

State of California Department of Transportation



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

MARINE MAMMAL MONITORING ANNUAL REPORT

JANUARY 8, 2013 –JANUARY 7, 2014

**(In accordance with the Incidental Harassment
Authorization issued January 7, 2013)**



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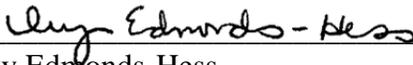


Prepared by



Phil Thorson
Garcia and Associates

Reviewed by



Ivy Edmonds-Hess
Parsons Brinckerhoff

Approved by



Stefan Galvez-Abadia
Chief – Office of Environmental Analysis
Caltrans District 4

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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, 2013 – January 7, 2014 timeframe, the Department conducted several activities that required marine mammal monitoring per the IHA. These activities included the installation of five test piles, the removal of temporary foundations, and the installation of temporary piles to support the construction of protective fenders for the new bridge tower (T1).

This report summarizes the construction and mechanical demolition activities and the associated marine mammal monitoring that occurred. Marine mammal monitoring was conducted during 12 days of pile driving and mechanical dismantling.

Pursuant to the SFOBB Project Revised Marine Mammal Monitoring Plan (Caltrans 2013), observers surveyed the Marine Mammal Exclusion Zone (MMEZ) to ensure that no marine mammals were seen within the MMEZ 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 behavioral harassment zone was monitored during approximately 20% of pile driving (impact or vibratory) and mechanical demolition.

Marine mammal monitoring was conducted at least 30 minutes prior to, during and following pile driving and mechanical dismantling. Ninety marine mammals were observed during the 12 days of marine mammal monitoring for temporary pile driving and mechanical demolition. No marine mammals were observed within the estimated MMEZs during any of the activities. Forty-five harbor seals and three sea lions were observed within the 1,000 to 2,000-meter (3,281 to 6,562-foot) behavioral harassment zones (Table ES-1) during pile driving or demolition. No cetaceans were observed during the monitoring periods. Marine mammals were more frequently sighted during monitoring of projects on or near YBI (i.e., Temporary Tower C Foundation demolition and T1 fender pile installation).

Table ES-1. Summary of All Marine Mammals Observed Including Those Seen Within the MMEZ or Behavioral Zones During Pile Driving or Demolition.

Total Marine Mammals Observed (Pre, During, Post Activity)	Harbor Seals in the MMEZ During Pile Driving or Demolition (190 dB RMS)	Sea Lions in the MMEZ During Pile Driving or Demolition (190 dB RMS)	Harbor Seals in the Behavioral Zone During Pile Driving or Demolition (120-160 dB RMS)	Sea Lions in the Behavioral Zone During Pile Driving or Demolition (120-160 dB RMS)
90	0	0	45	3

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.

Components of the new bridge that still have construction work ongoing include (see Figure 1):

- Self-Anchored Suspension (SAS) Span
- Yerba Buena Island (YBI) Transition Structure
- Oakland Touchdown Structures

Dismantling of the original bridge has five components (see Figure 2):

- Yerba Buena Island 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. San Francisco-Oakland Bay Bridge Seismic Safety Project Location Map.



Figure 2. Sections of the Original East Span for Removal.



Pile driving and demolition has the potential to harass marine mammals that are swimming, foraging, and resting in the project vicinity. Under the Marine Mammal Protection Act of 1972, the Department was issued an Incidental Harassment Authorizations (IHA) from the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS) to incidentally take a small number of California sea lions (*Zalophus californianus*), Pacific harbor seals (*Phoca vitulina richardii*), harbor porpoises (*Phocoena phocoena*), and gray whales (*Eschrichtius robustus*) by harassment incidental to construction.

During the January 8, 2013 – January 7, 2014 timeframe, the Department conducted several activities that required marine mammal monitoring per the IHA. These activities included the installation of five test piles as part of the YBITS2 project, the removal of temporary foundations as part of the SAS project, and the installation of temporary piles to support the construction of protective fenders for the new bridge tower (T1) as part of the SAS contract.

This report summarizes the construction and mechanical demolition activities and the associated marine mammal monitoring that occurred. Marine mammal monitoring was conducted during 12 days of pile driving and mechanical dismantling. Table 1 summarizes the activities and Figure 3 shows the general location of these activities. All monitoring was conducted in accordance with the requirements of the IHA (Sections 6b and 7).

Table 1. Summary of Construction and Demolition Activities and Marine Mammal Monitoring that Occurred during January 8, 2013 - January 7, 2014.

Project	Monitoring Dates	Days Monitoring	Area	Vibratory Pile Driving	Impact Pile Driving	Demolition
YBITS Test Piles	August 20, 2013	1	Piers E3/E4 Original Bay Bridge	Yes 2 piles	No	No
C3 Foundation Demolition	October 8-9, 2013	2	Yerba Buena Island	No	No	Yes
AE/AW Caps Demolition	October 14-15, 2013	2	AE/AW Tower Caps New Bay Bridge	No	No	Yes
C1 Foundation Demolition	October 30, 2013	1	Yerba Buena Island	No	No	Yes
T1 Fender Piles	November 20-26, 2013	6	T1 New Bay Bridge	Yes 12 piles	Yes 12 piles	No
Total Days		12				

Figure 3. Aerial Photo of the Four Construction and Demolition Sites.



METHODS

The Marine Mammal Monitoring Plan (2004) for the SFOBB Project was updated to include temporary pile driving and mechanical dismantling. This updated monitoring plan was provided to NMFS (Caltrans 2013). The following is a summary of that marine mammal monitoring plan.

MMEZ monitoring is conducted during impact driving of all open water piles (except proof testing) and mechanical dismantling (cetacean threshold = 180 decibels [dB] root-mean-square [RMS] isopleth and pinniped threshold = 190 dB RMS). Monitoring of the MMEZ is conducted by a minimum of three qualified NMFS-approved Marine Mammal Observers (MMO). In addition, a behavioral harassment zone is monitored during approximately 20% of pile driving (impact or vibratory) and mechanical demolition. The actual number of observers is dependent on the size of the exclusion zone with four to five observers for larger behavioral harassment zones. The exclusion zone radii ranged from 95 meters (312 feet) to 235 meters (771 feet) and the behavioral harassment zone radii ranged 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. During the 2013 monitoring period, the behavioral harassment zone for impulse noise or impact pile driving was generally smaller than the zone for vibratory pile driving due to the continuous sound it generates.

The MMOs begin monitoring at least 30 minutes prior to startup of the pile driving or mechanical dismantling. Observers 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 is 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 harassment zones. The MMOs are prepared to have impact pile driving or mechanical demolition delayed if any marine mammals are observed in the exclusion zone prior to the start of activities. Once pile driving begins, operations can continue uninterrupted until the pile reaches its predetermined depth. Unless pile driving is stopped for 30 minutes or more, then resuming pile driving would 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 end approximately 30 minutes after the activity has been completed.

Observations are made using binoculars during daylight hours. Each member of the monitoring team has a mobile phone (VHF radios for backup) for contact with the lead observer, other observers and work crews if necessary. The lead MMO is 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 is recorded in waterproof notebooks and included 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 is copied each day and stored in two separate places to prevent loss of data.

YBITS2 FALSEWORK TEST PILES

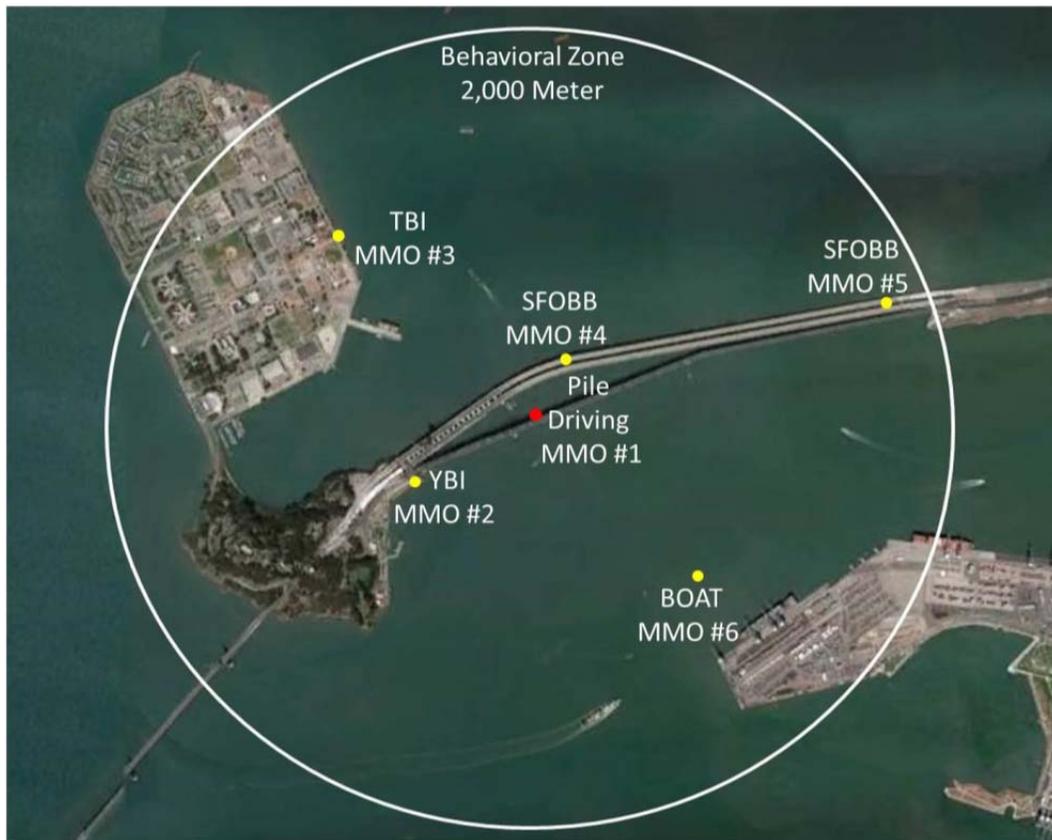
Project Description

In preparation for the dismantling of the cantilever span of the original bridge, five falsework test piles were installed between Piers E3 and E4 of the original bridge. Initial installation of five 36-inch diameter steel pipe piles was performed with a vibratory hammer on August 20th and 21st, 2013. Following vibratory hammer installation, all five piles proof tested with an impact hammer to test the resistance and load capacity of the piles on September 8th and 9th, 2013. Information gained during the testing of these piles will inform future falsework pile installation for the removal of the cantilever span.

Marine Mammal Monitoring Results

The position of each Observer is shown in Figure 4. Because all pile driving that required monitoring was vibratory, there was no MMEZ and a Behavioral Zone of 2,000 meters (6,562 feet) was implemented for monitoring. Vibratory pile driving was conducted on two piles from 1107-1212 hours and 1416-1428 hours using the vibratory hammer. Observations were made from 0825 to 1500 hours.

Figure 4. YBITS2 Falsework Test Pile Project Area with 2,000-meter (6,562-foot) (120 dB vibratory) Behavioral Harassment Zone.



Eleven harbor seals and two sea lions were observed during the monitoring period. Seven harbor seals and one sea lion were observed within the Behavioral Harassment Zone during pile driving (Table 2). None of the animals showed a response to pile driving with the exception of one harbor seal that dove at the start of pile driving for the second pile.

Harbor seals were also continuously observed in the cove adjacent to the U.S. Coast Guard station on YBI from 0825-1425 hours, at a distance of 600-800 meters (1,969-2,625 feet) east of the pile driving barge. Up to three harbor seals were observed at one time with an estimated total of six seals in the area, and the main behavior observed was most likely resting or foraging as most seals moved little and would surface in the same area.

Table 2. Monitoring Summary for the Falsework Test Piles.

Date	Observation Period	Pile Number	Pile Driving Time	Harbor Seals	Sea lions	Air Temp	Wind Speed
August 20, 2013	0825-1500	1	1107-1212	17	2	16.7-20.1°C (62.1-68.2°F)	2.5-16.9 kph (1.6-10.5 mph)
		2	1416-1428				

TEMPORARY TOWER C FOUNDATION REMOVAL

Project Description

As part of construction for the new east span, several temporary foundations were installed in order to support pieces of the bridge as they were installed. With the completion of the new east span, these foundations are no longer necessary and as such are being removed. The four Temporary Tower C foundations (C1, C2, C3 and C4) are located on YBI at the Bay shoreline interface (Figures 5 and 6). One of the foundations, C1 is located partially below the mean high water line (MHWL) and is subject to regular tidal action (Figure 5). The other three foundations are located on land above the mean high tide line and are subject to occasional tidal action.

The contractor utilized excavators located on crane mats placed to the east of each of the foundations. Excavators equipped with hydraulic hammers demolished the above surface portion of the foundation to just below the shoreline elevation. Following this, the rubble and steel reinforcement were removed and clean fill and rip rap were placed on top of the dismantled foundation footprint to bring the area back to preconstruction elevation and slope.

Figure 5. Temporary Tower C Foundations



Figure 6. Temporary Tower C Foundations, the Hydraulic Hammer, and Their Proximity to the Bay.



Monitoring Results

The MMEZ for demolition using a hydraulic hammer was unknown; therefore, NMFS required a distance to 100 meters (328 feet) until hydroacoustic measurements could be made (Figure 7). After underwater sound level measurements were collected for the C3 Foundation, the MMEZ was eliminated as sound levels were well below the 180 or 190 dB re 1 μ Pa RMS thresholds required in the 2013 IHA (Illingworth & Rodkin Inc. 2013). The Behavioral Harassment Zone was estimated to be 2,000 meters (6,562 feet). Additional marine mammal and hydroacoustic monitoring were undertaken for the C1 Foundation because it was closer to the Bay waters than the previously monitored C3 Foundation, and therefore the demolition could potentially produce higher sound levels in the Bay.

Figure 7. Aerial Photo of the Temporary Tower C Foundations and Marine Mammal Observer Locations.



Although the hydraulic hammer was used for most of the demolition, a hydraulic saw/cutter was used intermittently or at the same time as the hammer to cut the steel reinforcement bars.

Thirty harbor seals and two sea lions were observed during the monitoring period (Table 3). All 30 harbor seals and the two sea lions were observed within the Behavioral Harassment Zone during demolition and no seals or sea lions were observed within the MMEZ at any time. None of the animals showed a response to demolition noise and those within the cove adjacent to the U.S. Coast Guard station were sighted multiple times throughout the monitoring period suggesting that area for resting or foraging was not affected.

Table 3. Monitoring Summary for the Removal of Temporary Tower C Foundations.

Date	Foundation #	Observation Period	Demolition Period	Harbor Seals Sighted	Sea Lions Sighted	Air Temp	Wind Speed
October 8, 2013	C3	0645-1700	0728-1121 1238-1605	9	1	13.8-18.5°C (56.8-65.3°F)	4.7-14.5 kph (2.9-9.0 mph)
October 9, 2013	C3	0655-1650	0730-1132 1356-1614	8	0	11.8-18.0°C (53.2-64.4°F)	4.0-13.0 kph (2.5-8.1 mph)
October 30, 2013	C1	0715-1545	0855-1130 1240-1455	13	1	9.7-16.9°C (49.5-62.4°F)	2.5-15.6 kph (1.6-9.7 mph)
Total				30	2		

AE/AW FOUNDATION REMOVAL

Project Description

AE and AW Foundations, were located underneath the eastern edge of the SAS span of the bridge where it connects to the Skyway (Figure 8). The contractor utilized excavators located on the pier deck to remove the cast-in-place portion of the pile cap. An excavator equipped with a hydraulic hammer was used to demolish the concrete and a second excavator equipped with rotating shears was used to cut the steel reinforcement. Once the cast-in-place concrete was removed, the precast slab was removed using an excavator equipped with a concrete cracking jaw. The excavator was operated from a barge. Following dismantling of the precast slab, the piles were cut off below the mudline and removed.

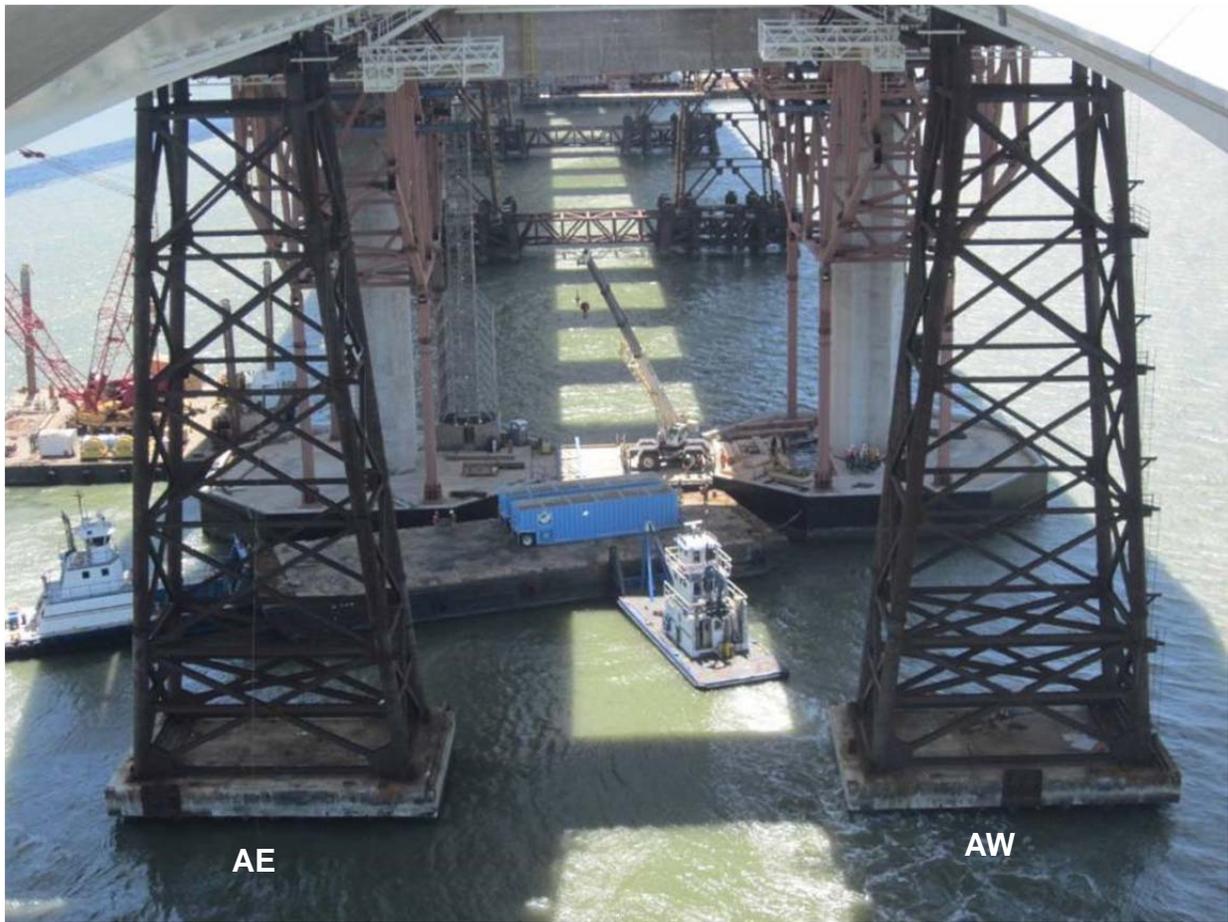
The mechanical splitting and pulverizing of concrete with equipment such as an impact hammer constitutes an impulse noise. The impact hammer was considered to have the potential to generate high sound pressure levels in excess of the 180 dB RMS and 190 dB RMS thresholds for Level A harassment.

Monitoring Results

The MMEZ for demolition using a hydraulic hammer was unknown; therefore, NMFS required a distance of 100 meters (328 feet) until hydroacoustic measurements could be made (Figure 9). Initial Behavioral Harassment Zones for demolition are based on estimated distances to the 120 dB RMS isopleth. The estimated distance to the 120 dB RMS isopleth was 2,000 meters (6,562 feet).

The Behavioral Harassment Zones were monitored during 20% of demolition work. Marine mammal monitoring was only conducted during demolition of the AE Foundation as hydroacoustic monitoring showed that the noise from the hydraulic hammer did not reach the 180 dB or 190 dB RMS threshold.

Figure 8. AE and AW Foundations.



Demolition on the AE Foundation was conducted from 1224 to 1729 hours on October 14, 2013 using the hydraulic hammer and shears. Although the hydraulic hammer was used for most of the demolition, a hydraulic shear was used intermittently or at the same time as the hammer to cut the steel reinforcement bars.

Observations were made from 1150 to 1809 hours. Demolition on the AE Foundation was continued from 1200 to 1643 hours on October 15, 2013 using the hydraulic hammer and shears. Observations were made from PDT 1145 to 1715 hours.

Nine harbor seals were observed during the monitoring period (Table 4). Eight harbor seals were observed within the Behavioral Harassment Zone during demolition and no seals or sea lions were observed within the MMEZ during demolition. None of the animals showed a response to demolition noise. One harbor seal was observed within the MMEZ near the AE Foundation but after demolition had ended for the day.

Figure 9. The AE Foundation Area with 100-meter (328 feet) MMEZ and 2,000-meter (6,562-foot). Behavioral Harassment Zone and Marine Mammal Monitor Observer Locations.



Table 4. Monitoring Summary for the Removal of the AE Foundation.

Date	Observation Period	Demolition Period	Harbor Seals Sighted	Sea Lions Sighted	Air Temp	Wind Speed
October 14, 2013	1150-1809	1224-1729	3	0	15.7-23.1°C (60.3-73.6°F)	3.5-10.8 kph (2.2 to 6.7 mph)
October 15, 2013	1145-1715	1200-1643	6	0	18.0-26.6°C (64.4-79.9°F)	4.0-15.8 kph (1.6-9.8 mph)
Total			9	0		

T1 FENDER PILES

Project Description

The SAS Span of the newly constructed bridge requires the installation of concrete fender panels around the base of the T1. In order to construct the fender panels, a falsework structure, supported by 12 steel 61-centimeter (24-inch) pipe piles needed to be constructed.

Initial installation of the temporary piles was conducted using a vibratory hammer (APE Model 200). Once the pile was fully vibrated in or if the pile could not be fully vibrated in, an attenuation device (bubble curtain) was installed and subsequent impact hammering of the piles occurred as part of proof testing or installation completion using a Diesel Delmag D62-22 hammer (Figure 10).

Figure 10. Photo of the T1 Fender Pile Driving.



Monitoring Results

The MMEZ was initially implemented at 95 meters (312 feet; Figure 11) and was used until hydroacoustic monitoring showed that sound levels did not reach the 180 or 190 dB re 1 μ Pa RMS isopleth threshold for attenuated impact pile driving. Monitoring for all impact pile driving continued, but no MMEZ was implemented for the remainder of the project. The Behavioral Zones required monitoring for only 20% of the piles driven (2013 IHA), but because there was a mix of vibratory and impact pile driving each day, monitoring for the behavioral zones was conducted on 85% of the piles being driven.

Thirty harbor seals were observed during the six days of monitoring (Table 5). No California sea lions or cetaceans were observed. Most of the seals were observed within the U.S. Coast Guard Cove or Clipper Cove which are beyond the MMEZ, but within the Behavioral Zones for both vibratory (2,000 meter radius [6,562 feet]) and impact driving (1,000 meter radius [3,281 feet]). No seals were observed within the MMEZ prior to or during any vibratory or impact pile driving. The only seal sighting within the MMEZ occurred two minutes after the end of impact pile driving. None of the animals observed during pile driving showed a response to the noise. Animals within the cove, adjacent to the US Coast Guard station and Clipper Cove, were sighted multiple times throughout the monitoring period.

Figure 11. The T1 Fender Pile Area with a 95-meter (312-foot) MMEZ and 2,000-meter (6,562-foot) Behavioral Harassment Zone and Marine Mammal Monitor Observer Locations.



Table 5: Monitoring Summary for the T1 Fender Piles

Date	Pile Number	Vibratory Pile Driving Periods	Impact Pile Driving Periods	MMO Observation Times	Harbor Seals Sighted	Air Temp	Wind Speed
November 20, 2013	1 2	1107-1115 1158-1202	1612-1617 1514-1528	0700-1615	4	13.3-14.6°C (55.9-58.3°F)	2.2-9.4 km/hr (1.4-5.8 mph)
November 21, 2013	3 4	0927-0958 1424-1432	1303-1306 1527-1529	0700-1610	13	11.8-15.7°C (53.2-60.3°F)	6.1-33.8 km/hr (3.8-21.0 mph)
November 22, 2013	5 6	1043-1052	1241-1246 1315-1318	0900-1355	5	14.5-19.7°C (58.1-67.5°F)	13.7-40.7 km/hr (8.5-25.3 mph)
November 23, 2013	7 8	1015-1027 1103-1206	1414-1419 1443-1447	0830-1525	0	12.2-17.2°C (54.0-63.0°F)	6.1-9.7 km/hr (3.8-6.0 mph)
November 25, 2013	9 10 11 12	0925-0937 1030-1043 1555-1611 1641-1648	1117-1144 1249-1252	0830-1720	4	9.7-14.5°C (49.5-58.1°F)	8.3-16.2 km/hr (5.2-10.1 mph)
November 26, 2013	11 12 9*		0816-0819 0843-0845 1333-1336	0700-1415	4	10.7-14.7°C (51.3-58.5°F)	2.2-10.8 km/hr (1.4-6.7 mph)
Total Seals					30		

*Pile # 9 was initially driven on November 25, 2013. On November 26, 2013 an extra section of pile was welded on and impact pile driving was used to complete the installation.

Not all piles were monitored during vibratory driving as only 20% was required in the IHA.

CONCLUSION

Ninety marine mammals were observed during the 12 days of marine mammal monitoring for temporary pile driving and mechanical demolition. No marine mammals were observed within the estimated MMEZs during any of the activities. Forty-five harbor seals and three sea lions were observed within the 1,000 to 2,000-meter (3,281 to 6,562-foot) behavioral harassment zones during pile driving or demolition (Table 6). No cetaceans were observed during the monitoring periods. Only one harbor seal showed a response to the permitted activities when it dove at the start of vibratory pile driving for the YBITS test pile project (the seal was approximately 750 meters [2,461 feet] north of the pile driving site). Marine mammals were more frequently sighted during monitoring of projects on or near YBI (i.e., Temporary Tower C foundation demolition and T1 fender pile installation). Harbor seals were frequently observed in the cove adjacent to the U.S. Coast Guard Station and in Clipper Cove just north of YBI, and moving to and from the YBI haul-out site (Figure 1).

Monitoring of the vibratory and demolition activity was only required for 20% of the time when those activities occurred but there was often a mix of impact and vibratory driving; therefore, monitoring was conducted from 20-100% of the time for some

construction projects. Table 7 summarizes all observations and estimates the total exposures of marine mammals if there was 100% monitoring for each construction or demolition project as requested by NMFS.

Most of the observations of harbor seals within the behavioral zones occurred within the Coast Guard Cove or Clipper Cove. Certain sites such as the Temporary Tower C Foundations and the T1 fender piles are either completely on shore of YBI or just offshore off the northeastern side of YBI but are not within the acoustic “line of sight” (the direct path of sound within the water with no land masses, i.e., Yerba Buena Island, within that path) of one or both coves (See Figure 12). Table 7 summarizes the harbor seal and sea lion exposures based on 100% monitoring of each project but takes into effect that some sites do not create sound that transmits directly into the two coves (i.e., Coast Guard Cove and Clipper Cove). The revised number of exposures, 41 seals and seven sea lions, are based only on those animals observed within the acoustic “line of sight” of the T1 Tower, Temporary Tower C, YBITS2 test pile, and AE Foundation construction sites (Table 7). These exposures are less than the 50 harbor seal and 10 sea lion exposures permitted by NMFS (NMFS 2013; Table 6).



Figure 12. C represents the Temporary Tower C Foundation demolition area and T1 for the T1 Fender pile driving. The lines represent the “line of sight” for sound for each of the two projects with sound only propagating to the east of the lines as it is blocked by YBI. Circles represent the harbor seal foraging areas within the Coast Guard and Clipper Coves where the majority of harbor seal sightings occur.

Table 6. Summary of All Marine Mammals Directly Observed During Monitoring Including Those Seen Within the MMEZ or Behavioral Zones During Pile Driving or Demolition Activities and the allowed number of exposures (National Marine Fisheries Service 2013).

Species	All Observations	MMEZ Observations During Pile Driving or Demolition	Behavioral Zone Observations During Pile Driving or Demolition	Behavioral Zone Observations No Pile Driving Or Demolition	IHA Behavioral Takes Allowed
Harbor Seals	86	0	45	41	50
Sea Lions	4	0	3	1	10
Totals	90	0	48	42	

Table 7: Estimated exposures of Harbor Seals and California Sea Lions Within the Behavioral Zone for Each Pile Driving or Demolition Site if Monitoring 100% of Time (20% is required; NMFS 2013).

Site	Date	Activity	Harbor Seals				California Sea Lions	
			Directly Observed Behavioral Exposures	Estimated Behavioral Zone Exposures if 100% monitored	Estimate of Observations Beyond Acoustic Line of Sight if 100% monitored	Estimate of Observations Within Acoustic Line of Sight if 100% Monitored	Directly Observed Behavioral Exposures	Estimated Behavioral Zone Exposures if 100 % monitored)
YBITS2 Test Piles (60% monitored)	August 20, 2013	Vibratory Pile Driving	8	13	0	13	1	2
C3 Foundation (33% monitored)	October 8-9, 2013	Demolition	18	51	42	9	1	3
AE Foundation (50% monitored)	October 4-15, 2014	Demolition	8	16	0	16	0	0
C1 Foundation (50% monitored)	November 7, 2014 Nov	Demolition	6	12	10	2	1	2
T1 Tower Temporary Fender Piles (100% monitored)	November 20-26, 2013	Vibratory and Impact Pile Driving	5	5	4	1	0	0
*Totals Observed (total from % monitored)			45	97	56	41	3	7
<p>*Total of Level B Behavioral Zone Exposures (Line of sight only excludes Coast Guard Cove for T1 Tower, and Coast Guard Cove and Clipper Cove for Temporary Tower C Foundations) for harbor seals = 41 Level B behavioral zone exposures (97 estimated observations – 56 estimated observations from beyond “line of sight”)</p>								

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