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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648-XG132

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to the South Basin Improvements Project at the San Francisco Ferry Terminal

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 Bay Area Water Emergency Transportation Authority (WETA) to incidentally harass, by Level B harassment only, marine mammals during construction activities associated with the Downtown San Francisco Ferry Terminal Expansion Project, South Basin Improvements Project in San Francisco, California.

DATES: This Authorization is effective from June 1, 2018 through May 31, 2019.

FOR FURTHER INFORMATION CONTACT: Amy Fowler, 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

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 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 action (*i.e.*, the issuance of an incidental harassment authorization) with respect to potential impacts on the human environment.

This action is consistent with categories of activities identified in Categorical Exclusion B4 (incidental harassment authorizations with no anticipated serious injury or mortality) of the Companion Manual for NOAA Administrative Order 216-6A, which do not individually or cumulatively have the potential for significant impacts on the quality of the human environment and for which we have not identified any extraordinary circumstances that would preclude this categorical exclusion. Accordingly, NMFS has determined that the issuance of the IHA qualifies to be categorically excluded from further NEPA review.

Summary of Request

On January 22, 2018, NMFS received a request from WETA for an IHA to take marine mammals incidental to expansion and improvements at the downtown San Francisco ferry terminal. The application was determined to be adequate and complete on April 10, 2018. WETA's request was for take of seven species of marine mammals by Level A and Level B harassment. This authorization is valid from June 1, 2018 to May 31, 2019. Neither WETA nor NMFS expect serious injury or mortality to result from this activity and, therefore, an IHA is appropriate.

NMFS previously issued an IHA to WETA for similar work (82 FR 29521; June 29, 2017). WETA 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 "Estimated Take" section.

Description of Activity

WETA is planning to expand berthing capacity at the Downtown San Francisco Ferry Terminal, located at the San Francisco Ferry Building, to support existing and future planned water transit services operated on San Francisco Bay by WETA and WETA's emergency operations. The Downtown San Francisco Ferry Terminal Expansion Project includes the construction of three new water transit gates and overwater berthing facilities, in addition to supportive landside improvements, such as additional passenger waiting and queueing areas, circulation improvements, and other water transit-related amenities. The new gates and other improvements would be designed to accommodate future planned water transit services between Downtown San Francisco and Antioch, Berkeley, Martinez, Hercules, Redwood City, Richmond, and Treasure Island, as well as emergency operation needs. The new gates will be constructed using 81 steel piles, ranging in diameter from 24 to 36 inches (in). All piles will be driven during the authorized in-water work window of June 1 to November 30, 2018.

A detailed description of the planned terminal expansion project is provided in the *Federal Register* notice for the proposed IHA (83 FR 18507; April 27, 2018). 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's proposal to issue an IHA to WETA was published in the *Federal Register* on April 27, 2018 (83 FR 18507). 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 comments from the Marine Mammal Commission (Commission).

Comment 1: The Commission noted minor errors and missing information in the text of the notice and the proposed authorization. The Commission recommends that NMFS review its notices more thoroughly before submitting for publication.

Response 1: NMFS thanks the Commission for pointing out the errors in the *Federal Register* notice for the proposed authorization. NMFS has addressed those errors in the notice of issuance of the authorization. NMFS makes every effort to read notices thoroughly prior to publication and will continue this effort to publish the best possible product for public comment.

Comment 2: The Commission stated its concerns over the appropriateness of the manner in which Level A harassment zones are estimated. The Commission pointed out that for impact driving of 36-inch piles, the Level A harassment zone for high-frequency cetaceans was estimated to be 602 meters, which is greater than the 341 meter Level B harassment zone. The Commission recommended that NMFS consult with both internal and external scientists and acousticians to determine the relevant accumulation time that could result in Level A harassment based on associated permanent threshold shift from cumulative sound exposure levels.

Response 2: NMFS understands the Commission's concerns and continues to work to improve Level A harassment zone estimation based on realistic noise propagation models and energy accumulation scheme. Currently, Level A harassment zones are based on exposure of cumulative sound exposure levels over a period of one working day's pile driving duration or instantaneous peak sound pressure level, while Level B harassment zones are based on instantaneous root-mean-squared sound pressure level that contains 90 percent of acoustic

energy. The difference in the metrics between sound exposure levels and sound pressure level in assessing Level A and Level B harassments reflects the fact that prolonged exposure of intense noise could lead to permanent threshold shift if the animal chooses to stay within the injury zone. Occasionally, the conservative assumptions built into the User Spreadsheet result in Level A zones that are larger than Level B zones. The process of impact assessments will continue to evolve as more scientific data become available.

Comment 3: The Commission recommended that NMFS refrain from using a source level reduction factor for sound attenuation device implementation during impact pile driving for all relevant incidental take authorizations due to the different noise level reduction at different received ranges.

Response 3: While it is true that noise level reduction measured at different received ranges does vary, given that both Level A and Level B estimation using geometric modeling is based on noise levels measured at near-source distances (~ 10m), NMFS believes it reasonable to use a source level reduction factor for sound attenuation device implementation during impact pile driving. In the case of the SF-OBB impact driving isopleth estimates using an air bubble curtain for source level reduction, NMFS reviewed Caltrans' bubble curtain "on and off" studies conducted in San Francisco Bay in 2003 and 2004. The equipment used for bubble curtains has likely improved since 2004 but due to concerns for fish species, Caltrans has not able to conduct "on and off" tests recently. Based on 74 measurements (37 with the bubble curtain on and 37 with the bubble curtain off) at both near (< 100 m) and far (> 100 m) distances, the linear averaged received level reduction is 6 dB. If limiting the data points (a total of 28 measurements, with 14 during bubble curtain on and 14 during bubble curtain off) to only near distance measurements, the linear averaged noise level reduction is 7 dB. Since impact zone analysis

using geometric spreading model is typically based on measurements at near-source distance, we consider it appropriate to use a reduction of 7 dB as a noise level reduction factor for impact pile driving using an air bubble curtain system.

NMFS will evaluate the appropriateness of using a certain source level reduction factor for sound attenuation device implementation during impact pile driving for all relevant incidental take authorizations when more data become available.

Comment 4: The Commission recommended that NMFS promptly revise its draft rounding criteria and share it with the Commission.

Response 4: NMFS appreciates the Commission's ongoing concern in this matter. Calculating predicted take is not an exact science and there are arguments for taking different mathematical approaches in different situations, and for making qualitative adjustments in other situations. We believe, however, that the methodology used for take calculation in this IHA remains appropriate and is not at odds with the 24-hour reset policy the Commission references. We look forward to continued discussion with the Commission on this matter and will share the rounding guidance as soon as it is completed.

Comment 5: The Commission expressed concern about the lack of adequate time to provide public comments as well as the abbreviated timeframes during which NMFS is able to address public comments. The Commission recommended that NMFS ensure that it publishes and finalizes proposed IHAs sufficiently before the planned start date of the proposed activities to ensure full consideration is given to all comments received.

Response 5: NMFS will work to provide adequate time for public comment and response. NMFS also seeks to process IHA applications in a more expeditious manner.

Comment 6: The Commission requested clarification regarding certain issues associated with NMFS's notice that one-year renewals could be issued in certain limited circumstances and expressed concern that the process would bypass the public notice and comment requirements. The Commission also suggested that NMFS should discuss the possibility of renewals through a more general route, such as a rulemaking, instead of notice in a specific authorization. The Commission further recommended that if NMFS did not pursue a more general route, that the agency provide the Commission and the public with a legal analysis supporting our conclusion that this process is consistent with the requirements of section 101(a)(5)(D) of the MMPA.

Response 6: The process of issuing a renewal IHA does not bypass the public notice and comment requirements of the MMPA. The notice of the proposed IHA expressly notifies the public that under certain, limited conditions an applicant could seek a renewal IHA for an additional year. The notice describes the conditions under which such a renewal request could be considered and expressly seeks public comment in the event such a renewal is sought. Importantly, such renewals would be limited to circumstances where: the activities are identical or nearly identical to those analyzed in the proposed IHA; monitoring does not indicate impacts that were not previously analyzed and authorized; and, the mitigation and monitoring requirements remain the same, all of which allow the public to comment on the appropriateness and effects of a renewal at the same time the public provides comments on the initial IHA. NMFS has, however, modified the language for future proposed IHAs to clarify that all IHAs, including renewal IHAs, are valid for no more than one year and that the agency would consider only one renewal for a project at this time. In addition, notice of issuance or denial of a renewal IHA would be published in the *Federal Register*, as they are for all IHAs. Last, NMFS will

publish on our website a description of the renewal process before any renewal is issued utilizing the new process.

Description of Marine Mammals in the Area of Specified Activities

A detailed description of the species likely to be affected by WETA's actions, including brief introductions to the species and relevant stocks as well as available information regarding population trends and threats, and information regarding local occurrence, are provided in WETA's application and the *Federal Register* notice for the proposed IHA (83 FR 18507; April 27, 2018). 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 refer to additional species information available in the NMFS stock assessment reports for the Pacific at *https://www.fisheries.noaa.gov/resource/document/us-pacific-marine-mammal-stock-assessments-2016.*

Table 1 lists all species with expected potential for occurrence near downtown San Francisco 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 Stock Assessment Reports (SARs)). While no mortality is anticipated or authorized here, PBR and annual serious injury and mortality from anthropogenic sources are included here as gross indicators of the status of the species and other threats.

Marine mammal abundance estimates presented in this document represent the total number of individuals that make up a given stock or the total number estimated within a

particular study or survey area. NMFS's stock abundance estimates for most species represent the total estimate of individuals within the geographic area, if known, that comprises that stock. For some species, this geographic area may extend beyond U.S. waters. All managed stocks in this region are assessed in NMFS's U.S. 2016 SARs (Caretta *et al.*, 2017). All values presented in Table 1 are the most recent available at the time of publication and are available in the 2016 SARs (Caretta *et al.*, 2017).

Table 1. Marine Mammals in the Vicinity of Downtown San Francisco.

Common name	Scientific name	Stock	ESA/MMPA status; Strategic (Y/N)[1]	Stock abundance (CV, Nmin, most recent abundance survey)[2]	PBR	Annual M/SI[3]
Order Cetartiodactyla – Cetacea – Superfamily Mysticeti (baleen whales)						
Family Eschrichtiidae						
Gray whale	*Eschrichtius robustus*	Eastern North Pacific	-/- ; N	20,990 (0.05, 20,125, 2011)	624	132
Family Balaenopteridae (rorquals)						
Humpback whale	*Megaptera novaeangliae*	California/Oregon/Washington	E/D ; Y	1,918 (0.03, 1,876, 2014)	11	> 6.5
Superfamily Odontoceti (toothed whales, dolphins, and porpoises)						
Family Delphinidae						
Bottlenose dolphin	*Tursiops truncatus*	California Coastal	-/- ; N	453 (0.06, 346, 2011)	2.7	> 2
Family Phocoenidae (porpoises)						
Harbor porpoise	*Phocoena phocoena*	San Francisco-Russian River	-/- ; N	9,886 (0.51, 6,625, 2011)	66	0
Order Carnivora – Superfamily Pinnipedia						
Family Otariidae (eared seals and sea lions)						
California sea lion	*Zalophus californianus*	U.S.	-/- ; N	296,750 (n/a, 153,337, 2011)	9,200	389
Northern fur seal	*Callorhinus ursinus*	California	-/- ; N	14,050 (n/a, 7,524, 2013)	451	1.8
Guadalupe fur seal	*Arctocephalus townsendi*	Mexico to California	T/D ; Y	20,000 (n/a, 15,830, 2010)	542	> 3.2
Family Phocidae (earless seals)						

Pacific harbor seal	*Phoca vitulina richardii*	California	-/- ; N	30,968 (n/a, 27,348, 2012)	1,641	43
Northern elephant seal	*Mirounga angustirostris*	California Breeding	-/- ; N	179,000 (n/a, 81,368, 2010)	4,882	8.8

[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. In some cases, CV is not applicable

[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 project area are included in Table 1. However, the temporal and/or spatial occurrence of humpback whales and Guadalupe fur seals is such that take is not expected to occur, and they are not discussed further beyond the explanation provided here. Humpback whales are rare visitors to the interior of San Francisco Bay. A recent, seasonal influx of humpback whales inside San Francisco Bay near the Golden Gate was recorded from April to November in 2016 and 2017 (Keener 2017). The Golden Gate is outside of this project's action area and humpback whales are not expected to be present during the project. Guadalupe fur seals occasionally range into the waters of Northern California and the Pacific Northwest. The Farallon Islands (off central California) and Channel Islands (off southern California) are used as haulouts during these movements (Simon 2016). Juvenile Guadalupe fur seals occasionally strand in the vicinity of San Francisco, especially during El Niño events. Most strandings along the California coast are animals younger than two years old, with evidence of malnutrition (NMFS 2017c). In the rare event that a Guadalupe fur seal or humpback whale is detected within the Level A or Level B harassment zones, work will cease until the animal has left the area (see "Mitigation").

Information concerning marine mammal hearing, including marine mammal functional hearing groups, was provided in the *Federal Register* notice for the proposed IHA (83 FR 18507; April 27, 2018), therefore that information is not repeated here; please refer to that *Federal Register* notice for this information. For further information about marine mammal functional hearing groups and associated frequency ranges, please see NMFS (2016) for a review of available information. Seven marine mammal species (three cetacean and four pinniped (two phocid and two otariid) species) have the reasonable potential to co-occur with the construction activities. Of the cetacean species that may be present, one is classified as a low-frequency cetacean (*i.e.*, gray whale), one is classified as a mid-frequency cetacean (*i.e.*, bottlenose dolphin), and one is classified as a high-frequency cetacean (*i.e.*, harbor porpoise).

Potential Effects of Specified Activities on Marine Mammals and their Habitat

The effects of underwater noise from pile driving activities for the Ferry Terminal Expansion 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 (83 FR 18507; April 27, 2018) included a discussion of the effects of anthropogenic noise on marine mammals, therefore that information is not repeated here; please refer to the *Federal Register* notice for that information. No instances of hearing threshold shifts, injury, serious injury, or mortality are expected as a result of the planned activities.

The main impact to habitat associated with the Ferry Terminal Expansion Project would be temporarily increased sound levels and the associated direct effects on marine mammals. The project would not result in permanent impacts to habitats used by marine mammals, such as haulout sits, but may have potential short-term impacts to food sources such as fish and minor impacts to the immediate substrate during installation of piles. These potential effects are

discussed in detail in the *Federal Register* notice for the proposed IHA (83 FR 18507; April 27, 2018), therefore that information is not repeated here; please refer to that *Federal Register* notice 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 exposure to acoustic sources (*i.e.*, impact and vibratory pile driving) 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 result, primarily for harbor seals and California sea lions due to larger predicted auditory injury zones. Auditory injury is unlikely to occur for cetaceans. The mitigation and monitoring measures are expected to minimize the severity of such taking to the extent practicable.

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 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 permanent threshold shift (PTS) of some degree (equated to Level A harassment).

Level B Harassment– 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 (μPa) (root mean square (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 and impact pile driving) or intermittent (*e.g.*, scientific sonar) sources.

WETA's activity includes the use of continuous (vibratory pile driving) and impulsive (impact pile driving) sources, and therefore the 120 and 160 dB re 1 μPa (rms) are applicable.

Level A harassment – 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 activity includes the use of impulsive (impact pile driving) and non-impulsive (vibratory pile driving) sources.

These thresholds 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)	
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 $L_{E,OW,24h}$: 203 dB	*Cell 10* $L_{E,OW,24h}$: 219 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 1µPa^{2}s. 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.

Level B Harassment

In-Water Disturbance during Vibratory Pile Driving – Level B behavioral disturbance may occur incidental to the use of a vibratory or impact hammer due to propagation of

underwater noise during installation of new steel piles. A total of 81 steel piles will be installed at the Ferry Terminal. During the 2017 construction season, all piles were installed using a vibratory hammer. The hydroacoustic monitoring conducted for vibratory driving during the 2017 season has been used to establish the expected source values of piles driven during the 2018 construction season. The SLs were measured at 10 m for the 30- and 36-in piles and between 9 and 15 m for the 24-in piles. The SLs for 24-in piles were calculated using the measured values from 9 to 15 m normalized to 10 m. The median RMS values were used as the SLs to estimate take from vibratory driving. These values are provided in Table 3.

Table 3. Sound Source Levels by Pile Type.

Pile Size and Installation Method	Source Level at 10 m (dB re 1 µPa)		
	Peak	RMS	SEL
24-in Vibratory	--	154	--
24-in Impact[1, 2]	196	183	170
30-in Vibratory	--	151	--
30-in Impact[1, 2]	203	183	170
36-in Vibratory	--	157	--
36-in Impact[1, 2]	203	186	176

[1]Caltrans 2009
[2]Impact SLs include 7 dB reduction due to bubble curtain

Additionally, monitoring conducted during 2017 construction established that for vibratory pile driving in the project area, the transmission loss is greater than the standard value of 15 used in typical take calculations. For estimating take from vibratory pile driving, Level B harassment zones were calculated using the average transmission loss measured during pile driving from June through August of 2017 minus one standard deviation of those measurements (22.26 – 3.51 = 18.75). Additional pile driving in September and November of 2017 yielded a mean transmission loss of 19.0. The F value originally calculated (18.75) is comparable to the final reported average and is slightly more conservative, and was therefore used to calculate the harassment zones from vibratory pile driving. Using the calculated transmission loss model

(18.75logR), the in-water Level B harassment zones were determined for each pile size (Table 4). For 24-in steel piles driven with a vibratory hammer, the Level B harassment zone is expected to be 651 m (2,136 ft). For 30-in piles, the Level B harassment zone is expected to be 450 m (1,476 ft). For 36-in piles, the Level B harassment zone is expected to be 940 m (3,084 ft).

In-Water Disturbance during Impact Pile Driving – As stated previously, all piles installed in the 2017 construction season were installed solely using a vibratory hammer. However, the use of an impact hammer to install piles may be required; therefore, the effects of impact pile driving is discussed here. Level B behavioral disturbance may occur incidental to the use of an impact hammer due to the propagation of underwater noise during the installation of steel piles. Piles will be driven to approximately 120 to 140 ft below Mean Lower Low Water (MLLW). Installation of these pipe piles may require up to 1,800 strikes per piles from an impact hammer using a DelMag D46-32, or similar diesel hammer, producing approximately 122,000 foot-pounds maximum energy per blow, and 1.5 seconds per blow average.

Other projects constructed under similar circumstances were reviewed to estimate the approximate noise produced by the 24-, 30, and 36-in steel piles. These projects include the driving of similarly sized piles at the Alameda Bay Ship and Yacht project, the Rodeo Dock Repair project, and the Amorco Wharf Repair Project (Caltrans 2012). Bubble curtains will be used during the installation of these piles, which, based on guidance provided by Caltrans for a mid-sized steel piles (with a diameter greater than 24 but less than 48 in), is expected to reduce noise levels by 7 dB rms (Caltrans 2015a).

Because no impact pile driving was used in the 2017 construction season, no site-specific transmission loss measurements exist for this project. The Practical Spreading Loss Model (15logR) is used to determine the Level B harassment zones for each pile size (Table 4). Both

24- and 30-in steel piles have a SL of 183 dB rms re 1 µPa and therefore have the same Level B harassment zone of 341 m (1,120 ft). For 36-in piles, the Level B harassment zone is expected to be 541 m (1,775 ft).

Table 4. Pile Driving Source Levels and Level B Harassment Zones.

Pile Size and Installation Method	Source Level (dB re 1 µPa rms)	Level B Threshold (dB re 1 µPa rms)	Propagation (xLogR)	Distance to Level B Threshold (m)
24-in Vibratory	154	120	18.75	651
24-in Impact	183[a]	160	15	341
30-in Vibratory	151	120	18.75	450
30-in Impact	183[a]	160	15	341
36-in Vibratory	157	120	18.75	940
36-in Impact	186[a]	160	15	541

[a]Impact source levels include 7 dB reduction due to bubble curtain

Level A Harassment

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 impact and vibratory pile driving), 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 5. Inputs for Determining Distances to Cumulative PTS Thresholds.

Pile Size and Installation Method	Source Level at 10 m (SEL)	Source Level at 10 m (rms)	Propagation (xLogR)	Number of Strikes Per Pile	Number of Piles Per Day	Activity Duration (seconds)
24-in Vibratory		154	18.75		4	900
24-in Impact	170[a]		15	1,800	3	
30-in Vibratory		151	18.75		4	900
30-in Impact	170[a]		15	1,800	3	
36-in Vibratory		157	18.75		4	1200
36-in Impact	176[a]		15	1,800	2	

[a] Source level includes 7 dB reduction due to bubble curtain

Table 6. Resulting Level A Isopleths.

Pile Size and Installation Method	**Distance to Level A Threshold (m)**				
	Low-Frequency Cetaceans	**Mid-Frequency Cetaceans**	**High-Frequency Cetaceans**	**Phocid Pinnipeds**	**Otariid Pinnipeds**
24-in Vibratory	3.1	< 1	4	2	< 1
24-in Impact	418	15	498	224	16
30-in Vibratory	2	< 1	3	1	<1
30-in Impact	418	15	498	224	16
36-in Vibratory	5	< 1	7	4	< 1
36-in Impact	801	29	954	429	31

The resulting PTS isopleths assume an animal would remain stationary at that distance for the duration of the activity. The largest isopleths result from impact pile driving. All piles installed in the 2017 construction season were driven solely using a vibratory hammer indicating that vibratory driving will be the most likely method of installation in the 2018 season. Level A take of harbor seals and California sea lions has been authorized given their increased presence in the nearshore waters of the project site and the large Level A harassment zones, especially for 36-in piles.

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.

Gray Whale

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 Oceanic Society has tracked gray whale sightings since they began returning to San Francisco Bay regularly in the late 1990s. Most sightings occurred just a mile or two inside of the Golden Gate, with some traveling into San Pablo Bay in the northern part of the San Francisco Bay (Self 2012). The Oceanic Society data show that all age classes of gray whales enter San Francisco Bay and they enter as singles or in groups of up to five individuals (Winning 2008). It is estimated that two to six gray whales enter San Francisco Bay in any given year.

Bottlenose Dolphin

Bottlenose dolphins are most often seen just within the Golden Gate or just east of the bridge when they are present in San Francisco Bay, and their presence may depend on the tides (GGCR 2016). Beginning in the summer of 2015, one to two bottlenose dolphins have been observed frequently swimming in the Oyster Point area of South San Francisco (GGCR 2016, 2017; Perlman 2017). Despite this recent occurrence, this stock is highly transitory in nature and is not expected to spend extended periods of time in San Francisco Bay. However, the number of sightings in the Central Bay has increased, suggesting that bottlenose dolphins are becoming more of a resident species.

Harbor Porpoise

In the last six decades, harbor porpoises have been observed outside of San Francisco Bay. The few porpoises that entered were not sighted past the 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. 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 have been documented in a photo-ID database. Porpoise activity inside San Francisco Bay is thought to be related to tide-dependent foraging, as well as mating behaviors (Keener 2011; Duffy 2015). Sightings are concentrated in the vicinity of the Golden Gate Bridge and Angel Island, with fewer numbers sighted south of Alcatraz and west of Treasure Island (Keener 2011).

California Sea Lion

In San Francisco Bay, sea lions haul out primarily on floating K docks at Pier 39 in the Fisherman's Wharf area of the San Francisco Marine. The Pier 39 haulout is approximately 1.5 miles from the project vicinity. The Marine Mammal Center (TMMC) in Sausalito, California has performed monitoring surveys at this location since 1991. A maximum of 1,706 sea lions was seen hauled out during one survey effort in 2009 (TMMC 2015). Winter numbers are generally over 500 animals (Goals Project 2000). In August to September, counts average from 350 to 850 (NMFS 2004). Of the California sea lions observed, approximately 85 percent were male. No pupping activity has been observed at this site or at other locations in the San Francisco Bay (Caltrans 2012). The California sea lions usually frequent Pier 39 in August after returning from the Channel Islands (Caltrans 2013). In addition to the Pier 39 haulout, California sea lions haul out on buoys and similar structures throughout San Francisco Bay. They are mainly seen

swimming off the San Francisco and Marin shorelines within San Francisco Bay, but may occasionally enter the project area to forage.

Northern Fur Seal

Juvenile northern fur seals occasionally strand during El Niño events (TMMC 2016). In normal years, TMMC admits about five northern fur seals that strand on the central California coast. During El Niño years, this number dramatically increases. For example, during the 2006 El Niño event, 33 fur seals were admitted. Some of these stranded animals were collected from shorelines in San Francisco Bay (TMMC 2016). The shoreline in the vicinity of the project is developed waterfront, consisting of piers and wharves where northern fur seals are unlikely to strand.

Pacific Harbor Seal

Long-term monitoring studies have been conducted at the largest harbor seal colonies in Point Reyes National Seashore and Golden Gate National Recreation Area since 1976. Castro Rocks and other haulouts in San Francisco Bay are part of the regional survey area for this study and have been included in annual survey efforts. Between 2007 and 2012, the average number of adults observed ranged from 126 to 166 during the breeding season (March through May), and from 92 to 129 during the molting season (June through July) (Truchinski *et al.*, 2008; Flynn *et al.*, 2009; Codde *et al.*, 2010, 2011, 2012; Codde and Allen 2015). Marine mammal monitoring at multiple locations inside San Francisco Bay was conducted by the California Department of Transportation (Caltrans) from May 1998 to February 2002, and determined that at least 500 harbor seals populate San Francisco Bay (Green *et al.*, 2002). This estimate agrees with previous seal counts in the San Francisco Bay, which ranged from 524 to 641 seals from 1987 to 1999 (Goals Project 2000).

Yerba Buena Island is the nearest harbor seal haulout site, with as many as 188 individuals observed hauled out. Harbor seals are more likely to be hauled out in the late afternoon and evening, and are more likely to be in the water during the morning and early afternoon. Tidal stage is a major controlling factor of haulout use by harbor seals, with more seals present during low tides than high tide periods (Green *et al.*, 2002). Therefore, the number of harbor seals in the vicinity of Yerba Buena Island will vary throughout the work period.

Northern Elephant Seal

Northern elephant seals are seen frequently on the California coast. Elephant seals aggregate at various sites along the coast to give birth and breed from December through March. Pups remain onshore or in adjacent shallow water through May. Adults make two foraging migrations each year, one after breeding and the second after molting (Stewart and DeLong 1995). Most strandings occur in May as young pups make their first trip out to sea. When those pups return to their rookery sites to molt in late summer and fall, some make brief stops in San Francisco Bay. Approximately 100 juvenile elephant seals strand in San Francisco Bay each year, including individual strandings at Yerba Buena Island and Treasure Island (fewer than 10 strandings per year) (Caltrans 2015b).

Take Calculation and Estimation

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

While impact pile driving may be used during this project, all piles in the previous year of construction were installed completely with vibratory pile driving. Impact driving take calculations are included for informational purposes (Tables 7 and 8). However, only vibratory pile driving take calculations are conservatively used to calculate Level B takes in this IHA as

vibratory driving is the most likely method of pile installation and results in greater Level B harassment zones. In the event impact driving does occur, we have authorized small numbers of Level A takes of harbor seals and California sea lions due to the large Level A harassment zones.

Gray Whale

Gray whales occasionally enter San Francisco Bay during their northward migration period of February and March. Pile driving will not occur during this time and gray whales are not likely to be present at other times of the year. It is estimated that two to six gray whales enter the Bay in any given year, but they are unlikely to be present during the work period (June 1 through November 30). However, individual gray whales have occasionally been observed in San Francisco Bay during the work period, and therefore it is estimated that, at most, one pair of gray whales may be exposed to Level B harassment during two days of pile driving if they enter the Level B harassment zones (Table 12).

Bottlenose Dolphin

When bottlenose dolphins are present in San Francisco Bay, they are more typically found close to the Golden Gate. Recently, beginning in 2015, two individuals have been observed frequently in the vicinity of Oyster Point (GGCR 2016, 2017; Perlman 2017). The average reported group size for bottlenose dolphins is five. Reports show that a group normally comes into San Francisco Bay and transits past Yerba Buena Island once per week for approximately a two week stint, then leaves (NMFS 2017b). Assuming the dolphins come into San Francisco Bay three times per year, the group of five dolphins would make six passes through the Level B harassment zone for a total of 30 takes (Table 11).

Harbor Porpoise

A small but growing population of harbor porpoises uses San Francisco Bay. Porpoises are usually spotted in the vicinity of Angel Island and the Golden Gate Bridge (Keener 2011), but may use other areas of the Central Bay in low numbers. During construction activities in 2017, marine mammal observers recorded eight sightings of harbor porpoises, including a group of two to three individuals that was seen three times over the course of the pile-driving season. Harbor porpoises generally travel individually or in small groups of two or three (Sekiguchi 1995), and a pod of up to four individuals was observed in the area south of Yerba Buena Island during the 2017 Bay Bridge monitoring window. A pod of four harbor porpoises could potentially enter the Level B harassment zone on as many as eight days of pile driving, for 32 total takes (Table 11).

California Sea Lion

Caltrans has conducted monitoring of marine mammals in the vicinity of the Bay Bridge for 16 years. From those data, Caltrans has produced at-sea density estimates for California sea lions of 0.161 animals per square kilometer (0.42 per square mile) for the summer-late fall season (Caltrans 2016). Marine mammal monitoring observations from the 2017 construction season were used to calculate a project-specific estimate of take per driving day (1.29 animals per day). Observations from marine mammal monitoring in 2017 were assumed to represent the occurrence of California sea lions along the waterfront while the Caltrans density represents the occurrence of California sea lions in open water in the bay. The two numbers were combined to calculate the daily average take over the entire Level B harassment zone (Table 7).

Table 7. Estimated Daily California Sea Lion Takes.

Pile Size and Installation Method	Area of Level B Harassment Zone (square km)	At-Sea Density (animals per square km)[a]	Takes Per Day from Density	Takes Per Day from 2017 Monitoring	Total Daily Level B Takes

24-in Vibratory	0.519	0.161	0.0836	1.29	1.37
30-in Vibratory	0.248	0.161	0.0399	1.29	1.33
36-in Vibratory	1.084	0.161	0.1745	1.29	1.46

[a]Caltrans 2016

During El Niño conditions, the density of California sea lions in San Francisco Bay may be much greater than the value used above. The likelihood of El Niño conditions occurring in 2018 is currently low, with La Niña conditions expected to develop (NOAA 2018). However, to account for the potential of El Niño developing in 2018, daily take estimated has been increased by a factor of 5 for each pile type (Table 8).

Table 8. Estimated Total California Sea Lion Takes from Vibratory Pile Driving.

Pile Size	Number of Piles	Number of Days	Daily Takes	Total Takes by Pile Type
24-in	35	18	6.87	124
30-in	18	9	6.65	60
36-in	28	14	7.32	103
			Total	286

In addition to Level B takes due to vibratory pile driving, NMFS has authorized a small number of Level A takes due to impact pile driving, should impact driving occur. Given the 31 m Level A harassment zone from impact driving of 36-in piles, NMFS has authorized the Level A take of one California sea lion per day of impact driving of 36-in piles (14 days) for a total of 14 Level A takes. WETA will be required to implement a 30 m shutdown zone to minimize Level A takes but this authorization allows for the taking of California sea lions that unexpectedly surface within the Level A zone before a shutdown can be initiated.

Northern Fur Seal

The incidence of northern fur seals in San Francisco Bay depends largely on oceanic conditions, with animals more likely to strand during El Niño events. El Niño conditions are

unlikely to develop in 2018 (NOAA 2018) but it is anticipated that up to 10 northern fur seals may be in San Francisco Bay and enter the Level B harassment zone (Table 11) (NMFS 2016b).

Pacific Harbor Seal

Caltrans has produced at-sea density estimates for Pacific harbor seals of 3.957 animals per square kilometer (10.25per square mile) for the fall-winter season (Caltrans 2016). Even though work will predominantly occur during the summer, when at-sea density has been observed to be lower (Caltrans 2016), the higher value of fall-winter density is conservatively used. Additionally, marine mammal monitoring observations from the 2017 construction season were used to calculate a project-specific estimate of take per driving day (3.18 animals per day). Observations from marine mammal monitoring in 2017 were assumed to represent the occurrence of harbor seals along the waterfront while the Caltrans density represents the occurrence of harbor seals in open water in the bay. The two numbers were combined to calculate the daily average take over the entire Level B harassment zone (Table 9). The daily take and days of pile installation were used to calculate total harbor seal Level B takes (Table 10).

Table 9. Estimated Daily Harbor Seal Takes.

Pile Size and Installation Method	Area of Level B Harassment Zone (square km)	At-Sea Density (animals per square km)[a]	Takes Per Day from Density	Takes Per Day from 2017 Monitoring	Total Daily Level B Takes
24-in Vibratory	0.510	3.957	2.054	3.18	5.23
30-in Vibratory	0.248	3.957	0.981	3.18	4.16
36-in Vibratory	1.084	3.957	4.289	3.18	7.47

[a]Caltrans 2016

Table 10. Estimated Total Pacific Harbor Seal Takes from Vibratory Pile Driving.

Pile Size	Number of Piles	Number of Days	Daily Takes	Total Takes by Pile Type
24-in	35	18	5.23	94

30-in	18	9	4.16	37
36-in	28	14	7.47	105
			Total	236

In addition to Level B takes due to vibratory pile driving, NMFS has authorized a small number of Level A takes due to impact pile driving, should impact driving occur. Given the large (224 – 429 m) Level A harassment zones from impact driving, NMFS has authorized the Level A take of three harbor seals per day on half of the planned days of activity (21 days) for a total of 63 Level A takes. WETA will be required to implement a 30 m shutdown zone to minimize Level A takes but this authorization allows for the taking of harbor seals that unexpectedly surface within the Level A zone before a shutdown can be initiated.

Northern Elephant Seal

Small numbers of elephant seals haul out or strand on Yerba Buena Island and Treasure Island each year. Monitoring of marine mammals in the vicinity of the Bay Bridge has been ongoing for 15 years. From these data, Caltrans has produced an estimated at-sea density for elephant seals of 0.06 animals per square kilometer (0.16 per square mile) (Caltrans 2015b). Most sightings of elephant seals occur in spring or early summer, and are less likely to occur during the period of in-water work for this project. As a result, densities during pile driving would be much lower. It is possible that a lone elephant seal may enter the Level B harassment zone once per week during the 26 week pile driving window (June 1 to November 30) for a total of 26 takes (Table 11).

Table 11. Total Authorized Takes.

	Gray Whale	**Bottlenose Dolphin**	**Harbor Porpoise**	**California Sea Lion**	**Northern Fur Seal**	**Pacific Harbor Seal**	**Northern Elephant Seal**
Level B Take	4	30	32	286	10	236	26

Authorized							
Level A Take Authorized	0	0	0	14	0	63	0
Total	4	30	32	300	10	299	26
Percent of Total Stock (%)	0.02	6.9	0.32	0.10	0.07	0.96	0.01

Mitigation

In order to issue an IHA under Section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to 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.

Mitigation for Marine Mammals and their Habitat

General Construction Measures

A Spill Prevention Control and Countermeasure (SPCC) plan has been prepared to address the emergency cleanup of any hazardous material, and will be available onsite. The SPCC plan incorporates SPCC, hazardous waste, stormwater, and other emergency planning requirements. In addition, the project will comply with the Port's stormwater regulations. Fueling of land and marine-based equipment will be conducted in accordance with procedures outlined in the SPCC. Well-maintained equipment will be used to perform work, and except in the case of a failure or breakdown, equipment maintenance will be performed offsite. Equipment will be inspected daily by the operator for leaks or spills. If leaks or spills are encountered, the source of the leak will be identified, leaked material will be cleaned up, and the cleaning materials will be collected and properly disposed. Fresh cement or concrete will not be allowed to enter San Francisco Bay. All construction materials, wastes, debris, sediment, rubbish, trash, fencing, etc. will be removed from the site once project construction is complete, and transported to an authorized disposal area.

Pile Driving

Pre-activity monitoring will take place from 30 minutes prior to initiation of pile driving activity and post-activity monitoring will continue through 30 minutes post-completion of pile driving activity. Pile driving may commence at the end of the 30-minute pre-activity monitoring period, provided observers have determined that the shutdown zone (described below) is clear of marine mammals, which includes delaying start of pile driving activities if a marine mammal is sighted in the zone, as described below. A determination that the shutdown zone is clear must be made during a period of good visibility (*i.e.*, the entire shutdown zone and surrounding waters must be visible to the naked eye).

If a marine mammal approaches or enters the shutdown zone during activities or pre-activity monitoring, all pile driving activities at that location shall be halted or delayed, respectively. If pile driving is halted or delayed due to the presence of a marine mammal, the activity may not resume or commence until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone and 15 or 30 minutes (for pinnipeds/small cetaceans or large cetaceans, respectively) have passed without re-detection of the animal. 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 thirty minutes.

For all pile driving activities, a minimum of one protected species observed (PSO) will be required, stationed at the active pile driving rig or at the best vantage point(s) practicable to monitor the shutdown zones for marine mammals and implement shutdown or delay procedures when applicable through communication with the equipment operator. Two PSOs will be required on days when impact pile driving occurs.

Monitoring of pile driving will be conducted by qualified PSOs (see below) who will have no other assigned tasks during monitoring periods. WETA will adhere to the following conditions when selecting observers:

- Independent PSOs will be used (*i.e.*, not construction personnel);
- PSOs must have prior experience working as a marine mammal observer during construction activities; and
- WETA will submit PSO CVs for approval by NMFS.

WETA will ensure that observers have the following additional qualifications:

- Ability to conduct field observations and collect data according to assigned protocols;
- Experience or training in the field identification of marine mammals, including the identification of behaviors;
- Sufficient training, orientation, or experience with the construction operation to provide for personal safety during observations;
- Writing skills sufficient to prepare a report of observations including but not limited to the number and species of marine mammals observed; dates and times when in-water construction activities were conducted; dates, times, and reason for implementation of mitigation (or why mitigation was not implemented when required); and marine mammal behavior; and
- Ability to communicate orally, by radio or in person, with project personnel to provide real-time information on marine mammals observed in the area as necessary.

To prevent Level A take of cetaceans, elephant seals, and Northern fur seals, shutdown zones equivalent to the Level A harassment zones will be established. If the Level A harassment zone is less than 10 m, a minimum 10 m shutdown zone will be enforced. WETA will implement shutdown zones as follows:

Table 12. Pile Driving Shutdown Zones.

Pile Size and Installation Method	**Shutdown Zone (m)**				
	Low-Frequency Cetaceans	**Mid-Frequency Cetaceans**	**High-Frequency Cetaceans**	**Phocid Pinnipeds**	**Otariid Pinnipeds**
24-in Vibratory	10	10	10	10	10
24-in Impact	420	15	500	30 for harbor seals, 224 for all other species	16
30-in Vibratory	10	10	10	10	10
30-in Impact	420	15	500	30 for harbor seals, 224 for all other species	16
36-in Vibratory	10	10	10	10	10
36-in Impact	800	30	955	30 for harbor seals, 430 for all other species	30

If a species for which authorization has not been granted, or a species for which authorization has been granted but the authorized takes are met, is observed approaching or within the Level B harassment zones (Table 4), pile driving and removal activities must cease immediately using delay and shut-down procedures. Similarly, if a species for which Level A take has not been authorized, or a species for which authorization has been granted but the authorized takes are met, is observed approaching or within the Level A harassment zones (Table 6), pile driving and removal activities must cease immediately. Activities must not resume until

the animal has been confirmed to have left the area or 15 or 30 minutes (pinniped/small cetacean or large cetacean, respectively) has elapsed.

Piles driven with an impact hammer will employ a "soft start" technique to give fish and marine mammals an opportunity to move out of the area before full-powered impact pile driving begins. This soft start will include an initial set of three strikes from the impact hammer at reduced energy, followed by a 30 second waiting period, then two subsequent three-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.

Impact hammers will be cushioned using a 12-in thick wood cushion block. WETA will also employ a bubble curtain during impact pile driving. WETA will implement the following performance standards:

- The bubble curtain must distribute air bubbles around 100 percent of the piling perimeter for the full depth of the water column;
- The lowest bubble ring shall be in contact with the mudline for the full circumference of the ring, and the weights attached to the bottom ring shall ensure 100 percent mudline contact. No parts of the ring or other objects shall prevent full mudline contact; and
- WETA shall require that construction contractors train personnel in the proper balancing of air flow to the bubblers, and shall require that construction contractors submit an inspection/performance report for approval by WETA within 72 hours following the performance test. Corrections to the attenuation device to meet the performance standards shall occur prior to impact driving.

Based on our evaluation of the mitigation measures listed above, NMFS has determined that the 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 action area. Effective reporting is critical both to compliance as well as ensuring that the most value is obtained from the required monitoring.

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

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

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

Hydroacoustic Monitoring

WETA's monitoring and reporting is also described in their Hydroacoustic Monitoring Plan and Marine Mammal Monitoring Plan, available at *https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-construction-activities*.

Hydroacoustic monitoring will be conducted in consultation with the California Department of Fish and Wildlife (CDFW) during a minimum of ten percent of all impact pile driving activities. Hydroacoustic monitoring of vibratory pile driving was completed during the 2017 construction season and will not be conducted in 2018. Monitoring of impact pile driving will be done in accordance with the methodology outlined in the Hydroacoustic Monitoring Plan. The monitoring will be conducted to achieve the following:

- Be based on the dual metric criteria (Popper *et al*., 2006) and the accumulated SEL;
- Establish field locations that will be used to document the extent of the area experiencing 187 dB SEL accumulated;

- Verify the distance of the Marine Mammal Level A harassment/shutdown zone and Level B harassment zone thresholds;
- Describe the methods necessary to continuously assess underwater noise on a real-time basis, including details on the number, location, distance, and depth of hydrophones and associated monitoring equipment;
- Provide a means of recording the time and number of pile strikes, the peak sound energy per strike, and interval between strikes; and
- Provide provisions to provide all monitoring data to the CDFW and NMFS.

Visual Marine Mammal Observations

WETA will collect sighting data and behavioral responses to construction for marine mammal species observed in the Level B harassment zones during the period of activity. All PSOs will be trained in marine mammal identification and behaviors and are required to have no other construction-related tasks while conducting monitoring. WETA proposes to use one PSO to monitor the shutdown zones and Level B harassment zones during vibratory pile driving. During impact pile driving, two PSOs will be used. The monitoring zones will be established equivalent to the Level B harassment zones for each pile size and installation method (Table 4). The PSO will monitor the shutdown zones and monitoring zones before, during, and after pile driving. Based on our requirements, WETA will implement the following procedures for pile driving and removal:

- The PSO will be located at the best vantage point in order to properly see the entire shutdown zone and as much of the monitoring zone as possible;
- During all observation periods, the observer 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 will not be initiated until that zone is visible. Should such conditions arise while pile driving is underway, the activity would be halted; and
- The shutdown and monitoring zones will be monitored for the presence of marine mammals before, during, and after any pile driving activity.

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

In addition, the PSO will survey the Level A and Level B harassment zones on two separate days—no earlier than seven days before the first day of construction—to establish baseline observations. Monitoring will be timed to occur during various tides (preferably low and high tides) during daylight hours from locations that are publicly accessible (*e.g.*, Pier 14 or the Ferry Plaza). The information collected from baseline monitoring will be used for comparison with results of monitoring during pile-driving activities.

Data Collection

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, age and sex 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 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.

Reporting

A draft report will be submitted to NMFS within 90 days of the completion of marine mammal monitoring, or sixty 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 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 activities associated with the ferry terminal 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 (PTS) and Level B harassment (behavioral disturbance), 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 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 in San Francisco Ferry Terminal 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 activities are localized and of relatively short duration (a maximum of 41 days of pile driving over the work season). The entire project area is limited to the San Francisco ferry terminal 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 planned 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 will 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.

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 will not result in any adverse impact to the stock as a whole.

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 is anticipated or authorized
- Injurious takes are not expected due to the presumed efficacy of the planned mitigation measures in reducing the effects of the specified activity to the level of least practicable impact;
- Level B harassment may consist of, at worst, temporary modifications in behavior (*e.g.*, temporary avoidance of habitat or changes in behavior);
- The lack of important feeding, pupping, or other areas in the action area;

- The high level of ambient noise already in the ferry terminal area; and
- The small percentage of the stock that may be affected by project activities (less than seven 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 the activity will have a negligible impact on all affected marine mammal species or stocks.

Small Numbers

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

Table 11 details the number of instances that animals could be exposed to received noise levels that could cause Level A and Level B harassment for the planned work at the ferry terminal project site relative to the total stock abundance. The instances of take authorized to be taken for all stocks are considered small relative to the relevant stocks or populations even if each estimated instance of take occurred to a new individual—an unlikely scenario. The total percent of the population (if each instance was a separate individual) for which take is requested is approximately seven percent for bottlenose dolphins, two percent for harbor seals, and less than one percent for all other species (Table 13). For pinnipeds occurring in the vicinity of the

ferry terminal, 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. Similarly, the number of bottlenose dolphins that could be subject to Level B harassment is expected to be a single pod of five individuals exposed up to six times over the course of the project.

Based on the analysis contained herein of the activity (including the mitigation and monitoring measures) and the anticipated take of marine mammals, NMFS 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.

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

Authorization

NMFS has issued an IHA to WETA for the potential harassment of small numbers of seven marine mammal species incidental to the Downtown San Francisco Ferry Terminal Expansion Project, South Basin Improvements Project, including the previously mentioned mitigation, monitoring, and reporting measures.

Dated: June 15, 2018.

Donna S. Wieting,

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National Marine Fisheries Service.

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