least practicable impact on marine mammal 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 action area. Effective reporting is critical to both compliance and 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 in action area (*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) population, species, or stock;

- 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.

WETA's monitoring and reporting is also described in their Marine Mammal Monitoring Plan, online at www.nmfs.noaa.gov/pr/permits/incidental/construction.htm.

Visual Marine Mammal Observations

WETA will collect sighting data and behavioral responses to construction for marine mammal species observed in the region of activity during the period of activity. All MMOs will be trained in marine mammal identification and behaviors and are required to have no other construction-related tasks while conducting monitoring. A minimum of two MMOs will be required for all pile driving/removal activities. WETA will monitor the shutdown zone and disturbance zone before, during, and after pile driving, with observers located at the best practicable vantage points. Based on our requirements, WETA will implement the following procedures for pile driving and removal:

- MMOs will be located at the best vantage point(s) in order to properly see the entire shutdown zone and as much of the disturbance zone as possible;
- During all observation periods, observers will use binoculars and the naked eye to search continuously for marine mammals;
- If the shutdown zones are obscured by fog or poor lighting conditions, pile driving at that location will not be initiated until that zone is visible. Should such conditions arise while impact driving is underway, the activity would be halted; and
- The shutdown and disturbance zones around the pile will be monitored for the presence of marine mammals before, during, and after any pile driving or removal activity.

Individuals implementing the monitoring protocol will assess its effectiveness using an adaptive approach. The monitoring biologists will use their best professional judgment throughout implementation and seek improvements to these methods when deemed appropriate. Any modifications to protocol will be coordinated between NMFS and WETA.

In addition, the MMO(s) will survey the potential Level A and nearby Level B harassment zones (areas within approximately 2,000 feet of the pile-driving area observable from the shore) on 2 separate days—no earlier than 7 days before the first day of construction—to establish baseline observations. Special attention will be given to the harbor seal haul-out sites in proximity to the project (*i.e.*, the harbor seal platform and Breakwater Island). Monitoring will be timed to occur during various tides (preferably low and high tides) during daylight hours from locations that provide the best vantage point available, including the pier, breakwater, and adjacent docks within the harbor. The information collected from baseline monitoring will be used for comparison with results of monitoring during pile-driving activities.

Data Collection

We require that observers use approved data forms. Among other pieces of information, WETA will record detailed information about any implementation of shutdowns, including the distance of animals to the pile and description of specific actions that ensued and resulting behavior of the animal, if any. In addition, WETA will attempt to distinguish between the number of individual animals taken and the number of incidences of take. We require that, at a minimum, the following information be collected on the sighting forms:

- 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 if possible, the correlation to SPLs;
- Distance from pile driving or removal activities to marine mammals and distance from the marine mammals to the observation point;
- Description of implementation of mitigation measures (*e.g.*, shutdown or delay);
- Locations of all marine mammal observations; and
- Other human activity in the area.

Hydroacousting Monitoring

The monitoring will be done in accordance with the methodology outlined in this Hydroacoustic Monitoring Plan (see Appendix B of WETA's application for more information on this Plan, including the methodology, equipment, and reporting information). The monitoring is based on dual metric criteria that will include the following:

- Establish the distance to the 206-dB peak sound pressure criteria;
- Verify the extent of Level A harassment zones for marine mammals;
- Verify the attenuation provided by bubble curtains; and
- Provide all monitoring data to NMFS. The reports will be submitted bi-weekly, unless WETA

proposes to modify the zones based on the hydroacoustic measurement, in which case WETA would report those data before zone modification. The reports would include the following information:

1. Size and type of piles;
2. A detailed description of the noise attenuation device, including design specifications;

3. The impact hammer energy rating used to drive the piles, and the make and model of the hammer and the output energy;
4. The physical characteristics of the bottom substrate into which the piles were driven;
5. The depth of water in which the pile was driven;
6. The depth into the substrate that the pile was driven;
7. A description of the sound monitoring equipment;
8. The distance between hydrophones and pile;
9. The depth of the hydrophones and depth of water at hydrophone locations;
10. The distance from the pile to the water's edge;
11. The total number of strikes to drive each pile and for all piles driven during a 24-hour period;
12. The results of the hydroacoustic monitoring, as described under Signal Processing;
13. The distance at which peak, cumulative SEL, and RMS values exceed the respective threshold values;
14. The 30 second average for the duration of each pile;
15. The spectra graphs for each pile type; and
16. A description of any observable fish, marine mammal, or bird behavior in the immediate area and, if possible, correlation to underwater sound levels occurring at that time.

A minimum of five piles of each size and type of piles to be impact driven will be monitored, including five of the 36-in-diameter donut piles, five of the 42-in-diameter guide piles; and five of the 24-in-diameter dolphin piles; and two piles of the 42-in steel piles and 14 in H piles to be vibratory drivne will be monitored. Piles chosen to be monitored will be representative of the different sizes and range of typical water depths at the project location where piles will be driven with an impact or vibratory hammer.

One hydrophone will be placed at mid-water depth at the nearest distance, approximately 10 meters, from each pile being monitored. An additional hydrophone will be placed at mid-water depth at a distance of 20 to 50 meters from the pile to provide two sound-level readings during ambient and pile driving conditions. A third hydrophone may be deployed at a greater distance (*e.g.*, 100 meters or further) for the purpose of better defining the long-distance sound propagation. Underwater sound levels will be continuously monitored during the entire duration of each pile being driven. The peak, rms (impulse level), and SEL level of each strike will be monitored in real time. The cSEL will also be monitored live, assuming no contamination from other noise sources. Sound levels will be measured in dB re: 1 µPa. For more details on the methodology of WETA's hydroacoustic monitoring, please Appendix B of their application.

Reporting

A draft report will be submitted to NMFS within 90 days of the completion of marine mammal monitoring, or 60 days prior to the requested date of issuance of any future IHA for projects at the same location, whichever comes first. The report will include marine mammal observations pre-activity, during-activity, and post-activity during pile driving and removal days, and will also provide descriptions of any behavioral responses to construction activities by marine mammals and a complete description of all mitigation shutdowns and the results of those actions and an extrapolated total take estimate based on the number of marine mammals observed during the course of construction. A final report must be submitted within 30 days following resolution of comments on the draft report.

Negligible Impact Analysis and Determinations

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 and removal activities associated with the facility construction 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 and Level B harassment (PTS and behavioral disturbance, respectively), from underwater sounds generated from pile driving and removal. Potential takes could occur if individuals of these species are present in the ensonified zone when pile driving and removal occurs.

No injury, serious injury, or mortality is anticipated given the nature of the activities and measures designed to minimize the possibility of injury to marine mammals. The potential for these outcomes is minimized through the construction method and the implementation of the

planned mitigation measures. Specifically, vibratory hammers will be the primary method of installation (impact driving is included only as a contingency). Impact pile driving produces short, sharp pulses with higher peak levels and much sharper rise time to reach those peaks. If impact driving is necessary, implementation of soft start and shutdown zones significantly reduces any possibility of injury. Given sufficient “notice” through use of soft start (for impact driving), marine mammals are expected to move away from a sound source that is annoying prior to it becoming potentially injurious. WETA will also employ the use of 12-in-thick wood cushion block on impact hammers, and a bubble curtain as sound attenuation devices. Environmental conditions at Alameda Point mean that marine mammal detection ability by trained observers is high, enabling a high rate of success in implementation of shutdowns to avoid injury.

WETA’s planned activities are localized and of relatively short duration (a maximum of 22 days for pile driving and removal). The entire project area is limited to the Central Bay operations and maintenance facility area and its immediate surroundings. These localized and short-term noise exposures may cause short-term behavioral modifications in harbor seals, northern fur seals, northern elephant seals, California sea lions, harbor porpoises, bottlenose dolphins, and gray whales. Moreover, the mitigation and monitoring measures are expected to reduce the likelihood of injury and behavior exposures. Additionally, no important feeding and/or reproductive areas for marine mammals are known to be within the ensonified area during the construction time frame.

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. However, 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.

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, 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; Lerma 2014). Most likely, individuals will simply move away from the sound source and be temporarily displaced from the areas of pile driving, although even this reaction has been observed primarily only in association with impact pile driving. Thus, even repeated Level B harassment of some small subset of the overall stock is unlikely to result in any significant realized decrease in fitness for the affected individuals, and thus would not result in any adverse impact to the stock as a whole. For harbor seals that may transit through the ensonified area to get to their haul out located approximately 300 m from the project area, Level A harassment may occur. However, harbor seals are not expected to be in the injurious ensonified area for long periods of time; therefore, the potential for those seals to actually have PTS is considered unlikely and any PTS they may incur would likely be of a low level.

In summary and as described above, the following factors primarily support our 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;

- Level B harassment may consist of, at worst, temporary modifications in behavior (*e.g.*, temporary avoidance of habitat or changes in behavior);
- Mitigation is expected to minimize the likelihood and severity of the level of harassment;
- The lack of important feeding, pupping, or other areas in the action area; and
- The small percentage of the stock that may be affected by project activities (< 11.479 percent for all species).

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 monitoring and mitigation measures, NMFS finds that the total marine mammal take from WETA's construction activities will have a negligible impact on the 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. Additionally, other qualitative factors may be considered in the analysis, such as the temporal or spatial scale of the activities.

Table 9 details the number of instances that animals could be exposed to received noise levels that could cause Level A and Level B behavioral harassment for the proposed work at the project site relative to the total stock abundance. The numbers of animals authorized to be taken for all species would be considered small relative to the relevant stocks or populations even if each estimated instance of take occurred to a new individual – an extremely unlikely scenario.

The total percent of the population (if each instance was a separate individual) for which take is requested is approximately 1.56 percent for harbor seals, approximately 11 percent for bottlenose dolphins, and less than 1 percent for all other species (Table 9). For pinnipeds, especially harbor seals occurring in the vicinity of the project area, there will almost certainly be some overlap in individuals present day-to-day, and the number of individuals taken is expected to be notably lower.

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.

Table 9. Estimated Numbers and Percentage of Stock That Taken.

Species	Authorized Level B Takes	Authorized Level A Takes	Stock(s) Abundance Estimate ¹	Percentage of Total Stock (percent)
Harbor Seal (<i>Phoca vitulina</i>) <i>California stock</i>	467	18	30,968	1.56
California sea lion (<i>Zalophus californianus</i>) <i>U.S. Stock</i>	149	0	296,750	0.05
Northern elephant seal (<i>Mirounga angustirostris</i>) <i>California breeding stock</i>	18	0	179,000	0.010
Northern fur seal (<i>Callorhinus ursinus</i>) <i>California stock</i>	10	0	14,050	0.071
Harbor Porpoise (<i>Phocoena phocoena</i>) <i>San Francisco-Russian River Stock</i>	10	0	9,886	0.101
Gray whale (<i>Eschrichtius robustus</i>) <i>Eastern North Pacific stock</i>	2	0	20,990	0.009
Bottlenose dolphin (<i>Tursiops truncatus</i>) <i>California coastal stock</i>	52	0	453	11.479

¹ All stock abundance estimates presented here are from the 2015 Pacific Stock Assessment Report

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 West Coast regional Protected Resources Division Office, whenever we propose to authorize take for endangered or threatened species.

No incidental take of ESA-listed marine mammal species is authorized or expected to result from these activities. 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 WETA for the potential harassment of small numbers of seven species of marine mammals incidental to the Central Bay Operations and Maintenance Facility Project in Alameda, CA, provided the previously mentioned mitigation, monitoring, and reporting.

Dated: August 24, 2017.

Donna Wieting,
Director, Office of Protected Resources,

National Marine Fisheries Service.

[FR Doc. 2017-18349 Filed: 8/25/2017 4:15 pm; Publication Date: 8/30/2017]