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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648-XG876

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to the Chevron Richmond Refinery Long Wharf Maintenance and Efficiency Project in San Francisco Bay, California

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 we have issued an incidental harassment authorization (IHA) to Chevron to take small numbers of marine mammals, by harassment, incidental to the Long Wharf Maintenance and Efficiency Project (LWMEP) in San Francisco Bay, California.

DATES: This authorization is effective from June 1, 2019, through May 31, 2020.

FOR FURTHER INFORMATION CONTACT: Rob Pauline, Office of Protected Resources, NMFS, (301) 427-8401. Electronic copies of the application and supporting documents, as well as the issued IHA, may be obtained online at: *https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act*. In case of problems accessing these documents, please call the contact listed above.

SUPPLEMENTARY INFORMATION:

Background

The MMPA prohibits the "take" of marine mammals, with certain exceptions. Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq*.) direct the Secretary of Commerce (as delegated to NMFS) to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of a proposed incidental take authorization may be provided to the public for review.

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

Summary of Request

On January 17, 2019, NMFS received a request from Chevron for an IHA to take marine mammals incidental to pile driving and removal associated with the LWMEP in San Francisco Bay, California. The application was deemed adequate and complete on April 8, 2019.

Chevron's request is for take of a small number of seven species of marine mammals, by Level B harassment and Level A harassment. Neither Chevron nor NMFS expects serious injury or mortality to result from this activity and, therefore, an IHA is appropriate.

NMFS previously issued an IHA to Chevron for similar work (82 FR 27240; June 17, 2017). However, the construction schedule and scope was revised and no work was conducted under that IHA. NMFS issued a second IHA on May 31, 2018 to Chevron for work not conducted in 2017 (83 FR 27578; June 13, 2018). This IHA covers one year of this larger project for which Chevron obtained the prior IHA, and Chevron also intends to request take authorizations for subsequent facets of the project. The larger multi-year project involves various construction activities that would allow Chevron to comply with Marine Oil Terminal Engineering and Maintenance Standards (MOTEMS) and to improve safety and efficiency at the Long Wharf. Chevron 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.

Because of the similarity of the work and marine mammal impacts to that covered in previous IHAs, we have often cited back to previous documents for more detailed descriptions.

Description of Activity

Chevron's Richmond Refinery Long Wharf (Long Wharf) located in San Francisco Bay, is the largest marine oil terminal in California. Impact pile driving and vibratory pile driving and removal will be employed during the planned construction project. These actions could produce underwater sound at levels that could result in the injury or behavioral harassment of marine mammal species. Pile driving activities would be timed to occur within the standard NMFS work windows for Endangered Species Act (ESA)-listed fish species (June 1 through November 30)

over multiple years. An estimated 67 days of pile driving activity within the designated work window are planned for 2019. Additional work in the future will require subsequent IHAs. The IHA is effective from June 1, 2019 through May 31, 2020.

A detailed description of the planned activities is provided in the **Federal Register** notice of the proposed IHA (84 FR 17788; April 26, 2019) for the issued IHA, **Federal Register** notice of the issuance of the 2018 IHA for Chevron's LWMEP project (83 FR 27578; June 13, 2018), the **Federal Register** notice of the proposed IHA (83 FR 18802; April 30, 2018), as well as Chevron's current IHA application for the 2019 work season. Therefore, a detailed description is not provided here. Please refer to that **Federal Register** notices and application for the description of the specific activity.

Comments and Responses

A notice of NMFS' proposal to issue an IHA was published in the **Federal Register** on March 26, 2019 (84 FR 177880). During the 30-day public comment period, NMFS received a comment letter from the Marine Mammal Commission (Commission). Specific comments and responses are provided below. The Commission's recommendations and our responses are provided here, and the comments have been posted online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-construction-activities.* The Commission recommended that NMFS issue the IHA, subject to inclusion of the proposed mitigation, monitoring, and reporting measures.

Comment 1: The Commission recommended that NMFS consult with external scientists and acousticians to determine the appropriate accumulation time that action proponents should use to determine the extent of the Level A harassment zones based on the associated SEL_{cum} thresholds for the various types of sound sources, including stationary sound sources.

Response: NMFS considers this a priority and has formed a Working Group to focus on the issue of accumulation time. Once the NMFS internal Working Group develops a proposal, it will be shared with Federal partners and other stakeholders.

Comment 2: The Commission recommended that, for all relevant incidental take authorizations, NMFS refrain from using a source level reduction factor for sound attenuation device implementation during impact pile driving, including the 60-inch steel piles proposed for use by Chevron.

Response: While it is true that noise level reduction measured at different received ranges does vary, given that both Level A and Level B harassment estimation using geometric modeling is based on noise levels measured at near-source distances (~10 meters), 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 San Francisco-Oakland Bay Bridge 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 been 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 meters) and far (>100 meters) distances, the linear averaged received level reduction is 6 decibels (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.

Bubble curtains are effective at attenuating sound originating within the water column. Pile driving does generate sound within the seafloor as well. This sound travels within the seafloor and emerges back to the water column, but its intensity is reduced within the sediment due to absorption by the sediment and reflection at the sediment/water interface.

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 3: The Commission recommended that NMFS should direct Chevron to use its PSOs to monitor more sufficiently both the Level A and B harassment zones, including the shut-down zones. The Commission further recommended that one PSO should be located in the near-field to ensure an unobstructed view of the shut-down zones and one PSO should be located on the north end of the wharf to monitor harbor seals in the far field, focusing on the area between the wharf and Castro Rocks.

Response: NMFS believes that the monitoring plan provided by the applicant is adequate to sufficiently monitor Level A and B harassment zones, including shut-down zones. Chevron opted to place one PSO on the east side of the wharf to monitor any marine mammals that occur between the wharf and the shoreline. The wharf is covered with building and large equipment resulting in obstructed views. Therefore, it is impossible for a single PSO on the east side of the wharf to also monitor the near or far fields on the west side of the wharf. However, NMFS will recommend that the PSO stationed on the north end of the wharf will monitor the entire visible area, with extra focus on the section between Castro Rocks and the wharf.

Comment 4: The Commission recommended that NMFS refrain from implementing its proposed renewal process for Chevron's subsequent authorizations. The Commission believes that the renewal process should be used sparingly and selectively, by limiting its use only to those proposed incidental harassment authorizations that are expected to have the lowest levels of impacts to marine mammals and that require the least complex analyses. Also, the Commission recommended that NMFS provide the Commission and other reviewers the full 30-day comment opportunity set forth in section 101(a)(5)(D)(iii) of the MMPA.

Response: Regarding the Commission's comment that Renewal IHAs should be limited to certain types of projects NMFS has explained on its website and in individual **Federal Register** notices that Renewal IHAs are appropriate where the continuing activities are identical, nearly identical, or a subset of the activities for which the initial 30-day comment period applied. If Chevron seeks to obtain a Renewal IHA in the future, NMFS will determine at that time whether the request meets the necessary conditions under which a Renewal IHA could be considered.

NMFS has taken a number of steps to ensure the public has adequate notice, time, and information to be able to comment effectively on Renewal IHAs within the limitations of processing IHA applications efficiently. **Federal Register** notices for the proposed initial IHAs identified the conditions under which a one-year Renewal IHA might be appropriate. This information is presented in the *Request for Public Comments* section and thus encourages submission of comments on the potential of a one-year renewal as well as the initial IHA during the 30-day comment period. In addition, when we receive an application for a Renewal IHA, we will publish notice of the proposed IHA Renewal in the **Federal Register** and provide an additional 15 days for public comment, making a total of 45 days of public comment. We also

directly contact all commenters on the initial IHA by email, phone, or, if the commenter did not provide email or phone information, by postal service to provide them the opportunity to submit any additional comments on the proposed Renewal IHA. Where the commenter has already had the opportunity to review and comment on the potential for a Renewal in the initial proposed IHA for these activities, the abbreviated additional comment period is sufficient for consideration of the results of the preliminary monitoring report and new information (if any) from the past year.

Comment 5: The Commission recommended that, NMFS (1) request that Chevron submit any future authorizations at least 6 months prior to the planned start date for incidental harassment authorizations and 9 months prior for rulemakings and (2) take all steps necessary to ensure that it publishes and finalizes proposed incidental harassment authorizations far enough in advance of the planned start date of the proposed activities to ensure full consideration is given to any and all comments received

Response: NMFS encourages all applicants to submit applications for IHA's 5-8 months in advance of the intended project start date and for rulemakings/LOA at least 9 months, and preferably 15 months, in advance of the intended project start date. NMFS provided the required 30-day notice for public comment, and has adequately considered all public comments received in making the necessary findings.

Description of Marine Mammals in the Area of Specified Activities

Sections 3 and 4 of the application summarize available information regarding status and trends, distribution and habitat preferences, and behavior and life history, of the potentially affected species. Additional information regarding population trends and threats may be found in NMFS's Stock Assessment Reports (SAR; *https://www.fisheries.noaa.gov/national/marine-*

mammal-protection/marine-mammal-stock-assessments) and more general information about these species (*e.g.*, physical and behavioral descriptions) may be found on NMFS's website (*https://www.fisheries.noaa.gov/find-species*).

Table 1 lists species that may occur in the vicinity of the project area. A description of the marine mammals in the area of the activities is found in the **Federal Register** notice of the issuance of the 2018 IHA for Chevron's LWMEP project (83 FR 27578; June 13, 2018), the **Federal Register** notice of the proposed IHA (83 FR 18802; April 30, 2018), as well as Chevron's current IHA application for the 2019 work season. NMFS has reviewed the monitoring data from the initial IHA, recent draft Stock Assessment Reports, information on relevant Unusual Mortality Events, and other scientific literature, and determined that neither this nor any other new information affects which species or stocks have the potential to be affected or the pertinent information in the Description of the Marine Mammals in the Area of Specified Activities contained in the supporting documents for the initial IHA. Specifically, the only change from the 2018 IHA is an increase in numbers of the eastern north Pacific stock of gray whale which have increased from 20,990 to 26,960.

Table 1. Marine Mammals Potentially Present in the Vicinity of the Project Area.

Common name	Scientific name	Stock	ESA/MMPA status; Strategic (Y/N)[1]	Stock abundance (CV, N_{min}, most recent abundance survey)[2]	PBR	Annual M/SI[3]
Order Cetartiodactyla – Cetacea – Superfamily Mysticeti (baleen whales)						
Family Eschrichtiidae						
Gray whale	*Eschrichtius robustus*	Eastern North Pacific	-/-; (N)	26,960 (0.05, 25,849, 2016)	801	138
Family Delphinidae						
Bottlenose dolphin	*Tursiops truncatus*	California Coastal	-/-;(N)	453 (0.06, 346, 2011)	2.7	$\geq$2.0
Family Phocoenidae (porpoises)						

Harbor porpoise	*Phocoena Phocoena*	San Francisco-Russian River Stock	-/-;(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*	Eastern U.S. stock	-/-;(N)	296,750 (-, 153,337, 2011)	9,200	389
Northern fur seal	*Callorhinus ursinus*	California stock	-/-;(N)	14,050 (-, 7,524, 2013)	451	1.8
Family Phocidae (earless seals)						
Pacific harbor seal	*Phoca vitulina*	California stock	-/-;(N)	30,968 (-,27,348, 2012)	1,641	43
Northern elephant seal	*Mirounga angustirostris*	California Breeding stock	-/-;(N)	179,000 (-, 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: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments.* CV is coefficient of variation; Nmin is the minimum estimate of stock abundance.
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.

Potential Effects of Specified Activities on Marine Mammals and their Habitat

A description of the potential effects of the specified activities on marine mammals and their habitat may be found in the **Federal Register** notice of the issuance of the 2018 IHA for Chevron's LWMEP project (83 FR 27578; June 13, 2018) and the **Federal Register** notice of the proposed IHA (83 FR 18802; April 30, 2018). This information remains applicable to the issuance of the 2019 IHA. NMFS has reviewed the monitoring data from the initial IHA and other scientific literature, and found no new information that would affect our initial analysis of impacts on marine mammals and their habitat.

Estimated Take

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

Harassment is the only type of take expected to result from these activities. Except with respect to certain activities not pertinent here, section 3(18) of the MMPA defines "harassment" as any act of pursuit, torment, or annoyance, which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment).

Authorized takes would primarily be by Level B harassment, as use of the acoustic source (*i.e.*, pile driving) has the potential to result in disruption of behavioral patterns for individual marine mammals. There is also some potential for limited auditory injury (Level A harassment) to result, primarily for high frequency species (harbor porpoises) because predicted auditory injury zones are larger than for other functional hearing groups and for phocids (harbor seals) as there is a sizable harbor seal haulout (Castro Rocks) located in close proximity to the project area. The required mitigation and monitoring measures are expected to minimize the severity of such taking to the extent practicable.

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

Generally speaking, we estimate take by considering: (1) acoustic thresholds above which NMFS believes the best available science indicates marine mammals will be behaviorally harassed or incur some degree of permanent hearing impairment; (2) the area or volume of water that will be ensonified above these levels in a day; (3) the density or occurrence of marine mammals within these ensonified areas; and, (4) and the number of days of activities. We note that while these basic factors can contribute to a basic calculation to provide an initial prediction

of takes, additional information that can qualitatively inform take estimates is also sometimes available (*e.g.*, previous monitoring results or average group size). Below, we describe the factors considered here in more detail and present the authorized 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). Based on what the available science indicates and the practical need to use a threshold based on a factor that is both predictable and measurable for most activities, NMFS uses a generalized acoustic threshold based on received level to estimate the onset of behavioral harassment. NMFS predicts that marine mammals are likely to be behaviorally harassed in a manner we consider Level B harassment when exposed to underwater anthropogenic noise above received levels of 120 dB re 1 microPascal, root mean square (μPa (rms) for continuous (*e.g.*, vibratory pile-driving), and above 160 dB re 1 μPa (rms) for non-explosive impulsive (*e.g.*, seismic airguns) or intermittent (*e.g.*, scientific sonar) sources.

Chevron's planned includes the use of continuous (vibratory pile driving and removal) and intermittent (impact pile driving) sources and, therefore, the 120 and 160 dB re 1 µPa (rms) thresholds are applicable.

Level A harassment for non-explosive sources - NMFS' Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0) (NMFS, 2018) identifies dual criteria to assess auditory injury (Level A harassment) to five different marine mammal groups (based on hearing sensitivity) as a result of exposure to noise from two different types of sources (impulsive or non-impulsive). Chevron's planned activity includes the use of impulsive (impact pile driving) and non-impulsive (vibratory pile driving and removal) sources.

These thresholds are provided in Table 2 below. The references, analysis, and methodology used in the development of the thresholds are described in NMFS 2018 Technical Guidance, which may be accessed at *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance*.

Table 2. Thresholds identifying the onset of Permanent Threshold Shift.

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

Otariid Pinnipeds (OW) (Underwater)	*Cell 9* $L_{pk,flat}$: 232 dB $L_{E,OW,24h}$: 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 1µPa²s. In this Table, thresholds are abbreviated to reflect American National Standards Institute standards (ANSI 2013). However, peak sound pressure is defined by ANSI as incorporating frequency weighting, which is not the intent for this Technical Guidance. Hence, the subscript "flat" is being included to indicate peak sound pressure should be flat weighted or unweighted within the generalized hearing range. The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The cumulative sound exposure level thresholds could be exceeded in a multitude of ways (i.e., varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these acoustic thresholds will be exceeded.		

Ensonified Area

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

The project includes impact pile driving, vibratory pile driving and vibratory pile removal. Source levels of some pile driving activities are based on hydroacoustic testing performed in 2018 at the LWMEP location as well as reviews of measurements of the same or similar types and dimensions of piles available in the literature. Based on this information, the source levels described below are assumed for the underwater noise produced by construction activities.

Eight batter steel pipe piles, 60-inch diameter would be installed using an impact hammer as it is difficult to vibrate in batter piles. These piles also have very high axial design loads that can only be achieved by impact driving methods. Other projects conducted under similar circumstances were reviewed in order to estimate the approximate noise effects of the 60-inch steel piles. The best match found for sound source levels is from summary values provided by

Caltrans in their hydroacoustic guidance document (Caltrans 2015). Summary values for the impact pile driving of 60-inch steel pipe piles indicates that noise levels of up to 210 peak, 185 dB SEL (single strike), and 195 RMS would be produced at 10 meters during pile driving using no sound attenuation such as a bubble curtain. The use of properly functioning bubble curtains is expected to reduce the peak and RMS noise levels by about 7 dB. As a result, noise levels of 203 dB peak, 178 dB SEL (single strike), and 188 dB are utilized to assess potential acoustic impacts.

It is expected that just one 60-inch pile would be driven over one (1) hour of active driving in a given day and that only one (1) pile would be installed in a given week. Installation could require up to 2,400 blows from an impact hammer, such as a HHK-16 or similar diesel hammer, producing approximately 173,000 to 217,000 ft. lbs. maximum energy per blow and 1.5 to 2 sec/blow average. As noted above, bubble curtains will be used during the installation of the 60-inch steel pipe piles in order to reduce underwater noise levels, with an assumed attenuation of 7 dB. NMFS acknowledges that noise level reductions measured at different project locations as well as different received ranges can vary widely. However, NMFS believes it reasonable to use a source level reduction factor for sound attenuation device implementation during impact pile driving. NMFS reviewed Caltrans' bubble curtain "on and off" studies conducted in San Francisco Bay in 2003 and 2004. Based on near distance measurements (a total of 28 measurements, with 14 during bubble curtain on and 14 during bubble curtain off), the linear averaged noise level reduction is 7 dB. As a conservative approach, NMFS will use a standard reduction of 7 dB of the source level for impact zone estimates.

Installation of 24-inch diameter square concrete piles is planned for the modifications at the four berths. Approximately one to two of these piles would be installed in one work day, using impact driving methods and a bubble curtain attenuation system. Based on measured blow

counts for 24-inch concrete piles driven at the Long Wharf Berth 4 in 2011, installation for each pile could require up to approximately 300 blows from a DelMag D62 22 or similar diesel hammer, producing approximately 165,000 ft lbs maximum energy (may not need full energy) and 1.5 second per blow average over a duration of approximately 20 minutes per pile, with 40 minutes of pile driving time per day if two (2) piles are installed.

To estimate the noise effects of the 24-inch square concrete piles, the underwater noise measurements recorded for this pile type at the Long Wharf during the 2018 construction season are utilized. These measured values were: 191 dB peak, 161 dB SEL (single strike), and 173 dB RMS during attenuated impact driving (AECOM 2018).

As part of the Berth 4 Loading Platform seismic retrofit, four (4) clusters of 13 composite piles (52 piles total) will be installed to provide protection to the infrastructure. These plastic encased concrete piles would be installed with a vibratory pile driver (APE 400B King Kong or similar vibratory driver), with a drive time of approximately 10 minutes per pile. Up to five (5) of these piles could be installed in any single work day.

Projects conducted under similar circumstances with similar piles were reviewed in order to approximate the noise effects of the 12-inch composite barrier piles. Since these piles will be composed of concrete encased in plastic, vibratory installation of similarly sized concrete piles would provide a good surrogate. However, concrete piles are rarely installed with a vibratory driver, and no suitable data could be located. In the absence of this data, we are conservatively using data from the Anacortes Ferry Terminal in Washington State, where 13-inch plastic coated steel piles were installed with a vibratory hammer. RMS noise levels produced during this installation varied from 138 to 158 dB RMS at 43 meters (141 feet) from the pile (Laughlin 2012). From these measurements, a peak noise value of 178 dB and an average RMS value of

168 dB normalized to a 10 meter (33 feet) distance was used to estimate the extent of underwater noise from installation of the 12-inch composite piles. During installation of the 12-inch composite barrier piles for the planned Project, up to 50 minutes of vibratory driving could occur per day.

For the Berth 4 Loading Platform seismic retrofit, eight (8) 36-inch diameter temporary steel piles would be installed using a vibratory pile driver (APE 400B King Kong or similar vibratory driver) will be needed to support the guide template for the driving of the permanent 60-inch steel pipe piles. Each 36-inch temporary pile has an estimated drive time of approximately 10 minutes per pile. Up to four (4) of these piles could be installed in any single work day.

Projects conducted under similar circumstances with similar piles were reviewed in order to approximate the noise effects of the 36-inch steel pipe. The best match for estimated noise levels is from the Explosive Handling Wharf-2 (EHW-2) project located at the Naval Base Kitsap in Bangor, Washington (Illingworth and Rodkin 2013) During vibratory pile driving associated with this Project, which occurred under similar circumstances, average peak noise levels were approximately 180 dB, and the RMS was approximately 170 dB at a 10 meter (33 feet) distance (Caltrans 2015a). Installation of the 36-inch steel pipe piles is expected to be require 40 minutes per day.

In total, two of the eight 36-inch temporary piles will require proofing using an impact hammer. Each pile will require up to 30 strikes from an impact hammer during proofing which will take place during the last foot of pile driving. Up to two (2) piles would be proofed in one day, with each pile requiring up to 30 strikes from an impact hammer, for a total of 60 strikes in one day. The best match found for sound source levels is from summary values provided by

Caltrans in their hydroacoustic guidance document (Caltrans 2015). Summary values for the impact pile driving of 36-inch steel pipe piles in water less than 5m deep indicates that noise levels of up to 208 peak, 180 dB SEL (single strike), and 193 RMS would be produced at 10 meters during pile driving. Since impact hammers are often operated at reduced power output during proofing, the source levels are likely to be lower than the values for impact driving used here. Due to very limited time that pile proofing would occur (60 strikes total, over a few minutes of active hammering) no sound attenuation would be used.

The Berth 4 Loading Platform seismic retrofit will require vibratory installation of, eight (8) 20-inch diameter temporary steel piles (APE 400B King Kong or similar vibratory driver) to support the guide template needed for the driving the permanent 60-inch steel pipe piles. Each 20-inch temporary pile has a drive time per pile of approximately 10 minutes. Up to four (4) of these piles could be installed in any single work day. The best match for estimated noise levels is from vibratory driving of 24-inch piles at the Explosive Handling Wharf-2 (EHW-2) project located at the Naval Base Kitsap in Bangor, Washington (Illingworth and Rodkin 2013). During vibratory pile driving associated with this Project, which occurred under similar circumstances, measured peak noise levels were approximately 180 dB, and the RMS was approximately 163 dB at a 10 meter (33 feet) distance (Illingworth and Rodkin 2013). During installation of the 20-inch steel pipe piles will require approximately 40 minutes per day.

The project includes the removal of 106 16-inch timber piles, and five (5) 18 to 24-inch square concrete piles using a vibratory pile driver. Up to 12 of these piles could be extracted in one (1) work day. Extraction time needed for each pile may vary greatly, but could require approximately 400 seconds (approximately seven (7) minutes) from an APE 400B King Kong or similar driver. The most applicable noise values for wooden pile removal from which to base

estimates for the LWMEP are derived from measurements taken at the Pier 62/63 pile removal in Seattle, Washington. During vibratory pile extraction associated with this Project, which occurred under similar circumstances, the RMS was approximately 152 dB (WSDOT 2011). Applicable sound values for the removal of concrete piles could not be located, but they are expected to be similar to the levels produced by wooden piles described above, as they are similarly sized, non-metallic, and will be removed using the same methods.

For pile driving that does not have project specific hydroacoustic data available, the practical spreading model with a transmission loss coefficient of 15 (4.5 dB per doubling of distance) is used. However, project-specific transmission loss values have been measured for the impact driving of concrete piles and resulted in a measured transmission loss factor of 20 (~8 dB per doubling of distance) which has been applied to calculate distances to harassment isopleths for those specific piles. This value is calculated from hydroacoustic monitoring of attenuated impact driving of concrete piles conducted as part of the LWMEP. The results of the 2018 hydroacoustic monitoring are provided in Appendix A of the application.

When the NMFS Technical Guidance (2016) was published, in recognition of the fact that ensonified area/volume could be more technically challenging to predict because of the duration component in the new thresholds, we developed a User Spreadsheet that includes tools to help predict a simple isopleth that can be used in conjunction with marine mammal density or occurrence to help predict takes. We note that because of some of the assumptions included in the methods used for these tools, we anticipate that isopleths produced are typically going to be overestimates of some degree, which may result in some degree of overestimate of Level A harassment take. However, these tools offer the best way to predict appropriate isopleths when more sophisticated 3D modeling methods are not available, and NMFS continues to develop

ways to quantitatively refine these tools, and will qualitatively address the output where appropriate. For stationary sources (such as 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 in Table 3.

Table 3. Inputs for User Spreadsheet.

Spreadsheet Tab Used	E.1-2: Impact Pile Driving	E.1-2: Impact Pile Driving	E.1-2: Impact Pile Driving	A.1: Vibratory Driving	A.1: Vibratory Driving	A.1: Vibratory Driving	A.1: Vibratory Driving
Pile Type	60-in steel	24-inch concrete	36-in steel	12-inch Composite	36-in steel	20-in steel	Wood/ Concrete
Source Level	178 SEL	161 SEL	180 SEL	168 RMS	170 RMS	163 RMS	152 RMS
Weighting Factor Adjustment (kHz)	2	2	2	2.5	2.5	2.5	2.5
Number of strikes in 1 h OR number of strikes per pile	2,400	300	30	NA	NA	NA	NA
Number of piles per day	1	2	2	5	4	4	12
Propagation (xLogR)	15	20	15	15	15	15	15
Duration to Drive single pile (minutes)	NA	NA	NA	10	10	10	7
Distance of source level measurement (meters)+	10	10	10	10	10	10	10

Table 4 shows the Level A harassment isopleths as determined utilizing inputs from Table 3. Note that for all calculations, the results based on SEL_{ss} are larger than SPL_{pk}, therefore, distances calculated using SEL_{ss} are used to calculate the area. Level B Harassment isopleths for impact and vibratory driving and extraction are shown in Table 5.

Table 4. Radial Distances to Level A Harassment Isopleths During Impact and Vibratory

Driving.

Project Element Requiring Pile Installation	Source Levels at 10 meters (dB)		Distance to Level A Threshold[1] meters (feet)				
	Peak[2]	RMS/SEL	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
Attenuated Impact Driving (with bubble curtain)							
60-inch steel pipe (1 per day)	203	178 SEL	831 (2,726)	30 (97)	990 (3,247)	445 (1,459)	32 (106)
24-inch square concrete (1-2 per day)	191	161 SEL	19 (64)	2 (5)	22 (73)	12 (40)	2 (6)
Impact Pile Proofing (no bubble curtain)							
36-inch steel pipe pile (2 total)	208	180 SEL	97 (317)	3 (11)	115 (377)	52 (170)	4 (12)
Vibratory Driving/Extraction							
12-inch Composite Barrier Pile (5 per day)	178	168 RMS	18 (58)	2 (5)	26 (86)	11 (35)	1 (2)
36-inch steel pipe pile (4 per day)	195	170 RMS	21 (68)	2 (6)	31 (101)	13 (41)	1 (3)
20-inch steel pipe pile (4 per day)	180	163 RMS	7 (23)	1 (2)	10 (34)	4 (14)	0 (1)
Wood and concrete pile extraction (12 per day)	No Data	152 RMS	2 (7)	0 (<1)	3 (10)	1 (4)	0 (<1)

Notes:

For calculation worksheets used to develop these numbers is provided in Appendix B.

[1] Level A thresholds are based on the NMFS 2016 Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing; cSEL threshold distances are shown. See footnote 3 below.

[2] All distances to the peak Level A thresholds are less than 33 feet (10 meters).

Distances are rounded to the nearest foot or to "<1.0 (0)" for values less than 1 foot.

Peak and cSEL are re: 1 µPa and 1 µPa^2-sec, respectively.

dB = decibels
SEL = sound exposure level

RMS=Root Mean Square

Table 5. Radial Distances to Level B Harassment Isopleths During Impact and Vibratory Driving.

Pile Type	Source Levels at 10 meters (dB)		Distance to Threshold 160/120 dB RMS (Level B)* meters (feet)
	Peak	RMS	
Attenuated Impact Driving (with bubble curtain)			
60-inch steel pipe (1 per day)	203	188	736 (2,413)
24-inch square concrete	191	173	45 (147)

(1-2 per day)			
Impact Pile Proofing (no bubble curtain)			
36-inch steel pipe pile (2 total)	208	190	1,000 (3,280)
Vibratory Driving/Extraction			
12-Inch Composite Barrier Piles (5 per day)	178	168	15,849 (51,984)
36-inch steel pipe pile (4 per day)	180	170	21,544 (70,665)
20-inch steel pipe pile (4 per day)	180	163	7,356 (24,129)
Wood and concrete pile extraction (12 per day)	No Data Available	152	1,359 (4,459)
Notes: dB decibels RMS root mean square * For underwater noise, the Level B Harassment threshold is 160 dB for impulsive noise and 120 dB for continuous noise			

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.

For the 2019 IHA application, a combination of nearby haul-out occupancy and at-sea densities were used to develop take estimates, in order to account for both local movements of harbor seals that haul out at Castro Rocks and other individuals that may be foraging in the more distant part of the Level B Harassment zone. By using hydroacoustic data collected in 2018, the extent of the harassment zones was refined for attenuated impact driving of concrete piles by using the transmission loss measured during 2018 project (20logr). As the Level B Harassment zones estimated for the 2019 IHA are generally more localized, only the occupancy from the local Castro Rocks haul-out is used.

Castro Rocks, located approximately 1.3 km northwest of the project site, is the largest harbor seal haul out site in the northern part of San Francisco Bay and is the second largest

pupping site in the Bay (Green *et al.* 2002). Tidal stage is a major controlling factor of haul out usage at Castro Rocks with more seals present during low tides than high tide periods (Green *et al.* 2002). Additionally, the number of seals hauled out at Castro Rocks also varies with the time of day, with proportionally more animals hauled out during the nighttime hours (Green *et al.* 2002). Therefore, the number of harbor seals in the water around Castro Rocks will vary throughout the work period. Pile driving would occur intermittently during the day with average active driving times typically of a few hours per day, so varying sets of animals may be hauled out or in the water. However, there are no systematic counts available for accurately estimating the number of seals that may be in the water near Long Wharf at any given time. The National Park Service provided recent data indicating that up to 176 seals could be present each day at Castro Rocks. This value was conservatively based on the highest mean plus the standard error of harbor seals observed at Castro Rocks per day (Codde, S. and S. Allen. 2013, 2015, and 2017), a value of 176 seals. The 2018 draft Long Wharf marine mammal monitoring report indicated that 24 harbor seals were observed within the Level B harassment zone and zero individuals were observed within the Level A harassment zone over 10 days of pile driving, which equals less than 1 percent of the authorized number of harbor seals with an average of 2.4 animals per day. The maximum number observed per day was six.

Since there are no California sea lion haul-outs in the vicinity of the project area, relatively few animals are expected to be present. However, monitoring for the RSRB did observe limited numbers in the north and central portions of the Bay during working hours. During monitoring for the San Francisco-Oakland Bay Bridge (SFOBB) Project in the central Bay, 83 California sea lions were observed in the vicinity of the bridge over a 17-year period from 2000-2017, and from these observations, an estimated at-sea density of 0.16 animals per

square kilometer is derived (NMFS 2018). This bridge is located approximately 25 km south of the LWMEP location and is considered by NMFS to be the best available information. The 2018 Long Wharf draft monitoring report did not record any observations of sea lions.

Small numbers of northern elephant seal may haul out or strand on coastline within the Central Bay. 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 0.16 animal per square mile (0.06 animal per square kilometer) (Caltrans, 2015b). 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. As a result, densities during pile driving for the planned action are likely to be lower. Additionally, this species was not observed by the marine mammal observers in the vicinity of the Long Wharf during 2018 pile driving monitoring.

The occurrence of northern fur seal in San Francisco Bay depends largely on oceanic conditions, with animals more likely to strand during El Niño events. Equatorial sea surface temperatures are above average across most of the Pacific Ocean this year, and El Niño is expected to continue through winter of 2019 and into spring (NOAA 2019). There are no estimated at-sea densities for this species in San Francisco Bay and no seals were recorded during 2018 Long Wharf marine mammal monitoring.

A small but growing population of harbor porpoises utilizes San Francisco Bay which are typically spotted in the vicinity of Angel Island and the Golden Gate (6 and 12 kilometers (3.7 and 7.5 miles) southwest respectively) and the vicinity of Treasure Island (Caltrans 2018). However, they may occur in other areas in the Central Bay in low numbers, including the project area. Based on monitoring conducted for the SFOBB project in 2017, an in-water density of 0.17

animals per square kilometer has been estimated by Caltrans for this species (NMFS 2018). No members of this species were recorded during 2018 during pile driving activities at LWMEP.

Bottlenose dolphins are typically found close to the Golden Gate Bridge when they are observed in San Francisco Bay. There are no estimated at-sea densities for this species in San Francisco Bay available for calculating a take estimate. Beginning in 2015, two individuals have been observed frequently in the vicinity of Oyster Point (GGCR 2018; Perlman, 2017). The average reported group size for bottlenose dolphins is five. Reports show that a group normally comes into San Francisco Bay, is near Yerba Buena Island once per week for approximately two (2) weeks and then leaves (NMFS, 2017).

Gray whales have been observed entering the Bay during their northward migration period, and are most often sighted in the Bay between February and May. Most venture only about 2 to 3 km (about 1-2 miles) past the Golden Gate. However, gray whales have occasionally been sighted as far north as San Pablo Bay. Pile driving is not expected to occur during the February-May period, and gray whales are not likely to be present at other times of year. No whales were observed as part of 2018 Long Wharf marine mammal monitoring activities.

Take Calculation and Estimation

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

When density data was available, take for the project was calculated by multiplying the density times the harassment zone (km^2) associated with pile driving activities that are underway times the number of construction days. Since density data was only available for harbor seals, harbor porpoises, and California sea lions, these were the only species whose take was calculated

using this methodology. For species without density information, information on average group size or local observational data was used as described below.

Pacific Harbor Seal

Chevron initially estimated that all harbor seals (176) at Castro Rocks would be exposed to noise that reaches the threshold for Level B harassment on every day on which there was pile driving. The areas of the Level A harassment zones in which take by injury could occur were determined by subtracting the shutdown zone areas from Level A harassment zone areas. Chevron estimated Level A take for impact driving of the 60-inch and 36-inch steel piles by using Level B take and multiplying it by the ratio of the Level A zone area to the Level B zone area. Level A take is not requested for vibratory driving. This resulted in an estimated 11,968 takes by Level B harassment and 513 takes by Level A harassment. However, based on input from the Commission as well as the size of the Level B zones extending beyond Castro Rocks, NMFS is authorizing takes for all 176 seals per day multiplied by 37 days for all piles but 24-inch concrete. For 24-inch concrete, the max observed, which was two, has been multiplied by 30 as resulting in a total of 6,572 Level B takes of harbor seal as shown in Table 9. For Level A harassment the same rationale was used. The area of the Level A harassment zone for 60-inch piles is 0.62 km^2, while the area of the Level B harassment zone is 1.7 km^2. The ratio of these two areas was multiplied by 176 seals resulting in 64 takes per day and a total of 513 authorized Level A harassment takes as shown in Table 6 and Table 10.

Table 6: Level A and Level B Harassment Estimate for Pacific Harbor Seal (Per Day).

				Estimated Take per Day	
Pile Type	Level B Zone (sq km)	Exclusion Zone radius (m)	Level A Zone, minus Shutdown Zone (sq km)	Level B Take per Day- Total	Level A Take per Day-Total
VIBRATORY DRIVING					
12-inch composite pile	165.62	15	0	176	NA
36-inch steel pipe pile	187.94	15	0	176	NA
20-inch steel pipe pile	87.57	10	0	176	NA
Timber/Concrete Pile Removal	5.33	15	0	176	NA
IMPACT DRIVING					
24-inch concrete pile	0.01	20	0	176	NA
60-inch steel pile	1.70	30	0.62	176	64.06
IMPACT PROOFING					
36-inch steel pile	3.14	30	0.01	176	0.14

For impact pile driving of the 60-inch steel piles, the shutdown zones (30 meters) are notably smaller than the Level A harassment zone and the applicant has accordingly requested take by Level A harassment for harbor seal so that pile driving can be completed on schedule without frequent shutdowns. Individuals occurring within the Level A harassment zone but outside of the shut-down zone may experience Level A harassment, if they reside in that area for a long enough duration. However, these animals can be highly mobile, and remaining within the small injury zone for an extended period is unlikely, though it could occur.

California sea lion

Monitoring data from the SFOBB Project over a 17-year period was used to develop a density of 0.16 California sea lions per square kilometer. This density and the areas of the potential Level B Harassment zones are used in Table 7. Level A harassment take of this species is not requested, due to the small size of the Level A harassment zone for otariid pinnipeds,

Table 7: Level B Harassment Estimate for California Sea Lion (Per Day).

Pile Type	Level B Zone (km^2)	Level B Take Estimate (based on Central Bay density of 0.16 animals per km^2)
VIBRATORY DRIVING		
12-inch composite pile	165.62	26.50
36-inch steel pipe pile	187.94	30.07
20-inch steel pipe pile	87.57	14.01
Timber/Concrete Pile Removal	5.33	0.85
IMPACT DRIVING		
24-inch concrete pile	0.01	0.01
60-inch steel pile	1.70	0.27
IMPACT PROOFING		
36-inch steel pile	3.14	0.50

Harbor Porpoise

Based on monitoring conducted for the SFOBB project in 2017, an in-water density of 0.17 animals per square kilometer has been estimated by Caltrans for this species (NMFS 2018). Using this in-water density and the areas of potential Level A and Level B harassment, take is estimated for harbor porpoise as provided in Table 10. Level A harassment zone areas in which PTS could occur were determined by subtracting the shutdown zone areas from Level A harassment zone areas. Level A take is not requested for vibratory driving.

Table 8: Level A and Level B Harassment Estimate for Pacific Harbor Porpoise (Per Day).

Pile Type	Level B Zone (km^2)	Exclusion Zone (m)	Level A Zone, minus Shutdown Zone (km^2)	Level B Estimate Central Bay In-Water - 0.17 per km^2	Estimated Level A take per day
VIBRATORY DRIVING					
12-inch composite barrier pile	165.62	50	NA	28.16	NA
36-inch steel pipe pile	187.94	50	NA	31.95	NA
20-inch steel pipe pile	87.57	50	NA	14.89	NA
Timber/Concrete Pile Removal	5.33	50	NA	0.91	NA
IMPACT DRIVING					

24-inch concrete pile 60-inch steel pile	0.01 0.21	50 50	0 0.23	0.01 0.29	0 0.52
IMPACT PROOFING					
36-inch steel pile	3.14	80	0	0.53	<0.01

Northern Elephant Seal

As noted above, elephant seal densities are expected to be extremely low. Therefore, Chevron did not use density data to calculate take. Additionally, this species was not observed by the marine mammal observers in the vicinity of the LWMEP during 2018 pile driving marine mammal monitoring activities. Therefore, Caltrans will conservatively assume that a lone northern elephant seal may enter the Level B Harassment area once per every three days during pile driving. As such, NMFS has authorized a total of 23 takes by Level B harassment. Level A harassment of this species is not expected to occur.

Northern Fur Seal

With weak El Niño conditions predicted to continue into spring and, perhaps, summer (NOAA 2019). There is a chance that fur seals could occur near the project area. Since there are no estimated at-sea densities for this species in San Francisco Bay, NMFS has authorized 10 takes of fur seals by Level B harassment. Level A harassment of this species is not anticipated.

Bottlenose Dolphin

As noted above, there are no estimated at-sea densities for this species in San Francisco Bay available for calculating a take estimate although they have been observed. Beginning in 2015, two individuals have been observed frequently in the vicinity of Oyster Point (GGCR, 2016; GGCR 2017; Perlman, 2017). The average reported group size for bottlenose dolphins is five. Assuming the dolphins come into San Francisco Bay once every 10 days, 30 takes would be anticipated, if the group enters the areas over which the Level B harassment thresholds may be exceeded. Therefore, NMFS has authorized the take of 30 bottlenose dolphins.

Gray Whale

Gray whales are most often sighted in the Bay between February and May. However, LWMEP pile driving is not expected to occur during this time, and gray whales are unlikely to be present at other times of year. However, should pile driving occur during the northward migration period, Chevron requests and NMFS has authorized two (2) Gray whale takes by Level B harassment.

The Level B Harassment estimates shown in Table 9 are based on the number of individuals assumed to be exposed per day, the number of piles driven per day and the number of days of pile driving expected based on an average installation rate.

Table 9: Summary of Estimated Take by Species for 2019 Work Season (Level B Harassment).

Pile Type	Pile Driver Type	# of Piles	# of Driving Days	Species						
				Harbor Seal	CA sea lion	Harbor porpoise	Gray whale*	N. elephant seal**	N. fur seal*	Bottlenose dolphin*
60-inch steel pipe	**Impact**	8	8	1,408	2.18	2.31	NA	2.66	NA	NA
36-inch steel pipe pile* ***	**Vibratory**	8	4	704	120.28	127.80	NA	1.33	NA	NA
36-inch steel pipe pile	**Impact Proofing**	2	1	176	0.50	0.53	NA	0.33	NA	NA
20-inch steel pipe pile	**Vibratory**	8	4	704	56.04	59.56	NA	1.33	NA	NA
Concrete pile removal	**Vibratory**	5	1	176	0.91	0.97	NA	0.33	NA	NA
24-inch concrete	**Impact**	39	30	60	0.3	0.04	NA	10	NA	NA
12-inch composite pile installation	**Vibratory**	52	11	1,936	291.50	309.72	NA	3.66	NA	NA
Timber pile removal	**Vibratory**	106	9	1,584	7.68	8.16	NA	3	NA	NA
Total Take by Species (2019)				**6,572**	**479**	**509**	**2**	**23**	**10**	**30**

*Take is not calculated by activity type for these species, only a total estimate is given.
**Assumes 1 take every 3 days of driving.
*** Level B take for this pile type is based on vibratory driving only, as the method produces the larger Level B zone.

Table 10: Summary of Estimated Take Level A Harassment for 2019 Work Season.

Pile Type	Pile Driver Type	# of Piles	# of Driving Days	Harbor Seal	Harbor porpoise
60-inch steel pipe	**Impact**	8	8	512.49	4.18
36-inch steel pipe pile	**Vibratory**	8	4	0	0
36-inch steel pipe pile	**Impact Proofing**	2	1	0.14	<0.01
20-inch steel pipe pile**	**Vibratory**	8	4	0	0
Concrete pile removal	**Vibratory**	5	1	0	0
24-inch concrete	**Impact**	39	30	0	0
12-inch composite pile installation	**Vibratory**	52	11	0	0
Timber pile removal	**Vibratory**	106	9	0	0
Total Take				**513**	**4**

Table 11. Authorized Take and Percentage of Stock or Population.

Species	Stock	Authorized Level A Takes	Authorized Level B Takes	Percent (instances of take compared to population abundance)
Harbor seal	California	513	6,572	22.9
California sea lion	Eastern U.S.	--	479	0.16
Harbor porpoise	San Francisco – Russian River	4	509	6.1
Northern elephant seal	California Breeding	--	23	<0.01
Gray whale	Eastern North Pacific	--	2	<0.01
Northern fur seal	California	--	10	<0.01
Bottlenose Dolphin	California Coastal	--	30	6.6

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, as well as subsistence uses. 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

The following measures will apply to Chevron's LWMEP mitigation requirements:

Noise Attenuation—Bubble curtains will be used during all impact pile driving of 60-inch steel shell pile and 24-inch square concrete piles to interrupt acoustic pressure and reduce impact on marine mammals. The use of bubble curtains is expected to reduce underwater noise levels by approximately 7 dB, which greatly reduces the area over which the cumulative SEL threshold for Level A harassment may be exceeded. Bubble curtains would also decrease the size of the Level B harassment zone, reducing the numbers of marine mammals affected by potential behavioral impacts.

Daylight Construction Period—Work would occur only during daylight hours (7:00 a.m. to 7:00 p.m.) when visual marine mammal monitoring can be conducted.

Establishment of a Shutdown Zone—For all pile driving and removal activities, Chevron will establish shutdown zones. The purpose of a shutdown zone is generally to define an area within which shutdown of activity would occur upon sighting of a marine mammal (or in anticipation of an animal entering the defined area). A shutdown zone will be established which will include all or a portion of the area where SPLs are expected to reach or exceed the cumulative SEL thresholds for Level A harassment as provided in Table 12.

Table 12: Shutdown Zones for LWMEP

Project Element Requiring Pile Installation	Exclusion Zones meters				
	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
Attenuated Impact Driving (with bubble curtain)					
60-inch steel pipe	840	30	50	30	35
24-inch square concrete	20	10	50	15	10

Impact Pile Proofing (no bubble curtain)					
36-inch steel pipe pile	100	10	80	30	10
Vibratory Driving/Extraction					
12-inch Composite Barrier Pile	20	10	50	15	10
36-inch steel pipe pile	20	10	50	15	10
20-inch steel pipe pile	10	10	50	10	10
Wood and concrete pile extraction	10	10	50	10	10

Establishment of Monitoring Zones for Level A and Level B—Chevron will establish and monitor Level A harassment zones during impact driving for harbor seal extending to 450 meters and harbor seals and extending to 990 for harbor porpoises. These are areas beyond the shutdown zone in which animals could be exposed to sound levels that could result in Level A harassment in the form of PTS. Chevron will also establish and monitor Level B harassment zones which are areas where SPLs are equal to or exceed the 160 dB rms threshold for impact driving and the 120 dB rms threshold during vibratory driving and extraction as shown in Table 5. Monitoring zones provide utility for observing by establishing monitoring protocols for areas adjacent to the shutdown zones. Monitoring zones also enable observers to be aware of and communicate the presence of marine mammals in the project area outside the shutdown zone and thus prepare for a potential cease of activity should the animal enter the shutdown zone. Level B harassment exposures will be recorded and extrapolated based upon the number of observed take and the percentage of the Level B harassment zone that was not visible.

10-Meter Shutdown Zone—During the in-water operation of heavy machinery (*e.g.*, barge movements), a 10-m shutdown zone for all marine mammals will be implemented. If a

marine mammal comes within 10 m, operations shall cease and vessels shall reduce speed to the minimum level required to maintain steerage and safe working conditions.

Soft Start—The use of a soft-start procedure are believed to provide additional protection to marine mammals by providing warning and/or giving marine mammals a chance to leave the area prior to the hammer operating at full capacity. Chevron shall use soft start techniques when impact pile driving. Soft start requires contractors to provide an initial set of strikes at reduced energy, followed by a thirty-second waiting period, then two subsequent reduced energy strike sets.

Pre-Activity Monitoring—Pre-activity monitoring shall take place from 30 minutes prior to initiation of pile driving activity and post-activity monitoring shall 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 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.

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 or 15 minutes 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.

Non-authorized Take Prohibited—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 monitoring zone, pile driving and removal activities must shut down immediately using delay and shut-down procedures. Activities must not resume until the animal has been confirmed to have left the area or an observation time period of 15 minutes has elapsed.

Based on our evaluation of the Chevron's measures, as well as other measures considered by NMFS, we have 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.

Visual Monitoring

The following visual monitoring measures are required as part of the issued IHA.

- One day of biological monitoring would occur within one week before the project's start date to establish baseline observations;
- Monitoring distances, in accordance with the identified shutdown, Level A, and Level B zones, will be determined by using a range finder, scope, hand-held global positioning system (GPS) device or landmarks with known distances from the monitoring positions;
- Monitoring locations will be established at locations offering best views of the monitoring zone;

- Monitoring would be conducted 30 minutes before, during, and 30 minutes after pile driving and removal activities. In addition, observers shall record all incidents of marine mammal occurrence, regardless of distance from activity, and shall document any behavioral reactions in concert with distance from piles being driven or removed. Pile driving and removal 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.
- Monitoring will be continuous unless the contractor takes a break longer than 2 hours from active pile driving, in which case, monitoring will be required 30 minutes prior to restarting pile installation;
- For in-water pile driving, under conditions of fog or poor visibility that might obscure the presence of a marine mammal within the shutdown zone, the pile in progress will be completed and then pile driving suspended until visibility conditions improve;
- At least two PSOs will be actively scanning the monitoring zone during all pile driving activities with one PSO stationed at the north end of the wharf monitoring the entire observable area with a special focus on the section between Castro Rocks and the wharf;
- Monitoring of pile driving shall be conducted by qualified PSOs (see below), who shall have no other assigned tasks during monitoring periods. Chevron shall adhere to the following conditions when selecting observers:

(1) Independent PSOs shall be used (*i.e.*, not construction personnel);

(2) At least one PSO must have prior experience working as a marine mammal observer during construction activities;

(3) Other PSOs may substitute education (degree in biological science or related field) or training for experience; and

(4) Chevron shall submit PSO CVs for approval by NMFS;

- Chevron will ensure that observers have the following additional qualifications:

(1) Ability to conduct field observations and collect data according to assigned protocols;

(2) Experience or training in the field identification of marine mammals, including the identification of behaviors;

(3) Sufficient training, orientation, or experience with the construction operation to provide for personal safety during observations;

(4) 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

(5) 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.

Hydroacoustic Monitoring

Sound Source Verification (SSV) testing of would be conducted under this IHA. The purpose of the planned acoustic monitoring plan is to collect underwater sound-level information at both near and distant locations during vibratory pile extraction and installation and impact pile installation. Hydroacoustic monitoring would be conducted by a qualified monitor during pile extraction and driving activities as described in the Hydroacoustic Monitoring plan and will likely include the following during 2019:

- Acoustic monitoring for at least two (2) timber piles (vibratory);
- Acoustic monitoring for at least four (4) 24-inch square concrete piles (impact);
- Acoustic monitoring for at least two (2) 20-inch steel piles (vibratory);

- Acoustic monitoring for at least two (2) 36-inch steel piles (vibratory);
- Acoustic monitoring for at least two (2) 60-inch steel piles (impact); and
- Acoustic monitoring of two (2) 12-inch composite piles (vibratory).

Reporting Measures

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

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

- Number of individuals of each species (differentiated by month as appropriate) detected within the monitoring zone, and estimates of number of marine mammals taken, by species (a correction factor may be applied to total take numbers, as appropriate);
- Detailed information about any implementation of any mitigation triggered (*e.g.*, shutdowns and delays), a description of specific actions that ensued, and resulting behavior of the animal, if any;
- Description of attempts to distinguish between the number of individual animals taken and the number of incidences of take, such as ability to track groups or individuals; and
- Level B harassment exposures recorded by PSOs must be extrapolated based upon the number of observed takes and the percentage of the Level B harassment zone that was not visible.

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

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

- Description of the incident;
- Environmental conditions (*e.g.*, Beaufort sea state, visibility);

- Description of all marine mammal observations in the 24 hours preceding the incident;
- Species identification or description of the animal(s) involved;
- Fate of the animal(s); and
- Photographs or video footage of the animal(s) (if equipment is available).

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

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

In the event that Chevron discovers an injured or dead marine mammal and the lead PSO determines that the injury or death is not associated with or related to the activities authorized in the IHA (*e.g.*, previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), Chevron would report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, and the West Coast Regional Stranding Coordinator, within 24 hours of the discovery. Chevron would provide photographs,

video footage (if available), or other documentation of the stranded animal sighting to NMFS and the Marine Mammal Stranding Network.

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 and extraction associated with Chevron's LWMEP project as outlined previously have the potential to injure, disturb or displace marine mammals. Specifically, the planned activities may result in Level B harassment (behavioral disturbance) for seven marine mammal species authorized for take from underwater sound generated during pile driving and

removal operations. Level A harassment in the form of limited PTS may also occur to animals of two species. No marine mammal stocks for which incidental take authorization are listed as threatened or endangered under the ESA or determined to be strategic or depleted under the MMPA. No serious injuries or mortalities are anticipated to occur as a result of Chevron's pile driving activities.

A limited number of animals (513 harbor seals and 4 harbor porpoises) could experience Level A harassment in the form of PTS if they stay within the Level A harassment zone during impact driving of 60-inch steel and 36-inch steel piles.. The degree of injury is expected to be mild and is not likely to affect the reproduction or survival of the individual animals. It is expected that, if hearing impairments occurs, most likely the affected animal would lose a few dB in its hearing sensitivity, which in most cases is not likely to affect its survival and recruitment.

The Level B takes that are anticipated and authorized are expected to be limited to short-term behavioral harassment. Marine mammals present near the action area and taken by Level B harassment would most likely show overt brief disturbance *(e.g.* startle reaction) and avoidance of the area from elevated noise level during pile driving. However, this is unlikely to result in any significant realized decrease in fitness for the affected individuals or stocks for which take is authorized. While harbor seals from Castro Rocks may experience some temporary low-level behavioral impacts, the number of seals potentially affected is conservatively estimated at approximately 23 percent of the stock. This number, however, likely includes multiple takes of the same individuals. Furthermore, Castro Rocks and the LWMEP location represent a small portion of the range of the California stock of harbor seal. These two factors indicate that a much

lower percentage of the stock would potentially be affected and, therefore, no adverse impacts to the stock as a whole are expected.

The project is not expected to have significant adverse effects on affected marine mammal habitat. The activities may cause fish to leave the area temporarily. This could impact marine mammals' foraging opportunities in a limited portion of the foraging range; but, because of the relatively short duration of driving activities and the relatively small area of affected habitat, the impacts to marine mammal habitat are not expected to cause significant or long-term negative consequences. Furthermore, there are no biologically important areas identified in the project area.

The likelihood that marine mammals will be detected by trained observers is high under the environmental conditions described for the project. The employment of the soft-start mitigation measure during impact driving would also allow marine mammals in or near the shutdown and Level A zone zones to move away from the impact driving sound source. Therefore, the mitigation and monitoring measures are expected to reduce the potential for injury and reduce the amount and intensity of behavioral harassment. Furthermore, the pile driving activities analyzed here are similar to, or less impactful than, numerous construction activities conducted in other similar locations which have taken place with no reported injuries or mortality to marine mammals, and no known long-term adverse consequences from behavioral harassment.

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;

- Anticipated incidences of Level A harassment would be in the form of a small degree of PTS to a limited number of animals;
- Anticipated incidents of Level B harassment consist of, at worst, temporary modifications in behavior;
- No biologically important areas have been identified in the vicinity of the project area;
- The small percentage of the stock that may be affected by project activities (< 23 percent for all stocks); and
- Efficacy of mitigation measures is expected to minimize the likelihood and severity of the level of harassment.

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

Table 13 depicts the number of animals that could be exposed to Level A and Level B harassment from work associated with Chevron's project. The analysis provided indicates that authorized take would account for no more than 23 percent of the populations of the stocks that could be affected. These are small numbers of marine mammals relative to the sizes of the affected stocks.

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

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 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.

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 expected to occur or authorized for this activity. Therefore, NMFS has determined that formal consultation under section 7 of the ESA is not required for this action.

Authorization

As a result of these determinations, NMFS has issued an IHA to Chevron for conducting pile driving and removal activities at Chevron's Long Wharf from June 1, 2019 through May 31, 2020, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated.

Dated: May 30, 2019.

Donna S. Wieting,

Director,

Office of Protected Resources,

National Marine Fisheries Service.

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