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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648-XC533

Takes of Marine Mammals Incidental to Specified Activities; Navy Training Conducted at the Silver Strand Training Complex, San Diego Bay

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 a complete application from the U.S. Navy (Navy) for an Incidental Harassment Authorization (IHA) to take marine mammals, by harassment, incidental to conducting training exercises at the Silver Strand Training Complex (SSTC) in the vicinity of San Diego Bay, California. Pursuant to the Marine Mammal Protection Act (MMPA), NMFS is requesting comments on its proposal to issue an IHA to the Navy to incidentally harass, by Level B Harassment only, eight species of marine mammals during the specified activity.

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

ADDRESSES: Comments on the application should be addressed to P. Michael Payne, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910-3225. The mailbox address for providing email comments is itp.magliocca@noaa.gov. NMFS is not responsible for e-mail comments sent to addresses other than the one provided here. Comments sent via e-mail, including all attachments, must not exceed a 10-megabyte file size.

Instructions: All comments received are a part of the public record and will generally be posted to http://www.nmfs.noaa.gov/pr/permits/incidental.htm without change. All Personal Identifying Information (for example, name, address, etc.) 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 may be obtained by visiting the internet at: http://www.nmfs.noaa.gov/pr/permits/incidental.htm. Documents cited in this notice may also be viewed, by appointment, during regular business hours, at the aforementioned address.

FOR FURTHER INFORMATION CONTACT: Michelle Magliocca, 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 (Secretary) 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) if certain findings are made and regulations are issued or, if the taking is limited to harassment, 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 taking 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."

The National Defense Authorization Act of 2004 (NDAA) (Public Law 108-136) removed the "small numbers" and "specified geographical region" limitations and amended the definition of "harassment" as it applies to a "military readiness activity" to read as follows (Section 3(18)(B) of the MMPA): (i) any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild [Level A Harassment]; or (ii) any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered [Level B Harassment].

Section 101(a)(5)(D) of the MMPA established an expedited process by which citizens of the United States 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.

Summary of Request

NMFS received an application on December 19, 2012, from the Navy for the taking, by harassment, of marine mammals incidental to conducting training exercises at the Navy's Silver Strand Training Complex (SSTC) in the vicinity of San Diego Bay, California. Underwater detonations and pile driving/removal during training events at the SSTC may rise to the level of harassment as defined under the MMPA. The Navy is currently operating under an IHA for training activities at the SSTC covering the period from July 18, 2012, through July 17, 2013.

Description of the Specific Activity

The Navy has conducted a review of its continuing and proposed training conducted at the SSTC to determine whether there is a potential for harassment of marine mammals. Underwater detonation training and pile driving, as described below, may result in the incidental take of marine mammals from elevated levels of sound. Other training events conducted at the SSTC, which are not expected to rise to the level of harassment, are described in the SSTC Final Environmental Impact Statement (http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications).

Underwater Detonations

Underwater detonations are conducted by Explosive Ordnance Disposal (EOD) units, Naval Special Warfare (NSW) units, MH-60S Mine Countermeasure helicopter squadrons, and Mobile Diving and Salvage units at the SSTC. The training provides Navy personnel with hands-on experience with the design, deployment, and detonation of underwater clearance devices of the general type and size that they are required to understand and utilize in combat. EOD units conduct most of the underwater detonation training at the SSTC as part of their training in the detection, avoidance, and neutralization of mines. Tables 1-3 and 2-1 in the

Navy's LOA application describe in detail the types of underwater detonation training events conducted at the SSTC. Below is a basic description of some underwater detonation procedures that typically apply to underwater training events at the SSTC, with the exception of the Unmanned Underwater Vehicle Neutralization and Airborne Mine Neutralization System.

- Prior to getting underway, all EOD and NSW personnel conduct a detailed safety and procedure briefing to familiarize everyone with the goals, objectives, and safety requirements (including mitigation zones) applicable to the particular training event.
- For safety reasons, and in accordance with Navy directives, given the training nature of many of these events, underwater detonations only occur during daylight and are only conducted in sea-states of up to Beaufort 3 (presence of large wavelets, crests beginning to break, presence of glassy foam, and/or perhaps scattered whitecaps).
- EOD or NSW personnel can be transported to the planned detonation site via small boat or helicopter depending on the training event. Small boats can include 7-m Rigid Hull Inflatable Boats (RHIB), zodiacs, or other similar craft as available to the particular unit.
- Once on site, the applicable mitigation zone is established and visual survey commences for 30 minutes. Divers enter the water to conduct the training objective which could include searching for a training object such as a simulated mine or mine-like shape.
- For the detonation part of the training, the explosive charge and associate charge initiating device are taken to the detonation point. The explosives used are military forms of C-4. In order to detonate C-4, a fusing and initiating device is required.
- Following a particular underwater detonation, additional personnel in the support boats (or helicopter) keep watch within the mitigation zone for 30 minutes.

- Concurrent with the post-detonation survey, divers return to the detonation site to confirm the explosives detonated correctly and retrieve any residual material (pieces of wire, tape, large fragments, etc.).

The Navy uses both time-delay and positive control to initiate underwater detonations, depending on the training event and objectives. The time-delay method uses a Time-delay Firing Device (TDFD) and the positive control method most commonly uses a Remote Firing Device (RFD). TDFDs are the simplest, safest, least expensive, most operationally acceptable method of initiating an underwater detonation. TDFDs are preferred due to their light weight, low magnetic signature (in cases of mines sensitive to magnetic fields), and reduced risk of accidental detonation from nearby radios or other electronics. TDFDs allow sufficient time for EOD personnel to swim outside of the detonation plume radius and human safety buffer zone after the timer is set. For a surface detonation training event involving a helicopter or a boat, the minimum time-delay that is reasonable for EOD divers to make their way to safety is about 10 minutes. For underwater detonation training events at depth using small boats, the time-delay can be minimized to 5 minutes; however, this requires the instructors to handle initiation of the detonation and therefore results in decreased training value for students. The Navy considers it critical that EOD and NSW platoons qualify annually with necessary time-delay certification, maintain proficiency, and train to face real-world scenarios that require use of TDFDs.

While positive control devices do allow for instantaneous detonation of a charge and are used for some SSTC training events, RFDs are the less-preferred method to initiate an underwater detonation. Current Navy RFDs use a radio signal to remotely detonate a charge. By using electronic positive control devices such as the RFD, additional electronic signals and metal from the receiver and wiring is unnecessarily introduced into the operating environment. Underwater detonation events need to be kept as simple and streamlined as possible, especially when diver safety is considered. In an open ocean environment, universal use of RFDs would greatly increase the risk of misfire due to component failure, and put unnecessary stress on all needed connections and devices (adding 600-1,000 feet of firing wire; building/deploying an improvised, bulky, floating system for the RFD receiver; and adding another 180 feet of detonating cord plus 10 feet of other material).

Pile Driving

Installation and removal of Elevated Causeway System (ELCAS) support piles may also result in the harassment of marine mammals. The ELCAS is a modular pre-fabricated causeway pier that links offshore amphibious supply ships with associated lighterage (i.e., small cargo boats and barges). Offloaded vehicles and supplies can be driven on the causeway to and from shore.

During ELCAS training events, 24-inch wide hollow steel piles would be driven into the sand in the surf zone with an impact hammer. About 101 piles would be driven into the beach and surf zone with a diesel impact hammer over the course of about 10 days, 24-hours per day (i.e., day and night). Each pile takes an average of 10 minutes to install, with around 250 to 300 impacts per pile. Pile driving includes a semi-soft start as part of the normal operating procedure based on the design of the drive equipment. The pile driver increases impact strength as resistance goes up. At first, the pile driver piston drops a few inches. As resistance goes up, the pile driver piston drops from a higher distance, providing more impact due to gravity. The pile driver can take 5 to 7 minutes to reach full impact strength. As chapters of piles are installed, causeway platforms are then hoisted and secured onto the piles with hydraulic jacks and cranes. At the end of training, the ELCAS piles would be removed with a vibratory extractor. Removal takes about 15 minutes per pile over a period of around 3 days. ELCAS training may occur along both the ocean side (SSTC-North boat and beach lanes) and with the designated training lane within Bravo beach on the bayside of SSTC. Up to four ELCAS training/installation events may occur during the year.

Dates and Duration of Proposed Activities

The Navy's proposed activities would occur between July 2013 and July 2014. Most underwater detonation training events include one or two detonations. Table 2-1 in the Navy's LOA application shows the 19 different types and number of training events per year in the SSTC. Pile installation and removal would occur over an approximate 13 day period, up to four times per year. NMFS is proposing to issue a 1-year IHA that may be superseded if we issue a Letter of Authorization under regulations for the Navy's Hawaii-Southern California Training and Testing (HSTT) (which would include the SSTC) prior to expiration of the IHA.

Location of Proposed Activities

The SSTC (Figure 1-1 of the Navy's IHA application) is located in and adjacent to San Diego Bay, south of Coronado, California and north of Imperial Beach, California. The complex is composed of ocean and bay training lanes, adjacent beach training areas, ocean anchorages, and inland training areas. To facilitate range management and scheduling, the SSTC is divided into numerous training sub-areas.

The surfside training lanes of the SSTC are located in the Silver Strand Littoral Cell, which is an exposed, open subtidal area of the Pacific Ocean extending from south of the international border to the Zuniga Jetty at San Diego Bay for over 17 miles of coastal reach. The Silver Strand Littoral Cell is a coastal eddy system that dominates local ocean movement and generally moves from south to north with periodic reversals. Surface water temperatures generally are highest from June through September and lowest from November through February. Historical temperatures in the study area range from 52 to 74 degrees Fahrenheit near the surface and from 49 to 61 degrees Fahrenheit near the bottom. Water temperatures near the beach tend to be more uniform throughout the water column due to turbulent mixing and shallower depth. The bathymetry off the surfside training lanes is relatively evenly sloped, with a predominantly soft sandy bottom mixed with minor amounts of mud, hard-shale bedrock, and small cobble-boulder fields. The area does not have underwater canyons or significant upwelling conditions. Flora and fauna in the region of the SSTC is dominated by coastal surf zone and some coastal pelagic zone species. In the summer of 2011, the Navy funded a new benthic habitat survey to reassess benthic habitat and bottom conditions with results shown in Figure 2-1 of the Navy LOA application. A second follow-up benthic habitat survey was performed in the late summer and fall of 2012 to cover areas between SSTC-North and SSTC-South, as well as areas further offshore to the 120-foot contour.

Description of Marine Mammals in the Area of the Specified Activity

Four marine mammal species may inhabit or regularly transit the SSTC area: California sea lion (Zalophus californianus), Pacific harbor seal (Phoca vitulina richardsii), California coastal stock of bottlenose dolphin (Tursiops truncatus), and gray whale (Eschrichtius robustus). Following the incident of common dolphin mortalities that resulted from the use of TDFDs during a training exercise in 2012, the Navy and NMFS reassessed the species distribution in the

SSTC study area and included four additional dolphin species: long-beaked common dolphin (Delphinus capensis), short-beaked common dolphin (D. delphis), Pacific white-sided dolphin (Lagenorhynchus obliquidens), and Risso's dolphin (Grampus griseus). These four dolphin species are less frequent visitors, but have been sighted in the vicinity of the SSTC training area.

Navy-funded surveys in the SSTC in late 2012 and 2013 have documented the sporadic presence of long-beaked common dolphins near some parts of the SSTC. There is no documented NMFS sighting data for short-beaked common dolphin, Pacific white-sided dolphin, or Risso's dolphin, or other anecdotal information currently available as to likely presence within the very near-shore, shallow waters associated with the SSTC boat lanes. Therefore, the Navy included these species in their analysis in the rare event that they move through the SSTC boat lanes. None of the species above are listed as threatened or endangered under the Endangered Species Act (ESA). Further information on these species can also be found in the NMFS Stock Assessment Reports (SAR) (http://www.nmfs.noaa.gov/pr/species/mammals/).

California Sea Lions

The California sea lion is by far the most commonly-sighted pinniped species at sea or on land in the vicinity of the SSTC. Nearly all of the U.S. Stock (more than 95 percent) of California sea lion breeds and gives birth to pups on San Miguel, San Nicolas, and Santa Barbara islands off California. Smaller numbers of pups are born on the Farallon Islands, and Año Nuevo Island (Lowry et al. 1992). In California waters, sea lions represented 97 percent (381 of 393) of identified pinniped sightings at sea during the 1998-1999 NMFS surveys (Carretta et al. 2000). They were sighted during all seasons and in all areas with survey coverage from nearshore to offshore areas (Carretta et al. 2000).

Survey data from 1975 to 1978 were analyzed to describe the seasonal shifts in the offshore distribution of California sea lions (Bonnell and Ford 1987). During summer, the highest densities were found immediately west of San Miguel Island. During autumn, peak densities of sea lions were centered on Santa Cruz Island. During winter and spring, peak densities occurred just north of San Clemente Island. The seasonal changes in the center of distribution were attributed to changes in the distribution of the prey species. If California sea lion distribution is determined primarily by prey abundance as influenced by variations in local, seasonal, and inter-annual oceanographic variation, these same areas might not be the center of sea lion distribution every year. Costa et al. (2007) was able to identify kernel home range contours for foraging female sea lions during non-El Nino conditions, although there was some variation over the three years of this tagging study. Melin et al. (2008) showed that foraging female sea lions showed significant variability in individual foraging behavior, and foraged farther offshore and at deeper depths during El Nino years as compared to non-El Nino years. The distribution and habitat use of California sea lions vary with the sex of the animals and their reproductive phase. Adult males haul out on land to defend territories and breed from mid-to-late May until late July. The pupping and mating season for sea lions begins in late May and continues through July (Heath 2002). Individual males remain on territories for 27–45 days without going to sea to feed. During August and September, after the mating season, the adult males migrate northward to feeding areas as far away as Washington (Puget Sound) and British Columbia (Lowry et al. 1992). They remain there until spring (March-May), when they migrate back to the breeding colonies. Thus, adult males are present in offshore areas of the SSTC only briefly as they move to and from rookeries. Distribution of immature California sea lions is less well known, but some make northward migrations that are shorter in length than the migrations of adult males (Huber 1991). However, most immature sea lions are presumed to remain near the rookeries, and thus remain near SSTC for most of the year (Lowry et al. 1992). Adult females remain near the rookeries throughout the year. Most births occur from mid-June to mid-July (peak in late June).

California sea lions feed on a wide variety of prey, including Pacific whiting, northern anchovy, mackerel, squid, sardines, and rockfish (Antonelis et al. 1990; Lowry et al. 1991; Lowry and Carretta 1999; Lowry and Forney 2005; Bearzi 2006). In Santa Monica Bay, California sea lions are known to follow and feed near bottlenose dolphins (Bearzi 2006), and if in the near shore waters of SSTC, may forage on common coastal beach fish species (corbina and barred surfperch) (Allen 2006).

There are limited published at-sea density estimates for pinnipeds within Southern California. Higher densities of California sea lions are observed during cold-water months. At-sea densities likely decrease during warm-water months because females spend more time ashore to give birth and attend to their pups. Radio-tagged female California sea lions at San Miguel Island spent approximately 70 percent of their time at sea during the non-breeding season (cold-water months) and pups spent an average of 67 percent of their time ashore during their mother's absence (Melin and DeLong 2000). Different age classes of California sea lions are found in the offshore areas of SSTC throughout the year (Lowry et al. 1992). Although adult male California sea lions feed in areas north of SSTC, animals of all other ages and sexes spend most, but not all, of their time feeding at sea during winter, thus, the winter estimates likely are somewhat low.

During warm-water months, a high proportion of the adult males and females are hauled out at terrestrial sites during much of the period, so the summer estimates are low to a greater degree.

The NMFS population estimate of the U.S. Stock of California sea lions is 296,750 (Carretta et al. 2010). The California sea lion is not listed under the ESA, and the U.S. Stock, some of which occurs in the SSTC, is not considered a strategic stock under the MMPA.

Pacific Harbor Seal

Harbor seals are considered abundant throughout most of their range from Baja California to the eastern Aleutian Islands. An unknown number of harbor seals also occur along the west coast of Baja California, at least as far south as Isla Asuncion, which is about 100 miles south of Punta Eugenia. Animals along Baja California are not considered to be a part of the California stock because it is not known if there is any demographically significant movement of harbor seals between California and Mexico (Carretta et al. 2010). Peak numbers of harbor seals haul out on land during late May to early June, which coincides with the peak of their molt. They generally favor sandy, cobble, and gravel beaches (Stewart and Yochem 1994; 2000), and most haul out on the central California mainland and Santa Cruz Island (Lowry and Carretta 2003; Carretta et al. 2010).

There are limited at-sea density estimates for pinnipeds within Southern California. Harbor seals do not make extensive pelagic migrations, but do travel 300-500 km on occasion to find food or suitable breeding areas (Herder 1986; Carretta et al. 2007). Nursing of pups begins in late February, and pups start to become weaned in May. Breeding occurs between late March and early May on the southern and northern Channel Islands. When at sea during May and June (and March to May for breeding females), they generally remain in the vicinity of haul out sites and forage close to shore in relatively shallow waters. Based on likely foraging strategies, Grigg et al. (2009) reported seasonal shifts in harbor seal movements based on prey availability.

Harbor seals are opportunistic feeders that adjust their feeding to take advantage of locally and seasonally abundant prey which can include small crustaceans, rock fish, cusk-eel, octopus, market squid, and surfperch (Bigg 1981; Payne and Selzer 1989; Stewart and Yochem 1994; Stewart and Yochem 2000; Baird 2001; Oates 2005). If in the near shore waters of SSTC, harbor seals may forage on common coastal beach fish species, such as corbina and barred surfperch (Allen 2006).

Harbor seals are found in the SSTC throughout the year (Carretta et al. 2000). Based on the most recent harbor seal counts (19,608 in May-July 2009; NMFS unpublished data) and the Harvey and Goley (2011) correction factor, the harbor seal population in California is estimated to number 30,196.

The harbor seal is not listed under the ESA, and the California Stock, some of which occurs in the SSTC, is not considered a strategic stock under the MMPA. The California population has increased from the mid-1960s to the mid-1990s, although the rate of increase may have slowed during the 1990s as the population has reached and may be stabilizing at carrying capacity (Hanan 1996, Carretta et al. 2010).

Bottlenose Dolphin

There are two distinct populations of bottlenose dolphins within southern California, a coastal population found within 0.5 nm (0.9 km) of shore and a larger offshore population (Hansen 1990; Bearzi et al. 2009). The California Coastal Stock is the only one of these two stocks likely to occur within the SSTC. The bottlenose dolphin California Coastal Stock occurs at least from Point Conception south into Mexican waters, at least as far south as San Quintin, Mexico. Bottlenose dolphins in the Southern California Bight (SCB) appear to be highly mobile within a relatively narrow coastal zone (Defran et al. 1999), and exhibit no seasonal site fidelity to the region (Defran and Weller 1999). There is little site fidelity of coastal bottlenose dolphins along the California coast; over 80 percent of the dolphins identified in Santa Barbara, Monterey, and Ensenada have also been identified off San Diego (Defran et al. 1999; Maldini-Feinholz 1996; Carretta et al. 2008; Bearzi et al. 2009). Bottlenose dolphins could occur in the SSTC at variable frequencies and periods throughout the year based on localized prey availability (Defran et al. 1999).

The Pacific coast bottlenose dolphins feed primarily on surf perches and croakers (Norris and Prescott 1961; Walker 1981; Schwartz et al. 1992; Hanson and Defran 1993), and also consume squid (Schwartz et al. 1992). The coastal stock of bottlenose dolphin utilizes a limited number of fish prey species with up to 74 percent being various species of surfperch or croakers, a group of non-migratory year-round coastal inhabitants (Defran et al. 1999; Allen et al. 2006). For Southern California, common croaker prey species include spotfin croaker, yellowfin croaker, and California corbina, while common surfperch species include barred surfperch and walleye surfperch (Allen et al. 2006). The corbina and barred surfperch are the most common surf zone fish where bottlenose dolphins have been observed foraging (Allen et al. 2006). Defran et al. (1999) postulated that the coastal stock of bottlenose dolphins showed significant movement within their home range (Central California to Mexico) in search of preferred but patchy concentrations of near shore prey (i.e., croakers and surfperch). 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 after which the dolphins once again shift location over larger distances (Defran et al. 1999). Bearzi (2005) and Bearzi et al. (2009) also noted little site fidelity from coastal bottlenose dolphins in Santa Monica Bay, California, and that these animals were highly mobile with up to 69 percent of their time spent in travel and dive-travel mode and only 5 percent of the time in feeding behaviors.

Group size of the California coastal stock of bottlenose dolphins has been reported to range from 1 to 57 dolphins (Bearzi 2005), although mean pod sizes were around 19.8 (Defran and Weller 1999) and 10.1 (Bearzi 2005). An at-sea density estimate of 0.202 animals/km^2 was used for acoustic impact modeling for both the warm and cold seasons as derived in National Center for Coastal Ocean Science (2005).

Based on photographic mark-recapture surveys conducted along the San Diego coast in 2004 and 2005, population size for the California Coastal Stock of the bottlenose dolphin is estimated to be 323 individuals (CV = 0.13, 95% CI 259-430; Dudzik et al. 2005; Carretta et al. 2010). This estimate does 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. 2010). The California Coastal Stock of bottlenose dolphins is not listed under the ESA, and is not considered a strategic stock under the MMPA.

Gray Whale

The Eastern North Pacific population is found from the upper Gulf of California (Tershy and Breese 1991), south to the tip of Baja California, and up the Pacific coast of North America to the Chukchi and Beaufort seas. There is a pronounced seasonal north-south migration. The eastern North Pacific population summers in the shallow waters of the northern Bering Sea, the Chukchi Sea, and the western Beaufort Sea (Rice and Wolman 1971). The northern Gulf of Alaska (near Kodiak Island) is also considered a feeding area; some gray whales occur there year-round (Moore et al. 2007). Some individuals spend the summer feeding along the Pacific coast from southeastern Alaska to central California (Sumich 1984; Calambokidis et al. 1987; 2002). Photo-identification studies indicate that gray whales move widely along the Pacific coast and are often not sighted in the same area each year (Calambokidis et al. 2002). In October and November, the whales begin to migrate southeast through Unimak Pass and follow the shoreline south to breeding grounds on the west coast of Baja California and the southeastern Gulf of California (Braham 1984; Rugh 1984). The average gray whale migrates 4,050 to 5,000 nm (7,500 to 10,000 km) at a rate of 80 nm (147 km) per day (Rugh et al. 2001; Jones and Swartz 2002). Although some calves are born along the coast of California (Shelden et al. 2004), most are born in the shallow, protected waters on the Pacific coast of Baja California from Morro de Santo Domingo (28°N) south to Isla Creciente (24°N) (Urbán et al. 2003). Main calving sites are Laguna Guerrero Negro, Laguna Ojo de Liebre, Laguna San Ignacio, and Estero Soledad (Rice et al. 1981).

A group of gray whales known as the Pacific Coast Feeding Aggregation (PCFA) feeds along the Pacific coast between southeastern Alaska and northern to central California throughout the summer and fall (NMFS 2001; Calambokidis et al. 2002; Calambokidis et al. 2004). The gray whales in this feeding aggregation are a relatively small proportion (a few hundred individuals) of the overall eastern North Pacific population and typically arrive and depart from these feeding grounds concurrently with the migration to and from the wintering grounds (Calambokidis et al. 2002; Allen and Angliss 2010). Although some site fidelity is known to occur, there is generally considerable inter-annual variation since many individuals do not return to the same feeding site in successive years (Calambokidis et al. 2000; Calambokidis et al. 2004).

The Eastern North Pacific stock of gray whale transits through Southern California during its northward and southward migrations between December and June. Gray whales follow three routes from within 15 to 200 km from shore (Bonnell and Dailey 1993). The nearshore route follows the shoreline between Point Conception and Point Vicente but includes a more direct line from Santa Barbara to Ventura and across Santa Monica Bay. Around Point Vicente or Point Fermin, some whales veer south towards Santa Catalina Island and return to the nearshore route near Newport Beach. Others join the inshore route that includes the northern chain of the Channel Islands along Santa Cruz Island and Anacapa Island and east along the Santa Cruz Basin to Santa Barbara Island and the Osborn Bank. From here, gray whales migrate east directly to Santa Catalina Island and then to Point Loma or Punta Descanso or southeast to San Clemente Island and on to the area near Punta Banda. A significant portion of the Eastern North Pacific stock passes by San Clemente Island and its associated offshore waters (Carretta et al. 2000). The offshore route follows the undersea ridge from Santa Rosa Island to the mainland shore of Baja California and includes San Nicolas Island and Tanner and Cortes banks (Bonnell and Dailey 1993).

Peak abundance of gray whales off the coast of San Diego is typically January during the southward migration and in March during the migration 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; Stevick et al. 2002; Angliss and Outlaw 2008). Gray whales would be expected to be infrequent migratory transients within the out portions of SSTC only during cold-water months (Carretta et al. 2000). Migrating gray whales that might infrequently transit through the SSTC would not be expected to forage, and would likely be present for less than two hours at typical travel speeds of 3 knots (approximately 3.5 miles per hour) (Perryman et al. 1999; Mate and Urbán-Ramirez 2003).
A mean group size of 2.9 gray whales was reported for both coastal (16 groups) and non-coastal (15 groups) areas around San Clemente Island (Carretta et al. 2000). The largest group reported was nine animals. The largest group reported by U.S. Navy (1998) was 27 animals. Gray whales would not be expected in the SSTC from July through November (Rice et al. 1981), and are excluded from warm season analysis. Even though gray whale transitory occurrence is infrequent along SSTC a cold season density is estimated at 0.014 animals per km^2 for purposes of conservative analysis.

Systematic counts of gray whales migrating south along the central California coast have been conducted by shore-based observers at Granite Canyon most years since 1967. The population size of the Eastern North Pacific gray whale stock has been increasing over the past several decades at a rate approximately between 2.5 to 3.3 percent per year since 1967. The most recent abundance estimates are based on the National Marine Fisheries Service's population estimate of 19,126 individuals as reported in Allen and Angliss (2010).

In 1994, due to steady increases in population abundance, the Eastern North Pacific stock of gray whales was removed from the List of Endangered and Threatened Wildlife, as it was no longer considered endangered or threatened under the ESA (Allen and Angliss 2010). The

Eastern North Pacific stock of gray whale is not considered a strategic stock under the MMPA. Even though the stock is within Optimal Sustainable Population, abundance will rise and fall as the population adjusts to natural and man-caused factors affecting the carrying capacity of the environment (Rugh et al. 2005). In fact, it is expected that a population close to or at the carrying capacity of the environment will be more susceptible to fluctuations in the environment (Moore et al. 2001).

Long-beaked Common Dolphin, California Stock

Long-beaked common dolphins are found year-round in the waters off California (Carretta et al. 2000; Bearzi 2005; DoN 2009, 2010). The distribution and abundance of long-beaked common dolphins appears to be variable based on inter-annual and seasonal time scales (Dohl et al. 1986; Heyning and Perrin 1994; Barlow 1995; Forney et al. 1995; Forney and Barlow 2007). As oceanographic conditions change, long-beaked common dolphins may move between Mexican and U.S. waters, and therefore a multi-year average abundance estimate is the most appropriate for management within the U.S. waters (Carretta et al. 2010). California waters represent the northern limit for this stock and animal's likely movement between U.S. and Mexican waters. No information on trends in abundance is available for this stock because of high inter-annual variability in line-transect abundance estimates (Carretta et al. 2010). Heyning and Perrin (1994) detected changes in the proportion of short-beaked to long-beaked common dolphins stranding along the California coast, with the short-beaked common dolphin stranding more frequently prior to the 1982-83 El Niño (which increased water temperatures off California), and the long-beaked common dolphin more frequently observed for several years afterwards. Thus, it appears that both relative and absolute abundance of these species off

California may change with varying oceanographic conditions (Carretta et al. 2010). Common dolphin distributions may be related to bathymetry (Hui 1979). Long-beaked common dolphins are usually found within 50 nautical miles (nm) (92.5 km) of shore with significantly more occurrence near canyons, escarpments, and slopes (Heyning and Perrin 1994; Barlow et al. 1997; Bearzi 2005, 2006). Group size ranges from less than a dozen to several thousand individuals (Barlow and Forney 2007; Barlow et al. 2010).

Recent anecdotal accounts from Navy Explosive Ordnance Disposal (EOD) divers remark on periodic sightings of large dolphin pods within the more seaward portions of the SSTC that are likely comprised of long-beaked common dolphin. During SSTC Navy-funded marine mammal monitoring conducted over 2 days in November 2012, there were confirmed sightings of long-beaked common dolphin pods in the outer portions of the SSTC in about 75 feet of water. Unlike the large congregated schools common to this species, the long-beaked common dolphins seen in November were in widely dispersed small sub-groups with one to five dolphins per group. Individuals and small groups were seen chasing bait fish to the surface and foraging. The dolphins were observed over a one-hour period and eventually left the SSTC heading seaward.

Sparse information is available on the life history of long-beaked common dolphins, however, some information is provided for short-beaked common dolphins which may also apply to long-beaked dolphins. North Pacific short-beaked common dolphin females and males reach sexual maturity at roughly 8 and 10 years, respectively (Ferrero and Walker 1995). Peak calving season for common dolphins in the eastern North Pacific may be spring and early summer (Forney 1994). Barlow (2010) reported average group size for long-beaked common dolphins within a Southern California-specific stratum as 195 individuals from a 2008 survey along the U.S. West Coast. The geometric mean abundance estimate in NMFS' annual stock assessment for the entire California stock of long-beaked common dolphins, based on two ship surveys conducted in 2005 and 2008, is 27,046 (CV = 0.59) (Forney 2007; Barlow 2010; Carretta et al. 2010). Using a more stratified approach, Barlow et al. (2010) estimated abundance within a Southern California-specific strata of 16,480 (CV = 0.41) long-beaked common dolphins based on analysis of pooled sighting data from 1991-2008. Long-beaked common dolphins are not listed under the ESA, and are not considered a strategic stock under the MMPA.

Pacific White-sided Dolphin, California/Oregon/Washington Stock

While Pacific white-sided dolphins could potentially occur year-round in Southern California, surveys suggest a seasonal north-south movement in the eastern North Pacific, with animals found primarily off California during the colder water months and shifting northward into Oregon and Washington as water temperatures increase during late spring and summer (Green et al. 1992, 1993; Forney 1994; Forney and Barlow 2007; Barlow 2010). Salvadeo et al. (2010) propose that increased global warming may increase a northward shift in Pacific white-sided dolphins. The Pacific white-sided dolphin is most common in waters over the continental shelf and slope, however, sighting records and captures in pelagic driftnets indicate that this species also occurs in oceanic waters well beyond the shelf and slope (Leatherwood et al. 1984; DoN 2009, 2010). Soldevilla et al. (2010a) reported the possibility of two distinct eco-types of Pacific white-sided dolphins occurring in Southern California based on passive acoustic detection of two distinct echolocation click patterns. No population trends have been observed in California or adjacent waters. Barlow (2010) reported average group size for Pacific white-sided dolphins within a Southern California-specific stratum as 17 from a 2008 survey along the U.S. West Coast. The size of the entire California/Oregon/Washington Stock is estimated to be 26,930 (CV = 0.28) individuals (Forney 2007, Barlow, 2010). Using a more stratified approach, Barlow et al. (2010) estimated abundance within a Southern California-specific strata of 1,914 (CV = 0.39) Pacific white-sided dolphins based on analysis of pooled sighting data from 1991-2008. Pacific white-sided dolphins are not listed under the ESA, and are not considered a strategic stock under the MMPA.

Risso's Dolphin, California/Oregon/ Washington Stock

Off the U.S. West coast, Risso's dolphins are commonly seen on the shelf off Southern California and in slope and offshore waters of California, Oregon and Washington (Soldevilla et al. 2010b; Carretta et al. 2010). Animals found off California during the colder water months are thought to shift northward into Oregon and Washington as water temperatures increase in late spring and summer (Green et al. 1992). The southern end of this population's range is not well documented, but previous surveys have shown a conspicuous 500 nm distributional gap between these animals and Risso's dolphins sighted south of Baja California and in the Gulf of California (Mangels and Gerrodette 1994). Thus this population appears distinct from animals found in the eastern tropical Pacific and the Gulf of California (Carretta et al. 2010). As oceanographic conditions vary, Risso's dolphins may spend time outside the U.S. Exclusive Economic Zone. Barlow (2010) reported average group size for Risso's dolphins within a Southern California-specific stratum as 23 from a 2008 survey along the U.S. West Coast. The size of the California/Oregon/Washington Stock is estimated to be 6,272 (CV = 0.30) individuals (Forney

2007; Barlow 2010; Carretta et al. 2010). Using a more stratified approach, Barlow et al. (2010) estimated abundance within a Southern California-specific strata of 3,974 (CV = 0.39) Risso's dolphins based on analysis of pooled sighting data from 1991-2008. Risso's dolphins are not listed under the ESA, and are not considered a strategic stock under the MMPA.

Short-beaked Common Dolphin, California/Oregon/Washington Stock

Short-beaked common dolphins are the most abundant cetacean off California, and are widely distributed between the coast and at least 300 nm distance from shore (Dohl et al. 1981; Forney et al. 1995; Barlow 2010; Carretta et al. 2010). Along the U.S. West Coast, portions of the short-beaked common dolphins' distribution overlap with that of the long-beaked common dolphin. The northward extent of short-beaked common dolphin distribution appears to vary inter-annually and with changing oceanographic conditions (Forney and Barlow 1998). Barlow (2010) reported average group size for short-beaked common dolphins within a Southern California-specific stratum as 122 from a 2008 survey along the U.S. West Coast. The size of the California/Oregon/Washington Stock is estimated to be 411,211 (CV = 0.21) individuals (Carretta et al. 2010). Using a more stratified approach, Barlow et al. (2010) estimated abundance within a Southern California-specific strata of 152,000 (CV = 0.17) short-beaked common dolphins based on analysis of pooled sighting data from 1991-2008. Short-beaked common dolphins are not listed under the ESA, and are not considered a strategic stock under the MMPA.

Potential Effects on Marine Mammals

Anticipated impacts resulting from the Navy's proposed SSTC training activities include disturbance from underwater detonation events and pile driving from ELCAS training events if marine mammals are in the vicinity of these action areas.

Impacts from Anthropogenic Noise

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 unrecoverable, or temporary (TTS), in which case the animal's hearing threshold will recover over time (Southall et al. 2007). Since marine mammals depend on acoustic cues for vital biological functions, such as orientation, communication, finding prey, and avoiding predators, marine mammals that suffer from PTS or TTS will have reduced fitness in survival and reproduction, either permanently or temporarily. Repeated noise exposure that leads to TTS could cause PTS.

Although no marine mammals have been shown to experience TTS or PTS as a result of being exposed to pile driving activities, experiments on a bottlenose dolphin and beluga whale (Delphinapterus leucas) showed that exposure to a single watergun impulse at a received level of 207 kPa (or 30 psi) peak-to-peak (p-p), which is equivalent to 228 dB re 1 μPa (p-p), resulted in a 7 and 6 dB TTS in the beluga whale at 0.4 and 30 kHz, respectively. Thresholds returned to within 2 dB of the pre-exposure level within 4 minutes of the exposure (Finneran et al. 2002). No TTS was observed in the bottlenose dolphin. 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 noise exposure in terms of SEL than from the single watergun impulse 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 noise levels for prolonged period of time. Current NMFS standards for preventing injury from PTS and TTS is to require shutdown or power-down of noise sources when a cetacean species is detected within the isopleths corresponding to SPL at received levels equal to or higher than 180 dB re 1 μPa (rms), or a pinniped species at 190 dB re 1 μPa (rms). Based on the best scientific information available, these SPLs are far below the threshold that could cause TTS or the onset of PTS. Certain mitigation measures proposed by the Navy, discussed below, can effectively prevent the onset of TS in marine mammals, including establishing safety zones and monitoring safety zones during the training exercise.

In addition, chronic exposure to excessive, though not high-intensity, noise 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, like TS, marine mammals whose acoustical sensors or environment are being masked are also impaired from maximizing their performance fitness in survival and reproduction.

Masking occurs at the frequency band which the animals utilize. Therefore, since noise generated from the proposed underwater detonation and pile driving and removal is mostly concentrated at low frequency ranges, it may have less effect on species with mid- and high-frequency echolocation sounds. However, lower frequency man-made noises are more likely to affect detection of communication calls and other potentially important natural sounds such as surf and prey noise. It may also affect communication signals when they occur near the noise band used by the animals 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 can potentially impact marine mammals at the individual, population, community, or even ecosystem levels (instead of individual levels caused by TS). Masking affects both senders and receivers of the signals and can potentially have long-term chronic effects on marine mammal species and populations in certain situations. Recent science suggests that low-frequency ambient sound levels have increased by as much as 20 dB (more than 3 times in terms of SPL) in the world's ocean from pre-industrial periods, and most of these increases are from distant shipping (Hildebrand 2009). All anthropogenic noise sources, such as those from underwater explosions and pile driving, contribute to the elevated ambient noise levels and, thus intensify masking. However, single detonations are unlikely to contribute much to masking.

Since all of the underwater detonation events and ELCAS events are planned in a very shallow water situation (wave length >> water depth), where low-frequency propagation is not efficient, the noise generated from these activities is predominantly in the low-frequency range and is not expected to contribute significantly to increased ocean ambient noise.

Finally, exposure of marine mammals to certain sounds could lead to behavioral disturbance (Richardson et al. 1995). Behavioral responses to exposure to sound and explosions can range from no observable response to panic, flight and possibly more significant responses as discussed previously (Richardson et al. 1995; Southall et al. 2007). These responses include: 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 noise sources are located, and/or flight responses (e.g., pinnipeds flushing into water from haul-outs or rookeries) (reviews by Richardson et al. 1995; Wartzok et al. 2003; Cox et al. 2006; Nowacek et al. 2007; Southall et al. 2007).

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, and reproduction. Some of these significant behavioral modifications include:

- Drastic change 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
- Cease feeding or social interaction.

For example, at the Guerreo Negro Lagoon in Baja California, Mexico, which is one of the important breeding grounds for Pacific gray whales, shipping and dredging associated with a salt works may have induced gray whales to abandon the area through most of the 1960s (Bryant et al. 1984). After these activities stopped, the lagoon was reoccupied, first by single whales and later by cow-calf pairs.

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

However, the proposed action area is not believed to be a prime habitat for marine mammals, nor is it considered an area frequented by marine mammals. Therefore, behavioral disturbances that could result from anthropogenic construction noise associated with the Navy's proposed training activities are expected to affect only a small number of marine mammals on an infrequent basis.

Impacts from Underwater Detonations at Close Range

In addition to noise induced disturbances and harassment, marine mammals could be killed or injured by underwater explosions due to the impacts to air cavities, such as the lungs and bubbles in the intestines, from the shock wave (Elsayed 1997; Elsayed and Gorbunov 2007). The criterion for mortality and non-auditory injury used in MMPA take authorization is the onset of extensive lung hemorrhage and slight lung injury or ear drum rupture, respectively (see Table 3). Extensive lung hemorrhage is considered debilitating and potentially fatal as a result of air embolism or suffocation. In the Incidental Harassment Authorization application, all marine mammals within the calculated radius for 1 percent probability of onset of extensive lung injury (i.e., onset of mortality) were counted as lethal exposures. The range at which 1 percent probability of onset of extensive lung hemorrhage is expected to occur is greater than the ranges at which 50 percent to 100 percent lethality would occur from closest proximity to the charge or from presence within the bulk cavitation region. (The region of bulk cavitation is an area near the surface above the detonation point in which the reflected shock wave creates a region of cavitation within which smaller animals would not be expected to survive). Because the range for onset of extensive lung hemorrhage for smaller animals exceeds the range for bulk cavitation and all more serious injuries, all smaller animals within the region of cavitation and all animals (regardless of body mass) with more serious injuries than onset of extensive lung hemorrhage were accounted for in the lethal exposures estimate. The calculated maximum ranges for onset of extensive lung hemorrhage depend upon animal body mass, with smaller animals having the greatest potential for impact, as well as water column temperature and density.

However, due to the small detonation that would be used in the proposed SSTC training activities and the resulting small safety zones to be monitored and mitigated for marine mammals in the vicinity of the proposed action area, it is highly unlikely that marine mammals would be killed or injured by underwater detonations.

Impact Criteria and Thresholds

The effects of an at-sea explosion or pile driving on a marine mammal depend on many factors, including the size, type, and depth of both the animal and the explosive charge/pile being driven; the depth of the water column; the standoff distance between the charge/pile and the animal; and the sound propagation properties of the environment. Potential impacts can range from brief acoustic effects (such as behavioral disturbance), tactile perception, physical discomfort, and slight injury of the internal organs and the auditory system, to death of the animal (Yelverton et al. 1973; O'Keeffe and Young 1984; DoN 2001). Non-lethal injury includes slight injury to internal organs and the auditory system; however, delayed lethality can be a result of individual or cumulative sub-lethal injuries (DoN 2001). Short-term or immediate lethal injury would result from massive combined trauma to internal organs as a direct result of proximity to the point of detonation or pile driving (DoN 2001).

This section summarizes the marine mammal impact criteria used for the subsequent modeled calculations. Several standard acoustic metrics (Urick 1983) are used to describe the thresholds for predicting potential physical impacts from underwater pressure waves:

- Total energy flux density or Sound Exposure Level (SEL). For plane waves (as assumed here), SEL is the time integral of the instantaneous intensity, where the instantaneous intensity is defined as the squared acoustic pressure divided by the characteristic impedance of sea water. Thus, SEL is the instantaneous pressure amplitude squared, summed over the duration of the signal and has dB units referenced to 1 re μPa^2-s.
- 1/3-octave SEL. This is the SEL in a 1/3-octave frequency band. A 1/3-octave band has upper and lower frequency limits with a ratio of 21:3, creating bandwidth limits of about 23 percent of center frequency.
- Positive impulse. This is the time integral of the initial positive pressure pulse of an explosion or explosive-like wave form. Standard units are Pa-s, but psi-ms also are used.
- Peak pressure. This is the maximum positive amplitude of a pressure wave, dependent on charge mass and range. Units used here are psi, but other units of pressure, such as µPa and Bar, also are used.

Harassment Threshold for Sequential Underwater Detonations – There may be rare occasions when sequential underwater detonations are part of a static location event. Sequential detonations are more than one detonation within a 24-hour period in a geographic location where harassment zones overlap. For sequential underwater detonations, accumulated energy over the entire training time is the natural extension for energy thresholds since energy accumulates with each subsequent shot.

For sequential underwater detonations, the acoustic criterion for behavioral harassment is used to account for behavioral effects significant enough to be judged as harassment, but occurring at lower sound energy levels than those that may cause TTS. The behavioral harassment threshold is based on recent guidance from NMFS (NMFS 2009a; 2009b) for the energy-based TTS threshold. The research on pure tone exposures reported in Schlundt et al. (2000) and Finneran and Schlundt (2004) provided the pure-tone threshold of 192 dB as the lowest TTS value. The resulting TTS threshold for explosives is 182 dB re 1 μPa^2-s in any 1/3 octave band. As reported by Schlundt et al. (2000) and Finneran and Schlundt (2004), instances of altered behavior in the pure tone research generally began 5 dB lower than those causing TTS. The behavioral harassment threshold is therefore derived by subtracting 5 dB from the 182 dB re 1 μPa^2-s in any 1/3 octave band threshold, resulting in a 177 dB re 1 μPa^2-s behavioral disturbance harassment threshold for multiple successive explosives (Table 3).

Criteria for ELCAS Pile Driving and Removal – Since 1997, NMFS has been using generic sound exposure thresholds to determine when an activity in the ocean that produces impact sound (i.e., pile driving) results in potential take of marine mammals by harassment (70 FR 1871). Current NMFS criteria (70 FR 1871) regarding exposure of marine mammals to underwater sounds is that cetaceans exposed to sound pressure levels (SPLs) of 180 dB root mean squared (dB_{rms} in units of dB re 1 μPa) or higher and pinnipeds exposed to 190 dB_{rms} or higher are considered to have been taken by Level A (i.e., injurious) harassment. Marine mammals (cetaceans and pinnipeds) exposed to impulse sounds (e.g., impact pile driving) of 160 dB_{rms} but below Level A thresholds (i.e., 180 or 190 dB) are considered to have been taken by Level B behavioral harassment. Marine mammals (cetaceans and pinnipeds) exposed to non-impulse noise (e.g., vibratory pile driving) at received levels of 120 dB RMS or above are considered to have been taken by Level B behavioral harassment (Table 3).

Table 3. Effects criteria for underwater detonations and ELCAS pile driving/removal.

<table>
<tr><th colspan="3">Underwater Explosive Criteria</th></tr>
<tr><th>Criterion</th><th>Criterion Definition</th><th>Threshold</th></tr>
<tr><td>Mortality</td><td>Onset of severe lung injury
(1 percent probability of mortality)</td><td>30.5 psi-ms
(positive impulse)</td></tr>
<tr><td rowspan="2">Level A Harassment (Injury)</td><td>Slight lung injury; or</td><td>13.0 psi-ms
(positive impulse)</td></tr>
<tr><td>50 percent of marine mammals would experience ear drum rupture; and 30 percent exposed sustain PTS</td><td>205 dB re 1 μPa^2-s
(full spectrum energy)</td></tr>
<tr><td rowspan="3">Level B Harassment</td><td rowspan="2">TTS (dual criteria)</td><td>23 psi (peak pressure; explosives <2,000 lbs), or</td></tr>
<tr><td>182 dB re 1 μPa^2-s (peak 1/3 octave band)</td></tr>
<tr><td>(sequential detonations only)</td><td>177 dB re 1 μPa^2-s</td></tr>
<tr><th colspan="3">Pile Driving/Removal Criteria</th></tr>
<tr><th>Criterion</th><th>Criterion Definition</th><th>Threshold</th></tr>
<tr><td rowspan="2">Level A Harassment</td><td>Pinniped only: PTS caused by repeated exposure to received levels that cause TTS</td><td>190 dB_{rms} re 1 μPa</td></tr>
<tr><td>Cetacean only: PTS caused by repeated exposure to received levels that cause TTS</td><td>180 dB_{rms} re 1 μPa</td></tr>
<tr><td rowspan="2">Level B Behavioral Harassment</td><td>Cetacean only: Impulse noise; Behavioral modification of animals</td><td>160 dB_{rms} re 1 μPa</td></tr>
<tr><td>Pinniped only: Non-impulse noise; Behavioral modification of animals</td><td>190 dB_{rms} re 1 μPa</td></tr>
</table>

Assessing Harassment from Underwater Detonations

Underwater detonations produced during SSTC training events represent a single, known source. Chemical explosives create a bubble of expanding gases as the material detonates. The bubble can oscillate underwater or, depending on charge-size and depth, be vented to the surface in which case there is no bubble-oscillation with its associated low-frequency energy. Explosions produce very brief, broadband pulses characterized by rapid rise-time, great zero-to-peak pressures, and intense sound, sometimes described as impulse. Close to the explosion, there is a very brief, great-pressure acoustic wave-front. The impulse's rapid onset time, in addition to great peak pressure, can cause auditory impacts, although the brevity of the impulse can include less SEL than expected to cause impacts. The transient impulse gradually decays in magnitude as it broadens in duration with range from the source. The waveform transforms to approximate a low-frequency, broadband signal with a continuous sound energy distribution across the spectrum. In addition, underwater explosions are relatively brief, transitory events when compared to the existing ambient noise within the San Diego Bay and at the SSTC.

The impacts of an underwater explosion to a marine mammal are dependent upon multiple factors including the size, type, and depth of both the animal and the explosive. Depth of the water column and the distance from the charge to the animal also are determining factors as are boundary conditions that influence reflections and refraction of energy radiated from the source. The severity of physiological effects generally decreases with decreasing exposure (impulse, sound exposure level, or peak pressure) and/or increasing distance from the sound source. The same generalization is not applicable for behavioral effects, because they do not depend solely on sound exposure level. Potential impacts can range from brief acoustic effects, tactile perception, and physical discomfort to both lethal and non-lethal injuries. Disturbance of ongoing behaviors could occur as a result of non-injurious physiological responses to both the acoustic signature and shock wave from the underwater explosion. Non-lethal injury includes slight injury to internal organs and auditory system. The severity of physiological effects generally decreases with decreasing sound exposure and/or increasing distance from the sound source. Injuries to internal organs and the auditory system from shock waves and intense impulsive noise associated with explosions can be exacerbated by strong bottom-reflected pressure pulses in reverberant environments (Gaspin 1983; Ahroon et al. 1996). Nevertheless, the overall size of the explosives used at the SSTC is much smaller than those used during larger Fleet ship and aircraft training events.

All underwater detonations proposed for SSTC were modeled as if they will be conducted in shallow water of 24 to 72 feet, including those that would normally be conducted in very shallow water (VSW) depths of zero to 24 feet. Modeling in deeper than actual water depths causes the modeled results to be more conservative (i.e., it overestimates propagation and potential exposures) than if the underwater detonations were modeled at their actual, representative depths when water depth is less than 24 feet.

The Navy's underwater explosive effects simulation requires six major process components:

- A training event description including explosive type;
- Physical oceanographic and geoacoustic data for input into the acoustic propagation model representing seasonality of the planned operation;
- Biological data for the area including density (and multidimensional animal movement for those training events with multiple detonations);
- An acoustic propagation model suitable for the source type to predict impulse, energy, and peak pressure at ranges and depths from the source;
- The ability to collect acoustic and animal movement information to predict exposures for all animals during a training event (dosimeter record); and
- The ability for post-operation processing to evaluate the dosimeter exposure record and calculate exposure statistics for each species based on applicable thresholds.

An impact model, such as the one used for the SSTC analysis, simulates the conditions present based on location(s), source(s), and species parameters by using combinations of embedded models (Mitchell et al. 2008). The software package used for SSTC consists of two main parts: an underwater noise model and bioacoustic impact model (Lazauski et al. 1999; Lazauski and Mitchell 2006; Lazauski and Mitchell 2008).

Location-specific data characterize the physical and biological environments while exercise-specific data construct the training operations. The quantification process involves employment of modeling tools that yield numbers of exposures for each training operation. During modeling, the exposures are logged in a time-step manner by virtual dosimeters linked to each simulated animal. After the operation simulation, the logs are compared to exposure thresholds to produce raw exposure statistics. It is important to note that dosimeters only were used to determine exposures based on energy thresholds, not impulse or peak pressure thresholds. The analysis process uses quantitative methods and identifies immediate short-term impacts of the explosions based on assumptions inherent in modeling processes, criteria and thresholds used, and input data. The estimations should be viewed with caution, keeping in mind that they do not reflect measures taken to avoid these impacts (i.e., mitigations). Ultimately, the goals of this acoustic impact model were to predict acoustic propagation, estimate exposure levels, and reliably predict impacts.

Predictive sound analysis software incorporates specific bathymetric and oceanographic data to create accurate sound field models for each source type. Oceanographic data such as the sound speed profiles, bathymetry, and seafloor properties directly affect the acoustic propagation model. Depending on location, seasonal variations, and the oceanic current flow, dynamic oceanographic attributes (e.g., sound speed profile) can change dramatically with time. The sound field model is embedded in the impact model as a core feature used to analyze sound and pressure fields associated with SSTC underwater detonations.

The sound field model for SSTC detonations was the Reflection and Refraction in Multilayered Ocean/Ocean Bottoms with Shear Wave Effects (REFMS) model (version 6.03). The REFMS model calculates the combined reflected and refracted shock wave environment for underwater detonations using a single, generalized model based on linear wave propagation theory (Cagniard 1962; Britt 1986; Britt et al. 1991).

The model outputs include positive impulse, sound exposure level (total and in 1/3-octave bands) at specific ranges and depths of receivers (i.e., marine mammals), and peak pressure. The shock wave consists of two parts, a very rapid onset "impulsive" rise to positive peak over-pressure followed by a reflected negative under-pressure rarefaction wave. Propagation of shock waves and sound energy in the shallow-water environment is constrained by boundary conditions at the surface and seafloor.

Multiple locations (in Boat Lanes and Echo area) and charge depths were used to determine the most realistic spatial and temporal distribution of detonation types associated with each training operation for a representative year. Additionally, the effect of sound on an animal depends on many factors including:

- properties of the acoustic source(s): source level (SL), spectrum, duration, and duty cycle;
- sound propagation loss from source to animal, as well as, reflection and refraction;
- received sound exposure measured using well-defined metrics;

- specific hearing;
- exposure duration; and
- masking effects of background and ambient noise.

To estimate exposures sufficient to be considered injury or significantly disrupt behavior by affecting the ability of an individual animal to grow (e.g., feeding and energetics), survive (e.g., behavioral reactions leading to injury or death, such as stranding), reproduce (e.g., mating behaviors), and/or degrade habitat quality resulting in abandonment or avoidance of those areas, dosimeters were attached to the virtual animals during the simulation process. Propagation and received impulse, SEL, and peak pressure are a function of depth, as well as range, depending on the location of an animal in the simulation space.

A detailed discussion of the computational process for the modeling, which ultimately generates two outcomes – the zones of influence (ZOIs) and marine mammal exposures, is presented in the Navy's IHA application.

Severity of an effect often is related to the distance between the sound source and a marine mammal and is influenced by source characteristics (Richardson and Malme 1995). For SSTC, ZOIs were estimated for the different charge weights, charge depths, water depths, and seasons using the REFMS model as described previously. These ZOIs for SSTC underwater detonations by training event are shown in Table 4 and conceptually illustrated in Figure 6-5 in the Navy's IHA application.

For single detonations, the ZOIs were calculated using the range associated with the onset of TTS based on the Navy REFMS model predictions.

For Multiple Successive Explosive events (i.e., sequential detonations) ZOI calculation was based on the range to non-TTS behavior disruption. Calculating the zones of influence in terms of total SEL, 1/3-octave bands SEL, impulse, and peak pressure for sequential (10 sec timed) and multiple controlled detonations (> 30 minutes) were slightly different than the single detonations. For the sequential detonations, ZOI calculations considered spatial and temporal distribution of the detonations, as well as the effective accumulation of the resultant acoustic energy. To calculate the ZOI, sequential detonations were modeled such that explosion SEL were summed incoherently to predict zones while peak pressure was not.

Table 4. Maximum ZOIs for underwater detonation events at the SSTC.

Underwater Detonation Training Event	Season*	Maximum ZOI (yards)				
		TTS		Injury		Mortality
		23 psi	182 dB re 1 μPa^2-s	13.0 psi-ms	205 dB re 1 μPa^2-s	30.5 psi-ms
Shock wave action generator (SWAG) (San Diego Bay - Echo sub-area) 0.033 NEW (74/yr)	Warm	60	20	0	0	0
	Cold	40	20	0	0	0
Shock wave action generator (SWAG) (SSTC-North and South oceanside) 0.033 NEW (16/yr)	Warm	60	20	0	0	0
	Cold	40	20	0	0	0
Mine Counter Measure < 20 lbs NEW (29/yr)	Warm	470	300	360	80	80
	Cold	450	340	160	80	80
Floating Mine < 5 lbs NEW (53/yr)	Warm	240	160	80	40	20
	Cold	260	180	80	40	20
Dive Platoon < 3.5 lbs NEW (sequential) (8/yr)	Warm	210	330	80	90	50
	Cold	220	370	90	90	50
Unmanned Underwater Vehicle <15 lbs NEW (4/yr)	Warm	440	280	360	80	80
	Cold	400	320	150	80	80
Marine Mammal Systems < 29 lbs NEW (sequential) (8/yr)	Warm	380	420	360	140	90
	Cold	450	470	170	140	90
Marine Mammal Systems < 29 lbs NEW (8/yr)	Warm	400	330	360	100	90
	Cold	490	370	170	100	90
Mine Neutralization < 3.5 lbs NEW (sequential) (4/yr)	Warm	210	330	80	90	50
	Cold	230	370	90	90	50
Surf Zone Training and Evaluation	Warm	470	300	160	80	80

		Maximum ZOI (yards)				
< 20 lbs NEW (2/yr)	Cold	450	340	160	80	80
Unmanned Underwater Vehicle Neutralization < 3.6 lbs NEW (sequential) (4/yr)	Warm	220	180	80	60	50
	Cold	230	180	90	60	50
Airborne Mine Neutralization System < 3.5 lbs NEW (10/yr)	Warm	220	170	80	40	40
	Cold	230	180	80	40	40
Qualification/Certification < 13.8 lbs NEW (sequential) (8/yr)	Warm	330	330	140	100	80
	Cold	360	370	140	100	80
Qualification/Certification < 25.5 lbs NEW (4/yr)	Warm	420	330	300	90	90
	Cold	470	360	170	90	90
Naval Special Warfare Demolition Training < 10 lbs NEW (4/yr)	Warm	360	240	160	80	40
	Cold	360	250	160	80	40
Naval Special Warfare Demolition Training < 3.6 lbs NEW (4/yr)	Warm	220	180	80	60	50
	Cold	230	180	90	60	50
Navy Special Warfare SEAL Delivery Vehicle < 10 lbs NEW (40/yr)	Warm	360	240	160	80	40
	Cold	360	250	160	80	40

* Warm: November – April; cold: May – October.

In summary, all ZOI radii were strongly influenced by charge size and placement in the water column, and only slightly by the environment variables. Detailed information on ZOI determination for very shallow water is provided in section 6 of the Navy's LOA application. The anticipated impacts from marine mammal exposure to explosive detonations and pile-driving remain unchanged from the IHA issued to the Navy in 2012 (77 FR 43238, July 24, 2012).

Proposed Mitigation Measures

In order to issue an incidental take authorization under section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to such activity, and other means of effecting the least practicable adverse 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.

The take estimates provided later in this document represent the maximum expected number of takes and do not account for mitigation measures. The Navy proposes the following mitigation measures to reduce potential impacts to marine mammals:

Mitigation Zones

The Navy used the ZOI modeling results (discussed in Chapter 6 of their IHA application) to develop mitigation zones for underwater detonations in water >24 feet and Shock Wave Generator (SWAG) training events. While the ZOIs vary between the different types of underwater detonation training, the Navy is proposing to establish an expanded 700 yard mitigation zone for all positive control (RFD) underwater detonations conducted on the oceanside of the SSTC, a 700-1,500 yard mitigation zone around all time-delay (TDFD) underwater detonations conducted on the oceanside of the SSTC, and a 60 yard mitigation zone around SWAG training events conducted on the oceanside and bayside of the SSTC. Details on how the mitigation zones were derived are provided in section 11 of the Navy's IHA application. These mitigation zones are expected to reduce or eliminate Level B harassment to marine mammals. The Navy also proposes a 50 yard mitigation zone during ELCAS pile driving and removal. In summary, the proposed mitigation zones are as follows for the three broad sets of training events:

Very shallow water (<24 feet) underwater detonation – The Navy would use a 700 yard mitigation zone for positive control events, and 700-1,500 yard mitigation zone for TDFD events depending on charge weight and delay time. The positive control mitigation zone is based on the maximum range of onset TTS as predicted by the iso-velocity analysis of empirically measured very shallow water detonations <20 lbs NEW (450-470 yards) plus a buffer that brings the final zone to 700 yards.

Shallow water (>24 feet) underwater detonation – The Navy would use a 700 yard mitigation zone for positive control events, and 700-1,500 yard mitigation zone for TDFD events depending on charge weight and delay time. The positive control mitigation zone is based on the maximum range to onset TTS predicted using the Navy's REFMS model (490 yards) plus a buffer that brings the final zone to 700 yards.

ELCAS pile driving and removal – The Navy would use a 50 yard mitigation zone based on the maximum range estimated to the Level A harassment criteria for cetaceans (180 dB).

Proposed Mitigation Measures for Underwater Detonations in Very Shallow Water (VSW, water depth < 24 ft)

Positive Control

1. Underwater detonations using positive control (remote firing devices) will only be conducted during daylight.

2. Easily visible anchored floats will be positioned on 700 yard radius of a roughly semi-circular zone (the shoreward half being bounded by shoreline and immediate off-shore water) around the detonation location for small explosive exercises at the SSTC. These mark the outer limits of the mitigation zone.

3. For each VSW underwater detonation event, a safety-boat with a minimum of one observer is launched 30 or more minutes prior to detonation and moves through the area

around the detonation site. The task of the safety observer is to exclude humans from coming into the area and to augment a shore observer's visual search of the mitigation zone for marine mammals. The safety-boat observer is in constant radio communication with the exercise coordinator and shore observer discussed below.

4. A shore-based observer will also be deployed for VSW detonations in addition to boat based observers. The shore observer will indicate that the area is clear of marine mammals after 10 or more minutes of continuous observation with no marine mammals having been seen in the mitigation zone or moving toward it.

5. At least 10 minutes prior to the planned initiation of the detonation event-sequence, the shore observer, on an elevated on-shore position, begins a continuous visual search with binoculars of the mitigation zone. At this time, the safety-boat observer informs the shore observer if any marine mammal has been seen in the zone and, together, both search the surface within and beyond the mitigation zone for marine mammals.

6. The observers (boat and shore based) will indicate that the area is not clear any time a marine mammal is sighted in the mitigation zone or moving toward it and, subsequently, indicate that the area is clear of marine mammals when the animal is out and moving away and no other marine mammals have been sited.

7. Initiation of the detonation sequence will only begin on final receipt of an indication from the shore observer that the area is clear of marine mammals and will be postponed on receipt of an indication from any observer that the area is not clear of marine mammals.

8. Following the detonation, visual monitoring of the mitigation zone continues for 30 minutes for the appearance of any marine mammal in the zone. Any marine mammal appearing in the area will be observed for signs of possible injury.

9. Any marine mammal observed after a VSW underwater detonation either injured or exhibiting signs of distress will be reported via operational chain of command to Navy environmental representatives from U.S. Pacific Fleet, Environmental Office, San Diego Detachment. Using Marine Mammal Stranding communication trees and contact procedures established for the Southern California Range Complex, the Navy will report these events to the Stranding Coordinator of NMFS' Southwest Regional Office. These voice or email reports will contain the date and time of the sighting, location (or if precise latitude and longitude is not currently available, then the approximate location in reference to an established SSTC beach feature), species description (if known), and indication of the animal's status.

Time-delay Firing Devices

1. Underwater detonations using timed delay devices would only be conducted during daylight.

2. Time-delays longer than 10 minutes would not be used. The initiation of the device will not start until the mitigation area below is clear for a full 30 minutes prior to initiation of the timer.

3. A mitigation zone would be established around each underwater detonation location as indicated in Table 7 (1,000, 1,400 yards, or 1,500) based on charge weight and length of time delay used.

4. VSW ranges 1,000 yds:

- For each VSW underwater detonation event with a mitigation zone of 1,000 yds, a safety boat with a minimum of one observer is launched 30 or more minutes prior to detonation and moves through the area around the detonation site at the seaward edge of the mitigation zone. The task of the boat is to exclude humans from coming into the area and to augment a shore observer's visual search of the mitigation zone for marine mammals. The safety-boat observer is in constant radio communication with the exercise coordinator and shore observer discussed below. To the best extent practical, boats will try to maintain a 10 knot search speed.
- A shore-based observer will also be deployed for VSW detonations in addition to boat based observers. At least 10 minutes prior to the planned initiation of the detonation event-sequence, the shore observer, on an elevated on-shore position, begins a continuous visual search with binoculars of the mitigation zone. At this time, the safety-boat observer informs the shore observer if any marine mammal has been seen in the zone and, together, both search the surface within and beyond the mitigation zone for marine mammals. The shore observer will indicate that the area is clear of marine mammals after 10 or more minutes of continuous observation with no marine mammals having been seen in the mitigation zone or moving toward it.

5. VSW ranges ≥1,400 yards:

- A minimum of two boats and one shore-based observer would be used to survey for marine mammals at mitigation ranges ≥1,400 yards.

- When conducting the surveys within a mitigation zone ≥1,400 yds, boats will position themselves near the mid-point of the mitigation zone radius (but always outside the detonation plume radius/human safety zone) and travel in a semi-circular pattern around the detonation location surveying both the inner (toward detonation site) and outer (away from detonation site) areas. When using two boats, each boat will be positioned on opposite sides of the detonation location, separated by 180 degrees. If using more than two boats, each boat will be positioned equidistant from one another (120 degrees separation for three boats, 90 degrees separation for four boats, etc.). If available, aerial visual survey support from Navy helicopters can be utilized, so long as it will not jeopardize safety of flight. Helicopters will travel in a circular pattern around the detonation location.

6. A mitigation zone will be surveyed from 30 minutes prior to the detonation and for 30 minutes after the detonation.

7. Other personnel besides boat observers can also maintain situational awareness on the presence of marine mammals within the mitigation zone to the best extent practical given dive safety considerations.

Divers placing the charges on mines will observe the immediate underwater area around a detonation site for marine mammals and report sightings to surface observers.

8. If a marine mammal is sighted within an established mitigation zone or moving towards it, underwater detonation events will be suspended until the marine mammal has voluntarily left the area and the area is clear of marine mammals for at least 30 minutes.

9. Immediately following the detonation, visual monitoring for affected marine mammals within the mitigation zone will continue for 30 minutes.

10. Any marine mammal observed after an underwater detonation either injured or exhibiting signs of distress will be reported via Navy operational chain of command to Navy environmental representatives from U.S. Pacific Fleet, Environmental Office, San Diego Detachment. Using Marine Mammal Stranding communication trees and contact procedures established for the Southern California Range Complex, the Navy will report these events to the Stranding Coordinator of NMFS' Southwest Regional Office. These voice or email reports will contain the date and time of the sighting, location (or if precise latitude and longitude is not currently available, then the approximate location in reference to an established SSTC beach feature), species description (if known), and indication of the animal's status.

Proposed Mitigation and Monitoring Measures for Underwater Detonations in Shallow Water (>24 Feet)

Positive Control (Except SWAG and Timed Detonations)

1. Underwater detonations using positive control devices would only be conducted during daylight.

2. A mitigation zone of 700 yards would be established around each underwater detonation point.

3. A minimum of two boats, including but not limited to small zodiacs and 7-m Rigid Hulled Inflatable Boats (RHIB) would be deployed. One boat would act as an observer platform, while the other boat is typically the diver support boat.

4. Two observers with binoculars on one small craft/boat would survey the detonation area and the mitigation zone for marine mammals from at least 30 minutes prior to commencement of the scheduled explosive event and until at least 30 minutes after detonation.

5. In addition to the dedicated observers, all divers and boat operators engaged in detonation events can potentially monitor the area immediately surrounding the point of detonation for marine mammals.

6. Explosive detonations would cease if a marine mammal is visually detected within the mitigation zone. Detonations may recommence if any of the following conditions are met: (1) the animal is observed exiting the mitigation zone, (2) the animal is thought to have exited the mitigation zone based on its course and speed, or (3) the mitigation zone has been clear from any additional sightings for a period of 30 minutes.

7. Immediately following the detonation, visual monitoring for marine mammals within the mitigation zone will continue for 30 minutes. Any marine mammal observed after an underwater detonation either injured or exhibiting signs of distress will be reported to via Navy operational chain of command to Navy environmental representatives from U.S. Pacific Fleet, Environmental Office, San Diego Detachment. Using Marine Mammal Stranding communication trees and contact procedures established for the Southern California Range Complex, the Navy will report these events to the Stranding Coordinator of NMFS' Southwest Regional Office. These voice or email reports will contain the date and time of the sighting, location (or if precise latitude and longitude is not currently available, then the approximate location in reference to an

established SSTC beach feature), species description (if known), and indication of the animals status.

Mitigation and Monitoring Measures for Underwater Detonations Using Time-Delay (TDFD Detonations Only)

1. Underwater detonations using timed delay devices would only be conducted during daylight.

2. Time-delays longer than 10 minutes would not be used. The initiation of the device would not start until the mitigation area below is clear for a full 30 minutes prior to initiation of the timer.

3. A mitigation zone would be established around each underwater detonation location as indicated in Table 3 based on charge weight and length of time-delay used. When conducting the surveys within a mitigation zone (either 1,000 or ≥1,400 yds), boats will position themselves near the mid-point of the mitigation zone radius (but always outside the detonation plume radius/human safety zone) and travel in a circular pattern around the detonation location surveying both the inner (toward detonation site) and outer (away from detonation site) areas.

4. Shallow water TDFD detonations 1,000 yds:

- A minimum of two boats would be used to survey for marine mammals at mitigation ranges of 1,000 yds.
- When using two boats, each boat would be positioned on opposite sides of the detonation location, separated by 180 degrees.
- Two observers in each of the boats will conduct continuous visual survey of the mitigation zone for the entire duration of a training event.

- To the best extent practical, boats will try to maintain a 10 knot search speed. This search speed was added to ensure adequate coverage of the buffer zone during observation periods. While weather conditions and sea states may require slower speeds in some instances, 10 knots is a prudent, safe, and executable speed that will allow for adequate surveillance. For a 1,000 yd radius buffer zone a boat travelling at 10 knots and 500 yds away from the detonation point would circle the detonation point 3.22 times during a 30 minute survey period. By using two boats, 6.44 circles around the detonation point would be completed in a 30 minute span.

5. Shallow water TDFD detonations ≥1,400 yds:

- A minimum of three boats or two boats and one helicopter would be used to survey for marine mammals at mitigation ranges of 1,400 yds.
- When using three (or more) boats, each boat would be positioned equidistant from one another (120 degrees separation for three boats, 90 degrees separation for four boats, etc.).
- For a 1,400 yd radius mitigation zone, a 10 knot speed results in 2.3 circles for each of the three boats, or nearly 7 circles around the detonation point over a 30 minute span.
- If available, aerial visual survey support from Navy helicopters can be utilized, so long as it will not jeopardize safety of flight.
- Helicopters, if available, can be used in lieu of one of the boat requirements. Navy helicopter pilots are trained to conduct searches for relatively small objects in the water, such as a missing person. A helicopter search pattern is dictated by standard Navy protocols and accounts for multiple variables, such as the size and shape of the search

area, size of the object being searched for, and local environmental conditions, among others.

6. A mitigation zone would be surveyed from 30 minutes prior to the detonation and for 30 minutes after the detonation.

7. Other personnel besides boat observers can also maintain situational awareness on the presence of marine mammals within the mitigation zone to the best extent practical given dive safety considerations.

Divers placing the charges on mines would observe the immediate underwater area around a detonation site for marine mammals and report sightings to surface observers.

8. If a marine mammal is sighted within an established mitigation zone or moving towards it, underwater detonation events will be suspended until the marine mammal has voluntarily left the area and the area is clear of marine mammals for at least 30 minutes.

9. Immediately following the detonation, visual monitoring for affected marine mammals within the mitigation zone will continue for 30 minutes.

10. Any marine mammal observed after an underwater detonation either injured or exhibiting signs of distress will be reported via Navy operational chain of command to Navy environmental representatives from U.S. Pacific Fleet, Environmental Office, San Diego Detachment or Pearl Harbor. Using Marine Mammal Stranding protocols and communication trees established for the Southern California and Hawaii Range Complexes, the Navy will report these events to the Stranding Coordinator of NMFS' Southwest or Pacific Islands Regional Office. These voice or email reports will contain the date and time of the sighting, location (or if precise latitude and longitude is not

currently available, then the approximate location in reference to an established SSTC beach feature), species description (if known), and indication of the animal's status.

(3) Proposed Mitigation and Monitoring Measures for Underwater SWAG Detonations (SWAG Only)

A modified set of mitigation measures would be implemented for SWAG detonations, which involve much smaller charges of 0.03 lbs NEW.

1. Underwater detonations using SWAG would only be conducted during daylight.

2. A mitigation zone of 60 yards would be established around each SWAG detonation site.

3. A minimum of two boats, including but not limited to small zodiacs and 7-m Rigid Hulled Inflatable Boats (RHIB) would be deployed. One boat would act as an observer platform, while the other boat is typically the diver support boat.

4. Two observers with binoculars on one small craft\boat would survey the detonation area and the mitigation zone for marine mammals from at least 10 minutes prior to commencement of the scheduled explosive event and until at least 10 minutes after detonation.

5. In addition to the dedicated observers, all divers and boat operators engaged in detonation events can potentially monitor the area immediately surrounding the point of detonation for marine mammals.

   Divers and personnel in support boats would monitor for marine mammals out to the 60 yard mitigation zone for 10 minutes prior to any detonation.

6. After the detonation, visual monitoring for marine mammals would continue for 10 minutes. Any marine mammal observed after an underwater detonation either injured

or exhibiting signs of distress will be reported via Navy operational chain of command to Navy environmental representatives from U.S. Pacific Fleet, Environmental Office, San Diego Detachment. Using Marine Mammal Stranding communication trees and contact procedures established for the Southern California Range Complex, the Navy will report these events to the Stranding Coordinator of NMFS' Southwest Regional Office. These voice or email reports will contain the date and time of the sighting, location (or if precise latitude and longitude is not currently available, then the approximate location in reference to an established SSTC beach feature), species description (if known), and indication of the animal's status.

<u>Proposed Mitigation for ELCAS Training</u>

- Mitigation zone – A mitigation zone would be established at 50 yards from ELCAS pile driving and removal events. This mitigation zone is based on the predicted range to Level A harassment for cetaceans (180 dB) and would also be applied to pinnipeds.
- Monitoring would be conducted within the 50 yard mitigation zone for the presence of marine mammals during ELCAS pile driving and removal events. Monitoring would begin 30 minutes before any ELCAS pile driving or removal event, continue during pile driving or removal events, and be conducted for 30 minutes after pile driving or removal ends. A minimum of one trained observer would be placed on shore, on the ELCAS, or in a boat at the best vantage point(s) to monitor for marine mammals.
- If a marine mammal is seen within the 50 yard mitigation zone, pile removal events would be delayed or stopped until the animal has voluntarily left the mitigation zone.

- The observer(s) would implement shutdown and delay procedures when applicable by notifying the hammer operator when a marine mammal is seen within the mitigation zone.
- Soft start – The Navy would implement a soft start for all ELCAS pile driving. The pile driver would increase impact strength as resistance goes up. The pile driver piston initially drops a few inches, but as resistance increases, the pile driver piston drops from a higher distance and has more impact. This would allow marine mammals in the proposed action area to move away from the sound source before the pile driver reaches full power.

Proposed Monitoring and Reporting

In order to issue an ITA for an activity, section 101(a)(5)(D) of the MMPA states that NMFS must set forth, where applicable, "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 will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the proposed action area.

In addition to the mitigation monitoring described above, the Navy also proposes to monitor a subset of SSTC underwater detonation events to validate the Navy's pre- and post-event mitigation effectiveness, and observe marine mammal reaction, or lack of reaction to SSTC training events. The Navy also proposes to conduct an acoustic monitoring project during the first field deployment of the ELCAS.

<u>Monitoring a Subset of Underwater Detonations</u>

Protected species observers would be placed either alongside existing Navy SSTC operators during a subset of training events, or on a separate small boat viewing platform. Use of protected species observers would verify Navy mitigation efforts within the SSTC, offer an opportunity for more detailed species identification, provide an opportunity to bring animal protection awareness to Navy personnel at the SSTC, and provide the opportunity for an experienced biologist to collect data on marine mammal behavior. Events selected for protected species observer participation would be an appropriate fit in terms of security, safety, logistics, and compatibility with Navy underwater detonation training. The Navy would attempt to monitor between 2 and 4 percent of their annual underwater detonations (6-12 detonations). Protected species observers would collect the same data currently being collected for more elaborate offshore ship-based observations, including but not limited to:

- Location of sighting;
- Species;
- Number of individuals;
- Number of calves present;
- Duration of sighting;
- Behavior of marine mammals sighted;
- Direction of travel;
- Environmental information associated with sighting event, including Beaufort sea state, wave height, swell direction, wind direction, wind speed, glare, percentage of glare, percentage of cloud cover; and
- Whether the sighting occurred before, during, or after a detonation.

Protected species observers would not be part of the Navy's formal reporting chain of command during their data collection efforts. However, exceptions would be made if a marine mammal is observed within the proposed mitigation zone. Protected species observers would inform any Navy operator of the sighting so that appropriate action may be taken.

ELCAS Underwater Propagation Monitoring

The Navy proposes to conduct an underwater acoustic propagation monitoring project during the first available ELCAS deployment at the SSTC. The acoustic monitoring would provide empirical field data on actual ELCAS pile driving and removal underwater source levels, and propagation specific to ELCAS training at the SSTC. These results would be used to either confirm or refine the Navy's exposure predictions.

Reporting

In order to issue an ITA for an activity, section 101(a)(5)(A) of the MMPA states that NMFS must set forth "requirements pertaining to the monitoring and reporting of such taking." Effective reporting is critical both to compliance as well as ensuring that the most value is obtained from the required monitoring.

General Notification of Injured or Dead Marine Mammals – Navy personnel would ensure that NMFS (the appropriate Regional Stranding Coordinator) is notified immediately (or as soon as clearance procedures allow) if an injured or dead marine mammal is found during or shortly after, and in the vicinity of, any Navy training exercises involving underwater detonations or pile driving. The Navy shall provide NMFS with species or description of the animal(s), the conditions of the animal(s) (including carcass condition if the animal is dead), location, time of first discovery, observed behaviors (if alive), and photo or video (if available).

The Navy shall submit a report to the Office of Protected Resources, NMFS, no later than 90 days after the expiration of the IHA. The report shall, at a minimum, include the following marine mammal sighting information:

- Location of sighting;
- Species;
- Number of individuals;
- Number of calves present;
- Duration of sighting;
- Behavior of marine mammals sighted;
- Direction of travel;
- Environmental information associated with each sighting event, including Beaufort sea state, wave height, swell direction, wind direction, wind speed, glare, percentage of glare, percentage of cloud cover; and
- Whether the sighting occurred before, during, or after a detonation.

In addition, the Navy would provide information for all underwater detonation events and ELCAS events under the IHA. This information would include: total number of each type of underwater detonation events and total number of piles driven/extracted during ELCAS.

The Navy would submit a draft report to NMFS, as described above, and would respond to NMFS comments within 3 months of receipt. The report would be considered final after the Navy has addressed NMFS' comments, or 3 months after the submittal of the draft if NMFS does not comment by then.

<u>Past Monitoring and Reporting</u>

The Navy has complied with monitoring and reporting requirements under their previous IHAs for the SSTC. To date, two underwater demolition training events have been observed by protected species observers between July 2012 and November 2012. Broad scale Navy-funded monitoring in support of the Navy's Southern California (SOCAL) Range Complex Letter of Authorization has typically focused on the offshore waters north and west of the SSTC. The Navy obtained special flight permission to survey the vicinity of the SSTC during part of three aerial surveys under the SOCAL monitoring plan in 2011-2012. As anticipated, marine mammal sightings were limited and included several California sea lions and a few unidentified dolphins, although the dolphin sightings were several miles offshore from the normal SSTC training area.

Estimated Take by Incidental Harassment

Estimated Marine Mammal Exposures from SSTC Underwater Detonations

The Navy's quantitative exposure modeling methodology estimated numbers of animals exposed to the effects of underwater detonations exceeding the thresholds used, as if no mitigation measures were employed. All estimated exposures are seasonal averages (mean) plus one standard deviation using half of the annual training tempo to represent each season. This approach results in an over-prediction of exposure to typical training during a single year. Table 5 shows the number of annual predicted exposures by species for all underwater detonation training within the SSTC. As stated previously, only events with sequential detonations were examined for non-TTS behavior disruption. For all underwater detonations, the Navy's impact model predicted no marine mammal mortality and no Level A exposure to any species.

Table 5. The Navy's modeled estimates of species exposed to underwater detonations without implementation of mitigation measures.

Species		Annual Marine Mammal Exposure (All Sources)			
		Level B Behavior (Multiple Successive Explosive Events Only)	Level B TTS	Level A	Mortality
		177 dB re 1 µPa	182 dB re 1 µPa^2-s / 23 psi	205 dB re 1 µPa^2-s / 13.0 psi-ms	30.5 psi-ms
Gray Whale	Warm	N/A	N/A	N/A	N/A
	Cold	0	0	0	0
Bottlenose Dolphin	Warm	30	43	0	0
	Cold	40	55	0	0
California Sea Lion	Warm	4	4	0	0
	Cold	40	51	0	0
Harbor Seal	Warm	0	0	0	0
	Cold	0	0	0	0
Long-beaked common dolphin	Warm	14	21	0	0
	Cold	7	10	0	0
Pacific white-sided dolphin	Warm	2	3	0	0
	Cold	3	4	0	0
Risso's dolphin	Warm	3	4	0	0
	Cold	11	15	0	0
Short-beaked common dolphin	Warm	123	177	0	0
	Cold	62	86	0	0
Total Annual Exposures		**339**	**473**	**0**	**0**

Estimated Marine Mammal Exposures from ELCAS Pile Driving and Removal

I. Pile Driving

Using the marine mammal densities presented in the Navy's IHA application, the number of animals exposed to annual Level B harassment from ELCAS pile driving can be estimated. A couple of business rules and assumptions are used in this determination:

1. Pile driving is estimated to occur 10 days per ELCAS training event, with up to four training exercises being conducted per year (40 days per year). Given likely variable training schedules, an assumption was made that approximately 20 of these 40 days

would occur during the warm water season, and 20 of the 40 days would occur during the cold water season.

2. To be more conservative even to the point of over predicting likely exposures, the Navy asserts that during the calculation there can be no "fractional" exposures of marine mammals on a daily basis, and all exposure values are rounded up during the calculation.

To estimate the potential ELCAS pile driving exposure, the following expression is used:

Annual exposure = ZOI × warm season marine mammal density × warm season pile driving days + ZOI × cold season marine mammal density × cold season pile driving days, with ZOI = $\pi \times R^2$, where R is the radius of the ZOI.

An example showing the take calculation for bottlenose dolphins, with the conservative "daily rounding up" business rule (#2 above), is shown below:

Daily exposure = $\pi \times 0.999^2 \times 0.202 + \pi \times 0.999^2 \times 0.202 = 0.6 + 0.6$.

When rounding up the daily exposure 0.6 dolphin to 1 dolphin; the annual exposure from warm season pile driving days (20 days) and cold season pile driving days (20 days) is:

Annual exposure = $1 \times 20 + 1 \times 20 = 40$

Based on the assessment using the methodology discussed previously, applying the business rules and limitations described here, and without consideration of mitigation measures, the take estimate is that ELCAS pile driving is predicted to result in no Level A Harassment takes of any marine mammal (received SPL of 190 dB_{rms} for pinnipeds and 180 dB_{rms} re 1 µPa for cetacean, respectively) but take of 40 bottlenose dolphins, 20 California sea lions, and 80 short-beaked common dolphins by Level B behavioral harassment (Table 5).

II. Pile Removal

The same approach is applied for take estimation from ELCAS pile removal. To estimate the potential ELCAS pile removal exposure, the following expression is used:

Annual exposure = ZOI × warm season marine mammal density × warm season pile removal days + ZOI × cold season marine mammal density × cold season pile removal days, with ZOI = $\pi \times R^2$, where R is the radius of the ZOI.

An example showing the take calculation for bottlenose dolphins, with the conservative "daily rounding up" business rule for pile removal, is shown below:

Daily exposure = $\pi \times 4.64^2 \times 0.202 + \pi \times 4.64^2 \times 0.202 = 13.7 + 13.7$.

When rounding up the daily exposure 13.7 dolphins to 14 dolphins; the annual exposure from warm season pile removal days (6 days) and cold season pile removal days (6 days) is:

Annual exposure = 14 × 6 + 14 × 6 = 168

Based on the assessment using the methodology discussed previously, applying the methods and limitations described here, and without consideration of mitigation measures, the take estimate is that ELCAS pile removal is predicted to result in no Level A Harassments takes of any marine mammal; Level B exposures are shown in Table 6.

Table 6. Exposure estimates from ELCAS pile driving and removal prior to implementation of mitigation.

Species		**Annual Marine Mammal Exposure (All Sources)**			
		Level B Behavior (Non-Impulse)	Level B Behavior (Impulse)	Level A (Cetacean)	Level A (Pinniped)
		120 dB_{rms} re 1 µPa	120 dB_{rms} re 1 µPa	120 dB_{rms} re 1 µPa	120 dB_{rms} re 1 µPa
Gray Whale	Installation	N/A	0	0	0
	Removal	6	N/A	0	0
Bottlenose Dolphin	Installation	N/A	40	0	0
	Removal	168	N/A	0	0

California Sea Lion	Installation	N/A	20	0	0
	Removal	102	N/A	0	0
Harbor Seal	Installation	N/A	0	0	0
	Removal	12	N/A	0	0
Long-beaked common dolphin	Installation	N/A	0	0	0
	Removal	54	N/A	0	0
Pacific white-sided dolphin	Installation	N/A	0	0	0
	Removal	12	N/A	0	0
Risso's dolphin	Installation	N/A	0	0	0
	Removal	30	N/A	0	0
Short-beaked common dolphin	Installation	N/A	80	0	0
	Removal	462	N/A	0	0
Total Annual Exposures		**846**	**140**	**0**	**0**

In summary, for all underwater detonations and ELCAS pile driving activities, the Navy's impact model predicted that no mortality and/or Level A harassment (injury) would occur to marine mammal species and stocks within the proposed action area.

Anticipated Effects on Habitat

The proposed training activities at SSTC would not result in any permanent impact on habitats used by marine mammals, and potentially short-term to minimum impact to the food sources such as forage fish. There are no known haul-out sites, foraging hotspots, or other ocean bottom structures of significant biological importance to harbor seals, California sea lions, or bottlenose dolphins within SSTC. Therefore, the main impact associated with the proposed activity would be temporarily elevated noise levels and the associated direct effects on marine mammals, as discussed previously.

The primary source of effects to marine mammal habitat is exposures resulting from underwater detonation training and ELCAS pile driving and removal training events. Other sources that may affect marine mammal habitat include changes in transiting vessels, vessel strike, turbidity, and introduction of fuel, debris, ordnance, and chemical residues. However, each of these components was addressed in the SSTC Environmental Impact Statement (EIS) and it is the Navy's assertion that there would be no likely impacts to marine mammal habitats from these training events.

The most likely impact to marine mammal habitat occurs from underwater detonation and pile driving and removal effects on likely marine mammal prey (i.e., fish) within SSTC. There are currently no well-established thresholds for estimating effects to fish from explosives other than mortality models. Fish that are located in the water column, in proximity to the source of detonation could be injured, killed, or disturbed by the impulsive sound and could leave the area temporarily. Continental Shelf Inc. (2004) summarized a few studies conducted to determine effects associated with removal of offshore structures (e.g., oil rigs) in the Gulf of Mexico. Their findings revealed that at very close range, underwater explosions are lethal to most fish species regardless of size, shape, or internal anatomy. In most situations, cause of death in fish has been massive organ and tissue damage and internal bleeding. At longer range, species with gas-filled swimbladders (e.g., snapper, cod, and striped bass) are more susceptible than those without swimbladders (e.g., flounders, eels).

Studies also suggest that larger fish are generally less susceptible to death or injury than small fish. Moreover, elongated forms that are round in cross section are less at risk than deep-bodied forms. Orientation of fish relative to the shock wave may also affect the extent of injury.

Open water pelagic fish (e.g., mackerel) seem to be less affected than reef fishes. The results of most studies are dependent upon specific biological, environmental, explosive, and data recording factors.

The huge variation in fish populations, including numbers, species, sizes, and orientation and range from the detonation point, makes it very difficult to accurately predict mortalities at any specific site of detonation. All underwater detonations are of small scale (under 29 lbs NEW), and the proposed training exercises would be conducted in several areas within the large SSTC Study Area over the seasons during the year. Most fish species experience a large number of natural mortalities, especially during early life-stages, and any small level of mortality caused by the SSTC training exercises involving explosives will likely be insignificant to the population as a whole.

Therefore, potential impacts to marine mammal food resources within the SSTC are expected to be minimal given both the very geographic and spatially limited scope of most Navy at-sea activities including underwater detonations, and the high biological productivity of these resources. No short or long term effects to marine mammal food resources from Navy activities are anticipated within the SSTC.

Subsistence Harvest of Marine Mammals

NMFS has preliminarily determined that the Navy’s proposed training activities at the SSTC would not have an unmitigable adverse impact on the availability of the affected species or stocks for subsistence use since there are no such uses in the specified area.

Negligible Impact Analysis and Determination

Pursuant to NMFS' regulations implementing the MMPA, an applicant is required to estimate the number of animals that will be "taken" by the specified activities (i.e., takes by harassment only, or takes by harassment, injury, and/or death). This estimate informs the analysis that NMFS must perform to determine whether the activity will have a "negligible impact" on the species or stock. Level B (behavioral) harassment occurs at the level of the individual(s) and does not assume any resulting population-level consequences, though there are known avenues through which behavioral disturbance of individuals can result in population-level effects. A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (i.e., population-level effects). An estimate of the number of Level B harassment takes, alone, is not enough information on which to base an impact determination. In addition to considering estimates of the number of marine mammals that might be "taken" through behavioral harassment, NMFS must consider other factors, such as the likely nature of any responses (their intensity, duration, etc.), the context of any responses (critical reproductive time or location, migration, etc.), or any of the other variables mentioned in the first paragraph (if known), as well as the number and nature of estimated Level A takes, the number of estimated mortalities, and effects on habitat.

The Navy's specified activities have been described based on best estimates of the planned training exercises at SSTC action area. Some of the noises that would be generated as a result of the proposed underwater detonation and ELCAS pile driving activities are high intensity. However, the planned explosives have relatively small zones of influence. The locations of the proposed training activities are shallow water areas, which would effectively contain the spreading of explosive energy within the bottom boundary. Taking the above into account, along with the fact that NMFS anticipates no mortalities and injuries to result from the action, the fact that there are no specific areas of reproductive importance for marine mammals recognized within the SSTC area, the sections discussed below, and dependent upon the implementation of the proposed mitigation measures, NMFS has determined that Navy training exercises utilizing underwater detonations and ELCAS pile driving and removal would have a negligible impact on the affected marine mammal species and stocks present in the SSTC Study Area.

NMFS' analysis of potential behavioral harassment, temporary threshold shifts, permanent threshold shifts, injury, and mortality to marine mammals as a result of the SSTC training activities was provided earlier in this document and is analyzed in more detail below.

Behavioral Harassment

As discussed earlier, the Navy's proposed SSTC training activities would use small underwater explosives with maximum NEW of 29 lbs with 16 events per year in areas of small ZOIs that would mostly eliminate the likelihood of mortality and injury to marine mammals. In addition, these detonation events are widely dispersed in several designated sites within the SSTC Study Area. The probability that detonation events will overlap in time and space with marine mammals is low, particularly given the densities of marine mammals in the vicinity of SSTC Study Area and the implementation of monitoring and mitigation measures. Moreover, NMFS does not expect animals to experience repeat exposures to the same sound source as animals will likely move away from the source after being exposed. In addition, these isolated exposures, when received at distances of Level B behavioral harassment (i.e., 177 dB re 1 μPa^2-s), are expected to cause brief startle reactions or short-term behavioral modification by the animals. These brief reactions and behavioral changes are expected to disappear when the exposures cease. Therefore, these levels of received impulse noise from detonation are not expected to affect annual rates or recruitment or survival.

TTS

NMFS and the Navy have estimated that individuals of some species of marine mammals may sustain some level of temporary threshold shift TTS from underwater detonations. TTS can last from a few minutes to days, be of varying degree, and occur across various frequency bandwidths. The TTS sustained by an animal is primarily classified by three characteristics:

- Frequency – Available data (of mid-frequency hearing specialists exposed to mid to high frequency sounds- Southall et al. 2007) suggest that most TTS occurs in the frequency range of the source up to one octave higher than the source (with the maximum TTS at ½ octave above).
- Degree of the shift (i.e., how many dB is the sensitivity of the hearing reduced by) – generally, both the degree of TTS and the duration of TTS will be greater if the marine mammal is exposed to a higher level of energy (which would occur when the peak dB level is higher or the duration is longer). Since the impulse from detonation is extremely brief, an animal would have to approach very close to the detonation site to increase the received SEL. The threshold for the onset of TTS for detonations is a dual criteria: 182 dB re 1 μPa^2-s or 23 psi, which might be received at distances from 20 – 490 yards from the centers of detonation based on the types of NEW involved to receive the SEL that causes TTS compared to similar source level with longer durations (such as sonar signals).

- Duration of TTS (Recovery time) – Of all TTS laboratory studies, some using exposures of almost an hour in duration or up to SEL at 217 dB re 1 μPa^2-s, almost all recovered within 1 day (or less, often in minutes), though in one study (Finneran et al. 2007), recovery took 4 days.

Although the degree of TTS depends on the received noise levels and exposure time, all studies show that TTS is reversible and animals' sensitivity is expected to recover fully in minutes to hours based on the fact that the proposed underwater detonations are small in scale and isolated. Therefore, NMFS expects that TTS would not affect annual rates of recruitment or survival.

Acoustic Masking or Communication Impairment

As discussed above, it is also possible that anthropogenic sound could result in masking of marine mammal communication and navigation signals. However, masking only occurs during the time of the signal (and potential secondary arrivals of indirect rays), versus TTS, which occurs continuously for its duration. Impulse sounds from underwater detonation and pile driving are brief and the majority of most animals' vocalizations would not be masked. Although impulse noises such as those from underwater explosives and impact pile driving tend to decay at distance, and thus become non-impulse, give the area of extremely shallow water (which effectively attenuates low frequency sound of these impulses) and the small NEW of explosives, the SPLs at these distances are expected to be barely above ambient level. Therefore, masking effects from underwater detonation are expected to be minimal and unlikely. If masking or communication impairment were to occur briefly, it would be in the frequency ranges below 100 Hz, which overlaps with some mysticete vocalizations; however, it would likely not mask the entirety of any particular vocalization or communication series because of the short impulse.

PTS, Injury, or Mortality

The modeling for take estimates predicts that no marine mammal would be taken by Level A harassment (injury, PTS included) or mortality due to the low power of the underwater detonation and the small ZOIs. Further, the mitigation measures have been designed to ensure that animals are detected in time to avoid injury or mortality when TDFDs are used, in consideration of swim speed.

Additionally, as discussed previously, the take estimates do not account for the implementation of mitigation measures. With the implementation of mitigation and monitoring measures, NMFS expects that the takes would be reduced further. Coupled with the fact that these impacts would likely not occur in areas and times critical to reproduction, NMFS has preliminarily determined that the total taking incidental to the Navy's proposed SSTC training activities would have a negligible impact on the marine mammal species and stocks present in the SSTC Study Area.

Based on the analyses of the potential impacts from the proposed underwater detonation training exercises conducted within the Navy's SSTC action area, including the consideration of TDFD use and the implementation of the improved marine mammal monitoring and mitigation measures, NMFS has preliminarily determined that the Navy's proposed activities within the SSTC would have a negligible impact on the marine mammal species and stocks, provided that mitigation and monitoring measures are implemented.

Endangered Species Act (ESA)

No marine mammal species are listed as endangered or threatened under the ESA with confirmed or possible occurrence in the study area. Therefore, section 7 consultation under the ESA for NMFS's proposed issuance of an MMPA authorization is not warranted.

National Environmental Policy Act (NEPA)

The Navy has prepared a Final Environmental Impact Statement (EIS) for the proposed SSTC training activities. The FEIS was released in January 2011 and it is available at http://www.silverstrandtrainingcomplexeis.com/EIS.aspx/. NMFS is a cooperating agency (as defined by the Council on Environmental Quality (40 CFR 1501.6)) in the preparation of the EIS. NMFS has subsequently adopted the FEIS for the SSTC training activities.

Proposed Authorization

As a result of these preliminary determinations, NMFS proposes to issue an IHA to the Navy for activities at the SSTC, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated. The proposed IHA language is provided below:

The Commander, U.S. Pacific Fleet, 250 Makalapa Drive, Pearl Harbor, HI 96860-7000, and persons operating under his authority (i.e., Navy), are hereby authorized under section 101(a)(5)(D) of the Marine Mammal Protection Act (16 U.S.C. 1371 (a)(5)(D)), to harass marine mammals incidental to Navy training activities conducted in the Silver Strand Training Complex (SSTC) in California.

1. This Incidental Harassment Authorization (IHA) is valid from July 18, 2012, through July 17, 2013.

2. This IHA is valid only for training activities conducted at the SSTC Study Area in the vicinity of San Diego Bay, California. The geography location of the SSTC Study Area is located south of the City of Coronado, California and north of the City of Imperial Beach, California.

3. General Conditions

(a) A copy of this IHA must be in the possession of the Commander, his designees, and commanding officer(s) operating under the authority of this IHA.

(b) The species authorized for taking are the California sea lion (Zalophus californianus), Pacific Harbor seal (Phoca vitulina), bottlenose dolphin (Tursiops truncatus), the eastern North Pacific gray whale (Eschrichtius robustus), long-beaked common dolphin (Delphinus capensis), short-beaked common dolphin (D. delphis), Pacific white-sided dolphin (Lagenorhynchus obliquidens), and Risso's dolphin (Grampus griseus).

(c) The taking, by Level B harassment only, is limited to the species listed in condition 3(b).

(d) The taking by Level A harassment, injury or death of any of the species listed in item 3(b) of the Authorization or the taking by harassment, injury or death of any other species of marine mammal is prohibited and may result in the modification, suspension, or revocation of this IHA.

(e) In the unanticipated event that any cases of marine mammal injury or mortality are judged to result from these activities, the holder of this Authorization must immediately cease operations and report the incident, as soon as clearance procedures allow, to the Assistant Regional Administrator (ARA) for Protected Resources, NMFS Southwest Region, phone (562)

980-4000 and to the Chief, Permits and Conservation Division, Office of Protected Resources, NMFS, phone (301) 427-8401.

(i) The Navy shall suspend the training activities at the SSTC until NMFS is able to review the incident and determine whether steps can be taken to avoid further injury or mortality or until such taking can be authorized under regulations promulgated under section 101(a)(5)(A) of the Marine Mammal Protection Act.

4. Mitigation Measures

In order to ensure the least practicable impact on the species and levels of takes listed in 3(b) and (c), the holder of this Authorization is required to comply with the following mitigation measures:

(a) Mitigation Measures for Underwater Detonations

(i) Mitigation and Monitoring Measures for Underwater Detonations in Very Shallow Water (VSW, water depth < 24 ft)

(1) Mitigation and Monitoring Measures for VSW Underwater Detonations Using Positive Control

A. Underwater detonations using positive control (remote firing devices) shall only be conducted during daylight.

B. Easily visible anchored floats shall be positioned on 700 yard radius of a roughly semi-circular zone (the shoreward half being bounded by shoreline and immediate off-shore water) around the detonation location for small explosive exercises at the SSTC. These mark the outer limits of the mitigation zone.

C. For each VSW underwater detonation event, a safety-boat with a minimum of one observer shall be launched 30 or more minutes prior to detonation and moves through the area around the detonation site. The safety-boat observer shall be in constant radio communication with the exercise coordinator and shore observer.

D. A shore-based observer shall also be deployed for VSW detonations in addition to boat based observers. The shore observer shall indicate that the area is clear of marine mammals after 10 or more minutes of continuous observation with no marine mammals having been seen in the mitigation zone or moving toward it.

E. At least 10 minutes prior to the planned initiation of the detonation event sequence, the shore observer, on an elevated on-shore position, shall begin a continuous visual search with binoculars of the mitigation zone. At this time, the safety-boat observer shall inform the shore observer if any marine mammal has been seen in the zone and, together, both search the surface within and beyond the mitigation zone for marine mammals.

F. The observers (boat and shore based) shall indicate that the area is not clear any time a marine mammal is sighted in the mitigation zone or moving toward it and, subsequently, indicate that the area is clear of marine mammals when the animal is out and moving away and no other marine mammals have been sited.

G. Initiation of the detonation sequence shall only begin on final receipt of an indication from the shore observer that the area is clear of marine mammals and will be postponed on receipt of an indication from any observer that the area is not clear of marine mammals.

H. Following the detonation, visual monitoring of the mitigation zone shall continue for 30 minutes for the appearance of any marine mammal in the zone. Any marine mammal appearing in the area shall be observed for signs of possible injury.

I. Any marine mammal observed after a VSW underwater detonation either injured or exhibiting signs of distress shall be reported via operational chain of command to Navy environmental representatives from U.S. Pacific Fleet, Environmental Office, San Diego Detachment. Using Marine Mammal Stranding communication trees and contact procedures established for the Southern California Range Complex, the Navy shall report these events to the Stranding Coordinator of NMFS' Southwest Regional Office. These voice or email reports shall contain the date and time of the sighting, location (or if precise latitude and longitude is not currently available, then the approximate location in reference to an established SSTC beach feature), species description (if known), and indication of the animal's status.

(2) Mitigation and Monitoring Measures for VSW Underwater Detonations Using Time-Delay (TDFD Only)

A. Underwater detonations using timed delay devices will only be conducted during daylight.

B. Time-delays longer than 10 minutes shall not be used. The initiation of the device shall not start until the mitigation area below is clear for a full 30 minutes prior to initiation of the timer.

C. A mitigation zone shall be established around each underwater detonation location as indicated in Table below based on charge weight and length of time delay used.

Table 7. Updated Buffer Zone Radius (yd) for TDFDs Based on Size of Charge and Length of Time-Delay, with Additional Buffer Added to Account for Faster Swim Speeds

		Time-delay					
		5 min	6 min	7min	8 min	9 min	10 min
Charge Size (lb NEW)	5 lb	1,000 yd	1,000 yd	1,000 yd	1,000 yd	1,400 yd	1,400 yd
	10 lb	1,000 yd	1,000 yd	1,000 yd	1,400 yd	1,400 yd	1,400 yd
	15-29 lb	1,000 yd	1,400 yd	1,400 yd	1,400 yd	1,500 yd	1,500 yd

D. VSW ranges 1,000 yds:

(A) For each VSW underwater detonation event with a mitigation zone of 1,000 yds, a safety boat with a minimum of one observer shall be launched 30 or more minutes prior to detonation and moves through the area around the detonation site at the seaward edge of the mitigation zone. The task of the boat is to exclude humans from coming into the area and to augment a shore observer's visual search of the mitigation zone for marine mammals. The safety-boat observer shall be in constant radio communication with the exercise coordinator and shore observer discussed below. To the best extent practical, boats will try to maintain a 10 knot search speed.

(B) A shore-based observer shall also be deployed for VSW detonations in addition to boat based observers. At least 10 minutes prior to the planned initiation of the detonation event-sequence, the shore observer, on an elevated on-shore position, begins a continuous visual search with binoculars of the mitigation zone. The safety-boat observer shall inform the shore observer if any marine mammal has been seen in the zone and, together, both search the surface within and beyond the mitigation zone for marine mammals. The shore observer shall indicate that the area is clear of marine mammals after 10 or more minutes of continuous observation with no marine mammals having been seen in the mitigation zone or moving toward it.

E. VSW ranges larger than 1,400 yards:

(A) A minimum of 2 boats shall be used to survey for marine mammals at mitigation ranges larger than 1,400 yards.

(B) When conducting the surveys within a mitigation zone >1,400 yds, boats shall position themselves near the mid-point of the mitigation zone radius (but always outside the detonation plume radius/human safety zone) and travel in a semi-circular pattern around the detonation location surveying both the inner (toward detonation site) and outer (away from detonation site) areas. When using 2 boats, each boat shall be positioned on opposite sides of the detonation location, separated by 180 degrees. If using more than 2 boats, each boat shall be positioned equidistant from one another (120 degrees separation for 3 boats, 90 degrees separation for 4 boats, etc.). If available, aerial visual survey support from Navy helicopters can be utilized, so long as it shall not jeopardize safety of flight. Helicopters will travel in a circular pattern around the detonation location.

F. A mitigation zone shall be surveyed from 30 minutes prior to the detonation and for 30 minutes after the detonation.

G. Other personnel besides boat observers shall also maintain situational awareness on the presence of marine mammals within the mitigation zone to the best extent practical given dive safety considerations. Divers placing the charges on mines shall observe the immediate underwater area around a detonation site for marine mammals and report sightings to surface observers.

H. If a marine mammal is sighted within an established mitigation zone or moving towards it, underwater detonation events shall be suspended until the marine mammal has voluntarily left the area and the area is clear of marine mammals for at least 30 minutes.

I. Immediately following the detonation, visual monitoring for affected marine mammals within the mitigation zone shall continue for 30 minutes.

J. Any marine mammal observed after an underwater detonation either injured or exhibiting signs of distress shall be reported via Navy operational chain of command to Navy environmental representatives from U.S. Pacific Fleet, Environmental Office, San Diego Detachment. Using Marine Mammal Stranding communication trees and contact procedures established for the Southern California Range Complex, the Navy shall report these events to the Stranding Coordinator of NMFS' Southwest Regional Office. These voice or email reports shall contain the date and time of the sighting, location (or if precise latitude and longitude is not currently available, then the approximate location in reference to an established SSTC beach feature), species description (if known), and indication of the animal's status.

(ii) Mitigation and Monitoring Measures for Underwater Detonations in Shallow Water (>24 Feet)

(1) Mitigation and Monitoring Measures for Underwater Detonations Using Positive Control (Except SWAG and Timed Detonations)

A. Underwater detonations using positive control devices shall only be conducted during daylight.

B. A mitigation zone of 700 yards shall be established around each underwater detonation point.

C. A minimum of two boats, including but not limited to small zodiacs and 7-m Rigid Hulled Inflatable Boats (RHIB) shall be deployed. One boat shall act as an observer platform, while the other boat is typically the diver support boat.

D. Two observers with binoculars on one small craft/boat shall survey the detonation area and the mitigation zone for marine mammals from at least 30 minutes prior to commencement of the scheduled explosive event and until at least 30 minutes after detonation.

E. In addition to the dedicated observers, all divers and boat operators engaged in detonation events can potentially monitor the area immediately surrounding the point of detonation for marine mammals.

F. If a marine mammal is sighted within the 700 yard mitigation zone or moving towards it, underwater detonation events shall be suspended until the marine mammal has voluntarily left the area and the area is clear of marine mammals for at least 30 minutes.

G. Immediately following the detonation, visual monitoring for marine mammals within the mitigation zone shall continue for 30 minutes. Any marine mammal observed after an underwater detonation either injured or exhibiting signs of distress shall be reported to via Navy operational chain of command to Navy environmental representatives from U.S. Pacific Fleet, Environmental Office, San Diego Detachment. Using Marine Mammal Stranding communication trees and contact procedures established for the Southern California Range Complex, the Navy will report these events to the Stranding Coordinator of NMFS' Southwest Regional Office. These voice or email reports shall contain the date and time of the sighting, location (or if precise latitude and longitude is not currently available, then the approximate location in reference to an established SSTC beach feature), species description (if known), and indication of the animals status.

(2) Mitigation and Monitoring Measures for Underwater Detonations Using Time-Delay (TDFD Detonations Only)

A. Underwater detonations using timed delay devices shall only be conducted during daylight.

B. Time-delays longer than 10 minutes shall not be used. The initiation of the device shall not start until the mitigation area below is clear for a full 30 minutes prior to initiation of the timer.

C. A mitigation zone shall be established around each underwater detonation location as indicated in Table above based on charge weight and length of time-delay used. When conducting the surveys within a mitigation zone (either 1,000 or 1,400 yds), boats shall position themselves near the mid-point of the mitigation zone radius (but always outside the detonation plume radius/human safety zone) and travel in a circular pattern around the detonation location surveying both the inner (toward detonation site) and outer (away from detonation site) areas.

D. Shallow water TDFD detonations range 1,000 yds:

(A) A minimum of 2 boats shall be used to survey for marine mammals at mitigation ranges of 1,000 yds.

(B) When using 2 boats, each boat shall be positioned on opposite sides of the detonation location, separated by 180 degrees.

(C) Two observers in each of the boats shall conduct continuous visual survey of the mitigation zone for the entire duration of a training event.

(D) To the best extent practical, boats shall try to maintain a 10 knot search speed. This search speed was added to ensure adequate coverage of the buffer zone during observation periods. While weather conditions and sea states may require slower speeds in some instances, 10 knots is a prudent, safe, and executable speed that will allow for adequate surveillance. For a 1,000 yd radius buffer zone a boat travelling at 10 knots and 500 yds away from the detonation point would circle the detonation point 3.22 times during a 30 minute survey period. By using 2 boats, 6.44 circles around the detonation point would be completed in a 30 minute span.

E. Shallow water TDFD detonations greater than 1,400 yds:

(A) A minimum of 3 boats or 2 boats and 1 helicopter shall be used to survey for marine mammals at mitigation ranges of 1,400 yds.

(B) When using 3 (or more) boats, each boat shall be positioned equidistant from one another (120 degrees separation for 3 boats, 90 degrees separation for 4 boats, etc.).

(C) For a 1,400 yd radius mitigation zone, a 10 knot speed results in 2.3 circles for each of the three boats, or nearly 7 circles around the detonation point over a 30 minute span.

(D) If available, aerial visual survey support from Navy helicopters shall be utilized, so long as it will not jeopardize safety of flight.

(E) Helicopters, if available, shall be used in lieu of one of the boat requirements. A helicopter search pattern is dictated by standard Navy protocols and accounts for multiple variables, such as the size and shape of the search area, size of the object being searched for, and local environmental conditions, among others.

F. A mitigation zone shall be surveyed from 30 minutes prior to the detonation and for 30 minutes after the detonation.

G. Other personnel besides boat observers can also maintain situational awareness on the presence of marine mammals within the mitigation zone to the best extent practical given dive safety considerations. Divers placing the charges on mines shall observe the immediate underwater area around a detonation site for marine mammals and report sightings to surface observers.

H. If a marine mammal is sighted within an established mitigation zone or moving towards it, underwater detonation events shall be suspended until the marine mammal has voluntarily left the area and the area is clear of marine mammals for at least 30 minutes.

I. Immediately following the detonation, visual monitoring for affected marine mammals within the mitigation zone shall continue for 30 minutes.

J. Any marine mammal observed after an underwater detonation either injured or exhibiting signs of distress shall be reported via Navy operational chain of command to Navy environmental representatives from U.S. Pacific Fleet, Environmental Office, San Diego Detachment or Pearl Harbor. Using Marine Mammal Stranding protocols and communication trees established for the Southern California and Hawaii Range Complexes, the Navy shall report these events to the Stranding Coordinator of NMFS' Southwest or Pacific Islands Regional Office. These voice or email reports shall contain the date and time of the sighting, location (or if precise latitude and longitude is not currently available, then the approximate location in reference to an established SSTC beach feature), species description (if known), and indication of the animal's status.

(3) Mitigation and Monitoring Measures for Underwater SWAG Detonations (SWAG Only)

A. Underwater detonations using SWAG shall only be conducted during daylight.

B. A mitigation zone of 60 yards shall be established around each SWAG detonation site.

C. A minimum of two boats, including but not limited to small zodiacs and 7-m Rigid Hulled Inflatable Boats (RHIB) shall be deployed. One boat shall act as an observer platform, while the other boat is typically the diver support boat.

D. Two observers with binoculars on one small craft\boat shall survey the detonation area and the mitigation zone for marine mammals from at least 10 minutes prior to commencement of the scheduled explosive event and until at least 10 minutes after detonation.

E. In addition to the dedicated observers, all divers and boat operators engaged in detonation events shall monitor the area immediately surrounding the point of detonation for marine mammals when possible.

F. Divers and personnel in support boats shall monitor for marine mammals out to the 60 yard mitigation zone for 10 minutes prior to any detonation.

G. After the detonation, visual monitoring for marine mammals shall continue for 10 minutes. Any marine mammal observed after an underwater detonation either injured or exhibiting signs of distress shall be reported via Navy operational chain of command to Navy environmental representatives from U.S. Pacific Fleet, Environmental Office, San Diego Detachment. Using Marine Mammal Stranding communication trees and contact procedures established for the Southern California Range Complex, the Navy shall report these events to the Stranding Coordinator of NMFS' Southwest Regional Office. These voice or email reports shall contain the date and time of the sighting, location (or if precise latitude and longitude is not currently available, then the approximate location in reference to an established SSTC beach feature), species description (if known), and indication of the animal's status.

(a) Mitigation for ELCAS Training at SSTC

(1) Safety Zone: A safety zone shall be established at 150 feet (50 yards) from ELCAS pile driving or removal events. This safety zone is base on the predicted range to Level A harassment (180 dB_{rms}) for cetaceans during pile driving, and is being applied conservatively to both cetaceans and pinnipeds during pile driving and removal.

(2) If marine mammals are found within the 150-foot (50-yard) safety zone, pile driving or removal events shall be halted until the marine mammals have voluntarily left the mitigation zone.

(3) Monitoring for marine mammals shall be conducted within the zone of influence and take place at 30 minutes before, during, and 30 minutes after pile driving and removal activities, including ramp-up periods. A minimum of one trained observer shall be placed on shore, on the ELCAS, or in a boat at the best vantage point(s) practicable to monitor for marine mammals.

(4) Monitoring observer(s) shall implement shut-down/delay procedures by calling for shut-down to the hammer operator when marine mammals are sighted within the safety zone. After a shut-down/delay, pile driving or removal shall not be resumed until the marine mammal within the safety zone is confirmed to have left the area or 30 minutes have passed without seeing the animal.

(5) Soft Start – ELCAS pile driving shall implement a soft start as part of normal construction procedures. The pile driver increases impact strength as resistance goes up. At first, the pile driver piston drops a few inches. As resistance goes up, the pile driver piston will

drop from a higher distance thus providing more impact due to gravity. This will allow marine mammals in the project area to vacate or begin vacating the area minimizing potential harassment.

(6) Emergency Shut-down Related to Marine Mammal Injury and Mortality – If there is clear evidence that a marine mammal is injured or killed as a result of the proposed Navy training activities (e.g., instances in which it is clear that munitions explosions caused the injury or death), the Naval activities shall be immediately suspended and the situation immediately reported by personnel involved in the activity to the officer in charge of the training, who will follow Navy procedures for reporting the incident to NMFS through the Navy's chain-of-command.

1. Monitoring Measures

In order to ensure the least practicable impact on the species and levels of takes listed in 3(b) and (c), the holder of this Authorization is required to comply with the following monitoring measures:

(i) Marine Mammal Observer at a Sub-set of SSTC Underwater Detonation:

(1) Civilian scientists acting as protected species observers (PSOs) shall be used to observe a sub-set of the SSTC underwater detonation events. The PSOs shall validate the suite of SSTC specific mitigation measures applicable to a sub-set of SSTC training events and to observe marine mammal behavior in the vicinity of SSTC training events.

(2) PSOs shall be field-experienced observers that are either Navy biologists or contracted marine biologists. These civilian PSOs shall be placed either alongside existing Navy SSTC operators during a sub-set of training events, or on a separate small boat viewing platform.

(3) PSOs shall collect the same data currently being collected for more elaborate offshore ship-based observations including but not limited to:

A. location of sighting;

B. species;

C. number of individuals;

D. number of calves present;

E. duration of sighting;

F. behavior of marine animals sighted;

G. direction of travel;

H. environmental information associated with sighting event including Beaufort sea state, wave height, swell direction, wind direction, wind speed, glare, percentage of glare, percentage of cloud cover; and

I. when in relation to Navy training did the sighting occur [before, during or after the detonation(s)].

(1) The PSOs will not be part of the Navy's formal reporting chain of command during their data collection efforts. Exceptions can be made if a marine mammal is observed by the PSO within the SSTC specific mitigation zones the Navy has formally proposed to the NMFS. The PSO shall inform any Navy operator of the sighting so that appropriate action may be taken by the Navy trainees.

(i) ELCAS Visual Monitoring: The Navy shall place monitoring personnel to note any observations during the entire pile driving sequence, including "soft start" period, for later analysis. Information regarding species observed during pile driving and removal events (including soft start period) shall include:

(1) location of sighting;

(2) species;

(3) number of individuals;

(4) number of calves present;

(5) duration of sighting;

(6) behavior of marine animals sighted;

(7) direction of travel;

(8) environmental information associated with sighting event including Beaufort sea state, wave height, swell direction, wind direction, wind speed, glare, percentage of glare, percentage of cloud cover; and

(9) when in relation to Navy training did the sighting occur (before, during or after pile driving or removal).

(i) ELCAS Acoustic Monitoring: The Navy shall conduct underwater acoustic propagation monitoring during the first available ELCAS deployment at the SSTC. These acoustic monitoring results shall be used to either confirm or refine the Navy's zones of safety and influence for pile driving and removal listed in 4(b)(1).

1. Reporting Measures

(i) The Navy shall report results obtained annually from the Southern California Range Complex Monitoring Plan for areas pertinent to the SSTC, if applicable.

(ii) The Navy shall submit a report to the Office of Protected Resources, NMFS, no later than 90 days after the expiration of the IHA. The report shall, at a minimum, includes the following marine mammal sighting information:

(1) location of sighting;

(2) species;

(3) number of individuals;

(4) number of calves present;

(5) duration of sighting;

(6) behavior of marine animals sighted;

(7) direction of travel;

(8) environmental information associated with sighting event including Beaufort sea state, wave height, swell direction, wind direction, wind speed, glare, percentage of glare, percentage of cloud cover; and

(9) when in relation to Navy training did the sighting occur [before, during or after the detonation(s)].

(i) In addition, the Navy shall provide the information for all of its underwater detonation events and ELCAS events under the IHA. The information shall include: (1) total number of each type of underwater detonation events conducted at the SSTC, and (2) total number of piles driven and extracted during the ELCAS exercise.

(ii) The Navy shall submit to NMFS a draft report as described above and shall respond to NMFS comments within 3 months of receipt. The report will be considered final after the

Navy has addressed NMFS' comments, or 3 months after the submittal of the draft if NMFS does not comment by then.

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

Dated: April 18, 2013.

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

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