

**SHALLOW OFFSHORE SEISMIC INVESTIGATION
PALOS VERDES, CALIFORNIA**

Field Operations Report



Submitted to:

California State Lands Commission
100 Howe Avenue, Suite 100 South
Sacramento, CA 95825-8202

Submitted by:

ECOSYSTEMS MANAGEMENT ASSOCIATES, INC.
2166 Avenida de la Playa, Suite G
La Jolla, CA 92037

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SHALLOW OFFSHORE SEISMIC INVESTIGATION PALOS VERDES, CALIFORNIA

Field Operations Report

1.0 INTRODUCTION

EcoSystems Management Associates, Inc. (ECO-M), conducted a nearshore geophysical survey offshore of Palos Verdes on 6-7 January 2014 for the Palos Verdes Artificial Reef Project.

The project objectives are to carry out the following surveys:

- Bathymetric survey 500-1000m seaward of kelp beds (depth zone of interest is 15-30m water depths).
- Seafloor imagery survey (side-scan sonar) 500-1000m seaward of kelp beds to classify bottom substrate (depth zone of interest is 15-30m water depths).
- Sub-bottom profiling survey 500-1000m seaward of kelp beds to measure sediment thickness (depth zone of interest is 15-30m water depths).

These surveys are necessary to define and map seafloor substrate distribution, thickness of unconsolidated sediments, and water depths in the project area to assist in designing an artificial reef.

The surveyed area and survey lines are shown in Figure 1-1. Surveys were performed from the seaward edge of existing kelp beds out to the 30m isobath. The side-scan survey is used to map the distribution of various seafloor substrate types. Sub-bottom profiling was performed to determine the thickness of areas covered by unconsolidated sediments. Bathymetric surveys were performed to determine the water depths in surveyed areas.

1.1 PERMITTING: CALIFORNIA STATE LANDS COMMISSION

Prior to the geophysical survey work, ECO-M acquired the necessary permit from the California State Lands Commission ([CSLC] Permit #PRC 8536.9). As per permit requirements, a Marine Wildlife Contingency Plan and an Oil Spill Response Plan were prepared. A marine mammal observer was present during the surveys to assure that marine mammals were not harmed by the low energy, high frequency seismic pulses generated by the acoustic profiling equipment. Marine mammal observations are carried out during the surveys to avoid affecting their habitats by regulating when survey activities should be altered or stopped to avoid disturbing them. A copy of the Marine Mammal Observer Report during the survey (6-7 January 2014) is provided Appendix A. Additionally, all parties identified in Exhibit E of the permit were sent a notification of the geophysical survey activity and all equipment was calibrated to manufacturer specifications.

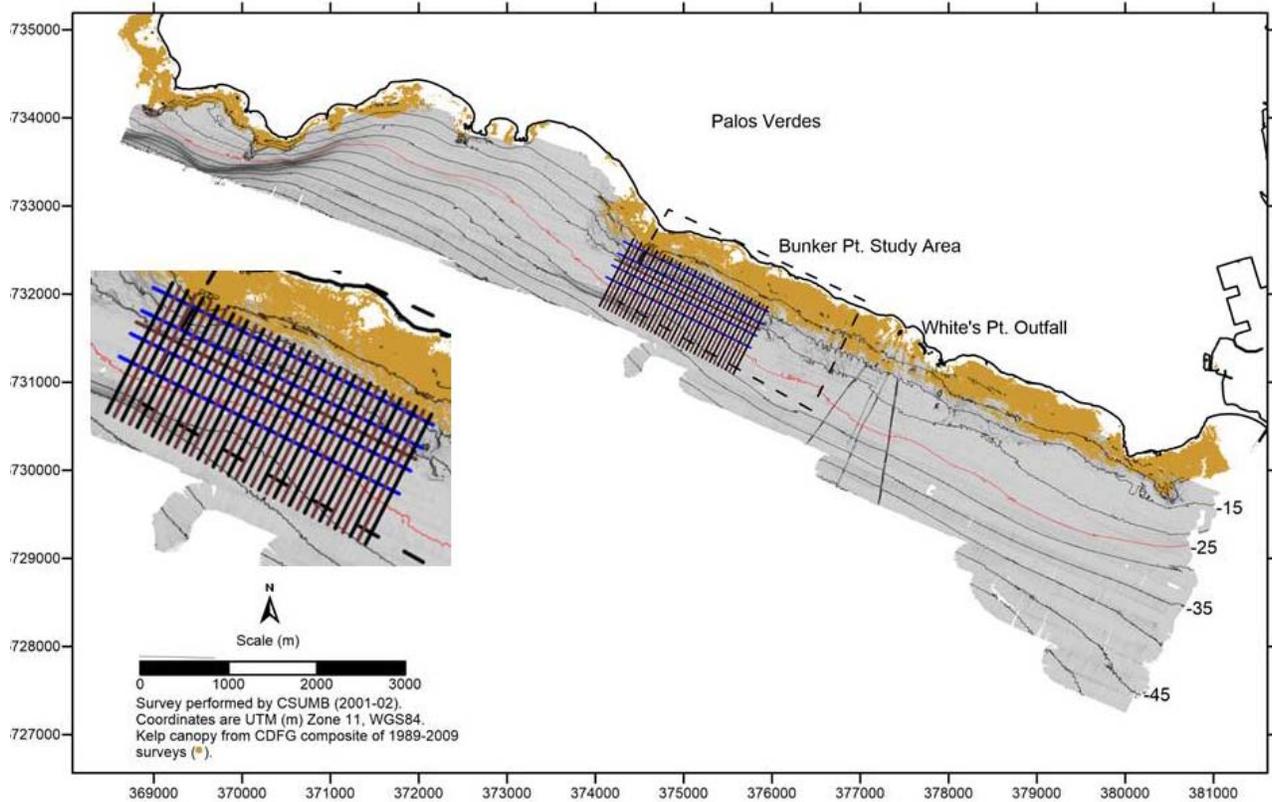


Figure 1-1. Survey area and survey lines for the survey of Palos Verdes performed on 6-7 January 2014. Blue upcoast/downcoast lines are side-scan survey lines. Black inshore/offshore lines are sub-bottom profile and bathymetric lines. Brown inshore/offshore lines are bathymetric lines only.

1.2 BACKGROUND OF PALOS VERDES REEF

The purpose of the Palos Verdes Artificial Reef is to displace contaminated fish species that occupy sandy bottom habitats and replace them with reef and water-column-feeding fish species that have lower contamination levels (Natural Resource Trustees, 2005).

Artificial reef placement should occur in areas with a sandy bottom in water depths between 15-30m. Water depths of greater than 30m were not chosen for two reasons: (1) shallower waters are easier for SCUBA monitoring activities; and (2) areas shallower than 30m off the Palos Verdes Peninsula have substantially lower levels of toxins in the sediments than areas further offshore.

2.0 OFFSHORE GEOPHYSICAL SURVEY

2.1 GEOPHYSICAL SURVEY DESIGN

Survey design included survey lines that were 150m apart for the side-scan sonar imagery, 100m apart for the sub-bottom profiles, and 50m apart for the bathymetric survey. Survey lines focused on areas just offshore of the kelp beds and approximately 500-1000m offshore. Satellite imagery and kelp canopy surveys conducted by the California Department of Fish and Wildlife (CDFW) were used to determine the extent of existing kelp beds in the area (Figures 2-1 and 2-2). Side-scan survey lines were placed in a shore-parallel (upcoast/downcoast) orientation and sub-bottom profiles and bathymetric survey lines were placed in an onshore/offshore orientation (Figure 1-1). Initial work included review of available data and reports to assist in the final design of the offshore seismic reflection survey and to aid in interpretation of the seismic profiles. The mapping projection used for the project is the California State Plane Zone 6 (in U.S. survey feet) in the 1983 North American Datum (NAD83).

2.2 GEOPHYSICAL SURVEY EQUIPMENT

The survey equipment used in this project included the following:

- Echosounder (Syquest Bathy 500 MF)
- Side-scan sonar (Klein 590 dual-channel)
- Sub-bottom profiler (Ross Laboratories transceiver with four 4T61 [3.5 kHz] Massa Transducers)
- Differential Global Positioning System (DGPS) navigation system

Equipment specifications are shown in Table 1.

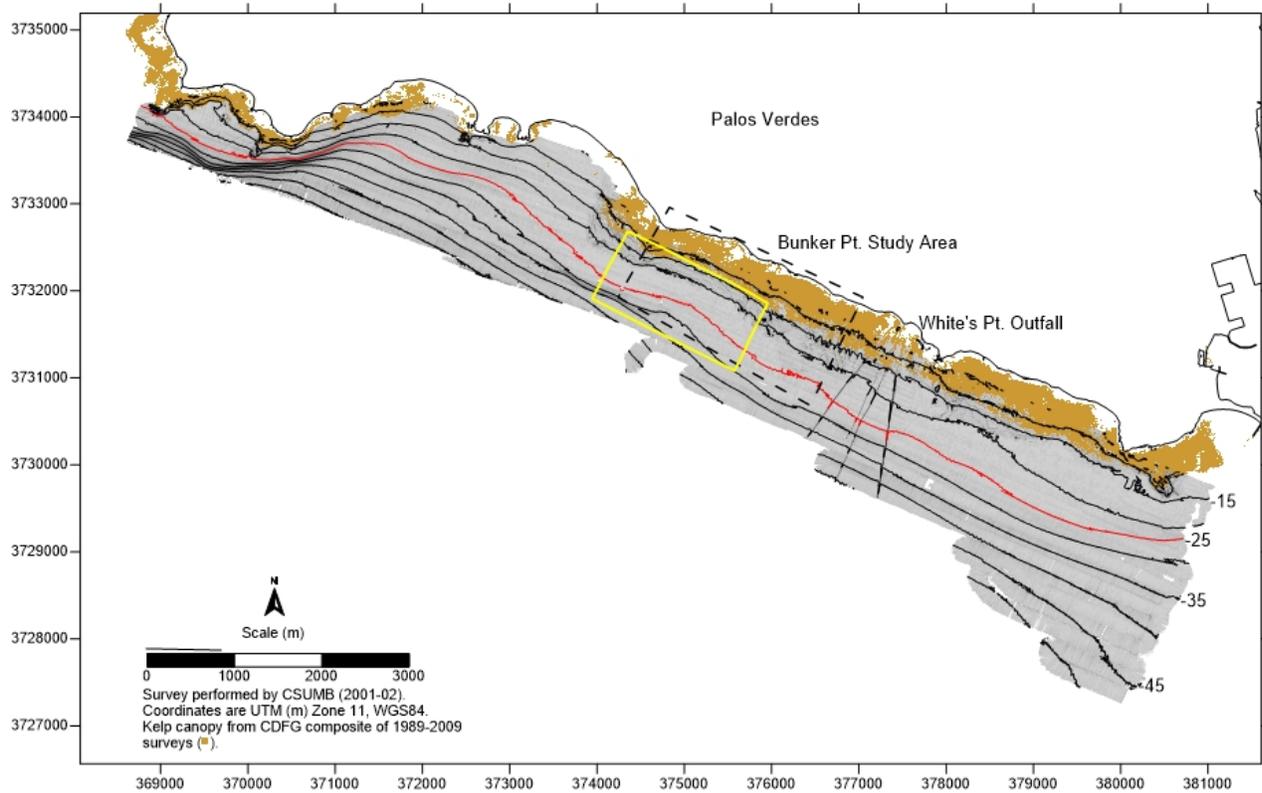


Figure 2-1. Location of kelp canopy at Palos Verdes near the survey area (yellow box). The kelp data is a composite of kelp data from 1989-2009 collected by the CDFW.



Figure 2-2. Satellite image of Palos Verdes survey area showing the location of kelp canopy.

Table 1. Equipment specifications for side-scan, echosounder, and sub-bottom profiler used on 6-7 January 2014 for the Palos Verdes survey.

Equipment	kHz	Source Level (dB re 1 μPa at 1 meter (m) [root mean square (rms)])	Pulse Rate and Length
Klein 590 Side-Scan Sonar	400	220	25-400 μ sec
Syquest Bathy 500 MF Echosounder	200	230	0.1 ms
Sub-bottom Profiler	3.5	214	330 μ sec

2.2.1 Echosounder

An echosounder measures the depth of the seafloor (bathymetry). When continuous measurements of seafloor depth are made along vessel tracks, and are then collated with accurate navigation positions, these depth measurements can be turned into bathymetric maps by connecting points of equal depth.

2.2.2 Sub-bottom Profiler

Sub-bottom profiler equipment (Photo 2-1) allows for the detection and characterization of objects buried below the seafloor. The 3.5 kHz sub-bottom profiler was effectively used for this project and provided excellent records.

2.2.3 Side-Scan Sonar

Side-scan sonar provides backscatter images of the seafloor. The reflection of sound from targets is related to the reflecting capacity of a given surface and the angles of the surfaces. Using this equipment, a determination of substrate changes along the vessel trajectory can be made.

2.2.4 Survey Vessel

The survey was conducted using a 27' Farrallon trailerable survey boat. The boat is powered by a Panther Marine 350 HP engine with dual counter-rotating props. The boat is equipped with DGPS, RADAR, echosounder, and related electronics with a lifting hoist for deployment of sonar fish and other marine instrumentation (Photo 2-2).

2.2.5 Navigation System

Navigation and positioning were accomplished with a Differential Global Positioning System (DGPS). The DGPS is an all-weather, radio-based, satellite navigation system that enables users to accurately determine position, velocity, and precise time. The DGPS system consists of a Leica Professional GPS Model MX600, Hydro-Pro Navigation Software, and a differential correction signal receiver. The differential signals are transmitted by the U.S. Coast Guard (USCG) beacons established for GPS correction. The system provides an accuracy of +/-1 meter (3 feet).

2.3 GEOPHYSICAL SURVEY

A total of 39 survey lines were acquired in a rectilinear grid of 200 hectares (495 acres). Four side-scan, 18 sub-bottom and bathymetric, and 17 bathymetric survey lines were acquired. Some profiles consisted of multiple segments (2-3) due to interruptions caused by equipment problems or marine mammal interference. Equipment was towed off the starboard quarter of the vessel from the towing davit fairlead at a depth of 1.5m – 7.6m (5ft – 25 ft) (Figure 2-1). Digital images were collected on a workstation using the Chesapeake data logging software. Daily field logs are in Appendix B.



Photo 2-1. Sub-bottom profiler tow fish being lowered into the water from the lifting hoist.



Photo 2-2. The helmsman steering display, seen in the photograph, shows pre-plotted survey lines.

A DGPS navigation system was used to record the shot points at precisely one-second intervals during acquisition. Differential system uses ties to the USCG-maintained permanent GPS base station in the area. Nominal GPS position accuracy is about 10 meters, and with differential technique, a sub-meter position accuracy (<3-ft) was achieved. The shot point navigation (geographic coordinates) during acquisition was based upon the World Geodetic System of 1984 (WGS84) and converted to the California State Plane Coordinate System, zone 6, North American Datum of 1983 (NAD83), in U.S. Survey Feet for mapping. Shot point positions were determined by adding corrections for the layback or acoustic source distance behind the GPS antenna on the boat. Digitally-recorded logs of shot points, navigation fixes, and adjacent landmarks were prepared and provide quality control to maintain the highest possible navigational accuracy.

The survey parameters (i.e., area coordinates, line, and cross-line spacings) were entered into the Chesapeake SonarWiz5 Navigation Software creating a “pre-plot.” With this pre-plot, it is possible to ensure that adequate survey line coverage has been obtained. The navigation system records the shot point number, x/y position, date, time, and geophysical information at each selected data point. Position and time data were automatically stored on a computer hard drive, and digital back-up storage was used. In addition, a real-time Helmsman Correct Course Steering Display helped keep the vessel on the pre-plotted survey lines (Figure 2-2). Simultaneously with the collection of positioning data, an event mark was sent to the recorders, which was annotated with shot point number, time, and date.

Data quality was established in the field during acquisition by monitoring data being recorded by the digital data acquisition systems and by effecting preliminary data processing aboard the boat. The software used for digital recording of the data allows display of shot records and some quantitative measures of signal and noise levels. Real-time records from the data acquisition system were also displayed to show data quality and allow preliminary geological interpretation.

2.3.1 Side-Scan Survey

A total of four tracklines were acquired for the side-scan survey. Tracklines were run in an upcoast/downcoast orientation (Figure 1-1) and were approximately 150m apart. Side-scan surveys began just offshore of the kelp beds and extended 2000m alongshore and 1,000m offshore. The dual-channel sonar scale selection was 100m per channel, thus covering a swath of 200m. The side-scan was towed off the starboard quarter on a cable length of 7.6m (25 ft). Data acquisition employed Chesapeake SonarWiz 5.

2.3.2 Bathymetry

A total of 35 tracklines were acquired during the bathymetric survey. Tracklines were run in an onshore/offshore orientation (Figure 1-1) and were 50m apart. Eighteen bathymetric survey lines were conducted on the existing sub-bottom survey lines. Seventeen bathymetric survey lines were run between each sub-bottom survey line. Bathymetric surveys began just seaward of the kelp beds and extended 1,000m offshore. The echosounder is located underneath the vessel, at about 1m or less below the surface. Bathymetric data were acquired with a Trimble Hydropro.

2.3.3 Sub-bottom Profiling

A total of 18 tracklines were acquired for the sub-bottom profiler survey. Sub-bottom tracklines were conducted in an onshore/offshore orientation (Figure 1-1) and were 100m apart. Sub-bottom surveys began just seaward of the kelp beds and extended 1,000m offshore. The sub-bottom profiler was towed off the starboard quarter on a cable length of 2m (6.5ft). Data acquisition was with Chesapeake SonarWiz 5.

2.4 DATA PROCESSING AND INTERPRETATION

2.4.1 Data Processing

Data processing for the side-scan and sub-bottom profiles was performed using the Chesapeake™ post-processing module of SonarWiz 5. Data processing for the bathymetric survey was with Hydro Pro. For the bathymetric data, data were tied to the local datum of Mean Lower Low Water (MLLW) from the LA Harbor tide gauge (9410660) by applying appropriate corrections for velocity of sound in seawater, transducer depth offset, and local tidal variations, depth of source, and receiver.

2.4.2 Data Interpretation

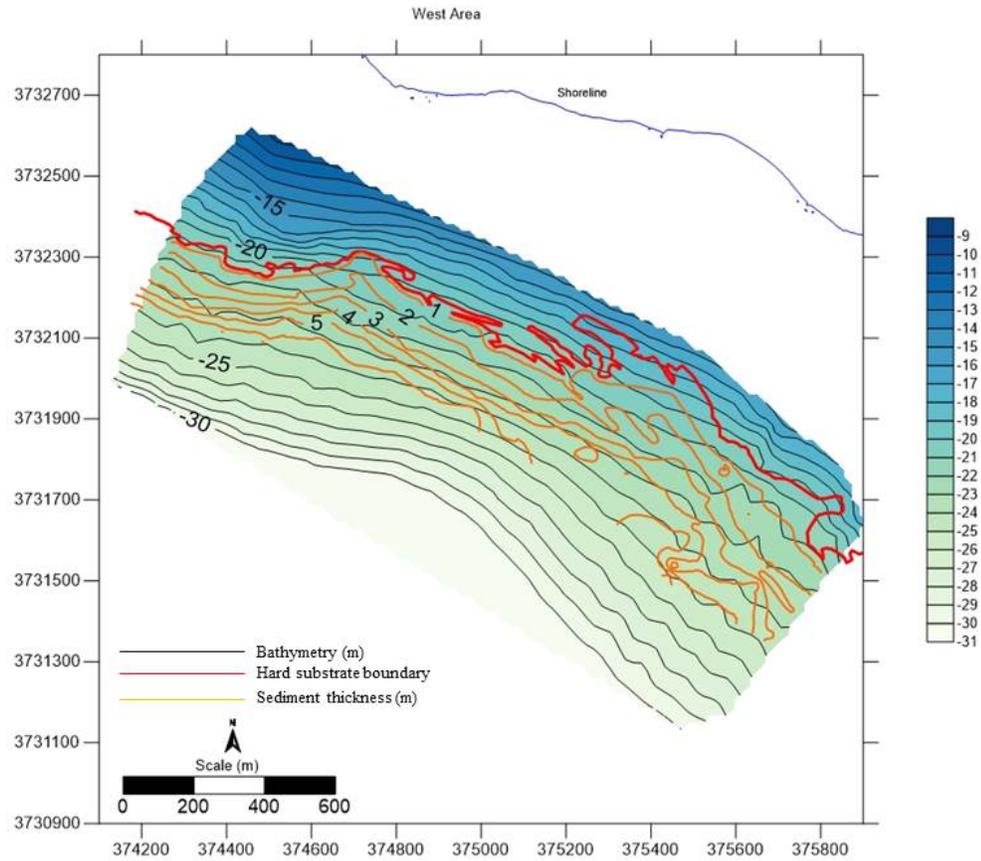
Side-scan data were analyzed to map seafloor substrate distribution, particularly the presence of rocky outcroppings. Sub-bottom profile data were processed to determine the unconsolidated sediment depth over bedrock in bottom areas surveyed by side-scan sonar. Echosounder data were overlain onto side-scan and sub-bottom profile data to map seafloor isobaths in the surveyed areas.

3.0 RESULTS

The results of the survey are shown in Figure 3-1. Figure 3-1 shows the hard substrate outcrops from the side-scan survey, sediment thickness from the sub-bottom profiler survey, and isobaths from the bathymetric survey.

Side-scan survey data confirmed that the survey area consisted of unconsolidated sediment bottom habitat. The hard substrate outcroppings were determined from the side-scan survey data (red line in Figure 3-1). This red line indicates the boundary of hard substrate to unconsolidated sediment bottom areas. These data indicate that the line of hard substrate is located at approximately the 20m isobath. The sub-bottom profile survey determined that the sediment thickness in bottom areas ranged from 1-5m, with sediment thickness increasing with increasing water depth.

The existence of unconsolidated sediment bottom habitat suggests that the area surveyed may be conducive to reef placement. However, a limited area exists where the sediment thickness is shallow enough to allow for ideal reef placement. This is located in the narrow band between the hard substrate outcrops and the area with 2m sediment thickness. Within this area, however, there is sufficient space for the placement of an approximately 40-acre artificial reef.



Coordinates are in UTM zone 11N (m) WGS84

Figure 3-1. Results of the Palos Verdes seismic survey performed on 6-7 January 2014. The red line indicates the hard substrate outcrop, which was determined from the side-scan sonar survey. The orange lines and 1-6 numbering indicate the sediment depth (m) over bedrock, determined from the sub-bottom profile survey. The black lines indicate the bathymetry (m) of the survey area, determined by the echosounder survey.

4.0 REFERENCES

Natural Resource Trustees, 2005. Montrose Settlements Restoration Plan, Executive Summary of the Draft Restoration Plan and Programmatic EIS/EIR. 20 pp.

APPENDIX A
MARINE MAMMAL OBSERVER REPORT

MARINE MAMMAL OBSERVER REPORT
Shallow Offshore Seismic Investigation
Palos Verdes, California

Vessel: R/V Survey

Marine Mammal Observer: Kelsey Hall

Dates of survey: January 6-7 2014

In transit to the sites, including in and out of the harbor, I observed the following seabirds and marine mammals: California sea lions, Common Bottlenose dolphins, Humpback whales, Gray whales, Forster's and Royal terns, Common murre, California gulls, Mew gulls, Herring gulls, Double-crested and Brandt's cormorants, Surf scoters, Brown pelicans, Pacific loons, Tree swallows, Western grebes, and Sooty shearwaters.

The following table shows the equipment that was used during the survey and the safety zone radius that pertains to that piece of equipment:

Equipment Type	Safety Zone (radius, m)
Single Beam Echosounder	95
Sub-bottom Profiler	223
Side-Scan Sonar	600

January 6, 2014

Arrived in San Pedro around 06:00. After loading gear, fueling, and setting up we were out at our first survey area by 09:00.

Weather: Clear. Temperature of 69 F. Winds S at 7 knots with gusts up to 11 knots. Swell 0.7 ft. Moderate to severe glare. Beaufort 1-2 throughout the day.

Today we surveyed with the side-scan sonar. The safety zone for the side-scan sonar is 600m for marine mammals.

Sighting 1

10 Common Bottlenose Dolphins (*Tursiops truncatus*)

Survey line: Side-Scan Sonar East 2

At 10:01 I observed 10 bottlenose dolphins feeding and playing in the surf approximately 300m north of the vessel near shore. Due to the sighting there was a delay in the soft start of the side-scan sonar. We were able to then begin the survey once the dolphins were outside of the 600m safety zone.

Survey line: S.S. E 2

Total animals: 10

Distance when first observed: 300m

Closest distance to the vessel: 300m

Mitigation action: Delayed soft start of side-scan sonar

Sighting 2

1 California Sea Lion (*Zalophus californianus*) & 6 Common Bottlenose Dolphins (*T. truncatus*)

Survey line: S.S. E 2

At 10:10 approximately 5m off the starboard stern 1 California sea lion was observed looking at the vessel before it dove out of sight. Also during the sea lion sighting there were also 6 common bottlenose dolphins 50m off the starboard side traveling away from the vessel near shore. These sightings resulted in a shutdown of the soft start. Once all animals were clear of the 600m safety zone, soft start resumed at 10:15.

Survey line: S.S. E 2

Total animals: 7

Distance when first observed: 5m & 50m

Closest distance to the vessel: 5m & 50m

Mitigation action: Shutdown soft start of side-scan sonar

Sighting 3

5 Common Bottlenose Dolphins (*T. truncates*)

Survey line: S.S. E 4

At 11:15 5 bottlenose were seen traveling away from the vessel at 600m, which is the edge of the safety zone. No mitigation action was taken or required because the bottlenose dolphins were at the edge of the safety zone when initially observed and also traveling away from the vessel.

Survey line: S.S. E 4

Total animals: 5

Distance when first observed: 600m

Closest distance to the vessel: 600m

Mitigation action: None taken

Sighting 4

6 Common Bottlenose Dolphins (*T. truncates*)

Survey line: S.S. E 6

6 bottlenose dolphins were observed off the port stern traveling north away from the vessel. These dolphins were observed at 11:50 at 650m and headed further away from the vessel so no mitigation was needed.

Survey line: S.S. E 6

Total animals: 6

Distance when first observed: 650m
Closest distance to the vessel: 650m
Mitigation action: None taken

Sighting 5

2 Gray Whales (*Eschrichtius robustus*)
Survey line: *Side-Scan Sonar West 5*

At 13:30 approx 3km off the port side I observed whale blows. These blows were high and heart shaped. After observing them for a min I was able to discern that the blows were 2 gray whales. No mitigation action was needed because the whales were well outside the 600m safety zone.

Survey line: S.S. W 5
Total animals: 2
Distance when first observed: 3km
Closest distance to the vessel: 3km
Mitigation action: None taken

Sighting 6

1 Unknown Mysticete Whale
Survey line: S.S. W 5

At 13:42 I observed 1 unknown mysticete whale blow approx 4km off the port bow. I only briefly observed the blow and was unable to positively identify it. It was most likely a gray whale. No mitigation was needed because it was outside the safety zone.

Survey line: S.S. W 5
Total animals: 1
Distance when first observed: 4km
Closest distance to the vessel: 4km
Mitigation action: None taken

Sighting 7

1 Humpback Whale (*Megaptera novaeangliae*)
Survey line: S.S. W 5

13:47 observed 1 humpback whale traveling south 2.5km from the vessel. I first observed the blow, which was high, broad, and bushy and was also how I was able to identify the whale. No mitigation needed.

Survey line: S.S. W 5
Total animals: 1
Distance when first observed: 2.5km
Closest distance to the vessel: 2.5km
Mitigation action: None taken

Sighting 8

1 Humpback Whale (*M. novaeangliae*)

Survey line: S.S. W 7

At 13:57 I observed a humpback whale being surface active 2km off the starboard bow. It blew a few times before diving. There was lots of bird activity around where the whale was observed, possibly the whale was feeding. This could also be a re-sight of Sighting 7 because it was observed around the same area as 7. No mitigation needed.

Survey line: S.S. W 7

Total animals: 1

Distance when first observed: 2km

Closest distance to the vessel: 2km

Mitigation action: None taken

End of survey was around 16:00 and our boat docked in the harbor at 16:30.

January 7, 2014

Arrived in San Pedro around 06:00. After loading gear, fueling, and setting up we were out at our first survey area by 09:00.

Weather: Clear. Temperature of 69 F. Winds S at 7 knots with gusts up to 11 knots. Swell 0.7 ft. Moderate to severe glare. Beaufort 1-2 throughout the day.

Today we surveyed with the sub-bottom profiler. The safety zone for the sub-bottom profiler is 223m for marine mammals. We also took bathymetric readings using a single beam echosounder. The safety zone for the single beam echosounder is 95m for marine mammals.

Sighting 9

1 California Sea Lion (*Z. californianus*)

Survey line: *Sub-bottom Profiler East 17*

While surveying line S.B. E 17 I observed a California sea lion 300m off the port-bow of the vessel resting with its flippers out of the water at 11:14. When first observed while we were on the line surveying the sea lion was out of the safety zone and no mitigation was needed. However, since the sea lion was staying in the same place as our vessel mitigation was going to be needed. Once the sea lion reached 223m from the vessel the sub-bottom profiler was turned off and it was decided to finish S.B. E 17 later in the day hoping the sea lion would not be there. So we then proceeded to another line away from the sea lion, line S.B. E 15. The closest the sea lion came to the vessel was 175m, but at that time the sub-bottom profiler was turned off.

Survey line: S.B. E 17

Total animals: 1

Distance when first observed: 300m

Closest distance to the vessel: 175m

Mitigation action: Shut off sub-bottom profiler and steered away from the sea lion and proceeded to the next line.

Sighting 10

1 Unknown Mysticete Whale

Survey line: *S.B. East 6*

At 12:09 I observed 2 unknown mysticete whale blows, it appeared to be only 1 whale. The blows were south of the vessel, closer to Catalina Island at a distance of 4km. I was unable to identify the blows due to glare. No mitigation needed because the whale is outside our safety zone of 223m.

Survey line: S.B. E 6

Total animals: 1

Distance when first observed: 4km

Closest distance to the vessel: 4km

Mitigation action: None taken

Sighting 11

5 California Sea Lions (*Z. californianus*)

Survey line: *S.B. East 3*

300m off the stern of the vessel I observed 5 California sea lions at the surface resting. Our vessel was currently traveling away from the sea lions and was already 300m meters away when first observed so no mitigation was needed.

Survey line: S.B. E 3

Total animals: 5

Distance when first observed: 300m

Closest distance to the vessel: 300m

Mitigation action: None taken

Sighting 12

1 California Sea Lion (*Z. californianus*)

Survey line: *Sub-bottom Profiler West 16*

11:27 1 California sea lion was briefly observed 300m north of the vessel, at our 1000 position. It looked around before diving and did not resurface. No mitigation was taken because it was outside the safety zone of 223m.

Survey line: S.B. W 16

Total animals: 1

Distance when first observed: 300m

Closest distance to the vessel: 300m

Mitigation action: None taken

Sighting 13

30 Common Bottlenose Dolphins (*T. truncates*)

Survey line: S.B. W 15

At 11:47 2km south of our vessel approx 30 bottlenose dolphins were traveling west. They were well outside our safety zone so no mitigation was required.

Survey line: S.B. W 15

Total animals: 30

Distance when first observed: 2km

Closest distance to the vessel: 2km

Mitigation action: None taken

Sighting 14

1 California Sea Lion (*Z. californianus*)

Survey line: S.B. W 14

At 11:57 a California sea lion was observed following the vessel at 15m. Mitigation was immediately taken and the sub-bottom profiler was turned off. The sea lion continued to follow us for a few min before it dove out of sight. The closest point of approach was 10m and the sub-bottom profiler was already turned off. The vessel then looped back around on the line to catch the section of the line we missed surveying. The sub-bottom profiler was turned on again at 12:01.

Survey line: S.B. W 14

Total animals: 1

Distance when first observed: 15m

Closest distance to the vessel: 10m

Mitigation action: Shutdown the sub-bottom profiler and looped back around on the line. The sub-bottom profiler was not turned on until the sea lion was outside the 223m safety zone.

Sighting 15

1 Humpback Whale (*M. novaeangliae*)

Survey line: S.B. W 11

At 12:34 I observed a humpback whale blow 3km south of the vessel. It was traveling east parallel to Catalina Island. I observed 4 blows before the humpback dove and did not reappear. No mitigation required.

Survey line: S.B. W 11

Total animals: 1

Distance when first observed: 3km

Closest distance to the vessel: 3km

Mitigation action: None taken

Sighting 16

1 Gray Whale (*E. robustus*)

Survey line: S.B. W 11

At 12:35, right after I observed the humpback whale, I saw a gray whale blow, a heart-shaped bushy blow, a few times and it too appeared to be traveling east. The gray whale was 1km to the south of the vessel as well. No mitigation required.

Survey line: S.B. W 11

Total animals: 1

Distance when first observed: 1km

Closest distance to the vessel: 1km

Mitigation action: None taken

Sighting 17

1 California Sea Lion (*Z. californianus*)

Survey line: S.B. W 8

A California sea lion was seen resting on the surface with flippers in the air at 13:17. The sea lion was approx 250m at the 1000 position to the west of the vessel. No mitigation was needed because the animal was outside the safety zone.

Survey line: S.B. W 8

Total animals: 1

Distance when first observed: 250m

Closest distance to the vessel: 250m

Mitigation action: None taken

Ended the sub-bottom profiler survey at 13:15

Sighting 18

5 Common Bottlenose Dolphins (*T. truncates*)

Survey line: Bathymetric East 29

At 09:00 5 bottlenose dolphins were traveling west approx 300m off our stern when we began line B. E 29. No mitigation was needed because the dolphins were outside the safety zone.

Survey line: B. E 29

Total animals: 5

Distance when first observed: 300m

Closest distance to the vessel: 300m

Mitigation action: None taken

Sighting 19a

3 Common Bottlenose Dolphins (*T. truncates*)

Survey line: B. E 28

At 09:14 3 bottlenose dolphins were surface active, possibly feeding, 200m off the vessels stern. They appeared to be staying in the same area and not traveling anywhere. No mitigation needed because outside the safety zone.

Survey line: B. E 28

Total animals: 3

Distance when first observed: 200m

Closest distance to the vessel: 200m

Mitigation action: None taken

Sighting 19b

3 Common Bottlenose Dolphins (*T. truncates*)

Survey line: B. E 26

RESIGHT. At 09:26 I re-sighted the 3 bottlenose dolphins in the same area that I had observed them in at 09:14. Still surface active, most likely feeding. No mitigation needed because they were still outside the safety zone.

Survey line: B. E 26

Total animals: 3

Distance when first observed: 150m

Closest distance to the vessel: 150m

Mitigation action: None taken

Sighting 20a

1 California Sea Lion (*Z. californianus*)

Survey line: B. E 7

At 11:55 a California sea lion was seen resting at the surface 250m off the port stern. No mitigation required because outside of the safety zone and also the vessel was traveling away from the sea lion at the time of the observation.

Survey line: B. E 7

Total animals: 1

Distance when first observed: 250m

Closest distance to the vessel: 250m

Mitigation action: None taken

Sighting 20b

1 California Sea Lion (*Z. californianus*)

Survey line: B. E 6

RESIGHT. At 12:02 we came upon the same sea lion as we were finished surveying line B. E 6. When first seen it was 100m off the starboard bow. The closest point of approach was at 12:07 when the sea lion was 70m from the vessel on the starboard side and then it dove out of sight and did not reappear. No mitigation taken because it was outside the 50m zone.

Survey line: B. E 6

Total animals: 1

Distance when first observed: 100m

Closest distance to the vessel: 70m

Mitigation action: None taken

Sighting 21

1 California Sea Lion (*Z. californianus*)

Survey line: Bathymetric West 11

At 15:03 a single California sea lion was observed briefly looking and the vessel before it dove and did not reappear. The sea lion was approx 80m off the starboard bow. No mitigation needed.

Survey line: B. W 6

Total animals: 1

Distance when first observed: 80m

Closest distance to the vessel: 80m

Mitigation action: None taken

Ended the bathymetric survey at 15:45 and the boat was docked at 16:15 and once the boat and all the gear was loaded up we left San Pedro at 17:00.

Overall there were a total of 21 sightings during the survey and only 4 mitigation acts were taken to stay in compliance with the marine wildlife contingency plan. Two of the sightings had re-sights. The side-scan sonar was delayed soft start once for bottlenose dolphins and shutdown once for a California sea lion. The sub-bottom profiler was shutdown 2 separate times; each instance was for a California sea lion.

APPENDIX B
FIELD LOG/OBSERVER REPORTS

Table B-1. Side-scan survey field log/observers report for 6 January 2014.

FIELD LOG/OBSERVERS REPORT				
JOB/CREW			VESSEL/WEATHER	
Date	6 Jan 2014		Vessel Name	Farallon
Client	NOAA		Vessel Length	27'
Area	Palos Verdes West		Vessel Speed	2 knots
Operator	Tim		Skies	Patchy clouds
Crew	Nicole, Ben, Mark		Wind	S. 7-11 knots
MWM	Kelsey		Seas	0.7 ft.
INSTRUMENTATION				
Type	Klein 590 side-scan		Scale	100m
Source power	220 dB		Recording instrument format	Digital/Hard disk/USB disk
kHz	400		Navigation system	DGPS
CABLE DEPTH/LAYOUT				
Cable depth	7.6m		Source depth	7.6m
FIELD NOTES				
Line #	SOL Time	EOL Time	Notes	
5	1327	1350	EM 233 SOL	
5a	1352	1355	navigation gliches at end, getting last 100m of 5	
7	1359	1421	EM 325 SOL, EM 392 EOL	
9	1425	1425	EM 406 SOL / EM 465 EOL, EM 432 boat wake starboard	
3	1429	1510	EM 0	

Table B-2. Sub-bottom survey field log/observers report for 7 January 2014.

FIELD LOG/OBSERVERS REPORT			
JOB/CREW		VESSEL/WEATHER	
Date	7 Jan 2014	Vessel Name	Farallon
Client	NOAA	Vessel Length	27'
Area	Palos Verdes West	Vessel Speed	2 knots
Operator	Tim	Skies	Patchy clouds
Crew	Nicole, Ben, Mark	Wind	S. 7-11 knots
MWM	Kelsey	Seas	0.7 ft.
INSTRUMENTATION			
Type	Ross 3.5 kHz sub-bottom profiler	Scale	100m
Source power	214 dB	Recording instrument format	Digital/Hard disk/USB disk
kHz	3.5	Navigation system	DGPS
CABLE DEPTH/LAYOUT			
Cable depth	2m	Source depth	2m
FIELD NOTES			
Line #	SOL Time	EOL Time	Notes
W sub 18	1049	1058	2x2 configuration; ping 300 ms
W sub 17	1058	1108	2x2 configuration; ping 300 ms
W sub 16			2x2 configuration; ping 300 ms
w sub 15		1150	changed to 4x4 configuration
W sub 13			
W sub 12		1230	
W sub 11	1231	1242	Ross gain +1; changed to 133 ms
W sub 10	1255	1301	
W sub 9	1305	1325	
W sub 8	1315	1336	
W sub 7	1338	1348	
W sub 6	1350	1358	
W sub 5	1359	1406	
W sub 4	1408	1415	
W sub 3	1416	1425	
W sub 2	1427	1435	
W sub 1	1437	1447	
W sub 8	1449	1458	sub-bottom x tie
W sub 18a	1459	1505	redone line
W sub 17a	1506	1510	

Table B-3. Echosounder survey field log/observers report for 7 January 2014.

FIELD LOG/OBSERVERS REPORT			
JOB/CREW		VESSEL/WEATHER	
Date	7 Jan 2014	Vessel Name	Farallon
Client	NOAA	Vessel Length	27'
Area	Palos Verdes West	Vessel Speed	2 knots
Operator	Tim	Skies	Patchy clouds
Crew	Nicole, Ben, Mark	Wind	S. 7-11 knots
MWM	Kelsey	Seas	0.7 ft.
INSTRUMENTATION			
Type	Bathy 500 MF Fathometer	Scale	100m
Source power	230 dB	Recording instrument format	Digital/Hard disk/USB disk
kHz	200	Navigation system	DGPS
CABLE DEPTH/LAYOUT			
Cable depth	1m	Source depth	1m
FIELD NOTES			
Line #	SOL Time	EOL Time	Notes
WB-1	1337	1350	at 6 with Hydro
WB-2	1355	1400	at 14
EB-3	1400	1407	at 16
WB-4	1407	1413	at 20
WB-5	1414	1419	at 23
WB-6	1420	1426	at 25
WB-7	1427	1432	at 28
WB-8	1433	1436	at 30
WB-9	1437	1443	at 33
WB-10	1444	1446	at 36
WB-11	1447	1455	at 39
WB-1	1457	1502	at 41
WB-13	1502	1503	at 44
WB-14	1509	1513	at 45
WB-15	1514	1523	at 49
WB-16	1524	1529	at 52
WB-17	1530	1535	at 54
	1536	1540	at 57