DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648–XC622

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to a Pier Replacement Project

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

ACTION: Notice; proposed incidental harassment authorization; request for comments.

SUMMARY: NMFS has received an application from the U.S. Navy (Navy) for an Incidental Harassment Authorization (IHA) to take marine mammals, by harassment, incidental to construction activities as part of a pier replacement project. Pursuant to the Marine Mammal Protection Act (MMPA), NMFS is requesting comments on its proposal to issue an IHA to the Navy to take, by Level B Harassment only, four species of marine mammals during the specified activity.

DATES: Comments and information must be received no later than June 24, 2013.

ADDRESSES: Comments on the application should be addressed to Michael Payne, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910. The mailbox address for providing email comments is *ITP.Laws@noaa.gov.* NMFS is not responsible for email comments sent to addresses other than the one provided here. Comments sent via email, including all attachments, must not exceed a 10-megabyte file size.

Instructions: All comments received are a part of the public record. 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.

A copy of the application as well as a list of the references used in this document may be obtained by writing to the address specified above, telephoning the contact listed below (see **FOR FURTHER INFORMATION CONTACT**), or visiting the internet at: *http://www.nmfs.noaa.gov/pr/permits/incidental.htm.* Supplemental documents provided by the U.S. Navy may be found at the same web address. The Navy has prepared a Draft Environmental Assessment (*Naval Base Point Loma Fuel Pier Replacement and Dredging (P–151/DESC1306) Environmental Assessment*) in accordance with the National Environmental Policy Act (NEPA) and the regulations published by the Council on Environmental Quality. It is posted at the foregoing site. NMFS will independently evaluate the EA and determine whether or not to adopt it. We may prepare a separate NEPA analysis and incorporate relevant portions of the Navy's EA by reference. Information in the Navy's application, EA and this notice collectively provide the environmental information related to proposed issuance of the IHA for public review and comment. We will review all comments submitted in response to this notice as we complete the NEPA process, including a decision of whether to sign a Finding of No Significant Impact (FONSI), prior to a final decision on the IHA request. Documents cited in this notice may also be viewed, by appointment only, at the aforementioned physical address.

FOR FURTHER INFORMATION CONTACT: Ben Laws, Office of Protected Resources, NMFS, (301) 427–8401.

SUPPLEMENTARY INFORMATION:

Background

Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq.*) direct the Secretary of Commerce to allow, upon request, 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 authorization is 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), will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant), and if the permissible methods of taking and requirements pertaining to the mitigation, monitoring and reporting of such takings are set forth. NMFS has defined ''negligible impact'' in 50 CFR 216.103 as ''. . . an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.''

Section 101(a)(5)(D) of the MMPA established an expedited process by which citizens of the U.S. can apply for an authorization to incidentally take small numbers of marine mammals by harassment. Section 101(a)(5)(D) establishes a 45-day time limit for NMFS review of an application followed by a 30-day public notice and comment period on any proposed authorizations for the incidental harassment of marine mammals. Within 45 days of the close of the comment period, NMFS must either issue or deny the authorization. Except with respect to certain activities not pertinent here, the MMPA defines ''harassment'' as ''any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment].''

Summary of Request

We received an application on September 24, 2012 from the Navy for the taking of marine mammals incidental to pile driving and removal in association with a pier replacement project in San Diego Bay at Naval Base Point Loma in San Diego, CA (NBPL). The Navy submitted a revised version of the application on November 15, 2012 which we deemed adequate and complete. The pier replacement project is proposed to occur over multiple years; however, this IHA would cover only the initial year of work, beginning September 1, 2013. Four species of marine mammals are expected to occur in the vicinity of the project during all or a portion of the project duration: California sea lion (*Zalophus californianus californianus*), harbor seal (*Phoca vitulina richardii*), bottlenose dolphin (*Tursiops truncatus truncatus*), and gray whale (*Eschrichtius robustus*). California sea lions are present year-round and are common in the project area, while bottlenose dolphins may be present year-round but sightings are highly variable in Navy marine mammal surveys of northern San Diego Bay. Harbor seals have limited occurrence in the project area. Gray whales may be observed in San Diego Bay sporadically during migration periods.

NBPL provides berthing and support services for Navy submarines and other fleet assets. The existing fuel pier serves as a fuel depot for loading and unloading tankers and Navy underway replenishment vessels that refuel ships at sea (''oilers''), as well as transferring fuel to local replenishment vessels and other small craft operating in San Diego Bay, and is the only active Navy fueling facility in southern California. Portions of the pier are over one hundred years old, while the newer segment was constructed in 1942. The pier as a whole is significantly past its design service life and does not meet current construction standards.

Demolition and construction would occur in two phases to maintain the fueling capabilities of the existing fuel pier while the new pier is being constructed. The total duration of demolition/construction is estimated to be approximately four years (2013–17). During the first year of construction (the specified activity considered under this proposed IHA), approximately 120 piles (including 18-in concrete and 36- to 48-in steel) would be installed and 109 piles would be removed (via multiple methods). All steel piles would be driven with a vibratory hammer for their initial embedment depths and finished with an impact hammer for proofing, as necessary. Proofing involves striking a driven pile with an impact hammer to verify that it provides the required load-bearing capacity, as indicated by the number of hammer blows per foot of pile advancement.

For pile driving activities, the Navy used NMFS-promulgated thresholds for assessing project impacts, outlined later in this document. The Navy used a site-specific model for transmission loss and empirically-measured source levels from other 36–72 in diameter pile driving events to estimate potential marine mammal exposures. Predicted exposures are outlined later in this document. The calculations predict that no Level A harassments would occur associated with pile driving or construction activities, and that as many as 1,738 incidents of Level B harassment may occur during the first year of the pier replacement project from sound produced by pile driving and removal activity.

Description of the Specified Activity

NBPL is located on the peninsula of Point Loma near the mouth and along the northern edge of San Diego Bay (see Figures 1–1 and 1–2 in the Navy's application). The proposed actions with the potential to cause harassment of marine mammals within the waterways adjacent to NBPL, under the MMPA, are vibratory and impact pile driving and removal of piles via vibratory driver or pneumatic chipper associated with the pier replacement project and associated projects. The entire project is scheduled to occur from 2013–17; the proposed activities that would be authorized by this IHA would occur for one year from September 1, 2013. Under the terms of a memorandum of understanding between the Navy and the U.S. Fish and Wildlife Service, all noise- and turbidity-producing in-water activities in designated least tern foraging habitat are to be avoided during the period when least terns are present and engaged in nesting and foraging. Therefore, all in-water construction activities will occur during a window from approximately September 15 through April 1.

Specific Geographic Region

San Diego Bay is a narrow, crescent-shaped natural embayment oriented northwest-southeast with an approximate length of fifteen miles and a total area of roughly 11,000 acres. The width of the bay ranges from 0.2 to 3.6 miles, and depths range from 74 ft mean lower low water (MLLW) near the tip of Ballast Point to less than 4 ft at the southern end (see Figure 2–1 of the Navy's application). San Diego Bay is a heavily urbanized area with a mix of industrial, military, and recreational uses. The northern and central portions of the bay have been shaped by historic dredging to support large ship navigation. Dredging occurs as necessary to maintain constant depth within the navigation channel. Outside the navigation channel, the bay floor consists of platforms at depths that vary slightly. Sediments in northern San Diego Bay are relatively sandy as tidal currents tend to keep the finer silt and clay fractions in suspension, except in harbors and elsewhere in the lee of structures where water movement is diminished. Much of the shoreline consists of riprap and manmade structures.

San Diego Bay is heavily used by commercial, recreational, and military vessels, with an average of 82,413 vessel movements (in or out of the bay) per year (not including recreational boating within the Bay) (see Table 2–2 of the Navy's application). The Navy has been measuring underwater noise in northern San Diego Bay and has thus far found that the median broadband sound pressure level for background sound in the Bay is 123.8 dB re 1 μPa. These preliminary data reflect the busy nature of the project area and show that background sound may be higher than the NMFS-specified Level B harassment threshold of 120 dB for continuous sound (see Figures 2–4 to 2–6 of the Navy's application). The Navy intends to continue gathering ambient sound data for the project area and this subject will be addressed in greater detail under future IHA requests. For more information about the specific geographic region, please see section 2.3 of the Navy's application.

In order to provide context, we will first describe the entire project and then describe the specific portions scheduled for completion during the first work window. Associated projects (separate from primary construction/demolition) are described first. The project consists of the following key elements:

Temporary Relocation of the Marine Mammal Program

The Navy Marine Mammal Program, administered by Space and Naval Warfare Systems Command (SPAWAR) Systems Center (SSC), would be moved approximately three kilometers to the Naval Mine and Anti-submarine Warfare Command (NMAWC). Although not subject to the MMPA, SSC's working animals are being relocated so that they will not be affected by the project. In addition to the distance of remove, NMAWC is acoustically shadowed from potential project noise (see Figure 1–4 of the Navy's application). Construction of the temporary holding facility would include impact driving fifty 18-in square concrete piles. After completion of the new fuel pier the Marine Mammal Program would move back to its original location adjacent to the fuel pier and the temporary facilities at NMAWC would be removed.

Temporary Relocation of Bait Barges

The Everingham Brothers San Diego Bay Bait Barge facility will be temporarily relocated by the owners. Although not an element of the Navy's Fuel Pier Replacement Project, this action is mentioned here because the barges, currently anchored approximately 600 m south of the existing fuel pier, attract large numbers of California sea lions and their relocation would be expected to reduce the number of sea lions that would be exposed to noise levels constituting harassment under the MMPA. The barges would be moved to either of two locations along the southwest side of Harbor Island, approximately five kilometers from the project site (see Figure 1–5 in the Navy's application). The Bait Barge would be moved prior to the initiation of in-water construction and may be moved back to the current location when in-water construction is complete.

Dredging and Sediment Disposal

Dredging and sediment disposal are needed to deepen the existing turning basin in order to safely accommodate current and future deep draft berthing capabilities. An estimated 80,000 yd^3 of sediment would be dredged. Laboratory testing of the sediments confirmed the lack of contamination and they were approved for ocean disposal by the U.S. Environmental Protection Agency and U.S. Army Corps of Engineers. However, the sediments also have sufficient content of sand for beneficial reuse in nearshore replenishment. Accordingly, the sediments would be transported by barge and deposited at an approved nearshore replenishment site (Imperial Beach). Noise measurements of dredging activities are rare in the literature, but dredging is considered to be a low-impact activity for marine mammals, producing non-pulsed sound and being substantially quieter in terms of acoustic energy output than sources such as seismic airguns and impact pile driving. Noise produced by dredging operations has been compared to that produced by a commercial vessel travelling at modest speed (Robinson *et al.,* 2011). Further discussion of dredging sound production may be found in the literature (e.g., Richardson *et al.,* 1995, Nedwell *et al.,* 2008, Parvin *et al.,* 2008, Ainslie *et al.,* 2009). Generally, the effects of dredging on marine mammals are not expected to rise to the level of a take. Therefore, this project component will not be discussed further.

Construction of the New Pier and Demolition and Removal of the Existing Pier

Demolition and construction would occur on a segment-by-segment basis to allow for continuous fueling operations during the project. The south side of the existing pier would remain operational while the north side is undergoing demolition and the new pier is being constructed. When construction of the new pier is complete, the remainder of the old pier would be demolished. See Table 1–1 in the Navy's application for a complete construction phase summary. More detail is provided below only on those aspects of the project that involve in-water activity and that have the potential to result in incidental take of marine mammals. The majority of the work would be conducted over water and would include removal of the pier, pilings, plastic camels and fenders. All utility infrastructure would be removed, including water and sewer pipelines, lighting systems, and wiring. The fueling systems, including piping and pipe supports, would also be removed. These and other aspects of the project are considered in more detail in the Navy's Draft Environmental Assessment.

Methods, Pile Removal—Typical pier demolition takes place bayward to landward and from the top down. Fender piles and exterior appurtenances (such as utilities and the fuel piping systems) would first be removed above and below the pier deck before the deck would be demolished using concrete saws and a barge-mounted excavator equipped with a hydraulic breaker. Next, structural and fender piles would be demolished. Table 1 summarizes the total number and nature of existing piles to be removed.

TABLE 1—EXISTING FUEL PIER TOTAL PILES AND CAISSONS

[To be removed]

Pile type or structure	Quantity
16-in concrete structural piles	518
14- and 24-in concrete fender piles	105
13-in plastic fender piles	34
16-in steel pipe filled with concrete	24
12-in timber piles	739
66-in diameter concrete-filled steel caissons	26
84-in diameter concrete-filled steel caissons	25
Total	1,471

There are multiple methods for pile removal, including dry pulling, cutting at the mudline, jetting, and vibratory removal. Typically piles would be cut off at the mudline; however, the full length of the piles would be pulled at the area where the new approach segment would be constructed. An attempt would first be made to dry pull the piles with a barge-mounted crane. A vibratory hammer or a pneumatic chipper may be used to loosen the piles. Jetting (the application of a focused stream of water under high pressure) would be another option to loosen piles that could not be removed through the previous procedures. The caisson elements would be removed with a clamshell, which is a dredging bucket consisting of two similar halves that open/close at the bottom and are hinged at the top. The clamshell would be used to grasp and lift large components. When a wooden pile cannot be completely pulled out, the pile may be cut at the mudline using the clamshell's hydraulic jaws and/or a diver-operated underwater chainsaw, except for piles that are within the footprint of the approach pier, which may require jetting to remove.

Methods, Pile Installation—In general, pile installation work would be accomplished during the in-water work window from September through March, with installation of deck and utility components as well as acceptable demolition work (i.e., work that is not considered a significant source of underwater noise or turbidity) occurring from April through August. Pile driving would occur during normal working hours (7:00 a.m. to 4:00 p.m.). The impact pile driver would be used for all types of piles (steel, concrete and fiberglass). For steel piles, a vibratory hammer would be used to drive the pile to refusal and then the impact hammer would be used for proofing or until the pile meets structural requirements (expected to require 25–125 blows). The concrete piles would first be jetted, a process wherein pressurized air or water jets are applied at the tip of the pile to loosen the substrate and allow the pile to sink vertically, before being driven the last few feet with the impact hammer. The fiberglass piles do not need to be embedded very deeply into the subsurface so would be impact-driven for the entire length. In all cases, impact driving would be minimized.

The replacement pier structure, including the mooring dolphins, would consist of steel pipe piles, supporting concrete pile caps and cast-in-place concrete deck slabs. The upper 10 ft of the steel wall pipe piles would be filled with concrete as part of the connection between the piles and the pier deck. Approximately 554 total piles would be installed, including 228 36-in steel pipe piles, 77 48-in steel pipe piles, 84 16-in concrete-filled fiberglass piles, and 165 24-in prestressed concrete piles. The sizes of the steel piles are dependent on water depth, subsurface soil conditions, and the mass of the deck structure. In most areas, a 36-in diameter steel pile is adequate to meet the criteria. In other areas, a 48-in diameter pile is necessary. Table 1–4 in the Navy's application summarizes the total piles that would be installed over the life of the project.

Project Indicator Pile Program and Temporary Mooring Dolphin (March–April 2014); North Segment Demolition (March–July 2014)—The Indicator Pile Program (IPP) is designed to validate the length of pile required and the method of installation (vibratory and impact). Approximately twelve steel pipe piles (36- and 48-in diameter, exact mix to be determined later) would be driven in the new pier alignment to verify the driving conditions and establish the final driving lengths prior to fabrication of the final production piles that would be used to construct the new pier. In addition, the IPP will validate the acoustics modeling used by the Navy to estimate incidental take levels.

A temporary mooring dolphin would be constructed to allow vessels to berth and load/unload fuel on the existing south segment while the north segment of the existing pier is under demolition.

Sixteen 36-in piles would be driven during construction. The north segment would be demolished by water access using barges to provide a working area for the crane and equipment. Some equipment used for demolition may include: hydraulic hammers mounted to back-hoes for breaking concrete, front-end loaders, fork-lifts, concrete saws, steel cutting torches, and excavators with hydraulic thumb shears.

Approach Pier Construction, North Pier Construction and Mooring Dolphins (March 2014–September 2016)—The north pier would be constructed concurrently with the approach pier. Two mooring dolphins and connecting catwalks would also be constructed at this time.

South Pier Construction (September 2016–November 2016)—The south berthing dolphin and mooring dolphin construction would begin after the approach pier, north pier, and mooring dolphins are operational.

South Pier and Approach Pier Demolition (June 2016–November 2016)—The old south pier and old approach pier demolition would begin after the new south pier is operational. The temporary mooring dolphin near the north pier would also be demolished at this time.

The currently proposed action (i.e., the specified activity for the one-year period of this proposed IHA) includes pile driving associated with relocation of the Navy Marine Mammal Program (MMP), pile driving associated with the Indicator Pile Program and construction of the temporary mooring dolphin, and beginning of construction of the new pier structure. In addition, pile removal associated with demolition of the old structure will begin. These activities are detailed in Table 2. As described under Methods, the majority of pile removal will likely not require the use of vibratory extraction and/or pneumatic chipping, and these methods are included here as contingency in the event other methods of extraction are not successful.

TABLE 2—SPECIFIED ACTIVITY SUMMARY

[2013–14]

Activity	Timing (days)	Pile type	Number piles
MMP relocation (at NMAWC)	Sep–Oct 2013 (16)	18-in square concrete	50
Indicator Pile Program	Mar 2014 (17)	36- and 48-in steel pipe	12
Temporary mooring dolphin	Mar 2014 (5)	36-in steel pipe	16
Abutment pile driving	Mar–Apr 2014 (13)	48-in steel pipe	24
Structural pile driving	Mar–Apr 2014 (15)	36- and 48-in steel pipe	26
Total installed			128
Pile removal [1]	Mar–Sep 2014	16- and 24-in square concrete	18
Pile removal [1]	Mar–Sep 2014	12-in timber	91

[1] Pile removal schedule is notional and is dependent on contractor workload and timing of in-water work shutdown in spring 2014. Removals using no-impact methods (e.g., dry pull) may continue outside the in-water work window or would resume under the period of subsequent IHAs (i.e., September 2014).

The Navy assumes that the contractor will drive approximately two steel piles per day, and five concrete or fiberglass piles per day. For steel piles, each pile is assumed to require up to two hours of driving, including 1–1.5 hours of vibratory pile driving and up to 0.5 hour of impact pile driving (if necessary). Concrete and fiberglass piles would be jetted then driven with an impact pile driver only. During the first year of work, approximately 66 non-overlapping days of pile driving are expected to occur in the episodes described in Table 2. Approximately 84 days of demolition work are expected, beginning in March 2014. The majority of these 84 days will involve above-water work or other no-impact methods and would not impact marine mammals; the Navy assumes that approximately one quarter of the days (21 days) might involve methods that could cause disturbance to marine mammals.

Description of Sound Sources

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

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

When underwater objects vibrate or activity occurs, sound-pressure waves are created. These waves alternately compress and decompress the water as the sound wave travels. Underwater sound waves radiate in all directions away from the source (similar to ripples on the surface of a pond), except in cases where the source is directional. The compressions and decompressions associated with sound waves are detected as changes in pressure by aquatic life and man-made sound receptors such as hydrophones. Underwater sound levels ('ambient sound') are comprised of multiple sources, including physical (e.g., waves, earthquakes, ice, atmospheric sound), biological (e.g., sounds produced by marine mammals, fish, and invertebrates), and anthropogenic sound (e.g., vessels, dredging, aircraft, construction). Even in the absence of anthropogenic sound, the sea is typically a loud environment. A number of sources of sound are likely to occur within Hood Canal, including the following (Richardson *et al.,* 1995):

- Wind and waves: The complex interactions between wind and water surface, including processes such as breaking waves and wave-induced bubble oscillations and cavitation, are a main source of naturally occurring ambient noise for frequencies between 200 Hz and 50 kHz (Mitson, 1995). In general, ambient noise levels tend to increase with increasing wind speed and wave height. Surf noise becomes important near shore, with measurements collected at a distance of 8.5 km (5.3 mi) from shore showing an increase of 10 dB in the 100 to 700 Hz band during heavy surf conditions.
- Precipitation noise: Noise from rain and hail impacting the water surface can become an important component of total noise at frequencies above 500 Hz, and possibly down to 100 Hz during quiet times.
- Biological noise: Marine mammals can contribute significantly to ambient noise levels, as can some fish and shrimp. The frequency band for biological contributions is from approximately 12 Hz to over 100 kHz.
- Anthropogenic noise: Sources of ambient noise related to human activity include transportation (surface vessels and aircraft), dredging and construction, oil and gas drilling and production, seismic surveys, sonar, explosions, and ocean acoustic studies (Richardson *et al.,* 1995). Shipping noise typically dominates the total ambient noise for frequencies between 20 and 300 Hz. In general, the frequencies of anthropogenic sounds are below 1 kHz and, if higher frequency sound levels are created, they will attenuate (decrease) rapidly (Richardson *et al.,* 1995). Known sound levels and frequency ranges associated with anthropogenic sources similar to those that would be used for this project are summarized in Table 2. Details of each of the sources are described in the following text.

TABLE 3—REPRESENTATIVE SOUND LEVELS OF ANTHROPOGENIC SOURCES

Sound source	Frequency range (Hz)	Underwater sound level (dB re 1 μPa)	Reference
Small vessels	250–1,000	151 dB rms at 1 m (3.3 ft)	Richardson *et al.,* 1995.
Tug docking gravel barge	200–1,000	149 dB rms at 100 m (328 ft)	Blackwell and Greene, 2002.
Vibratory driving of 72-in (1.8 m) steel pipe pile.	10–1,500	180 dB rms at 10 m (33 ft)	Reyff, 2007.
Impact driving of 36-in steel pipe pile	10–1,500	195 dB rms at 10 m	Laughlin, 2007.
Impact driving of 66-in cast-in-steel-shell pile.	10–1,500	195 dB rms at 10 m	Reviewed in Hastings and Popper, 2005.

In-water construction activities associated with the project would include impact pile driving, vibratory pile driving and removal, and possibly pneumatic chipping. The sounds produced by these activities fall into one of two sound types: Pulsed and non-pulsed (defined in next paragraph). The distinction between these two general sound types is important because they have differing potential to cause physical effects, particularly with regard to hearing (e.g., Ward, 1997 in Southall *et al.,* 2007). Please see Southall *et al.,* (2007) for an in-depth discussion of these concepts.

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

Non-pulse (intermittent or continuous sounds) can be tonal, broadband, or both. Some of these non-pulse sounds can be transient signals of short duration but without the essential properties of pulses (e.g., rapid rise time). Examples of non-pulse sounds include those produced by vessels, aircraft, machinery operations such as drilling or dredging, vibratory pile driving, and active sonar systems. The duration of such sounds, as received at a distance, can be greatly extended in a highly reverberant environment.

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 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).

Ambient Sound

The underwater acoustic environment consists of ambient sound, defined as environmental background sound levels lacking a single source or point (Richardson *et al.,* 1995). The ambient underwater sound level of a region is defined by the total acoustical energy being generated by known and unknown sources, including sounds from both natural and anthropogenic sources. The sum of the various natural and anthropogenic sound sources at any given location and time 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, the ambient sound levels at a given frequency and location can vary by 10–20 dB from day to day (Richardson *et al.,* 1995).

In the vicinity of the project area, the median broadband background underwater sound levels have been measured by the Navy at 123.8 dB re 1 µPa between 3 Hz and 20 kHz (see Figures 2–4 to 2–6 in the Navy's application. The distribution of underwater sound levels was relatively uniform, reflecting the active ship traffic passing through the navigation channel at all times of day. The sample locations are distributed in the project area on either side of the channel in the fairly narrow entrance of San Diego Bay proper. Most ship traffic is transiting through the vicinity of the fuel pier to berths farther in the bay. Higher levels were observationally associated with nearby ship movements when the data were collected (refer to the field log in Appendix B of the Navy's application), with the exception of Zuniga Jetty, where large populations of snapping shrimp are found.

Sound Thresholds

NMFS uses generic sound exposure thresholds to determine when an activity that produces sound might result in impacts to a marine mammal such that a take by harassment might occur. To date, no studies have been conducted that examine impacts to marine mammals from pile driving sounds from which empirical sound thresholds have been established. Current NMFS practice (in relation to the MMPA) regarding exposure of marine mammals to sound is that cetaceans and pinnipeds exposed to impulsive sounds of 180 and 190 dB rms or above, respectively, are considered to have been taken by Level A (i.e., injurious) harassment. Behavioral harassment (Level B) is considered to have occurred when marine mammals are exposed to sounds at or above 160 dB rms and 120 dB rms (for pulsive sounds such as impact pile driving and for non-pulsed sounds such as vibratory pile driving, respectively), but below injurious thresholds. For airborne sound, pinniped disturbance from haul-outs has been documented at 100 dB (unweighted) for pinnipeds in general, and at 90 dB (unweighted) for harbor seals. NMFS uses these levels as guidelines to estimate when harassment may occur.

Distance to Sound Thresholds

Underwater sound propagation formula—Pile driving would generate underwater noise that potentially could result in disturbance to marine mammals in the project area. Transmission loss (TL) is the decrease in acoustic intensity as an acoustic pressure wave propagates out from a source. TL parameters vary with frequency, temperature, sea conditions, current, source and receiver depth, water depth, water chemistry, and bottom composition and topography. The general formula for underwater TL is:

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

Where:

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

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

This formula neglects loss due to scattering and absorption, which is assumed to be zero here. The degree to which underwater sound propagates away from a sound source is dependent on a variety of factors, most notably by the water bathymetry and presence or absence of reflective or absorptive conditions including in-water structures and sediments. Spherical spreading occurs in a perfectly unobstructed (free-field) environment not limited by depth or water surface, resulting in a 6 dB reduction in sound level for each doubling of distance from the source (20*log[range]). Cylindrical spreading occurs in an environment in which sound propagation is bounded by the water surface and sea bottom, resulting in a reduction of 3 dB in sound level for each doubling of distance from the source (10*log[range]). A practical spreading value of 15 is often used in shallow water conditions, such as San Diego Bay, where spreading may start out spherically but then end up cylindrically as the sound is constrained by the surface and the bottom.

However, for this request, the Navy consulted with the University of Washington Applied Physics Laboratory to develop a site-specific model for TL from pile driving at a central point at the project site (see Appendix A in the Navy's application). The model is based on historical temperature-salinity data and location-dependent bathymetry. In the model, TL is the same for different sound source levels and is applied to each of the different activities to determine the point at which the applicable thresholds are reached as a function of distance from the source. The model's predictions result in a slightly lower average rate of TL than practical spreading, and hence are conservative. We reviewed and approved this approach. Because the model is specific to the project area around the fuel pier site, practical spreading loss was assumed in modeling sound propagation for pile driving at NMAWC (for relocation of the Navy Marine Mammal Program facility).

Underwater sound from pile driving and extraction—The intensity of pile driving sounds is greatly influenced by factors such as the type of piles, hammers, and the physical environment in which the activity takes place. A large quantity of literature regarding SPLs recorded from pile driving projects is available for consideration. In order to determine reasonable SPLs and their associated affects on marine mammals that are likely to result from pile driving at NBPL, studies with similar properties to the proposed action were evaluated. Piles to be installed include 36- and 48-in steel pipes, 24- and 18-in concrete piles, and 16-in fiberglass-concrete piles. In addition, a vibratory pile driver could be used in the extraction of 16-in steel, 14-, 16- and 24-in concrete, 13-in plastic, and 12-in timber piles. Sound levels associated with vibratory pile removal are assumed to be the same as those during vibratory installation (Caltrans, 2007)—which is likely a conservative assumption—and have been taken into consideration in the modeling analysis. Overall, studies which met the following parameters were considered: (1) Pile size and materials: Steel pipe piles (30–72 in diameter); (2) Hammer machinery: Vibratory and impact hammer; and (3) Physical environment: shallow depth (less than 100 ft [30 m]).

TABLE 4—UNDERWATER SPLS FROM MONITORED CONSTRUCTION ACTIVITIES USING IMPACT HAMMERS

Project and location	Pile size and type	Method	Water depth	Measured SPLs
Mukilteo Test Piles, WA [1]	36-in steel pipe	Impact	7.3 m	195 dB re 1 µPa (rms) at 10 m.
Richmond-San Rafael Bridge, CA [2]	66-in steel cast-in-steel shell	Impact	4 m	195 dB re 1 µPa (rms) at 10 m.
Richmond Inner Harbor, CA [2]	72-in steel pipe	Vibratory	~5 m	180 dB re 1 µPa (rms) at 10 m.

TABLE 4—UNDERWATER SPLS FROM MONITORED CONSTRUCTION ACTIVITIES USING IMPACT HAMMERS—Continued

Project and location	Pile size and type	Method	Water depth	Measured SPLs
San Francisco Bay, CA [2]	16–24-in concrete	Impact	10–15 m	173–176 dB re 1 μPa (rms) at 10 m.
Columbia River Crossing, OR/WA [3]	24–48-in steel pipe	Vibratory extraction.	10 m	172 dB re 1 μPa (rms) at 10 m.

Sources: [1] Laughlin, 2007;
[2] Oestman *et al.,* 2009;
[3] Coleman, 2011.

Driving of non-steel piles produces lower levels of sound than does that of steel piles, and extraction of non-steel piles is assumed to produce lower sound levels than that of steel piles (Oestman *et al.,* 2009). We assume here that a reduction of 10–20 dB from the sound produced by extraction of steel piles can be assumed for non-steel (i.e., concrete, timber, plastic) piles. There are few data regarding use of pneumatic chippers or other underwater cutting tools. In a previous IHA proposal (NMFS, 2012), we considered a source value of 161 dB re 1 μPa (rms) at 1 m for use of a jackhammer (Nedwell and Howell, 2004). Here, we conservatively assume that use of these tools will produce the same sound levels as vibratory extraction of non-steel piles. Underwater sound levels from pile driving for this project are therefore assumed to be as follows:

- For 36- and 48-in steel pipes, 195 dB re 1 μPa (rms) at 10 m when driven by impact hammer, 180 dB re 1 μPa (rms) at 10 m when driven by vibratory hammer;
- For 24-in concrete piles driven by impact hammer, 176 dB re 1 μPa (rms) at 10 m; and
- For 16- and 18-in concrete piles driven by impact hammer, 173 dB re 1 μPa (rms) at 10 m.
- For vibratory removal of steel piles, 172 dB re 1 μPa (rms) at 10 m; for vibratory removal/pneumatic chipping of non-steel piles, 160 dB re 1 μPa (rms) at 10 m.

Based on these values and the results of site-specific transmission loss modeling, distances to relevant thresholds and associated areas of ensonification are presented in Table 5. Predicted distances to thresholds for different sources are shown in Figures 6–1 through 6–7 of the Navy's application. The areas of ensonification reflect the conventional assumption that topographical features such as shorelines act as a barrier to underwater sound. Although it is known that there can be leakage or diffraction around such barriers, it is generally accepted practice to model underwater sound propagation from pile driving as continuing in a straight line past a shoreline projection such as Ballast Point. In contrast, although Zuniga Jetty would likely prevent sound propagation east of the jetty, this effect was not considered. Hence the projection of sound through the mouth of the bay into the open ocean would be truncated along the jetty and narrower in reality than shown. The limits of ensonification due to the project are assumed to be essentially the same for different pile sizes subject to vibratory installation or removal.

TABLE 5—DISTANCES TO RELEVANT SOUND THRESHOLDS AND AREAS OF ENSONIFICATION

Description	Source level (dB at 10 m)	Distance to threshold (m) and associated area of ensonification (km²)			
		190 dB	180 dB	160 dB	120 dB
Steel piles, impact	195	36, 0.0034	452, 0.1477	5,484, 8.5069	n/a
Steel piles, vibratory	180	n/a	14, 0.0004	n/a	6,470, 11.4895
24-in concrete piles	176	n/a	n/a	505, 0.1914	n/a
16-in concrete-fiberglass piles	173	n/a	n/a	259, 0.0834	n/a
18-in concrete piles [1] (NMAWC)	173	n/a	n/a	84, 0.0620	n/a
Vibratory extraction, steel	172	n/a	n/a	n/a	6,467, 11.4895
Vibratory extraction/pneumatic chipping, non-steel	160	n/a	n/a	n/a	6,467, 11.4890

[1] Practical spreading loss was assumed for pile driving at marine mammal relocation site because site-specific TL model used for sources at fuel pier is not applicable.

Airborne sound from pile installation and removal—Pile driving can generate airborne sound that could potentially result in disturbance to marine mammals (specifically, pinnipeds) which are hauled out or at the water's surface. As a result, the Navy analyzed the potential for pinnipeds hauled out or swimming at the surface near NBPL to be exposed to airborne SPLs that could result in Level B behavioral harassment. Although there is no official airborne sound threshold, NMFS assumes for purposes of the MMPA that behavioral disturbance can occur upon exposure to sounds above 100 dB re 20 μPa rms (unweighted) for all pinnipeds, except harbor seals. For harbor seals, the threshold is 90 dB re 20 μPa rms (unweighted). A spherical spreading loss model, assuming average atmospheric conditions, was used to estimate the distance to the 100 dB and 90 dB re 20 μPa rms (unweighted) airborne thresholds.

As was discussed for underwater sound from pile driving, the intensity of pile driving sounds is greatly influenced by factors such as the type of piles, hammers, and the physical environment in which the activity takes place. In order to determine reasonable airborne SPLs and their associated effects on marine mammals that are likely to result from pile driving at NBPL, studies with similar properties to the proposed action, as described previously, were evaluated. Table 6 details representative pile driving activities that have occurred in recent years. Due to the similarity of these actions and the Navy's proposed action, they represent reasonable SPLs which could be anticipated.

TABLE 6—AIRBORNE SPLS FROM SIMILAR CONSTRUCTION ACTIVITIES

Project and location	Pile size and type	Method	Water depth	Measured SPLs
Northstar Island, AK [1]	42-in steel pipe	Impact	Approximately 12 m	97 dB re 20 µPa (rms) at 160 m.
Keystone Ferry Terminal, WA [2].	30-in steel pipe	Vibratory	Approximately 9 m	97 dB re 20 µPa (rms) at 13 m.

Sources: [1] Blackwell *et al.,* 2004; [2] Laughlin, 2010.

Based on these values and the assumption of spherical spreading loss, distances to relevant thresholds and associated areas of ensonification are presented in Table 7. The nearest known haul-out location for harbor seals is approximately 250 m away and hence would be subject to sound levels that may result in behavioral disturbance, if animals are present. For sea lions, all airborne distances are less than those calculated for underwater sound thresholds, therefore, protective measures would be in place out to the distances calculated for the underwater thresholds, and the distances for the airborne thresholds would be covered fully by mitigation and monitoring measures in place for underwater sound thresholds. No sea lion haul-outs or rookeries are located within the airborne harassment radii.

TABLE 7—DISTANCES TO RELEVANT SOUND THRESHOLDS AND AREAS OF ENSONIFICATION, AIRBORNE SOUND

Group	Threshold, re 20 µPa rms (unweighted)	Distance to threshold (m) and associated area of ensonification (km²)	
		Impact driving	Vibratory driving
Harbor seals	90 dB	358, 0.403	28, 0.002
California sea lions	100 dB	113, 0.040	9, 0.000

Description of Marine Mammals in the Area of the Specified Activity

The Navy has conducted marine mammal surveys in the project area beginning in 2007 and continuing through March 2012 (Merkel and Associates, Inc., 2008; Johnson, 2010, 2011; Lerma, 2012). Boat survey routes (see Figure 3–1 of the Navy's application) established in 2007 have been resurveyed on 16 occasions, 13 of which were during the seasonal window for in-water construction and demolition (September–April). There are four marine mammal species which are either resident or have known seasonal occurrence in San Diego Bay, including the California sea lion, harbor seal, bottlenose dolphin, and gray whale. Navy records indicate that other species that occur in the Southern California Bight may have the potential for isolated occurrence within San Diego Bay or just offshore. The Pacific white-sided and common dolphin (*Lagenorhynchus obliquidens* and *Delphinus* sp., respectively) were sighted along a previously used transect on the opposite side of the Point Loma peninsula (Merkel & Associates, Inc., 2008), near the kelp forests. Risso's dolphin (*Grampus griseus*) is fairly common in southern California coastal waters, but has not been seen in San Diego Bay. These species have not been observed near the project area and are not expected to occur there, and, given the unlikelihood of their exposure to sound generated from the project, are thus not considered further. This section summarizes the population status and abundance of the four species for which we anticipate exposure to sound from the project. We have reviewed the Navy's detailed species descriptions, including life history information, for accuracy and completeness and refer the reader to Sections 3 and 4 of the Navy's application instead of reprinting the information here. Table 7 lists the marine mammal species that occur in the vicinity of NBPL. The following information is summarized largely from NMFS Stock Assessment Reports.

TABLE 8—MARINE MAMMALS PRESENT IN THE VICINITY OF NBPL

Species	Stock abundance [1] (CV, N_{min})	Relative occurrence in north San Diego Bay	Season of occurrence
California sea lion U.S. stock	296,750 (n/a, 153,337)	Abundant	Year-round.
Harbor seal California stock	30,196 (0.157, 26,667)	Uncommon, localized	Year-round.
Bottlenose dolphin California coastal stock.	323 (0.13, 290)	Occasional	Year-round.
Gray whale Eastern North Pacific stock	19,126 (0.07, 18,017)	Rare, during migration only	Late winter.

[1] NMFS marine mammal stock assessment reports at: *http://www.nmfs.noaa.gov/pr/sars/species.htm.* CV is coefficient of variation; N_{min} is the minimum estimate of stock abundance.

California Sea Lion

California sea lions range from the Gulf of California north to the Gulf of Alaska, with breeding areas located in the Gulf of California, western Baja California, and southern California. Five genetically distinct geographic populations have been identified: (1) Pacific Temperate, (2) Pacific Subtropical, (3) Southern Gulf of California, (4) Central Gulf of California and (5) Northern Gulf of California (Schramm *et al.,* 2009). Rookeries for the Pacific Temperate population are found within U.S. waters and just south of the U.S.-Mexico border, and animals belonging to this population may be found form the Gulf of Alaska to Mexican waters off Baja California. Animals belonging to other populations (e.g., Pacific Subtropical) may range into U.S. waters during non-breeding periods. For management purposes, a stock of California sea lions comprising those animals at rookeries within the U.S. is defined (i.e., the U.S. stock of California sea lions) (Carretta *et al.,* 2012). Pup production at the Coronado Islands rookery in Mexican waters is considered an insignificant contribution to the overall size of the Pacific Temperate population (Lowry and Maravilla-Chavez, 2005).

California sea lions are not protected under the Endangered Species Act (ESA) or listed as depleted under the MMPA. Total annual human-caused mortality (at least 431) is substantially less than the potential biological removal (PBR, estimated at 9,200 per year); therefore, California sea lions are not considered a strategic stock under the MMPA. There are indications that the California sea lion may have reached or is approaching carrying capacity, although more data are needed to confirm that leveling in growth persists (Carretta *et al.,* 2012).

The best abundance estimate of the U.S. stock of California sea lions is 296,750 and the minimum population size of this stock is 153,337 individuals (Carretta *et al.,* 2012). The entire population cannot be counted because all age and sex classes are never ashore at the same time; therefore, the best abundance estimate is determined from the number of births and the proportion of pups in the population, with censuses conducted in July after all pups have been born. Specifically, the pup count for rookeries in southern California from 2008 was adjusted for pre-census mortality and then multiplied by the inverse of the fraction of newborn pups in the population (Carretta *et al.,* 2012). The minimum population size was determined from counts of all age and sex classes that were ashore at all the major rookeries and haul-out sites in southern and central California during the 2007 breeding season, including all California sea lions counted during the July 2007 census at the Channel Islands in southern California and at haul-out sites located between Point Conception and Point Reyes, California (Carretta *et al.,* 2012). An additional unknown number of California sea lions are at sea or hauled out at locations that were not censused and are not accounted for in the minimum population size.

Trends in pup counts from 1975 through 2008 have been assessed for four rookeries in southern California and for haul-outs in central and northern California. During this time period counts of pups increased at an annual rate of 5.4 percent, excluding six El Nino years when pup production declined dramatically before quickly rebounding (Carretta *et al.,* 2012). The maximum population growth rate was 9.2 percent when pup counts from the El Niño years were removed. However, the apparent growth rate from the population trajectory underestimates the intrinsic growth rate because it does not consider human-caused mortality occurring during the time series; the default maximum net productivity rate for pinnipeds (12 percent per year) is considered appropriate for California sea lions (Carretta *et al.,* 2012).

Historic exploitation of California sea lions include harvest for food by Native Americans in pre-historic times and for oil and hides in the mid-1800s, as well as exploitation for a variety of reasons more recently (Carretta *et al.,* 2012). There are few historical records to document the effects of such exploitation on sea lion abundance (Lowry *et al.,* 1992). Data from 2003–09 indicate that a minimum of 337 (CV = 0.56) California sea lions are killed annually in commercial fisheries. In addition, a summary of stranding database records for 2005–09 shows an annual average of 65 such events, which is likely a gross underestimate because most carcasses are not recovered. California sea lions may also be removed because of predation on endangered salmonids (17 per year, 2008–10) or incidentally captured during scientific research (3 per year, 2005–09) (Carretta *et al.,* 2012). Sea lion mortality has also been linked to the algal-produced neurotoxin domoic acid (Scholin *et al.,* 2000). There is currently an Unusual Mortality Event (UME) declaration in effect for California sea lions. Future mortality may be expected to occur, due to the sporadic occurrence of such harmful algal blooms. Beginning in January 2013, elevated strandings of California sea lion pups have been observed in Southern California, with live sea lion strandings nearly three times higher than the historical average. The causes of this UME are under investigation (*http://www.nmfs.noaa.gov/pr/health/mmume/californiasealions2013.htm;* accessed April 10, 2013).

The California sea lion is by far the most commonly-sighted pinniped species at sea or on land in the vicinity of NBPL and northern San Diego Bay, where there is a resident non-breeding population. California sea lions regularly occur on rocks, buoys and other structures, and especially on the bait barges, although numbers vary greatly as individuals move between the bay and rookeries on offshore islands. Different age classes of California sea lions are found in the San Diego region throughout the year (Lowry *et al.,* 1991), although Navy surveys show that the local population comprises adult females and subadult males and females, with adult males being uncommon. The Navy has conducted marine mammal surveys throughout the north San Diego Bay project area (Merkel & Associates, Inc., 2008, Johnson, 2010, 2011, Lerma, 2012). Sightings include all animals observed and their locations (using geographical positioning systems). The majority of observations are of animals hauled out.

Harbor Seal

Harbor seals inhabit coastal and estuarine waters and shoreline areas of the northern hemisphere from temperate to polar regions. The eastern North Pacific subspecies is found from Baja California north to the Aleutian Islands and into the Bering Sea. Multiple lines of evidence support the existence of geographic structure among harbor seal populations from California to Alaska (Carretta *et al.,* 2012). However, because stock boundaries are difficult to meaningfully draw from a biological perspective, three separate harbor seal stocks are recognized for management purposes along the west coast of the continental U.S.: (1) Inland waters of Washington, (2) outer coast of Oregon and Washington, and (3) California (Carretta *et al.,* 2012). Multiple stocks are recognized in Alaska. Placement of a stock boundary at the California-Oregon border is not based on biology but is considered a political and jurisdictional convenience (Carretta *et al.,* 2012). In addition, harbor seals may occur in Mexican waters, but these animals are not considered part of the California stock. Only the California stock may be found in the project area.

California harbor seals are not protected under the ESA or listed as depleted under the MMPA, and are not considered a strategic stock under the MMPA because annual human-caused mortality (31) is significantly less than the calculated PBR (1,600). The population appears to be stabilizing at what may be its carrying capacity and the fishery mortality is declining.

The best abundance estimate of the California stock of harbor seals is 30,196 (CV = 0.157) and the minimum population size of this stock is 26,667 individuals (Carretta *et al.,* 2012). The entire population cannot be counted because some individuals are always away from haul-out sites. In addition, complete pup counts are not possible as for other species of pinniped because pups are precocious and enter the water almost immediately after birth. Therefore, the best abundance estimate is estimated by counting the number of seals ashore during the peak haul-out period (May to July) and by multiplying this count by a correction factor equal to the inverse of the estimated fraction of seals on land (Carretta *et al.,* 2012). The current abundance estimate, as well as the minimum population size, is based off of haul-out counts from 2009.

Counts of harbor seals in California increased from 1981 to 2004, with a calculated annual net productivity rate of 9.2 percent for the period 1983–1994 (Carretta *et al.,* 2012). However, maximum net productivity rates cannot be estimated because measurements were not made when the stock size was very small, and the default maximum net productivity rate for pinnipeds (12 percent per year) is considered appropriate for harbor seals (Carretta *et al.,* 2012).

Prior to state and federal protection and especially during the nineteenth century, harbor seals along the west coast of North America were greatly reduced by commercial hunting, with only a few hundred individuals surviving in a few isolated areas along the California coast (Carretta *et al.,* 2012). However, in the last half of this century, the population has increased dramatically. Data from 2004–09 indicate that 18 (CV = 0.73) California harbor seals are killed annually in commercial fisheries. In addition, California stranding database records for 2005–09 shows an annual average of 12 such events, which is likely an underestimate because most carcasses are not recovered. Two UMEs of harbor seals in California occurred in 1997 and 2000 with the cause considered to be infectious disease. All west coast harbor seals that have been tested for morbilliviruses were found to be seronegative, indicating that this disease is not endemic in the population and that this population is extremely susceptible to an epidemic of this disease (Ham-Lammé *et al.,* 1999).

Harbor seals are relatively uncommon within San Diego Bay, and do not have a significant mainland California distribution south of Point Mugu. Sightings in the Navy transect surveys of northern San Diego Bay cited above were limited to individuals outside of the project area, on the south side of Ballast Point. The haul-out area south of Ballast Point is only temporary with overwash of the rocks occurring daily; primary local harbor seal haul-outs are in La Jolla. With heavy vessel traffic and noise in the project area, it is likely that harbor seals seen outside the project area at Ballast Point move toward Point Loma and preferred foraging habitat rather than actively foraging in or transiting the project area on a frequent basis. However, Navy marine mammal monitoring for another project conducted intermittently from 2010–12 has documented several harbor seals near Pier 122 (within the project area) at various times, with the greatest number of sightings during April and May.

Gray Whale

Gray whales are found in shallow coastal waters, migrating between summer feeding areas in the north and winter breeding areas in the south. Gray whales were historically common throughout the northern hemisphere but are now found only in the Pacific, where two populations are recognized, Eastern and Western North Pacific (ENP and WNP). ENP whales breed and calve primarily in areas off Baja California and in the Gulf of California. From February to May, whales typically migrate northbound to summer/fall feeding areas in the Chukchi and northern Bering Seas, with the southbound return to calving areas typically occurring in November and December. WNP whales are known to feed in the Okhotsk Sea and off of Kamchatka before migrating south to poorly known wintering grounds, possibly in the South China Sea.

The two populations have historically been considered geographically isolated from each other; however, recent data from satellite-tracked whales indicates that there is some overlap between the stocks. Two WNP whales were tracked from Russian foraging areas along the Pacific rim to Baja California (Mate *et al.,* 2011), and, in one case where the satellite tag remained attached to the whale for a longer period, a WNP whale was tracked from Russia to Mexico and back again (IWC, 2012). Between 22–24 WNP whales are known to have occurred in the eastern Pacific through comparisons of ENP and WNP photo-identification catalogs (IWC, 2012; Weller *et al.,* 2011; Burdin *et al.,* 2011), and WNP animals comprised 8.1 percent of gray whales identified during a recent field season off of Vancouver Island (Weller *et al.,* 2012). In addition, two genetic matches of WNP whales have been recorded off of Santa Barbara, CA (Lang *et al.,* 2011). Therefore, a portion of the WNP population is assumed to migrate, at least in some years, to the eastern Pacific during the winter breeding season.

However, only ENP whales are expected to occur in the project area. The likelihood of any gray whale being exposed to project sound to the degree considered in this document is already low, as it would require a migrating whale to linger for an extended period of time, or for multiple migrating whales to linger for shorter periods of time. While such an occurrence is not unknown, it is uncommon. Further, of the approximately 20,000 gray whales migrating through the Southern California Bight, it is extremely unlikely that one found in San Diego Bay would be one of the approximately 20 WNP whales that have been documented in the eastern Pacific (less than one percent probability). The likelihood that a WNP whale would be exposed to elevated levels of sound from the specified activities is insignificant and discountable.

The ENP population of gray whales, which is managed as a stock, was removed from ESA protection in 1994, is not currently protected under the ESA, and is not listed as depleted under the MMPA. Punt and Wade (2010) estimated the ENP population was at 91 percent of carrying capacity and at 129 percent of the maximum net productivity level and therefore within the range of its optimum sustainable population. The ENP stock of gray whales is not classified as a strategic stock under the MMPA because the estimated annual level of human-caused mortality (128) is less than the calculated PBR (558) (Carretta *et al.,* 2013). The WNP population is listed as endangered under the ESA and depleted under the MMPA as a foreign stock.

The best abundance estimate of the ENP stock of gray whales is 19,126 (CV = 0.071) and the minimum population size of this stock is 18,017 individuals (Carretta *et al.,* 2013). Systematic counts of gray whales migrating south along the central California coast have been conducted by shore-based observers since 1967. The best and minimum abundance estimates were calculated from 2006–07 survey data, the first year in which improved counting techniques and a more consistent approach to abundance estimation were used (Carretta *et al.,* 2013). The population size of the ENP gray whale stock has been increasing over the past several decades despite a west coast UME (unexplained causes) from 1999–2001. The estimated annual rate of increase from 1967–88, based on the revised abundance time series from Laake et al. (2009), is 3.2 percent (Punt and Wade, 2010). Based on the same analyses, the best estimate of the maximum productivity rate for gray whales is considered to be 6.2 percent. The most recent estimate of WNP gray whale abundance is 137 individuals (IWC, 2012).

As noted above, gray whale numbers were significantly reduced by whaling, becoming extirpated from the Atlantic by the early 1700s and listed as an endangered species in the Pacific. The ENP stock has since recovered sufficiently to be delisted from the ESA. Gray whales remain subject to occasional fisheries-related mortality and death from ship strikes. Based on stranding network data for the period 2006–10, there are an average of 0.2 deaths per year from the former and 2.2 per year from the latter. In addition, subsistence hunting of gray whales by hunters in Russia and the U.S. is approved by the International Whaling Commission, although none is currently authorized in the U.S. From 2006–10, the annual Russian subsistence harvest was 123 whales (Carretta *et al.,* 2013). Climate change is considered a significant habitat concern for gray whales, as prey composition and distribution is likely to be altered and human activity in the whales' summer feeding grounds increases (Carretta *et al.,* 2013).

Peak abundance of gray whales off the coast of San Diego is typically during January during the southbound migration and in March as whales return north, although females with calves, which depart Mexico later than males or females without calves, can be sighted from March through May or June (Leatherwood, 1974; Poole, 1984; Rugh *et al.,* 2001). Gray whales are not expected in the project area except during the northward migration, when they are closest to the coast and may be infrequently observed offshore of San Diego Bay (Rice *et al.,* 1981). Migrating gray whales that do transit nearshore waters would likely be traveling, rather than foraging, and would likely be present only briefly at typical travel speeds of 3 kn (Perryman *et al.,* 1999, Mate and Urbán-Ramirez, 2003). Gray whales are known to occur near the mouth of San Diego Bay, and occasionally enter the bay. However, their occurrence in San Diego Bay is sporadic and unpredictable. In recent years, local records show that solitary individuals have entered the bay and remained for varying lengths of time during March 2009, April 2010, and July 2011. Navy field notes show an occurrence of one gray whale that lingered in the northern part of the bay for two weeks.

Bottlenose Dolphin

Bottlenose dolphins are found worldwide in tropical to temperate waters and can be found in all depths from estuarine inshore to deep offshore waters. Temperature appears to limit the range of the species, either directly, or indirectly, for example, through distribution of prey. Off North American coasts, common bottlenose dolphins are found where surface water temperatures range from about 10 °C to 32 °C. In many regions, including California, separate coastal and offshore populations are known, with significant genetic differentiation evident between the two ecotypes (e.g., Walker, 1981). Therefore, two stocks of bottlenose dolphins—coastal and offshore—are managed along the west coast. California coastal bottlenose dolphins are found within about one kilometer of shore from San Francisco Bay south into Mexican waters (Hansen, 1990; Carretta *et al.,* 1998; Defran and Weller, 1999). Although there is little site fidelity of coastal bottlenose dolphins in California and they are known to move between U.S. and Mexican waters, the stock as defined for management purposes includes only animals found in U.S. waters. In southern California, animals are found within 500 m of the shoreline 99 percent of the time and within 250 m 90 percent of the time (Hanson and Defran, 1993). Only coastal bottlenose dolphins would be expected to occur at the project location.

California coastal bottlenose dolphins are not protected under the MMPA or listed as depleted under the MMPA. The total annual human-caused mortality for this stock (≥0.2) is less than the calculated PBR (2.4) and the stock is not considered strategic under the MMPA.

The best abundance estimate for California coastal bottlenose dolphins is 323 (CV = 0.13, 95% CI 259–430), and the minimum population estimate is approximately 290 individuals (Carretta *et al.,* 2009). These values are based on photographic mark-recapture surveys conducted along the San Diego coast in 2004–05, but are considered likely underestimates, as they do not reflect that approximately 35 percent of dolphins encountered lack identifiable dorsal fin marks (Defran and Weller, 1999). If 35 percent of all animals lack distinguishing marks, then the true population size would be closer to 450–500 animals (Carretta *et al.,* 2009). Based on a comparison of mark-recapture abundance estimates for the periods 1987–89, 1996–98, and 2004–05, Dudzik *et al.* (2006) stated that the population size had remained stable over this period. No information on current or maximum net productivity rates is available for California coastal bottlenose dolphins, and the default maximum annual net growth rate for cetaceans (4 percent) is considered appropriate (Carretta *et al.,* 2009).

Historically, bottlenose dolphins were removed via live-capture for display, but no such captures have been documented since 1982 and no permits are active. Due to its exclusive use of coastal habitats, the California coastal bottlenose dolphin population is susceptible to fishery-related mortality in coastal set net fisheries. However, because of various fishery closures, the potential for mortality of coastal bottlenose dolphins in California set gillnet fisheries has been greatly reduced. Records from 2002–06 indicate that a minimum of 0.2 deaths per year occurred (Carretta *et al.,* 2009). Coastal gillnet fisheries exist in Mexico and may take animals from this population, but no details are available. Habitat concerns may be an issue for this stock, as pollutant levels, especially DDT residues, found in Southern California coastal bottlenose dolphins have been found to be among the highest of any cetacean examined (O'Shea et al. 1980). Effects of these pollutants are not well understood. In addition, California coastal bottlenose dolphins may be vulnerable to the effects of morbillivirus outbreaks, which have been implicated in mass mortality of bottlenose dolphins on the U.S. Atlantic coast (Lipscomb et al. 1994).

As seen in the Navy's marine mammal surveys of San Diego Bay, cited above, coastal bottlenose dolphins have occurred within San Diego Bay sporadically and in variable numbers and locations. California coastal bottlenose dolphins show little site fidelity and likely move within their home range in response to patchy concentrations of nearshore prey (Defran et al., 1999, Bearzi et al., 2009). After finding concentrations of prey, animals may then forage within a more limited spatial extent to take advantage of this local accumulation until such time that prey abundance is reduced, likely then shifting location once again and possibly covering larger distances. Navy surveys frequently result in no observations of bottlenose dolphins, and sightings have ranged from 0–8 groups observed (0–40 individuals).

Potential Effects of the Specified Activity on Marine Mammals

We have determined that pile driving and removal (depending on technique used), as outlined in the project description, has the potential to result in behavioral harassment of marine mammals present in the project area, which may include California sea lions, harbor seals, bottlenose dolphins, and gray whales. Pinnipeds spend much of their time in the water with heads held above the surface and therefore are not subject to underwater noise to the same degree as cetaceans (although they are correspondingly more susceptible to exposure to airborne sound). For purposes of this assessment, however, pinnipeds are conservatively assumed to be available to be exposed to underwater sound 100 percent of the time that they are in the water.

Marine Mammal Hearing

The primary effect on marine mammals anticipated from the specified activities would result from exposure of animals to underwater sound. Exposure to sound can affect marine mammal hearing. When considering the influence of various kinds of sound on the marine environment, it is necessary to understand that different kinds of marine life are sensitive to different frequencies of sound. Based on available behavioral data, audiograms derived using auditory evoked potential techniques, anatomical modeling, and other data, Southall *et al.* (2007) designate functional hearing groups for marine mammals and estimate the lower and upper frequencies of functional hearing of the groups. The functional groups and the associated frequencies are indicated below (though animals are less sensitive to sounds at the outer edge of their functional range and most sensitive to sounds of frequencies within a smaller range somewhere in the middle of their functional hearing range):

- Low frequency cetaceans (thirteen species of mysticetes): Functional hearing is estimated to occur between approximately 7 Hz and 22 kHz;
- Mid-frequency cetaceans (32 species of dolphins, six species of larger toothed whales, and nineteen species of beaked and bottlenose whales): Functional hearing is estimated to occur between approximately 150 Hz and 160 kHz;
- High frequency cetaceans (six species of true porpoises, four species of river dolphins, two members of the genus *Kogia,* and four dolphin species of the genus *Cephalorhynchus*): Functional hearing is estimated to occur between approximately 200 Hz and 180 kHz; and
- Pinnipeds in water: Functional hearing is estimated to occur between approximately 75 Hz and 75 kHz, with the greatest sensitivity between approximately 700 Hz and 20 kHz.

Two pinniped and two cetacean species are likely to occur in the proposed project area. Of the two cetacean species likely to occur in the project area, the bottlenose dolphin is classified as a mid-frequency cetacean, and the gray whale is classified as a low-frequency cetacean (Southall *et al.,* 2007).

Underwater Sound Effects

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

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

Hearing Impairment and Other Physical Effects—Marine mammals exposed to high intensity sound repeatedly or for prolonged periods can experience hearing threshold shift (TS), which is the loss of hearing sensitivity at certain frequency ranges (Kastak *et al.,* 1999; Schlundt *et al.,* 2000; Finneran *et al.,* 2002, 2005). TS can be permanent (PTS), in which case the loss of hearing sensitivity is not recoverable, or temporary (TTS), in which case the animal's hearing threshold would recover over time (Southall *et al.,* 2007). Marine mammals depend on acoustic cues for vital biological functions, (e.g., orientation, communication, finding prey, avoiding predators); thus, TTS may result in reduced fitness in survival and reproduction. However, this depends on the frequency and duration of TTS, as well as the biological context in which it occurs. TTS of limited duration, occurring in a frequency range that does not coincide with that used for recognition of important acoustic cues, would have little to no effect on an animal's fitness. Repeated sound exposure that leads to TTS could cause PTS. PTS, in the unlikely event that it occurred, would constitute injury, but TTS is not considered injury (Southall *et al.,* 2007). It is unlikely that the project would result in any cases of temporary or especially permanent hearing impairment or any significant non-auditory physical or physiological effects for reasons discussed later in this document. Some behavioral disturbance is expected, but it is likely that this would be localized and short-term because of the short project duration.

Several aspects of the planned monitoring and mitigation measures for this project (see the ''Proposed Mitigation'' and ''Proposed Monitoring and Reporting'' sections later in this document) are designed to detect marine mammals occurring near the pile driving to avoid exposing them to sound pulses that might, in theory, cause hearing impairment. In addition, many cetaceans are likely to show some avoidance of the area where received levels of pile driving sound are high enough that hearing impairment could potentially occur. In those cases, the avoidance responses of the animals themselves would reduce or (most likely) avoid any possibility of hearing impairment. Non-auditory physical effects may also occur in marine mammals exposed to strong underwater pulsed sound. It is especially unlikely that any effects of these types would occur during the present project given the brief duration of exposure for any given individual and the planned monitoring and mitigation measures. The following subsections discuss in somewhat more detail the possibilities of TTS, PTS, and non-auditory physical effects.

Temporary Threshold Shift—TTS is the mildest form of hearing impairment that can occur during exposure to a strong sound (Kryter, 1985). While experiencing TTS, the hearing threshold rises, and a sound must be stronger in order to be heard. In terrestrial mammals, TTS can last from minutes or hours to days (in cases of strong TTS). For sound exposures at or somewhat above the TTS threshold, hearing sensitivity in both terrestrial and marine mammals recovers rapidly after exposure to the sound ends. Few data on sound levels and durations necessary to elicit mild TTS have been obtained for marine mammals, and none of the published data concern TTS elicited by exposure to multiple pulses of sound. Available data on TTS in marine mammals are summarized in Southall *et al.* (2007).

Given the available data, the received level of a single pulse (with no frequency weighting) might need to be approximately 186 dB re 1 μPa^2-s (i.e., 186 dB sound exposure level [SEL] or approximately 221–226 dB pk-pk) in order to produce brief, mild TTS. Exposure to several strong pulses that each have received levels near 190 dB re 1 μPa rms (175–180 dB SEL) might result in cumulative exposure of approximately 186 dB SEL and thus slight TTS in a small odontocete, assuming the TTS threshold is (to a first approximation) a function of the total received pulse energy. Levels greater than or equal to 190 dB re 1 μPa rms are expected to be restricted to radii no more than 5 m (16 ft) from the pile driving. For an odontocete closer to the surface, the maximum radius with greater than or equal to 190 dB re 1 μPa rms would be smaller.

The above TTS information for odontocetes is derived from studies on the bottlenose dolphin and beluga whale (*Delphinapterus leucas*). There is no published TTS information for other species of cetaceans. However, preliminary evidence from a harbor porpoise exposed to pulsed sound suggests that its TTS threshold may have been lower (Lucke *et al.,* 2009). To avoid the potential for injury, NMFS has determined that cetaceans should not be exposed to pulsed underwater sound at received levels exceeding 180 dB re 1 μPa rms. As summarized above, data that are now available imply that TTS is unlikely to occur unless odontocetes are exposed to pile driving pulses stronger than 180 dB re 1 μPa rms.

Permanent Threshold Shift—When PTS occurs, there is physical damage to the sound receptors in the ear. In severe cases, there can be total or partial deafness, while in other cases the animal has an impaired ability to hear sounds in specific frequency ranges (Kryter, 1985). There is no specific evidence that exposure to pulses of sound can cause PTS in any marine mammal. However, given the possibility that mammals close to pile driving activity might incur TTS, there has been further speculation about the possibility that some individuals occurring very close to pile driving might incur PTS. Single or occasional occurrences of mild TTS are not indicative of permanent auditory damage, but repeated or (in some cases) single exposures to a level well above that causing TTS onset might elicit PTS.

Relationships between TTS and PTS thresholds have not been studied in marine mammals but are assumed to be similar to those in humans and other terrestrial mammals. PTS might occur at a received sound level at least several decibels above that inducing mild TTS if the animal were exposed to strong sound pulses with rapid rise time. Based on data from terrestrial mammals, a precautionary assumption is that the PTS threshold for impulse sounds (such as pile driving pulses as received close to the source) is at least 6 dB higher than the TTS threshold on a peak-pressure basis and probably greater than 6 dB (Southall *et al.,* 2007). On an SEL basis, Southall *et al.* (2007) estimated that received levels would need to exceed the TTS threshold by at least 15 dB for there to be risk of PTS. Thus, for cetaceans, Southall *et al.* (2007) estimate that the PTS threshold might be an M-weighted SEL (for the sequence of received pulses) of approximately 198 dB re 1 μPa^2-s (15 dB higher than the TTS threshold for an impulse). Given the higher level of sound necessary to cause PTS as compared with TTS, it is considerably less likely that PTS could occur.

Measured source levels from impact pile driving can be as high as 214 dB re 1 μPa at 1 m (3.3 ft). Although no marine mammals have been shown to experience TTS or PTS as a result of being exposed to pile driving activities, captive bottlenose dolphins and beluga whales exhibited changes in behavior when exposed to strong pulsed sounds (Finneran *et al.,* 2000, 2002, 2005). The animals tolerated high received levels of sound before exhibiting aversive behaviors. Experiments on a beluga whale showed that exposure to a single watergun impulse at a received level of 207 kPa (30 psi) p-p, which is equivalent to 228 dB p-p re 1 μPa, resulted in a 7 and 6 dB TTS in the beluga whale at 0.4 and 30 kHz, respectively. Thresholds returned to within 2 dB of the pre-exposure level within four minutes of the exposure (Finneran *et al.,* 2002). Although the source level of pile driving from one hammer strike is expected to be much lower than the single watergun impulse cited here, animals being exposed for a prolonged period to repeated hammer strikes could receive more sound exposure in terms of SEL than from the single watergun impulse (estimated at 188 dB re 1 μPa^2-s) in the aforementioned experiment (Finneran *et al.,* 2002). However, in order for marine mammals to experience TTS or PTS, the animals have to be close enough to be exposed to high intensity sound levels for a prolonged period of time. Based on the best scientific information available, these SPLs are far below the thresholds that could cause TTS or the onset of PTS.

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

Disturbance Reactions

Disturbance includes a variety of effects, including subtle changes in behavior, more conspicuous changes in activities, and displacement. Behavioral responses to sound are highly variable and context-specific and reactions, if any, depend on species, state of maturity, experience, current activity, reproductive state, auditory sensitivity, time of day, and many other factors (Richardson *et al.,* 1995; Wartzok *et al.,* 2003/2004; Southall *et al.,* 2007).

Habituation can occur when an animal's response to a stimulus wanes with repeated exposure, usually in the absence of unpleasant associated events (Wartzok *et al.,* 2003/04). Animals are most likely to habituate to sounds that are predictable and unvarying. The opposite process is sensitization, when an unpleasant experience leads to subsequent responses, often in the form of avoidance, at a lower level of exposure. Behavioral state may affect the type of response as well. For example, animals that are resting may show greater behavioral change in response to disturbing sound levels than animals that are highly motivated to remain in an area for feeding (Richardson *et al.,* 1995; NRC, 2003; Wartzok *et al.,* 2003/04).

Controlled experiments with captive marine mammals showed pronounced behavioral reactions, including avoidance of loud sound sources (Ridgway *et al.,* 1997; Finneran *et al.,* 2003). Observed responses of wild marine mammals to loud pulsed sound sources (typically seismic guns or acoustic harassment devices, but also including pile driving) have been varied but often consist of avoidance behavior or other behavioral changes suggesting discomfort (Morton and Symonds, 2002; Thorson and Reyff, 2006; see also Gordon *et al.,* 2004; Wartzok *et al.,* 2003/04; Nowacek *et al.,* 2007). Responses to continuous sound, such as vibratory pile installation, have not been documented as well as responses to pulsed sounds.

With both types of pile driving, it is likely that the onset of pile driving could result in temporary, short term changes in an animal's typical behavior and/or avoidance of the affected area. These behavioral changes may include (Richardson *et al.,* 1995): Changing durations of surfacing and dives, number of blows per surfacing, 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; and/or flight responses (e.g., pinnipeds flushing into water from haul-outs or rookeries). Pinnipeds may increase their haul-out time, possibly to avoid in-water disturbance (Thorson and Reyff, 2006). Since pile driving would likely only occur for a few hours a day, over a short period of time, it is unlikely to result in permanent displacement. Any potential impacts from pile driving activities could be experienced by individual marine mammals, but would not be likely to cause population level impacts, or affect the long-term fitness of the species.

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

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

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

Auditory Masking

Natural and artificial sounds can disrupt behavior by masking, or interfering with, a marine mammal's ability to hear other sounds. Masking occurs when the receipt of a sound is interfered with by another coincident sound at similar frequencies and at similar or higher levels. Chronic exposure to excessive, though not high-intensity, sound could cause masking at particular frequencies for marine mammals that utilize sound for vital biological functions. Masking can interfere with detection of acoustic signals such as communication calls, echolocation sounds, and environmental sounds important to marine mammals. Therefore, under certain circumstances, marine mammals whose acoustical sensors or environment are being severely masked could also be impaired from maximizing their performance fitness in survival and reproduction. If the coincident (masking) sound were man-made, it could be potentially harassing if it disrupted hearing-related behavior. It is important to distinguish TTS and PTS, which persist after the sound exposure, from masking, which occurs during the sound exposure. Because masking (without resulting in TS) is not associated with abnormal physiological function, it is not considered a physiological effect, but rather a potential behavioral effect.

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

Masking has the potential to impact species at population, community, or even ecosystem levels, as well as at individual levels. Masking affects both senders and receivers of the signals and can potentially have long-term chronic effects on marine mammal species and populations. Recent research suggests that low frequency ambient sound levels have increased by as much as 20 dB (more than three times in terms of SPL) in the world's ocean from pre-industrial periods, and that most of these increases are from distant shipping (Hildebrand, 2009). All anthropogenic sound sources, such as those from vessel traffic, pile driving, and dredging activities, contribute to the elevated ambient sound levels, thus intensifying masking. However, the sum of sound from the proposed activities is confined in an area of inland waters (San Diego Bay) that is bounded by landmass; therefore, the sound generated is not expected to contribute to increased ocean ambient sound.

The most intense underwater sounds in the proposed action are those produced by impact pile driving. Given that the energy distribution of pile driving covers a broad frequency spectrum, sound from these sources would likely be within the audible range of marine mammals present in the project area. Impact pile driving activity is relatively short-term, with rapid pulses occurring for approximately fifteen minutes per pile. The probability for impact pile driving resulting from this proposed action masking acoustic signals important to the behavior and survival of marine mammal species is likely to be negligible. Vibratory pile driving is also relatively short-term, with rapid oscillations occurring for approximately one and a half hours per pile. It is possible that vibratory pile driving resulting from this proposed action may mask acoustic signals important to the behavior and survival of marine mammal species, but the short-term duration and limited affected area would result in insignificant impacts from masking. Any masking event that could possibly rise to Level B harassment under the MMPA would occur concurrently within the zones of behavioral harassment already estimated for vibratory and impact pile driving, and which have already been taken into account in the exposure analysis.

Airborne Sound Effects

Marine mammals that occur in the project area could be exposed to airborne sounds associated with pile driving that have the potential to cause harassment, depending on their distance from pile driving activities. Airborne pile driving sound would have less impact on cetaceans than pinnipeds because sound from atmospheric sources does not transmit well underwater (Richardson *et al.,* 1995); thus, airborne sound would only be an issue for hauled-out pinnipeds in the project area. 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 their habitat and move further from the source. Studies by Blackwell *et al.* (2004) and Moulton *et al.* (2005) indicate a tolerance or lack of response to unweighted airborne sounds as high as 112 dB peak and 96 dB rms.

Anticipated Effects on Habitat

The proposed activities at NBPL would not result in permanent impacts to habitats used directly by marine mammals, such as haul-out sites, but may have potential short-term impacts to food sources such as forage fish. There are no rookeries or major haul-out sites nearby (the bait barges will be relocated from the project area), foraging hotspots, or other ocean bottom structure of significant biological importance to marine mammals that may be present in the marine waters in the vicinity of the project area. Therefore, the main impact issue associated with the proposed activity would be temporarily elevated sound levels and the associated direct effects on marine mammals, as discussed previously in this document. The most likely impact to marine mammal habitat occurs from pile driving effects on likely marine mammal prey (i.e., fish) near NBPL and minor impacts to the immediate substrate during installation and removal of piles during the wharf construction project.

Pile Driving Effects on Potential Prey (Fish)

Construction activities would produce both pulsed (i.e., impact pile driving) and continuous (i.e., vibratory pile driving) sounds. Fish react to sounds which are especially strong and/or intermittent low-frequency sounds. Short duration, sharp sounds can cause overt or subtle changes in fish behavior and local distribution. Hastings and Popper (2005, 2009) identified several studies that suggest fish may relocate to avoid certain areas of sound energy. Additional studies have documented effects of pile driving (or other types of continuous sounds) 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). Sound pulses at received levels of 160 dB re 1 μPa may cause subtle changes in fish behavior. SPLs of 180 dB may cause noticeable changes in behavior (Pearson *et al.,* 1992; Skalski *et al.,* 1992). SPLs of sufficient strength may cause injury to fish and fish mortality. 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. In general, impacts to marine mammal prey species are expected to be minor and temporary due to the short timeframe for the pier replacement project.

Pile Driving Effects on Potential Foraging Habitat

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 vicinity of San Diego Bay.

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. Therefore, pile driving is not likely to have a permanent, adverse effect on marine mammal foraging habitat at the project area.

Proposed Mitigation

In order to issue an incidental take authorization (ITA) under Section 101(a)(5)(D) of the MMPA, we must, where applicable, set forth the permissible methods of taking pursuant to such activity, and other means of effecting the least practicable impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for taking for certain subsistence uses (where relevant).

Proxy source measurements and site-specific modeling of spreading loss (with the exception of the MMP relocation site, where practical spreading loss was assumed) were used to estimate zones of influence (ZOIs; see ''Estimated Take by Incidental Harassment''); these values were used to develop mitigation measures for pile driving activities at NBPL. The ZOIs effectively represent the mitigation zone that would be established around each pile to prevent Level A harassment to marine mammals, while providing estimates of the areas within which Level B harassment might occur. In addition to the measures described later in this section, the Navy would employ the following standard mitigation measures:

(a) Conduct briefings between construction supervisors and crews, marine mammal monitoring team, acoustical monitoring team, and Navy staff prior to the start of all pile driving activity, and when new personnel join the work, in order to explain responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures.

(b) Comply with applicable equipment sound standards and ensure that all construction equipment has sound control devices no less effective than those provided on the original equipment.

(c) For in-water heavy machinery work with the potential to affect marine mammals (other than pile driving), 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 and (2) removal of the pile from the water column/substrate via a crane (i.e., deadpull). For these activities, monitoring would take place from 15 minutes prior to initiation until the action is complete.

Monitoring and Shutdown for Pile Driving

The following measures would apply to the Navy's mitigation through shutdown and disturbance zones:

Shutdown Zone—For all pile driving and removal activities, the Navy will establish a shutdown zone intended to contain the area in which SPLs equal or exceed the 180/190 dB rms acoustic injury criteria. The purpose of a shutdown zone is to define an area within which shutdown of activity would occur upon sighting of a marine mammal (or in anticipation of an animal entering the defined area), thus preventing injury, serious injury, or death of marine mammals. Radial distances for shutdown zones are shown in Table 5. For certain pile types or techniques, the shutdown zone would not exist because source levels are lower than the threshold (see Table 5). However, a minimum shutdown zone of 10 m will be established during all pile driving and removal activities, regardless of the estimated zone. These precautionary measures are intended to prevent the already unlikely possibility of physical interaction with construction equipment and to further reduce any possibility of acoustic injury.

Disturbance Zone—Disturbance zones are typically defined as the area in which SPLs equal or exceed 160 or 120 dB rms (for pulsed or non-pulsed sound, respectively). Disturbance zones provide utility for monitoring conducted for mitigation purposes (i.e., shutdown zone monitoring) by establishing monitoring protocols for areas adjacent to the shutdown zones. Monitoring of disturbance zones enables observers to be aware of and communicate the presence of marine mammals in the project area but outside the shutdown zone and thus prepare for potential shutdowns of activity. However, the primary purpose of disturbance zone monitoring is for documenting incidents of Level B harassment; disturbance zone monitoring is discussed in greater detail later (see ''Proposed Monitoring and Reporting''). Nominal radial distances for disturbance zones are shown in Table 5 and Table 7 (for airborne sound). As with any such large action area, it is impossible to guarantee that all animals would be observed or to make comprehensive observations of fine-scale behavioral reactions to sound.

In order to document observed incidences of harassment, monitors record all marine mammal observations, regardless of location. The observer's location, as well as the location of the pile being driven, is known from a GPS. The location of the animal is estimated as a distance from the observer, which is then compared to the location from the pile. If acoustic monitoring is being conducted for that pile, a received SPL may be estimated, or the received level may be estimated on the basis of past or subsequent acoustic monitoring. It may then be determined whether the animal was exposed to sound levels constituting incidental harassment in post-processing of observational and acoustic data, and a precise accounting of observed incidences of harassment created. Therefore, although the predicted distances to behavioral harassment thresholds are useful for estimating incidental harassment for purposes of authorizing levels of incidental take, actual take may be determined in part through the use of empirical data. That information may then be used to extrapolate observed takes to reach an approximate understanding of actual total takes.

Monitoring Protocols—Monitoring would be conducted before, during, and after pile driving activities. In addition, observers shall record all incidences of marine mammal occurrence, regardless of distance from activity, and shall document any behavioral reactions in concert with distance from piles being driven. Observations made outside the shutdown zone will not result in shutdown; that pile segment would be completed without cessation, unless the animal approaches or enters the shutdown zone, at which point all pile driving activities would be halted. Please see the Marine Mammal Monitoring Plan (available at *http://www.nmfs.noaa.gov/pr/permits/incidental.htm*), developed by the Navy in agreement with us, for full details of the monitoring protocols. Monitoring will take place from 15 minutes prior to initiation through 15 minutes post-completion of pile driving activities. Pile driving activities include the time to remove a single pile or series of piles, as long as the time elapsed between uses of the pile driving equipment is no more than 30 minutes.

The following additional measures apply to visual monitoring:

(1) Monitoring will be conducted by qualified observers, who will be placed at the best vantage point(s) practicable (as defined in the Navy's Marine Mammal Monitoring Plan) to monitor for marine mammals and implement shutdown/delay procedures when applicable by calling for the shutdown to the hammer operator. Qualified observers are trained biologists, with the following minimum qualifications:

- Visual acuity in both eyes (correction is permissible) sufficient for discernment of moving targets at the water's surface with ability to estimate target size and distance; use of binoculars may be necessary to correctly identify the target;
- Advanced education in biological science, wildlife management, mammalogy, or related fields (bachelor's degree or higher is required);
- Experience and ability to conduct field observations and collect data according to assigned protocols (this may include academic experience);
- Experience or training in the field identification of marine mammals, including the identification of behaviors;
- Sufficient training, orientation, or experience with the construction operation to provide for personal safety during observations;
- Writing skills sufficient to prepare a report of observations including but not limited to the number and species of marine mammals observed; dates and times when in-water construction activities were conducted; dates and times when in-water construction activities were suspended to avoid potential incidental injury from construction sound of marine mammals observed within a defined shutdown zone; and marine mammal behavior; 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.

(2) Prior to the start of pile driving activity, the shutdown zone will be monitored for 15 minutes to ensure that it is clear of marine mammals. Pile driving will only commence once observers have declared the shutdown zone clear of marine mammals; animals will be allowed to remain in the

shutdown zone (i.e., must leave of their own volition) and their behavior will be monitored and documented. The shutdown zone may only be declared clear, and pile driving started, when the entire shutdown zone is visible (i.e., when not obscured by dark, rain, fog, etc.). In addition, if such conditions should arise during impact pile driving that is already underway, the activity would be halted.

(3) If a marine mammal approaches or enters the shutdown zone during the course of pile driving operations, activity will be halted and delayed until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone or 15 minutes have passed without re-detection of the animal. Monitoring will be conducted throughout the time required to drive a pile.

Sound Attenuation Devices

The use of bubble curtains to reduce underwater sound from impact pile driving was considered but is not proposed. Use of a bubble curtain in a channel with substantial current may not be effective, as unconfined bubbles are likely to be swept away and confined curtain systems may be difficult to deploy effectively in high currents. Data gathered during monitoring of construction on the San Francisco-Oakland Bay Bridge indicated that no reduction in the overall linear sound level resulted from use of a bubble curtain in deep water with relatively strong current, and the distance to the 190 dB zone was considered to be the same with and without the bubble curtain (Illingworth & Rodkin, Inc., 2001). During project monitoring for pile driving associated with the Richmond-San Rafael Bridge, also in San Francisco Bay, it was observed that performance in moderate current was significantly reduced (Oestman *et al.,* 2009). Lucke et al. (2011) also note that the effectiveness of most currently used curtain designs may be compromised in stronger currents and greater water depths. We believe that conditions (relatively deep water and strong tidal currents of up to 3 kn) at the project site would disperse the bubbles and compromise the effectiveness of sound attenuation.

Timing Restrictions

The Navy has set timing restrictions for pile driving activities to avoid in-water work when least tern populations are most likely to be foraging and nesting. The in-water work window for avoiding negative impacts to terns is September 16–March 31.

Soft-Start

The use of a soft-start procedure is believed to provide additional protection to marine mammals by warning or providing a chance to leave the area prior to the hammer operating at full capacity. The pier replacement project will utilize soft-start techniques (ramp-up and dry fire) for impact and vibratory pile driving. The soft-start requires contractors to initiate sound from vibratory hammers for fifteen seconds at reduced energy followed by a 30-second waiting period. This procedure is repeated two additional times. For impact driving, contractors will be required to provide an initial set of three strikes from the impact hammer at 40 percent energy, followed by a 30-second waiting period, then two subsequent three strike sets.

Daylight Construction

All pile driving would be conducted only during daylight hours.

We have carefully evaluated the applicant's proposed mitigation measures and considered a range of other measures in the context of ensuring that we prescribe the means of effecting the least practicable impact on the affected marine mammal species and stocks and their habitat. Our evaluation of potential measures included consideration of the following factors in relation to one another: (1) The manner in which, and the degree to which, the successful implementation of the measure is expected to minimize adverse impacts to marine mammals; (2) the proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and (3) the practicability of the measure for applicant implementation, including consideration of personnel safety, and practicality of implementation.

Based on our evaluation of the applicant's proposed measures, as well as other measures considered, we have preliminarily determined that the proposed mitigation measures provide the means of effecting the least practicable impact on marine mammal 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 ITA for an activity, section 101(a)(5)(D) of the MMPA states that we must, where applicable, 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 ITAs must include the suggested means of accomplishing the necessary monitoring and reporting that would 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. Please see the Navy's Acoustic and Marine Mammal Monitoring Plan for full details of the requirements for monitoring and reporting. We have preliminarily determined this monitoring plan, which is summarized here, to be sufficient to meet the MMPA's monitoring and reporting requirements.

Acoustic Measurements

The primary purpose of acoustic monitoring is to empirically verify modeled injury and behavioral disturbance zones for marine mammals. The Navy will determine actual distances to the 160-, 180-, and 190-dB zones for underwater sound (where applicable) and to the 90- and 100-dB zones for airborne sound. For non-pulsed sound, distances will be determined for attenuation to the greater of either the 120-dB threshold or to the point at which sound becomes indistinguishable from background levels. Acoustic monitoring will be conducted with the following objectives:

(1) Indicator Pile Program (IPP)—Implement a robust in-situ monitoring effort to measure sound pressure levels from different project activities, including impact and vibratory driving of 36- and 48-in piles, and to validate the Navy's site-specific transmission loss modeling effort.

(2) Conduct acoustic monitoring for vibratory pile extraction and for pneumatic chipping, if used.

(3) Continue the Navy's collection of ambient underwater sound measurements in the absence of project activities to develop a rigorous baseline for the San Diego Bay region.

It is assumed that the measured contours will be significantly reduced compared to the conservatively modeled ZOIs. As statistically robust results from acoustic monitoring become available, marine mammal mitigation zones would be revised as necessary to encompass actual ZOIs in subsequent years of the fuel pier replacement project. However, should substantial discrepancies become evident through limited data processing, the Navy will contact NMFS to propose and discuss appropriate changes in monitoring. Acoustic monitoring will be conducted in accordance with the approved Acoustic and Marine Mammal Monitoring Plan developed by the Navy. Notional monitoring locations are shown in Figures 3–1 and 3–2 of the Navy's Plan. Please see that plan, available at *http://www.nmfs.noaa.gov/pr/permits/incidental.htm,* for full details of the required acoustic monitoring.

Some details of the methodology include:

• Hydroacoustic monitoring will be conducted for each different type of pile and each different method of installation and removal. Monitoring will occur across a representative range of locations with special attention given to the 120-, 160-, 180-, and 190-dB ZOI contours. The resulting data set will be analyzed to provide a statistically robust characterization of the sound source levels and transmission loss associated with different types of pile driving and removal activities.

• For underwater recordings, hydrophone systems with the ability to measure real time SPLs will be used in accordance with NMFS' most recent guidance for the collection of source levels.

• For airborne recordings, to the extent that logistics and security allow, reference recordings will be collected at approximately 50 ft (15.2 m) from the source via a sound meter with integrated microphone placed on a tripod 5 ft above the ground. Other distances may also be utilized to obtain better data if the signal cannot be isolated clearly due to other sound sources (i.e., barges or generators). If from a distance other than 50 ft, the source data would be converted to the 50-ft distance based on simple spherical spreading.

• Hydrophones will be placed 10 m from the source and within the ZOIs to their predicted eastern and southern limits. An integrated DGPS will record the location of individual acoustic records. A depth sounder or weighted tape measure will be used to determine the depth of the water. The hydrophone will be attached to a weighted line to maintain a constant depth.

• Each hydrophone (underwater) and microphone (airborne) will be calibrated at the beginning of each day of monitoring activity. Pressure and intensity levels will be reported relative to 1 μPa and 1 μPa^2, respectively.

• For each monitored location, a hydrophone will be deployed at mid-depth in order to evaluate site specific attenuation and propagation characteristics.

• In order to determine the area encompassed by the relevant isopleths for marine mammals, hydrophones will collect data at various distances from the source to measure attenuation throughout the ZOIs.

• Ambient conditions, both airborne and underwater, would be measured at the same monitoring locations but in the absence of project sound to determine background sound levels. Ambient levels are intended to be recorded over the frequency range from 7 Hz to 20 kHz. Ambient conditions will be recorded for at least one minute every hour of the work day, for at least one week of each month of the period of the IHA.

• Sound levels associated with soft-start techniques will also be measured but will be differentiated from source level measurements.

• Airborne levels would be recorded as unweighted, as well as in dBA and the distance to marine mammal injury and behavioral disturbance thresholds, also referred to as shutdown and buffer zones, would be measured.

• Environmental data would be collected including but not limited to: Wind speed and direction, air temperature, humidity, surface water temperature, water depth, wave height, weather conditions and other factors that could contribute to influencing the airborne and underwater sound levels (e.g., aircraft, boats, etc.).

Visual Marine Mammal Observations

The Navy will collect sighting data and behavioral responses to construction for marine mammal species observed in the region of activity during the period of activity. All observers will be trained in marine mammal identification and behaviors and are required to have no other construction-related tasks while conducting monitoring. The Navy will monitor the shutdown zone and disturbance zone before, during, and after pile driving as described under ''Proposed Mitigation'' and in the Acoustic and Marine Mammal Monitoring Plan. Notional monitoring locations are shown in Figures 3–1 and 3–2 of the Navy's Plan. Please see that plan, available at *http://www.nmfs.noaa.gov/pr/permits/incidental.htm,* for full details of the required marine mammal monitoring. Based on our requirements, the Plan includes the following procedures for pile driving:

• MMOs would be located at the best vantage point(s) in order to properly see the entire shutdown zone and as much of the disturbance zone as possible.

• During all observation periods, observers will use binoculars and the naked eye to search continuously for marine mammals.

• If the shutdown zones are obscured by fog or poor lighting conditions, pile driving at that location will not be initiated until that zone is visible. Should such conditions arise while impact driving is underway, the activity would be halted.

• The shutdown and disturbance zones around the pile will be monitored for the presence of marine mammals before, during, and after any pile driving or removal activity.

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

Data Collection

We require that observers use approved data forms. Among other pieces of information, the Navy will record detailed information about any implementation of shutdowns, including the distance of animals to the pile and description of specific actions that ensued and resulting behavior of the animal, if any. We require that, at a minimum, the following information be collected on the sighting forms:

• Date and time that pile driving begins or ends;

• Construction activities occurring during each observation period;

• Weather parameters (e.g., percent cover, visibility);

• Water conditions (e.g., sea state, tide state);

• Species, numbers, and, if possible, sex and age class of marine mammals;

• Marine mammal behavior patterns observed, including bearing and direction of travel, and if possible, the correlation to SPLs;

• Distance from pile driving activities to marine mammals and distance from the marine mammals to the observation point;

• Locations of all marine mammal observations; and

• Other human activity in the area.

In addition, photographs would be taken of any gray whales observed. These photographs would be submitted to NMFS' Southwest Regional Office for comparison with photo-identification catalogs to determine whether the whale is a member of the WNP population.

Reporting

A draft report would be submitted to NMFS within 45 calendar days of the completion of acoustic measurements and marine mammal monitoring. The report will include marine mammal observations pre-activity, during-activity, and post-activity during pile driving days, and will also provide descriptions of any adverse responses to construction activities by marine mammals and a complete description of all mitigation shutdowns and the results of those actions. A final report would be prepared and submitted within 30 days following resolution of comments on the draft report. Required contents of the monitoring reports are described in more detail in the Navy's Acoustic and Marine Mammal Monitoring Plan.

Estimated Take by Incidental Harassment

With respect to the activities described here, the MMPA defines ''harassment'' as: ''any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment].''

All anticipated takes would be by Level B harassment, involving temporary changes in behavior. The proposed mitigation and monitoring measures are expected to minimize the possibility of injurious or lethal takes such that take by Level A harassment, serious injury or mortality is considered remote. However, as noted earlier, it is unlikely that injurious or lethal takes would occur even in the absence of the planned mitigation and monitoring measures.

If a marine mammal responds to an underwater sound by changing its behavior (e.g., through relatively minor changes in locomotion direction/speed or vocalization behavior), the response may or may not constitute taking at the individual level, and is unlikely to affect the stock or the species as a whole. However, if a sound source displaces marine mammals from an important feeding or breeding area for a prolonged period, impacts on animals or on the stock or species could potentially be significant (Lusseau and Bejder, 2007; Weilgart, 2007). Given the many uncertainties in predicting the quantity and types of impacts of sound on marine mammals, it is common practice to estimate how many animals are likely to be present within a particular distance of a given activity, or exposed to a particular level of sound. This practice potentially overestimates the numbers of marine mammals taken.

The proposed project area is not believed to be particularly important habitat for marine mammals, nor is it considered an area frequented by marine mammals (with the exception of California sea lions). The occurrence of California sea lions in the project area, and, therefore, the likely incidence of exposure of sea lions to sound levels above relevant thresholds, will be much reduced due to the relocation of the bait barges (i.e., significant California sea lion haul-outs). Behavioral disturbances that could result from anthropogenic sound associated with the proposed activities are expected to affect only a relatively small number of individual marine mammals, although those effects could be recurring over the life of the project if the same individuals remain in the project vicinity.

The Navy is requesting authorization for the potential taking of small numbers of California sea lions, harbor seals, bottlenose dolphins, and gray whales in San Diego Bay that may result from pile driving during construction activities associated with the fuel pier replacement project described previously in this document. The takes requested are expected to have no more than a minor effect on individual animals and no effect at the population level for these species. Any effects experienced by individual marine mammals are anticipated to be limited to short-term disturbance of normal behavior or temporary displacement of animals near the source of the sound.

Marine Mammal Densities

For all species, the best scientific information available was used to construct density estimates or estimate local abundance. Although information exists for regional offshore surveys for marine mammals, it is unlikely that these data would be representative of the fauna that may be encountered in San Diego Bay. As a result, the data resulting from dedicated line-transect surveys conducted by the Navy from 2007–12, or from opportunistic observations for more rarely observed species, was deemed most appropriate for use in estimating the number of incidental harassments that may occur as a result of the specified activities (see Figures 3–1 and 3–2 of the Navy's application). Boat survey transects established within northern San Diego Bay in 2007 have been resurveyed on 16 occasions, 13 of which were during the seasonal window for in-water construction and demolition (September–April).

Description of Take Calculation

The take calculations presented here rely on the best data currently available for marine mammal populations in San Diego Bay. The formula was developed for calculating take due to pile driving activity and applied to each group-specific sound impact threshold. The formula is founded on the following assumptions:

- Each species' density is based on the average daily number of individuals observed within the project area (defined as the 120-dB ZOI for potential behavioral disturbance by vibratory pile driving) during Navy marine mammal surveys, corrected for detection probability. It is the opinion of the professional biologists who conducted these surveys that detectability of animals during these surveys, at slow speeds and under calm weather and excellent viewing conditions, approached 100%. However, to account for the possibility that some parts of the study area may not have been covered due to access limitations, and to allow for variation in the accuracy of counts of large numbers of animals, a 95% detection rate is assumed.
- ZOIs for underwater sound generating activities at the fuel pier location are based on sound emanating from a central point in the water column slightly offshore of the existing pier, at the source levels specified in Table 5, and rates of transmission loss derived from the site-specific model described in Appendix A of the Navy's application.
- Pile driving or vibratory extraction is conservatively estimated to occur on every day within the scheduled window for that component of project construction, as defined in in the project description.
- An individual can only be ''taken'' once during each 24-hour period of activity.
- Although sea lions and harbor seals in the project area spend a considerable amount of time above water, when they would not be subject to underwater sound, the conservative assumption is made that all sea lions within the ZOI are underwater during at least a portion of the noise generating activity, and hence exposed to sound at the predicted levels. However, all sea lions within each airborne sound ZOI are also assumed to be exposed to the airborne sound of each activity.

The calculation for marine mammal takes is estimated by:

Take estimate = (n * ZOI) * days of total activity

Where:

n = density estimate used for each species/

season

n * ZOI produces an estimate of the abundance of animals that could be present in the area for exposure, and is rounded to the nearest whole number before multiplying by days of total activity.

The ZOI impact area is the estimated range of impact to the sound criteria. The distances (actual) specified in Table 5 were used to calculate ZOI around each pile. The ZOI impact area took into consideration the possible affected area of San Diego Bay with attenuation due to land shadowing from bends in the shoreline. Because of the close proximity of some of the piles to the shore, the ZOIs for each threshold are not necessarily spherical and may be truncated.

While pile driving can occur any day throughout the in-water work window, and the analysis is conducted on a per day basis, only a fraction of that time is actually spent pile driving. On days when pile driving occurs, it could take place for thirty minutes, or up to several hours. The Navy assumes that the contractor will drive approximately two steel piles per day, and five concrete or fiberglass piles per day. For each pile installed, vibratory pile driving is expected to be no more than 1–1.5 hours. The impact driving portion of the project is anticipated to take approximately thirty minutes per pile (for proofing, when necessary). Based on the proposed action, the total pile driving time from vibratory pile driving during installation would be a maximum of 66 days. Approximately 21 days of demolition work might involve methods that could cause disturbance to marine mammals are expected.

The exposure assessment methodology is an estimate of the numbers of individuals exposed to the effects of pile driving activities exceeding NMFS-established thresholds. Of note in these exposure estimates, mitigation methods (i.e., visual monitoring and the use of shutdown zones) were not quantified within the assessment and successful implementation of mitigation is not reflected in exposure estimates. Results from acoustic impact exposure assessments should be regarded as conservative estimates.

California Sea Lion

The Navy Marine Species Density Database (NMSDD) reports estimated densities for North and Central San Diego Bay of 5.75/km^2 for the summer and fall periods and 2.51/km^2 during the winter and spring. During Navy surveys of northern San Diego Bay, the maximum number of sea lions observed within the study area was 114, with an average abundance of 59.92 individuals per survey day; translating to an average density of 5.22/km^2. Adjusting based on 95% detection results in an average abundance of 63.07 and density of 5.50/km^2, which is similar to the value reported by Hanser *et al.* (2012). For California sea lions, the most common species in northern San Diego Bay and the only species with regular occurrence in the project area, it was determined that the density value derived from site-specific surveys would be most appropriate for use in estimating potential incidences of take.

In the surveys analyzed for this IHA request, an average of 47.00 animals were observed on or swimming next to the bait barges. Assuming the same proportion of the population continues to spend most of their time at the bait barges when they are relocated, there would be an average of 12.92 individuals within the ZOI (1.12/km^2). Assuming 95% detection results in an estimated average abundance of 13.60 and density of 1.18/km^2 in the ZOI without the bait barges' influence as a sea lion aggregator within the project area. With the relocation of the bait barges, no haul-outs are available for California sea lions within the airborne ZOI. We acknowledge that California sea lions may experience airborne acoustic harassment when in the water within the airborne ZOI but with their heads above water. However, these animals are considered harassed by underwater sound.

Harbor Seal

As discussed previously, the occurrence of harbor seals in the ZOI appears to be limited. Small numbers of individuals are known to haul out south of Ballast Point, but these have not been observed entering or transiting the project area and are believed to move from this location to haul-outs further north at La Jolla. Accordingly, harbor seal presence in the project area is assessed on the basis of the only observational data available, the opportunistic observation of several individuals occurring in the vicinity of Pier 122 repeatedly for a period of about a month. We therefore assume that as many as three harbor seals could be incidentally harassed on a daily basis for as much as one month. In addition, because the Pier 122 location is approximately 250 m from the fuel pier, these individuals we assume that these individuals could be either in the water or hauled out each day and therefore conservatively consider them to be exposed to both underwater and airborne sound on each day.

Gray Whale

Similar to the harbor seal, observational data for gray whales is limited and their occurrence in the project area infrequent and unpredictable. On the basis of limited information, we assume here that 15 exposures of gray whales to sound that could result in harassment might occur. This could result from as many as 15 individuals transiting near the mouth of the Bay, or from one individual entering the Bay and lingering in the project area for 15 days. We limit the time period to 15 days because, although both of these scenarios are unlikely, they would only possibly occur in March. Most sightings of gray whales near or within the Bay have been outside of the in-water work window.

Bottlenose Dolphin

Coastal bottlenose dolphins can occur at any time of year in San Diego Bay, and with California sea lions are the only species observed during site-specific marine mammal surveys conducted by the Navy. Numbers sighted have been highly variable, ranging from zero (6 out of 13 surveys) to 40 individuals. Unidentified dolphins recorded in the surveys are assumed to have been coastal bottlenose dolphins. Given the sporadic nature of bottlenose dolphin sightings and their high variability in terms of numbers and locations, the regional density estimate of 0.36/km^2 developed for the NMSDD (Hanser et al., 2012) was considered a more reliable indicator of the number of bottlenose dolphins that may be present and is used here to estimate the potential number of incidences of take.

Steel pile installation involves a combination of vibratory and impact hammering. Both are assumed to occur on the same day and, therefore, the estimated number of animals taken is given by the maximum of either type of exposure. Given that the vibratory (120 dB rms) ZOI is larger, all animals considered behaviorally harassed by impact pile driving are also considered to potentially be harassed by vibratory pile driving, whereas animals outside of the ZOI for impact hammering but within the ZOI for vibratory hammering would only be harassed by the latter. For example, for California sea lions the estimate for vibratory pile driving is 700 and the estimate for impact pile driving is 500. Because both events occur on the same day and the vibratory harassment zone subsumes the impact harassment zone, the estimate for vibratory pile driving necessarily includes the 500 incidents of harassment estimated for impact pile driving alone. To provide a more conservative estimate of total harassments, demolition use of vibratory extraction is assumed not to overlap the driving of steel piles for the new pier. Thus, the 294 incidences of harassment for California sea lions resulting from pile removal would add to the 700 estimated for pile installation (500 resulting from either vibratory or impact installation and 200 resulting from vibratory installation alone) for a total estimate of 994 incidences of harassment.

TABLE 8—NUMBER OF POTENTIAL INCIDENTAL TAKES OF MARINE MAMMALS WITHIN VARIOUS ACOUSTIC THRESHOLD ZONES

Species	Density (#/km²)	Underwater				Airborne	Total proposed authorized takes
		Impact injury threshold (180/190 dB)	Disturbance threshold, combined impact/vibratory (160 dB) [1]	Vibratory injury threshold (180/190 dB)	Vibratory disturbance threshold (120 dB)	Impact disturbance threshold (90/100 dB)	
California sea lion	1.18	0	500	0	494	0	994
Harbor seal [2]	n/a	0	90	0	0	90	180
Gray whale [2]	n/a	0	15	0	0	n/a	15
Bottlenose dolphin	0.36	0	144	0	163	n/a	307

[1] The 160-dB acoustic harassment zone associated with impact pile driving would always be subsumed by the 120-dB harassment zone produced by vibratory driving. Therefore, total takes estimated for impact driving alone could occur as a result of either impact or vibratory driving.

[2] Because there is no density estimate available for harbor seals or gray whales, we cannot estimate takes separately for vibratory and impact pile driving. We simply assume here that these animals could be present within the project area for 30 (3 harbor seals) or 15 days (1 gray whale), respectively, and that they could be taken by impact or vibratory driving or vibratory removal. We also assume that mitigation measures would be effective in preventing Level A harassment for these species and believe a zero value for Level A harassments to be reasonable.

Potential takes could occur if individuals of these species move through the area on foraging trips when pile driving is occurring. Individuals that are taken could exhibit behavioral changes such as increased swimming speeds, increased surfacing time, or decreased foraging. Most likely, individuals may move away from the sound source and be temporarily displaced from the areas of pile driving. Potential takes by disturbance would likely have a negligible short-term effect on individuals and not result in population-level impacts. Negligible Impact and Small Numbers Analysis and Preliminary Determination

NMFS has defined ''negligible impact'' in 50 CFR 216.103 as ''. . .an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.'' In making a negligible impact determination, we consider a variety of factors, including but not limited to: (1) The number of anticipated mortalities; (2) the number and nature of anticipated injuries; (3) the number, nature, intensity, and duration of Level B harassment; and (4) the context in which the take occurs.

Pile driving activities associated with the pier replacement project, as outlined previously, have the potential to disturb or displace marine mammals. Specifically, the proposed activities may result in take, in the form of Level B harassment (behavioral disturbance) only, from airborne or underwater sounds generated from pile driving. No mortality, serious injury, or Level A harassment is anticipated given the methods of installation and measures designed to minimize the possibility of injury to marine mammals and Level B harassment would be reduced to the level of least practicable adverse impact. Specifically, vibratory hammers, which do not have significant potential to cause injury to marine mammals due to the relatively low source levels (less than 190 dB), would be the primary method of installation. Also, pile driving would either not start or be halted if marine mammals approach the shutdown zone (described previously in this document). The pile driving activities analyzed here are similar to other similar construction activities, including recent projects conducted by the Navy in the Hood Canal as well as substantial work conducted in San Francisco Bay by the California Department of Transportation, which have taken place with no reported injuries or mortality to marine mammals.

The proposed numbers of authorized take for California sea lions, harbor seals, and gray whales would be considered small relative to the relevant stocks or populations (each less than one percent) even if each estimated taking occurred to a new individual—an extremely unlikely scenario. For pinnipeds, no rookeries are present in the project area, there are no haul-outs other than those provided opportunistically by man-made objects, and the project area is not known to provide foraging habitat of any special importance.

The proposed numbers of authorized take for bottlenose dolphins are higher relative to the total stock abundance estimate and would not represent small numbers if a significant portion of the take was for a new individual. However, these numbers represent the estimated incidences of take, not the number of individuals taken. That is, it is likely that a relatively small subset of California coastal bottlenose dolphins would be harassed by project activities. California coastal bottlenose dolphins range from San Francisco Bay to San Diego (and south into Mexico) and the specified activity would be stationary within an enclosed Bay that is not recognized as an area of any special significance for coastal bottlenose dolphins (and is therefore not an area of dolphin aggregation, as evident in Navy observational records). We therefore believe that the estimated numbers of takes, were they to occur, likely represent repeated exposures of a much smaller number of bottlenose dolphins and that, based on the limited region of exposure in comparison with the known distribution of the coastal bottlenose dolphin, these estimated incidences of take represent small numbers of bottlenose dolphins.

Repeated exposures of individuals to levels of sound that may cause Level B harassment are unlikely to result in hearing impairment or to significantly disrupt foraging behavior. Thus, even repeated Level B harassment of some small subset of the overall stock is unlikely to result in any significant realized decrease in viability for California coastal bottlenose dolphins, and thus would not result in any adverse impact to the stock as a whole. The potential for multiple exposures of a small portion of the overall stock to levels associated with Level B harassment in this area is expected to have a negligible impact on the stock.

We have preliminarily determined that the impact of the first phase of the previously described wharf construction project, to be conducted under this proposed one-year IHA, may result, at worst, in a temporary modification in behavior (Level B harassment) of small numbers of marine mammals. No injuries, serious injuries, or mortalities are anticipated as a result of the specified activity, and none are proposed to be authorized. Additionally, animals in the area are not expected to incur hearing impairment (i.e., TTS or PTS) or non-auditory physiological effects. For pinnipeds, the absence of any major rookeries and only a few isolated and opportunistic haul-out areas near or adjacent to the project site means that potential takes by disturbance would have an insignificant short-term effect on individuals and would not result in population-level impacts. Similarly, for cetacean species the absence of any known regular occurrence adjacent to the project site means that potential takes by disturbance would have an insignificant short-term effect on individuals and would not result in population-level impacts. Due to the nature, degree, and context of behavioral harassment anticipated, the activity is not expected to impact rates of recruitment or survival.

For reasons stated previously in this document, the negligible impact determination is also supported by the likelihood that, given sufficient "notice" through mitigation measures including soft start, marine mammals are expected to move away from a sound source that is annoying prior to its becoming potentially injurious, and the likelihood that marine mammal detection ability by trained observers is high under the environmental conditions described for San Diego Bay, enabling the implementation of shutdowns to avoid injury, serious injury, or mortality. As a result, no take by injury, serious injury or death is anticipated, and the potential for temporary or permanent hearing impairment is very low and would be avoided through the incorporation of the proposed mitigation measures.

While the number of marine mammals potentially incidentally harassed would depend on the distribution and abundance of marine mammals in the vicinity of the survey activity, the number of potential harassment takings is estimated to be small, and has been mitigated to the lowest level practicable through incorporation of the proposed mitigation and monitoring measures mentioned previously in this document. This activity is expected to result in a negligible impact on the affected species or stocks. No species for which take authorization is requested are either ESA-listed or considered depleted under the MMPA.

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 mitigation and monitoring measures, we preliminarily find that the first year of construction associated with the proposed pier replacement project would result in the incidental take of small numbers of marine mammal, by Level B harassment only, and that the total taking from the activity would have a negligible impact on the affected species or stocks.

Impact on Availability of Affected Species for Taking for Subsistence Uses

There are no relevant subsistence uses of marine mammals implicated by this action.

Endangered Species Act (ESA)

The Navy initiated informal consultation under section 7 of the ESA with NMFS Southwest Regional Office on March 5, 2013. NMFS concluded on May 16, 2013, that the proposed action may affect, but is not likely to adversely affect, WNP gray whales. The Navy has not requested authorization of the incidental take of WNP gray whales and no such authorization is proposed, and there are no other ESA-listed marine mammals found in the action area. Therefore, no consultation under the ESA is required.

National Environmental Policy Act (NEPA)

In September 2012, the Navy prepared a Draft Environmental Assessment (*Naval Base Point Loma Fuel Pier Replacement and Dredging (P–151/DESC1306) Environmental Assessment*) in accordance with the National Environmental Policy Act (NEPA) and the regulations published by the Council on Environmental Quality. We have posted it on the NMFS Web site (see **ADDRESSES**) concurrently with the publication of this proposed IHA. NMFS will independently evaluate the EA and determine whether or not to adopt it. We may prepare a separate NEPA analysis and incorporate relevant portions of the Navy's EA by reference. Information in the Navy's application, EA and this notice collectively provide the environmental information related to proposed issuance of the IHA for public review and comment. We will review all comments submitted in response to this notice as we complete the NEPA process, including a decision of whether to sign a Finding of No Significant Impact (FONSI), prior to a final decision on the IHA request.

Proposed Authorization

As a result of these preliminary determinations, we propose to authorize the take of marine mammals incidental to the Navy's pier replacement project, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated.

Dated: May 17, 2013.

Helen M. Golde,

Acting Director, Office of Protected Resources, National Marine Fisheries Service.

[FR Doc. 2013–12251 Filed 5–22–13; 8:45 am]

BILLING CODE 3510–22–P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648–XC640

Taking and Importing Marine Mammals; U.S. Navy Training in the Gulf of Alaska Temporary Maritime Activities Area

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

ACTION: Notice of issuance of a Letter of Authorization.

SUMMARY: In accordance with the Marine Mammal Protection Act (MMPA), as amended, and implementing regulations, notice is hereby given that NMFS has issued a 3-year Letter of Authorization (LOA) to the U.S. Navy (Navy) to take marine mammals incidental to Navy training and research activities to be conducted within the Gulf of Alaska Temporary Maritime Activities Area (GOA TMAA). These activities are considered military readiness activities pursuant to the Marine Mammal Protection Act (MMPA), as amended by the National Defense Authorization Act of 2004 (NDAA).