

**Ammunition Pier and Turning Basin
at Naval Weapons Station Seal Beach**

**2021 Annual Pile Driving
Monitoring Report**

Marine Species



FINAL

**Prepared for:
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LIST OF ACRONYMS

ESA	Endangered Species Act	PBC	Public Boating Channel
LOA	Letter of Authorization	SBNWR	Seal Beach National Wildlife Refuge
NAVWPNSTA	Naval Weapons Station	TPP	Test Pile Program
NMFS	National Marine Fisheries Service	WCR	West Coast Region

EXECUTIVE SUMMARY

The purpose of this report is to meet annual reporting requirements of the approved Letter of Authorization from NMFS (see 85 FR 10312) and Endangered Species Act Section 7(a)(2) Biological Opinion for green sea turtles. These requirements include monitoring of the construction areas to detect the presence of marine mammals and sea turtles before beginning construction activities, shutdown of construction activities under certain circumstances to avoid injury of marine mammals, and soft start for impact pile driving to allow marine mammals the opportunity to leave the area prior to beginning impact pile driving at full power.

In 2021, monitoring was conducted by qualified observers trained in marine species identification and behaviors and experience conducting marine mammal and sea turtle monitoring for pile driving activities during pier construction. Monitoring results are presented for pile driving activities during the Test Pile Program (TPP) in September and pier pile installation which began in December.

A combined total of 97 individual observations of green sea turtles and marine mammals were recorded during pile driving activities in 2021. California sea lions had the most sightings (n=65), representing 67% of all the observations. Bottlenose dolphin had the second highest number of sightings (n=25), representing 26% of all the observations.

Only one Level B take was recorded during pile driving activities in 2021 from a Pacific harbor seal reported at the 100-m monitoring zone during active pile driving. Monitoring results indicated few observations of marine mammals were made during active pile driving for the TPP in September and pier construction in December and most observations were from animals outside Level B monitoring zones during pile driving.

Methods and protocols used during monitoring, such as shutdown zones were effective in preventing any injury or disturbance to sea turtles and marine mammals during pile driving activities. Work stoppage due to animals observed within the shutdown zones during pile driving occurred five times for a total of 92 minutes in December. When an animal got close to shutdown zones, monitors contacted the Command monitor using VHF radios and the Command monitor radioed the pile driving operator to stop pile driving until the animal was outside of the designated shutdown zone. Overall, effective monitoring during pile driving activities in 2021 resulted in no injuries or unintended disturbances to any marine species.

1 Introduction

This report summarizes the monitoring efforts required for the Navy Ammunition Pier and Turning Basin project (Project) at Naval Weapons Station (NAVWPNSTA) Seal Beach. The Project Area comprises all areas potentially affected directly or indirectly by the Project and encompasses inner and outer Anaheim Bay to Huntington Harbour and the entrance to the Seal Beach National Wildlife Refuge (SBNWR) (**Error! Reference source not found.**). Monitoring efforts described in this report are required per the Letter of Authorization (LOA) issued by the National Marine Fisheries Service (NMFS) (National Marine Fisheries Service, 2020) and NMFS Biological Opinion (National Marine Fisheries Service, 2019). This report reflects the second year of the project, but the first year that pile driving occurred. Monitoring results for other in-water activities (e., dredging and rock placement) are described in U.S. Department of the Navy (2021).

This report provides monitoring results for green sea turtles (*Chelonia mydas*) and marine mammals (California sea lions - *Zalophus californianus*; Pacific harbor seal - *Phoca vitulina*; bottlenose dolphin - *Tursiops truncatus*; and common dolphin - *Delphinus* spp.) observed during pile driving activities in 2021. Background information on each of the marine species historically observed and reported in 2021 is presented below, while monitoring methods and results of are presented in Section 4 (Monitoring Methods) and Section 5 (Monitoring Results), respectively.

1.1 Project Description and Location

The Project involves constructing an approximately 1,100-foot (ft.) by 125 ft. pile-supported Ammunition Pier with associated waterfront facilities at NAVWPNSTA Seal Beach. The Project includes the construction of a breakwater to reduce wave heights at the pier, a causeway (raised road), pile-supported mooring dolphins, a public navigation channel for access into Huntington Harbour, dredging for the pier and a Navy ship turning basin, and operational support buildings (Figure 1). The demolition of existing facilities and the wharf fender system will also occur and involves vibratory or hammer extraction. Suitable dredge material from the project area will be used as fill to create a causeway and a truck turnaround area. To ensure continued operations, the existing wharf will be upgraded and used until the new ammunition pier is operational. The Project began in December 2019 and overall, the Project is estimated to take approximately five to six years to complete.

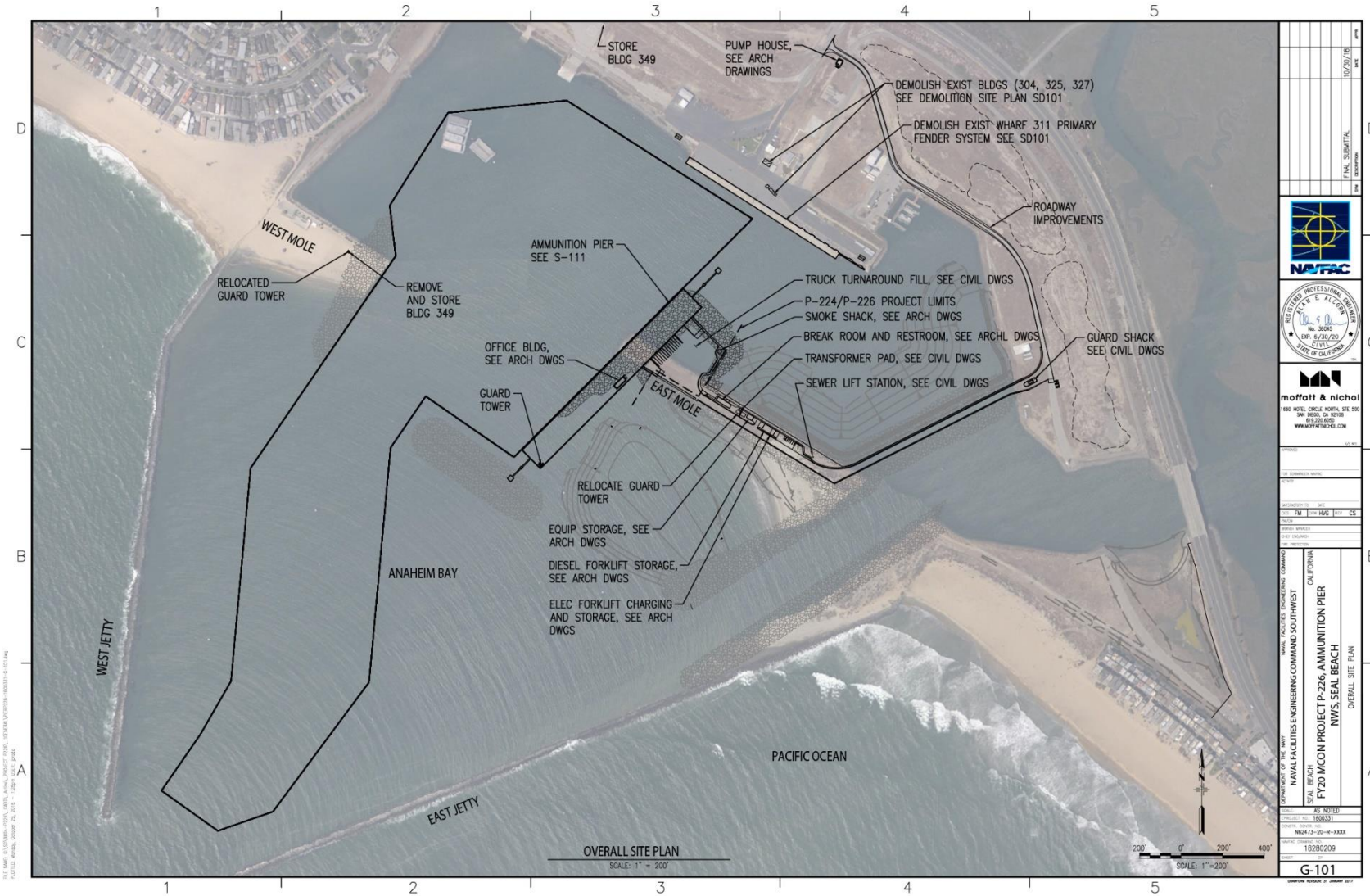


Figure 1: Location of In-Water Construction Activities in 2021

2 Marine Species in the Project Area

There are five marine mammal and one sea turtle species that are known to occur in sufficient proximity to the Project Area and have the potential to be affected by project activities. Those species include the common dolphin (*Delphinus spp.*), bottlenose dolphin (*Tursiops truncatus*), California sea lion (*Zalophus californianus*), Pacific harbor seal (*Phoca vitulina*), gray whale (*Eschrichtius robustus*), and green sea turtle (*Chelonia mydas*). Relevant information on their distribution and occurrence in Anaheim Bay is presented below for those species that were sighted in 2021 (common dolphins were not observed in 2021).

2.1 Bottlenose Dolphin

Bottlenose dolphins typically are found in coastal and continental shelf waters of tropical and temperate regions of the world (Jefferson et al., 2008; Wells & Scott, 2009). Bottlenose dolphins are known to occur year-round in both coastal and off-shore waters of Monterey Bay, Santa Monica Bay, San Diego Bay, and San Clemente Island, California (Bearzi, 2005; Bearzi et al., 2009; Carretta et al., 2016; Carretta et al., 2017; Henkel & Harvey, 2008; Maldini-Feinholz, 1996).

California coastal bottlenose dolphins are found within about 0.6 miles (0.95 kilometers) of shore, generally from Point Conception to as far south as San Quintin, Mexico (Carretta et al., 1998; Defran & Weller, 1999; Hwang et al., 2014). Off Southern California, animals are found within 500 meters (m) of the shoreline 99 percent of the time and within 250 m of the shoreline 90 percent of the time (Hanson & Defran, 1993; Hwang et al., 2014). Bottlenose dolphins have been sighted several times within Anaheim Bay and the Seal Beach National Wildlife Refuge (Kirk Gilligan; Refuge Manager; Seal Beach National Wildlife Refuge, 2016).

2.2 California Sea Lion

The California sea lion occurs in the eastern north Pacific from Puerto Vallarta, Mexico, through the Gulf of California and north along the West Coast of North America to the Gulf of Alaska (Barlow et al., 2008; Jefferson et al., 2008; Maniscalco et al., 2004). Typically, during the summer, California sea lions congregate near rookery islands and specific open-water areas. The primary rookeries off the West coast of the United States are on San Nicolas, San Miguel, Santa Barbara, and San Clemente Islands (Carretta et al., 2000; Le Boeuf & Bonnell, 1980; Lowry et al., 1992; Lowry & Forney, 2005).

California sea lions can be found in California open ocean and coastal waters (Barlow et al., 2008; Jefferson et al., 2008; Lander et al., 2010). California sea lions are usually found in waters over the continental shelf and slope; however, they are also known to occupy locations far offshore in deep, oceanic waters, such as Guadalupe Island and Alijos Rocks off the coast of Baja California (Jefferson et al., 2008; Melin et al., 2008; Urrutia & Dziendzielewski, 2012; Zavala-Gonzalez & Mellink, 2000).

California sea lions are the most frequently offshore-sighted pinnipeds in Southern California during the spring, and peak abundance is during the May through August breeding season (Green et al., 1992; Keiper et al., 2005).

2.3 Pacific Harbor Seal

The harbor seal is one of the most widely distributed seals, found in nearly all temperate coastal waters of the northern hemisphere (Jefferson et al., 2008). Harbor seals are a coastal species, rarely found more than 12.4 miles (20 kilometers) from shore, and frequently occupying bays, estuaries, and inlets (Baird, 2001). Individual seals have been observed several kilometers upstream in coastal rivers (Baird, 2001). Harbor seals are not considered migratory (Burns, 2009; Jefferson et al., 2008). During surveys in 2016 and 2017, there were three in-water sightings of harbor seals in Anaheim Bay (Bredvik et al., 2017. Unpublished Data). Monitoring associated with dredging in the spring of 2019 also encountered harbor seals once within Anaheim Bay (Merkel & Associates Inc., 2019).

2.4 Gray Whale

Gray whales of the Eastern North Pacific stock primarily occur in shallow waters over the continental shelf of North America and Mexico and are considered one of the most coastal of the great whales (Jefferson et al., 2008; Jones & Swartz, 2009). Gray whales are not likely to occur within the Seal Beach Action Area. During surveys in 2016 and 2017, there were no sightings of gray whales in Anaheim Bay (Bredvik et al., 2017. Unpublished Data). Monitoring associated with dredging in March of 2019 encountered one gray whale within Anaheim Bay (Merkel & Associates Inc., 2019). One juvenile gray whale was observed in 2021 by the avian monitor in Anaheim Bay on September 9th when no in-water construction activities were occurring.

2.5 Green Sea Turtle

Along the Pacific coast, green turtles have been found as far north as British Columbia, with high concentrations in the subtropical coastal waters of southern Baja California, Mexico, and Central America (Chaloupka et al., 2004). Off Southern California, this species is most often observed from Los Angeles to San Diego. Stinson (1984) reported that more than 60 percent of green sea turtles observed in California were in areas where the water was less than 165 ft. (50 m) deep, often along the shore in areas of eelgrass. Ocean waters off Southern California and northern Baja California are also designated as areas of occurrence because of the presence of rocky ridges and channels and floating kelp habitats suitable for green sea turtle foraging and resting (Stinson, 1984); however, these waters are often at temperatures below the thermal preferences of this primarily tropical species. In general, turtle sightings increase during summer as warm water moves northward along the coast (National Marine Fisheries Service & U.S. Fish and Wildlife Service, 1998). Sightings may also be more numerous in El Niño years, when water temperatures are on average higher compared to colder years. Stinson (1984) also found seasonal sightings to be independent of temperature fluctuations within a season and that sightings of green sea turtles north of Point Conception increased during years with warmer water.

A small population of green turtles is sustained in the San Gabriel River (just north of Anaheim Bay) and Seal Beach National Wildlife Refuge (Crear et al., 2016). While green sea turtles are known to transit through Anaheim Bay to the waters in the Seal Beach National Wildlife Refuge, the number of turtles present in the Project footprint is uncertain. Additionally, there is limited information about their movements and behavior within the Seal Beach National Wildlife Refuge, Anaheim Bay, and the San Gabriel River. Studies indicate increased water temperatures from power-generating stations in the San

Gabriel River have created an environment where turtles can survive at the northern extent of their normal range and substantially influence their movement and distribution patterns (Crear, 2015; Crear et al., 2017; Crear et al., 2016). Crear et al. (2016) showed that acoustically tagged juvenile sea turtles move into the San Gabriel River during winter months, when temperatures dropped below 15° Celsius (C). Conversely, turtles moved through Anaheim Bay to get to the 7th Street Basin in the Seal Beach National Wildlife Refuge during summer months to forage on eelgrass beds. The power plants that discharge warm water into the San Gabriel River are expected to discontinue the warm water release by 2029, which may cause a decline in the population of green sea turtles in the area due to lack of survivable temperatures (Crear, 2015; Crear et al., 2016) or a change in behavior. Recent satellite tracking data of a green sea turtle tagged in the SBNWR indicated it left Anaheim Bay and headed south, presumably to a nesting beach in Mexico (National Marine Fisheries Service and U.S. Department of the Navy, 2022). This individual's track is the first-ever satellite tracked nesting migration from Seal Beach to Mexico and redefines perceptions about the offshore extent of the foraging area-nesting beach migratory corridor for green turtles in Southern California (National Marine Fisheries Service and U.S. Department of the Navy, 2022).

3 Scope of Construction Activities

Removal of navigational aid steel pipe and timber piles by vibratory methods was included in the LOA. However, in March 2020, those piles were removed with a combination of being pulled out with a barge-mounted crane and being cut off below the mudline by divers. Therefore, these activities did not require monitoring since removal methods did not generate significant underwater noise.

Pile driving activities performed in 2021 that required monitoring for green sea turtles and marine mammals included the Test Pile Program (TPP) that occurred between September 10-20 and pier production pile driving that occurred from 3-28 December. Detailed information on pile installation methods are presented below.

3.1 Pile Driving Methods

Pile driving equipment and methods were the same for both the TPP and pier construction, including jetting, "ramp up" or "soft start" technique, and impact pile driving. All piles were installed using an impact pile driving hammer, as described below in Section 3.1.2. Information on each in-water construction activity is provided below.

3.1.1 Jetting

Jetting was accomplished using a Jet Pump with a Peerless three stage horizontal split case pump powered by a 350 HP Volvo Diesel engine. The pump is rated at 750 GPM at 350 PSI. Per specifications, pile jetting can occur until 5 feet above tip elevation for octagonal pile.

3.1.2 Impact Pile Driving

Impact pile driving took place from a crane mounted on a 200'x70' barge. Impact pile driving utilized a Delmag D100 hammer rated at 265,520 ft lbs at maximum setting and 157,840 ft lbs at minimum setting. A "ramp up" or "soft start" procedure was used at the start of pile driving and following a

shutdown. The purpose of the ramp up or soft start was to warn sea turtles and marine mammals potentially in the area and provide sufficient time for them to leave the Project Area and avoid any potential injury. The soft-start included an initial set of three strikes from the impact hammer at reduced energy, followed by a 30-second waiting period, then two subsequent 3-strike sets.

4 Monitoring Methods

Monitoring was conducted by qualified observers trained in marine species identification and behaviors and have experience conducting marine mammal and sea turtle monitoring. Monitoring of pile driving activities occurred eight to 10 hours per day Monday through Friday. Monitoring of the TPP occurred between September 10-20, while monitoring of pier construction occurred between December 3-28. All monitoring began approximately 30 minutes prior to initiation of pile driving (pre-construction survey) and stopped 30 minutes after activities were completed for the day (post-construction survey).

During pile driving, one Monitor was stationed at the active pile driving rig (“Command” position) to monitor the shutdown zone, while three other Monitors, including a Lead Monitor, were placed at the best vantage point(s) practicable around Anaheim Bay to monitor for marine species and implement shutdown or delay procedures (when applicable). The Command position was primarily responsible for collecting activity start/end times, as well as shutting down construction when/if an animal enters the shutdown zone. All other Monitors were responsible for identifying and tracking animals in and out of their monitoring zones and relaying animal positions to each other and to Command position if animals moved toward the shutdown zones.

Standard land-based marine species observation methods were implemented to record the presence of sea turtles and marine mammals, as well as any behavioral reactions to pile driving in the vicinity of that activity. Marine species identifications and observations were recorded using an Android-based tablet with the ESRI Field Maps application. The exact position of each individual sea turtle and marine mammal (distance and bearing) relative to the location of the pile was determined. Information on the presence of turbidity plumes, as well as daily weather parameters (i.e., percent cloud cover, sea state, air temperature, wind speed and direction, and visibility) were also recorded.

Daily weather conditions during monitoring of the TPP and pier construction are presented in Appendix A, while raw sighting data are presented in Appendix B.

Shutdown Procedures

The purpose of a shutdown zone is to define an area within which shutdown of activity would occur upon sighting of a marine mammal or sea turtle (or in anticipation of an animal entering the defined zone).

During pile driving, Monitors scanned Anaheim Bay for sea turtles and marine mammals entering or leaving the Bay. Radial distances of shutdown zones for Project pile driving activities are presented in Table 1. Marine mammals observed during pile driving activities are arranged into the following functional hearing groups based on their generalized hearing sensitivities: low-frequency cetaceans (group LF: gray whales), mid-frequency cetaceans (group MF: common dolphins and bottlenose

dolphins), otariids and other non-phocid marine carnivores in water and air (groups OW and OA: California sea lions), and phocids in water and air (group PW and PA: Pacific harbor seals).

Table 1: Radial Distance to Shutdown and Monitoring Zones.

Activity	Level A Shutdown Zone (m)				Monitoring Zone (m) ²
	LF ¹	MF ¹	PW ¹	OW ¹	
24-in concrete piles; impact driving	46	10	25	10	100
12-in steel piles; impact driving	85	10	45	10	Varous ³
24-in steel piles; vibratory driving	27	10	17	10	770
12-in steel piles; vibratory driving	32	10	19	10	Various ⁴
24-in timber piles; vibratory driving	10	10	10	10	1,359

¹ LF = Low-frequency cetaceans (gray whales); MF = Mid-frequency cetaceans (common and bottlenose dolphin); PW = Phocid pinnipeds (Pacific harbor seal); OW = Otariid pinnipeds (California sea lion).

² Monitoring zones are equal to the described distance, as constrained by topography, and are limited to waters within Anaheim Bay.

³ Echo location = 424 m; OSCAR 4 location = 439 m; OSCAR 8 location = 430 m.

⁴ Echo location = 821 m; OSCAR 4 location = 1,496 m; OSCAR 8 location = 1,498 m.

The ZOI areas and maximum distances for the pile driving activities are shown in Figure 2. Monitoring zones for impact driving of 24” concrete piles installed during the TPP and pier construction included a Level B (disturbance) zone for all marine mammals at 100 m and Level A shutdown zones for bottlenose dolphin and California sea lions at 10 m and Pacific harbor seals at 25 m. The pier was divided into five separate zones and shutdown zones were set in the pier zone where the pile was being driven.

In order to determine if behavioral harassment (Level B) take occurred during impact pile driving, construction activity logs and marine mammal observations were evaluated. The Command monitor kept detailed logs of pile driving activities, including the start and stop times during pre-construction and post-construction surveys, soft starts, impact pile driving, and delays. These data were then cross-referenced against the marine species observation times, allowing each observation to be directly associated with an activity, pile number, and pile zone for analysis of take. Once animal observations during active pile driving were cross-referenced against the pile driving activity, observations were then plotted on a map and checked against the Level B monitoring zone. If the animal location was outside of the monitoring zone, then it was not deemed a take, even if it had occurred during pile driving. If the animal was located inside of the monitoring zone and during active pile driving, then it was deemed a

take. Also, if the animal was located inside the ZOIs, but not during active pile driving (i.e., pile setup, jetting, and delays), then it was not deemed as a take.



Figure 2: Underwater Sound Zones of Influence for Pile Activities at the New Pier (24-inch concrete and 16-inch concrete filled fiberglass piles) and Existing Navigation Piles (24-inch timber and steel pipe piles)

The following shutdown procedures were used to prevent Level A take:

- Pile driving was shut down completely if a sea turtle or marine mammal approached the applicable shutdown zone. The shutdown procedure was accomplished within several seconds of the determination that a sea turtle or marine mammal was either in or about to enter the applicable shutdown zone.
- The Lead Monitor (Command position) was alerted when an animal approached the monitoring zone (100 m). If an animal passed the monitoring zone and was approaching the shutdown zone during pile driving, the Monitor called out on the designated radio channel “Red Alert...this is LOCATION X, SPECIES X is approaching the shutdown zone” and provided basic information including your location and a frame of reference for the Command position. The Lead Monitor asked for more details (if needed) and notified the impact pile driving operator of the potential shutdown situation.
- Shutdown of impact pile driving occurred when a marine mammal or sea turtle entered the designated shutdown zone. All Monitors initiated a construction shutdown by calling out “Code red, code red, code red” on the designated radio channel. This included Monitors near the activity for any marine mammal species covered under the LOA.
- If an animal caused a shutdown of construction, each time that the animal was re-sighted by individual Monitors, a “code red” note was added to the electronic data form. This allowed for tracking of the general location and movement of the animal, as well as tracking any potential behavioral changes after the shutdown was called.

If an animal entered the Level A shutdown zones during pile driving/extraction, the activity was stopped until the individual was observed exiting the shutdown zone, the animal was thought to have exited the shutdown zone based on its course and speed, or the shutdown zone was clear from any marine mammal sightings for a period of 30 minutes.

Plumes

Information on the presence and size of sediment plumes were reported (if plumes were detected). When necessary, silt curtains would be installed around each fill area to minimize the resuspension of sediments in the water column. Siltation barriers would be made of a material that is unlikely to entangle any marine animals (e.g., reinforced impermeable polycarbonate vinyl fabric), were installed in a manner in which a sea turtle cannot become easily entangled (i.e., stretched out tightly with very little slack), would be installed with the minimum extent of curtain needed (in terms of surface to bottom height, as well as total area surrounded), would be inspected daily to ensure proper integrity and for the presence of entangled or entrapped protected species, and would be removed immediately upon project completion.

NMFS West Coast Region (WCR) will be notified prior to, or at least within 48 hours after, the placement of silt curtains in the Project Area. As part of this coordination process, NMFS WCR will be provided a description of the silt curtains being used, including specific deployment locations, as well as any expectations for the duration of use. In addition, NMFS WCR will be provided the most recent relevant project monitoring data that is available, as well as updated on the use of silt curtains, including when they were removed.

5 Monitoring Results

Monitoring of pile driving activities for the TPP was conducted between September 10-20 and between December 3-28 for pier construction. Information on the daily totals for all marine species observations made during pile driving activities in 2021 are presented below.

A total of 14 test piles were installed during the TPP in September (Table 2) and 86 piles during pier construction in December (Table 3). All piles installed during the TPP and pier construction were 24" octagonal concrete piles driven with an impact hammer.

A total of 20 individuals were observed during the TPP (

Table 2). The species and number of individuals observed during the TPP are presented in Table 2. The location where individuals were observed during pre-construction surveys is presented in Figure 3, during pile driving activities and shutdown zones in pier zone 1 through pier zone 5 in Figure 4 through Figure 8, respectively, and during post-construction surveys in Figure 9.

A total of 77 observations were made before (pre-construction), during, and after (post-construction) pile driving in December (Table 3). The species and number of individuals observed during pier construction are presented in Table 3. The location where individuals were observed during pre-construction surveys is presented in Figure 10, during pile driving activities and shutdown zones in pier zones 4 and 5 in Figure 11 and Figure 12, respectively, and during post-construction surveys in Figure 13. Note that no pile driving occurred in pier zones 1, 2, or 3 in December.

5.1 Marine Mammals

5.1.1 Bottlenose Dolphin

A total of eight observations of bottlenose dolphins were recorded during the TPP in 2021 (Table 2). No bottlenose dolphin were observed before or after pile driving during the TPP (Figure 3 and Figure 9, respectively), and eight were observed during test pile driving (Figure 4 and Figure 8). Individuals were observed coming into outer Anaheim Bay from the ocean. No individuals were observed near the shutdown zones.

A total of 17 common bottlenose dolphin were observed in Anaheim Bay before (pre-construction), during, and after (post-construction) pile driving during pier construction in December (Table 3 and Figure 10 through Figure 13). Eight dolphins were observed before pile driving (Figure 10), while six were observed during pile driving (Figure 11 and Figure 12), and three were observed after pile driving during post-construction surveys (Figure 13). Individuals were observed coming into outer Anaheim Bay from the ocean, swimming up the navigation channel, and foraging within outer and inner Anaheim Bay.

Table 2: Marine Species Observations During the Test Pile Program in September 2021

Date	Species Observed				Daily Total	Total Number of Piles Installed
	BTD	CSL	PHS	GST		
9/10/2021		2		1	3	5
9/13/2021					0	0
9/14/2021	4	2		1	7	3
9/15/2021		1			1	4
9/16/2021	4	1			5	2
9/17/2021					0	0
9/20/2021		3		1	4	0
Total	8	9	0	3	20	14

Dates are only presented for days pile driving activities were conducted; missing dates are from equipment down days, weekend days, and holidays. BTD = Common bottlenose dolphin; CSL = California sea lion; GST = Green sea turtle; PHS = Pacific harbor seal.

Table 3: Marine Species Observations During Pier Construction in December 2021

Date	Species Observed				Daily Total	Total Number of Piles Installed
	BTD	CSL	PHS	GST		
12/3/2021	3				3	1
12/6/2021		2			2	7
12/7/2021		1			1	7
12/8/2021		11			11	8
12/9/2021		9			9	4
12/10/2021	6	11			17	6
12/13/2021		1	1		2	5
12/15/2021		2			2	3
12/16/2021		3			3	6
12/17/2021	2	6	1		9	5
12/20/2021		2			2	8
12/21/2021		2		1	3	8
12/22/2021	6	1	1		8	8
12/23/2021		2			2	4
12/27/2021		2			2	4
12/28/2021		1			1	2
Total	17	56	3	1	77	86

Dates are only presented for days pile driving activities were conducted; missing dates are from equipment down days, weekend days, and holidays. BTD = Common bottlenose dolphin; CSL = California sea lion; GST = Green sea turtle; PHS = Pacific harbor seal.



Figure 3: Location of Individual Marine Species Sightings During Pre-Construction Surveys During the Test Pile Program in September 2021.

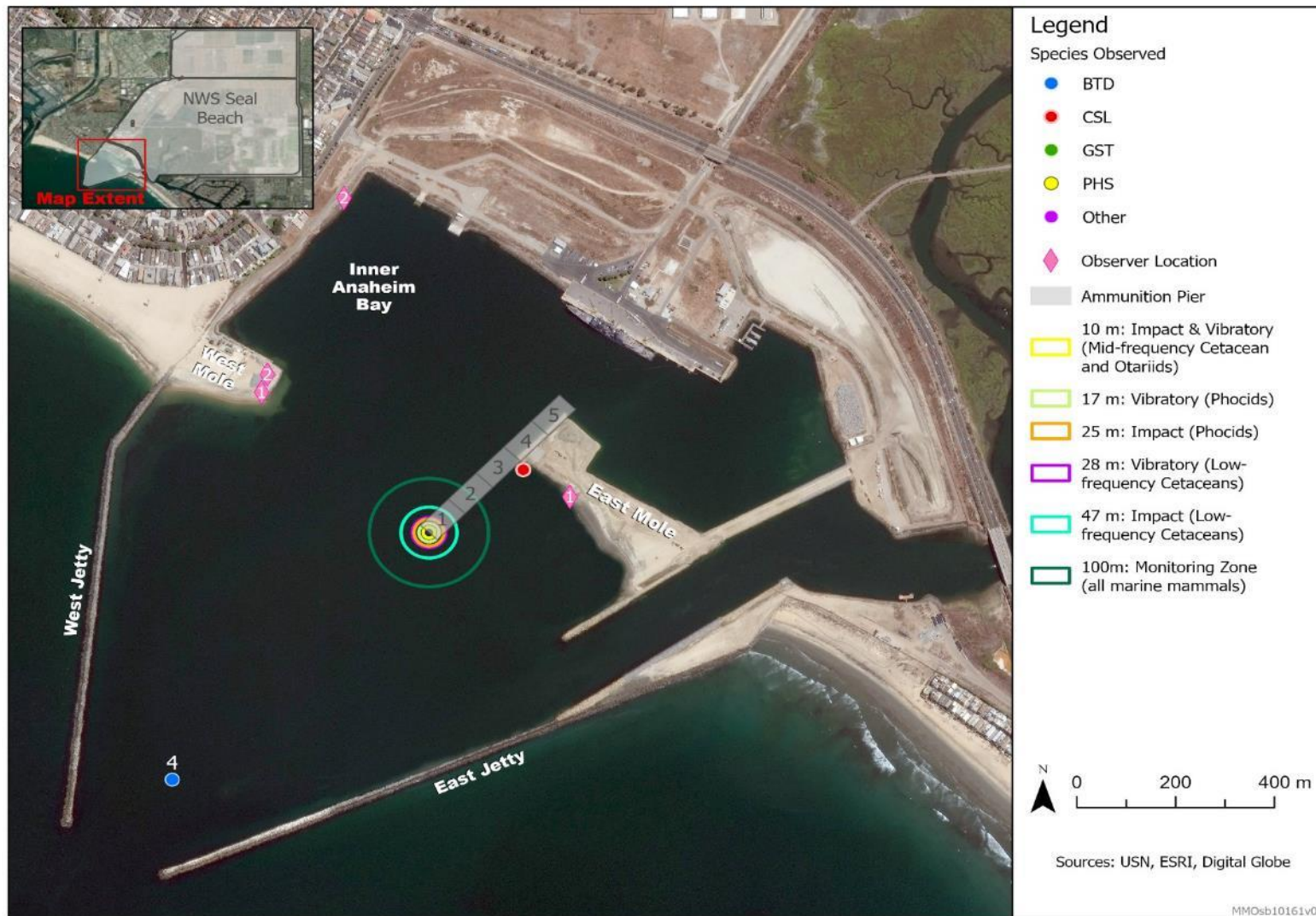


Figure 4: Location of Individual Marine Species Sightings in Pier Zone 1 During the Test Pile Program in September 2021. Monitoring and shutdown zones are set in the pier zone where the pile is being driven

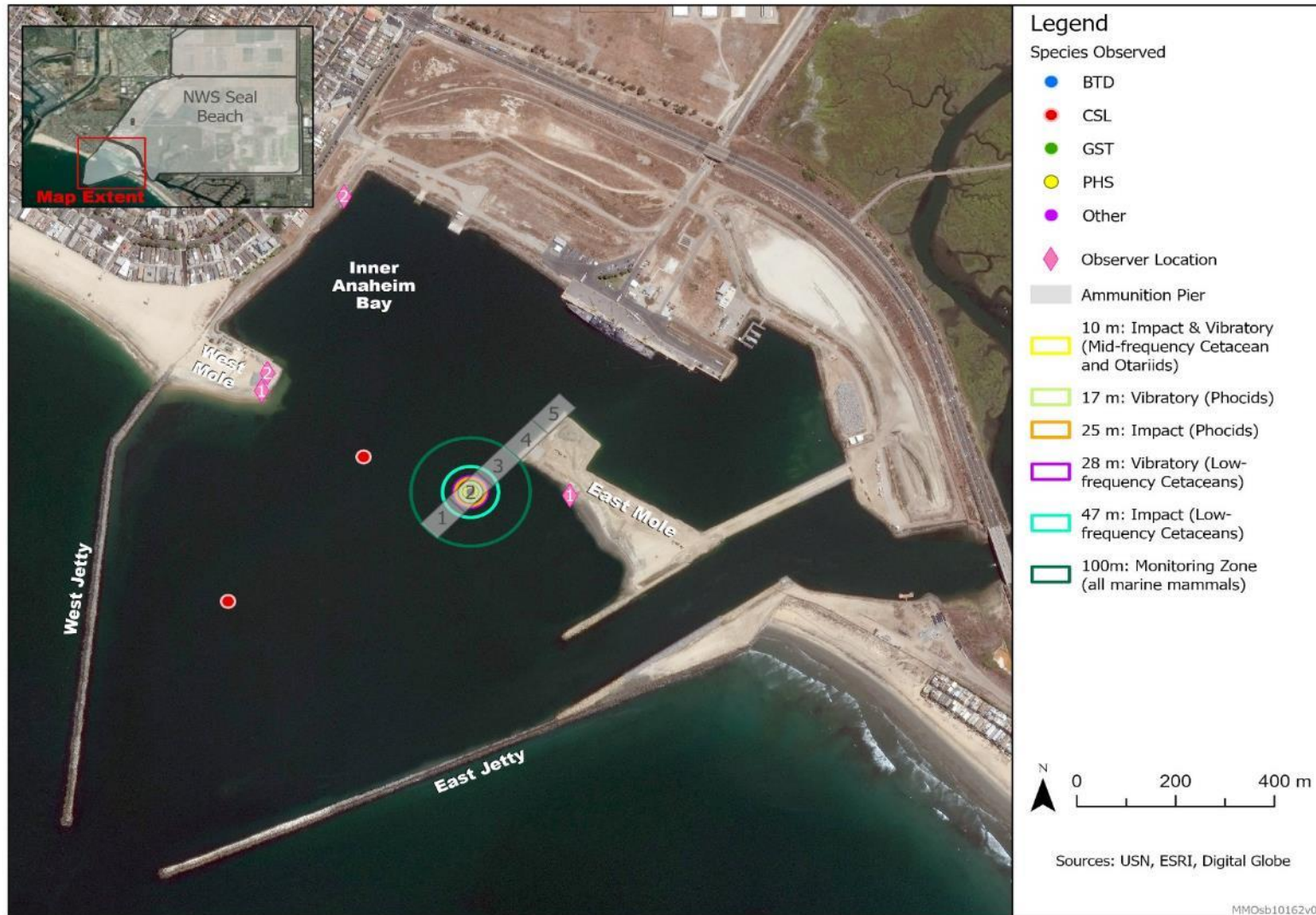


Figure 5: Location of Individual Marine Species Sightings in Pier Zone 2 During the Test Pile Program in September 2021. Monitoring and shutdown zones are set in the pier zone where the pile is being driven.

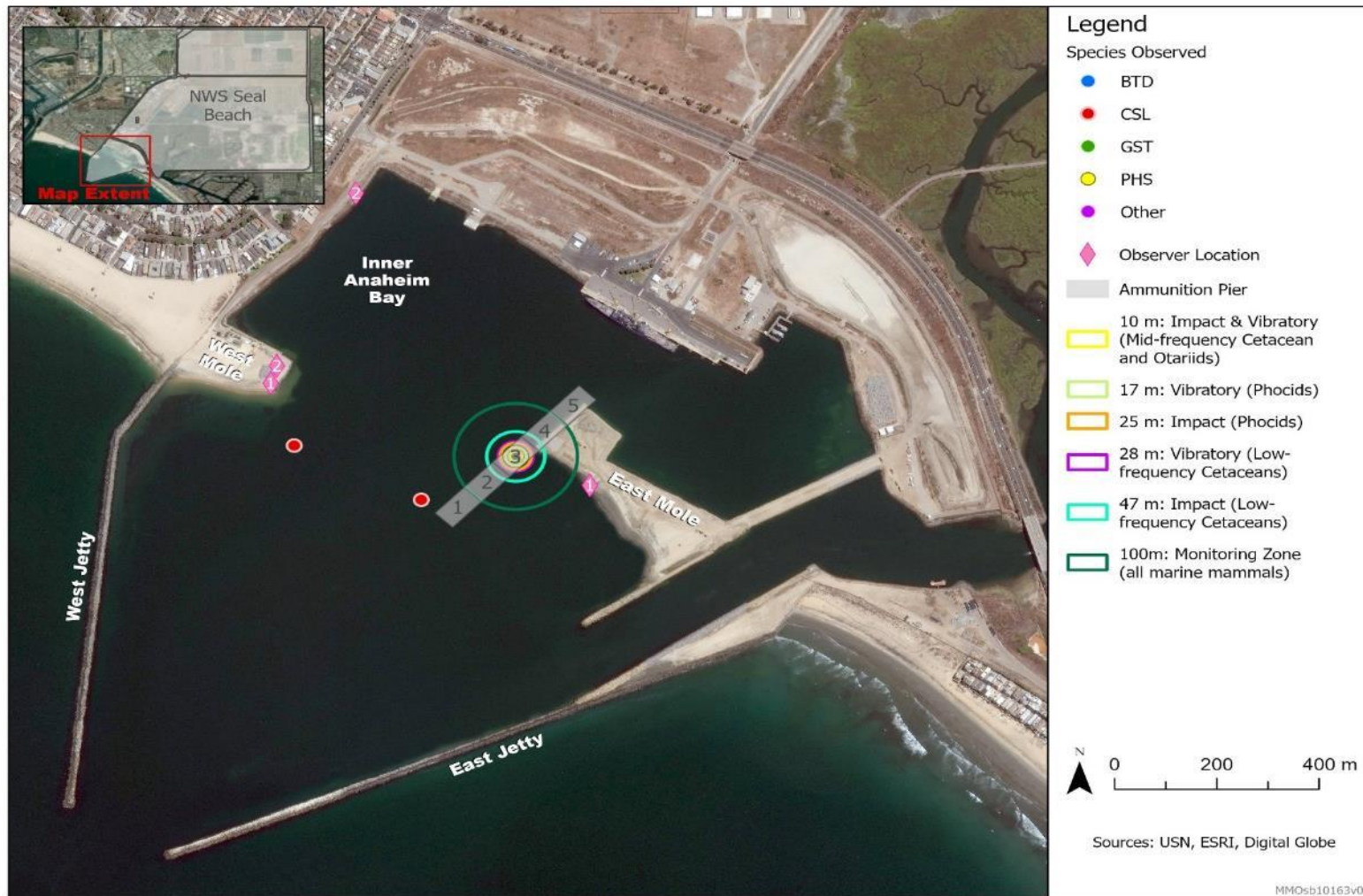


Figure 6: Location of Individual Marine Species Sightings in Pier Zone 3 During the Test Pile Program in September 2021. Monitoring and shutdown zones are set in the pier zone where the pile is being driven.

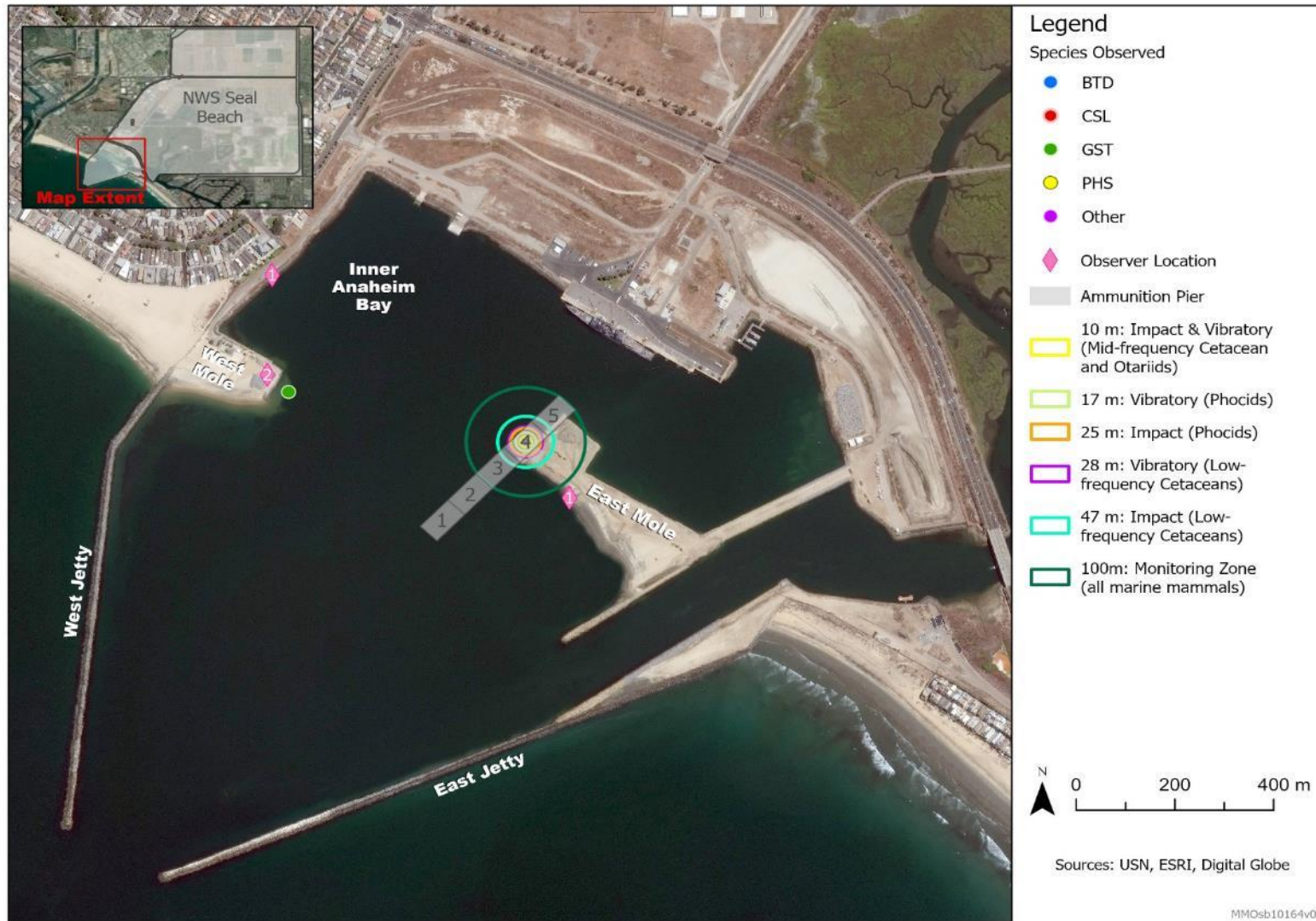


Figure 7: Location of Individual Marine Species Sightings in Pier Zone 4 During the Test Pile Program in September 2021. Monitoring and shutdown zones are set in the pier zone where the pile is being driven.

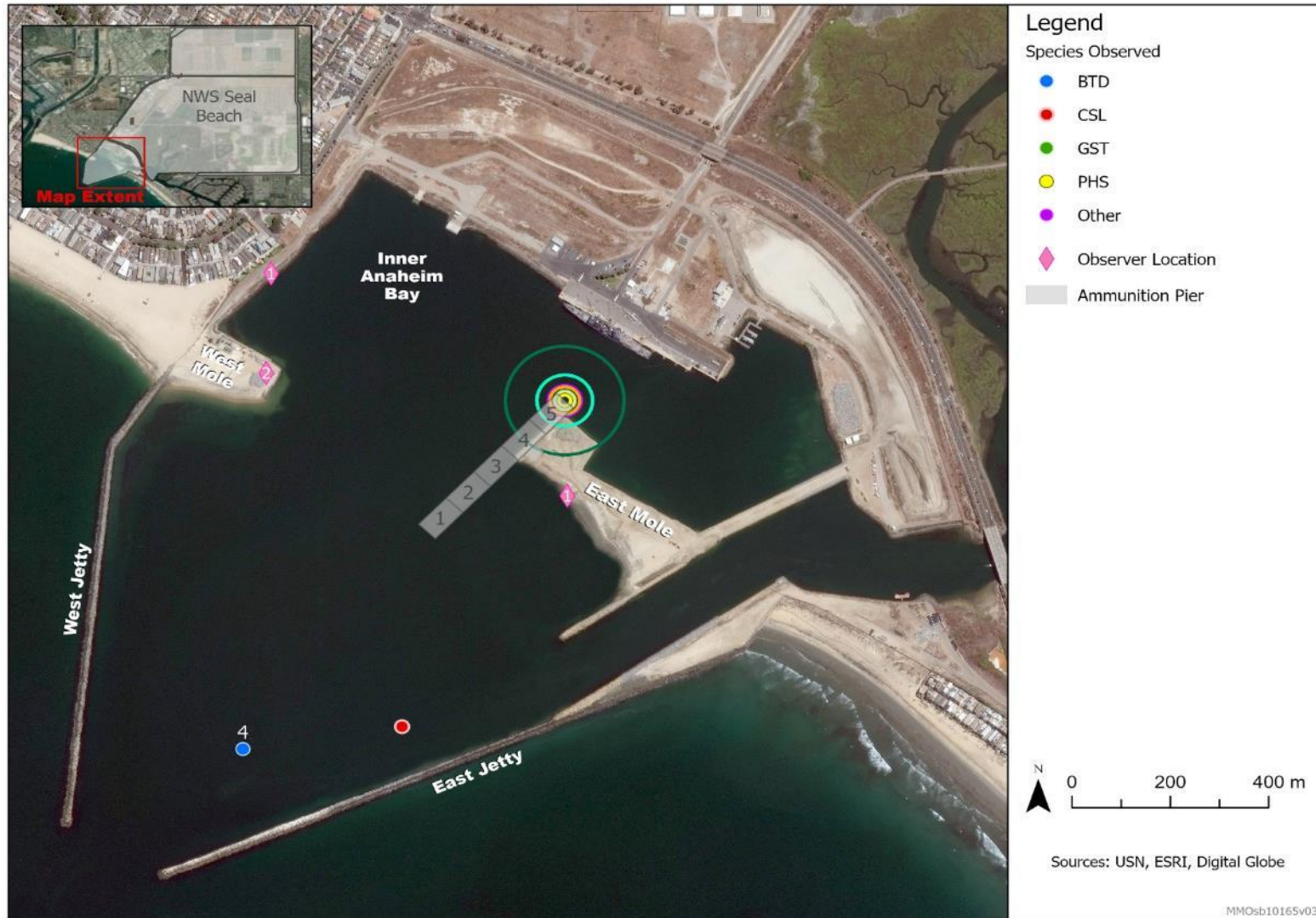


Figure 8: Location of Individual Marine Species Sightings in Pier Zone 5 During the Test Pile Program in September 2021. Monitoring and shutdown zones are set in the pier zone where the pile is being driven.



Figure 9: Location of Individual Marine Species Sightings During Post-Construction Surveys for the Test Pile Program in September 2021.

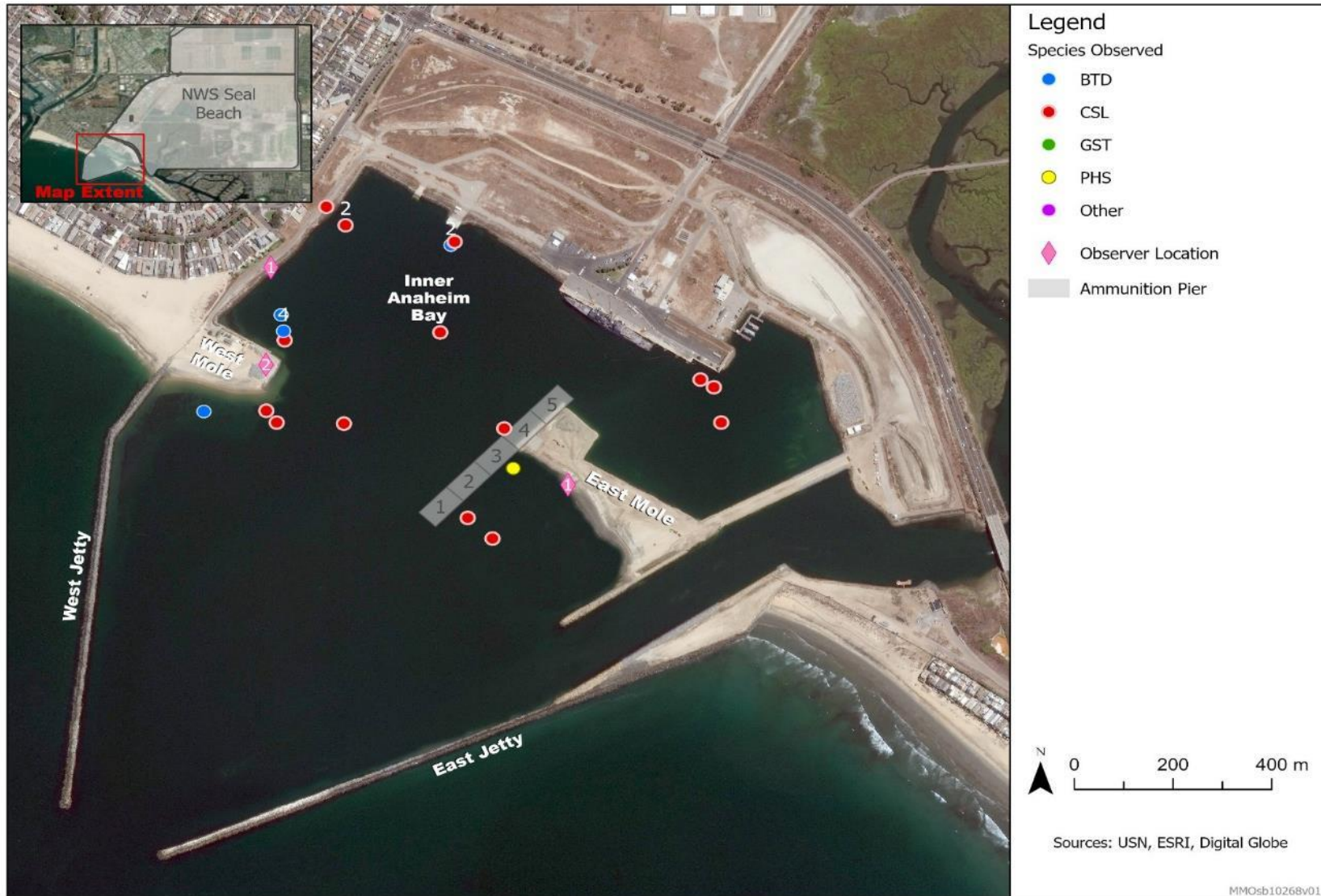


Figure 10: Location of Individual Marine Species Sightings During Pre-Construction Surveys for Pier Construction in December 2021.

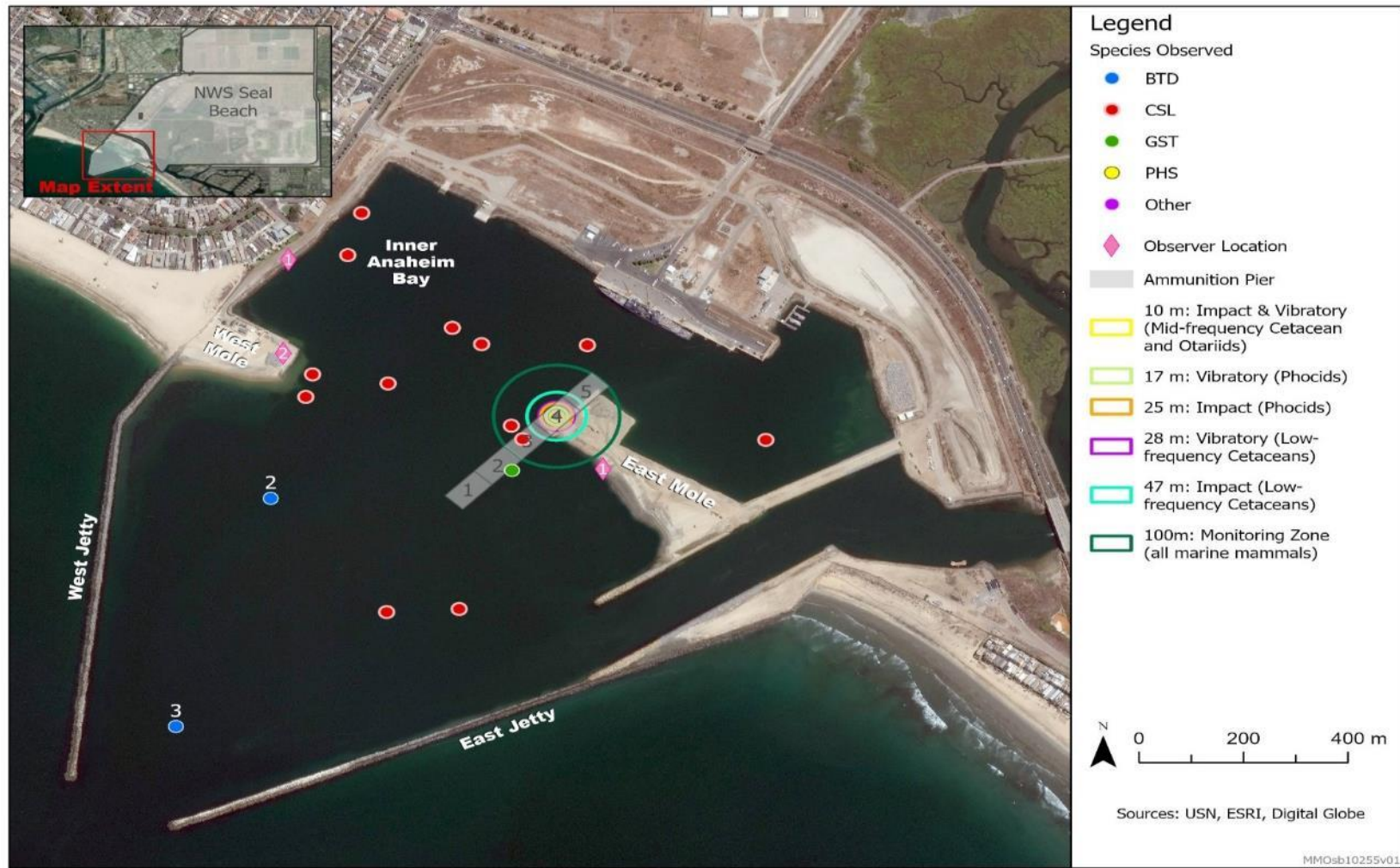


Figure 11: Location of Individual Marine Species Sightings in Pier Zone 4 During Pile Driving for Pier Construction in December 2021. Monitoring and shutdown zones are set in the pier zone where the pile is being driven.

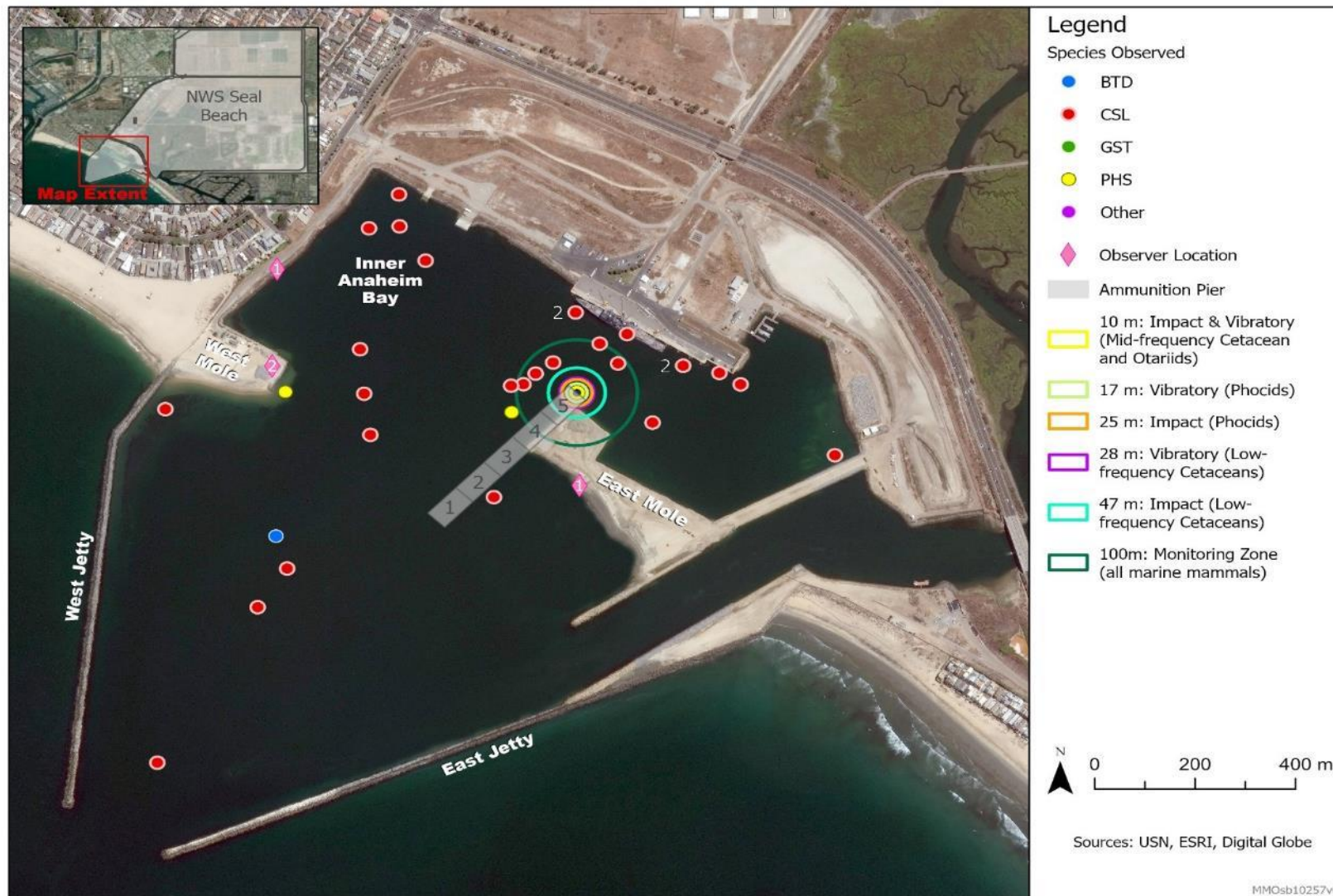


Figure 12: Location of Individual Marine Species Sightings in Pier Zone 5 During Pile Driving for Pier Construction in December 2021. Monitoring and shutdown zones are set in the pier zone where the pile is being driven.



Figure 13: Location of Individual Marine Species Sightings During Post-Construction Surveys for Pier Construction in December 2021.

Overall, bottlenose dolphins were observed throughout Anaheim Bay. Individuals were reported swimming in the navigational channel in outer Anaheim Bay, likely moving from the ocean, as well as moving from the ocean through the new public boating channel (PBC) and into Huntington Harbour, as well as milling and foraging in both inner and outer Anaheim Bay. The behaviors observed during monitoring in 2021 indicated animals were not disturbed by construction activities. Note that bottlenose dolphins were regularly re-sighted, and those numbers are not included in the daily totals (Table 2 and Table 3) or the estimated take (see Section 5.4).

5.1.2 California Sea Lion

A total of 65 observations of California sea lions were recorded during pile driving activities in 2021, including nine during the TPP (Table 2) and 56 before, during, and after pile driving in December (Table 3 and Figure 10 through Figure 13). Only two sea lions were observed during active pile driving for the TPP, while the other observations during the TPP were made before or after pile driving, or during non-pile driving periods (e.g., between piles or delays in pile installation). Of the 56 observations of sea lions made in December 2021, 15 were during pre-construction surveys and 17 were made during active pile driving, including soft starts, jetting, and impact pile driving. A total of 23 observations were made in non-pile driving periods, and only one observation of a California sea lion was made during post-construction surveys in December 2021.

Sea lions were only sighted in the water (i.e., not hauled out) and were in all parts of Anaheim Bay, most frequently being observed swimming and foraging within inner and outer Anaheim Bay. In addition, individuals moved in and out of the inner Bay towards the ocean and out of Huntington Harbour through the new PBC. This species is quite curious and was often observed swimming toward the barges during in-water activities. The behaviors observed during monitoring in 2021 indicated animals were not disturbed by construction activities.

5.1.3 Pacific Harbor Seal

A total of three Pacific harbor seals observations were recorded during pile driving activities in 2021, with all the observations reported in December. One harbor seal was observed during pre-construction surveys, one during active pile driving (jetting), and one during non-pile driving activities.

This species was only sighted in the water (i.e., not hauled out), swimming and milling in inner Anaheim Bay and using the navigation channel to travel between the ocean and inner Anaheim Bay, as well as the PBC to travel from the ocean to Huntington Harbour. Individuals were also recorded milling in the vicinity of the barges. The behaviors observed during monitoring in 2021 indicated animals were not disturbed by construction activities.

5.1.4 Green Sea Turtles

A total of four green sea turtles were observed during pile driving monitoring efforts in 2021. Two turtles were observed before pile driving for the TPP (Figure 3) and one was observed during TPP pile driving (Figure 7). One green sea turtle was observed in December during pile driving (Table 3 and Figure 11). This individual was sighted just off the east mole in outer Anaheim Bay (see Figure 11).

5.2 Plumes

Information on the presence and size of sediment plumes were reported (if plumes were detected). Turbidity plumes during jetting during pile driving were rarely observed and were only present for a short amount of time and relatedly small (5-10 m) in size (when detected).

5.3 Shutdowns

There were no shutdowns due to marine mammals or sea turtles during the TPP in September. Work stoppage due to animals observed within both the Level A Shutdown and Level B monitoring zones during pier construction in December occurred five times for a total of 92 minutes (Table 4). None of the work stoppages in December were due to animals within the monitoring or shutdown zones during active pile driving; animals either entered the monitoring zone during a pre-construction or post-construction survey, during pile setup, or when pile driving was delayed or suspended. The time for each work shutdown ranged between 8-42 minutes. Shutdowns also occurred in 2021 due to weather (e.g., rain, wind, or fog), with most delays or work stoppage occurring for only short durations. In addition, some construction shifts were cancelled in 2021 due to weather.

Table 4: Shutdowns During Pile Driving for Pier Construction in 2021

Date	Stoppage Time (min)	Reason
12/6/2021	42	Juvenile CSL foraging within 50 m of pile
12/7/2021	8	Juvenile CSL swimming into and foraging within 50 m of pile
12/8/2021	10	CSL swimming 50 m from pile from Pile G-552 for 2 min and 50 m from pile G-54 for 8 min
12/17/2021	14	CSL 50 m from pile for 8 min and PHS 50 m from pile for 6 min
12/21/2021	18	Juvenile CSL foraging within 50 m of pile G-43
Total	92	

Note: Stoppage time includes pre-construction / post-construction surveys

5.4 Estimated Level B Take

Three marine mammal species were observed during pile driving monitoring in 2021. While those three species were all observed before, during, or after pile driving activities, only individuals observed inside the designated monitoring/shutdown zones during active pile driving can be considered take. Table 5 provides a summary of the observed animals during active pile driving that had the potential for Level B take and the actual observed Level B take for marine mammals in 2021. Note that observations made during non-pile driving (e.g., pre-construction / post-construction survey, time between driving piles, jetting, or delays) are not considered in the take analysis.

Monitoring results indicated few observations of marine mammals were made during active pile driving for the TPP in September and pier construction in December. Moreover, almost all of these individuals were observed outside of the Level B monitoring zones during pile driving (see Figure 4 through Figure 8 and Figure 11 and Figure 12), with only one Pacific harbor seal reported at the 100-m monitoring zone

during active pile driving (Figure 12). Therefore, only one Level B take is being reported for 2021. In addition, no Level A take occurred in 2021.

Table 5: Summary of Observed Take During Pile Driving Activities in 2021.

	Total Number of Observations During Active Piles Driving for TPP	Total Number of Observations During Active Pile Driving for Pier Construction	Authorized Level B “Take”	Observed	
				Total Level B Take	Percent of Authorized “Take”
Species					
California sea lion	2	17	2,016	0	0
Bottlenose dolphin	8	6	1,008	0	0
Pacific Harbor seal	0	1	336	1	0.3
Total	10	24	2,160	1	0.05

6 Conclusions

A combined total of 97 observations of marine mammals were recorded before (pre-construction surveys), during, and after (post-construction surveys) pile driving activities in 2021 (see Table 2 and Table 3). California sea lions had the most sightings (n=65), representing 67% of all the observations. Bottlenose dolphin had the second highest number of sightings (n=25), representing 26% of all the observations. These species were commonly observed swimming and foraging in all parts of Anaheim Bay. A total of three Pacific harbor seals observations were made during pile driving activities in 2021, while four green sea turtles observations were also recorded during pile driving activities in 2021.

A total of 24 marine mammals were observed during active pile driving in December (see Table 5). Of those 24 observations, only one was determined to be a Level B take. All other observations made during active pile driving were outside of designated monitoring zones.

Methods and protocols used during monitoring were effective in preventing any injury or disturbance to marine mammals during pile driving activities. Work was stopped in 2021 due to animals inside of the shutdown zones, as well as during some weather conditions (i.e., fog and wind). When an animals approached the 100-m monitoring zone, monitors contacted the Command Monitor, who used a VHF radio to stop or delay pile driving until the animal was outside of the shutdown zone. Overall, effective monitoring during pile driving activities in 2021 resulted in no injuries or unintended disturbances to any marine species.

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APPENDIX A
WEATHER DATA

Table A-1: Weather Observations During Pile Driving in 2021.

Date	AM / PM	Cloud Cover	BS	Tidal State	Wind Speed (kt)	Wind Direction	Temp (°F)	Visibility (m)	Weather Notes
9/10/2021	AM	75	1	In	2	NW	66	1500	
9/10/2021	AM	30	1	In	4	W	66	1000	
9/10/2021	AM	20	1	In	5	W	70	1000	
9/10/2021	PM	0	3	Out	10	SW	79	1000	
9/10/2021	PM	10	3	Out	9	SW	84	1000	Strong winds
9/10/2021	PM	10	2	Out	6	WSW	84	1500	
9/13/2021	AM	100	1	Out	1	NW	60	1000	
9/13/2021	AM	100	0	Out	1	N	59	800	
9/13/2021	AM	100	1	Slack	1	W	60	900	
9/13/2021	PM	100	1	Slack	1	W	61	900	
9/13/2021	PM	100	1	In	0	SW	64	300	
9/13/2021	PM	100	1	Out	3	NNW	64	600	Fog
9/14/2021	AM	98	1	Out	1	NW	61	1500	
9/14/2021	AM	70	0	Out	0	N	63	1000	
9/14/2021	AM	30	1	Slack	2	SE	65	1500	
9/14/2021	PM	0	2	In	9	SSW	72	1000	
9/14/2021	PM	0	1	In	5	S	77	1500	
9/14/2021	PM	0	2	In	11	SW	70	1000	
9/15/2021	AM	100	1	In	1	SW	63	1100	
9/15/2021	AM	100	1	Out	5	SW	64	1000	
9/15/2021	AM	95	1	Slack	2	NW	64	1500	
9/15/2021	PM	0	3	In	8	SW	64	1000	
9/15/2021	PM	0	3	In	10	SW	72	1000	
9/15/2021	PM	0	2	In	6	W	76	1500	
9/16/2021	AM	100	0	In	1	NNW	64	1000	
9/16/2021	AM	100	1	In	1	W	62	1500	
9/16/2021	AM	100	1	Out	2	N	64	1000	
9/16/2021	PM	25	1	Out	2	SW	64	1000	
9/16/2021	PM	30	1	Out	2	SW	64	1000	
9/16/2021	PM	10	1	Out	2	ESE	69	1500	
9/17/2021	PM	0	3	Out	8	SSW	70	1000	
9/17/2021	PM	15	1	Out	5	WSW	74	1500	
9/17/2021	PM	0	1	Out	9	W	73	1000	
9/20/2021	AM	75	1	In	2	NE	58	1500	
9/20/2021	AM	40	1	In	4	NE	64	1000	
9/20/2021	AM	10	1	In	3	ESE	62	1000	
9/20/2021	PM	0	2	Out	6	SSW	73	1000	
9/20/2021	PM	0	1	Out	7	SW	72	1000	
12/3/2021	AM	100	1	In	1	NNW	55	700	
12/3/2021	AM	100	1	In	1	N	56	1000	
12/3/2021	AM	100	1	Out	1	N	55	1000	

Date	AM / PM	Cloud Cover	BS	Tidal State	Wind Speed (kt)	Wind Direction	Temp (°F)	Visibility (m)	Weather Notes
12/3/2021	PM	0	3	In	8	WSW	61	1500	
12/3/2021	PM	0	2	In	7	SW	63	1000	
12/3/2021	PM	0	1	Out	5	WSW	63	1100	
12/6/2021	AM	100	1	Slack	1	ENE	44	200	Fog lifting
12/6/2021	AM	100	1	In	1	ENE	49	800	Dense fog
12/6/2021	AM	100	1	In	2	E	50	800	
12/6/2021	PM	100	2	Out	7	S	60	1500	
12/7/2021	AM	100	1	Out	7	S	61	1000	
12/7/2021	AM	100	1	Out	2	ESE	60	1500	
12/7/2021	AM	100	1	Slack	1	NE	57	700	Light drizzle
12/7/2021	PM	100	1	In	7	E	57	1500	light rain
12/7/2021	PM	100	1	In	5	E	57	1000	Light rain
12/7/2021	PM	90	1	Out	5	SE	63	1500	
12/8/2021	AM	40	2	Out	10	SE	61	1000	No more rain
12/8/2021	AM	55	1	Out	4	S	62	1100	
12/8/2021	AM	20	1	Slack	1	NNE	48	700	
12/8/2021	PM	10	1	In	5	NW	48	1000	
12/8/2021	PM	15	1	In	2	ENE	51	1500	
12/8/2021	PM	0	2	Out	11	SW	64	1500	
12/9/2021	AM	100	1	Out	2	WSW	56	650	
12/9/2021	AM	100	2	Slack	6	WSW	57	1500	potential rain
12/9/2021	AM	100	1	Out	4	SW	57	1000	Light rain
12/9/2021	PM	100	3	Out	13	W	58	1000	Raining
12/9/2021	PM	100	3	Out	10	WSW	57	1000	
12/9/2021	PM	100	1	In	5	WSW	58	1500	Steady light rain
12/10/2021	AM	75	1	Out	2	N	41	700	
12/10/2021	AM	30	1	Out	3	E	41	1000	
12/10/2021	AM	60	2	Slack	3	ENE	50	1500	
12/10/2021	PM	60	2	Slack	5	SE	60	1500	
12/13/2021	AM	10	1	Out	8	SW	63	1000	
12/13/2021	AM	100	1	In	1	NNE	44	600	
12/13/2021	AM	100	1	Out	5	NE	46	1000	
12/13/2021	PM	95	1	Out	3	E	50	1000	
12/13/2021	PM	90	1	In	8	S	60	1000	
12/13/2021	PM	100	2	In	8	S	61	1000	
12/14/2021	AM	100	1	In	2	S	59	1500	
12/14/2021	AM	100	4	Out	20	S	59	100	Heavy rain and wind; low vis
12/14/2021	AM	100	3	In	20	SE	59	75	Pouring rain
12/15/2021	AM	10	1	In	1	NE	35	700	
12/15/2021	AM	0	1	Out	2	N	40	1000	
12/15/2021	AM	0	1	Out	5	NNW	39	1000	
12/15/2021	PM	0	1	In	6	SW	57	1000	

Date	AM / PM	Cloud Cover	BS	Tidal State	Wind Speed (kt)	Wind Direction	Temp (°F)	Visibility (m)	Weather Notes
12/16/2021	AM	50	2	In	8	S	55	1000	
12/16/2021	AM	60	1	Slack	1	SW	54	1500	
12/16/2021	AM	15	1	In	1	NNW	37	700	
12/16/2021	PM	30	1	Out	3	NNE	41	1500	
12/16/2021	PM	10	1	Out	4	N	41	1000	
12/16/2021	PM	90	1	In	5	SSW	55	1000	
12/17/2021	AM	100	0	In	0	ND	54	800	
12/17/2021	AM	100	1	Slack	1	WSW	53	700	Light rain
12/17/2021	AM	5	1	In	1	NW	50	700	
12/17/2021	PM	20	1	In	2	NNE	50	1000	
12/17/2021	PM	0	1	In	6	N	48	1000	
12/17/2021	PM	0	1	Out	2	NW	63	1000	
12/20/2021	AM	80	1	In	2	N	37	600	
12/20/2021	AM	80	1	In	1	N	40	500	fog
12/20/2021	AM	30	0	In	0	N	37	800	
12/20/2021	PM	50	1	Out	2	WSW	59	1000	
12/20/2021	PM	80	1	In	7	W	57	1000	
12/20/2021	PM	95	1	Out	1	S	58	1500	
12/21/2021	AM	100	1	In	1	N	48	600	
12/21/2021	AM	60	1	In	2	N	52	1000	
12/21/2021	AM	50	1	In	3	NNW	50	1000	
12/21/2021	PM	90	1	Out	3	SW	63	1000	
12/21/2021	PM	60	1	Out	3	SSW	62	1200	
12/21/2021	PM	30	2	In	7	WNW	61	1000	
12/22/2021	AM	70	1	Slack	1	NW	45	600	
12/22/2021	AM	30	0	In	1	N	47	1000	
12/22/2021	AM	20	1	In	5	NW	46	1000	
12/22/2021	PM	90	1	Out	3	WSW	63	1000	
12/22/2021	PM	100	1	Out	5	NW	64	1000	
12/22/2021	PM	100	1	Out	2	S	61	1500	
12/23/2021	AM	100	1	Slack	2	ENE	55	600	
12/23/2021	AM	100	1	In	5	ESE	55	1000	
12/23/2021	AM	100	1	In	5	E	57	1000	
12/23/2021	PM	100	1	In	1	ENE	57	1500	Steady rain
12/23/2021	PM	100	1	Out	5	ESE	58	1000	Rain started
12/23/2021	PM	100	1	Out	7	ENE	55	1000	Raining
12/27/2021	AM	30	2	Out	4	NW	42	1000	
12/27/2021	AM	20	1	Out	3	ENE	43	1000	
12/27/2021	AM	100	3	In	10	SW	53	1000	incoming rain, winds increasing
12/27/2021	PM	100	1	In	3	SSW	53	900	Steady rain
12/27/2021	PM	100	4	Slack	13	SW	54	500	Rain and strong winds

Date	AM / PM	Cloud Cover	BS	Tidal State	Wind Speed (kt)	Wind Direction	Temp (°F)	Visibility (m)	Weather Notes
12/28/2021	AM	65	1	Out	3	WSW	45	600	
12/28/2021	AM	50	3	Out	7	NW	48	1000	20 kt gusts
12/28/2021	AM	70	3	Out	7	WNW	47	1000	
12/28/2021	PM	90	3	In	12	SSW	55	1000	
12/28/2021	PM	90	4	In	12	WSW	52	1000	
12/28/2021	PM	90	2	Slack	7	N	55	1000	
12/30/2021	AM	100	2	In	7	ENE	51	600	Steady rain
12/30/2021	AM	100	3	Out	12	SE	51	1000	Light rain, gusty winds

Note: In = Incoming tide; Out = Outgoing tide

APPENDIX B
SIGHTING DATA

Table B-1: Sightings of Marine Species During the Test Pile Program in September 2021.

Date	Time	Species	Number	Direction of Travel	Primary Behavior	Age Class	Pier Zone	Construction Activity	Animal Position		Distance to Pile (m)	Bearing to Pile	Direction to Pile
									Long	Lat			
9/10/2021	6:54	GST	1	NW	Breathing		-	Pre-Con	-118.0975	33.7348	343	293	WNW
9/10/2021	13:09	CSL	1	NE	Swimming	Adult	5	Jetting	-118.0957	33.7291	658	208	SSW
9/10/2021	17:21	CSL	1	NE	Swimming	Juvenile	-	Post-Con	-118.0940	33.7342	113	278	W
9/14/2021	7:31	CSL	1	ND	Milling	Adult	-	Pre-Con	-118.0900	33.7330	483	81	E
9/14/2021	8:22	GST	1	SW	Breathing		4	Delay	-118.0978	33.7347	368	312	NW
9/14/2021	12:42	CSL	1	W	Resting	Adult	3	Non PD	-118.0979	33.7336	298	296	WNW
9/14/2021	16:19	BTD	4	E	Milling	Mix	1	Pile Driving	-118.1000	33.7282	791	229	WSW
9/15/2021	13:51	CSL	1	E	Swimming	Adult	3	Jetting	-118.0957	33.7327	186	240	WSW
9/16/2021	6:57	CSL	1	SE	Swimming	Adult	4	Pre-Con	-118.0945	33.7362	256	337	NNW
9/16/2021	9:02	BTD	4	SW	Swimming	Mix	5	Jetting	-118.0986	33.7287	820	224	WSW
9/20/2021	6:45	GST	1	ND	Breathing		-	Pre-Con	-118.0985	33.7356	NA	301	WNW
9/20/2021	7:25	CSL	1	NE	Swimming	Adult	2	Non PD	-118.0965	33.7335	180	280	W
9/20/2021	7:52	CSL	1	SW	Swimming	Adult	2	Non PD	-118.0989	33.7311	465	245	WSW
9/20/2021	15:22	CSL	1	NW	Swimming	Adult	1	Non PD	-118.0936	33.7334	208	63	ENE

BTD = bottlenose dolphin; CSL = California sea lion; GST = Green sea turtle; PHS = Pacific harbor seal; ND = Non-directional; Pre-Con = Pre-Construction; Post-Con = Post-Construction; Non PD = Non Pile driving

Table B-2: Sightings of Marine Species During Pier Construction in December 2021.

Date	Time	Species	Number	Direction of Travel	Primary Behavior	Age Class	Pier Zone	Construction Activity	Animal Position		Distance to Pile (m)	Bearing to Pile	Direction to Pile
									Long	Lat			
12/3/2021	6:30	BTD	2	NW	Swimming	Mixed	-	Pre-Con	-118.0949	33.7370	393	329	NNW
12/3/2021	6:40	BTD	1	SW	Swimming	Mixed	-	Pre-Con	-118.0994	33.7341	593	273	W
12/6/2021	6:50	CSL	1	E	Foraging	Adult	-	Pre-Con	-118.0901	33.7346	262	78	ENE
12/6/2021	7:44	CSL	1	NW	Milling	Juvenile	5	Non PD	-118.0932	33.7350	117	339	NNW
12/7/2021	11:48	CSL	1	ND	Resting	Adult	5	Pile Driving	-118.0985	33.7308	635	241	WSW
12/7/2021	16:08	CSL	1	NW	Foraging	Juvenile	5	Pile Driving	-118.0882	33.7334	438	95	E
12/8/2021	6:31	CSL	1	ND	Milling		-	Pre-Con	-118.0951	33.7355	262	303	WNW
12/8/2021	7:23	CSL	1	NE	Swimming	Juvenile	5	Non PD	-118.0937	33.7346	107	304	WNW
12/8/2021	7:38	CSL	1	ND	Diving	Adult	5	Pile Driving	-118.1001	33.7342	678	271	W
12/8/2021	7:47	CSL	1	ND	Milling	Adult	5	Pile Driving	-118.0919	33.7355	184	33	NNE
12/8/2021	8:15	CSL	1	S	Swimming	Adult	5	Non PD	-118.0939	33.7346	123	296	WNW
12/8/2021	9:18	CSL	1	W	Diving	Adult	5	Non PD	-118.1003	33.7282	956	232	SW
12/8/2021	11:09	CSL	1	SW	Swimming	Adult	5	Non PD	-118.0935	33.7348	106	318	NW
12/8/2021	12:55	CSL	1	ND	Diving	Adult	5	Non PD	-118.0920	33.7350	123	41	NE
12/8/2021	13:26	CSL	1	ND	Diving	Adult	5	Pile Driving	-118.0966	33.7352	377	287	WNW
12/8/2021	14:21	CSL	1	SW	Swimming	Juvenile	5	Jetting	-118.0955	33.7367	387	315	NW
12/8/2021	16:23	CSL	1	S	Diving	Adult	5	Non PD	-118.0898	33.7346	298	75	ENE
12/8/2021	16:37	CSL	1	ND	Milling	Adult	5	Pile Driving	-118.0902	33.7348	272	70	ENE
12/9/2021	6:32	CSL	1	ND	Breathing		-	Pre-Con	-118.0945	33.7323	218	229	SW
12/9/2021	7:35	CSL	2	ND	Milling	Adult	5	Non PD	-118.0909	33.7349	231	60	ENE
12/9/2021	9:20	CSL	1	SE	Swimming	Adult	5	Jetting	-118.0914	33.7340	144	82	E
12/9/2021	9:57	CSL	1	N	Milling	Adult	5	Non PD	-118.0965	33.7338	325	269	W
12/9/2021	10:22	CSL	2	SW	Milling	Adult	5	Non PD	-118.0928	33.7359	226	5	N
12/9/2021	11:22	CSL	1	N	Swimming	Adult	5	Pile Driving	-118.0924	33.7353	176	22	NNE
12/9/2021	12:56	CSL	1	S	Swimming	Juvenile	5	Jetting	-118.0965	33.7373	507	315	NW
12/10/2021	6:30	BTD	4	ND	Milling	Mixed	-	Pre-Con	-118.0979	33.7355	498	289	WNW
12/10/2021	6:31	CSL	1	W	Swimming	Adult	-	Pre-Con	-118.0903	33.7347	262	71	ENE
12/10/2021	6:32	CSL	1	NW	Diving	Adult	-	Pre-Con	-118.0979	33.7354	489	287	WNW

Table B-2: Sightings of Marine Species During Pile Driving in December 2021 (Continued).

Date	Time	Species	Number	Direction of Travel	Primary Behavior	Age Class	Pier Zone	Construction Activity	Animal Position		Distance to Pile (m)	Bearing to Pile	Direction to Pile
									Long	Lat			
12/10/2021	6:34	BTD	1	SW	Foraging	Mixed	-	Pre-Con	-118.0979	33.7358	514	292	WNW
12/10/2021	6:44	CSL	2	ND	Milling	Juvenile	-	Pre-Con	-118.0968	33.7373	527	312	NW
12/10/2021	7:31	BTD	1	NE	Swimming	Mixed	5	Non PD	-118.0982	33.7320	522	251	WSW
12/10/2021	10:24	CSL	1	NE	Milling	Adult	5	Soft Start	-118.0966	33.7345	345	280	W
12/10/2021	13:07	CSL	1	S	Diving	Adult	5	Jetting	-118.0980	33.7315	534	245	WSW
12/10/2021	14:28	CSL	1	N	Swimming	Adult	5	Soft Start	-118.0959	33.7373	480	319	NW
12/10/2021	15:48	CSL	1	E	Milling	Adult	4	Non PD	-118.0899	33.7334	283	98	E
12/10/2021	16:30	CSL	1	ND	Milling	Adult	-	Post-Con	-118.0893	33.7345	343	79	ENE
12/13/2021	8:50	PHS	1	ND	Resting	Adult	5	Non PD	-118.0980	33.7345	470	277	W
12/13/2021	14:32	CSL	1	N	Swimming	Adult	-	Pre-Con	-118.0948	33.7370	384	330	NNW
12/15/2021	6:34	CSL	1	ND	Diving	Adult	-	Pre-Con	-118.0980	33.7340	476	272	W
12/15/2021	6:42	CSL	1	E	Swimming	Adult	-	Pre-Con	-118.0968	33.7339	362	272	W
12/16/2021	10:33	GST	1	W	Resting	Adult	4	Non PD	-118.0943	33.7329	163	234	SW
12/16/2021	11:35	CSL	1	W	Diving	Adult	4	Pile Driving	-118.0978	33.7342	453	274	W
12/16/2021	11:50	CSL	1	W	Diving	Adult	4	Pile Driving	-118.0952	33.7304	431	213	SSW
12/16/2021	13:14	CSL	1	N	Swimming	Adult	4	Non PD	-118.0964	33.7304	497	226	SW
12/17/2021	6:31	CSL	1	S	Swimming		4	Pre-Con	-118.0899	33.7340	281	87	E
12/17/2021	6:41	CSL	1	N	Swimming	Juvenile	4	Pre-Con	-118.0971	33.7376	572	312	NW
12/17/2021	6:55	CSL	1	W	Diving	Adult	4	Pre-Con	-118.0941	33.7320	228	212	SSW
12/17/2021	7:28	CSL	1	W	Swimming	Adult	4	Non PD	-118.0948	33.7351	223	305	WNW
12/17/2021	8:32	CSL	1	N	Swimming	Adult	4	Non PD	-118.0953	33.7354	279	304	WNW
12/17/2021	12:34	PHS	1	ND	Resting		5	Pile Driving	-118.0939	33.7342	100	291	WNW
12/17/2021	13:09	CSL	1	ND	Foraging	Adult	5	Non PD	-118.0960	33.7379	534	324	NW
12/17/2021	14:39	BTD	2	NW	Swimming	Juvenile	4	Non PD	-118.0984	33.7324	531	256	WSW
12/20/2021	6:41	CSL	1	NW	Swimming	Adult	5	Pre-Con	-118.0982	33.7342	480	274	W
12/20/2021	7:30	CSL	1	E	Swimming	Adult	5	Non PD	-118.0943	33.7327	168	227	SW
12/21/2021	7:00	CSL	1	ND	Milling	Adult	4	Post-Con	-118.0939	33.7339	91	270	W
12/21/2021	10:30	CSL	1	E	Swimming	Adult	4	Non PD	-118.0971	33.7367	500	304	WNW
12/21/2021	17:06	BTD	3	NE	Swimming	Mixed	4	Post-Con	-118.0965	33.7366	447	307	NW

Table B-2: Sightings of Marine Species During Pile Driving in December 2021 (Continued).

Date	Time	Species	Number	Direction of Travel	Primary Behavior	Age Class	Pier Zone	Construction Activity	Animal Position		Distance to Pile (m)	Bearing to Pile	Direction to Pile
									Long	Lat			
12/22/2021	6:51	PHS	1	E	Resting	Adult	4	Pre-Con	-118.0937	33.7332	87	233	SW
12/22/2021	9:02	CSL	1	SW	Swimming	Adult	4	Pile Driving	-118.0964	33.7344	326	281	W
12/22/2021	9:49	BTD	3	NW	Diving	Mixed	4	Non PD	-118.1001	33.7284	886	233	SW
12/23/2021	7:13	CSL	1	NE	Swimming	Adult	4	Non PD	-118.0977	33.7346	438	284	WNW
12/23/2021	9:08	CSL	1	NW	Swimming	Adult	4	Non PD	-118.0941	33.7334	89	269	W
12/27/2021	9:54	CSL	1	N	Foraging		4	Non PD	-118.0930	33.7351	160	15	NNE
12/27/2021	14:17	CSL	1	N	Swimming	Adult	4	Non PD	-118.0943	33.7337	75	271	W
12/28/2021	7:10	CSL	1	W	Swimming		4	Non PD	-118.0969	33.7374	543	313	NW

BTD = bottlenose dolphin; CSL = California sea lion; GST = Green sea turtle; PHS = Pacific harbor seal; ND = Non-directional; Pre-Con = Pre-Construction; Post-Con = Post-Construction; Non PD = Non Pile driving