BILLING CODE 3510-22-P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RTID 0648-XA126

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to the Alameda Marina Shoreline Improvement Project

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

ACTION: Notice; proposed incidental harassment authorization; request for comments on proposed authorization and possible renewal.

SUMMARY: NMFS has received a request from Pacific Shops, Inc. (Pacific Shops) for authorization to take marine mammals incidental to the Alameda Marina Shoreline Improvement Project in Alameda, CA over two years. Pursuant to the Marine Mammal Protection Act (MMPA), NMFS is requesting comments on its proposal to issue two incidental harassment authorizations (IHAs) to incidentally take marine mammals during the specified activities. NMFS is also requesting comments on possible one-year renewals that could be issued under certain circumstances and if all requirements are met, as described in **Request for Public Comments** at the end of this notice. NMFS will consider public comments prior to making any final decision on the issuance of the requested MMPA authorizations, and agency responses will be summarized in the final notice of our decision.

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

ADDRESSES: Comments 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.Davis@noaa.gov*.

Instructions: NMFS is not responsible for comments sent by any other method, to any other address or individual, or received after the end of the comment period. Comments received electronically, including all attachments, must not exceed a 25-megabyte file size. All comments received are a part of the public record and will generally be posted online at *https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-construction-activities* 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: Leah Davis, Office of Protected Resources, NMFS, (301) 427-8401. Electronic copies of the application and supporting documents, as well as a list of the references cited in this document, may be obtained online at: *https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act*. In case of problems accessing these documents, please call the contact listed above.

SUPPLEMENTARY INFORMATION:

Background

The MMPA prohibits the "take" of marine mammals, with certain exceptions. Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq.*) direct the Secretary

of Commerce (as delegated to NMFS) to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of a proposed incidental take authorization may be provided to the public for review.

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

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

National Environmental Policy Act

To comply with the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq.*) and NOAA Administrative Order (NAO) 216-6A, NMFS must review our proposed action (*i.e.*, the issuance of IHAs) with respect to potential impacts on the human environment. This action is consistent with categories of activities

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

We will review all comments submitted in response to this notice prior to concluding our NEPA process or making a final decision on the request.

Summary of Request

On November 25, 2019, NMFS received a request from Pacific Shops, Inc. (Pacific Shops) for two IHAs to take marine mammals incidental to construction activities at the Alameda Marina in Alameda, CA over two years. The applicant expects to conduct vibratory pile removal and vibratory and impact installation during Year 1, and vibratory and impact pile installation during Year 2. The application was deemed adequate and complete on April 9, 2020. Pacific Shops' request is for take of a small number of six species of marine mammals, by Level B harassment. Neither Pacific Shops nor NMFS expects serious injury or mortality to result from this activity and, therefore, IHAs are appropriate.

The IHAs, if issued, will be effective from June 1, 2020 to May 31, 2021 for Year 1 activities, and June 1, 2021 to May 31, 2022 for Year 2 activities.

Description of Proposed Activity

Overview

Pacific Shops is proposing to conduct improvements to the Alameda Marina and its shoreline in Alameda, CA over a two-year construction period. The project will address climate resiliency and rehabilitate existing shoreline and marina facilities so that the shoreline meets current seismic resistance criteria and addresses sea level rise risk. The project will update the existing marina facilities, reconfigure some of the existing marina piers, and provide the public with more aquatic recreational opportunities. The construction activities include vibratory and impact pile driving and removal which will ensonify the Oakland Estuary over approximately 68 days in year 1, and 98 days in year 2.

Dates and Duration

Pacific Shops anticipates that construction for the Alameda Marina Shoreline Improvement Project will occur over two years. The proposed IHAs would each be effective for one year beginning June 2020 and June 2021, respectively. Pile driving and/or removal are expected to occur on up to 200 minutes per day, depending on the pile type, and will occur primarily during daylight hours. Fishery regulatory authorities recommend that Pacific Shops close off the cofferdam (see details below) during low tide, which could occur outside of daylight hours. Pacific Shops estimates that in-water construction will occur over approximately 68 days in Year 1, and 98 days in Year 2.

Specific Geographic Region

The project site is entirely within the Oakland Estuary (Estuary), in the City and County of Alameda, California. Alameda is southeast of Treasure Island, Yerba Buena Island, and the San Francisco-Oakland Bay Bridge, by approximately 3km (1.9 mi). The Estuary is connected to the Central San Francisco Bay (Central Bay) on the west end and

San Leandro Bay on the east end. From the Central Bay to the project area, the Estuary is only approximately 492 ft (150 m) wide, and is relatively shallow throughout (ranging from 50 ft (15 m) in the shipping channel to 30 ft (9 m) deep in the project area (BCDC 1994, 2018)).

The geographic, bathymetric, and ecological characteristics of the Estuary limit its use by marine mammals. The geography of the Estuary limits tidal flushing, and the industrial history of the Estuary has led to an accumulation of toxins in the sediment: substrates in the Oakland Inner Harbor and turning basin contain contaminants that are harmful to sensitive marine organisms (Shreffler *et al.* 1994). There are no eelgrass beds in the project area within the Estuary. This lack of foraging habitat along with the compromised substrate quality limit prey resources for marine mammals.

Figure 1-- Alameda Marina Shoreline Improvement Project Site

Detailed Description of Specific Activity

Pacific Shops' planned construction includes work on many components of the Marina. Please see Figures 2 and 3 in the IHA application for a detailed map of Alameda Marina and the location of proposed construction components.

Demolition Activities

During Year 1, Pacific Shops is proposing to remove several degraded wharves, piers, and pier studs (the shoreline portion of a previously removed pier), collectively referred to here as "pile-supported structures." These structures include the boat elevator wharf, boat lift wharf, Pier 4 stud, Pier 6 stud, and a pier outboard of the Promenade Wharf (see Application, Figure 2). Generally, the pile-supported structures are comprised of piles supporting a wooden platform of timber joists/girders that are covered with timber deck boards. The removal methods for these pile-supported structures will all be similar, and involve removal of the deck boards, followed by the timber joists/girders and shoring beams, and finally the support piles. Deck boards will be removed by hand working from the northern end of the structure back towards the shore. Once the deck is removed, the underlying timber joists/girders will be dismantled from the estuary-side toward the landside.

Pacific Shops is proposing to remove piles associated with the pile supported structures and with Seawall 1 (Table 1). All piles will be either vibrated out or cut off at the mudline and removed. The applicant will decide in-situ whether to vibrate-out or cut off the piles depending on the condition of the pile. The applicant may first attempt to vibrate the pile out, but if it is so deteriorated that it cannot be removed, the pile will be cut it off at the mudline. Table 1 includes a summary of structures proposed for removal,

and the type and number of piles to be removed. Please see Figure 2 of Pacific Shops' application for the location of each structure at Alameda Marina.

Table 1 -- Summary of Piles to be Removed With a Vibratory Hammer in Year 1

Structure	Type of Pile	Number of Piles
Seawall 1	16-in Timber	150
Pier 4 Stud	16-in Timber	16
Pier 6 Stud	16-in Timber	20
Boat Elevator Wharf	16-in Timber	7
	12-in Square Concrete	12
Boat Lift Wharf	16-in Timber	25
	12-in Square Concrete	7
Pier Outboard of Promenade Wharf	16-in Timber	60
Building 13 Wharf	16-in Timber	3
Building 14 Wharf	16-in Timber	20
TOTAL	16-in Timber	301
	12-in Square Concrete	19

Pile Installation

The contractor will install sheet piles with a crane or excavator-mounted vibratory hammer to a design depth. Sheet pile installation will be conducted from both land and water. The contractor estimates that they will install approximately 20 sheet piles per day, each of which will take approximately 10 minutes (min) to install. Vibratory hammering will be conducted year-round.

The contractor will initially install all steel pipe piles with a vibratory hammer through the top soft soils until the vibration cannot advance the pile further into the substrate. In some cases, the contractor may be able to achieve final depths for steel piles using a vibratory hammer only. The contractor will use a crane or excavator-mounted impact hammer to complete pipe pile installation and drive to final depths. The contractor

will use a bubble curtain during all impact driving of steel piles. Pipe pile installation will be conducted from both land and water.

The contractor will install concrete piles with an impact hammer. Concrete pile installation will be conducted from both land and water.

Table 2 -- Summary of Piles to be Installed in Year 1

Structure	Type of Pile	Number of Piles	Hammer Type
Seawall 4	Steel Sheet Pile	149	Vibratory
Seawall 6	Steel Sheet Pile	106	Vibratory
Promenade Wharf	16-in Square Concrete	39	Impact
Building 5 Wharf	16-in Square Concrete	1	Impact
Building 13 Wharf	36-in Steel Pipe	2	Vibratory & Attenuated Impact
	16-in Square Concrete	1	Impact
Cofferdam	Steel Sheet Pile	214[a]	Vibratory
TOTAL	Steel Sheet Pile	469	Vibratory
	16-in Square Concrete	41	Impact
	36-in Steel Pipe	2	Vibratory & Attenuated Impact

[a] 107 steel sheet piles will be installed and later removed (part of cofferdam), and are accounted for in 214 of these piles, as SLs are considered to be the same for both activities. The applicant has not yet determined the exact sheet pile they will be using.

Table 3 -- Summary of Piles to be Installed in Year 2

Structure	Type of Pile	Number of Piles	Hammer Type
Seawall 1	Steel Sheet Pile	233	Vibratory
	Wide Flange Beam	117	Vibratory & Attenuated Impact
Seawall 1A	Steel Sheet Pile	26	Vibratory
	Wide Flange Beam[a]	13	Vibratory & Attenuated Impact
Building 14 Wharf	36-in Steel Pipe	1	Vibratory & Attenuated Impact
Headwalk	14-in Square Concrete	19	Impact
Boat Hoist Deck	24-in Square Concrete	8	Impact
	30-in Steel Pipe	1	Vibratory & Attenuated Impact

TOTAL	Steel Sheet Pile	259	Vibratory
	Wide Flange Beam[a]	130	Vibratory & Attenuated Impact
	30-in Steel Pipe	1	Vibratory & Attenuated Impact
	36-in Steel Pipe	1	Vibratory & Attenuated Impact
	14-in Square Concrete	19	Impact
	24-in Square Concrete	8	Impact

[a] Wide flange beams are steel beams with two parallel "flanges" that are longer than the central piece connecting them. They have an H-shaped cross-section. The contractor will select the specific wide flange beams at the time of construction.

Wharf Refurbishment

Pacific Shops plans to refurbish the Promenade Wharf, Building 5 Wharf, Building 13 Wharf, and Building 14 Wharf (see application, Figure 2). In addition to the pile removal and installation activities outlined above, Pacific Shops will remove and replace or reinforce miscellaneous support framing, bracing, and connectors (*i.e.*, joists/girders, blocking, and hardware). NMFS does not expect these above-water activities to result in marine mammal harassment, and they are not considered further in this notice.

The contractor will install new prestressed concrete piles adjacent to existing severely deteriorated piles, and will jacket timber piles with moderate deterioration. Pile jacketing involves encasing existing piles in a circular plastic case and filling the space between the pile and plastic case with cement grout. NMFS does not expect pile jacketing to result in marine mammal harassment and we do not consider it further in this notice.

The contractor will replace deteriorated beams with new beams of the same size and new piles will be added to the wharves for lateral restraint (steel pipe piles and wide flange beams). The contractor will construct structural connections between the new piles and the deck beam frame. Finally, the contractor will place the wharf deck boards over the frame.

Some limited falsework will likely be required for access, which will span between the existing beams and piles. Falsework will likely consist of hanging a temporary scaffold system under the existing wharf to prevent debris generated during the refurbishment of the wharf from falling into the water.

NMFS does not expect the installation of structural connections, deck boards, and falsework to result in marine mammal harassment, and we do not consider them further in this notice.

Seawall Maintenance

Pacific Shops is proposing repairs that will strengthen the walls and address projected sea level rise. They anticipate completing seawall repairs prior to the removal of some existing seawall materials. Seawall maintenance has been broken up into four segments: Seawall 1 spans Pier 7 to Pier 3 (700 LF); Seawall 1A is directly east of Pier 3 (80 LF); Seawall 4 is south of East Pier (280 LF); and Seawall 6 is east of the graving dock (*i.e.*, dry dock) (200 LF).

The contractor will repair Seawall 4 and Seawall 6 in Year 1 and will consist of new steel sheet piles with reinforced concrete caps and tie-rods (Table 2). Seawall 1 and Seawall 1A will be repaired in Year 2. Repairs will consist of new steel sheet piles or combi-wall (combination of steel wide flange beams and steel sheet piles) with a reinforced concrete cap at its top (Table 3).

The new sheet piles (steel sheet piles) or combi-wall at Seawalls 1 and 1A will be driven to the design tip elevation seaward of the existing timber seawall. Wide flange beams and sheet piles will typically tip in a dense sand layer approximately 25 to 35 ft (7.6 to 10.6m) below mudline. The contractor will install the sheet piles using a vibratory

hammer. If wide flange beams are used, the contractor will first use a vibratory hammer, and then use an impact hammer to complete beam installation and drive to final depths. The reinforced concrete cap will be cast in place along the top of the piles of the new seawall.

To repair Seawalls 4 and 6, Pacific Shops will construct new wall segments consisting of steel sheet piles with a concrete cap beam on the outside face of the existing seawall. The contractor will install the steel sheet piles and concrete cap in a manner similar to that described for Seawalls 1 and 1A. Following the installation of the steel sheet pile wall, the contractor will excavate soil behind the wall to the depth of the existing tie-rod for inspection of the steel and concrete deadman anchor components. Deteriorated components of the deadman anchor and the associated connection components will be replaced as needed. The existing deadman anchor will be tied to the new concrete cap beam above the sheet pile wall using a steel tie-rod. Excavation and replacement of deadman anchor components, as needed, will occur completely out of water.

NMFS does not expect construction of the concrete caps, excavation behind the seawall, or potential replacement of the deadman anchor and associated components to result in take of marine mammals. Therefore, we do not consider them further in this notice.

Outfall Installation

The Master Plan stormwater management system will include outfall repair and installation with new inlets and pipelines of appropriate size to convey runoff and run-on. This stormwater management system will continue to discharge directly to the Estuary

through six outfalls located either in revetments or in seawalls that range in size from 18-in to 36-in-diameter (45.7 cm to 91.4 cm) pipelines.

The Project includes the installation of one new outfall in the Estuary, located in the shoreline between Pier 3 and Pier 2 (see Application, Figure 3). The outfall is located along the revetment and will be a cast-in-place concrete structure consisting of a headwall, wingwalls, and riprap. The outfall will include a tide valve to prevent backwater into the storm drain system.

The contractor will install a sheet pile cofferdam to facilitate outfall repair and installation. The sheet pile cofferdam wall will be embedded in shoreline substrate immediately downstream from the outfall using a vibratory hammer. The contractor expects to install the final cofferdam piles during low tide, if possible, as recommended NMFS Southwest Region, to minimize impacts to fish. The contractor will remove some riprap and sediment from the cofferdam footprint prior to cofferdam installation. Once the cofferdam is installed, soil and riprap will be excavated from the location of the new outfall using a landside excavator. Once the contractor has excavated and cleared the existing material, they will construct forms for the new headwall and wingwalls and pour concrete into the forms. After the headwall and wingwalls have cured enough to hold the slope, the contractor will place riprap in upland areas and within the Estuary. The contractor will remove the forms and sheet pile cofferdam after the concrete has reached design strength, allowing the headwall and wingwalls to cure. The contractor will stabilize the shoreline with riprap, and install the tidal flap gate.

NMFS does not expect construction of the headwall and wingwalls (poured concrete), installation of the rip rap, or insallation of the tidal flap gate to result in marine mammal harassment. Therefore, we do not consider these activities further in this notice.

Marina Infrastructure Removal/Reconfiguration

Pacific Shops plans to reconfigure the existing 529-slip marina to reduce points of land access as a measure of safety, to improve access and operation of the docks, and to create a new waterlife park in the remnant graving dock. The existing marina uses will remain unchanged with no additional slips. Pacific Shops plans to modify existing marina infrastructure, including removing Pier 2 slip covers, installing floating docks in the existing graving dock, and reconfiguring gangways and headwalks. Gangways provide pedestrian access from land to the floating docks and headwalks are pile-supported floating portions of a dock that provide pedestrian access to slips.

The contractor will reuse existing support piles for marina infrastructure to the greatest extent possible; however, they will remove some existing piles for dock reconfiguration, as previously described in the Pile Removal section. The contractor will reconfigure Pier 1 slips to accommodate larger vessels and the East Pier slips will be moved toward the channel to accommodate the new waterfront park. The contractor will install new support piles for the new headwalks (Table 3).

The contractor will complete the bulk of marina reconfiguration work from land. New sections of headwalks, gangways, and docks will be constructed in an upland location, hoisted onto the water and floated into place. Existing features that require demolition will be disconnected from the current fixed dock, floated to the edge of the marina, hoisted onto land, and demolished in an upland location.

Only the headwalk reconfiguration involves pile driving. NMFS does not anticipate that Pier 2 slipcover removal, gangway reconfiguration, and floating dock installation will result in marine mammal harassment. Therefore, we do not consider those activities further in this notice.

Boat Hoist Deck

The contractor will replace three existing boat hoists with a new 3-ton boat hoist (approximately 42 ft by 50 ft (12.8 m by 15.2 m) in area). The new boat hoist, located on the west side of the project site (see application, Figure 4), will lift sailboats into and out of the Estuary. It requires a new, pile-supported deck.

The new deck will be 2,100ft^2, (195m^2) with 270 ft^2 (25m^2) over land and 1,830 ft^2 (170 m^2) over water. The new deck will be supported by eight 24-in square prestressed concrete piles and one 30-in cylindrical steel pipe pile (Table 3). The single 30-in steel pipe pile supporting the hoist platform deck will be initially installed with a vibratory hammer; an attenuated impact hammer will be used to complete pile installation and drive to final depths. The 24-in concrete piles will be impact-driven their entire length without attenuation.

Pacific Shops does not plan to conduct pile driving with multiple hammers concurrently.

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

Description of Marine Mammals in the Area of Specified Activities

Sections 3 and 4 of the application summarize available information regarding status and trends, distribution and habitat preferences, and behavior and life history, of the potentially affected species. Additional information regarding population trends and threats may be found in NMFS's Stock Assessment Reports (SARs; *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments*) and more general information about these species (*e.g.*, physical and behavioral descriptions) may be found on NMFS's website (*https://www.fisheries.noaa.gov/find-species*).

Table 4 lists all species with expected potential for occurrence in Alameda, CA and summarizes information related to the population or stock, including regulatory status under the MMPA and ESA and potential biological removal (PBR), where known. For taxonomy, we follow Committee on Taxonomy (2019). PBR is defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population (as described in NMFS's SARs). While no mortality is anticipated or authorized here, PBR and annual serious injury and mortality from anthropogenic sources are included here as gross indicators of the status of the species and other threats.

Marine mammal abundance estimates presented in this document represent the total number of individuals that make up a given stock or the total number estimated within a particular study or survey area. NMFS's stock abundance estimates for most species represent the total estimate of individuals within the geographic area, if known, that comprises that stock. For some species, this geographic area may extend beyond U.S.

waters. All managed stocks in this region are assessed in NMFS's U.S. Pacific SARs (*e.g.*, Carretta *et al.*, 2019). All values presented in Table 4 are the most recent available at the time of publication and are available in the 2018 SARs (Carretta *et al.*, 2019) and draft 2019 SARs (available online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/draft-marine-mammal-stock-assessment-reports*).

Table 4 -- Species That Spatially Co-Occur With the Activity to the Degree That Take May Occur

Common name	Scientific name	Stock	ESA/MMPA status; Strategic (Y/N)[1]	Stock abundance (CV, N_{min}, most recent abundance survey)[2]	PBR	Annual M/SI[3]
Order Cetartiodactyla – Cetacea – Superfamily Odontoceti (toothed whales, dolphins, and porpoises)						
Family Delphinidae						
Bottlenose Dolphin	*Tursiops truncatus*	California Coastal	-, -, N	453 (0.06, 346, 2011)	2.7	>2.0
Family Phocoenidae (porpoises)						
Harbor porpoise	*Phocoena phocoena*	San Francisco/Russian River	-, -, N	9,886 (0.51, 2019)	66	0
Order Carnivora – Superfamily Pinnipedia						
Family Otariidae (eared seals and sea lions)						
California Sea Lion	*Zalophus californianus*	United States	-, -, N	257,606 (N/A, 233,515, 2014)	14,011	>321
Northern fur seal	*Callorhinus ursinus*	California	-, D, N	14,050 (N/A, 7,524, 2013)	451	1.8
		Eastern North Pacific	-, D, N	620,660 (0.2, 525,333, 2016)	11,295	399
Family Phocidae (earless seals)						
Northern elephant seal	*Mirounga angustirostris*	California Breeding	-, -, N	179,000 (N/A, 81,368, 2010)	4,882	8.8
Harbor seal	*Phoca vitulina*	California	-, -, N	30,968 (N/A, 27,348, 2012)	1,641	43

1 - Endangered Species Act (ESA) status: Endangered (E), Threatened (T)/MMPA status: Depleted (D). A dash (-) indicates that the species is not listed under the ESA or designated as depleted under the MMPA. Under the MMPA, a strategic stock is one for which the level of direct human-caused mortality exceeds PBR or which is determined to be declining and likely to be listed under the ESA within the foreseeable future. Any species or stock listed under the ESA is automatically designated under the MMPA as depleted and as a strategic stock.
2- NMFS marine mammal stock assessment reports online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region.* CV is coefficient of variation; Nmin is the minimum estimate of stock abundance.
3 - These values, found in NMFS's SARs, represent annual levels of human-caused mortality plus serious injury from all sources combined (e.g., commercial fisheries, ship strike). Annual M/SI often cannot be determined precisely and is in some cases presented as a minimum value or range. A CV associated with estimated mortality due to commercial fisheries is presented in some cases.

Harbor seal and California sea lion spatially co-occur with the activity to the degree that take is reasonably likely to occur, and we have proposed authorizing take of these species. For bottlenose dolphin, harbor porpoise, northern fur seal, and northern elephant seal, occurrence is such that take is possible, and we have proposed authorizing take of these species also. All species that could potentially occur in the proposed survey areas are included in Pacific Shops' IHA application (see application, Table 4). While gray whale and humpback whale could potentially occur in the area, the spatial occurrence of these species is such that take is not expected to occur, and they are not discussed further beyond the explanation provided here. In recent years there have been an increased number of gray whales in the San Francisco Bay, but they primarily occur in the western and central Bay (W. Keener, pers. comm. 2019), and none have been reported in the Estuary (NMFS 2019a, 2019b). Humpbacks have regularly been seen inside the Bay, primarily in the western Bay, from April through November since 2016 (W. Keener, pers. comm. 2019), and sometimes venture up the Delta waterway (*e.g.*, Gulland *et al.* 2008), but have not been recorded in the Estuary (NMFS 2019a, 2019b). Additionally, both gray whales and humpback whales are not expected to enter the project area due to the narrow channel width and shallow water depths.

Bottlenose Dolphin

The California coastal stock of common bottlenose dolphin is found within 0.6 mi (1 km) of shore (Defran and Weller 1999) and occurs from northern Baja California, Mexico to Bodega Bay, CA. Their range has extended north over the last several decades with El Niño events and increased ocean temperatures (Hansen and Defran 1990). Genetic studies have shown that no mixing occurs between the California coastal stock and the offshore common bottlenose dolphin stock (Lowther-Thieleking *et al.* 2015). Bottlenose dolphins are opportunistic foragers: time of day, tidal state, and oceanographic habitat influence where they pursue prey (Hanson and Defran 1993). Dive durations up to 15 minutes have been recorded for trained Navy bottlenose dolphins, (Ridgway *et al.* 1969), but typical dives are shallower and of a much shorter duration (approximately 30 seconds [sec]; Bearzi *et al.* 1999, Mate *et al.* 1995).

Please see the *Marine Mammal Occurrence and Take Calculation and Estimation* section for information on local occurrence in the project area.

Harbor Porpoise

Harbor porpoise occur along the US west coast from southern California to the Bering Sea (Allen and Angliss 2013, Barlow and Hanan 1995, Carretta *et al.* 2009, 2014). They rarely occur in waters warmer than 62.6 degrees Fahrenheit (17 degrees Celsius; Read 1990). The San Francisco–Russian River stock is found from Pescadero, 18 mi (30 km) south of the San Francisco Bay, to 99 mi (160 km) north of the Bay at Point Arena (Carretta *et al.* 2014, Chivers *et al.* 2002). In most areas, harbor porpoise occur in small groups of just a few individuals.

Harbor porpoise occur frequently outside the Bay and re-entered the Bay beginning in 2008 (Stern *et al.* 2017). They now commonly occur year-round within the

Bay, primarily on the west and northwest side of the Central Bay near the Golden Gate Bridge, near Marin County, and near the city of San Francisco (Duffy 2015, Keener *et al.* 2012, Stern *et al.* 2017). In the summer of 2017 and 2018, mom-calf pairs and small groups (1–4 individuals) were seen to the north and west of Treasure Island, and just south of YBI (Yerba Buena Island) (Caltrans 2018a, 2019; M. Schulze, pers. comm. 2019). Please see the *Marine Mammal Occurrence and Take Calculation and Estimation* section for information on local occurrence in the project area.

Harbor porpoise must forage nearly continuously to meet their high metabolic needs (Wisniewska *et al.* 2016). They consume up to 550 small fish (1.2–3.9 in [3–10 cm]; *e.g.* anchovies) per hour at a nearly 90 percent capture success rate (Wisniewska *et al.* 2016).

California Sea Lion

California sea lions occur from Vancouver Island, British Columbia, to the southern tip of Baja California. Sea lions breed on the offshore islands of southern and central California from May through July (Heath and Perrin 2008). During the non-breeding season, adult and subadult males and juveniles migrate northward along the coast to central and northern California, Oregon, Washington, and Vancouver Island (Jefferson *et al.* 1993). They return south the following spring (Heath and Perrin 2008, Lowry and Forney 2005). Females and some juveniles tend to remain closer to rookeries (Antonelis *et al.* 1990, Melin *et al.* 2008).

California sea lions have occupied docks near Pier 39 in San Francisco, about 9.2 mi (14.9 km) from the project area, since 1987. The highest number of sea lions recorded at Pier 39 was 1,701 individuals in November 2009. Occurrence of sea lions here is

typically lowest in June (during pupping and breeding seasons) and highest in August. Approximately 85 percent of the animals that haul out at this site are males, and no pupping has been observed here or at any other site in the Bay. Pier 39 is the only regularly used haulout site in the project vicinity, but sea lions occasionally haul out on human-made structures such as bridge piers, jetties, or navigation buoys (Riedman 1990).

Pupping occurs primarily on the California Channel Islands from late May until the end of June (Peterson and Bartholomew 1967). No pupping has been observed at the Pier 39 site or any other site in San Francisco Bay under normal conditions (USACE 2011). Although there has been documentation of pupping on docks in the Bay, this event was during a domoic acid event. There is no reason to anticipate that any domoic events will occur during the project construction activities. Weaning and mating occur in late spring and summer during the peak upwelling period (Bograd *et al.*, 2009). After the mating season, adult males migrate northward to feeding areas as far away as the Gulf of Alaska (Lowry et al,. 1992), and they remain away until spring (March–May), when they migrate back to the breeding colonies. Adult females generally remain south of Monterey Bay, California throughout the year, feeding in coastal waters in the summer and offshore waters in the winter, alternating between foraging and nursing their pups on shore until the next pupping/breeding season (Melin and DeLong 2000; Melin *et al.* 2008).

Please see the *Marine Mammal Occurrence and Take Calculation and Estimation* section for information on local occurrence in the project area.

Northern Fur Seal

Two northern fur seal stocks may occur near the Bay: the California and Eastern North Pacific stocks. The California stock breeds and pups on the offshore islands of

California, and forages off the California coast. The Eastern Pacific stock breeds and pups on islands in the North Pacific Ocean and Bering Sea, including the Aleutian Islands, Pribilof Islands, and Bogoslof Island, but females and juveniles move south to California waters to forage in the fall and winter months (Gelatt and Gentry 2018). Breeding and pupping occur from mid- to late-May into July. Pups are weaned in September and move south to feed offshore California (Gentry 1998).

Both the California and Eastern North Pacific stocks forage in the offshore waters of California, but usually only sick or emaciated juvenile fur seals seasonally enter the Bay. The Marine Mammal Center (TMMC) occasionally picks up stranded fur seals around YBI and Treasure Island (NMFS, 2019b). Please see the *Marine Mammal Occurrence and Take Calculation and Estimation* section for information on local occurrence in the project area.

Northern Elephant Seal

Northern elephant seals are common on California coastal mainland and island sites, where the species pups, breeds, rests, and molts. The largest rookeries are on San Nicolas and San Miguel islands in the northern Channel Islands. Near the Bay, elephant seals breed, molt, and haul out at Año Nuevo Island, the Farallon Islands, and Point Reyes National Seashore.

Northern elephant seals haul out to give birth and breed from December through March. Pups remain onshore or in adjacent shallow water through May. Both sexes make two foraging migrations each year: one after breeding and the second after molting (Stewart 1989; Stewart and DeLong 1995). Adult females migrate to the central North Pacific to forage, and males migrate to the Gulf of Alaska to forage (Robinson *et al.*

2012). Pup mortality is high when they make the first trip to sea in May, and this period correlates with the time of most strandings. Young-of-the-year pups return in the late summer and fall to haul out at breeding rookeries and small haul-out sites, but occasionally may make brief stops in the Bay. Please see the *Marine Mammal Occurrence and Take Calculation and Estimation* section for information on local occurrence in the project area.

Harbor Seal

Harbor seals are found from Baja California to the eastern Aleutian Islands of Alaska (Harvey and Goley 2011, Herder 1986). In California there are approximately 500 haulout sites along the mainland and on offshore islands, including intertidal sandbars, rocky shores, and beaches (Hanan 1996, Lowry *et al.* 2008).

Harbor seals are the most common marine mammal species observed in the San Francisco Bay. Within the Bay they primarily haul out on exposed rocky ledges and on sloughs in the southern Bay. Harbor seals are central-place foragers (Orians and Pearson 1979) and tend to exhibit strong site fidelity within season and across years, generally forage close to haulout sites, and repeatedly visit specific foraging areas (Grigg *et al.* 2012, Suryan and Harvey 1998, Thompson *et al.* 1998). Harbor seals in the Bay forage mainly within 7 mi (10 km) of their primary haulout site (Grigg *et al.* 2012), and often within just 1–3 mi (1–5 km; Torok 1994). Depth, bottom relief, and prey abundance also influence foraging location (Grigg *et al.* 2012).

Harbor seals molt from May through June. Peak numbers of harbor seals haul out in central California during late May to early June, which coincides with the peak molt. During both pupping and molting seasons, the number of seals and the length of time

hauled out per day increase, from an average of 7 hours per day to 10–12 hours (Harvey and Goley 2011, Huber *et al.* 2001, Stewart and Yochem 1994).

Harbor seals tend to forage at night and haul out during the day with a peak in the afternoon between 1 p.m. and 4 p.m. (Grigg *et al.* 2002, London *et al.* 2001, Stewart and Yochem 1994, Yochem *et al.* 1987). Tide levels affect the maximum number of seals hauled out, with the largest number of seals hauled out at low tide, but time of day and season have the greatest influence on haul-out behavior (Manugian *et al.* 2017, Patterson and Acevedo-Gutiérrez 2008, Stewart and Yochem 1994). Harbor seals in the Bay typically haul out in groups ranging from a few individuals to over 300 during peak molt (NPS, unpublished data).

The closest haulout to the project area is YBI, approximately 6.6 mi (10.7 km) to the northwest. The YBI haulout site has a daily range of zero to 109 harbor seals during fall months, with the highest numbers hauled out during afternoon low tides (Caltrans, 2004).

A second high-use haulout is located on the southwest side of Alameda Island near the Encinal Boat Ramp, 7.8 mi (12.6 km) by water. This location consists of two haulout sites approximately 0.5 mi (0.8 km) apart: one at the western end of Breakwater Island, and the other on a platform installed for the harbor seals within the harbor protected by Breakwater Island. More animals haul out here daily in the winter than in the summer and fall: an average of fewer than 10 animals per day haul out in the fall, while up to 75 animals per day use this haulout in January and December (M. Klein and R. Bangert, pers. comm. 2019). This trend reflects the fact that more seals are present in the Bay during the winter foraging period than during the spring breeding season. Large

concentrations of spawning Pacific herring (*Clupea pallasii*) and migrating salmonids likely attract seals into the Bay during the winter months (Greig and Allen 2015) and may similarly increase harbor seal numbers in the Estuary. Harbor seals forage for Pacific herring in eelgrass beds in the winter (Schaeffer *et al.* 2007). There are no eelgrass beds in the Estuary to attract foraging harbor seals. Please see the *Marine Mammal Occurrence and Take Calculation and Estimation* section for information on local occurrence in the project area.

Pupping occurs from March through May in central California (Codde and Allen 2018). Pups are weaned in four weeks, most by mid-June (Codde and Allen 2018). Harbor seals molt from June through July (Codde and Allen 2018) and breed between late March and June (Greig and Allen 2015). The closest recognized harbor seal pupping site to Alameda Marina is at Castro Rocks, approximately 24.5 km (15.2 mi) from the project area.

Marine Mammal Hearing

Hearing is the most important sensory modality for marine mammals underwater, and exposure to anthropogenic sound can have deleterious effects. To appropriately assess the potential effects of exposure to sound, 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 directly measured or estimated hearing ranges on the basis of available behavioral response data, audiograms derived using auditory evoked potential techniques,

anatomical modeling, and other data. Note that no direct measurements of hearing ability have been successfully completed for mysticetes (*i.e.*, low-frequency cetaceans). Subsequently, NMFS (2018) described generalized hearing ranges for these marine mammal hearing groups. Generalized hearing ranges were chosen based on the approximately 65 decibel (dB) threshold from the normalized composite audiograms, with the exception for lower limits for low-frequency cetaceans where the lower bound was deemed to be biologically implausible and the lower bound from Southall *et al.* (2007) retained. Marine mammal hearing groups and their associated hearing ranges are provided in Table 5.

Table 5 -- Marine Mammal Hearing Groups (NMFS, 2018)

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, *Kogia*, river dolphins, cephalorhynchid, *Lagenorhynchus cruciger* & *L. australis*)	275 Hz to 160 kHz
Phocid pinnipeds (PW) (underwater) (true seals)	50 Hz to 86 kHz
Otariid pinnipeds (OW) (underwater) (sea lions and fur seals)	60 Hz to 39 kHz

***** Represents the generalized hearing range for the entire group as a composite (*i.e.*, 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 *et al.* 2007) and PW pinniped (approximation).

The pinniped functional hearing group was modified from Southall *et al.* (2007) on the basis of data indicating that phocid species have consistently demonstrated an extended frequency range of hearing compared to otariids, especially in the higher frequency range (Hemilä *et al.*, 2006; Kastelein *et al.*, 2009; Reichmuth and Holt, 2013).

For more detail concerning these groups and associated frequency ranges, please see NMFS (2018) for a review of available information. Six marine mammal species (two cetacean and four pinniped (two otariid and two phocid) species) have the reasonable potential to co-occur with the proposed activities. Please refer to Table 4. Of the cetacean species that may be present, one is classified as mid-frequency cetacean (*i.e.*, bottlenose dolphin), and one is classified as high-frequency cetacean (*i.e.*, harbor porpoise).

Potential Effects of Specified Activities 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 includes a quantitative analysis of the number of individuals that are expected to be taken by this activity. The **Negligible Impact Analysis and Determination** section considers the content of this section, the **Estimated Take** section, and the **Proposed 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.

Acoustic effects on marine mammals during the specified activity can occur from vibratory and impact pile driving. The effects of underwater noise from Pacific Shops' proposed activities have the potential to result in Level B harassment of marine mammals in the action area.

Description of Sound Sources

The marine soundscape is comprised of both ambient and anthropogenic sounds. Ambient sound is defined as the all-encompassing sound in a given place and is usually a

composite of sound from many sources both near and far. The sound level of an area is defined by the total acoustical energy being generated by known and unknown sources. These sources may include physical (*e.g.*, waves, wind, precipitation, earthquakes, ice, atmospheric sound), biological (*e.g.*, sounds produced by marine mammals, fish, and invertebrates), and anthropogenic sound (*e.g.*, vessels, dredging, aircraft, construction).

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, vibratory pile driving, and vibratory pile removal. The sounds produced by these activities fall into one of two general sound types: Impulsive and non-impulsive. Impulsive sounds (*e.g.*, explosions, gunshots, sonic booms, impact pile driving) are typically transient, brief (less than 1 second), broadband, and consist of high peak sound pressure with rapid rise time and rapid decay (ANSI 1986; NIOSH 1998; ANSI 2005;

NMFS 2018a). Non-impulsive sounds (*e.g.* aircraft, machinery operations such as drilling or dredging, vibratory pile driving, and active sonar systems) can be broadband, narrowband or tonal, brief or prolonged (continuous or intermittent), and typically do not have the high peak sound pressure with raid rise/decay time that impulsive sounds do (ANSI 1995; NIOSH 1998; NMFS 2018a). 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).

Two types of pile hammers would be used on this project: Impact and vibratory. Impact hammers 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). Vibratory hammers install piles by vibrating them and allowing the weight of the hammer to push them into the sediment. Vibratory hammers produce significantly less sound than impact hammers. Peak sound pressure levels (SPLs) may be 180 dB or greater, but are generally 10 to 20 dB lower than SPLs generated during impact pile driving of the same-sized pile (Oestman *et al.* 2009). Rise time is slower, reducing the probability and severity of injury, and sound energy is distributed over a greater amount of time (Nedwell and Edwards 2002; Carlson *et al.* 2005).

The likely or possible impacts of Pacific Shops' proposed activity on marine mammals could involve both non-acoustic and acoustic stressors. Potential non-acoustic stressors could result from the physical presence of the equipment and personnel; however, any impacts to marine mammals are expected to primarily be acoustic in nature.

Acoustic stressors include effects of heavy equipment operation during pile installation and removal.

Acoustic Impacts

The introduction of anthropogenic noise into the aquatic environment from pile driving and removal is the primary means by which marine mammals may be harassed from Pacific Shops' specified activity. In general, animals exposed to natural or anthropogenic sound may experience physical and psychological effects, ranging in magnitude from none to severe (Southall *et al.* 2007). In general, exposure to pile driving and removal noise has the potential to result in auditory threshold shifts and behavioral reactions (*e.g.*, avoidance, temporary cessation of foraging and vocalizing, changes in dive behavior). Exposure to anthropogenic noise can also lead to non-observable physiological responses such an increase in stress hormones. Additional noise in a marine mammal's habitat can mask acoustic cues used by marine mammals to carry out daily functions such as communication and predator and prey detection. The effects of pile driving and removal noise on marine mammals are dependent on several factors, including, but not limited to, sound type (*e.g.*, impulsive vs. non-impulsive), the species, age and sex class (*e.g.*, adult male vs. mom with calf), duration of exposure, the distance between the pile and the animal, received levels, behavior at time of exposure, and previous history with exposure (Wartzok *et al.* 2004; Southall *et al.* 2007). Here we discuss physical auditory effects (threshold shifts) followed by behavioral effects and potential impacts on habitat.

NMFS defines a noise-induced threshold shift (TS) 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 2018). The amount of threshold shift is customarily expressed in dB. A TS can be permanent or temporary. As described in NMFS (2018), there are numerous factors to consider when examining the consequence of TS, including, but not limited to, the signal temporal pattern (*e.g.*, impulsive or non-impulsive), likelihood an individual would be exposed for a long enough duration or to a high enough level to induce a TS, the magnitude of the TS, time to recovery (seconds to minutes or hours to days), the frequency range of the exposure (*i.e.*, spectral content), the hearing and vocalization frequency range of the exposed species relative to the signal's frequency spectrum (*i.e.*, how an animal uses sound within the frequency band of the signal; *e.g.*, Kastelein *et al.* 2014), and the overlap between the animal and the source (*e.g.*, spatial, temporal, and spectral).

Permanent Threshold Shift (PTS)—NMFS defines PTS as 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 2018). 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 levels for marine mammals are estimates, as with the exception of a single study unintentionally inducing PTS in a harbor seal (Kastak *et al.* 2008), there are no empirical data measuring PTS in marine mammals largely due to the fact that, for various ethical reasons, experiments involving anthropogenic noise exposure at levels inducing PTS are not typically pursued or authorized (NMFS 2018).

Temporary Threshold Shift (TTS)—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 2018). Based on data from cetacean TTS measurements (see Southall *et al.* 2007), a TTS 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 (Schlundt *et al.* 2000; Finneran *et al.* 2000, 2002). As described in Finneran (2015), marine mammal studies have shown the amount of TTS increases with cumulative sound exposure level (SELcum) in an accelerating fashion: At low exposures with lower SELcum, the amount of TTS is typically small and the growth curves have shallow slopes. At exposures with higher SELcum, the growth curves become steeper and approach linear relationships with the noise SEL.

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 (similar to those discussed in auditory masking, below). 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 takes place during a time when the animal is traveling through the open ocean, 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. We note that reduced hearing sensitivity as a simple function of aging has been observed in marine mammals, as well as humans and other taxa (Southall *et al.* 2007), so

we can infer that strategies exist for coping with this condition to some degree, though likely not without cost.

Currently, TTS data only exist for four species of cetaceans (bottlenose dolphin , beluga whale (*Delphinapterus leucas*), harbor porpoise, and Yangtze finless porpoise (*Neophocoena asiaeorientalis*)) and five species of pinnipeds exposed to a limited number of sound sources (*i.e.*, mostly tones and octave-band noise) in laboratory settings (Finneran 2015). TTS was not observed in trained spotted (*Phoca largha*) and ringed (*Pusa hispida*) seals exposed to impulsive noise at levels matching previous predictions of TTS onset (Reichmuth *et al.* 2016). In general, harbor seals and harbor porpoises have a lower TTS onset than other measured pinniped or cetacean species (Finneran 2015). Additionally, the existing marine mammal TTS data come from a limited number of individuals within these species. No data are 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), Finneran (2015), and Table 5 in NMFS (2018). Installing piles requires a combination of impact pile driving and vibratory pile driving. For the project, these activities would not occur at the same time and there would be pauses in activities producing the sound during each day. Given these pauses and that many marine mammals are likely moving through the ensonified area and not remaining for extended periods of time, the potential for TS declines.

Behavioral Harassment—Exposure to noise from pile driving and removal also has the potential to behaviorally disturb marine mammals. Available studies show wide variation in response to underwater sound; therefore, it is difficult to predict specifically

how any given sound in a particular instance might affect marine mammals perceiving the signal. If a marine mammal does react briefly to an underwater sound by changing its behavior or moving a small distance, the impacts of the change are unlikely to be significant to the individual, let alone the stock or population. However, if a sound source displaces marine mammals from an important feeding or breeding area for a prolonged period, impacts on individuals and populations could be significant (*e.g.*, Lusseau and Bejder 2007; Weilgart 2007; NRC 2005).

Disturbance may result in changing durations of surfacing and dives, number of blows per surfacing, 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 (such as tail/fluke slapping or jaw clapping); avoidance of areas where sound sources are located. Pinnipeds may increase their haul out time, possibly to avoid in-water disturbance (Thorson and Reyff 2006). 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). In general, pinnipeds seem more tolerant of, or at least habituate more quickly to, potentially disturbing underwater

sound than do cetaceans, and generally seem to be less responsive to exposure to industrial sound than most cetaceans. Please see Appendices B-C of Southall *et al.* (2007) for a review of studies involving marine mammal behavioral responses to sound.

Disruption of feeding behavior can be difficult to correlate with anthropogenic sound exposure, so it is usually inferred by observed displacement from known foraging areas, the appearance of secondary indicators (*e.g.*, bubble nets or sediment plumes), or changes in dive behavior. As for other types of behavioral response, the frequency, duration, and temporal pattern of signal presentation, as well as differences in species sensitivity, are likely contributing factors to differences in response in any given circumstance (*e.g.*, Croll *et al.* 2001; Nowacek *et al.* 2004; Madsen *et al.* 2006; Yazvenko *et al.* 2007). A determination of whether foraging disruptions incur fitness consequences would require information on or estimates of the energetic requirements of the affected individuals and the relationship between prey availability, foraging effort and success, and the life history stage of the animal.

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), however distress is an unlikely result of this project based on observations of marine mammals during previous, similar projects in the area.

Masking—Sound can disrupt behavior through masking, or interfering with, an animal's ability to detect, recognize, or discriminate between acoustic signals of interest (*e.g.*, those used for intraspecific communication and social interactions, prey detection, predator avoidance, navigation) (Richardson *et al.* 1995). Masking occurs when the receipt of a sound is interfered with by another coincident sound at similar frequencies and at similar or higher intensity, and may occur whether the sound is natural (*e.g.*, snapping shrimp, wind, waves, precipitation) or anthropogenic (*e.g.*, pile driving, shipping, sonar, seismic exploration) in origin. The ability of a noise source to mask biologically important sounds depends on the characteristics of both the noise source and the signal of interest (*e.g.*, signal-to-noise ratio, temporal variability, direction), in relation to each other and to an animal's hearing abilities (*e.g.*, sensitivity, frequency range, critical ratios, frequency discrimination, directional discrimination, age or TTS hearing loss), and existing ambient noise and propagation conditions. Masking of natural sounds can result when human activities produce high levels of background sound at frequencies important to marine mammals. Conversely, if the background level of underwater sound is high (*e.g.* on a day with strong wind and high waves), an

anthropogenic sound source would not be detectable as far away as would be possible under quieter conditions and would itself be masked.

Airborne Acoustic Effects—Pinnipeds that occur near the project site could be exposed to airborne sounds associated with pile driving and removal that have the potential to cause behavioral harassment, depending on their distance from pile driving activities. Cetaceans are not expected to be exposed to airborne sounds that would result in harassment as defined under the MMPA.

Airborne noise would primarily be an issue for pinnipeds that are swimming or hauled out near the project site within the range of noise levels exceeding the acoustic thresholds. We recognize that pinnipeds in the water could be exposed to airborne sound that may result in behavioral harassment when looking with their heads above water. Most likely, airborne sound would cause behavioral responses similar to those discussed above in relation to underwater sound. For instance, anthropogenic sound could cause hauled-out pinnipeds to exhibit changes in their normal behavior, such as reduction in vocalizations, or cause them to temporarily abandon the area and move further from the source. However, these animals would previously have been 'taken' because of exposure to underwater sound above the behavioral harassment thresholds, which are, in all cases, larger than those associated with airborne sound. Thus, the behavioral harassment of these animals is already accounted for in these estimates of potential take. Therefore, we do not believe that authorization of incidental take resulting from airborne sound for pinnipeds is warranted, and airborne sound is not discussed further here.

Marine Mammal Habitat Effects

Pacific Shops' construction activities could have localized, temporary impacts on marine mammal habitat by increasing in-water sound pressure levels and slightly decreasing water quality. Construction activities are of short duration and would likely have temporary impacts on marine mammal habitat through increases in underwater sound. Increased noise levels may affect acoustic habitat (see masking discussion above) and adversely affect marine mammal prey in the vicinity of the project area (see discussion below). During impact and vibratory pile driving, elevated levels of underwater noise would ensonify the estuary where both fish and mammals may occur and could affect foraging success. Additionally, marine mammals may avoid the area during construction, however, displacement due to noise is expected to be temporary and is not expected to result in long-term effects to the individuals or populations.

A temporary and localized increase in turbidity near the seafloor would occur in the immediate area surrounding the area where piles are installed (and removed in the case of the temporary templates). The sediments on the sea floor will be disturbed during pile driving; however, suspension will be brief and localized and is unlikely to measurably affect marine mammals or their prey in the area. In general, turbidity associated with pile installation is localized to about a 25-foot (7.6-meter) radius around the pile (Everitt *et al.* 1980). Cetaceans are not expected to be close enough to the pile driving areas to experience effects of turbidity, and any pinnipeds could avoid localized areas of turbidity. Therefore, we expect the impact from increased turbidity levels to be discountable to marine mammals and do not discuss it further.

In-Water Construction Effects on Potential Foraging Habitat

The proposed activities would not result in permanent impacts to habitats used directly by marine mammals except for the actual footprint of the project. The total seafloor area affected by pile installation and removal is a very small area compared to the vast foraging area available to marine mammals in the San Francisco Bay. At best, the impact area provides marginal foraging habitat for marine mammals and fish, while the new pilings installed would provide substrate for invertebrate prey to settle on.

Avoidance by potential prey (*i.e.*, fish) of the immediate area due to the temporary loss of this foraging habitat is also possible. The duration of fish avoidance of this area after pile driving stops is unknown, but we anticipate a rapid return to normal recruitment, distribution and behavior. Any behavioral avoidance by fish of the disturbed area would still leave significantly large areas of more preferable fish and marine mammal foraging habitat in the nearby vicinity in San Francisco Bay.

Effects on Potential Prey

Sound may affect marine mammals through impacts on the abundance, behavior, or distribution of prey species (*e.g.*, crustaceans, cephalopods, fish, zooplankton). Marine mammal prey varies by species, season, and location. Here, we describe studies regarding the effects of noise on known marine mammal prey.

Fish utilize the soundscape and components of sound in their environment to perform important functions such as foraging, predator avoidance, mating, and spawning (*e.g.*, Zelick *et al.*, 1999; Fay, 2009). Depending on their hearing anatomy and peripheral sensory structures, which vary among species, fishes hear sounds using pressure and particle motion sensitivity capabilities and detect the motion of surrounding water (Fay *et al.*, 2008). The potential effects of noise on fishes depends on the overlapping frequency

range, distance from the sound source, water depth of exposure, and species-specific hearing sensitivity, anatomy, and physiology. Key impacts to fishes may include behavioral responses, hearing damage, barotrauma (pressure-related injuries), and mortality.

Fish react to sounds which are especially strong and/or intermittent low-frequency sounds, and behavioral responses such as flight or avoidance are the most likely effects. Short duration, sharp sounds can cause overt or subtle changes in fish behavior and local distribution. The reaction of fish to noise depends on the physiological state of the fish, past exposures, motivation (*e.g.*, feeding, spawning, migration), and other environmental factors. 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). Several studies have demonstrated that impulse sounds might affect the distribution and behavior of some fishes, potentially impacting foraging opportunities or increasing energetic costs (*e.g.*, Fewtrell and McCauley, 2012; Pearson *et al.*, 1992; Skalski *et al.*, 1992; Santulli *et al.*, 1999; Paxton *et al.*, 2017). However, some studies have shown no or slight reaction to impulse sounds (*e.g.*, Pena *et al.*, 2013; Wardle *et al.*, 2001; Jorgenson and Gyselman, 2009; Cott *et al.*, 2012).

SPLs of sufficient strength have been known to cause injury to fish and fish mortality. However, in most fish species, hair cells in the ear continuously regenerate and loss of auditory function likely is restored when damaged cells are replaced with new cells. Halvorsen *et al.* (2012a) showed that a TTS of 4-6 dB was recoverable within 24

hours for one species. Impacts would be most severe when the individual fish is close to the source and when the duration of exposure is long. Injury caused by barotrauma can range from slight to severe and can cause death, and is most likely for fish with swim bladders. Barotrauma injuries have been documented during controlled exposure to impact pile driving (Halvorsen *et al.*, 2012b; Casper *et al.*, 2013).

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

The area impacted by the project is relatively small compared to the available habitat in the remainder of the Oakland Estuary and the San Francisco Bay. Any behavioral avoidance by fish of the disturbed area would still leave significantly large areas of fish and marine mammal foraging habitat in the nearby vicinity. As described in the preceding, the potential for Pacific Shops' construction to affect the availability of prey to marine mammals or to meaningfully impact the quality of physical or acoustic habitat is considered to be insignificant.

Estimated Take

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

Harassment is the only type of take expected to result from these activities. Except with respect to certain activities not pertinent here, section 3(18) of the MMPA defines "harassment" as any act of pursuit, torment, or annoyance, which (i) has the

potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment).

Authorized takes would be by Level B harassment only, in the form of disruption of behavioral patterns and/or TTS for individual marine mammals resulting from exposure to pile driving and removal noise. Based on the nature of the activity and the anticipated effectiveness of the mitigation measures (*i.e.*, shutdown zones) discussed in detail below in the **Proposed Mitigation** section, Level A harassment is neither anticipated nor proposed to be authorized. As described previously, no mortality is anticipated or proposed to be authorized for this activity.

Below we describe how the take is estimated.

Generally speaking, we estimate take by considering: (1) acoustic thresholds above which NMFS believes the best available science indicates marine mammals will be behaviorally harassed or incur some degree of permanent hearing impairment; (2) the area or volume of water that will be ensonified above these levels in a day; (3) the density or occurrence of marine mammals within these ensonified areas; and, (4) and the number of days of activities. We note that while these basic factors can contribute to a basic calculation to provide an initial prediction of takes, additional information that can qualitatively inform take estimates is also sometimes available (*e.g.*, previous monitoring results or average group size). Below, we describe the factors considered here in more detail and present the proposed take estimate.

Acoustic Thresholds

NMFS recommends the use of acoustic thresholds that identify the received level of underwater sound above which exposed marine mammals would be reasonably expected to be behaviorally harassed (equated to Level B harassment) or to incur PTS of some degree (equated to Level A harassment).

Level B Harassment for non-explosive sources – Though significantly driven by received level, the onset of behavioral disturbance from anthropogenic noise exposure is also informed to varying degrees by other factors related to the source (*e.g.*, frequency, predictability, duty cycle), the environment (*e.g.*, bathymetry), and the receiving animals (hearing, motivation, experience, demography, behavioral context) and can be difficult to predict (Southall *et al.*, 2007, Ellison *et al.*, 2012). Based on what the available science indicates and the practical need to use a threshold based on a factor that is both predictable and measurable for most activities, NMFS uses a generalized acoustic threshold based on received level to estimate the onset of behavioral harassment. NMFS predicts that marine mammals are likely to be behaviorally harassed in a manner we consider Level B harassment when exposed to underwater anthropogenic noise above received levels of 120 dB re 1 μPa (rms) (microPascal, root mean square) for continuous (*e.g.*, vibratory pile-driving, drilling) and above 160 dB re 1 μPa (rms) for non-explosive impulsive (*e.g.*, seismic airguns) or intermittent (*e.g.*, scientific sonar) sources.

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

Level A harassment for non-explosive sources - NMFS' Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0)

(Technical Guidance, 2018) identifies dual criteria to assess auditory injury (Level A harassment) to five different marine mammal groups (based on hearing sensitivity) as a result of exposure to noise from two different types of sources (impulsive or non-impulsive). Pacific Shops' proposed activity includes the use of impulsive (impact pile driving) and non-impulsive (vibratory pile driving) sources.

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

Table 6 -- Thresholds Identifying the Onset of Permanent Threshold Shift

	PTS Onset Acoustic Thresholds* **(Received Level)**	
Hearing Group	**Impulsive**	**Non-impulsive**
Low-Frequency (LF) Cetaceans	*Cell 1* $L_{pk,flat}$: 219 dB $L_{E,LF,24h}$: 183 dB	*Cell 2* $L_{E,LF,24h}$: 199 dB
Mid-Frequency (MF) Cetaceans	*Cell 3* $L_{pk,flat}$: 230 dB $L_{E,MF,24h}$: 185 dB	*Cell 4* $L_{E,MF,24h}$: 198 dB
High-Frequency (HF) Cetaceans	*Cell 5* $L_{pk,flat}$: 202 dB $L_{E,HF,24h}$: 155 dB	*Cell 6* $L_{E,HF,24h}$: 173 dB
Phocid Pinnipeds (PW) (Underwater)	*Cell 7* $L_{pk,flat}$: 218 dB $L_{E,PW,24h}$: 185 dB	*Cell 8* $L_{E,PW,24h}$: 201 dB
Otariid Pinnipeds (OW) (Underwater)	*Cell 9* $L_{pk,flat}$: 232 dB $L_{E,OW,24h}$: 203 dB	*Cell 10* $L_{E,OW,24h}$: 219 dB

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

Note: Peak sound pressure (L_{pk}) has a reference value of 1 µPa, and cumulative sound exposure level (L_E) has a reference value of 1µPa^{2}s. In this Table, thresholds are abbreviated to reflect American National Standards Institute standards (ANSI 2013). However, peak sound pressure is defined by ANSI as incorporating frequency weighting, which is not the intent for this Technical Guidance. Hence, the subscript "flat" is being included to indicate peak sound pressure should be flat weighted or unweighted within the generalized hearing range. The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The cumulative sound exposure level thresholds could be exceeded in a multitude of ways (*i.e.*, varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these acoustic thresholds will be exceeded.

Ensonified Area

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

The sound field in the project area is the existing background noise plus additional construction noise from the proposed project. Marine mammals are expected to be affected via sound generated by the primary components of the project (*i.e.,* impact pile driving and vibratory pile driving and removal). The largest calculated Level B harassment zone is 21.5 km (13.4 mi), however, the ZOI is functionally only 1.43 km^2 (0.6 mi^2) due to the geography of the Estuary.

The project includes vibratory and impact pile installation and vibratory pile removal. Source levels of pile installation and removal activities are based on reviews of measurements of the same or similar types and dimensions of piles available in the literature. Source levels for vibratory installation and removal of piles of the same diameter are assumed the same. Source levels for each pile size and activity are presented in Table 7.

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

Pacific Shops will implement bubble curtains (*e.g.* pneumatic barrier typically comprised of hosing or PVC piping that disrupts underwater noise propagation; see *Mitigation* section below) during impact pile driving of the wide flange beams, 30-inch steel pipe piles, and 36-inch steel pipe piles. They have reduced the source level for these activities by 7dB (a conservative estimate based on several studies including Austin *et al.*, 2016).

Table 7 -- Project Sound Source Levels

Pile Type	**Source Level @ 10m**			**Source**
	dB RMS	**dB peak**	**dB SEL**	
VIBRATORY				
16-in Timber (removal)	152			The Greenbusch Group, Inc 2018
12-in Square Concrete (removal)	155			CalTrans 2015 (Based on 12-in steel pipe pile)
Steel sheet pile	160			CalTrans 2015 (Based on 24-in AZ steel sheet)
30-in Steel Pipe	170			CalTrans 2015 (Based on 36-in steel pipe pile)
36-in Steel Pipe	170			CalTrans 2015
Wide Flange Beam	155			Based on 38-in x 18-in king piles at the Naval Station Mayport in Jacksonville, Florida

IMPACT				
14-in Square Concrete	166	185	155	CalTrans 2015 (Based on 18-inch concrete piles)
16-in Square Concrete	166	185	155	CalTrans 2015 (Based on 18-inch concrete piles)
24-in Concrete piles	176	188	166	CalTrans 2015
Wide Flange Beam (attenuated in parentheses)	194 (187)	207 (200)	178 (171)	CalTrans 2015 (Source levels based on 24-in steel pipe pile)
30-in Steel Pipe (attenuated in parentheses)	190 (183)	210 (203)	177 (170)	CalTrans 2015
36-in Steel Pipe (attenuated in parentheses)	193 (186)	210 (203)	183 (176)	CalTrans 2015

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

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

where

TL = transmission loss in dB

B = transmission loss coefficient

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

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

Absent site-specific acoustical monitoring with differing measured transmission loss, a practical spreading value of 15 is used as the transmission loss coefficient in the above formula. Site-specific transmission loss data for Alameda Marina are not available,

therefore the default coefficient of 15 is used to determine the distances to the Level A and Level B harassment thresholds.

Table 8 -- Pile Driving Source Levels and Distances to Level B Harassment Thresholds

Source	Source level at 10m (dB re 1 µPa rms)	Level B Harsasment Threshold (dB re 1 µPa rms)	Distance to Level B Harassment Threshold (m)
VIBRATORY			
16-in Timber (removal)	152	120	1,359
12-in Square Concrete (removal)	155		2,154
Steel sheet pile	160		4,642
30-in Steel Pipe	170		21,544
36-in Steel Pipe	170		21,544
Wide Flange Beam	155		2,154
IMPACT			
14-in Square Concrete	166	160	25
16-in Square Concrete	166		25
24-in Concrete piles	176		117
Wide Flange Beam (attenuated[a])	194 (187)		631[b]
30-in Steel Pipe (attenuated[a])	190 (183)		341[b]
36-in Steel Pipe (attenuated[a])	193 (186)		541[b]

[a] Includes 7dB reduction for use of bubble curtain.
[b] Calculated using attenuated source level.

When the NMFS Technical Guidance (2016) was published, in recognition of the fact that ensonified area/volume could be more technically challenging to predict because of the duration component in the new thresholds, we developed a User Spreadsheet that includes tools to help predict a simple isopleth that can be used in conjunction with marine mammal density or occurrence to help predict takes. We note that because of some of the assumptions included in the methods used for these tools, we anticipate that

isopleths produced are typically going to be overestimates of some degree, which may result in some degree of overestimate of Level A harassment take. However, these tools offer the best way to predict appropriate isopleths when more sophisticated 3D modeling methods are not available, and NMFS continues to develop ways to quantitatively refine these tools, and will qualitatively address the output where appropriate. For stationary sources such has pile driving, NMFS User Spreadsheet predicts the distance at which, if a marine mammal remained at that distance the whole duration of the activity, it would incur PTS. Inputs used in the User Spreadsheet, and the resulting isopleths are reported below.

Table 9 -- User Spreadsheet Input Parameters Used for Calculating Level A Harassment Isopleths

Pile Size and Installation Method	Spreadsheet Tab Used	Weighting Factor Adjustment (kHz)	Source Level	Number of piles within 24-h period	Duration to drive a single pile (minutes)	Number of strikes per pile	Propagation (xLogR)	Distance from source level measurement (meters)
16-in Timber (removal)	A.1) Vibratory pile driving	2.5	152[a]	10	5		15	10
12-in Square Concrete (removal)			155[a]	10	5			
Steel sheet pile			160[a]	20	10			
30-in Steel Pipe			170[a]	1	10			
36-in Steel Pipe			170[a]	3	10			
Wide Flange Beam			155[a]	4	10			
IMPACT								
14-in	E.1) Impact	2	155[b]	4		500	15	10

Square Concrete	pile driving							
16-in Square Concrete			155[b]	4				
24-in Concrete piles			166[b]	4				
Wide Flange Beam (attenuated)			171[b,c]	4				
30-in Steel Pipe (attenuated)			170[b,c]	1				
36-in Steel Pipe (attenuated)			176[b,c]	3				

[a] dB RMS SPL at 10m
[b] dB SEL at 10m
[c] Includes 7dB reduction from use of bubble curtain.

Table 10 -- Calculated Distances to Level A Harassment Isopleths

Source	Level A- Radius to Isopleth (m)			
	MF Cetaceans	HF Cetaceans	Phocids	Otariids
VIBRATORY				
16-in Timber (removal)	<1	1	<1	<1
12-in Square Concrete (removal)	<1	4	2	<1
Steel sheet pile	<1	3	1	<1
30-in Steel Pipe	<1	12	5	<1
36-in Steel Pipe	2	25	10	<1
Wide Flange Beam	<1	3	1	<1
IMPACT				
14-in Square Concrete	<1	26	12	<1
16-in Square Concrete	<1	26	12	<1
24-in Concrete piles	4	139	62	5
Wide Flange Beam (attenuated)	9	299	135	10
30-in Steel Pipe (attenuated)	3	102	46	3
36-in Steel Pipe (attenuated)	16	532	239	17

Marine Mammal Occurrence and Take Calculation and Estimation

In this section we provide the information about the presence, density, or group dynamics of marine mammals that will inform the take calculations. We describe how the information provided above is brought together to produce a quantitative take estimate.

Bottlenose Dolphin

Bottlenose dolphins began entering San Francisco Bay in 2010 (Szczepaniak 2013). They primarily occur in the western Central and South Bay, from the Golden Gate Bridge to Oyster Point and Redwood City. However, one individual has been regularly seen in the Bay since 2016 near the former Alameda Air Station (Perlman 2017; W. Keener, pers. comm. 2017), and five animals were regularly seen in the summer and fall of 2018 in the same location (W. Keener, pers. comm. 2019). This area is on the far side of Alameda Island from the Project area, approximately 6.8 mi (10.9 km) by water.

There have been no formal surveys of marine mammals in the Estuary before 2019 (W. Keener, pers. comm, 2019), and no known reports of bottlenose dolphins in the Estuary between 2006 and May 2019 (NMFS 2019a, 2019b). The two closest known sightings to the project area were of a single dolphin on one occasion and an adult and juvenile on another occasion in February 2019. Both sightings were on the edge of the Inner Harbor Entrance Channel to the northwest of the Estuary, approximately 5.8 mi (9.3 km) from the project area (W. Keener, pers. comm., 2019).

Pacific Shops conducted 30 hours of monitoring over four days in June 2019 at the project site, and did not observe any bottlenose dolphins. Additionally, six local frequent users of the Estuary interviewed for this project reported never having seen a bottlenose dolphin in the Estuary. However, the applicant has requested the authorization of Level B harassment take of bottlenose dolphins due to their year-round presence in the

Bay, regular proximity to the work area, and potential to enter the Level B harassment zone while pile driving or removal are underway.

Pacific Shops conservatively estimates that a group of two bottlenose dolphins may occur in the project area every 10 project days. NMFS concurs that this approach is reasonable given the available information. Pacific Shops has requested, and NMFS proposes to authorize, 14 Level B harassment takes of bottlenose dolphins during Year 1 (2 individuals / 10 days * 68 project days = 14 Level B harassment takes), and 20 Level B harassment takes of bottlenose dolphins during Year 2 (2 individuals / 10 days * 98 project days = 20 Level B harassment takes).

The largest Level A harassment zone for mid-frequency cetaceans extends 16 m from the source during impact pile driving of 36-in steel pipe piles (Table 10). Pacific Shops is planning to implement a 25m shutdown zone during that activity (Table 12). Given the small size of the Level A harassment zones, the shutdown zones are expected to eliminate the potential for Level A harassment take of bottlenose dolphins. Therefore, NMFS does not propose to authorize Level A harassment take of bottlenose dolphins.

Harbor Porpoise

Historically, harbor porpoise primarily occur near the Golden Gate Bridge, Marin County, and the city of San Francisco on the northwest side of the Bay (Keener *et al.* 2012, Stern *et al.* 2017). However, in the summer of 2017 and 2018, mom-calf pairs and small groups (one to four individuals) were seen to the north and west of Treasure Island, and just south of YBI (Caltrans 2018a, 2019), indicating that their range may be expanding within the Bay.

No formal surveys of marine mammals were conducted in the Estuary before 2019 (W. Keener, pers. comm. 2019). The applicant conducted 30 hours of monitoring over four days in June 2019 at the project site, and did not observe any harbor porpoises. Six local frequent users of the Estuary interviewed for this project reported never seeing a harbor porpoise in the Estuary. Between 2006 and June 2019, one harbor porpoise stranded in the Estuary. The animal was in an advanced state of decomposition (NMFS 2019a), indicating that it probably died outside of the Estuary and floated in. However, given their year-round residency in the Bay, their proximity to the work area, and their seemingly expanding range within the Bay, the applicant has requested the authorization of Level B harassment take of harbor porpoise.

Pacific Shops conservatively estimates that a group of two harbor porpoises may occur in the project area every 10 project days. NMFS concurs that this approach is reasonable given the available information. Pacific Shops has requested, and NMFS proposes to authorize, 14 Level B harassment takes of harbor porpoise during Year 1 (2 individuals / 10 days * 68 project days = 14 Level B harassment takes), and 20 Level B harassment takes of harbor porpoise during Year 2 (2 individuals / 10 days * 98 project days = 20 Level B harassment takes).

The largest Level A harassment zone for high-frequency cetaceans extends 532 m from the source during impact pile driving of 36-in steel pipe piles (Table 10). This largest zone is only relevant for impact pile driving of the 36-inch piles, which would only occur on a maximum of three days between both project years. Additionally, the calculated Level A harassment zone for this activity is based on assumed accumulation of sound from driving three piles in a day. However, we do not expect a harbor porpoise to

remain within the Level A harassment zone for a long enough period to incur PTS. Pacific Shops is planning to implement a 400 m shutdown zone during that activity (Table 12), which includes the 11.7 m peak PTS isopleth. Pacific Shops will provide a 3.8m high platform for protected species observers (PSOs). NMFS expects that the platform, in combination with the anticipated ideal weather conditions, will allow PSOs to effectively observe harbor porpoises at 400 m. Therefore, the shutdown zones are expected to eliminate the potential for Level A harassment take of harbor porpoise, and NMFS does not propose to authorize Level A harassment take of harbor porpoise.

California Sea Lion

There have been no formal surveys of marine mammals in the Oakland Estuary before 2019 (W. Keener, pers. comm. 2019). The few sightings that have been recorded have been opportunistic, including a sea lion observed in May 2017 in the small canal that connects Lake Merritt with the Estuary (Martichoux, 2017). Between 2006 and May 2019, 18 confirmed sea lion sightings in the Estuary were reported to TMMC and California Academy of Sciences (CAS) (NMFS 2019a, 2019b), and between 2006 and June 2019, three sea lions stranded in the Estuary (NMFS 2019a, 2019b). The applicant conducted 30 hours of monitoring over four days in June 2019 at the project site, and observed one sea lion near the project site, across the Estuary under the Coast Guard dock approximately 1130 ft (345 m) from the Alameda Marina shoreline. Interviews with local frequent users of the Estuary confirm that sightings of sea lions are rare. Two people interviewed reported seeing one to two sea lions per year in the Estuary. California sea lions forage for Pacific herring in eelgrass beds in the winter (Schaeffer *et al.* 2007), however, there are no eelgrass beds in the Estuary to attract foraging sea lions.

Pacific Shops conservatively estimates that one California sea lion may occur in the project area every five project days. NMFS concurs that this approach is reasonable given the available information. Therefore Pacific Shops has requested, and NMFS proposes to authorize, 14 Level B harassment takes of California sea lion during Year 1 (1 individual / 5 days * 68 project days = 14 Level B harassment takes), and 20 Level B harassment takes of California sea lion during Year 2 (1 individual / 5 days * 98 project days = 20 Level B harassment takes).

The largest Level A harassment zone for otariids extends 17 m from the source during impact pile driving of 36-in steel pipe piles (Table 10). Pacific Shops is planning to implement a 25 m shutdown zone during that activity (Table 12). Given the small size of the Level A harassment zones, we expect the shutdown zones to eliminate the potential for Level A harassment take of California sea lion. Therefore, NMFS does not propose to authorize Level A harassment take of California sea lion.

Northern Fur Seal

There are no available density estimates of northern fur seals in the project area, and northern fur seals have not been reported in the Estuary (NMFS 2019b). The applicant conducted 30 hours of monitoring over four days in June 2019 at the project site and did not observe any fur seals. Between 2006 and May 2019 there were no reports of stranded fur seals in the Estuary (NMFS 2019a, 2019b). Interviews with frequent users of the Estuary also reported they had never seen a fur seal in the Estuary. However, to account for the possible rare presence of the species in the action area, NMFS proposes to authorize six Level B harassment takes of northern fur seal during Year 1, and nine Level B harassment takes of northern fur seal during Year 2.

The largest Level A harassment zone for otariids extends 17 m from the source during impact pile driving of 36-in steel pipe piles (Table 10). Pacific Shops is planning to implement a 25 m shutdown zone during that activity (Table 12). Given the small size of the Level A harassment zones, we expect the shutdown zones to eliminate the potential for Level A harassment take of northern fur seal. Therefore, NMFS does not propose to issue Level A harassment take of northern fur seal.

Northern Elephant Seal

There are no available density estimates of northern elephant seals in the project area. Generally, only juvenile elephant seals enter the Bay seasonally and do not remain long if they are healthy. From mid-February to the end of June, TMMC reports the most strandings, primarily of malnourished juveniles (TMMC, 2019). However, no elephant seals, alive or stranded, have been reported in the Estuary (NMFS 2019a, 2019b). The applicant conducted 30 hours of monitoring over four days in June 2019 at the project site and did not observe any elephant seals. Interviews with frequent users of the Estuary also reported they had never seen an elephant seal in the Estuary. However, to account for the possible rare presence of the species in the action area, NMFS proposes to authorize six Level B harassment takes of northern elephant seal during Year 1, and nine Level B harassment takes of northern elephant seal during Year 2.

The largest Level A harassment zone for phocids extends 239 m from the source during impact pile driving of 36-in steel pipe piles (Table 10). Pacific Shops is planning to implement a 240 m shutdown zone during that activity (Table 12). Given the small size of the Level A harassment zones, we expect the shutdown zones to eliminate the potential

for Level A harassment take of northern elephant seal. Therefore, NMFS does not propose to authorize Level A harassment take of northern elephant seal.

Harbor Seal

There have been no formal surveys of marine mammals in the Estuary before 2019 (W. Keener, pers. comm. 2019), and the few recorded harbor seal sightings have been opportunistic. The applicant conducted 30 hours of monitoring over four days in June 2019 at the project site and did not observe any harbor seals. A local recreational boater who lives on his boat full-time in the existing Alameda Marina reported seeing a harbor seal approximately twice a week throughout 2019 (G. Dees, pers. comm. 2019). Another recreational boater who is occasionally on her boat in Alameda Marina reported a harbor seal in the marina on five days in August through October, 2019 (T. Drake, pers. comm. 2019). This respondent also reported that a single harbor seal occasionally hauled out on the marina docks for several hours. Two staff members of a local marina reported an average of two harbor seals per month in the Estuary. There were only four confirmed harbor seal sightings reported in the Estuary to TMMC and CAS between 2006 and May 2019 (NMFS 2019a, 2019b), and a dead harbor seal at Pier 2 in the existing Alameda Marina on October 27, 2019 (T. Drake, pers. comms. 2019).

The number of harbor seals hauled out on a floating platform at the Alameda Breakwater, approximately 7.8 mi (12.6 km) from the Project area, has been recorded almost every day since March 2014 (M. Klein and R. Bangert, pers. comm. 2019). Between zero and 75 seals haul out each day; more animals are present in the winter during the herring run. However, based on observations at the Alameda Marina, we do

not expect the counts at the Alameda Breakwater to be representative of harbor seal presence in the project area.

Between 2006 and June 2019, only two harbor seals stranded in the Estuary (NMFS 2019a, 2019b). In August 2017 a harbor seal was seen in Lake Merritt, after transiting through the Estuary (Martichoux 2017). Grigg *et al.* (2012) tagged 19 harbor seals at Castro Rocks, approximately 15.2 mi (24.5 km) north-northeast of the project area. Although some ranged as far as the South Bay, approximately 39 mi (63 km) from Castro Rocks, none were recorded in the Estuary (Grigg *et al.* 2012).

Pacific Shops conservatively estimates that one harbor seal may enter the project area per project day. NMFS concurs that this approach is reasonable given the available information. Therefore, Pacific Shops has requested, and NMFS proposes to authorize, 68 Level B harassment takes of harbor seal in Year 1 (1 harbor seal per day x 68 project days = 68 Level B harassment takes), and 98 Level B harassment takes of harbor seal in Year 2 (1 harbor seal per day x 98 project days = 98 Level B harassment takes).

The largest Level A harassment zone for phocids extends 239 m from the source during impact pile driving of 36-in steel pipe piles (Table 10). This largest zone is only relevant for impact pile driving of the 36-inch piles, which would occur on a maximum of three days between both project years. Additionally, the calculated Level A harassment zone for this activity is based on assumed accumulation of sound from driving three piles in a day. However, we do not expect a harbor seal to remain within the Level A harassment zone for a long enough period to incur PTS. Pacific Shops is planning to implement a 240 m shutdown zone during impact pile driving of the 36-inch piles (Table 12), and there is no peak PTS isopleth for phocids. Additionally, as noted previously,

PSOs would be observing from a 3.8 m high platform which would further increase their ability to detect harbor seals within this zone. Therefore, the shutdown zones are expected to eliminate the potential for Level A harassment take of harbor seal, and NMFS does not propose to authorize Level A harassment take of harbor seal.

Table 11 -- Estimated Take by Level B Harassment, by Species and Stock

Common Name	**Stock**	**Stock Abundance**	**Year 1 Level B Harassment Take (Percent of Stock)**		**Year 2 Level B Harassment Take (Percent of Stock)**	
Bottlenose Dolphin	California Coastal	453	14 (3.1)		20 (4.4)	
Harbor Porpoise	San Francisco/Russian River	9,886	14 (0.1)		20 (0.2)	
California Sea Lion	United States	257,606	14 (0.01)		20 (0.01)	
Northern Fur Seal	California	14,050	6	(0.04)	9	(0.06)
	Eastern North Pacific	620,660		(<0.01)		(<0.01)
Northern Elephant Seal	California Breeding	179,000	6 (<0.01)		9 (<0.01)	
Harbor Seal	California	30,968	68 (0.2)		98 (0.3)	

Proposed Mitigation

In order to issue an IHA under Section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to the activity, and other means of effecting the least practicable impact on the species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of the species or stock for taking for certain subsistence uses (latter not applicable for this action). NMFS regulations require applicants for incidental take authorizations to include information about the availability and feasibility (economic and

technological) of equipment, methods, and manner of conducting the activity or other means of effecting the least practicable adverse impact upon the affected species or stocks and their habitat (50 CFR 216.104(a)(11)).

In evaluating how mitigation may or may not be appropriate to ensure the least practicable adverse impact on species or stocks and their habitat, as well as subsistence uses where applicable, we carefully consider two primary factors:

(1) the manner in which, and the degree to which, the successful implementation of the measure(s) is expected to reduce impacts to marine mammals, marine mammal species or stocks, and their habitat. This considers the nature of the potential adverse impact being mitigated (likelihood, scope, range). It further considers the likelihood that the measure will be effective if implemented (probability of accomplishing the mitigating result if implemented as planned), the likelihood of effective implementation (probability implemented as planned), and;

(2) the practicability of the measures for applicant implementation, which may consider such things as cost, impact on operations, and, in the case of a military readiness activity, personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

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

- For in-water heavy machinery work other than pile driving (*e.g.*, standard barges, *etc.*), 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. This type of work could include the following activities: (1)

Movement of the barge to the pile location; or (2) positioning of the pile on the substrate via a crane (*i.e.,* stabbing the pile);

- Conduct briefings between construction supervisors and crews and the marine mammal monitoring team prior to the start of all pile driving activity and when new personnel join the work, to explain responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures;
- For those marine mammals for which Level B harassment take has not been requested, in-water pile installation/removal will shut down immediately if such species are observed within or entering the Level B harassment zone; and
- If take reaches the authorized limit for an authorized species, pile installation will be stopped as these species approach the Level B harassment zone to avoid additional take.

The following mitigation measures would apply to Pacific Shops' in-water construction activities.

- *Establishment of Shutdown Zones*- Pacific Shops will establish shutdown zones for all pile driving and removal activities. The purpose of a shutdown zone is generally to define an area within which shutdown of the activity would occur upon sighting of a marine mammal (or in anticipation of an animal entering the defined area). Shutdown zones will vary based on the activity type and marine mammal hearing group (Table 5). The largest shutdown zones are generally for high frequency cetaceans, as shown in Table 12.
- The placement of PSOs during all pile driving and removal activities (described in detail in the **Proposed Monitoring and Reporting** section) will ensure that the

entire shutdown zone is visible during pile installation. Should environmental conditions deteriorate such that marine mammals within the entire shutdown zone would not be visible (*e.g.*, fog, heavy rain), pile driving and removal must be delayed until the PSO is confident marine mammals within the shutdown zone could be detected.

Table 12 -- Shutdown Zones During Pile Installation and Removal

<table>
<tr><th rowspan="2">Source</th><th colspan="4">Shutdown Zone (m)</th></tr>
<tr><th>MF Cetaceans</th><th>HF Cetaceans</th><th>Phocids</th><th>Otariids</th></tr>
<tr><td>VIBRATORY</td><td></td><td colspan="2"></td><td></td></tr>
<tr><td>16-in Timber (removal)</td><td rowspan="6">10</td><td rowspan="3">10</td><td rowspan="6">10</td><td rowspan="6">10</td></tr>
<tr><td>12-in Square Concrete (removal)</td></tr>
<tr><td>Steel sheet pile</td></tr>
<tr><td>30-in Steel Pipe</td><td rowspan="2">25</td></tr>
<tr><td>36-in Steel Pipe</td></tr>
<tr><td>Wide Flange Beam</td><td>10</td></tr>
<tr><td>IMPACT</td><td></td><td colspan="2"></td><td></td></tr>
<tr><td>14-in Square Concrete</td><td rowspan="7">25</td><td rowspan="2">30</td><td rowspan="2">25</td><td rowspan="7">25</td></tr>
<tr><td>16-in Square Concrete</td></tr>
<tr><td>24-in Concrete piles</td><td>140</td><td>70</td></tr>
<tr><td>Wide Flange Beam</td><td>300</td><td>140</td></tr>
<tr><td>30-in Steel Pipe</td><td>140</td><td>70</td></tr>
<tr><td>36-in Steel Pipe</td><td>400[a]</td><td>240</td></tr>
</table>

[a] This shutdown zone is smaller than the 532m Level A harassment zone. NMFS expects that PSOs will be able to monitor this zone more effectively, and that the smaller zone will reduce unnecessary shutdowns while remaining sufficient to prevent Level A harassment.

- *Monitoring for Level B Harassment*- Pacific Shops will monitor the Level B harassment zones (areas where SPLs are equal to or exceed the 160 dB rms threshold for impact driving and the 120 dB rms threshold during vibratory pile

driving) and the Level A harassment zones. Monitoring zones provide utility for observing by establishing monitoring protocols for areas adjacent to the shutdown zones. Monitoring zones enable observers to be aware of and communicate the presence of marine mammals in the project area outside the shutdown zone and thus prepare for a potential cease of activity should the animal enter the shutdown zone. Placement of PSOs on the shorelines around Alameda Marina will allow PSOs to observe marine mammals within the Level B harassment zones. However, due to the large Level B harassment zones (Table 8), PSOs will not be able to effectively observe the entire zone. Therefore, Level B harassment exposures will be recorded and extrapolated based upon the number of observed takes and the percentage of the Level B harassment zone that was not visible.

- *Pre-activity Monitoring*- Prior to the start of daily in-water construction activity, or whenever a break in pile driving/removal of 30 minutes or longer occurs, PSOs will observe the shutdown and monitoring zones for a period of 30 minutes. The shutdown zone will be considered cleared when a marine mammal has not been observed within the zone for that 30-minute period. If a marine mammal is observed within the shutdown zone, a soft-start cannot proceed until the animal has left the zone or has not been observed for 15 minutes. When a marine mammal for which Level B harassment take is authorized is present in the Level B harassment zone, activities may begin and Level B harassment take will be recorded. If the entire Level B harassment zone is not visible at the start of construction, pile driving activities can begin. If work ceases for more than 30 minutes, the pre-activity monitoring of the shutdown zones will commence.

- *Soft Start*- Soft-start procedures are believed to provide additional protection to marine mammals by providing warning and/or giving marine mammals a chance to leave the area prior to the hammer operating at full capacity. For impact pile driving, contractors will be required to provide an initial set of three strikes from the hammer at reduced energy, followed by a thirty-second waiting period. This procedure will be conducted three times before impact pile driving begins. Soft start will be implemented at the start of each day's impact pile driving and at any time following cessation of impact pile driving for a period of thirty minutes or longer.
- *Pile driving energy attenuator*- Pacific Shops will use a marine pile-driving energy attenuator (*i.e.*, air bubble curtain system) during impact pile driving of the wide flange beams, 30-in steel pipe piles, and 36-inch steel pipe piles. The use of sound attenuation will reduce SPLs and the size of the zones of influence for Level A harassment and Level B harassment. Bubble curtains will meet the following requirements:
    - The bubble curtain must distribute air bubbles around 100 percent of the piling perimeter for the full depth of the water column.
    - The lowest bubble ring shall be in contact with the mudline for the full circumference of the ring, and the weights attached to the bottom ring shall ensure 100 percent mudline contact. No parts of the ring or other objects shall prevent full mudline contact.
    - The bubble curtain shall be operated such that there is proper (equal) balancing of air flow to all bubblers.

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.

Proposed Monitoring and Reporting

In order to issue an IHA for an activity, Section 101(a)(5)(D) of the MMPA states that NMFS must set forth requirements pertaining to the monitoring and reporting of such taking. The MMPA implementing regulations at 50 CFR 216.104 (a)(13) indicate that requests for authorizations must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the proposed action area. Effective reporting is critical both to compliance as well as ensuring that the most value is obtained from the required monitoring.

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

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

marine mammal species with the action; or (4) biological or behavioral context of exposure (*e.g.*, age, calving or feeding areas).

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

Visual Monitoring

Marine mammal monitoring must be conducted in accordance with the Marine Mammal Monitoring Plan, dated March 2020. Marine mammal monitoring during pile driving and removal must be conducted by NMFS-approved PSOs in a manner consistent with the following:

- Independent PSOs (*i.e.*, not construction personnel) who have no other assigned tasks during monitoring periods must be used;
- Where a team of three or more PSOs are required, a lead observer or monitoring coordinator must be designated. The lead observer must have prior experience working as a marine mammal observer during construction;
- Other PSOs may substitute education (degree in biological science or related field) or training for experience; and

- Pacific Shops must submit PSO CVs for approval by NMFS prior to the onset of pile driving.

PSOs must have the following additional qualifications:

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

Two PSOs will be employed during all pile driving and removal activities. PSO locations will provide an unobstructed view of all water within the shutdown zone, and as much of the Level A and Level B harassment zones as possible. PSO locations are as follows:

(1) At the pile driving site or best vantage point practicable to monitor the shutdown zone; and

(2) Best vantage point practicable to observe the monitoring zone for each activity.

Monitoring will be conducted 30 minutes before, during, and 30 minutes after pile driving/removal activities. In addition, observers shall record all incidents of marine mammal occurrence, regardless of distance from activity, and shall document any behavioral reactions in concert with distance from piles being driven or removed. Pile driving activities include the time to install or remove a single pile or series of piles, as long as the time elapsed between uses of the pile driving or drilling equipment is no more than thirty minutes.

Acoustic Monitoring

Pacific Shops intends to conduct a sound source verification (SSV) study to confirm the sound source levels, transmission loss coefficient, and size of the Level A and Level B harassment zones. They intend to request a modification to the zones accordingly. They will follow accepted methodological standards to achieve their objectives. If NMFS approves the results of the SSV study, we propose to modify the zone sizes based on the approved data. Acoustic monitoring report requirements are listed in the **Reporting** section, below.

Reporting

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

- Dates and times (begin and end) of all marine mammal monitoring.

- Construction activities occurring during each daily observation period, including how many and what type of piles were driven or removed and by what method (*i.e.*, impact or vibratory).
- Weather parameters and water conditions during each monitoring period (*e.g.*, wind speed, percent cover, visibility, sea state).
- The number of marine mammals observed, by species, relative to the pile location and if pile driving or removal was occurring at time of sighting.
- Age and sex class, if possible, of all marine mammals observed.
- PSO locations during marine mammal monitoring.
- Distances and bearings of each marine mammal observed to the pile being driven or removed for each sighting (if pile driving or removal was occurring at time of sighting).
- Description of any marine mammal behavior patterns during observation, including direction of travel and estimated time spent within the Level A and Level B harassment zones while the source was active.
- Number of individuals of each species (differentiated by month as appropriate) detected within the monitoring zone, and estimates of number of marine mammals taken, by species (a correction factor may be applied to total take numbers, as appropriate).
- Detailed information about any implementation of any mitigation triggered (*e.g.*, shutdowns and delays), a description of specific actions that ensued, and resulting behavior of the animal, if any.

- Description of attempts to distinguish between the number of individual animals taken and the number of incidences of take, such as ability to track groups or individuals.
- An extrapolation of the estimated takes by Level B harassment based on the number of observed exposures within the Level B harassment zone and the percentage of the Level B harassment zone that was not visible.

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

Pacific Shops must include the following information in their acoustic monitoring report.

- Hydrophone equipment and methods: recording device, sampling rate, distance (m) from the pile where recordings were made; depth of recording device(s).
- Type of pile being driven, substrate type, method of driving during recordings, and if a sound attenuation device is used.
- For impact pile driving: Pulse duration and mean, median, and maximum sound levels (dB re: 1µPa): cumulative sound exposure level (SELcum), peak sound pressure level (SPLpeak), and single-strike sound exposure level (SELs-s).
- For vibratory driving/removal: Mean, median, and maximum sound levels (dB re: 1µPa): root mean square sound pressure level (SPLrms), cumulative sound exposure level (SELcum).

- Number of strikes (impact) or duration (vibratory) per pile measured, one-third octave band spectrum and power spectral density plot.
- Estimated source levels, transmission loss coefficient, and revised Level A and Level B harassment zones.

In the event that personnel involved in the construction activities discover an injured or dead marine mammal, the IHA-holder must immediately cease the specified activities and report the incident to the Office of Protected Resources (OPR) (301-427-8401), NMFS and to the West Coast Region stranding coordinator (562-980-3230) as soon as feasible. If the death or injury was clearly caused by the specified activity, the IHA-holder must immediately cease the specified activities until NMFS is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure compliance with the terms of the IHA. The IHA-holder must not resume their activities until notified by NMFS.

The report must include the following information:

i. Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);

ii. Species identification (if known) or description of the animal(s) involved;

iii. Condition of the animal(s) (including carcass condition if the animal is dead);

iv. Observed behaviors of the animal(s), if alive;

v. If available, photographs or video footage of the animal(s); and

vi. General circumstances under which the animal was discovered.

Negligible Impact Analysis and Determination

NMFS has defined negligible impact as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival (50 CFR 216.103). A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (*i.e.*, population-level effects). An estimate of the number of takes alone is not enough information on which to base an impact determination. In addition to considering estimates of the number of marine mammals that might be "taken" through harassment, NMFS considers other factors, such as the likely nature of any responses (*e.g.*, intensity, duration), the context of any responses (*e.g.*, critical reproductive time or location, migration), as well as effects on habitat, and the likely effectiveness of the mitigation. We also assess the number, intensity, and context of estimated takes by evaluating this information relative to population status. Consistent with the 1989 preamble for NMFS's implementing regulations (54 FR 40338; September 29, 1989), the impacts from other past and ongoing anthropogenic activities are incorporated into this analysis via their impacts on the environmental baseline (*e.g.*, as reflected in the regulatory status of the species, population size and growth rate where known, ongoing sources of human-caused mortality, or ambient noise levels).

To avoid repetition, this introductory discussion of our analyses applies to all of the species listed in Table 11, given that many of the anticipated effects of this project on different marine mammal stocks are expected to be relatively similar in nature. Also,

because the nature of the estimated takes anticipated to occur are identical in Years 1 and 2, and the number of estimated takes in each year are extremely similar, the analysis below applies to each of the IHAs.

The nature of the pile driving project precludes the likelihood of serious injury or mortality, and the mitigation is expected to ensure that no Level A harassment occurs, which would be unlikely to occur even absent the required mitigation. For all species and stocks, take would occur within a limited, confined area (Oakland Estuary) of any given stock's range. Take would be limited to Level B harassment only due to potential behavioral disturbance and TTS. Effects on individuals that are taken by Level B harassment, on the basis of reports in the literature as well as monitoring from other similar activities, will likely be limited to reactions such as increased swimming speeds, increased surfacing time, or decreased foraging (if such activity were occurring) (*e.g.*, Thorson and Reyff 2006; HDR, Inc. 2012; Lerma 2014; ABR 2016). Level B harassment will be reduced to the level of least practicable adverse impact through use of mitigation measures described herein. Further the amount of take proposed to be authorized for any given stock is extremely small when compared to stock abundance.

Exposure to noise resulting in Level B harassment for all species is expected to be temporary and minor due to the general lack of use of the Oakland Estuary by marine mammals, as previously explained. In general, marine mammals are only occasionally sighted within the Oakland Estuary. Any behavioral harassment occurring during the project is highly unlikely to impact the health or fitness of any individuals, much less effect annual rates of recruitment or survival. Any harassment would be brief, and if

sound produced by project activities is sufficiently disturbing, animals are likely to simply avoid the area while the activity is occurring.

As previously discussed, the closest harbor seal pupping area is 24.5 km (15.2 mi) from the project area. However, there are no habitat areas of particular importance for marine mammals within the Oakland Estuary, and it is not preferred habitat for marine mammals. Therefore, we expect that animals annoyed by project sound will simply avoid the area and use more-preferred habitats, particularly as the project would only occur on approximately 68 days in Year 1, and 98 days in Year 2, for up to approximately 9.5 hours per day.

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

In summary and as described above, the following factors primarily support our preliminary determination that the impacts resulting from this activity are not expected to adversely affect the species or stock through effects on annual rates of recruitment or survival:

- No mortality is anticipated or authorized.
- No Level A harassment is anticipated or authorized.

- The number and intensity of anticipated takes by Level B harassment is relatively low for all stocks.
- No biologically important areas have been identified within the project area.
- For all species, the Oakland Estuary is a very small part of their range.
- For all species, proposed Level B harassment takes in each IHA would affect less than five percent of each stock.

Year 1 IHA – 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 required monitoring and mitigation measures, we find that the total marine mammal take from Pacific Stores' construction activities will have a negligible impact on the affected marine mammal species or stocks.

Year 2 IHA – 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 required monitoring and mitigation measures, we find that the total marine mammal take from the Pacific Stores' construction activities will have a negligible impact on the affected marine mammal species or stocks.

Small Numbers

As noted above, only small numbers of incidental take may be authorized under Sections 101(a)(5)(A) and (D) of the MMPA for specified activities other than military readiness activities. The MMPA does not define small numbers so, in practice, where estimated numbers are available, NMFS compares the number of individuals taken to the most appropriate estimation of abundance of the relevant species or stock in our

determination of whether an authorization is limited to small numbers of marine mammals. Additionally, other qualitative factors may be considered in the analysis, such as the temporal or spatial scale of the activities.

Table 11 includes the number of takes for each species proposed to be taken as a result of activities in Year 1 and Year 2 of this project. Our analysis shows that less than one-third of the best available population abundance estimate of each stock could be taken by harassment during each project year. In fact, for each stock, the take proposed for authorization each year comprises less than five percent of the stock abundance. The number of animals proposed to be taken for each stock discussed above would be considered small relative to the relevant stock's abundances even if each estimated taking occurred to a new individual, which is an unlikely scenario.

Year 1 IHA- 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 in Year 1 of the project.

Year 2 IHA- 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 in Year 2 of the project.

Unmitigable Adverse Impact Analysis and Determination

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

Endangered Species Act (ESA)

Section 7(a)(2) of the Endangered Species Act of 1973 (ESA: 16 U.S.C. 1531 *et seq*.) requires that each Federal agency insure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat. To ensure ESA compliance for the issuance of IHAs, NMFS consults internally whenever we propose to authorize take for endangered or threatened species.

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

Proposed Authorization

As a result of these preliminary determinations, NMFS proposes to issue two, one-year IHAs to Pacific Shops for conducting vibratory and impact pile driving in Alameda, CA beginning June 2020 and June 2021, respectively, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated. Drafts of these proposed IHAs can be found at *https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act*.

Request for Public Comments

We request comment on our analyses, the proposed authorization, and any other aspect of this Notice of Proposed IHA for the proposed project. We also request at this time comment on the potential Renewal of this proposed IHA as described in the paragraph below. Please include with your comments any supporting data or literature citations to help inform decisions on the request for this IHA or a subsequent Renewal IHA.

On a case-by-case basis, NMFS may issue a one-year Renewal IHA following notice to the public providing an additional 15 days for public comments when (1) up to another year of identical or nearly identical, or nearly identical, activities as described in the Specified Activities section of this notice is planned or (2) the activities as described in the Specified Activities section of this notice would not be completed by the time the IHA expires and a Renewal would allow for completion of the activities beyond that described in the Dates and Duration section of this notice, provided all of the following conditions are met:

- A request for renewal is received no later than 60 days prior to the needed Renewal IHA effective date (recognizing that the Renewal IHA expiration date cannot extend beyond one year from expiration of the initial IHA).
- The request for renewal must include the following:

(1) An explanation that the activities to be conducted under the requested Renewal IHA are identical to the activities analyzed under the initial IHA, are a subset of the activities, or include changes so minor (*e.g.*, reduction in pile size) that the changes do not affect the previous analyses, mitigation and monitoring requirements, or take estimates (with the exception of reducing the type or amount of take).

(2) A preliminary monitoring report showing the results of the required monitoring to date and an explanation showing that the monitoring results do not indicate impacts of a scale or nature not previously analyzed or authorized.

- Upon review of the request for Renewal, the status of the affected species or stocks, and any other pertinent information, NMFS determines that there are no more than minor changes in the activities, the mitigation and monitoring measures will remain the same and appropriate, and the findings in the initial IHA remain valid.

Dated: April 23, 2020.

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Donna S. Wieting,

Director, Office of Protected Resources,

National Marine Fisheries Service.

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