



BILLING CODE 3510-22-P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[RTID 0648-XA180]

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Treasure Island Ferry Dock Project, San Francisco, California

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 the City and County of San Francisco, CA (San Francisco) for authorization to take marine mammals incidental to the Treasure Island Ferry Dock Project in San Francisco, California. Pursuant to the Marine Mammal Protection Act (MMPA), NMFS is requesting comments on its proposal to issue an incidental harassment authorization (IHA) to incidentally take marine mammals during the specified activities. NMFS is also requesting comments on a possible one-year renewal 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.Meadows@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. Attachments to electronic comments will be accepted in Microsoft Word or Excel or Adobe PDF file formats only. All comments received are a part of the public record and will generally be posted online at

<https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act> 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: Dwayne Meadows, Ph.D., 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 an IHA) 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 IHA 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 IHA request.

Summary of Request

On February 6, 2020, NMFS received an application from San Francisco requesting an IHA to take small numbers of seven species of marine mammals incidental to pile driving associated with the Treasure Island Ferry Dock Project. The application was deemed adequate and complete on May 13, 2020. San Francisco's request is for take of a small number of seven species of marine mammals by Level B harassment and Level A harassment. Neither San Francisco nor NMFS expects serious injury or mortality to result from this activity and, therefore, an IHA is appropriate.

Description of Proposed Activity

Overview

The project consists of the construction of a ferry terminal, breakwater, fireboat access pier, and removal of an old pier on Treasure Island in the middle of San Francisco Bay. San Francisco would install and then remove two temporary 36-inch-diameter steel piles for moorings and 186 temporary 14-inch by 89 foot steel H piles as templates. Final construction requires installation of nine 36-inch-diameter steel piles, five 48-inch-diameter steel piles, 52 24-inch octagonal concrete breakwater piles, and 120 14-inch by 89 foot steel H piles for the breakwater. Removing the old pier requires removal of 198 12-inch diameter timber piles. Pile driving/removal is expected to take no more than 1,890 hours over 189 days. Pile driving would be by vibratory pile driving until resistance is too great and driving would switch to an impact hammer. Removal of temporary piles would use vibratory methods only.

The pile driving/removal can result in take of marine mammals from sound in the water which results in behavioral harassment or auditory injury.

Dates and Duration

The work described here is scheduled for June 8, 2020 through January 15, 2021. California Department of Fish and Wildlife (CDFW) regulates activities in San Francisco Bay with the potential to affect Pacific herring (*Clupea pallasii*) breeding, and special work windows have been established to avoid potential impacts to Pacific herring spawning activities. From November 30th through January 15, 2021, a biological monitor trained by CDFW to monitor Pacific herring must be present on site during pile installation. If a herring spawning event is observed, work will cease for a period of two weeks following the spawning event. The area must be surveyed by the biological

monitor prior to resumption of work. This measure is anticipated to avoid impacts to marine mammal prey species within the project area. San Francisco has proposed the daily construction window for pile removal and driving would begin no sooner than 30 minutes after sunrise and would end 30 minutes prior to sunset to allow for marine mammal monitoring.

Specific Geographic Region

The project site is located in the middle of San Francisco Bay on the western shoreline of Treasure Island just where the island ends and connects by a narrow road to the smaller Yerba Buena Island to the south (Figure 1). The San Francisco-Oakland Bay Bridge runs through a tunnel on Yerba Buena Island. There is a known harbor seal haulout location on Yerba Buena Island on the southern shoreline just east of the bridge. The project location is separated from the haulout by approximately 0.85 miles (1.4 km) of shoreline but there is no direct line of sight with the project. After November 30, when more seals may be present at the Yerba Buena haulout, only concrete piles or vibratory driving/extraction of steel piles will occur.

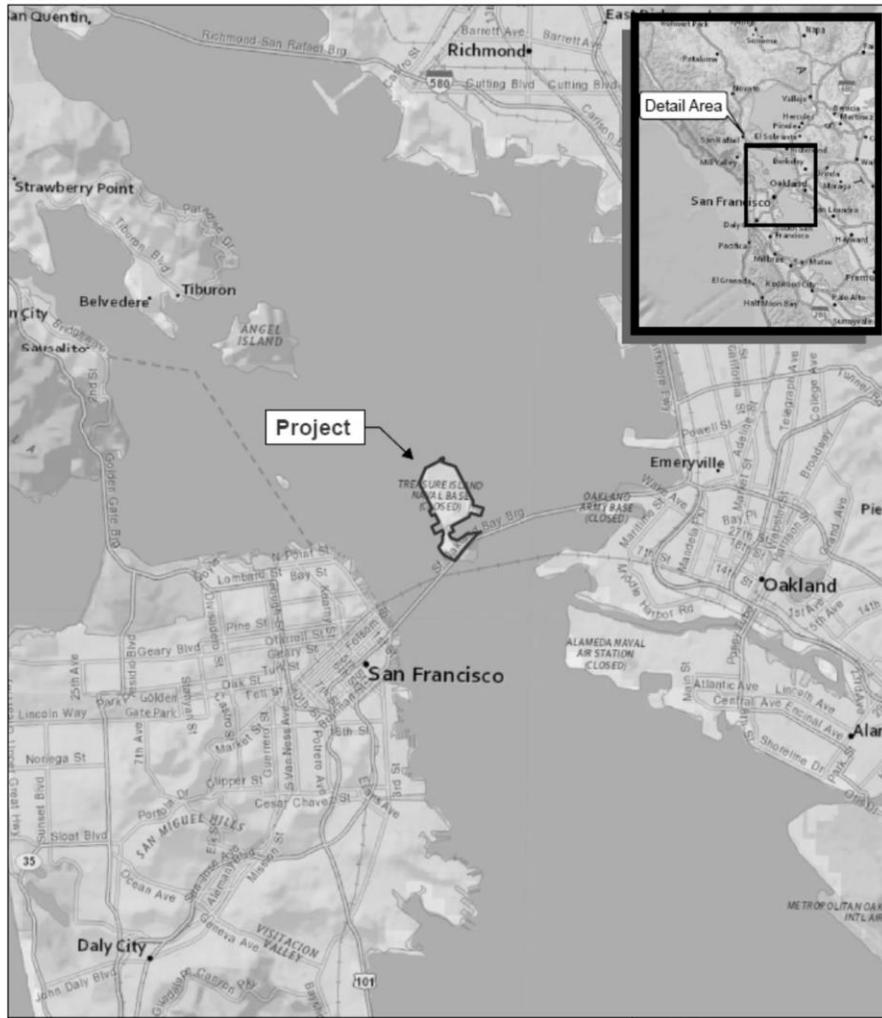


Figure 1-- Map of Proposed Project Area in San Francisco, CA

Detailed Description of Specific Activity

The proposed project includes an approximately 5,175-square-foot float with a temporary water taxi landing supported by 36-inch-diameter steel piles and an approximately 1,170-square-foot gangway; an approximately 2,400-square foot section of a pier with a canopy supported by 48-inch diameter steel piles (driven using a combination of vibratory and impact); a fireboat access platform with supporting utilities consisting of a 2,500 square foot pier supported by 48-inch diameter steel piles and 36-inch diameter steel piles; and a breakwater, approximately 820 feet long supported by 24-

inch diameter concrete batter piles and 14-inch by 48-inch sheet piles north of the terminal with an approximately 2,400-square-foot rock revetment connecting the breakwater to the shoreline (see application Figure 2). The temporary water taxi landing is to allow smaller watercraft ferry dock landing access when the ferry service is limited to one ferryboat. The project will also remove an approximately 11,684-square-foot old pier, including 12-inch diameter timber piles and bents and an approximately 258-square-foot gangway. These timber piles will be pulled or vibrated out entirely unless broken; broken piles will be cut 3 feet below the mudline. A number of temporary 14-inch by 89-foot steel template h-piles will be driven using a vibratory hammer, as well as temporary 14-inch by 89-foot steel template batter piles (h-piles) will be driven using a vibratory hammer. Temporary 36-inch diameter steel mooring piles will be driven using a vibratory hammer, and 14-inch by 89-foot mooring batter piles (steel h-piles) will be driven using a vibratory hammer. Temporary piles will also be removed by vibratory hammer. A total of 784 piles will be driven or removed; see Table 1 for detailed summary of pile activities. The piles will be installed to an estimated depth of embedment of 50 to 90 feet below the bay bottom, to be confirmed by geotechnical investigation.

The pile driving equipment will be deployed and operated from barges, on water. Materials will be delivered on barges. Between 3 and 15 piles will be placed/removed daily (with the larger piles taking more time to install, and therefore fewer will be installed per day). Temporary piles will be placed to assist in the installation of the supporting piles for each structure. The temporary piles will be removed when the associated permanent piles are installed. Pile installation will be completed with the use of two to three cranes and hammers, at times operating simultaneously.

Work is proposed to occur on the following schedule:

- Ferry pier pile and North breakwater template H pile driving will occur on 27 days in June 2020.
- North breakwater sheet pile and template H pile driving will occur on 162 days from July 2020 to January 15, 2021.
- Old pier timber piles will be removed during the north breakwater pile driving from July 2020 to December 2020.

Table 1 – Summary of Pile Driving Activities

ACTIVITY	PILES		
	Location	Number (maximum)	Type
Install Piles for Ferry Pier (impact and/or vibratory)	Ferry Pier	4	36-inch steel pipe (mooring piles)/ vibratory
	Ferry Pier	2	48-inch steel pipe vibratory & impact
	Ferry Pier	2	36-inch steel pipe (fender piles)/ vibratory
Install Temporary Steel Template Piles (Vibratory)	Ferry Pier	20	14-inch x 89-foot steel H-piles
Remove Temporary Steel Template Piles (Vibratory)	Ferry Pier	20	14-inch x 89-foot steel H-piles
Install Octagonal for North Breakwater (impact)	North Breakwater	52	24-inch octagonal concrete
Install Sheetpiles for North Breakwater (impact)	North Breakwater	120	14 x 48-inch concrete sheetpiles
Install Temporary Steel Template Piles (Vibratory)	North Breakwater	108	14-inch x 89-foot steel H-piles
Remove Temporary Steel Template Piles (Vibratory)	North Breakwater	108	14-inch x 89-foot steel H-piles
Install Temporary Steel Template Batter Piles(Vibratory)	North Breakwater	46	14-inch x 89-foot steel H-piles
Remove Temporary Steel Template Batter Piles (Vibratory)	North Breakwater	46	14-inch x 89-foot steel H-piles
Install Temporary Mooring Piles (Vibratory)	Mooring	2	36-inch steel pipe

Remove Temporary Mooring Piles (Vibratory)	Mooring	2	36-inch steel pipe
Install Temporary Mooring Batter Piles (Vibratory)	Mooring	4	14-inch x 89-foot steel H-piles
Remove Temporary Mooring Batter Piles (Vibratory)	Mooring	4	14-inch x 89-foot steel H-piles
Install Crew Access Piles (Vibratory)	Mooring	2	14-inch x 89-foot steel H-piles
Remove Crew Access Piles (Vibratory)	Mooring	2	14-inch x 89-foot steel H-piles
Install Fireboat Access Pier (Vibratory & Impact)	North Breakwater	3	48-inch steel pipe
Install Fireboat Access Pier (Vibratory)	North Breakwater	2	36-inch steel pipe
Install Temporary Fireboat Steel Template Piles (Vibratory)	North Breakwater	16	14-inch x 89-foot steel H-piles
Remove Temporary Fireboat Steel Template Piles (Vibratory)	North Breakwater	16	14-inch x 89-foot steel H-piles
Remove Existing Pier (vibratory or crane cable)	Pier	198	12-inch timber
TOTAL		784	N/A

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 2 lists all species with expected potential for occurrence in the project area near Treasure Island 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 and draft SARs (*e.g.*, Caretta *et al.* 2019).

Table 2 -- Species That Spatially Co-occur with the Activity to the Degree That Take Is Reasonably Likely to 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 Mysticeti (baleen whales)						
Family Eschrichtiidae						
Gray Whale	<i>Eschrichtius robustus</i>	Eastern North Pacific	-, -, N	26,960 (0.05, 25,849, 2016)	801	138
Order Cetartiodactyla – Cetacea – Superfamily Odontoceti (toothed whales, dolphins, and porpoises)						
Family Delphinidae						
Bottlenose Dolphin	<i>Tursiops truncatus</i>	California Coastal	-, -, N	453 (0.06, 346, 2011)	2.7	>2.0
Family Phocoenidae (porpoises)						
Harbor porpoise	<i>Phocoena phocoena</i>	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	<i>Zalophus californianus</i>	United States	-, -, N	257,606 (N/A, 233,515, 2014)	14,011	>321
Northern fur seal	<i>Callorhinus ursinus</i>	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	<i>Mirounga angustirostris</i>	California Breeding	-, -, N	179,000 (N/A, 81,368, 2010)	4,882	8.8
Harbor seal	<i>Phoca vitulina</i>	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: www.nmfs.noaa.gov/pr/sars/. CV is coefficient of variation; N_{min} 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, California sea lion, bottlenose dolphin and Harbor porpoise 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 gray whale, 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 San Francisco's IHA application (see application, Table 2). Humpback whales could potentially occur in the area. However the spatial and temporal occurrence of this species is very rare, the species is readily observed, and the applicant would shut down pie driving if humpback whales enter the project area. Thus take is not expected to occur, and they are not discussed further.

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; *et al.*, 1999, Mate *et al.*, 1995).

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 San Francisco 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).

Harbor Porpoise

Harbor porpoise occur along the US west coast from southern California to the Bering Sea (Carretta *et al.*, 2019). 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). In most areas, harbor porpoise occur in small groups of just a few individuals.

Harbor porpoise sightings in the San Francisco Bay declined in the 1930's and were functionally extirpated shortly after. Harbor porpoise occur frequently outside San Francisco Bay and re-entered the bay beginning in 2008 (Stern *et al.*, 2017). They now commonly occur year-round within San Francisco 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 (one to four individuals) were seen to the north and west of Treasure Island, and just south of Yerba Buena Island (Caltrans 2018a, 2019; M. Schulze, pers. comm. 2019).

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, a few miles 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 San Francisco 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). 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).

Northern Fur Seal

Two northern fur seal stocks may occur near San Francisco 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 Yerba Buena and Treasure Islands (NMFS, 2019b).

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 San Francisco 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 haulout sites, but occasionally may make brief stops in San Francisco Bay.

Harbor Seal

Harbor seals are found from Baja California to the eastern Aleutian Islands of Alaska (Harvey and Goley, 2011). 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 San Francisco Bay. Harbor seals are central-place foragers (Orlans 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 San Francisco 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.*, 2012; 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).

The closest haulout to the project area is on Yerba Buena Island as noted above. This 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). The Golden Gate National Recreation Area contains a number of haul out areas in San Francisco Bay including Alcatraz Island and Point Bonita at the entrance to the bay (NPS, 2016).

Large concentrations of spawning Pacific herring (*Clupea pallasii*) and migrating salmonids likely attract seals into San Francisco Bay during the winter months (Greig and

Allen, 2015). Harbor seals forage for Pacific herring in eelgrass beds in the winter (Schaeffer *et al.*, 2007).

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 the project is at Castro Rocks, approximately 12 miles (20 km) from the project area.

Gray Whale

In the fall, gray whales migrate from their summer feeding grounds, heading south along the coast of North America to spend the winter in their breeding and calving areas off the coast of Baja California, Mexico. From mid-February to May, the Eastern North Pacific stock of gray whales can be seen migrating northward with newborn calves along the west coast of the U.S. During the migration, gray whales will occasionally enter rivers and bays (such as San Francisco Bay) along the coast but not in high numbers. In recent years there have been an increased number of gray whales in the San Francisco Bay (W. Keener, pers. comm. 2019).

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 3.

Table 3 -- 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, <i>Kogia</i> , river dolphins, cephalorhynchid, <i>Lagenorhynchus cruciger</i> & <i>L. australis</i>)	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>i.e.</i> , all species within the group), where individual species' hearing ranges are typically not as broad. Generalized hearing range chosen based on ~65 dB threshold from normalized composite audiogram, with the exception for lower limits for LF cetaceans (Southall <i>et al.</i> 2007) and PW pinniped (approximation).	

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. Harbor seals are in the phocid group and Dall's and harbor porpoises are classified as high-frequency cetaceans.

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 A or 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 (ANSI 1994, 1995). 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, 2018). Non-impulsive sounds (*e.g.*, 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 rapid rise/decay time that impulsive sounds do (ANSI 1995; NIOSH 1998; NMFS 2018). 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 San Francisco's 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 San Francisco's 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). Generally, exposure to pile driving and drilling 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 as 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 drilling 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 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 and Hu, 2008). PTS levels for marine mammals are estimates, 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 (2016), marine mammal studies have shown the amount of TTS increases with cumulative sound exposure level (SEL_{cum}) in an accelerating fashion: At low exposures with lower SEL_{cum} , the amount of TTS is typically small and the growth curves have shallow slopes. At exposures with higher SEL_{cum} , 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). The potential for TTS from impact pile driving exists. After exposure to playbacks of impact pile driving sounds (rate 2760 strikes/hour) in captivity, mean TTS increased from 0 dB after 15 minute exposure to 5 dB after 360 minute exposure; recovery occurred within 60 minutes (Kastelein *et al.*, 2016). 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 this project, these activities could occur at the same time because of the use of multiple hammers. There would likely be pauses in activities producing the sound

during each day. Given these pauses and that many marine mammals are likely moving through the action 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 and 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.

In 2016, the Alaska Department of Transportation and Public Facilities (ADOT&PF) documented observations of marine mammals during construction activities (*i.e.*, pile driving) at the Kodiak Ferry Dock (see 80 FR 60636, October 7, 2015). In the

marine mammal monitoring report for that project (ABR 2016), 1,281 Steller sea lions were observed within the Level B disturbance zone during pile driving or drilling (*i.e.*, documented as Level B harassment take). Of these, 19 individuals demonstrated an alert behavior, 7 were fleeing, and 19 swam away from the project site. All other animals (98 percent) were engaged in activities such as milling, foraging, or fighting and did not change their behavior. In addition, two sea lions approached within 20 meters of active vibratory pile driving activities. Three harbor seals were observed within the disturbance zone during pile driving activities; none of them displayed disturbance behaviors. Fifteen killer whales and three harbor porpoise were also observed within the Level B harassment zone during pile driving. The killer whales were travelling or milling while all harbor porpoises were travelling. No signs of disturbance were noted for either of these species. Given the similarities in activities and habitat and the fact the some of same species are involved, we expect similar behavioral responses of marine mammals to San Francisco's specified activity. That is, disturbance, if any, is likely to be temporary and localized (*e.g.*, small area movements).

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. The San Francisco area contains active commercial shipping, cruise ship and ferry operations, as well as numerous recreational and other commercial vessels; therefore, background sound levels in the area are already elevated.

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 elevated above the acoustic criteria. 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. In the case of the Yerba Buena haulout nearest to this project, airborne sounds would also

be blocked by the island and the haulout is too far from the project site. 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

San Francisco's construction activities could have localized, temporary impacts on marine mammal habitat and their prey by increasing in-water sound pressure levels and slightly decreasing water quality. 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 San Francisco Bay where both fishes and mammals 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. Construction activities are of short duration and would likely have temporary impacts on marine mammal habitat through increases in underwater and airborne sound.

A temporary and localized increase in turbidity near the seafloor would occur in the immediate area surrounding the area where piles are installed or removed. 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. Local strong currents are anticipated to disburse any additional suspended sediments produced by project activities at moderate to rapid rates

depending on tidal stage. 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 area likely impacted by the project is relatively small compared to the available habitat (*e.g.*, most of the impacted area is west of Treasure Island) of San Francisco Bay and does not include any Biologically Important Areas or other habitat of known importance. The area is highly influenced by anthropogenic activities. 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. Furthermore, pile driving and removal at the project site would not obstruct movements or migration of marine mammals.

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 a rapid return to normal recruitment, distribution and behavior is anticipated. 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.

In-water Construction 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 and Mann., 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 area would be temporary behavioral avoidance of the area. The duration of fish avoidance of this area after pile driving stops is unknown, but a rapid return to normal recruitment, distribution and behavior is anticipated.

Construction activities, in the form of increased turbidity, have the potential to adversely affect forage fish and juvenile salmonid out migratory routes in the project area. Both herring and salmon form a significant prey base for many marine mammal species that occur in the project area. Increased turbidity is expected to occur in the immediate vicinity (on the order of 10 feet (3 m) or less) of construction activities. However, suspended sediments and particulates are expected to dissipate quickly within a

single tidal cycle. Given the limited area affected and high tidal dilution rates any effects on forage fish and salmon are expected to be minor or negligible. Finally, exposure to turbid waters from construction activities is not expected to be different from the current exposure; fish and marine mammals in San Francisco Bay are routinely exposed to substantial levels of suspended sediment from natural and anthropogenic sources.

In summary, given the short daily duration of sound associated with individual pile driving events and the relatively small areas being affected, pile driving activities associated with the proposed action are not likely to have a permanent, adverse effect on any fish habitat, or populations of fish species. 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. Thus, we conclude that impacts of the specified activity are not likely to have more than short-term adverse effects on any prey habitat or populations of prey species. Further, any impacts to marine mammal habitat are not expected to result in significant or long-term consequences for individual marine mammals, or to contribute to adverse impacts on their populations.

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 primarily be by Level B harassment, as use of the acoustic source (*i.e.*, vibratory or impact pile driving) has the potential to result in disruption of behavioral patterns for individual marine mammals. There is also some potential for auditory injury (Level A harassment) to result for pinnipeds and harbor porpoise because predicted auditory injury zones are larger. The proposed mitigation and monitoring measures are expected to minimize the severity of the taking to the extent practicable.

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) 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). Due to the lack of marine mammal density for some species, NMFS relied on local occurrence data and group size to estimate take. Below, we describe the factors considered here in more detail and present the proposed take

estimate.

Acoustic Thresholds

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

Level B Harassment for non-explosive sources – Though significantly driven by received level, the onset of behavioral disturbance from anthropogenic noise exposure is also informed to varying degrees by other factors related to the source (*e.g.*, frequency, predictability, duty cycle), the environment (*e.g.*, bathymetry), and the receiving animals (hearing, motivation, experience, demography, behavioral context) and can be difficult to predict (Southall *et al.*, 2007, Ellison *et al.*, 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 microPascal (μPa) (root mean square (rms)) for continuous (*e.g.*, vibratory pile-driving) and above 160 dB re 1 μPa (rms) for non-explosive impulsive (*e.g.*, impact pile driving) or intermittent (*e.g.*, scientific sonar) sources.

San Francisco's 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) thresholds are applicable.

Level A harassment for non-explosive sources - NMFS' Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0) (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). PSSA's activity includes the use of impulsive (impact pile-driving) and non-impulsive (vibratory pile driving/removal) sources.

These thresholds are provided in Table 4. 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 4 -- Thresholds Identifying the Onset of Permanent Threshold Shift

Hearing Group	PTS Onset Acoustic Thresholds* (Received Level)	
	Impulsive	Non-impulsive
Low-Frequency (LF) Cetaceans	<i>Cell 1</i> $L_{pk,flat}$: 219 dB $L_{E,LF,24h}$: 183 dB	<i>Cell 2</i> $L_{E,LF,24h}$: 199 dB
Mid-Frequency (MF) Cetaceans	<i>Cell 3</i> $L_{pk,flat}$: 230 dB $L_{E,MF,24h}$: 185 dB	<i>Cell 4</i> $L_{E,MF,24h}$: 198 dB
High-Frequency (HF) Cetaceans	<i>Cell 5</i> $L_{pk,flat}$: 202 dB $L_{E,HF,24h}$: 155 dB	<i>Cell 6</i> $L_{E,HF,24h}$: 173 dB
Phocid Pinnipeds (PW) (Underwater)	<i>Cell 7</i> $L_{pk,flat}$: 218 dB $L_{E,PW,24h}$: 185 dB	<i>Cell 8</i> $L_{E,PW,24h}$: 201 dB
Otariid Pinnipeds (OW) (Underwater)	<i>Cell 9</i> $L_{pk,flat}$: 232 dB $L_{E,OW,24h}$: 203 dB	<i>Cell 10</i> $L_{E,OW,24h}$: 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 1 $\mu\text{Pa}^2\text{s}$. In this Table, thresholds are abbreviated to reflect American National Standards Institute standards (ANSI 2013). However, peak sound pressure is defined by ANSI as incorporating frequency weighting, which is not the intent for this Technical Guidance. Hence, the subscript “flat” is being included to indicate peak sound pressure should be flat weighted or unweighted within the generalized hearing range. The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The cumulative sound exposure level thresholds could be exceeded in a multitude of ways (*i.e.*, varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these acoustic thresholds will be exceeded.

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, vibratory pile driving, vibratory pile removal).

Vibratory hammers produce constant sound when operating, and produce vibrations that liquefy the sediment surrounding the pile, allowing it to penetrate to the required seating depth. An impact hammer would then generally be used to place the pile at its intended depth through rock or harder substrates. The actual durations of each installation method vary depending on the type and size of the pile. An impact hammer is a steel device that works like a piston, producing a series of independent strikes to drive the pile. Impact hammering typically generates the loudest noise associated with pile installation.

In order to calculate distances to the Level A harassment and Level B harassment sound thresholds for piles of various sizes being used in this project, NMFS used acoustic monitoring data from other locations to develop source levels for the various pile types, sizes and methods (see Table 5).

Table 5 -- Project Sound Source Levels

Pile Driving Activity		Estimated sound source level at 10 meters without attenuation			Data Source
Hammer Type	Pile Type	dB RMS	dB SEL	dB peak	
Impact	36-inch steel pipe	193	183	210	Compendium pg. 131 (Buehler <i>et al.</i> 2015) Humboldt
	48-inch steel pipe	195	185	210*	Compendium pg. 132 (Buehler <i>et al.</i> 2015) Russian River
	24-inch octagonal concrete	170	164	189	Measurements at Pile 3B, 9/10/2019 at Alameda Seaplane Lagoon Project (Illingworth and Rodkin, Inc., 2019a)
	14-inch x 48-inch concrete sheetpile (measured at 33m)	156	146	167	Treasure Island (Illingworth and Rodkin, Inc., 2019b)
Vibratory	36-inch steel pipe	170			Compendium pg. 129 (Buehler <i>et al.</i> 2015)
	48" steel pipe	170**			Pile-Driving Noise Measurements at Atlantic Fleet Naval Installations (Illingworth and Rodkin, Inc., 2017)
	14-inch x89-foot steel H-piles	150			Compendium pg. 129 (Buehler <i>et al.</i> 2015)
Vibratory Removal	12-inch timber piles (measured at 15.8m)	150			Port Townsend Dolphin Timber Pile Removal (WSDOT 2011)***

Note: It is assumed that noise levels during pile installation and removal are similar. Use of an impact hammer will be limited to 5-10 minutes per pile, if necessary. SEL = single strike sound exposure level; dB peak = peak sound level; rms = root mean square.

* The peak source level from the Compendium is 205 dB; because the peak source for 36-inch piles was 210 dB we conservatively increased this source level to 210 dB to be no less than the 36-inch piles.

**No sound source level information for vibratory driving for 48-inch steel pipes is available in the Compendium. Sound source levels of 48-inch piles for the Atlantic Fleet Naval Installations (162 dB) were lower than those listed for 36-inch piles in the Compendium (170 dB rms). Sound source levels for 48-inch piles are expected to be at least as high as those measured for 36-inch piles. Sound source levels from the Compendium for 72-inch piles were also 170 dB rms. As such, 170 dB rms was used for isopleth calculations for 48-inch piles.

*** NMFS typically uses Greenbusch Group (2018) data for source levels for timber pile removal, but the applicant chose the more conservative WSDOT (2011). The source level from Greenbusch Group (2018) is 152 dB at 10m, the equivalent source level for WSDOT (2011) at 10m is 153 dB.

During pile driving installation activities, there may be times when multiple hammers are used simultaneously. For impact hammering, it is unlikely that the two hammers would strike at the same exact instant, and therefore, the sound source levels will not be adjusted regardless of the distance between the hammers. For this reason, multiple impact hammering is not discussed further. For simultaneous vibratory hammering, the likelihood of such an occurrence is anticipated to be infrequent and would be for short durations on that day. In-water pile installation is an intermittent activity, and it is common for installation to start and stop multiple times as each pile is adjusted and its progress is measured. When two continuous noise sources, such as vibratory hammers, have overlapping sound fields, there is potential for higher sound levels than for non-overlapping sources. When two or more vibratory hammers are used simultaneously, and the sound field of one source encompasses the sound field of another source, the sources are considered additive and combined using the following rules (see Table 6): for addition of two simultaneous vibratory hammers, the difference between the two sound source levels (SSLs) is calculated, and if that difference is between 0 and 1 dB, 3 dB are added to the higher SSL; if difference is between 2 or 3 dB, 2 dB are added to the highest SSL; if the difference is between 4 to 9 dB, 1 dB is added to the highest SSL; and with differences of 10 or more dB, there is no addition.

Table 6 -- Rules for Combining Sound Levels Generated during Pile Installation

Hammer Types	Difference in SSL	Level A Zones	Level B Zones
Vibratory, Impact	Any	Use impact zones	Use vibratory zone
Impact, Impact	Any	Use zones for each pile size and number of strikes	Use zone for each pile size
Vibratory, Vibratory	0 or 1 dB	Add 3 dB to the higher source level	Add 3 dB to the higher source level
	2 or 3 dB	Add 2 dB to the higher source level	Add 2 dB to the higher source level
	4 to 9 dB	Add 1 dB to the higher source level	Add 1 dB to the higher source level
	10 dB or more	Add 0 dB to the higher source level	Add 0 dB to the higher source level

Source: Modified from USDOT 1995, WSDOT 2018, and NMFS 2018b
 Note: dB = decibels; SSL = sound source level.

For simultaneous usage of three or more continuous sound sources, such as vibratory hammers, the three overlapping sources with the highest SSLs are identified. Of the three highest SSLs, the lower two are combined using the above rules, then the combination of the lower two is combined with the highest of the three. For example, with overlapping isopleths from 24-, 36-, and 42-inch diameter steel pipe piles with SSLs of 161, 167, and 168 dB rms respectively, the 24- and 36-inch would be added together; given that $167 - 161 = 6$ dB, then 1 dB is added to the highest of the two SSLs (167 dB), for a combined noise level of 168 dB. Next, the newly calculated 168 dB is added to the 42-inch steel pile with SSL of 168 dB. Since $168 - 168 = 0$ dB, 3 dB is added to the highest value, or 171 dB in total for the combination of 24-, 36-, and 42-inch steel pipe piles (NMFS 2018b; WSDOT 2018). As described in Table 6, dB addition calculations were carried out for all possible combinations of vibratory installation.

In consideration of the various pile types and sizes and the construction work plan for the different structures and components of the project, San Francisco developed a set

of likely worst case scenarios for the activities that would be carried out over the course of individual days (Table 7). These scenarios encompass the worst possible combinations of simultaneous pile driving over the worst possible number of days it might take to complete those tasks. There are four basic scenarios plus the short-term addition of pile removal of the timber piles from the old pier. The course of the project is broken up into work windows for the first month of the project versus the remaining months. Within each of these temporal work windows there are some days with driving of larger and louder piles (called the maximum exposure days) and some days where driving will be of smaller piles (called average exposure days). The table shows what pile driving source is used to calculate the Level A and level B zones under each scenario.

The applicant discusses how they will follow the California Environmental Quality Act requirement that a bubble curtain be used during operation of an impact hammer if sound pressures exceeded 160 dB at 500 meters from the source. Because San Francisco will not use a bubble curtain for all impact hammering of any pile size, we do not include a source level reduction for bubble curtain use or isopleth calculation for this project.

Table 7 -- Work Scenarios with Simultaneous Pile Driving Sources Used to Calculate Level A and Level B zones

Date	Location	Total Days	Piles driven during 24 hours	Drive Type	Pile Type	Loudest Potential Sound Source Combination	
						Level A	Level B
MAXIMUM EXPOSURE DAYS							
June	Ferry Pier	7	2	Impact	48-inch steel pipe	Impact 48-inch steel pipe	2 vibratory 14-inch x 89-foot steel H-pile
	North Breakwater		4	Vibratory	14-inch x 89-foot steel H-piles		
July to January 15	North Breakwater	50	4	Impact	24-inch octagonal concrete or 14x48-inch concrete sheetpiles	Impact 24-inch octagonal concrete	2 vibratory 14-inch x 89-foot steel H-pile
			4	Vibratory	14-inch x 89-foot steel H-piles		
AVERAGE EXPOSURE DAYS							
June	Ferry Pier	20	1	Vibratory	48-inch steel pipe	2 vibratory (48-inch and 36-inch) steel pipes	2 vibratory (48-inch and 36-inch) steel pipes
			1	Vibratory	36-inch steel pipe (fender and/or mooring piles)		
			2	Vibratory	14-inch x 89-foot steel H-piles		
July to January 15	North Breakwater	112	1	Impact	14 x 48-inch concrete sheetpiles	Impact 14 x 48-inch	2 vibratory 14-inch x 89-foot steel H-pile
			2	Vibratory	14-inch x 89-foot steel H-piles		
Existing Timber Pier Removal		14*	15	Vibratory	12-inch Timber Piles	Same as above	12-inch timber pile plus 14-inch x 89-foot steel H-pile

*Pier removal will overlap with work days in July to December 2020, but is kept separate as it is located north of the project area and could have more piles per day, though most will likely be pulled and not vibrated. Based on the rules from Table 6, vibratory pile removal at the pier would not add to total sound source levels when combined with the other stimuluos sources.

Level B Harassment Zones

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:

$$TL = B * \text{Log}_{10} (R1/R2), \text{ where}$$

TL = transmission loss in dB

B = transmission loss coefficient; for practical spreading equals 15

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

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

The recommended TL coefficient for most nearshore environments is the practical spreading value of 15. This value results in an expected propagation environment that would lie between spherical and cylindrical spreading loss conditions, which is the most appropriate assumption for San Francisco's proposed activity.

Using the practical spreading model, San Francisco determined underwater noise would fall below the behavioral effects threshold of 120 dB rms for marine mammals at distances of 1,585 to 34,164 m depending on the pile type(s) and number of simultaneous vibratory hammers. The distance determines the maximum Level B harassment zones for the project. Other activities have smaller Level B harassment zones. It should be noted that based on the geography of Treasure Island, sound will not reach the full distance of the largest Level B harassment isopleth, except a potential sliver that would exit San Francisco Bay. We do not expect significant sound to exit San Francisco Bay however because the entrance to the bay is 13 km from the project location, there is extensive anthropogenic ambient noise from vessels and development in San Francisco that would mask the project sounds, and the geography and bathymetry of the bay is not conducive to sounds originating from Treasure Island escaping the San Francisco Bay.

Table 8 -- Level B Isopleths for Each Work Scenario

	Maximum Exposure Day		Average Exposure Day	
	June	July-January	June	July-January
Loudest Pile Type or Combination	2 vibratory 14-inch x 89-foot steel H-pile	2 vibratory 14-inch x 89-foot steel H-pile	2 vibratory (48-inch and 36-inch) steel pipes	2 vibratory 14-inch x 89-foot steel H-pile*
Level B Isopleth (meters)	1585	1585	34,164	1585

*One vibratory removal of 12-inch timber piles could be substituted for one 14-inch x 89-foot steel H-pile. Since source levels are identical for each type of pile, Level B isopleth distance does not change.

Level A Harassment Zones

When the NMFS Technical Guidance (2016) was published, in recognition of the fact that ensounded 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 take by Level A harassment. However, these tools offer the best way to predict appropriate isopleths when more sophisticated 3D modeling methods are not available, and NMFS continues to develop ways to quantitatively refine these tools, and will qualitatively address the output where appropriate. For stationary sources such as impact/vibratory pile driving or drilling, NMFS User Spreadsheet predicts the closest distance at which, if a marine mammal remained at that distance the whole duration of the activity, it would not incur PTS.

Inputs used in the User Spreadsheet (Table 9), and the resulting isopleths are reported below (Table 10) for each of the work scenarios. These inputs follow the rules for simultaneous pile driving as described in Table 6.

Table 9 -- NMFS Technical Guidance User Spreadsheet Input to Calculate Level A Isopleths for a Combination of Pile Driving

	High Exposure Day		Average Exposure Day		
	June	July-January	June	July-January	Vibratory Removal of 12-inch Timber Pile
Pile Type	48-inch Steel Pipe Impact	24-inch Octagonal Concrete Impact	48-inch Steel Pipe & 36-inch Steel Simultaneous Vibratory	14x48-inch Concrete Sheet Pile Impact	
Source Level (RMS SPL)	195	170	173	156	150
Source Level (Peak)	210	189		167	
Number of Piles per day	2	4	2*	1	15
Number of Strikes per Pile/ Duration to drive a single pile	225 strikes	1000 strikes	45 minutes	600 strikes	5 minutes
Distance of source level measurement (m)	10	10	10	33	15.8

Note: Propagation loss coefficient is 15LogR for all cells.

*Two combined piling events, four piles total.

The above input scenarios lead to PTS isopleth distances (Level A thresholds) of 3.6 to 322.5 meters, depending on the marine mammal group and scenario (Table 10).

Table 10 -- Calculated Distances (meters) to Level A Harassment Isopleths (m) During Pile Installation and Removal for each Hearing Group and Work Scenario

Pile Driving Activity	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds (m)	Otariid Pinnipeds (m)

			(m)	(m)	(m)		
Maximum Exposure Day	June	48-inch steel pipe impact	798	28	950	427	31
	July - January	24-inch Octagonal Concrete Impact	74	3	88	39	3
Average Exposure Day	June	48-inch steel and 36-inch steel simultaneous vibratory	57	5	84	34	2
	July - January	14x48-inch concrete sheet pile impact	8	0.3	10	4	0.3
		Vibratory Removal of 12-inch Timber pile	2	0.2	3	1	0.1

Note: a 10-meter shutdown zone will be implemented for all species and activity types to prevent direct injury of marine mammals.

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. For the three most common species (harbor seal, California sea lion, and Harbor porpoise) density data exists from the multiple years of the San Francisco-Oakland Bay Bridge (SFOBB) demolition and reconstruction project (Caltrans 2015, 2018). For other species we used more qualitative data on observations from the SFOBB project and observations from year one of this project along with local information on strandings and other biology. Take by Level A and B harassment is proposed for authorization and summarized in Table 11.

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

Bottlenose Dolphin

Density data for this species in the project vicinity do not exist. SFOBB monitoring showed two observations of this species over 6 days of monitoring in 2017 (CalTrans 2018). No common bottlenose dolphins were observed over the course of 264 monitoring hours within the 1,000 foot (305 m) monitoring zone for the Treasure Island Ferry Dock project in 2019. One common bottlenose dolphin is sighted with regularity near Alameda (GGCR 2016). Based on the regularity of the sighting in Alameda and the SFOBB observations of approximately 0.33 dolphin a day, we propose the Level B harassment take equivalent to 0.33 dolphins per day for the 189 proposed days of the project, or 63 common bottlenose dolphin. Because the Level A harassment zones are relatively small and we believe the Protected Species Observer (PSO) will be able to effectively monitor the Level A harassment zones, we do not anticipate or propose take by Level A harassment of bottlenose dolphins.

Harbor Porpoise

Density data for this species from SFOBB monitoring was $0.17/\text{km}^2$ (CalTrans 2018). Based on the work scenarios of different pile types there are two different sized ensonified areas to be considered to estimate Level B harassment take (Table 12). These are the smaller area from simultaneous driving of the H-piles and the larger area from simultaneous driving of the largest pipe piles. There are 169 days of work for the H-pile scenario and 20 days of work for the pipe pile scenario. Multiplication of the above density times the corresponding scenario area and duration, and summing the results for

the two scenarios leads to a proposed Level B harassment take of 537 harbor porpoise (Table 12).

Given the relatively high density and large size of the Level A isopleths for many of the scenarios for Harbor porpoises (Table 10, high-frequency cetaceans) we consider Level A harassment take is a possibility. Based on density alone it is estimated only two harbor porpoises will enter a Level A harassment zone (see Table 14 of application). However, we recognize that harbor porpoises travel in groups of up to 10 individuals and observers of the Treasure Island Ferry Dock project in 2019 recorded two harbor porpoises over 264 hours of observation, or 0.008 per hour. Based on this observation we request take equivalent to this rate (0.008 per hour) over the entire project period of 189 days (10 hours per day or 1890 hours). As such, we propose Level A harassment take of 15 harbor porpoise.

Because any harbor porpoises that enter the Level A harassment zone would initially be counted as entering the Level B harassment zone, we deduct the Level A harassment take from the Level B harassment take calculation in Table 12 to avoid double-counting and arrive at the proposed Level B harassment take in Table 11.

California Sea Lion

Density data for this species from SFOBB monitoring was 0.16/km² (CalTrans 2018). Based on the work scenarios of different pile types there are two different sized ensonified areas to be considered to estimate Level B harassment take (Table 12). These are the smaller area from simultaneous driving of the H-piles and the larger area from simultaneous driving of the largest pipe piles. There are 169 days of work for the H-pile scenario and 20 days of work for the pipe pile scenario. Multiplication of the above

density times the corresponding scenario area and duration, and summing the results for the two scenarios leads to a proposed Level B harassment take of 505 California sea lions (Table 12).

Given the relatively high density for California sea lions we consider Level A harassment take a possibility. Based on density alone it is estimated only one California sea lion will enter a Level A harassment zone (see Table 13 of application). However, we recognize that observers of the Treasure Island Ferry Dock project in 2019 recorded five California sea lions over 264 hours of observation, or 0.019 per hour. Because the observation area in 2019 is much larger than the small otariid Level A harassment zones we propose take at less than half this rate. Specifically we propose take of 15 California sea lions.

Because any California sea lions that enter the Level A harassment zone would initially be counted as entering the Level B harassment zone, we deduct the Level A harassment take from the Level B harassment take calculation in Table 12 to avoid double-counting and arrive at the proposed Level B harassment take in Table 11.

Northern Fur Seal

Density data for this species in the project vicinity do not exist. SFOBB monitoring showed no observations of this species (CalTrans 2018). None were observed for the Treasure Island Ferry Dock project in 2019. The Marine Mammal Center rescues about five northern fur seals in a year, and they occasionally rescue them from Yerba Buena Island and Treasure Island (TMMC, 2019). To be conservative we propose Level B harassment take of five northern fur seals. Because the Level A harassment zones are relatively small and we believe the PSO will be able to effectively monitor the Level A

harassment zones, and the species is rare, we do not anticipate or propose take by Level A harassment of northern fur seals.

Northern Elephant Seal

Density data for this species in the project vicinity do not exist. SFOBB monitoring showed no observations of this species (CalTrans 2018). None were observed for the Treasure Island Ferry Dock project in 2019. Out of the approximately 100 annual northern elephant seal strandings in San Francisco Bay, approximately 10 individuals strand at Yerba Buena or Treasure Islands each year (TMMC, 2020). Therefore, we propose the Level B harassment take of 10 northern elephant seals. Because the Level A harassment zones are relatively small and we believe the PSO will be able to effectively monitor the Level A harassment zones, and the species is rare, we do not anticipate or propose take by Level A harassment of northern elephant seals.

Harbor Seal

Density data for this species from SFOBB monitoring was $3.92/\text{km}^2$ (CalTrans 2018). Based on the work scenarios of different pile types there are two different sized ensonified areas to be considered to estimate Level B harassment take (Table 12). These are the smaller area from simultaneous driving of the H-piles and the larger area from simultaneous driving of the largest pipe piles. There are 169 days of work for the H-pile scenario and 20 days of work for the pipe pile scenario. Multiplication of the above density times the corresponding scenario area and duration leads to an estimate of 13.54 harbor seals per day for the H-pile driving and 511 harbor seals per day for the pipe pile scenario. Summing the results for the two scenarios leads to an expectation of 12,509 instances of Level B harassment take of harbor seals.

The number of expected takes per day for the pipe pile scenario (511) exceeds the estimate that there is only 500 harbor seals in San Francisco Bay (NPS 2016). It is our normal practice not to issue more than one take per individual per day. Therefore, we cap the number of takes per day for this scenario at 500 per day. Thus, summing the results for the two scenarios leads to a proposed Level B harassment take of 12,289 harbor seals (Table 12).

Given the relatively high density and large size of the Level A isopleths for many of the scenarios for harbor seals (Table 10, phocid pinnipeds) we consider Level A harassment take is a possibility. Based on density alone it is estimated that nine harbor seals will enter a Level A harassment zone (see Table 12 of application). However, we recognize that harbor seals can occur in moderate and rarely large size groups and observers of the Treasure Island Ferry Dock project in 2019 recorded 324 harbor seals over 264 hours of observation, or 6.12 per km² per hour. Most of the Level A take is expected to occur during the driving of the 48-inch pipe piles that have the largest level harassment zones (Table 10). Using the area of this zone of 0.27 km², and seven 10-hour work days results in an estimate of 116 takes. As such, we propose Level A harassment take of 116 harbor seals.

Because any harbor seals that enter the Level A harassment zone would initially be counted as entering the Level B harassment zone, we deduct the Level A harassment take from the Level B harassment take calculation in Table 12 to avoid double-counting and arrive at the proposed Level B harassment take in Table 11.

Gray Whale

Density data for this species in the project vicinity do not exist. SFOBB monitoring showed no observations of this species (CalTrans 2018). None were observed for the Treasure Island Ferry Dock project in 2019. Approximately 12 gray whales were stranded in San Francisco Bay from January to May of 2019 (TMMC, 2019). Because recent observations are not well understood, Treasure Island sits near the entrance to the bay, and as a conservative measure, we propose Level B harassment take of 10 gray whales. Because the Level A harassment zones are relatively small and we believe the PSO will be able to effectively monitor the Level A harassment zones, and the species is rare, we do not anticipate or propose take by Level A harassment of gray whales.

Table 11 -- Proposed Authorized Amount of Taking, by Level A Harassment and Level B Harassment, by Species and Stock and Percent of Take by Stock

Species	Authorized Take		Percent of Stock
	Level B	Level A	
Harbor seal (<i>Phoca vitulina</i>) California Stock	12,173	116	1.6
Harbor porpoise (<i>Phocoena phocoena</i>) San Francisco – Russian River Stock	522	15	5.4
California sea lion (<i>Zalophus californianus</i>) U.S. Stock	490	15	0.2
Gray whale (<i>Eschrichtius robustus</i>) Eastern North Pacific Stock	10	0	<0.1
Common bottlenose dolphin (<i>Tursiops truncatus</i>) California Coastal Stock	63	0	13.9
Northern elephant seal (<i>Mirounga angustirostris</i>) California breeding Stock	10	0	<0.1
Northern fur seal (<i>Callorhinus ursinus</i>) California and Eastern North Pacific Stocks	5	0	<0.1

Table 12 -- Calculations of Level B Harassment Take From Density Data by Species

		Harbor Porpoise	California Sea Lion	Harbor Seal
SFOBB density (animals/ square km)		0.17	0.16	3.96
	Piling Scenario / Level B isopleth Distance (m)			
Days of Pile Driving	2 vibratory 14-inch x 89-foot steel H-pile / 1585 m	169	169	169
	2 vibratory (48-inch and 36-inch) steel pipes / 34,164 m	20	20	20
Area of Isopleth in square kilometers	2 vibratory 14-inch x 89-foot steel H-pile / 1585 m	3.42	3.42	3.42
	2 vibratory (48-inch and 36-inch) steel pipes / 34,164 m	129	129	129
Per day take Level B	2 vibratory 14-inch x 89-foot steel H-pile / 1585 m	0.6	0.5	13.5
	2 vibratory (48-inch and 36-inch) steel pipes / 34,164 m	21.9	20.6	500*
Total Level B Take Calculated		537	505	12,289

*Capped at maximum population size (500) in San Francisco Bay per day (NPS 2016)

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.

The following mitigation measures are proposed in the IHA:

- 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 San Francisco's in-water construction activities.

- *Establishment of Shutdown Zones*- San Francisco 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 4). The largest shutdown zones are generally for high frequency cetaceans, as shown in Table 13.
- 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 13 -- Shutdown Zones During Pile Installation and Removal

Pile Driving Activity			Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
High Exposure Day	June	48-inch steel pipe impact	100*	30	100*	100*	40
	July - January	24-inch Octagonal Concrete Impact	80	10	100	40	10
Average Exposure Day	June	48-inch steel and 36-inch steel simultaneous vibratory	60	10	100	40	10
	July - January	14x 48-inch concrete sheet pile impact	10	10	10	10	10
	Vibratory Removal of 12-inch Timber pile		10	10	10	10	10

* This shutdown zone is smaller than the 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.

- *Monitoring for Level B Harassment-* San Francisco will monitor the Level B harassment zones 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 halt of activity should the animal enter the shutdown zone. Placement of PSOs 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 or removal must occur during daylight hours.

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); and
 - Mitigation and monitoring effectiveness.

Visual Monitoring

Marine mammal monitoring must be conducted in accordance with the Monitoring section of the application and Section 5 of the IHA. 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;

- Other PSOs may substitute education (degree in biological science or related field) or training for experience; and
- San Francisco must submit PSO Curriculum Vitae 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. 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 zones; and

(2) For the large Level B harassment zone associated with simultaneous driving of large pipe piles, a second PSO will be placed near Pier 33 in San Francisco. This PSO is not needed for other activities.

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 30 minutes.

Reporting

A draft marine mammal monitoring report will be submitted to NMFS within 90 days after the completion of pile driving and removal activities, or 60 days prior to a requested date of issuance of any future IHAs for projects at the same location, whichever comes first. 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, when applicable.

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

Reporting Injured or Dead Marine Mammals

In the event that personnel involved in the construction activities discover an injured or dead marine mammal, San Francisco shall report the incident to the Office of Protected Resources (OPR), NMFS and to the regional stranding coordinator as soon as feasible. If the death or injury was clearly caused by the specified activity, San Francisco 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:

- Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);
- Species identification (if known) or description of the animal(s) involved;
- Condition of the animal(s) (including carcass condition if the animal is dead);
- Observed behaviors of the animal(s), if alive;
- If available, photographs or video footage of the animal(s); and
- 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. Additional discussion is included for harbor seals, which occur more densely in the area and may be disturbed repeatedly during the season. Pile driving activities have the potential to disturb or displace marine mammals. Specifically, the project activities may

result in take, in the form of Level A harassment and Level B harassment from underwater sounds generated from pile driving and removal. Potential takes could occur if individuals are present in the ensonified zone when these activities are underway.

The takes from Level A and Level B harassment would be due to potential behavioral disturbance, TTS, and PTS. No mortality is anticipated given the nature of the activity and measures designed to minimize the possibility of injury to marine mammals. The potential for harassment is minimized through the construction method and the implementation of the planned mitigation measures (see **Proposed Mitigation** section).

The Level A harassment zones identified in Table 10 are based upon an animal exposed to impact pile driving multiple piles per day. Considering duration of impact driving each pile (up to 10 minutes) and breaks between pile installations (to reset equipment and move pile into place), this means an animal would have to remain within the area estimated to be ensonified above the Level A harassment threshold for multiple hours. This is highly unlikely given marine mammal movement throughout the area. If an animal was exposed to accumulated sound energy, the resulting PTS would likely be small (*e.g.*, PTS onset) at lower frequencies where pile driving energy is concentrated, and unlikely to result in impacts to individual fitness, reproduction, or survival.

The nature of the pile driving project precludes the likelihood of serious injury or mortality. For all species and stocks, take would occur within a limited, confined area (western San Francisco Bay) of any given stock's range. Level A and 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.

Behavioral responses of marine mammals to pile driving at the project site, if any, are expected to be mild and temporary. Marine mammals within the Level B harassment zone may not show any visual cues they are disturbed by activities (as noted during modification to the Kodiak Ferry Dock) or could become alert, avoid the area, leave the area, or display other mild responses that are not observable such as changes in vocalization patterns. Given the short duration of noise-generating activities per day and that pile driving and removal would occur across six months, any harassment would be temporary. There are no other areas or times of known biological importance for any of the affected species.

We are authorizing large numbers of take of harbor seals. As discussed above, there are approximately 500 harbor seals in San Francisco Bay. Thus we expect most of the harbor seal take to consist of repeated take of a smaller number of individuals, rather than a large proportion of the stock. Most of the take is expected to occur from the 20 days of simultaneous vibratory pile driving of large piles. However, we are not concerned about fitness impacts as the daily exposure is likely to be brief and intermittent. The 20 days of simultaneous pile driving are not expected to be sequential, providing the animals recovery time. The presence of the large simultaneous level B harassment zones are also likely to be of very short duration within a day on any given day given the dynamics of operating and adjusting different pile driving rigs and thus the likelihood that both rigs will be operating simultaneously. It is also the case that some of the simultaneous pile driving will consist of one large pile and smaller, quieter H-piles (see Table 7), so that effects are likely to be less significant. In addition, this area of the bay lacks important habitat areas, including haulouts within the level B harassment zone, and the existing

industrialized nature and loud ambient noise of the area minimize the degradation of habitat and effects on individual fitness, reproduction, or survival. Moreover, harbor seals resident in San Francisco Bay are likely habituated to this noise and activity as evident in the low number of observed responses, none of which seemed severe, from monitoring. Finally, the status of this stock is not of concern.

In addition, it is unlikely that minor noise effects in a small, localized area of habitat would have any effect on the stocks' ability to recover. In combination, we believe that these factors, as well as the available body of evidence from other similar activities, demonstrate that the potential effects of the specified activities will have only minor, short-term effects on individuals. The specified activities are not expected to impact rates of recruitment or survival and will therefore not result in population-level impacts.

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.
- Authorized Level A harassment would be very small amounts and of low degree.
- No biologically important areas have been identified within the project area.
- For all species, San Francisco Bay is a very small and peripheral part of their range.

- For harbor seals take is concentrated in a small number of individuals with the 20 days of major activity spread out, the most severe simultaneous pile driving likely of short duration on any given day in an area of unimportant habitat with significant existing anthropomorphic noise and disturbance and evidence the animals are habituated to these circumstances.
- San Francisco would implement mitigation measures such as vibratory driving piles to the maximum extent practicable, soft-starts, and shut downs.
- Monitoring reports from similar work in San Francisco Bay have documented little to no effect on individuals of the same species impacted by the specified activities.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the proposed monitoring and mitigation measures, NMFS preliminarily finds that the total marine mammal take from the proposed activity will have a negligible impact on all affected marine mammal species or stocks.

Small Numbers

As noted above, only small numbers of incidental take may be authorized under Section 101(a)(5)(D) of the MMPA for specified activities other than military readiness activities. The MMPA does not define small numbers and so, in practice, 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. When the predicted number of individuals to be taken is fewer than one third of the species or stock

abundance, the take is considered to be of small numbers. Additionally, other qualitative factors may be considered in the analysis, such as the temporal or spatial scale of the activities.

The amount of take NMFS proposes to authorize of all species or stocks is below one third of the estimated stock abundance. These are all likely conservative estimates because they assume all takes are of different individual animals which is likely not the case. Some individuals may return multiple times in a day, but PSOs would count them as separate takes if they cannot be individually identified.

Based on the analysis contained herein of the proposed activity (including the proposed mitigation and monitoring measures) and the anticipated take of marine mammals, NMFS preliminarily finds that small numbers of marine mammals will be taken relative to the population size of the affected species or stocks.

Unmitigable Adverse Impact Analysis and Determination

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

Endangered Species Act (ESA)

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

internally, in this case with the West Coast Region Protected Resources Division Office, 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 an IHA to San Francisco to conduct the Treasure Island Ferry Dock project in San Francisco, CA for one year from the date of issuance, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated. A draft of the proposed IHA 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 Treasure Island Ferry Dock 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-time 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, activities as described in the *Description of Proposed Activity* section of this notice is planned or (2) the activities as

described in the *Description of Proposed Activity* 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 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); and
 - (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; and
- 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: June 3, 2020.

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

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