

State of California Department of Transportation



**San Francisco – Oakland Bay Bridge
East Span Seismic Safety Project**

**MARINE MAMMAL MONITORING ANNUAL REPORT
FOR PILE DRIVING AND MECHANICAL
DEMOLITION**

JANUARY 8, 2014 – JANUARY 7, 2015

**(In accordance with the Incidental Harassment
Authorization issued December 18, 2013)**



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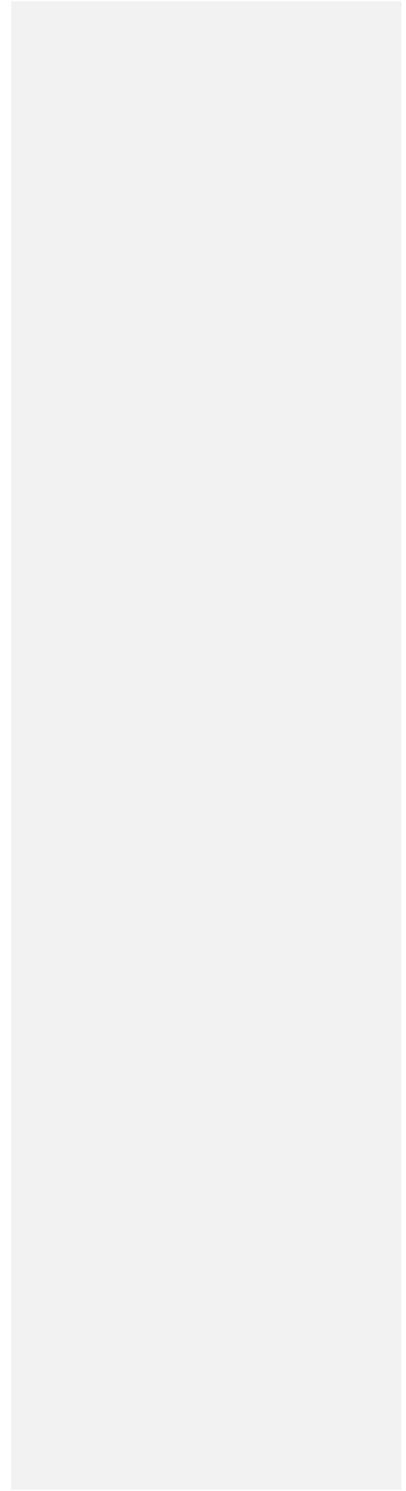
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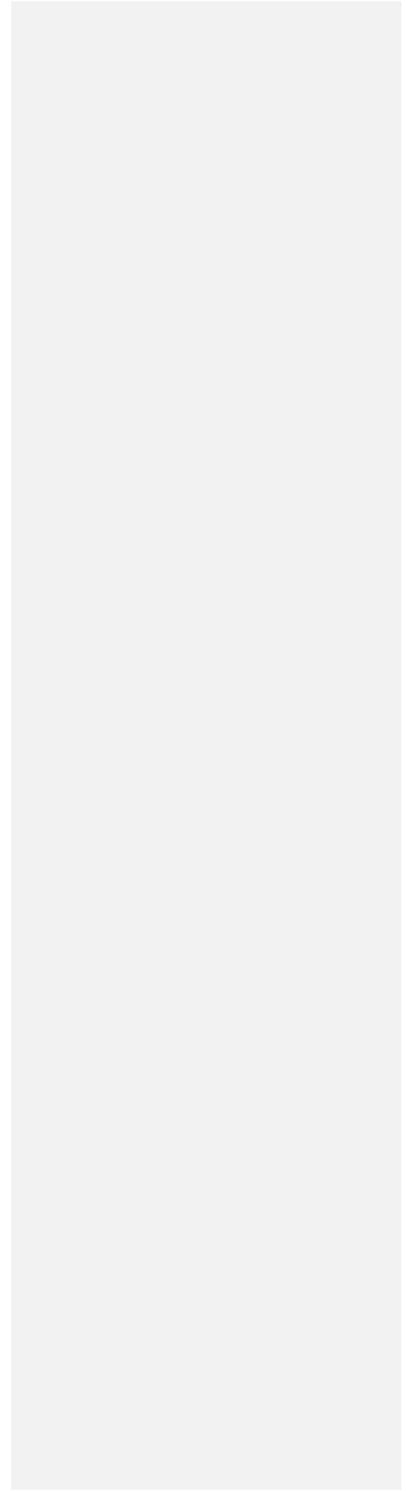


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EXECUTIVE SUMMARY

The California Department of Transportation (Department) is in the process of replacing and dismantling the original east span of the San Francisco-Oakland Bay Bridge (SFOBB). The new east span opened in September 2013 and dismantling of the original structure is currently underway.

During the January 8, 2014 – January 7, 2015 timeframe, the Department conducted several activities that required marine mammal monitoring per the current Incidental Harassment Authorization (IHA; National Marine Fisheries Service 2014) for the project. These activities included the installation of temporary piles in two areas for the construction of falsework to support the original Bay Bridge during dismantling. On January 21, 2014, the Department received a waiver from the California Department of Fish and Wildlife to allow the installation of H piles during the herring spawning season at the eastern end of Yerba Buena Island (YBI).

This report summarizes the construction activities and the associated marine mammal monitoring that occurred. Marine mammal monitoring was conducted during 42 days of pile driving for pile driving activities associated with two project construction contracts (Table ES1).

Pursuant to the SFOBB East Span Seismic Safety Project (SFOBB Project) Revised Marine Mammal Monitoring Plan (Department 2013), observers surveyed the Marine Mammal Exclusion Zone (MMEZ) to ensure that no marine mammals were seen within the zone before pile driving of a pile segment began. If marine mammals were found within the MMEZ, pile driving of the segment would be delayed until the marine mammals had moved beyond the MMEZ, either verified through sighting by an observer or by waiting until enough time had elapsed without a sighting (15 minutes) to assume that the animal had moved beyond the MMEZ. If a marine mammal were to enter the MMEZ after pile driving of a segment had commenced, pile driving would continue unabated with monitors recording the number and behavior of the marine mammals.

In addition, a Zone of Influence (ZOI) for Level B behavioral harassment was monitored during approximately 30-88% of vibratory pile driving, although the IHA requirement is only to monitor at least 20% of vibratory piles, and 100% for impact pile driving except proofing (short impact blows for pile load testing: < 2 minutes of driving or 20 blows, therefore no monitoring requirement in the IHA).

Table ES1. Summary of Impact and Vibratory Pile Driving.

Project	Monitoring Dates	Days Of Monitoring	Project Area	Monitored Vibratory Piles Driven	Monitored Impact Piles Driven
YBITS2 H-Piles	February 3 - 23, 2014 and June 2 - 28, 2014	31	East End of YBI Shore Original Bay Bridge	42	70
YBITS2 Piers E3/E4 Pipe Piles	June 19, 2014 and July 11 - September 11, 2014	11	Piers E3/E4 Original Bay Bridge	28	2
Totals		42		70	72

Marine mammal monitoring was conducted at least 30 minutes prior to, during, and following pile driving and mechanical dismantling. During 42 days of monitoring for temporary pile driving, 295 harbor seals, one California Sea Lion and one harbor porpoise were observed. No marine mammals were observed within the estimated MMEZs during any of the activities. During both pile driving activities monitored, 52 harbor seals and no sea lions or harbor porpoises were observed within the 1,000 to 2,000-meter (3,281 to 6,562-foot) ZOI (impact and vibratory ZOIs, respectively) during pile driving, with an extrapolation to 130 harbor seals for all pile driving (Table ES2). This exceeded the allowable takes for harbor seals as authorized in the IHA (50 harbor seals) although many of the harbor seals observed within the ZOI during pile driving were foraging in the Coast Guard and Clipper Coves, and showed no response to pile driving.

Table ES2. Summary of the Total Number of Harbor Seals Observed.

Site	Total Harbor Seals Observed	Harbor Seals Observed in the ZOI During Pile Driving	Percentage of Piles That Were Monitored*	Number of Seals Within the ZOI if 100% of Piles Were Monitored
YBI Shore	202	19	95% (88% and 100%)	20
Piers E3/E4	93	33	30%	110
Total	295	52		130

* The combined percentage of pile driving monitored for the YBI Shore site was 95%, 42 vibratory piles (88% monitored) and 70 impact piles (100% monitored). One sea lion and one harbor porpoise were also observed in the ZOI, but prior to pile driving.

INTRODUCTION

The California Department of Transportation (Department) is in the process of replacing and dismantling the original east span of the San Francisco-Oakland Bay Bridge (SFOBB). The new east span opened in September 2013 and dismantling of the original structure is currently underway.

Dismantling of the original bridge has five components (see Figure 1):

- Yerba Buena Island (YBI) Detour
- Cantilever Truss (Pier E1-E4)
- 504-Foot Span Steel Trusses (Piers E4-E9)
- 288-Foot Span Steel Trusses (Piers E9-E23)
- Marine Foundations

Figure 1. Sections of the Original East Span for Removal.



This report summarizes the construction and mechanical demolition activities and the associated marine mammal monitoring that occurred from January 8, 2014 to January 7, 2015 as required by the Incidental Harassment Authorization (IHA, dated December 18, 2014) issued by National Marine Fisheries Service (NMFS) to the Department. On January 21, 2014, the Department received a waiver from the California Department of Fish and Wildlife to allow the installation of H piles during the herring spawning season at the eastern end of Yerba Buena Island (YBI).

During 2014, the Department conducted several activities related to the demolition of the original east span. These included installation of temporary piles to support the construction of falsework to support the original SFOBB structure during dismantling. There was no in water demolition of any temporary or permanent cement piers, all demolition was conducted on the steel roadway structure of the original Bay Bridge (cutting with a welding torch) and the pieces hauled away to a landfill area.

Marine mammal monitoring was conducted for two construction contracts for the project at the east shoreline of YBI and in water near Piers E3/E4, totaling 42 days of pile driving, and included vibratory pile driving and un-attenuated impact pile driving (Table 1 and Figure 2). All monitoring was conducted in accordance with the requirements of the IHA (Sections 6b and 7) issued to the Department (NMFS 2014). The marine mammal exclusion zones (MMEZ) for impact pile driving, and Zone of Influence (ZOI) for Level B behavioral harassment for impact and vibratory pile driving were observed based on Table 1 of the IHA.

Table 1. Summary of Impact and Vibratory Pile Driving Monitoring.

Project	Monitoring Dates	Days Of Monitoring	Project Area	Monitored Vibratory Piles Driven	Monitored Impact Piles Driven
YBITS2 H-Piles	February 3-23, 2014 and June 2-28, 2014	31	East End of YBI Shore Original Bay Bridge	42	70
YBITS2 Piers E3/E4 Pipe Piles	June 19, 2014 and July 11 -September 11, 2014	11	Piers E3/E4 Original Bay Bridge	28	2
Totals		42		70	72

Figure 2. Aerial Photo of the Construction Area (closed circles).



MONITORING PROTOCOL

A detailed monitoring plan was updated in 2013 and was provided to NMFS (Department 2013). The following is a summary of that marine mammal monitoring plan.

Marine Mammal Exclusion Zone (MMEZ) monitoring will be conducted during impact driving of all open water piles (except proof testing) and mechanical dismantling of the bridge (cetacean threshold = 180 dB Root-Mean-Square (RMS) isopleth and pinniped threshold = 190 dB RMS). In addition, a ZOI for Level B behavioral harassment will be monitored during at least 20% of pile driving (impact or vibratory) and mechanical demolition. The exclusion zone radii range from 95 meters (312 feet) to 235 meters (771 feet) and the ZOI radii range from 1,000 meters (3,281 feet) to 2,000 meters (6,562 feet), depending on the size of the pile being driven and the method of installation or mechanical demolition equipment being used (Table 2). The ZOI for impulse noise or impact pile driving is generally smaller than the zone for vibratory pile driving due to the continuous sound it generates.

Only experienced, NMFS approved Marine Mammal Observers (MMO) will be allowed to monitor activities. Monitoring of the MMEZ will be conducted by a minimum of three MMOs. The actual number of observers will be dependent on the size of the MMEZ with four to five observers for larger ZOIs. The MMOs will begin monitoring at least 30 minutes prior to startup of the pile driving or mechanical dismantling. Observers will likely conduct the monitoring from small boats, existing bridge piers, YBI and/or Treasure Island, the new SFOBB or construction barges. The number and distribution of MMOs will be dependent on the construction site (taking in to account barges, bridge piers or other visual obstructions in the area) and the size of the exclusion or behavioral response zones. Impact pile driving will be delayed if any marine mammals are observed in the MMEZ prior to the start of activities. Pile driving will not start until either the MMOs observe the marine mammal leaving the MMEZ or the marine mammal has not been observed for at least 15 minutes. Once driving a pile begins, operations will continue uninterrupted until the pile has reached its predetermined depth, unless pile driving is stopped for 30 minutes or more, then resuming pile driving will go through the same protocol for startup as described above.

Mechanical demolition equipment will be powered down or shut down if a marine mammal enters the exclusion zone. Monitoring will continue through the entire pile driving or demolition periods and will end approximately 30 minutes after the activity has been completed.

Observations will be made using binoculars during daylight hours. Each member of the monitoring team will have a mobile phone (VHF radios for backup) for contact with the lead observer, other observers and work crews if necessary. The lead MMO will be positioned on the pile driving or demolition barge to warn the construction crew if any marine mammals are sighted in the MMEZ.

Data on all observations will be recorded in waterproof notebooks and will include items such as species, numbers, sex and age class (when possible), behavior, time of observation, location, direction of travel, time that the pile driving or mechanical dismantling begins and ends, and other acoustic or visual disturbances. The daily contents of each notebook will be copied each day and stored in two separate places to prevent loss of data.

YBITS2 DEMO TEMPORARY H-PILES (YBI East Shoreline)

The cantilever section of the original bridge is currently being dismantled. In order to perform this activity safely, the cantilever structure must be braced from below at both the western and eastern ends. In order to brace the western end, a set of falsework and associated foundations was constructed west of Pier E2. One of these foundations consisted of 48 H-piles that were driven at the shoreline interface on YBI (Figure 3). Initial installation of the H-piles was conducted using a vibratory hammer. Once the pile was vibrated in through the sediment layer above the bedrock, an impact hammer was used to achieve final installation of the H-pile during low tide. More than 48 piles were driven because some of the H-piles were removed and re-installed, others were driven twice on separate days due to reaching the cumulative acoustic threshold for fish, and others needed an additional section of pile spliced on the original pile which was then driven again (Table 2).

Monitoring was conducted during 31 days of pile driving from February 3-23, 2014 and June 2-28, 2014 (Table 3). All impact driving was monitored (70 piles including removed and re-driven piles, and piles with an extra section spliced on to the original pile). Only 88% of vibratory driving was monitored (42 piles) and is well above the IHA requirement of monitoring a minimum of 20% of piles. On most days there was a mix of impact and vibratory driving, therefore the MMOs continued to monitor during vibratory pile driving. All pile driving was conducted out of water during low tide (Figure 3).

The position of each observer is shown in Figure 4. A ZOI of 2,000 meters (6,562 feet) for vibratory driving, a ZOI of 1,000 meters (3,281 feet) for impact pile driving, and an MMEZ of 10 meters (33 feet) for impact driving was implemented for monitoring (Figure 4).

Figure 3. Photo of the YBITS2 Temporary H-Piles Site.

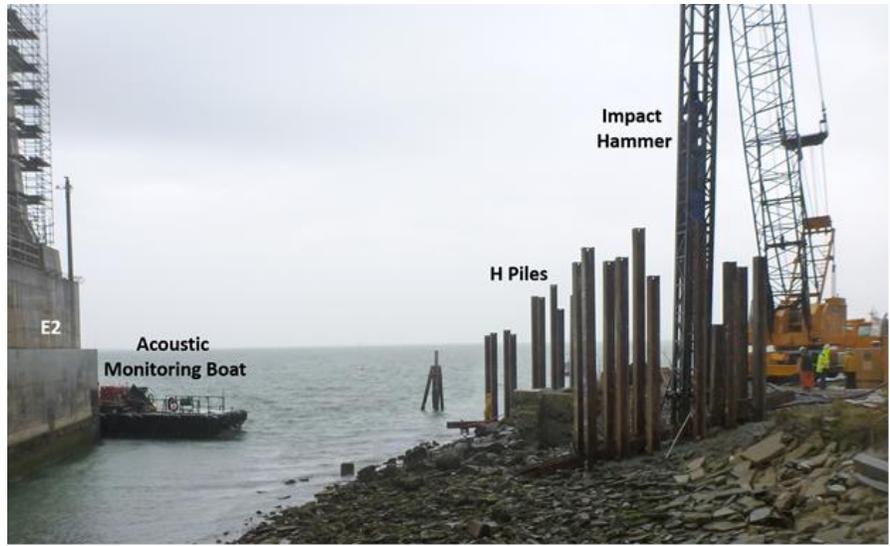


Figure 4. Zone of Influences for Behavioral Harassment and Monitoring Positions.



Pile site is represented by a red circle and monitoring positions are represented by yellow circles.

Table 2. Construction and Weather Condition Summary for the YBITS2 Temporary Pile Installation.

Date	Observation Period	Number Of Piles	Pile Driving Times	Air Temperature	Wind Speed
February 3	0700-1300	No pile driving due to herring	--	7.5-11.3 °C (45.5-52.3°F)	4.3-14.4 km/hr (2.7-8.9 mph)
February 4	0700-1300	5 Vibratory	0822-0835 0850-0858 0908-0912 0925-0932 0942-0944	7.3-10.2 °C (45.5-50.4°F)	4.3-13.3 km/hr (2.7-8.3 mph)
February 5	0700-1300	2 Vibratory	0936-0940 0946-0947	6.6-10.5 °C (43.9-50.9°F)	5.8-13.7 km/hr (3.6-8.5 mph)
February 6	0700-1400	No pile driving due to herring	--	8.7-10.2 °C (47.7-50.4°F)	5.0-14.8 km/hr (3.1-9.2 mph)
February 7	0700-1430	2 Impact	1145-1245 1256-1314	10.9-11.7 °C (51.6-53.1°F)	13.7-29.2 km/hr (8.5-18.1 mph)
February 15	1430-1830	2 Impact	1640-1721 1735-1757	13.6-14.1 °C (51.5-57.4°F)	12.2- 17.6 km/hr (7.6-10.9 mph)
February 19	0645-1200	3 Impact	0744-0821* 0846-0907* 0926-0958*	11.9-13.8 °C (53.4-56.8°F)	6.5-18.0 km/hr (4.0-11.2 mph)
February 20	0650-1200	1 Impact 2 Vibratory	0725-0740 0858-0957* 1030-1042	10.4-14.3°C (50.7-57.7°F)	10.1-17.3 km/hr (6.3-10.8 mph)
February 21	0750-1200	2 Impact	0951-1020* 1035-1050*	10.3-14.0°C (50.3-57.2°F)	2.2-4.7 km/hr (1.4-2.9 mph)
February 22	0900-1230	1 Impact	1057-1109*	11.7-14.9°C (53.1-58.8°F)	2.2-8.6 km/hr (1.4-5.3 mph)
February 23	0900-1245	1 Impact	1051-1109*	10.5-13.0°C (50.9-55.4°F)	5.0-7.9 km/hr (3.1-4.9 mph)
June 2	0615-1300	7 Impact	0817-0830 0835-0843 0848-0851 0855-0901 0907-0909 0917-0926 0938-0952	11.7-15.4°C (53.1-59.7°F)	7.9-18.4 km/hr (4.9-11.4 mph)
June	0620-1100	5 Impact	0702-0706 0737-0802 0910-0919 0927-0938 0953-0956	12.2-14.4°C (54.0-57.9°F)	5.0-16.2 km/hr (3.1-10.1 mph)

Date	Observation Period	Number Of Piles	Pile Driving Times	Air Temperature	Wind Speed
June 4	0620-1230	5 Impact	0728-0739 0744-0804 0813-0840 1020-1043 1050-1059	11.8-14.1 °C (53.2-57.4 °F)	2.2-16.9 km/hr (1.4-10.5 mph)
June 5	0630-1500	7 Impact	1010-1029 1043-1057 1106-1114 1121-1129 1302-1308 1315-1321 1332-1340	12.3-14.7 °C (54.1-58.5 °F)	4.0-21.2 km/hr (2.5-13.2 mph)
June	0630-1130	2 Impact	1019-1030 1035-1040	13.1-13.8 °C (55.6-56.8)	12.2-19.4 km/hr (7.6-12.1 mph)
June 10	0630-1450	2 Vibratory	1342-1347 1419-1420	13.8-15.7 °C (56.8-60.3 °F)	7.9-29.5 km/hr (4.9-18.3 mph)
June 11	0630-1415	2 Impact	0806-0854 0859-0910	14.8-16.1 °C (58.6-61.0 °F)	7.6-23.4 km/hr (4.7-14.5 mph)
June 12	0630-1500	2 Impact 3 Vibratory	0954-1006 1015-1041 1244-1315 1330-1332 1349-1359	11.9-15.6 °C (53.4-60.1 °F)	12.6-16.2 km/hr (7.8-10.1 mph)
June 13	0630-1530	1 Vibratory	1517-1521	13.3-17.0 °C (55.9-62.6 °F)	5.4-12.6 km/hr (3.4-7.8 mph)
June 14	0625-1130	3 Impact 2 Vibratory	0707-0744 0930-0931 0937-0938 1000-1018 1025-1042	15.6-18.9 °C (60.1-66.0 °F)	3.6-11.9 km/hr (2.2-7.4 mph)
June 16	0635-1540	2 Impact	0720-0728 1500-1504	12.4-15.3 °C (54.3-59.5 °F)	15.1-33.5 km/hr (9.4-20.8 mph)
June 17	0630-1425	3 Impact 3 Vibratory	1011-1014 1016-1017 1053-1055 1306-1319 1327-1329 1348-1352	12.8-18.3 °C (55.0-64.9 °F)	3.2-21.6 km/hr (2.0-13.4 mph)
June 18	0630-1205	4 Impact	0929-0941 0947-0954 1003-1033 1048-1055	14.2-18.9 °C (57.6-66.0 °F)	1.8-8.3 km/hr (1.1-5.2 mph)

Date	Observation Period	Number Of Piles	Pile Driving Times	Air Temperature	Wind Speed
June 19	0630-1600	6 Impact 5 Vibratory	0850-0852 0854-0855 1023-1027 1202-1211 1220-1229 1237-1247 1259-1302 1303-1306 1446-1450 1454-1459 1513-1519	12.3-16.3 °C (54.1-61.3 °F)	2.9-13.0 km/hr (1.8-8.1 mph)
June 23	0630-1130	No Pile Driving	--	12.2-16.1°C (54.0-60.0°F)	4.3-10.4 km/hr (2.7-6.5 mph)
June 24	0630-1000	2 Impact 1 Vibratory	0746-0803 0842-0848 0858-0907	14.7-16.8°C (58.5-61.2°F)	4.3-13.0 km/hr (2.7-8.1 mph)
June 25	0615-1615	3 Impact 5 Vibratory	0712-0715 1225-1228 1234-1242 1252-1254 1258-1303 1343-1357 1407-1419 1449-1537	13.2-16.2°C (55.8-61.2°F)	10.8-34.2 km/hr (6.7-21.3 mph)
June 26	0630-1530	1 Impact 6 Vibratory	0715-0727 0743-0744 1254-1257 1305-1306 1313-1314 1320-1322 1354-1445	15.0-17.1°C (59.0-62.8°F)	11.9-29.9 km/hr (7.4-18.6 mph)
June 27	0730-1145	2 Impact 2 Vibratory	0940-0948 0954-1000 1030-1032 1044-1102	14.3-17.5 °C (57.7-63.5°F)	1.8-7.6 km/hr (1.1-4.7 mph)
June 28	0930-1430	2 Impact 2 Vibratory	1220-1221 1224-1225 1248-1253 1321-1350	14.4-19.8°C (57.9-67.8°F)	8.6-11.9 km/hr (5.3-7.4 mph)
Totals 31 Days		70 Impact 42 Vibratory			

* Pile driving was intermittent as the construction contractor was working with the acoustic monitor to reduce cumulative sound levels to prevent exceeding the threshold criteria for listed fish species.

Table 3. Monitoring Summary for YBITS2 Temporary Pile Installation.

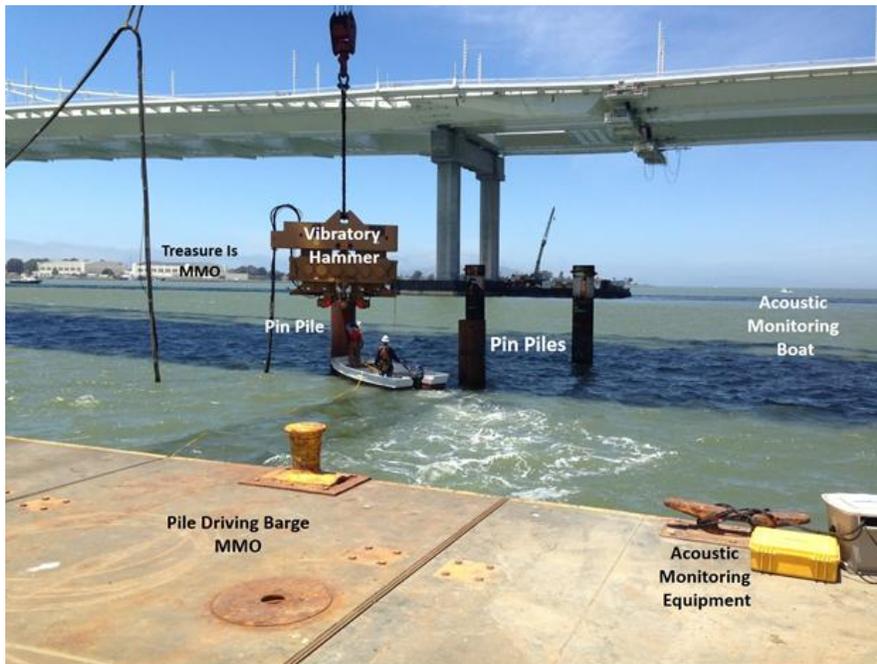
Date	Piles Driven Vibratory	Piles Driven Impact	Total Harbor Seals Observed	Harbor Seals Observed In The Behavioral Response Zone During Pile Driving	Total California Sea Lions Observed	Sea Lions Observed In The Behavioral Response Zone During Pile Driving
Feb 3	0	0	1	0	0	0
Feb 4	5	0	1	0	0	0
Feb 5	2	0	1	0	0	0
Feb 6	0	0	0	0	0	0
Feb 7	0	2	0	0	0	0
Feb 15	0	2	1	1	1	0
Feb 19	0	3	0	0	0	0
Feb 20	2	1	1	0	0	0
Feb 21	0	2	0	0	0	0
Feb 22	0	1	0	0	0	0
Feb 23	0	1	0	0	0	0
June 2	0	7	16	7*	0	0
June 3	0	5	5	1	0	0
June 4	0	5	13	5*	0	0
June 5	0	7	13	5*	0	0
June 6	0	2	16	6*	0	0
June 10	2	0	4	0	0	0
June 11	0	2	14	2*	0	0
June 12	4	2	15	7*	0	0
June 13	1	0	13	0	0	0
June 14	2	3	14	7*	0	0
June 16	0	2	5	0	0	0
June 17	3	3	4	0	0	0
June 18	0	4	5	4*	0	0
June 19	5	6	9	3*	0	0
June 23	0	0	7	0	0	0
June 24	1	2	7	4*	0	0
June 25	5	3	8	3*	0	0
June 26	6	1	11	6*	0	0
June 27	2	2	15	7*	0	0
June 28	2	2	3	0	0	0
Totals	42	70	202	68	1	0

* Most seals in the BHZ-ZOI during pile driving were within the acoustic shadow area (pile driving noise blocked by YBI) while foraging in Coast Guard and Clipper Coves.

YBITS2 CANTILEVER FALSEWORK FOUNDATION PILES (PIERS E3 to E4)

Installation of temporary piles were required to construct the temporary falsework needed to support the original SFOBB structure during dismantling between Piers E3 and E4. All piles were driven using a vibratory hammer although some piles were proofed (brief impact hammer; Figure 5; Table 4). Eleven days of monitoring were conducted on June 19, and from July 11 to September 11, 2014. Monitoring was conducted during installation of both the 61-centimeter (24-inch) pin piles (provided support for the pile installation template) and the 91-centimeter (36-inch) piles (main support for the falsework). Twenty-eight of the 94 temporary piles were driven by vibratory hammer providing 30% of the required monitoring for vibratory driven piles as required by the IHA issued to the Department (monitoring is required of at least 20% of vibratory piles driven; NMFS 2014).

Figure 5. Photo of the Piers E3/E4 Pile Installation Site.



All pile driving was vibratory (with the exception of proofing which did not require marine mammal monitoring), therefore, there was no MMEZ and a ~~BHZ~~ ZOI of 2,000 meters (6,562 feet) was implemented for monitoring. Past monitoring for the east span has shown that the vast majority of marine mammals are found west of Pier E3, particularly near YBI and Treasure Island (Department 2004 and 2014), therefore, most of the monitors were situated west of the Piers E3/E4 pile driving area. The positions of the MMOs were based on the higher density of seals foraging in the Coast Guard and Clipper Coves around YBI and the area between Piers E2 and E3 of the original bridge and T1 of the new bridge where most harbor seals and sea lions transited north and south. MMO #1 and MMO #2 were located on the pile driving barge, MMO #3 was on the southeast side of YBI, MMO #4 was located on the hill above the northeast side of YBI, and MMO #5 was located on the southeast shore of Treasure Island as shown on Figure 6.

Figure 6. Aerial Photo of the YBITS2 Cantilever Falsework Foundation Project Area.



Table 4. Construction and Weather Condition Summary for the Cantilever Falsework

Date	Observation Period	Number Of Piles	Pile Driving Times	Air Temperature	Wind Speed
June 19	0630-1600	3 Vibratory	1023-1027 1259-1302 1513-1519	12.3-16.3 °C (54.1-61.3 °F)	2.9-13.0 km/hr (1.8-8.1 mph)
July 11	0630-1100	No Pile Driving	No Pile Driving	15.2-17.2°C (59.4-63.0°F)	11.2-16.6 km/hr (7.0-10.3 mph)
July 17	0630-1500	4 Vibratory	0711-0717 0836-0842 1326-1336 1343-1350	16.4-18.3°C (61.5-64.9°F)	11.2-22.0 km/hr (7.0-13.7 mph)
July 23	0630-1100	2 Vibratory	0713-0741 0810-0813	18.4-19.6°C (65.1-67.3°F)	5.8-7.6 km/hr (3.6-4.7 mph)
July 28	0630-1530	3 Vibratory	1046-1053 1103-1109 1436-1443	15.4-18.2°C (59.7-64.8°F)	6.5-18.0 km/hr (4.0-11.2 mph)
Aug 11	0630-1145	2 Impact	0956-1003 1057-1058	16.0-18.3°C (60.8-64.9°F)	1.4-19.1 km/hr (0.9-11.9 mph)
Aug 14	0630-1500	6 Vibratory	1303-1311 1317-1325 1333-1340 1348-1354 1400-1403 1413-1418	15.1-19.3°C (59.2-66.7°F)	7.2-14.4 km/hr (4.5-8.9 mph)
Aug 27	0930-1430	2 vibratory	1128-1204 1255-1345	18.1-22.2°C (64.6-72.0°F)	1.8-10.4 km/hr (1.1-6.5 mph)
Aug 28	0630-1230	2 Vibratory	0826-0910 0924-0933	15.9-19.9°C (60.6-67.8°F)	2.9-6.5 km/hr (1.8-4.0 mph)
Sep 3	0630-1530	4 Vibratory	0951-0957 1132-1138 1330-1334 1432-1436	16.6-21.0°C (61.9-69.8°F)	2.2-19.4 km/hr (1.4-12.1 mph)
Sep 11	0615-1230	2 Vibratory	1105-1117 1127-1139	15.0-21.8°C (59.0-71.2°F)	5.4-8.3 km/hr (3.4-5.2 mph)
Totals 11 Days		28 Vibratory 2 Impact			

Ninety-three marine mammals, all harbor seals, were observed during the eleven days of monitoring vibratory and impact pile driving (Table 5). Thirty-three harbor seals were observed within the ~~BHZ-ZOI~~ during vibratory driving, but did not show any response to the noise. Twenty-four of the 33 harbor seals (77.4%) observed within the ~~BHZ-ZOI~~ during pile driving appeared to be foraging in either the Coast Guard Cove or Clipper Cove. These are areas regularly used by harbor seals to forage and the seals continued foraging during pile driving and did not show any response.

Marine mammal monitoring was conducted during 30% of the piles that were installed using the vibratory pile driver in 2014 (28 of 94 all template and falsework piles, and spliced piles). This exceeded the 20% required in the 2014 IHA issued to the Department (NMFS 2014).

Vibratory pile driving had been planned for August 11, but did not occur although impact pile driving for proofing did occur. The two impact driven piles were also monitored since the MMOs were on site and monitoring in anticipation of vibratory driving although monitoring for proofing was not required in the 2014 IHA.

DISCUSSION

During the 42 days of marine mammal monitoring for temporary pile driving in 2014, 297 marine mammals were observed with harbor seals being the most frequently observed species (295 harbor seals) followed by one sea lion and one harbor porpoise. No marine mammals were observed within the estimated MMEZs during any of the activities. ~~Only harbor seals (101-Fifty-two harbor seals)~~ were observed within the 1,000 to 2,000 meter (3,281 to 6,562 feet) ~~BHZs-ZOIs~~ (impact and vibratory ~~BHZs-ZOIs~~, respectively) during monitored pile driving, with an extrapolation to 130 harbor seals for all pile driving (Table 6). The number of harbor seals observed in the ZOI during pile driving exceeded the allowable take for Level B harassment in the IHA (50 harbor seals). Most of those harbor seals observed within the ~~BHZ-ZOI~~ were in Coast Guard Cove and Clipper Cove just north of YBI, and the area 200-400 meters (656-1,312 feet) off the southeast shore of YBI, and ~~seals~~ appeared to be foraging. None of those seals showed any response to the pile driving noise and continued foraging in those areas for up to several hours during pile driving.

Table 5. Monitoring Summary for the Cantilever Falsework.

Date	Piles Driven Vibratory*	Piles Driven Impact	Total Harbor Seals Observed	Harbor Seals in the Behavioral Response Zone During Pile Driving	Total California Sea Lions Observed	Sea Lions in the Behavioral Response Zone During Pile Driving
June 19	3	0	10	0	0	0
July 11	0	0	3	0	0	0
July 17	4	0	4	3	0	0
July 23	2	0	10	7	0	0
July 28	3	0	10	3	0	0
Aug 11	0	2	13	1	0	0
Aug 14	6	0	8	2	0	0
Aug 27	2	0	5	2	0	0
Aug 28	2	0	6	3	0	0
Sep 3	4	0	22	8	0	0
Sep 11	2	0	12	4	0	0
Totals	28	2	103	33	0	0

*30% of the vibratory installed piles were monitored. Thirty-three seals were observed in the BHZ-ZOI during pile driving. For 100% monitoring the number would be 110 harbor seals within the BHZ-ZOI during pile driving. One harbor porpoise was observed in the BHZZOI, but prior to pile driving.

Table 6. Summary of the Total Number of Harbor Seals Observed Within the Zone of Influence (ZOI) for Level B Behavioral Harassment During Pile Driving.

Site	Total Harbor Seals Observed	<u>During Pile Driving</u> Harbor Seals Observed in the <u>BHZZOI During Pile Driving</u>	Percentage of Piles That Were Monitored*	Number of Seals Within the <u>BHZZOI</u> if 100% of Piles Were Monitored
YBI Shore	202	68 19	95 % (88% and 100%)	20
Piers E3/E4	93	33	30%	110
Total	295	101 52		130

* The combined percentage of pile driving monitored for the YBI Shore site was 95%, 42 vibratory piles (88% monitored) and 70 impact piles (100% monitored). One sea lion and one harbor porpoise were also observed in the BHZZOI, but prior to pile driving.

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