



**BILLING CODE 3510-22-P**

**DEPARTMENT OF COMMERCE**

**National Oceanic and Atmospheric Administration**

**RIN 0648-XF246**

**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; proposed incidental harassment authorization; request for comments.

**SUMMARY:** NMFS has received an application from Chevron for an Incidental Harassment Authorization (IHA) to take marine mammals, by harassment, incidental to pile driving and removal associated with the Long Wharf Maintenance and Efficiency Project (WMEP). Pursuant to the Marine Mammal Protection Act (MMPA), NMFS is requesting comments on its proposal to issue an IHA to Chevron to incidentally take marine mammals during the specified activity.

**DATES:** Comments and information must be received no later than *[insert date 30 days after date of publication in the FEDERAL REGISTER]*.

**ADDRESSES:** Comments on the applications should be addressed to Jolie Harrison, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service. Physical comments should be sent to 1315 East-West Highway, Silver Spring, MD 20910 and electronic comments should be sent to *ITP.pauline@noaa.gov*.

*Instructions:* Comments sent by any other method, to any other address or individual, or received after the end of the comment period, may not be considered by NMFS. Comments received electronically, including all attachments, must not exceed a 25-megabyte file size. Attachments to electronic comments will be accepted in Microsoft Word or Excel or Adobe PDF file formats only. All comments received are a part of the public record and will generally be posted for public viewing on the Internet at [www.nmfs.noaa.gov/pr/permits/incidental/construction.htm](http://www.nmfs.noaa.gov/pr/permits/incidental/construction.htm) without change. All personal identifying information (*e.g.*, name, address) voluntarily submitted by the commenter may be publicly accessible. Do not submit confidential business information or otherwise sensitive or protected information.

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

**SUPPLEMENTARY INFORMATION:**

**Background**

Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq.*) direct the Secretary of Commerce to allow, upon request by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified area, the incidental, but not intentional, taking of small numbers of marine mammals, providing that certain findings are made and the necessary prescriptions are established.

The incidental taking of small numbers of marine mammals may be allowed only if NMFS (through authority delegated by the Secretary) finds that the total taking by the specified activity during the specified time period will (i) have a negligible impact on the species or stock(s) and (ii) not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant). Further, the permissible methods of taking, as well as the other means of effecting the least practicable adverse impact on the species or stock and its habitat (*i.e.*, mitigation) must be prescribed. Last, requirements pertaining to the monitoring and reporting of such taking must be set forth.

Where there is the potential for serious injury or death, the allowance of incidental taking requires promulgation of regulations under section 101(a)(5)(A). Subsequently, a Letter (or Letters) of Authorization (LOA) may be issued as governed by the prescriptions established in such regulations, provided that the level of taking will be consistent with the findings made for the total taking allowable under the specific regulations. Under section 101(a)(5)(D), NMFS may authorize incidental taking by harassment only (*i.e.*, no serious injury or mortality), for periods of not more than one year, pursuant to requirements and conditions contained within an IHA. The promulgation of regulations or issuance of IHAs (with their associated prescribed mitigation, monitoring, and reporting) requires notice and opportunity for public comment.

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.”

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).

### **Summary of Request**

On July 21, 2014, NMFS received a request from Chevron for authorization to take marine mammals incidental to pile driving and pile removal associated with the WMEP in San Francisco Bay, California. The project was delayed due to funding constraints. Chevron submitted a revised version of the request on November 16, 2016, which was deemed adequate and complete on January 12, 2017. Chevron proposes to undertake the WMEP in order to comply with current Marine Oil Terminal Engineering and Maintenance Standards (MOTEMS) requirements and to improve safety and efficiency at the Long Wharf. Construction would start in 2018, and be complete by the fourth quarter of 2022. Therefore, Chevron expects to request additional IHAs in association with this multi-year project. The effective dates for this first proposed IHA would be from January 1, 2018 through December 31, 2018. The use of both vibratory and impact pile driving during pile removal and installation during the four-year construction period is expected to produce underwater sound at levels that have the potential to result in Level B (behavioral) harassment of marine mammals. However, only impact driving will occur during 2018 and would be covered under the proposed IHA. Species expected to occur in

the area and for which authorization is requested include California sea lion (*Zalophus californianus*) and Pacific harbor seal (*Phoca vitulina*).

## **Description of the Specified Activity**

### **Overview**

The Chevron's Richmond Refinery Long Wharf (Long Wharf) is the largest marine oil terminal in California. Its operations are regulated primarily by the California State Lands Commission (CSLC) through a State Lands lease, Article 5 of CSLC regulations, and MOTEMS (California Building Code (CBC) Chapter 31F). The Long Wharf has existed in its current location since the early 1900s (Figure 1-1 in Application). The Berth 2 fender system (timber pile and whaler) was designed and installed in 1940. Marine loading arms, gangways, and fender systems at Berths 1, 3 and 4 were installed in 1972. The Berth 4 fender panels were replaced in 2011 and the Berth 1 fender panels were replaced in 2012. The existing configuration of these systems have limitations to accepting more modern, fuel efficient vessels with shorter parallel mid-body hulls and in some cases do not meet current MOTEMS requirements.

The purpose of the proposed WMEP is to comply with current MOTEMS requirements and to improve safety and efficiency at the Long Wharf. To meet MOTEMS requirements, the fendering system at Berth 2 is being updated and the Berth 4 loading platform will be seismically retrofitted to stiffen the structure and reduce movement of the Long Wharf in the event of a level 1 or 2 earthquake. Safety will be improved by replacing gangways and fire monitors. Efficiency at the Long Wharf will be improved by updating the fender system configuration at Berth 4 to accommodate newer, more fuel efficient vessels and thus reduce idling time for vessels waiting to berth. Further,

efficiency will be improved by updating the fender system at Berth 1 to accommodate barges, enabling balanced utilization across Berths 1, 2, and 3.

### **Dates and Duration**

Project construction would start in 2018, and be completed by the fourth quarter of 2022. Pile driving activities would be timed to occur within the standard NMFS work windows for listed fish species (June 1 through November 30) in those four years. The effective date for the first proposed IHA would be from January 1, 2018 through December 31, 2018. Over the course of the multi-year project 249 piles of various sizes will be installed via impact and vibratory driving; 161 piles will be removed via vibratory removal; and 209 driving days are planned. During the first year of construction covered under this proposed IHA, eight 24-inch concrete piles would be installed by impact driving over 4 workdays at Berth 2.

### **Specified Geographic Region**

The Long Wharf is located in San Francisco Bay (the Bay) just south of the eastern terminus of the Richmond-San Rafael Bridge (RSRB) in Contra Costa County. The wharf is located in the northern portion of the Central Bay, which is generally defined as the area between the RSRB, Golden Gate Bridge, and San Francisco-Oakland Bay Bridge. The South Bay is located south of the San Francisco-Oakland Bay Bridge. San Pablo Bay extends north of the RSRB.

### *Detailed Description of Specified Activities*

The complete multi-year project would involve modifications at four berths (Berths 1, 2, 3, and 4) as shown in Figure 1-1 in the Application. Proposed modifications to the Long Wharf include replacing gangways and cranes, adding new mooring hooks

and standoff fenders, adding new dolphins and catwalks, and modifying the fire water system at Berths 1, 2, 3 and/or 4, as well as the seismic retrofit to the Berth 4 loading platform. The type and numbers of piles to be installed, as well as those that will be removed, are summarized in Table 1-1 in the Application and an overview of the modifications at Berths 1 to 4 are shown in Figure 1-2 in the Application.

The combined modifications to Berths 1-4 would require the installation of 141 new concrete piles to support new and replacement equipment and their associated structures. The Berth 4 loading platform would add eight, 60-inch diameter steel piles as part of the seismic retrofit.

The project would also add four clusters of 13 composite piles each (52 total) as markers and protection of the new batter (driven at an angle) piles on the east side of the Berth 4 retrofit. The project would remove 106 existing timber piles, two existing 18-inch and two existing 24-inch concrete piles. A total of 12 24-inch temporary steel piles would also be installed and removed during the seismic retrofit of Berth 4.

The modifications at each berth are summarized below.

*Modifications at Berth 1 include the following:*

- Replace gangway to accommodate barges and add a new raised fire monitor.
- Construct a new 24' x 20' mooring dolphin and hook to accommodate barges.
- Construct a new 24' x 25' breasting dolphin and 13' x 26' breasting point with standoff fenders to accommodate barges. The new breasting dolphin will require removal of an existing catwalk and two piles and moving a catwalk to a slightly different location to maintain access to currently existing dolphins. A new catwalk will be installed to provide access to the new breasting dolphin.

- A portion of the existing gangway will be removed. The remaining portion is used for other existing services located on its structure.

Much of this work will be above the water or on the deck of the terminal. The mooring dolphin and hook, breasting dolphin, and new gangway will require installation of 42 new 24-inch square concrete piles using impact driving methods.

*Modifications at Berth 2 include the following:*

- Install new gangway to replace portable gangway and add a new elevated fire monitor.
- Replace one bollard with a new hook.
- Install four new standoff fenders (to replace timber fender pile system).
- Replace existing auxiliary and hose cranes and vapor recovery crane to accommodate the new standoff fenders.
- Remove the existing timber fender pile system along the length of the Berth (~650 ft.)
- Three (3) existing brace piles (22-inch square concrete jacketed timber piles) would be removed by cutting below the mud line if possible.

These modifications will require the installation of 51 new 24-inch square concrete piles, using impact driving methods, to support the gangway, standoff fenders, hose crane, and auxiliary crane. To keep Berth 2 operational during construction, four temporary fenders will be installed, supported by 36 temporary 14-inch H-piles driven using vibratory methods. It is expected that the H-piles would largely sink under their own weight and would require very little driving. The H-piles and temporary fenders will be removed once the permanent standoff fenders are complete. The auxiliary and hose cranes

are being replaced with cranes with longer reach to accommodate the additional distance of the new standoff fenders. The new vapor recovery crane would be mounted on an existing pedestal and not require in-water work.

*Modifications at Berth 3 include the following:*

- Install new fixed gangway to replace portable gangway and add a new raised fire monitor. The gangway would be supported by four, 24-inch square concrete piles. This would be the only in-water work for modifications at Berth 3.

Modifications at Berth 4 include the following:

- Install two new 36' x 20' dolphins with standoff fenders (two per dolphin) and two catwalks.
- Seismically retrofit the Berth 4 loading platform including bolstering and relocation of piping and electrical facilities.

The new fenders would add 44 new 24-inch square concrete piles.

The seismic retrofit would structurally stiffen the Berth 4 Loading Platform under seismic loads. This will require cutting holes in the concrete decking and driving eight, 60-inch diameter hollow steel batter piles, using impact pile driving. To accommodate the new retrofit, an existing sump will be replaced with a new sump and two, 24-inch square concrete piles will be removed or cut to the “mudline.” The engineering team has determined that to drive the 60-inch batter piles, twelve temporary steel piles, 24 inches in diameter, will be needed to support templates for the angled piles during driving. Two templates are required, each 24 feet by 4 feet and supported by up to six 24-inch steel pipe piles. The templates will be above water. The project would also add 4 clusters of 13

composite piles each (52 total composite piles) as markers and protection of the new batter piles on the east side of the retrofit. See Table 1 for pile summary information.

**Table 1. Summary of Pile Types, Sizes, Locations, and Installation/Removal Methods.**

Item	Description	No. Piles	Pile Installation / Removal Method
New Installation	Berth 1 Mooring Hook Dolphin	13	Impact
	Berth 1 Outer Breasting Dolphin	17	Impact
	Berth 1 Inner Breasting Point	8	Impact
	Berth 1 Gangway	4	Impact
	Berth 2 South Outside Fender	10	Impact
	Berth 2 South Inside Fender	10	Impact
	Berth 2 North Inside Fender	9	Impact
	Berth 2 North Outside Fender	10	Impact
	Berth 2 Main Hose Crane	4	Impact
	Berth 2 Aux Crane	4	Impact
	Berth 2 Gangway	4	Impact
	Berth 3 Gangway	4	Impact
	Berth 4 South Breasting Dolphin	22	Impact
	Berth 4 North Breasting Dolphin	22	Impact
	<b>Total 24-inch Square Concrete Piles</b>	<b>141</b>	
	Berth 4 Loading Platform Retrofit (60-inch-diameter Steel Piles)	8	Impact
	Berth 4 Barrier Piles (4 Clusters of 13 Composite Piles)	52	Vibrate
<b>Total</b>	<b>201</b>		
Permanent Removal	Berth 1 Pile Removal	-2	Vibrate
	Berth 2 Pile Removal (106 Wooden - Actual Count)	-106	Vibrate
	Berth 2 Brace Piles (22-inch Square Concrete Jacketed Timber Piles)	-3	Cut
	Berth 4 Concrete Pile Removal	-2	Cut
	<b>Total Removal</b>	<b>-113</b>	
<b>Net Change</b>		<b>88</b>	
Temporary	Berth 1 Pile Installation and Removal	36	Vibrate
	Berth 2 Whaler Installation and Removal (excluding wooden Piles)	12	Vibrate
<b>Total Installation</b>		<b>249</b>	
<b>Total Removal</b>		<b>116</b>	

Note that the proposed IHA covers actions occurring during 2018 only. These actions include only the installation of eight 24-inch concrete piles by impact hammer driving over four workdays. These piles would replace existing auxiliary and hose cranes and vapor recovery crane at Berth 2. Impact installation would occur utilizing a DelMag

D62 22 or similar diesel hammer, producing approximately 165,000 ft lbs maximum energy (may not need full energy) over a duration of approximately 20 minutes per pile.

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

### **Description of Marine Mammals in the Area of the Specified Activity**

Although 35 species of marine mammals can be found off the coast of California, few species venture into San Francisco Bay, and only Pacific harbor seals (*Phoca vitulina*), California sea lions (*Zalophus californianus*), and harbor porpoises (*Phocoena phocoena*) make the Bay a permanent home. Small numbers of gray whales (*Eschrichtius robustus*) are regularly sighted in the Bay during their yearly migration, though most sightings tend to occur in the Central Bay near the Golden Gate Bridge. Two other species that may occasionally occur within San Francisco Bay include the Steller sea lion (*Eumetopias jubatus*) and bottlenose dolphin (*Tursiops truncatus*).

#### *Pacific Harbor Seal*

The Pacific harbor seal is one of five subspecies of *Phoca vitulina*, or the common harbor seal. They are a true seal, with a rounded head and visible ear canal, distinct from the eared seals, or sea lions, which have a pointed head and an external ear. Although generally solitary in the water, harbor seals come ashore at “haul-outs” — shoreline areas where pinnipeds congregate to rest, socialize, breed, and molt — that are used for resting, thermoregulation, birthing, and nursing pups. Haul-out sites are relatively consistent from year to year (Kopec and Harvey 1995), and females have been recorded returning to their own natal haul-out when breeding (Green *et al.*, 2006). The nearest haul-out site to the

project site is Castro Rocks, approximately 650 meters north of the northernmost point on the Long Wharf.

The haul-out sites at Mowry Slough (~55 km distant from project site), in the South Bay, Corte Madera Marsh (~8 km distant) and Castro Rocks (~650 m distant), in the northern portion of the Central Bay, and Yerba Buena Island (~12 km distant) in the Central Bay, support the largest concentrations of harbor seals within the San Francisco Bay. The California Department of Transportation (Caltrans) conducted marine mammal surveys before and during seismic retrofit work on the RSRB in northern San Francisco Bay. The RSRB is located north of the project site, The surveys included extensive monitoring of marine mammals at points throughout the Bay. Although the study focused on harbor seals hauled out at Castro Rocks and Red Rock Island near the RSRB, all other observed marine mammals were recorded. Monitoring took place from May 1998 to February 2002 (Green *et al.*, 2002.) and determined that at least 500 harbor seals populate San Francisco Bay. This estimate agrees with previous seal counts in San Francisco Bay, which ranged from 524 to 641 seals from 1987 to 1999 (Goals Project 2000).

Although births of harbor seals have not been observed at Corte Madera Marsh and Yerba Buena Island, a few pups have been seen at these sites. The main pupping areas in the San Francisco Bay are at Mowry Slough and Castro Rocks (Caltrans 2012). Seals haul out year-round on Castro Rocks during medium to low tides; few low tide sites are available within San Francisco Bay. The seals at Castro Rocks are habituated, to a degree, to some sources of human disturbance such as large tanker traffic and the noise from vehicle traffic on the bridge, but often flush into the water when small boats maneuver close by or when people work on the bridge (Kopec and Harvey 1995). Long-term

monitoring studies have been conducted at the largest harbor seal colonies in Point Reyes National Seashore (~45 km west of the project site on Pacific coast) and Golden Gate National Recreation Area (~15 km southwest of the project site) since 1976. Castro Rocks and other haul-outs 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 at Castro Rocks 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, Codde *et al.*, 2011, Codde *et al.* 2012, Codde and Allen 2013).

### *California Sea Lion*

The California sea lion (*Zalophus californianus*) belongs to the family Otariidae or “eared seals,” referring to the external ear flaps not shared by other pinniped families. While California sea lions forage and conduct many activities within the water, they also use haul-outs. California sea lions breed in Southern California and along the Channel Islands during the spring.

In the Bay, sea lions haul out primarily on floating docks at Pier 39 in the Fisherman’s Wharf area of the San Francisco Marina, approximately 12.5 km southwest of the project site. The California sea lions usually arrive at Pier 39 in August after returning from the Channel Islands (Caltrans 2013). In addition to the Pier 39 haul-out, California sea lions haul out on buoys and similar structures throughout the Bay. They are seen swimming off mainly the San Francisco and Marin County shorelines within the Bay but may occasionally enter the project area to forage. Over the monitoring period for the RSRB, monitors sighted California sea lions on 90 occasions in the northern portion of the

Central Bay and at least 57 times in the Central Bay. No pupping activity has been observed at this site or at other locations within the San Francisco Bay (Caltrans 2012).

Although there is little information regarding the foraging behavior of the California sea lion in the San Francisco Bay, they have been observed foraging on a regular basis in the shipping channel south of Yerba Buena Island. Because California sea lions forage over a wide range in San Francisco Bay, it is possible that a limited number of individuals would be incidentally harassed during construction.

#### *Harbor Porpoise*

The harbor porpoise (*Phocoena phocoena*) is a member of the Phocoenidae family. They generally occur in groups of two to five individuals, and are considered to be shy, relatively nonsocial animals.

In prior years, harbor porpoises were observed primarily outside of San Francisco Bay. The few harbor porpoises that entered did not venture far into the Bay. No harbor porpoises were observed during marine mammal monitoring conducted before and during seismic retrofit work on the RSRB. In recent years, there have been increasingly common observations of harbor porpoises within San Francisco Bay. According to observations by the Golden Gate Cetacean Research team, as part of their multi-year assessment, approximately 650 harbor porpoises have been observed in the San Francisco Bay, and up to 100 may occur on a single day (Golden Gate Cetacean Research 2017). In San Francisco Bay, harbor porpoises are concentrated in the vicinity of the Golden Gate Bridge (approximately 12 km southwest of the project site) and Angel Island (5.5 km southwest), with lesser numbers sighted in the vicinity of Alcatraz (11 km south) and west of Treasure Island (10 km southeast) (Keener 2011). Because this species may venture

into the Bay east of Angel Island, there is a slight chance that a small number of individuals could occur in the vicinity of the proposed project.

### *Gray Whale*

Gray whales (*Eschrichtius robustus*) are large baleen whales. They are one of the most frequently seen whales along the California coast, easily recognized by their mottled gray color and lack of dorsal fin. They feed in northern waters primarily off the Bering, Chukchi, and western Beaufort seas during the summer, before heading south to the breeding and calving grounds off Mexico over the winter. Between December and January, late-stage pregnant females, adult males, and immature females and males will migrate southward. The northward migration peaks between February and March. During this time, recently pregnant females, adult males, immature females, and females with calves move north to the feeding grounds (NOAA 2003). A few individuals will enter into the San Francisco Bay during their northward migration.

RSRB project monitors recorded 12 living and 2 dead gray whales, all in either the Central Bay or San Pablo Bay, and all but 2 sightings occurred during the months of April and May (Winning 2008). One gray whale was sighted in June and one in October (the specific years were unreported). The Oceanic Society has tracked gray whale sightings since they began returning to the Bay regularly in the late 1990s. The Oceanic Society data show that all age classes of gray whales are entering the Bay and that they enter as singles or in groups of up to five individuals. However, the data do not distinguish between sightings of gray whales and number of individual whales (Winning 2008). It is possible that a small number of gray whales enter the Bay in any given year, typically

from March to May. However, this is outside of the June to November window when pile driving would occur.

### *Steller Sea Lion*

Steller sea lions (*Eumetopias jubatus*) have been reported at Año Nuevo Island between Santa Cruz and Half Moon Bay and at the Farallon Islands about 48 km off the coast of San Francisco (Fuller 2012). Two studies of Steller sea lion distribution did not detect individuals in San Francisco Bay. The SF Bay Subtidal Habitat Goals Report, Appendix 2-1 contains one reference to Steller sea lions in the San Francisco Bay, stating that since 1989, several hundred California sea lions have congregated in the winter on docks at Pier 39, which are on rare occasions joined by a few Steller sea lions (Cohen 2010). Over a 2-year period from 2010-2012, 16 Steller sea lions were sighted in the Bay from land or from the Golden Gate Bridge (GGCR, 2012) This species is an uncommon visitor to San Francisco Bay and is not expected to occur in the project area during construction. As a result, this species is not considered further.

### *Bottlenose Dolphin*

The range of the bottlenose dolphin (*Tursiops truncatus*) has expanded northward along the Pacific Coast since the 1982-1983 El Niño (Carretta *et al.*, 2013; Wells and Baldrige 1990). They now occur as far north as the San Francisco Bay region and have been observed along the coast in Half Moon Bay, San Mateo, Ocean Beach in San Francisco, and Rodeo Beach in Marin County. Observations indicate that bottlenose dolphin occasionally enter San Francisco Bay, sometimes foraging for fish in Fort Point Cove, just east of the Golden Gate Bridge (Golden Gate Cetacean Research 2014). While individuals of this species occasionally enter San Francisco Bay, observations indicate that

they remain in proximity to the Golden Gate near the mouth of the Bay and would not be within the project area during construction. As a result, this species is not considered further.

Table 2 lists the marine mammal species with the potential for occurrence in the vicinity of the project during the project timeframe and summarizes key information regarding stock status and abundance. None of these species are listed as threatened or endangered under the Endangered Species Act. Furthermore, they are not listed as depleted or as strategic stocks under the MMPA. Section 3 and 4 of Chevron’s application contains summaries of marine mammal species’ status and trends, distribution and habitat preferences, behavior and life history, and auditory capabilities. Please also refer to NMFS' Web site ([www.nmfs.noaa.gov/pr/species/mammals/](http://www.nmfs.noaa.gov/pr/species/mammals/)) for generalized species accounts. NMFS' Stock Assessment Reports are also available at <http://www.nmfs.noaa.gov/pr/sars>, and provide more detailed accounts of these stocks' status and abundance.

**Table 2. Marine Mammals Potentially Present in the Vicinity of the Project.**<sup>1</sup>

Species	Stock	ESA/ MMPA status; strategic (Y/N) <sup>2</sup>	Stock abundance (CV/ N <sub>min</sub> ) <sup>3</sup>	PBR <sup>4</sup>	Occurrence in/near project	Seasonal
Pacific harbor seal <i>Phoca vitulina</i>	California Stock	-/N	30,968 (- /27,348)	1,641	Common	Year-round
California sea lion <i>Zalophus californianus</i>	Eastern U.S. Stock	-/N	296,750 (- /153,337)	9,200	Uncommon	Year-round
Harbor porpoise <i>Phocoena phocoena</i>	San Francisco- Russian River Stock	-/N	9,886 (0.51/6,625)	66	Common in the vicinity of the Golden Gate and Richardson’s Bay, Rare elsewhere	Year-round

Gray whale <i>Eschrichtius robustus</i>	Eastern North Pacific Stock	-/N	20,990 (0.05/20,125)	624	Rare to occasional	December – April
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<sup>1</sup> Source: Carretta *et al.* 2016

<sup>2</sup> 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 (see footnote 3) or which is determined to be declining and likely to be listed under the ESA within the foreseeable future. Any species or stock listed under the ESA is automatically designated under the MMPA as depleted and as a strategic stock.

<sup>3</sup> CV is coefficient of variation;  $N_{\min}$  is the minimum estimate of stock abundance. In some cases, CV is not applicable. For certain stocks of pinnipeds, abundance estimates are based upon observations of animals (often pups) ashore multiplied by some correction factor derived from knowledge of the species' (or similar species') life history to arrive at a best abundance estimate; therefore, there is no associated CV. In these cases, the minimum abundance may represent actual counts of all animals ashore.

<sup>4</sup> Potential biological removal, defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population size (OSP).

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

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

Impact pile driving may create underwater noise at levels that could injure or behaviorally disturb marine mammals. In order to assess the level of impacts of sound on marine mammals it is necessary to have a basic understanding of underwater sound characteristics and potential effects. A brief overview is provided below.

#### *Description of Sound Sources*

Sound travels in waves, the basic components of which are frequency, wavelength, velocity, and amplitude. Frequency is the number of pressure waves that pass by a reference point per unit of time and is measured in hertz (Hz) or cycles per second. Wavelength is the distance between two peaks of a sound wave; lower frequency sounds have longer wavelengths than higher frequency sounds and attenuate (decrease) more rapidly in shallower water. Amplitude is the height of the sound pressure wave or the 'loudness' of a sound and is typically measured using the decibel (dB) scale. A dB is the ratio between a measured pressure (with sound) and a reference pressure (sound at a constant pressure, established by scientific standards). It is a logarithmic unit that accounts for large variations in amplitude; therefore, relatively small changes in dB ratings correspond to large changes in sound pressure. When referring to sound pressure levels (SPLs; the sound force per unit area), sound is referenced in the context of underwater sound pressure to 1 microPascal ( $\mu\text{Pa}$ ). One pascal is the pressure resulting from a force of one newton exerted over an area of one square meter. The source level (SL) represents the sound level at a distance of 1 m from the source (referenced to 1  $\mu\text{Pa}$ ). The received level is the sound level at the listener's position. Note that all underwater sound levels in this document are referenced to a pressure of 1  $\mu\text{Pa}$ .

Root mean square (rms) is the quadratic mean sound pressure over the duration of an impulse, and is calculated by squaring all of the sound amplitudes, averaging the squares, and then taking the square root of the average (Urick 1983). Rms accounts for both positive and negative values; squaring the pressures makes all values positive so that they may be accounted for in the summation of pressure levels (Hastings and Popper, 2005). This measurement is often used in the context of discussing behavioral effects, in

part because behavioral effects, which often result from auditory cues, may be better expressed through averaged units than by peak pressures.

When underwater objects vibrate or activity occurs, sound-pressure waves are created. These waves alternately compress and decompress the water as the sound wave travels. Underwater sound waves radiate in all directions away from the source (similar to ripples on the surface of a pond), except in cases where the source is directional. The compressions and decompressions associated with sound waves are detected as changes in pressure by aquatic life and man-made sound receptors such as hydrophones.

Even in the absence of sound from the specified activity, the underwater environment is typically loud due to ambient sound. Ambient sound is defined as environmental background sound levels lacking a single source or point (Richardson *et al.*, 1995), and the sound level of a region is defined by the total acoustical energy being generated by known and unknown sources. These sources may include physical (*e.g.*, waves, earthquakes, ice, atmospheric sound), biological (*e.g.*, sounds produced by marine mammals, fish, and invertebrates), and anthropogenic sound (*e.g.*, vessels, dredging, aircraft, construction). A number of sources contribute to ambient sound, including the following (Richardson *et al.*, 1995):

- Wind and waves: The complex interactions between wind and water surface, including processes such as breaking waves and wave-induced bubble oscillations and cavitation, are a main source of naturally occurring ambient noise for frequencies between 200 Hz and 50 kHz (Mitson 1995). In general, ambient sound levels tend to increase with increasing wind speed and wave height. Surf noise becomes important near shore, with measurements collected at a distance of

8.5 km from shore showing an increase of 10 dB in the 100 to 700 Hz band during heavy surf conditions.

- **Precipitation:** Sound from rain and hail impacting the water surface can become an important component of total noise at frequencies above 500 Hz, and possibly down to 100 Hz during quiet times.
- **Biological:** Marine mammals can contribute significantly to ambient noise levels, as can some fish and shrimp. The frequency band for biological contributions is from approximately 12 Hz to over 100 kHz.
- **Anthropogenic:** Sources of ambient noise related to human activity include transportation (surface vessels and aircraft), dredging and construction, oil and gas drilling and production, seismic surveys, sonar, explosions, and ocean acoustic studies. Shipping noise typically dominates the total ambient noise for frequencies between 20 and 300 Hz. In general, the frequencies of anthropogenic sounds are below 1 kHz and, if higher frequency sound levels are created, they attenuate rapidly (Richardson *et al.*, 1995). Sound from identifiable anthropogenic sources other than the activity of interest (*e.g.*, a passing vessel) is sometimes termed background sound, as opposed to ambient sound.

The sum of the various natural and anthropogenic sound sources at any given location and time—which comprise “ambient” or “background” sound—depends not only on the source levels (as determined by current weather conditions and levels of biological and shipping activity) but also on the ability of sound to propagate through the environment. In turn, sound propagation is dependent on the spatially and temporally varying properties of the water column and sea floor, and is frequency-dependent. As a

result of the dependence on a large number of varying factors, ambient sound levels can be expected to vary widely over both coarse and fine spatial and temporal scales. Sound levels at a given frequency and location can vary by 10-20 dB from day to day (Richardson *et al.*, 1995). The result is that, depending on the source type and its intensity, sound from the specified activity may be a negligible addition to the local environment or could form a distinctive signal that may affect marine mammals.

In-water construction activities associated with the project would include impact pile driving. Underwater sounds produced by pile driving fall into one of two general sound types: impulsive and non-impulsive (defined in the following). The distinction between these two sound types is important because they have differing potential to cause physical effects, particularly with regard to hearing (*e.g.*, Ward, 1997 in Southall *et al.*, 2007). Please see Southall *et al.*, (2007) for an in-depth discussion of these concepts. Only impulsive sound is described as part of this notice of proposed IHA.

Impulsive sound sources (*e.g.*, explosions, gunshots, sonic booms, impact pile driving) produce signals that are brief (typically considered to be less than one second), broadband, atonal transients (ANSI, 1986; Harris, 1998; NIOSH, 1998; ISO, 2003; ANSI, 2005) and occur either as isolated events or repeated in some succession. Impulsive sounds are all characterized by a relatively rapid rise from ambient pressure to a maximal pressure value followed by a rapid decay period that may include a period of diminishing, oscillating maximal and minimal pressures, and generally have an increased capacity to induce physical injury as compared with sounds that lack these features.

Impact hammers used as part of the proposed project operate by repeatedly dropping a heavy piston onto a pile to drive the pile into the substrate. Sound generated by

impact hammers is characterized by rapid rise times and high peak levels, a potentially injurious combination (Hastings and Popper 2005).

### *Marine Mammal Hearing*

Hearing is the most important sensory modality for marine mammals, and exposure to sound can have deleterious effects. To appropriately assess these potential effects, it is necessary to understand the frequency ranges marine mammals are able to hear. Current data indicate that not all marine mammal species have equal hearing capabilities (*e.g.*, Richardson *et al.*, 1995; Wartzok and Ketten 1999; Au and Hastings 2008). To reflect this, Southall *et al.* (2007) recommended that marine mammals be divided into functional hearing groups based on measured or estimated hearing ranges on the basis of available behavioral data, audiograms derived using auditory evoked potential techniques, anatomical modeling, and other data. The lower and/or upper frequencies for some of these functional hearing groups have been modified from those designated by Southall *et al.* (2007), and the revised generalized hearing ranges are presented in the new Guidance. The functional hearing groups and the associated frequencies are indicated in Table 3 below.

**Table 3. Marine mammal hearing groups and their generalized hearing range.**

Hearing Group	Generalized Hearing Range*
Low-frequency (LF) cetaceans (baleen whales)	7 Hz to 35 kHz
Mid-frequency (MF) cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales)	150 Hz to 160 kHz
High-frequency (HF) cetaceans (true porpoises, <i>Kogia</i> , river dolphins, cephalorhynchid, <i>Lagenorhynchus cruciger</i> and <i>L. australis</i> )	275 Hz to 160 kHz
Phocid pinnipeds (PW) (underwater) (true	50 Hz to 86 kHz

seals)	
Otariid pinnipeds (OW) (underwater) (sea lions and fur seals)	60 Hz to 39 kHz
<p>* Represents the generalized hearing range for the entire group as a composite (<i>i.e.</i>, all species within the group), where individual species' hearing ranges are typically not as broad. Generalized hearing range chosen based on ~65 dB threshold from normalized composite audiogram, with the exception for lower limits for LF cetaceans (Southall <i>et al.</i>, 2007) and PW pinniped (approximation).</p>	

### *Acoustic Effects, Underwater*

*Potential Effects of Pile Driving Sound* – The effects of sounds from pile driving might result in one or more of the following: temporary or permanent hearing impairment, non-auditory physical or physiological effects, behavioral disturbance, and masking (Richardson *et al.*, 1995; Gordon *et al.*, 2004; Nowacek *et al.*, 2007; Southall *et al.*, 2007). The effects of pile driving on marine mammals are dependent on several factors, including the size, type, and depth of the animal; the depth, intensity, and duration of the pile driving sound; the depth of the water column; the substrate of the habitat; the standoff distance between the pile and the animal; and the sound propagation properties of the environment. Impacts to marine mammals from pile driving activities are expected to result primarily from acoustic pathways. As such, the degree of effect is intrinsically related to the received level and duration of the sound exposure, which are in turn influenced by the distance between the animal and the source. The further away from the source, the less intense the exposure should be. The substrate and depth of the habitat affect the sound propagation properties of the environment. Shallow environments are typically more structurally complex, which leads to rapid sound attenuation. In addition, substrates that are soft (*e.g.*, sand) would absorb or attenuate the sound more readily than hard substrates

(e.g., rock) which may reflect the acoustic wave. Soft porous substrates would also likely require less time to drive the pile, and possibly less forceful equipment, which would ultimately decrease the intensity of the acoustic source.

In the absence of mitigation, impacts to marine species would be expected to result from physiological and behavioral responses to both the type and strength of the acoustic signature (Viada *et al.*, 2008). The type and severity of behavioral impacts are more difficult to define due to limited studies addressing the behavioral effects of impulsive sounds on marine mammals. Potential effects from impulsive sound sources can range in severity from effects such as behavioral disturbance or tactile perception to physical discomfort, slight injury of the internal organs and the auditory system, or mortality (Yelverton *et al.*, 1973).

*Hearing Impairment and Other Physical Effects* – Marine mammals exposed to high intensity sound repeatedly or for prolonged periods can experience hearing threshold shift (TS), which is defined as “a change, usually an increase, in the threshold of audibility at a specified frequency or portion of an individual’s hearing range above a previously established reference level” (NMFS, 2016). The amount of threshold shift is customarily expressed in decibels (ANSI 1995, Yost 2007). A TS can be permanent (PTS) or temporary (TTS). PTS is a permanent, irreversible increase in the threshold of audibility at a specified frequency or portion of an individual’s hearing range above a previously established reference level (NMFS 2016). TTS is a temporary, reversible increase in the threshold of audibility at a specified frequency or portion of an individual’s hearing range above a previously established reference level (NMFS 2016).

Marine mammals depend on acoustic cues for vital biological functions (*e.g.*, orientation, communication, finding prey, avoiding predators); thus, TTS may result in reduced fitness in survival and reproduction. However, this depends on the frequency and duration of TTS, as well as the biological context in which it occurs. TTS of limited duration, occurring in a frequency range that does not coincide with that used for recognition of important acoustic cues, would have little to no effect on an animal's fitness. Repeated sound exposure that leads to TTS could cause PTS. PTS constitutes injury, but TTS does not (Southall *et al.*, 2007). The following subsections discuss in somewhat more detail the possibilities of TTS, PTS, and non-auditory physical effects.

*Temporary Threshold Shift* – TTS is the mildest form of hearing impairment that can occur during exposure to a strong sound (Kryter 1985). While experiencing TTS, the hearing threshold rises, and a sound must be stronger in order to be heard. In terrestrial mammals, TTS can last from minutes or hours to days (in cases of strong TTS). For sound exposures at or somewhat above the TTS threshold, hearing sensitivity in both terrestrial and marine mammals recovers rapidly after exposure to the sound ends.

Marine mammal hearing plays a critical role in communication with conspecifics, and interpretation of environmental cues for purposes such as predator avoidance and prey capture. Depending on the degree (elevation of threshold in dB), duration (*i.e.*, recovery time), and frequency range of TTS, and the context in which it is experienced, TTS can have effects on marine mammals ranging from discountable to serious. For example, a marine mammal may be able to readily compensate for a brief, relatively small amount of TTS in a non-critical frequency range that occurs during a time where ambient noise is lower and there are not as many competing sounds present. Alternatively, a larger amount

and longer duration of TTS sustained during time when communication is critical for successful mother/calf interactions could have more serious impacts.

Currently, TTS data only exist for four species of cetaceans (bottlenose dolphin (*Tursiops truncatus*), beluga whale (*Delphinapterus leucas*), harbor porpoise (*Phocoena phocoena*), and Yangtze finless porpoise (*Neophocaena asiaorientalis*)) and three species of pinnipeds (northern elephant seal (*Mirounga angustirostris*), harbor seal (*Phoca vitulina*) and California sea lion (*Zalophus californianus*)) exposed to a limited number of sound sources (*i.e.*, mostly tones and octave-band noise) in laboratory settings (*e.g.*, Finneran, 2016; Finneran *et al.*, 2002; Finneran and Schlundt, 2010, 2013; Nachtigall *et al.*, 2004; Kastaket *et al.*, 2005; Lucke *et al.*, 2009; Popov *et al.*, 2011). In general, harbor seals and harbor porpoises have a lower TTS onset than other measured pinniped or cetacean species (Kastak *et al.*, 2005; Kastelein *et al.*, 2011, 2012a, 2012b, 2013a, 2013b, 2014a, 2014b, 2015a, 2015b, 2015c, 2016). Additionally, the existing marine mammal TTS data come from a limited number of individuals within these species. There are no data available on noise-induced hearing loss for mysticetes. For summaries of data on TTS in marine mammals or for further discussion of TTS onset thresholds, please see Southall *et al.* (2007), Finneran and Jenkins (2012), and Finneran (2016).

*Permanent Threshold Shift* – When PTS occurs, there is physical damage to the sound receptors in the ear. In severe cases, there can be total or partial deafness, while in other cases the animal has an impaired ability to hear sounds in specific frequency ranges (Kryter 1985). There is no specific evidence that exposure to pulses of sound can cause PTS in any marine mammal. However, given the possibility that mammals close to a

sound source might incur TTS, there has been further speculation about the possibility that some individuals might incur PTS. Single or occasional occurrences of mild TTS are not indicative of permanent auditory damage, but repeated or (in some cases) single exposures to a level well above that causing TTS onset might elicit PTS.

Relationships between TTS and PTS thresholds have not been studied in marine mammals but are assumed to be similar to those in humans and other terrestrial mammals. Available data from humans and other terrestrial mammals indicate that a 40 dB threshold shift approximates PTS onset (see Ward *et al.*, 1958, 1959; Ward 1960; Kryter *et al.* 1966; Miller 1974; Ahroon *et al.*, 1996; Henderson *et al.*, 2008).

PTS onset acoustic thresholds for marine mammals have not been directly measured and must be extrapolated from available TTS onset measurements. Thus, based on cetacean measurements from TTS studies (see Southall *et al.*, 2007; Finneran, 2015; Finneran, 2016 (found in Appendix A of the Guidance)) a threshold shift of 6 dB is considered the minimum threshold shift clearly larger than any day-to-day or session-to-session variation in a subject's normal hearing ability and is typically the minimum amount of threshold shift that can be differentiated in most experimental conditions (Finneran *et al.*, 2000; Schlundt *et al.*, 2000; Finneran *et al.*, 2002).

Measured peak underwater source levels from impact pile driving can be as high as 214 dB re 1  $\mu$ Pa (Laughlin 2011). Although no marine mammals have been shown to experience TTS or PTS as a result of being exposed to pile driving activities, captive bottlenose dolphins and beluga whales exhibited changes in behavior when exposed to strong-pulsed sounds (Finneran *et al.*, 2000, 2002, 2005). The animals tolerated high received levels of sound before exhibiting aversive behaviors. Experiments on a beluga

whale showed that exposure to a single watergun impulse at a received level of 207 kilopascal (kPa) (30 psi) peak-to-peak (p-p), which is equivalent to 228 dB p-p, resulted in a 7 and 6 dB TTS in the beluga whale at 0.4 and 30 kHz, respectively. Thresholds returned to within 2 dB of the pre-exposure level within four minutes of the exposure (Finneran *et al.*, 2002). Although the source level of pile driving from one hammer strike is expected to be much lower than the single watergun impulse cited here, animals being exposed for a prolonged period to repeated hammer strikes could receive more sound exposure in terms of sound exposure level (SEL) than from the single watergun impulse (estimated at 188 dB re 1  $\mu\text{Pa}^2\text{-s}$ ) in the aforementioned experiment (Finneran *et al.*, 2002). However, in order for marine mammals to experience TTS or PTS, the animals have to be close enough to be exposed to high intensity sound levels for a prolonged period.

*Non-auditory Physiological Effects* – Non-auditory physiological effects or injuries that theoretically might occur in marine mammals exposed to strong underwater sound include stress, neurological effects, bubble formation, resonance effects, and other types of organ or tissue damage (Cox *et al.*, 2006; Southall *et al.*, 2007). Studies examining such effects are limited. In general, little is known about the potential for pile driving to cause auditory impairment or other physical effects in marine mammals. Available data suggest that such effects, if they occur at all, would presumably be limited to short distances from the sound source and to activities that extend over a prolonged period. The available data do not allow identification of a specific exposure level above which non-auditory effects can be expected (Southall *et al.*, 2007) or any meaningful quantitative predictions of the numbers (if any) of marine mammals that might be affected

in those ways. Marine mammals that show behavioral avoidance of pile driving, including some odontocetes and some pinnipeds, are especially unlikely to incur auditory impairment or non-auditory physical effects. Given the modest number of piles that will be driven, limited driving time per pile, short duration of the project, relatively low sound source levels, and small Level A (injury) harassment zones, NMFS is confident that marine mammals would not experience auditory or non-acoustic physiological impacts.

#### *Disturbance Reactions*

Behavioral disturbance may include a variety of effects, including subtle changes in behavior (*e.g.*, minor or brief avoidance of an area or changes in vocalizations), more conspicuous changes in similar behavioral activities, and more sustained and/or potentially severe reactions, such as displacement from or abandonment of high-quality habitat. Behavioral responses to sound are highly variable and context-specific and any reactions depend on numerous intrinsic and extrinsic factors (*e.g.*, species, state of maturity, experience, current activity, reproductive state, auditory sensitivity, time of day), as well as the interplay between factors (*e.g.*, Richardson *et al.*, 1995; Wartzok *et al.*, 2003; Southall *et al.*, 2007; Weilgart, 2007; Archer *et al.*, 2010). Behavioral reactions can vary not only among individuals but also within an individual, depending on previous experience with a sound source, context, and numerous other factors (Ellison *et al.*, 2012), and can vary depending on characteristics associated with the sound source (*e.g.*, whether it is moving or stationary, number of sources, distance from the source). Please see Appendices B-C of Southall *et al.* (2007) for a review of studies involving marine mammal behavioral responses to sound.

Habituation can occur when an animal's response to a stimulus wanes with repeated exposure, usually in the absence of unpleasant associated events (Wartzok *et al.*, 2003). Animals are most likely to habituate to sounds that are predictable and unvarying. It is important to note that habituation is appropriately considered as a "progressive reduction in response to stimuli that are perceived as neither aversive nor beneficial," rather than as, more generally, moderation in response to human disturbance (Bejder *et al.*, 2009). The opposite process is sensitization, when an unpleasant experience leads to subsequent responses, often in the form of avoidance, at a lower level of exposure. Behavioral state may affect the type of response as well. For example, animals that are resting may show greater behavioral change in response to disturbing sound levels than animals that are highly motivated to remain in an area for feeding (Richardson *et al.*, 1995; NRC, 2003; Wartzok *et al.*, 2003). Controlled experiments with captive marine mammals showed pronounced behavioral reactions, including avoidance of loud sound sources (Ridgway *et al.*, 1997; Finneran *et al.*, 2003). Observed responses of wild marine mammals to loud pulsed sound sources (typically seismic guns or acoustic harassment devices, but also including pile driving) have been varied but often consist of avoidance behavior or other behavioral changes suggesting discomfort (Morton and Symonds 2002; Thorson and Reyff 2006; see also Gordon *et al.*, 2004; Wartzok *et al.*, 2003; Nowacek *et al.*, 2007).

With both types of pile driving, it is likely that the onset of pile driving could result in temporary, short-term changes in an animal's typical behavior and/or avoidance of the affected area. These behavioral changes may include (Richardson *et al.*, 1995): changing durations of surfacing and dives, number of blows per surfacing (cetaceans only), or

moving direction and/or speed; reduced/increased vocal activities; changing/cessation of certain behavioral activities (such as socializing or feeding); visible startle response or aggressive behavior; avoidance of areas where sound sources are located; and/or flight responses (*e.g.*, pinnipeds flushing into water from haul-outs or rookeries). Pinnipeds may increase the amount of time spent hauled out, possibly to avoid in-water disturbance (Thorson and Reyff 2006). Since pile driving would likely only occur for a few hours a day, over a short period, it is unlikely to result in permanent displacement. Any potential impacts from pile driving activities could be experienced by individual marine mammals, but would not be likely to cause population level impacts, or affect the long-term fitness of the species.

The biological significance of many of these behavioral disturbances is difficult to predict, especially if the detected disturbances appear minor. However, the consequences of behavioral modification could be expected to be biologically significant if the change affects growth, survival, or reproduction. Significant behavioral modifications that could potentially lead to effects on growth, survival, or reproduction include:

- Drastic changes in diving/surfacing patterns (such as those thought to cause beaked whale stranding due to exposure to military mid-frequency tactical sonar);
- Habitat abandonment due to loss of desirable acoustic environment; and
- Cessation of feeding or social interaction.

The onset of behavioral disturbance from anthropogenic sound depends on both external factors (characteristics of sound sources and their paths) and the specific characteristics of the receiving animals (hearing, motivation, experience, demography) and is difficult to predict (Southall *et al.*, 2007).

### *Stress responses*

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

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

The primary distinction between stress (which is adaptive and does not normally place an animal at risk) and “distress” is the cost of the response. During a stress response, an animal uses glycogen stores that can be quickly replenished once the stress is alleviated. In such circumstances, the cost of the stress response would not pose serious fitness consequences. However, when an animal does not have sufficient energy reserves to satisfy the energetic costs of a stress response, energy resources must be diverted from

other functions. This state of distress will last until the animal replenishes its energetic reserves sufficient to restore normal function.

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

#### *Auditory Masking*

Natural and artificial sounds can disrupt behavior by masking, or interfering with, a marine mammal’s ability to hear other sounds. Masking occurs when the receipt of a sound is interfered with by another coincident sound at similar frequencies and at similar or higher levels. Chronic exposure to excessive, though not high-intensity, sound could cause masking at particular frequencies for marine mammals that utilize sound for vital biological functions. Masking can interfere with detection of acoustic signals such as communication calls, echolocation sounds, and environmental sounds important to marine

mammals. Therefore, under certain circumstances, marine mammals whose acoustical sensors or environment are being severely masked could also be impaired from maximizing their performance fitness in survival and reproduction. If the coincident (masking) sound were man-made, it could be potentially harassing if it disrupted hearing-related behavior. It is important to distinguish TTS and PTS, which persist after the sound exposure, from masking, which occurs during the sound exposure. Because masking (without resulting in TS) is not associated with abnormal physiological function, it is not considered a physiological effect, but rather a potential behavioral effect.

The frequency range of the potentially masking sound is important in determining any potential behavioral impacts. Because sound generated from in-water pile driving is mostly concentrated at low frequency ranges, it may affect detection of communication calls and other potentially important natural sounds such as surf and prey sound. It may also affect communication signals when they occur near the sound band and thus reduce the communication space of animals (*e.g.*, Clark *et al.*, 2009) and cause increased stress levels (*e.g.*, Foote *et al.*, 2004; Holt *et al.*, 2009).

Masking has the potential to impact species at the population or community levels as well as at individual levels. Masking affects both senders and receivers of the signals and can potentially have long-term chronic effects on marine mammal species and populations. Recent research suggests that low frequency ambient sound levels have increased by as much as 20 dB (more than three times in terms of SPL) in the world's ocean from pre-industrial periods, and that most of these increases are from distant shipping (Hildebrand 2009). All anthropogenic sound sources, such as those from vessel

traffic, pile driving, and dredging activities, contribute to the elevated ambient sound levels, thus intensifying masking.

The most intense underwater sounds in the proposed action are those produced by impact pile driving. Given that the energy distribution of pile driving covers a broad frequency spectrum, sound from these sources would likely be within the audible range of marine mammals present in the project area. Impact pile driving activity is relatively short-term, with rapid pulses occurring for approximately twenty minutes per pile.

#### *Anticipated Effects on Habitat*

The proposed project would result in small net increase in bay fill of approximately 0.01 acre of benthic habitat due to the placement of piles. The piles would generally be placed within the existing footprint of the Long Wharf. This would not have a measurable influence on habitat for marine mammals in the Bay. A temporary, small-scale loss of foraging habitat may occur for marine mammals if marine mammals leave the area during pile driving activities. Acoustic energy created during pile replacement work would have the potential to disturb fish within the vicinity of the pile replacement work. As a result, the affected area could have a temporarily decreased foraging value to marine mammals. During pile driving, high noise levels may exclude fish from the vicinity of pile driving; Hastings and Popper (2005) identified several studies that suggest fish will relocate to avoid areas of damaging noise energy. An analysis of potential noise output of the proposed project indicates that the distance from underwater pile driving at which noise has the potential to cause temporary hearing loss in fish ranges from approximately 10 to 158 m (32 ft to 520 ft) from pile driving activity, depending on the type of pile.

Therefore, if fish leave the area of disturbance, pinniped foraging habitat may have temporarily decreased foraging value when piles are driven.

The duration of fish avoidance of this area after pile driving stops is unknown. However, the affected area represents an extremely small portion of the total area within foraging range of marine mammals that may be present in the project area.

As such, the main impact associated with the proposed activity would be temporarily elevated sound levels and the associated direct effects on marine mammals, as discussed previously in this document. The most likely impact to marine mammal habitat occurs from pile driving effects on likely marine mammal prey (*i.e.*, fish) near the project location, and minor impacts to the immediate substrate during installation and removal of piles during the dock construction project.

*Effects on Potential Prey*—Construction activities would produce impulsive sounds. Fish react to sounds that are especially strong and/or intermittent low-frequency sounds. Short duration, sharp sounds can cause overt or subtle changes in fish behavior and local distribution. Hastings and Popper (2005) identified several studies that suggest fish may relocate to avoid certain areas of sound energy. Additional studies have documented effects of pile driving on fish, although several are based on studies in support of large, multiyear bridge construction projects (*e.g.*, Scholik and Yan, 2001, 2002; Popper and Hastings, 2009) and are therefore not directly comparable with the proposed project. Sound pulses at received levels of 160 dB may cause subtle changes in fish behavior. SPLs of 180 dB may cause noticeable changes in behavior (Pearson *et al.*, 1992; Skalski *et al.*, 1992). SPLs of sufficient strength have been known to cause injury to fish and fish mortality. In general, impacts to marine mammal prey species from the

proposed project are expected to be minor and temporary due to the relatively short timeframe of four days of pile driving activities for a total of 160 minutes that would occur under the proposed IHA.

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

*Effects on Potential Foraging Habitat*—San Francisco Bay is classified as Essential Fish Habitat (EFH) under the Magnuson-Stevens Fisheries Conservation and Management Act, as amended by the Sustainable Fisheries Act. The EFH provisions of the Sustainable Fisheries Act are designed to protect fisheries habitat from being lost due to disturbance and degradation. The act requires implementation of measures to conserve and enhance EFH. San Francisco Bay, including the area of the project, is classified as EFH for 20 species of commercially important fish and sharks that are federally managed under three fisheries management plans (FMPs): Coastal Pelagic, Pacific Groundfish, and Pacific Coast Salmon (Table 9-1 in the Application). The Pacific Coast Salmon FMP includes Chinook salmon.

In addition to EFH designations, San Francisco Bay is designated as a Habitat Area of Particular Concern (HAPC) for various fish species within the Pacific Groundfish and Coastal Pelagic FMPs, as this estuarine system serves as breeding and rearing grounds important to these fish stocks. A number of these fish species are prey species for pinnipeds.

Given the short duration of increased underwater noise levels and small project footprint associated with the proposed project, there is not likely to be a permanent, adverse effect on EFH. Therefore, the project is not likely to have a permanent, adverse effect on marine mammal foraging habitat.

Any behavioral avoidance by fish of the disturbed area would still leave significantly large areas of fish and marine mammal foraging habitat in San Francisco Bay. While the proposed project would result in a small net increase in Bay fill of approximately 0.01 acre of benthic foraging habitat, this would not have a measurable influence on habitat for marine mammals in the Bay.

In summary, given the short duration of sound associated with individual pile driving events and the relatively small area that would be affected, pile driving activities associated with the proposed action are not likely to have a permanent, adverse effect on any fish habitat, or populations of fish species. Thus, any impacts to marine mammal habitat are not expected to cause significant or long-term consequences for individual marine mammals or their populations.

### **Estimated Take**

This section includes an estimate of the number of incidental “takes” proposed for authorization pursuant to this IHA, which will inform both NMFS’ consideration of whether the number of takes is “small” and the negligible impact determination.

Harassment is the primary means of take expected to result from these activities. 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).

As described previously in the *Effects* section, Level B Harassment is expected to occur and is proposed to be authorized for select species in numbers identified below. Based on the nature of the activity and the anticipated effectiveness of the mitigation measures, Level A harassment is neither anticipated nor proposed to be authorized.

In order to estimate the potential incidents of take that may occur incidental to the specified activity, we must first estimate the extent of the sound field that may be produced by the activity and then consider the sound field in combination with information about marine mammal density or abundance in the project area. We first provide information on applicable sound thresholds for determining effects to marine mammals before describing the information used in estimating the sound fields, the available marine mammal density or abundance information, and the method of estimating potential incidences of take

*Sound Thresholds*—NMFS uses sound exposure thresholds to determine when an activity that produces underwater sound might result in impacts to a marine mammal such that a “take” by harassment might occur. On August 4, 2016, NMFS released its Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Guidance) (81 FR 51694) (available at <http://www.nmfs.noaa.gov/pr/acoustics/guidelines.htm>). This new guidance established new thresholds for predicting auditory injury, which equates to Level A harassment under the MMPA. As will be discussed below, NMFS has revised PTS (and TTS) onset acoustic thresholds for impulsive and

non-impulsive sound as part of its new acoustic guidance. The Guidance does not address Level B harassment; therefore, NMFS uses the current acoustic exposure criteria to determine exposure to underwater noise sound pressure levels for Level B harassment (Table 4).

During the installation of piles, the project has the potential to increase airborne noise levels. Airborne pile-driving RMS noise levels above the NMFS airborne noise thresholds are not expected to extend to the Castro Rocks haul-out site, which is located 650 m north of Long Wharf. In addition, the Castro Rocks haul out is subject to high levels of background noise from the Richmond Bridge, ongoing vessel activity at the Long Wharf, ferry traffic, and other general boat traffic. Any pinnipeds that surface in the area over which the airborne noise thresholds may be exceeded would have already been exposed to underwater noise levels above the applicable thresholds and thus would not result in an additional incidental take. Airborne noise is not considered further.

*Source Levels*—Pile driving generates underwater noise that can potentially result in disturbance to marine mammals in the project area. In order to establish distances to PTS and behavioral harassment isopleths, the sound source level associated with a specific pile driving activity must be measured directly or estimated using proxy information. The intensity of pile driving sounds is greatly influenced by factors such as the material type and dimension of piles. To estimate the noise effects of the 24-inch square concrete piles proposed for use in Year 1 of this project, Chevron reviewed sound pressure levels (SPLs) from other projects conducted under similar circumstances. These projects include the Pier 40 Berth Construction in San Francisco, and the Berth 22 and Berth 32 reconstruction projects at the Port of Oakland. However, NMFS elected to use data from only the Pier 40

project since 24-inch square concrete piles were installed at that location. At Berth 22 and Berth 32, 24-inch octagonal concrete piles were installed. The differences in pile shape may result in varying SPLs. Impact pile driving at Pier 40 resulted in measured RMS values ranging from 162-174 dB and peak SPLs from 172 to 186 dB. SEL measurements were not recorded. From Pier 40, NMFS selected a RMS value of 170 dB, which was the average of the eight piles tested, excluding 2 piles that utilized “jetting”. Jetting consists of employing a carefully directed and pressurized flow of water to assist in pile placement by liquefying soils at the pile tip during pile placement. Jetting tends to increase driving efficiency while decreasing sound levels and will not be utilized by Chevron during this project. NMFS used an identical approach to arrive at an average peak value of 181 dB. Based on Pier 40 results.

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

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

Where:

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

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

This formula neglects loss due to scattering and absorption, which is assumed to be zero here. The degree to which underwater sound propagates away from a sound source is dependent on a variety of factors, most notably the water bathymetry and presence or

absence of reflective or absorptive conditions including in-water structures and sediments. Spherical spreading occurs in a perfectly unobstructed (free-field) environment not limited by depth or water surface, resulting in a 6 dB reduction in sound level for each doubling of distance from the source ( $20 \cdot \log(\text{range})$ ). Cylindrical spreading occurs in an environment in which sound propagation is bounded by the water surface and sea bottom, resulting in a reduction of 3 dB in sound level for each doubling of distance from the source ( $10 \cdot \log(\text{range})$ ). As is common practice in coastal waters, here we assume practical spreading loss (4.5 dB reduction in sound level for each doubling of distance) here. Practical spreading is a compromise that is often used under conditions where water increases with depth as the receiver moves away from the shoreline, resulting in an expected propagation environment that would lie between spherical and cylindrical spreading loss conditions.

Level A Zone—Chevron’s Level A harassment zone was calculated by utilizing the methods presented in Appendix D of NMFS’ Guidance and the accompanying User Spreadsheet. The Guidance provides updated PTS onset thresholds using the cumulative SEL ( $SEL_{\text{cum}}$ ) metric, which incorporates marine mammal auditory weighting functions, to identify the received levels, or acoustic thresholds, at which individual marine mammals are predicted to experience changes in their hearing sensitivity for acute, incidental exposure to all underwater anthropogenic sound sources. The Guidance (Appendix D) and its companion User Spreadsheet provide alternative methodology for incorporating these more complex thresholds and associated weighting functions.

The User Spreadsheet accounts for weighting functions using Weighting Factor Adjustments (WFAs), and NMFS used the recommended values for impact driving therein

(2 kHz). Pile driving durations were estimated based on similar project experience. NMFS' new acoustic thresholds use dual metrics of SELcum and peak sound level (PK) for impulsive sounds (*e.g.*, impact pile driving). The noise levels noted above were used in the Spreadsheet for 24-inch square concrete piles. It was estimated that two piles would be installed in one 24-hr workday with installation for each pile requiring approximately 300 blows. NMFS used an RMS of 170 dB and pulse duration of 0.1 seconds. Measured SEL values were not available for 24-inch square concrete piles.

Utilizing the User Spreadsheet, NMFS applied the updated PTS onset thresholds for impulsive PK and SELcum in the new acoustic guidance to determine distance to the isopleths for PTS onset for impact pile driving. In determining the cumulative sound exposure levels, the Guidance considers the duration of the activity, the sound exposure level produced by the source during a 24-hr period, and the generalized hearing range of the receiving species. In the case of the dual metric acoustic thresholds for impulsive sound, the larger of the two isopleths for calculating PTS onset is used. Results in Table 4 display the Level A injury zones for the various hearing groups.

**Table 4. Injury Zones And Shutdown Zones For Hearing Groups Associated With Installation Of 24-Inch Concrete Piles Via Impact Driving.**

Hearing group	Low-frequency cetaceans (gray whale)	Mid-frequency cetaceans	High-frequency cetaceans (harbor porpoise)	Phocid pinnipeds (harbor seal)	Otariid pinnipeds (CA sea lion)
PTS Onset Acoustic Thresholds - Impulsive* (Received Level)	Lpk,flat: 219 dB L <sub>E</sub> ,LF,24h: 183 dB	Lpk,flat: 230 dB L <sub>E</sub> ,MF,24h: 185 dB	Lpk,flat: 202 dB L <sub>E</sub> ,HF,24h: 155 dB	Lpk,flat: 218 dB L <sub>E</sub> ,PW,24h: 185 dB	Lpk,flat: 232 dB L <sub>E</sub> ,OW,24h: 203 dB
PTS Isopleth to threshold (m)	20.8	0.7	24.8	11.1	0.8
* 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  $\mu\text{Pa}$ , and cumulative sound exposure level ( $L_E$ ) has a reference value of 1  $\mu\text{Pa}^2\text{s}$ . 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.

The zone of influence (ZOI) refers to the area(s) in which SPLs equal or exceed NMFS' current Level B harassment thresholds (160 dB for impulse sound). Calculated radial distances to the 160 dB threshold assume a field free of obstruction. Assuming a source level of 170 dB RMS, installation of the 24-inch concrete piles is expected to produce underwater sound exceeding the Level B 160 dB RMS threshold over a distance of 46 meters (150 feet) (Table 5).

**Table 5. Isopleth for Level B harassment associated with impact driving of 24-inch concrete piles**

<b>Criterion</b>	<b>Definition</b>	<b>Threshold</b>	<b>Isopleth (distance from source)</b>
Level B harassment	Behavioral disruption	160 dB RMS (impulse sources)	46 m

*Density/Abundance*—Data specifying a marine mammal’s density or abundance in a given area can often be used to generate exposure estimates. However, no systematic line transect surveys of marine mammals have been performed in the San Francisco Bay near the project site. Density information for marine mammal species has been generated by Caltrans based on 15 years (2000-2015) of observations as part of the San Francisco-Oakland Bay Bridge replacement project (Caltrans 2016). The data revealed densities of 0.00004 animals/ $\text{km}^2$  for gray whale, 0.021 animals/ $\text{km}^2$  for harbor porpoise, 0.09

animals/km<sup>2</sup> for California sea lion, and 0.17 animals/km<sup>2</sup> for harbor seal. Utilization of these data to develop exposure estimates results in very small exposure values. Despite the near zero estimate provided through use of the Caltrans density data, local observational data leads us to believe that this estimate may not be accurate in illustrating the potential for take at this particular site, so we have to use other information. Instead, NMFS relied on local observational data as described below.

*Take Estimate*—The estimated number of marine mammals that may be exposed to noise at levels expected to result in take as defined in the MMPA is determined by comparing the calculated areas over which the Level B harassment threshold may be exceeded, as described above, with the expected distribution of marine mammal species within the vicinity of the proposed project.. NMFS calculated take qualitatively utilizing observational data taken during marine mammal monitoring associated with the RSRB retrofit project, the San Francisco-Oakland Bay Bridge replacement project, and other marine mammal observations for San Francisco Bay. As described previously in the *Effects* section, Level B Harassment is expected to occur and is proposed to be authorized in the numbers identified below.

#### *Pacific harbor seal*

Castro Rocks 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). The pupping season is from March to June in San Francisco Bay. During the molting season (typically June-July and coinciding with the period when piles will be driven) as many as 129 harbor seals have been observed using Castro Rocks as a haul 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 (Green *et al.*, 2002). However, during the molting season, harbor seals spend more time hauled out and tend to enter the water later in the evening. During molting, harbor seals can stay onshore resting for an average of 12 hours per day during the molt compared to around 7 hours per day outside of the pupping/molting seasons (NPS 2014).

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. The take estimates are based on the highest number of harbor seals observed at Castro Rocks during 2007 to 2012 annual surveys (approximately 129 seals). Without site-specific data, it is impossible to determine how many hauled out seals enter the water and, of those, how many enter into the Level B harassment area. Given the relatively small size of the Level B harassment area compared to the large expanse of Bay water that is available to the seals, NMFS will assume that no more than 6 seals per day would enter into the Level B harassment area during the 40 minutes of pile driving per day scheduled to occur over 4 days. Therefore, NMFS proposes that up to 6 seals per day may be exposed to Level B harassment over 4 days of impact driving, resulting in a total of 24 takes.

#### *California Sea Lion*

Relatively few California sea lions are expected to be present in the project area during periods of pile driving, as there are no haul-outs utilized by this species in the

vicinity. However, monitoring for the RSRB did observe small numbers of this species in the north and central portions of the Bay during working hours. During monitoring that occurred over a period of May 1998 to February 2002, California sea lions were sighted at least 90 times in the northern portion of the Central Bay and at least 57 times near the San Francisco-Oakland Bay Bridge in the Central Bay. During monitoring for the San Francisco-Oakland Bay Bridge Project in the Central Bay, California sea lions were observed on 69 occasions in the vicinity of the bridge over a 14-year period from 2000-2014 (Caltrans 2015b). The limited data regarding these observations do not allow a quantitative assessment of potential take. Given the limited driving time, low number of sea lions that are likely to be found in the northern part of the Bay, and small size of the level B zone, NMFS is proposing a total of 2 California sea lion takes.

#### *Harbor Porpoise*

A small but growing population of harbor porpoises utilizes San Francisco Bay. Harbor porpoises are typically spotted in the vicinity of Angel Island and the Golden Gate Bridge (6 and 12 km southwest respectively) (Keener 2011), but may utilize other areas in the Central Bay in low numbers, including the project area. The density and frequency of this usage throughout the Bay is unknown. For this proposed IHA, NMFS is not authorizing take of any harbor porpoise since the proposed exclusion zone will be conservatively set at 50 m, which is larger than the Level B zone isopleth of 46 m, and take can be avoided.

#### *Gray Whale*

The only whale species that enters San Francisco bay with any regularity is the gray whale. Gray whales occasionally enter 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 past the Golden Gate Bridge , but gray whales have occasionally been sighted as far north as San Pablo Bay. Impact pile driving is not expected to occur during this time, however, and gray whales are not likely to be present at other times of year. Furthermore, the proposed exclusion zone of 50 m for this species is larger than the Level B zone isopleth of 46 m. As such, NMFS is not proposing to authorize any gray whale take.

Table 6 shows estimated Level B take for authorized species.

**Table 6: Summary of Estimated Take by Species (Level B Harassment)**

Pile Type	Pile Driver Type	Number of Piles	Number of Driving Days	Species	
				Harbor seal	CA sea lion
24-inch square concrete	Impact	8	4	24	2

**Mitigation**

Under section 101(a)(5)(D) of the MMPA, NMFS shall prescribe the “permissible methods of taking by harassment 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 subsistence uses.”

To ensure that the “least practicable impact” will be achieved, NMFS evaluates mitigation measures in consideration of the following factors in relation to one another: 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, their habitat, and their availability for subsistence uses (latter where relevant); the proven or likely efficacy of the measures; and the practicability of the measures for applicant implementation.

*Mitigation for Mammals and their Habitat*

The following measures would apply to Chevron's mitigation through the exclusion zone and zone of influence ZOI:

*Time Restriction*—For all in-water pile driving activities, Chevron shall operate only during daylight hours when visual monitoring of marine mammals can be conducted.

*Seasonal Restriction*— To minimize impacts to listed fish species, pile-driving activities would occur between June 1 and November 30.

*Exclusion Zone*—For all pile driving activities, Chevron will establish an exclusion zone intended to contain the area in which Level A harassment thresholds are exceeded. The purpose of the exclusion zone is to define an area within which shutdown of construction activity would occur upon sighting of a marine mammal within that area (or in anticipation of an animal entering the defined area), thus preventing potential injury of marine mammals. The calculated distance to Level A harassment isopleths threshold during impact pile driving, assuming a maximum of 2 piles per day is 25 m for harbor porpoise; 11.1 m for harbor seal; 0.8 m for California sea lion, and; 20.8 m for gray whales.

NMFS proposes to require a 15 m exclusion zone for harbor seals and California sea lions. In order to prevent any take of the cetacean species, a 50 m exclusion zone is proposed for harbor porpoises and gray whales. A shutdown will occur prior to a marine mammal entering the shutdown zones. Activity will cease until the observer is confident that the animal is clear of the shutdown zone. The animal will be considered clear if:

- It has been observed leaving the shutdown zone; or
- It has not been seen in the shutdown zone for 30 minutes for cetaceans and 15 minutes for pinnipeds.

*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.

*Level B Harassment Zone (Zone of Influence)*—The ZOI refers to the area(s) in which SPLs equal or exceed NMFS' current Level B harassment thresholds (160 dB rms for pulse sources). ZOIs provide utility for monitoring that is conducted for mitigation purposes (i.e., exclusion zone monitoring) by establishing monitoring protocols for areas adjacent to the exclusion zone. Monitoring of the ZOI enables observers to be aware of, and communicate about, the presence of marine mammals within the project area but outside the exclusion zone and thus prepare for potential shutdowns of activity should those marine mammals approach the exclusion zone. However, the primary purpose of ZOI monitoring is to allow documentation of incidents of Level B harassment; ZOI monitoring is discussed in greater detail later (see *Monitoring and Reporting*). The modeled radial distances for the ZOI for impact pile driving of 24-inch square concrete piles is 46 m. NMFS proposes a 50 m Level B zone for harbor seals and California sea lions.

In order to document observed incidents of harassment, monitors will record all marine mammals observed within the ZOI. Due to the relatively small ZOI and to the

monitoring locations chosen by Chevron we expect that two monitors will be able to observe the entire ZOI.

*Ramp up/Soft-start* - A “soft-start” technique is intended to allow marine mammals to vacate the area before the pile driver reaches full power. For impact driving, an initial set of three strikes would be made by the hammer at reduced energy, followed by a 30-sec waiting period, then two subsequent three- strike sets before initiating continuous driving. 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 thirty minutes or longer.

*Pile Caps/Cushions*- Chevron will employ the use of pile caps or cushions as sound attenuation devices to reduce impacts from sound exposure during impact pile driving.

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

### **Monitoring and Reporting**

In order to issue an IHA for an activity, Section 101(a)(5)(D) of the MMPA states that NMFS must set forth, “requirements pertaining to the monitoring and reporting of such taking.” The MMPA implementing regulations at 50 CFR 216.104 (a)(13) indicate that requests for authorizations must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected

to be present in the proposed action area. Effective reporting is critical both to compliance as well as ensuring that the most value is obtained from the required monitoring.

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

- Occurrence of marine mammal species or stocks in the action area (*e.g.*, presence, abundance, distribution, density).
- Nature, scope, or context of likely marine mammal exposure to potential stressors/impacts (individual or cumulative, acute or chronic), through better understanding of: (1) action or environment (*e.g.*, source characterization, propagation, ambient noise); (2) affected species (*e.g.*, life history, dive patterns); (3) co-occurrence of marine mammal species with the action; or (4) biological or behavioral context of exposure (*e.g.*, age, calving or feeding areas).
- Individual marine mammal responses (behavioral or physiological) to acoustic stressors (acute, chronic, or cumulative), other stressors, or cumulative impacts from multiple stressors.
- How anticipated responses to stressors impact either: (1) long-term fitness and survival of individual marine mammals; or (2) populations, species, or stocks.
- Effects on marine mammal habitat (*e.g.*, marine mammal prey species, acoustic habitat, or other important physical components of marine mammal habitat).
- Mitigation and monitoring effectiveness.

Chevron will collect sighting data and will record behavioral responses to construction activities for marine mammal species observed in the project location during

the period of activity. Monitoring will be conducted by qualified marine mammal observers (MMO), who are trained biologists, with the following minimum qualifications:

- Independent observers (*i.e.*, not construction personnel) are required;
- At least one observer must have prior experience working as an observer;
- Other observers may substitute education (undergraduate degree in biological science or related field) or training for experience;
- Ability to conduct field observations and collect data according to assigned protocols;
- Experience or training in the field identification of marine mammals, including the identification of behaviors;
- Sufficient training, orientation, or experience with the construction operation to provide for personal safety during observations;
- Writing skills sufficient to prepare a report of observations including but not limited to the number and species of marine mammals observed; dates and times when in-water construction activities were conducted; dates and times when in-water construction activities were suspended to avoid potential incidental injury from construction sound of marine mammals observed within a defined shutdown zone; and marine mammal behavior;
- 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; and
- NMFS will require submission and approval of observer CVs.

Chevron will monitor the exclusion zones and Level B harassment zone before, during, and after pile driving, with at least two observers located at the best practicable vantage points. Based on our requirements, the Marine Mammal Monitoring Plan would implement the following procedures for pile driving:

- During observation periods, observers will continuously scan the area for marine mammals using binoculars and the naked eye;
- Monitoring shall begin 30 minutes prior to impact pile driving;
- Observers will conduct observations, meet training requirements, fill out data forms, and report findings in accordance with this IHA;
- If the exclusion zone is obscured by fog or poor lighting conditions, pile driving will not be initiated until the exclusion zone is clearly visible. Should such conditions arise while impact driving is underway, the activity would be halted;
- Observers will be in continuous contact with the construction personnel via two-way radio. A cellular phone will be used for back-up communications and for safety purposes;
- Observers will implement mitigation measures including monitoring of the proposed shutdown and monitoring zones, clearing of the zones, and shutdown procedures; and
- At the end of the pile-driving day, post-construction monitoring will be conducted for 30 minutes beyond the cessation of pile driving.

### **Data Collection**

We require that observers use approved data forms. Among other pieces of information, chevron will record detailed information about any implementation of

shutdowns, including the distance of animals to the pile being driven, a description of specific actions that ensued, and resulting behavior of the animal, if any. In addition, Chevron will attempt to distinguish between the number of individual animals taken and the number of incidents of take, when possible. We require that, at a minimum, that the following information be recorded on sighting forms:

- Date and time that permitted construction activity begins or ends;
- Weather parameters (*e.g.*, percent cloud cover, percent glare, visibility) and Beaufort sea state;
- Species, numbers, and, if possible, sex and age class of observed marine mammals;
- Construction activities occurring during each sighting;
- Marine mammal behavior patterns observed, including bearing and direction of travel;
- Specific focus should be paid to behavioral reactions just prior to, or during, soft-start and shutdown procedures;
- Location of marine mammal, distance from observer to the marine mammal, and distance from pile driving activities to marine mammals;
- Record of whether an observation required the implementation of mitigation measures, including shutdown procedures and the duration of each shutdown; and
- Other human activity in the area. Record the hull numbers of fishing vessels if possible.

#### *Reporting Measures*

Chevron shall submit a draft report to NMFS within 90 days of the completion of marine mammal monitoring, or 60 days prior to the issuance of any subsequent IHA for

this project (if required), whichever comes first. The annual report would detail the monitoring protocol, summarize the data recorded during monitoring, and estimate the number of marine mammals that may have been harassed. If no comments are received from NMFS within 30 days, the draft final report will become final. If comments are received, a final report must be submitted up to 30 days after receipt of comments.

Reports shall contain the following information:

- Summaries of monitoring effort (*e.g.*, total hours, total distances, and marine mammal distribution through the study period, accounting for sea state and other factors affecting visibility and detectability of marine mammals);
- Analyses of the effects of various factors influencing detectability of marine mammals (*e.g.*, sea state, number of observers, and fog/glare); and
- Species composition, occurrence, and distribution of marine mammal sightings, including date, numbers, age/size/gender categories (if determinable), and group sizes.

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 (Level A harassment), serious injury or mortality (*e.g.*, ship-strike, gear interaction, and/or entanglement), Chevron would immediately cease the specified activities and immediately report the incident to the Office of Protected Resources, NMFS, and the West Coast Regional Stranding Coordinator. The report would include the following information:

- Time, date, and location (latitude/longitude) of the incident;
- Name and type of vessel involved (if applicable);
- Vessel's speed during and leading up to the incident (if applicable);

- Description of the incident;
- Status of all sound source used in the 24 hours preceding the incident;
- Water depth;
- Environmental conditions (*e.g.*, wind speed and direction, Beaufort sea state, cloud cover, and 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 necessary actions 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 MMO determines that the cause of the injury or death is unknown and the death is relatively recent (*i.e.*, in less than a moderate state of decomposition as described in the next paragraph), Chevron would immediately report the incident to the Office of Protected Resources, NMFS, and the West Coast Regional Stranding Coordinator. The report would include the same information identified in the section 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 MMO 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 Office of Protected Resources, NMFS, and West Coast Regional Stranding Coordinator, within 24 hours of the discovery. Chevron would provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS and the Marine Mammal Stranding Network. Pile driving activities would be permitted to continue.

### **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 the authorized 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, etc.), as well as effects on habitat, the status of the affected stocks, and the likely effectiveness of the mitigation. 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 these analyses via their impacts on the environmental baseline (*e.g.*, as

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

To avoid repetition, this introductory discussion of our analyses applies to all the species listed in Table 7 given that the anticipated effects of Chevron's construction activities involving impact pile driving on marine mammals are expected to be relatively similar in nature. There is no information about the nature or severity of the impacts, or the size, status, or structure of any species or stock that would lead to a different analysis for this activity, or else species-specific factors would be identified and analyzed.

Impact pile driving activities associated with the proposed 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 B harassment (behavioral disturbance) from underwater sounds generated from pile driving. Potential takes could occur if individuals of these species are present in the ensonified zone when in-water construction is under way.

No marine mammal stocks for which incidental take authorization is proposed are listed as threatened or endangered under the ESA or determined to be strategic or depleted under the MMPA. No injuries or mortalities are anticipated to occur as a result of Chevron's impact pile driving activities. The relatively low marine mammal density and small shutdown zones make injury takes of marine mammals unlikely. In addition, the Level A exclusion zones would be thoroughly monitored before the proposed impact pile driving occurs and driving activities would be postponed if a marine mammal is sighted entering the exclusion zones. The likelihood that marine mammals will be detected by trained observers is high under the environmental conditions described for the

proposed project. The employment of the soft-start mitigation measure would also allow marine mammal in or near the ZOI or exclusion zone to move away from the impact driving sound source. Therefore, the proposed mitigation and monitoring measures are expected to eliminate 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.

The takes that are anticipated and authorized are expected to be limited to short-term Level B harassment (behavioral and TTS) as only eight piles will be driven over 4 days with each pile requiring approximately 20 minutes of driving time. 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. A few marine mammals could experience TTS if they move into the Level B ZOI. However, TTS is a temporary loss of hearing sensitivity when exposed to loud sound, and the hearing threshold is expected to recover completely within minutes to hours. Therefore, it is not considered an injury. Repeated exposures of individuals to levels of sound that may cause Level B harassment are unlikely to significantly disrupt foraging behavior. Thus, even repeated Level B harassment of some small subset of the overall stock is unlikely to result in any significant realized decrease in fitness for the affected individuals, and thus would not result in any adverse impact to the stock as a whole.

The proposed project is not expected to have significant adverse effects on affected marine mammals' habitat. While EFH for several species does exist in the proposed project area, the proposed activities would not permanently modify existing 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 short duration of the 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.

In summary, this negligible impact analysis is founded on the following factors: (1) The possibility of non-auditory injury, serious injury, or mortality may reasonably be considered discountable; (2) the anticipated incidents of Level B harassment consist of, at worst, TTS or temporary modifications in behavior; (3) the short duration of in-water construction activities (4 days, 160 minutes total driving time); (4) limited spatial impacts to marine mammal habitat; and (5) the presumed efficacy of the proposed mitigation measures in reducing the effects of the specified activity to the level of least practicable impact. In combination, we believe that these factors, as well as the available body of evidence from other similar activities, demonstrate that the potential effects of the specified activity will have only short-term effects on individuals. The specified activity is not expected to impact rates of recruitment or survival and will therefore not result in population-level impacts.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the proposed monitoring and mitigation measures, NMFS preliminarily finds that the total

marine mammal take from the proposed activity will have a negligible impact on all affected marine mammal species or stocks.

**Small Numbers**

As noted above, only small numbers of incidental take may be authorized under Section 101(a)(5)(D) of the MMPA for specified activities other than military readiness activities. The MMPA does not define small numbers and so, in practice, NMFS compares the number of individuals taken to the most appropriate estimation of the relevant species or stock size in our determination of whether an authorization is limited to small numbers of marine mammals.

The numbers of animals authorized to be taken would be considered small relative to the relevant stocks or populations (<0.01 percent for both species as shown in Table 7) even if each estimated taking occurred to a new individual. However, the likelihood that each take would occur to a new individual is extremely low. Further, these takes are likely to occur only within some small portion of the overall regional stock.

**Table 7. Population abundance estimates, total proposed Level B take, and percentage of population that may be taken for the potentially affected species during the proposed Project.**

Species	Abundance*	Total Proposed Level B Take	Percentage of Stock or Population
Harbor seal	30,968 <sup>1</sup>	24	<0.01
California sea lion (U.S. Stock)	296,750	2	<0.01

\*Abundance estimates are taken from the 2015 U.S. Pacific Marine Mammal Stock Assessments (Carretta *et al.*, 2016).

<sup>1</sup> California stock abundance estimate

Based on the analysis contained herein of the proposed activity (including the proposed mitigation and monitoring measures) and the anticipated take of marine

mammals, NMFS preliminarily finds that small numbers of marine mammals will be taken relative to the population size of the affected species or stocks.

### **Unmitigable Adverse Impact Analysis and Determination**

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

### **Endangered Species Act (ESA)**

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

### **National Environmental Policy Act (NEPA)**

Issuance of an MMPA authorization requires compliance with NEPA. NMFS will pursue categorical exclusion (CE) status under NEPA for this action. As such, we have preliminarily determined the issuance of the proposed IHA is consistent with categories of activities identified in CE B4 of the Companion Manual for NAO 216-6A and we have not identified any extraordinary circumstances listed in Chapter 4 of the Companion Manual for NAO 216-6A that would preclude this categorical exclusion. If, at the close of the public comment period, NMFS has not received comments or information contradictory to our initial CE determination, we will prepare a CE memorandum for the record.

### **Proposed Authorization**

As a result of these preliminary determinations, NMFS proposes to issue an IHA to Chevron for conducting impact pile driving at the MWEF in San Francisco Bay. This

section contains a draft of the IHA itself. The wording contained in this section is proposed for inclusion in the IHA (if issued).

1. This Incidental Harassment Authorization (IHA) is valid from January 1, 2018 through December 31, 2018.
2. This Authorization is valid only for in-water construction work associated with the Chevron Long Wharf Maintenance and Efficiency Project.
3. General Conditions
  - (a) A copy of this IHA must be in the possession of Chevron, its designees, and work crew personnel operating under the authority of this IHA.
  - (b) The species authorized for taking by Level B harassment include Pacific harbor seal (*Phoca vitulina*) and California sea lion (*Zalophus californianus*). Table 1 shows the number of takes permitted for each species.

**Table 8. Total Proposed Level B Takes.**

Species	Total Proposed Level B Takes
Harbor seal	24
California sea lion	2

- (c) The taking, by Level B harassment only, is limited to the species listed in condition 3(b). See Table 1 above.
- (d) The taking by injury (Level A harassment), serious injury, or death of any of the species listed in condition 3(b) or any taking of any other species of marine mammal is prohibited and may result in the modification, suspension, or revocation of this IHA.

- (e) Chevron shall conduct briefings between construction supervisors and crews, marine mammal monitoring team, and staff prior to the start of all in-water pile driving, and when new personnel join the work.

4. Mitigation Measures

The holder of this Authorization is required to implement the following mitigation measures:

- (a) Time Restrictions: For all in-water pile driving activities, Chevron shall operate only during daylight hours.
- (b) Establishment of Shutdown zone: For all pile driving activities, Chevron shall establish shutdown zones of 50 m for harbor porpoises and gray whales and 15 m for harbor seals and California sea lions.
- (c) Establishment of Level B harassment zone (ZOI): For all pile driving activities, Chevron shall establish a ZOI of 50 m for species listed in 3(b).
- (d) The shutdown zone and ZOI shall be monitored throughout the time required to install a pile. If a harbor seal or California sea lion is observed entering the ZOI, a Level B exposure shall be recorded and behaviors documented. That pile segment shall be completed without cessation, unless the animal approaches the shutdown zone. Pile installation shall be halted immediately before the animal enters the Level A zone.
- (e) If any marine mammal species other than those listed in condition 3(b) enters or approaches the ZOI zone all activities shall be shut down until the animal is seen leaving the ZOI or it has not been seen in the shutdown zone for 30 minutes for cetaceans and 15 minutes for pinnipeds.

- (f) Use of Ramp Up/ Soft Start
- (i) The project shall utilize soft start techniques for all impact pile driving. We require Chevron to implement an initial set of three strikes would be made by the hammer at reduced energy, followed by a 30-second waiting period, then two subsequent three- strike sets.
  - (ii) Soft start shall be required at the beginning of each day's impact pile driving work and at any time following a cessation of pile driving of 30 minutes or longer.
  - (iii) If a marine mammal is present within a shutdown zone, ramping up shall be delayed until the animal(s) leaves the relevant shutdown zone. Activity shall begin only after the MMO has determined, through sighting, that the animal(s) has moved outside the relevant shutdown zone or it has not been seen in the shutdown zone for 30 minutes for cetaceans and 15 minutes for pinnipeds.
  - (iv) If species listed in 3(b) is present in the Level B harassment zone, ramping up shall begin and a Level B take shall be documented. Ramping up shall occur when these species are in the Level B harassment zone whether they entered the Level B zone from the Level A zone, or from outside the project area.
- (g) Pile caps or cushions shall be used during all impact pile-driving activities.
- (h) For in-water heavy machinery work other than pile driving (*e.g.*, standard barges, tug boats, barge-mounted excavators, or clamshell equipment used

to place or remove material), if a marine mammal comes within 10 meters, operations shall cease and vessels shall reduce speed to the minimum level required to maintain steerage and safe working conditions.

5. Monitoring and Reporting

The holder of this Authorization is required to submit a report to NMFS within 90 days of the completion of marine mammal monitoring, or 60 days prior to the issuance of any subsequent IHA for this project (if required), whichever comes first.

(a) Visual Marine Mammal Monitoring and Observation

- (i) At least two individuals meeting the minimum qualifications below shall monitor the shutdown zones and Level B harassment zone from best practicable vantage points during impact pile driving,
- (ii) Requirements when choosing MMOs as follows:
  - a. Independent observers (*i.e.*, not construction personnel) are required.
  - b. At least one observer must have prior experience working as an observer.
  - c. Other observers may substitute education (undergraduate degree in biological science or related field) or training for experience.
  - d. Ability to conduct field observations and collect data according to assigned protocols

- e. Experience or training in the field identification of marine mammals, including the identification of behaviors.
  - f. Sufficient training, orientation, or experience with the construction operation to provide for personal safety during observations.
  - g. Writing skills sufficient to prepare a report of observations including but not limited to the number and species of marine mammals observed; dates and times when in-water construction activities were conducted; dates and times when in-water construction activities were suspended to avoid potential incidental injury from construction sound of marine mammals observed within a defined shutdown zone; and marine mammal behavior.
  - h. 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.
  - i. Chevron shall submit observer CVs for NMFS approval.
- (iii) If the exclusion zone is obscured by fog or poor lighting conditions, pile driving shall not be initiated until the exclusion zone is clearly visible. Should such conditions arise while impact driving is underway, the activity shall be halted.
- (iv) At the end of the pile-driving day, post-construction monitoring will be conducted for 30 minutes beyond the cessation of pile driving

(b) Data Collection

- (i) Observers are required to use approved data forms. Among other pieces of information, Chevron shall 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, Chevron shall attempt to distinguish between the number of individual animals taken and the number of incidents of take. At a minimum, the following information shall be collected on the sighting forms:
- a. Date and time that monitored activity begins or ends;
  - b. Weather parameters (*e.g.*, percent cloud cover, percent glare, visibility) and Beaufort sea state.
  - c. Species, numbers, and, if possible, sex and age class of observed marine mammals;
  - d. Construction activities occurring during each sighting;
  - e. Marine mammal behavior patterns observed, including bearing and direction of travel;
  - f. Specific focus should be paid to behavioral reactions just prior to, or during, soft-start and shutdown procedures;
  - g. Location of marine mammal, distance from observer to the marine mammal, and distance from pile driving activities to marine mammals;

- h. Record of whether an observation required the implementation of mitigation measures, including shutdown procedures and the duration of each shutdown; and
      - i. Other human activity in the area.
- (c) Reporting Measures
  - (i) In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by the IHA, such as an injury (Level A harassment), serious injury or mortality (*e.g.*, ship-strike, gear interaction, and/or entanglement), Chevron would immediately cease the specified activities and immediately report the incident to the Office of Protected Resources, NMFS, and the West Coast Regional Stranding Coordinator. The report would include the following information:
    - a. Time, date, and location (latitude/longitude) of the incident;
    - b. Name and type of vessel involved;
    - c. Vessel's speed during and leading up to the incident;
    - d. Description of the incident;
    - e. Status of all sound source use in the 24 hours preceding the incident;
    - f. Water depth;
    - g. Environmental conditions (*e.g.*, wind speed and direction, Beaufort sea state, cloud cover, and visibility);

- h. Description of all marine mammal observations in the 24 hours preceding the incident;
- i. Species identification or description of the animal(s) involved;
- j. Fate of the animal(s); and
- k. 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.

- (ii) In the event that Chevron discovers an injured or dead marine mammal, and the lead MMO determines that the cause of the injury or death is unknown and the death is relatively recent (*i.e.*, in less than a moderate state of decomposition as described in the next paragraph), Chevron would immediately report the incident to the 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.

- (iii) In the event that Chevron discovers an injured or dead marine mammal, and the lead MMO 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 Office of Protected Resources, NMFS, and the West Coast Regional Coordinator, within 24 hours of the discovery. Chevron would provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS and the Marine Mammal Stranding Network.

- 6. This Authorization may be modified, suspended or withdrawn if the holder fails to abide by the conditions prescribed herein, or if NMFS determines the authorized taking is having more than a negligible impact on the species or stock of affected marine mammals.

### **Request for Public Comments**

NMFS requests comment on our analysis, the draft authorization, and any other aspect of the Notice of Proposed IHA for impact pile driving associated with Chevron's

Long Wharf Maintenance and Efficiency Project from January 1, 2018 through December 31, 2018. Please include with your comments any supporting data or literature citations to help inform our final decision on Chevron's request for an MMPA authorization.

Dated: March 17, 2017.

Donna S. Wieting,  
Director, Office of Protected Resources,  
National Marine Fisheries Service.

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