

Cruise Report
U.S. Geological Survey Research Cruise 2014-673-FA
Northern Monterey Bay, California
November 5-6, 2014

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USGS

Summary

On November 5 and 6, 2014, the Pacific Coastal and Marine Science Center of the U.S. Geological Survey (USGS) conducted a high resolution swath survey collecting bathymetry and acoustic-backscatter data in northern Monterey Bay offshore Santa Cruz. The work was conducted aboard the 36-foot USGS Research Vessel *Parke Snavely* out of the Santa Cruz harbor. The survey was the first in a series of surveys that will take place over the 2014-2015 winter season to map changes in Ripple Scour Depressions (RSDs) found in Northern Monterey Bay. Davis et al. (2013) showed that there are more than 6,000 RSDs along California and that they cover just under 4% of California's State waters, and Hallenbeck et al. (2012) demonstrated that RSDs are important habitats for many important benthic species along California. Despite their widespread extent in California's State waters and their ecological significance, little is understood about their formation and persistence, and thus how they may be impacted by natural phenomena (storms) and potential future impacts (sea floor cables, trawling, climate change, etc.). This study will begin to map how these seafloor features change over time. This research effort and data acquisition has already received authorization through the Monterey Bay National Marine Sanctuary under permit **MBNMS-2014-029**.

It was determined that the operating frequency of the sonar system (234.5 kHz) is above the cutoff hearing threshold for marine mammals, therefore the CSLC determined that the observance of a safety zone is not a requirement for this survey (personal communications, K. Keen, CSLC), and that only one marine wildlife monitor (MWO) was required.

The USGS research cruise 2014-673-FA took place on November 5 and 6, 2014. All operations, including transits and surveying took place during daylight hours (0830 – 1800). Mapping was completed using a hull-mounted 234-kHz SEA SWATHPlus phase-differencing side-scan sonar at survey speeds of 4-6 knots. While at sea, 11 sightings of wildlife were made including sea lions, sea otters, dolphins and one whale. Dolphins were observed during a transit to the survey area when the sonar system was turned off and the whale was observed at a great distance (~10 miles). During all wildlife sightings the crew did not observe any abnormal behavior and there was no risk of collision. Figure 1 shows the location of the 11 sightings and other operational notes in relation to the survey track lines. Table 1 summarizes the date, time, location, and wildlife observation. Fishing gear (buoys) were observed during both days of surveying but all gear was outside of the survey area. Track line start and end of line time and position are given in Table 2.

References

Hallenbeck, T.R., Kvitek, R., Lindholm, J., 2012. Rippled scour depressions add ecologically significant heterogeneity to soft sediment habitats on the continental shelf. *Marine Ecology Progress Series*, v. 468, p. 119–133.

Davis, A., Muller, C., Kvitek, R., Storlazzi, C.D., and Phillips, E., 2013. Distribution and abundance of rippled scour depressions along the California coast. *Continental Shelf Research*, v. 69, p. 88-100.

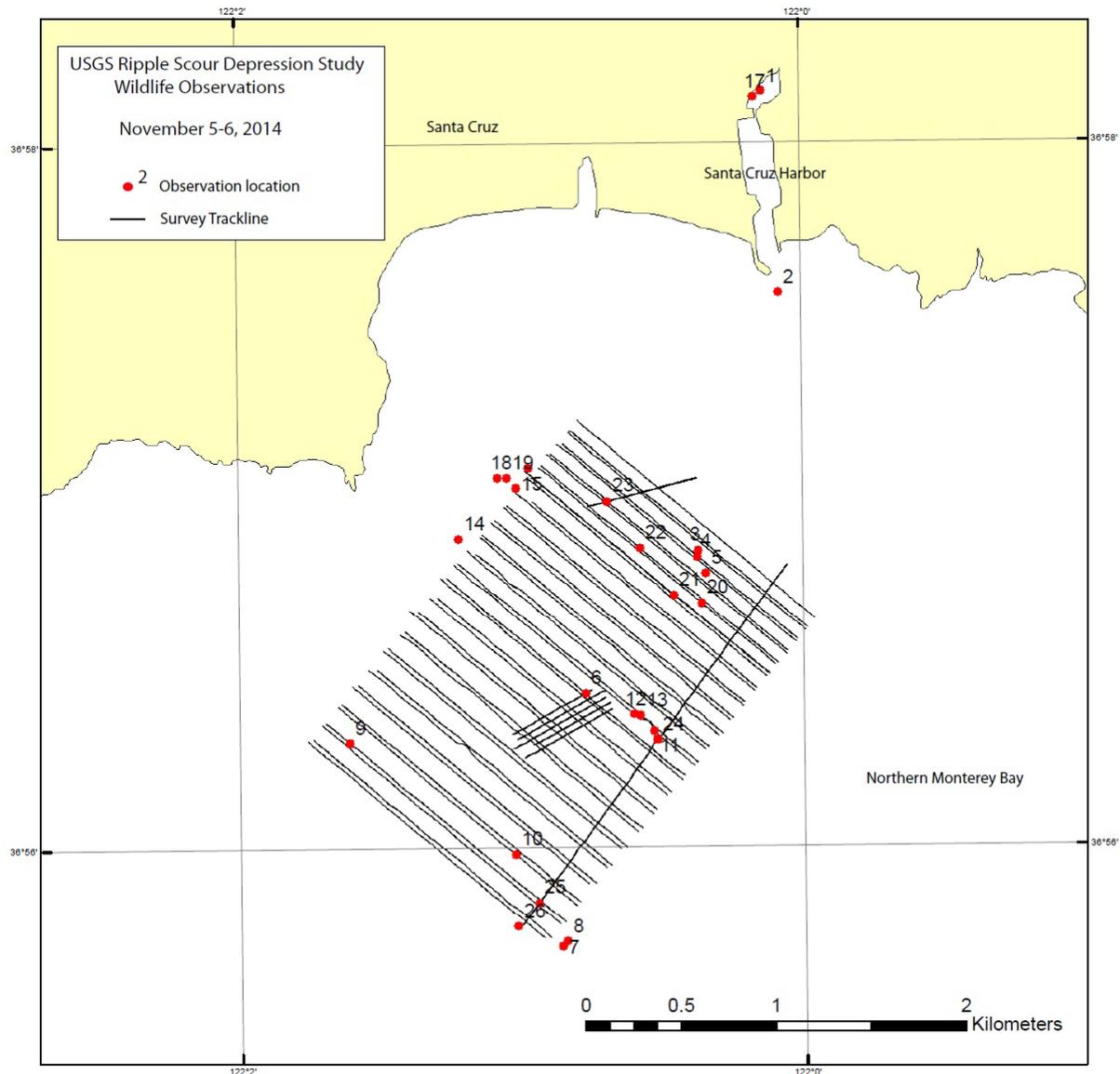


Figure 1. Marine Wildlife Sightings Map

**Table 1. USGS Research Cruise 2014-673-FA Wildlife Observations
Nov. 5-6, 2014, Northern Monterey Bay**

Obs #	Date	Time (UTC)	Latitude	Longitude	Observation
1	11/5/2014	16:26:05	36° 57.57197' N	122° 00.08124' W	about 12 dolphins, swimming east across bow 50m distance, Snavely transit. 8.0 knots.
2	11/5/2014	16:34:54	36° 56.84103' N	122° 00.37200' W	in survey area
3	11/5/2014	16:36:41	36° 56.82342' N	122° 00.37455' W	turn sonar on, ramping up power
4	11/5/2014	17:21:07	36° 56.43621' N	122° 00.77558' W	no fishing gear in northern side of survey block
6	11/5/2014	17:56:30	36° 55.71643' N	122° 00.86405' W	fishing gear 50m distance, outside survey area
7	11/5/2014	18:16:11	36° 55.73202' N	122° 00.84733' W	fishing gear 100m off starboard side, outside survey area
8	11/5/2014	18:28:24	36° 56.29953' N	122° 01.61280' W	sea lion 10m distance, 1 o'clock, heading east
9	11/5/2014	18:39:52	36° 55.98078' N	122° 01.02763' W	Sea otter 30m distance to the south west, Snavely maneuvering away
10	11/5/2014	21:35:13	36° 56.32741' N	122° 00.53258' W	6 sea lions on 1-mile buoy,
11	11/5/2014	21:36:10	36° 56.37611' N	122° 00.60460' W	maneuvered around the sea lions and the buoy
12	11/5/2014	21:51:40	36° 56.37286' N	122° 00.58043' W	6 sea lions and one sea otter on the 1-mile buoy, 30m distance
13	11/5/2014	22:05:04	36° 56.87787' N	122° 01.22164' W	buoy, does not look like fishing buoy
14	11/5/2014	23:33:33	36° 57.02302' N	122° 01.01706' W	sea lion 100m distance, 11 o'clock, swimming west
15	11/6/2014	16:18:22	36° 58.12715' N	122° 00.16522' W	leave dock
17	11/6/2014	17:04:44	36° 56.69168' N	122° 00.36138' W	sea otter 3 o'clock off bow, 30m distance, laying on surface
20	11/6/2014	17:32:21	36° 56.71471' N	122° 00.46002' W	sea otter, off port side, 40m distance, laying on surface
21	11/6/2014	18:17:58	36° 56.84971' N	122° 00.57943' W	Whales 10 miles to the south, can only see blow spout on horizon
22	11/6/2014	18:36:17	36° 56.98322' N	122° 00.69287' W	Sea lion, 50m distance, diving to the southeast
23	11/6/2014	19:43:34	36° 56.30389' N	122° 00.52210' W	6 sea lions, 100m distance, on 1-mile buoy
24	11/6/2014	19:49:27	36° 55.84225' N	122° 00.94772' W	no fishing gear observed on tie line

Table 2. Survey Track Lines

Line No.	Start of Line		End of Line	
	LAT	LON	LAT	LON
11/5/2014				
patch_1	36.950752	-122.00642	36.94987	-122.01078
patch_1	36.950815	-122.00623	36.95057	-122.00733
patch_1	36.950745	-122.006467	36.94948	-122.01277
patch_6	36.940786	-122.012543	36.93867	-122.01729
patch_7	36.938435	-122.017004	36.94072	-122.0118
patch_8	36.940432	-122.011716	36.93799	-122.01721
patch_9	36.938165	-122.016032	36.94019	-122.01142
patch_10	36.939874	-122.01135	36.93757	-122.01657
1	36.929023	-122.015432	36.93841	-122.02931
12	36.938496	-122.029015	36.92903	-122.01507
13	36.929683	-122.014514	36.93917	-122.02846
14	36.939314	-122.028298	36.92977	-122.0142
16	36.930557	-122.013557	36.94003	-122.02752
17	36.940184	-122.027366	36.93074	-122.01333
19	36.931597	-122.012818	36.94102	-122.0267
20	36.941091	-122.026379	36.93161	-122.01239
21	36.932334	-122.011726	36.94177	-122.02572
20	36.941811	-122.02525	36.93246	-122.01147
21	36.933224	-122.010841	36.94267	-122.02486
22	36.942829	-122.02458	36.93332	-122.01056
23	36.934031	-122.009892	36.94346	-122.02389
24	36.943618	-122.023588	36.93423	-122.00964
25	36.934863	-122.008952	36.94461	-122.0233
26	36.944553	-122.022787	36.93508	-122.00878
27	36.935742	-122.008152	36.94519	-122.02207
28	36.945223	-122.021653	36.9359	-122.00793
29	36.93646	-122.007226	36.94614	-122.02145
30	36.946136	-122.021123	36.93668	-122.00708
31	36.937129	-122.006498	36.94675	-122.02064
32	36.94682	-122.020424	36.9373	-122.00634
33	36.937907	-122.005843	36.94741	-122.01983
34	36.94729	-122.01938	36.93805	-122.00571
35	36.938525	-122.005033	36.94806	-122.01907
36	36.948183	-122.018971	36.93864	-122.00481
37	36.93929	-122.004406	36.94875	-122.01843
38	36.948851	-122.018196	36.93939	-122.00422

39	36.939947	-122.003602	36.94948	-122.01767
40	36.94956	-122.017494	36.94011	-122.00351
41	36.940645	-122.002941	36.94437	-122.00836
41a	36.944024	-122.007889	36.95015	-122.01699
42	36.94974	-122.016006	36.94078	-122.00279
43	36.941335	-122.002213	36.95083	-122.01629

11/6/2014

44	36.950876	-122.016055	36.94147	-122.00206
45	36.941904	-122.001671	36.95132	-122.01562
44B	36.951192	-122.016437	36.94148	-122.00203
47	36.942393	-122.001005	36.95196	-122.0151
46	36.951471	-122.0155	36.94199	-122.00154
49	36.942981	-122.000443	36.95243	-122.01449
48	36.952013	-122.014945	36.94254	-122.00098
51	36.943556	-121.999904	36.95301	-122.01385
50	36.952459	-122.014173	36.94313	-122.0004
53	36.944076	-121.999331	36.95358	-122.0133
52	36.953104	-122.013784	36.94365	-121.99979
56	36.946707	-122.00096	36.92964	-122.01676

Appendix A: Rippled Scour Depression Study Weather Observation Forms

Appendix B: Rippled Scour Depression Study Marine Wildlife Observation Forms

Marine Wildlife Observations Form

Date: 11/5/14

Monitor: Dartnell

Time: <u>16:26</u>	Latitude: <u>36° 57.571'</u>	Longitude: <u>122° 00.084'</u>
Weather: <u>clear</u>	Cloud Cover: <u>0-10</u>	Glare: <u>low</u>
Visibility: <u>10-20</u>	Wind Speed: <u>5 kts</u>	Sea State: <u>1</u>
Swell Height: <u><1</u>	Survey Vessel Activity: <u>transit</u>	

Marine Wildlife Observations and Interactions:

about 12 dolphins swimming east across bow, 50m distance

Time: <u>18:28</u>	Latitude: <u>36° 56.299</u>	Longitude: <u>122 01.613</u>
Weather: <u>clear</u>	Cloud Cover: <u>0-10</u>	Glare: <u>medium</u>
Visibility: <u>10-20</u>	Wind Speed: <u>5 kts</u>	Sea State: <u>1</u>
Swell Height: <u><1</u>	Survey Vessel Activity: <u>survey</u>	

Marine Wildlife Observations and Interactions:

sea lion 10m distance 10'clock off bow. Heading east

Marine Wildlife Observations Form

Date: 11/5/14

Monitor: Dartnell

Time: <u>18:39</u>	Latitude: <u>36° 55.980'</u>	Longitude: <u>122° 01.027</u>
Weather: <u>clear</u>	Cloud Cover: <u>0-10</u>	Glare: <u>medium</u>
Visibility: <u>10-20</u>	Wind Speed: <u>5 kts</u>	Sea State: <u>2</u>
Swell Height: <u><1</u>	Survey Vessel Activity: <u>survey</u>	

Marine Wildlife Observations and Interactions:

sea otter 30m southwest. Snavely maneuvering away

Time: <u>21:35</u>	Latitude: <u>36° 56.327</u>	Longitude: <u>122° 00.532</u>
Weather: <u>clear</u>	Cloud Cover: <u>0-10</u>	Glare: <u>medium</u>
Visibility: <u>10-20</u>	Wind Speed: <u>8 kts</u>	Sea State: <u>2</u>
Swell Height: <u><1</u>	Survey Vessel Activity: <u>survey</u>	

Marine Wildlife Observations and Interactions:

6 sea lions on mile buoy. About 20m distance. Snavely maneuvering away

Marine Wildlife Observations Form

Date: 11/5/14

Monitor: Dartnell

Time: <u>21:51</u>	Latitude: <u>36° 56.373</u>	Longitude: <u>122° 00.580</u>
Weather: <u>clear</u>	Cloud Cover: <u>0-10</u>	Glare: <u>medium</u>
Visibility: <u>10-20</u>	Wind Speed: <u>8 kts</u>	Sea State: <u>2</u>
Swell Height: <u><1</u>	Survey Vessel Activity: <u>Survey</u>	

Marine Wildlife Observations and Interactions:

6 sea lions and 1 otter on 1 mile buoy.
 Same buoy as last observation.
 30 m distance

Time: <u>23:34</u>	Latitude: <u>36° 56.937</u>	Longitude: <u>122° 00.876</u>
Weather: <u>clear</u>	Cloud Cover: <u>0-10</u>	Glare: <u>medium</u>
Visibility: <u>10-20</u>	Wind Speed: <u>4 kts</u>	Sea State: <u>1</u>
Swell Height: <u><1</u>	Survey Vessel Activity: <u>Survey</u>	

Marine Wildlife Observations and Interactions:

1 sea lion, 100m distance, 11 o'clock off bow. Swimming west.

Marine Wildlife Observations Form

Date: 11/6/14

Monitor: Dartnell

Time: <u>17:05</u>	Latitude: <u>36° 56.691'</u>	Longitude: <u>122° 00.361'</u>
Weather: <u>clear</u>	Cloud Cover: <u>10-50</u>	Glare: <u>low</u>
Visibility: <u>>10</u>	Wind Speed: <u>5 KTS</u>	Sea State: <u>1</u>
Swell Height: <u><1</u>	Survey Vessel Activity: <u>survey</u>	

Marine Wildlife Observations and Interactions:

sea otter. 11' o'clock off bow, 30 m distance
Laying on surface

Time: 17:05 <u>17:32</u>	Latitude: <u>36° 56.715'</u>	Longitude: <u>122° 00.460'</u>
Weather: <u>clear</u>	Cloud Cover: <u>10-50</u>	Glare: <u>low</u>
Visibility: <u>>10 miles</u>	Wind Speed: <u>7 KTS</u>	Sea State: <u>1</u>
Swell Height: <u><1 m</u>	Survey Vessel Activity: <u>survey</u>	

Marine Wildlife Observations and Interactions:

sea otter, 40m distance, off port side
(east), laying on surface

Marine Wildlife Observations Form

Date: 11/6/14

Monitor: Dartnell

Time: <u>18:17</u>	Latitude: <u>36° 56.849</u>	Longitude: <u>122° 00.579</u>
Weather: <u>clear</u>	Cloud Cover: <u>10-50</u>	Glare: <u>low</u>
Visibility: <u>>10</u>	Wind Speed: <u>7 kts</u>	Sea State: <u>1</u>
Swell Height: <u><1m</u>	Survey Vessel Activity: <u>survey</u>	

Marine Wildlife Observations and Interactions:

whale blow, 5-10 miles, southeast
towards Moss Landing

Time: <u>18:36</u>	Latitude: <u>36° 56.983</u>	Longitude: <u>122° 00.693</u>
Weather: <u>clear</u>	Cloud Cover: <u>10-50</u>	Glare: <u>low</u>
Visibility: <u>>10</u>	Wind Speed: <u>6 kts</u>	Sea State: <u>1</u>
Swell Height: <u><1</u>	Survey Vessel Activity: <u>survey</u>	

Marine Wildlife Observations and Interactions:

sea lion, 50 m distance, southeast,
dove

Marine Wildlife Observations Form

Date: 11/6/14

Monitor: Dartrell

Time: <u>19:43</u>	Latitude: <u>36° 56.304'</u>	Longitude: <u>122° 00.522'</u>
Weather: <u>overcast</u>	Cloud Cover: <u>50-90</u>	Glare: <u>low</u>
Visibility: <u>5-10 miles</u>	Wind Speed: <u>8 kts</u>	Sea State: <u>2</u>
Swell Height: <u>2'</u>	Survey Vessel Activity: <u>Survey</u>	

Marine Wildlife Observations and Interactions:

6 sea lions on 1-mile buoy. 100 m distance

Time:	Latitude:	Longitude:
Weather:	Cloud Cover:	Glare:
Visibility:	Wind Speed:	Sea State:
Swell Height:	Survey Vessel Activity:	

Marine Wildlife Observations and Interactions:

Appendix A: Rippled Scour Depression Study Exhibit H

EXHIBIT H

Mitigation Monitoring Program

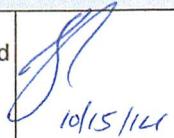
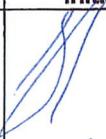
Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
Air Quality and Greenhouse Gas (GHG) Emissions (MND Section 3.3.3)						
MM AIR-1: Engine Tuning, Engine Certification, and Fuels. The following measures will be required to be implemented by all Permittees under the Offshore Geophysical Permit Program (OGPP), as applicable depending on the county offshore which a survey is being conducted. Pursuant to section 93118.5 of CARB's Airborne Toxic Control Measures, the Tier 2 engine requirement applies only to diesel-fueled vessels.	All Counties: Maintain all construction equipment in proper tune according to manufacturers' specifications; fuel all off-road and portable diesel-powered equipment with California Air Resources Board (CARB)-certified motor vehicle diesel fuel limiting sulfur content to 15 parts per million or less (CARB Diesel).	Daily emissions of criteria pollutants during survey activities are minimized.	Determine engine certification of vessel engines. Review engine emissions data to assess compliance, determine if changes in tuning or fuel are required.	OGPP permit holder and contract vessel operator; California State Lands Commission (CSLC) review of Final Monitoring Report.	Prior to, during, and after survey activities. Submit Final Monitoring Report after completion of survey activities.	
	Los Angeles and Orange Counties: Use vessel engines meeting CARB's Tier 2-certified engines or cleaner; the survey shall be operated such that daily NO _x emissions do not exceed 100 pounds based on engine certification emission factors. This can be accomplished with Tier 2 engines if daily fuel use is 585 gallons or less, and with Tier 3 engines if daily fuel use is 935 gallons or less.	Verify that Tier 2 or cleaner engines are being used. Calculate daily NO _x emissions to verify compliance with limitations.				
	San Luis Obispo County: Use vessel engines meeting CARB's Tier 2-certified engines or cleaner, accomplished with Tier 2 engines if daily fuel use is 585 gallons or less; all diesel equipment shall not idle for more than 5 minutes; engine use needed to maintain position in the water is not considered idling; diesel idling within 300 meters (1,000 feet) of sensitive receptors is not permitted; use alternatively fueled construction equipment on site where feasible, such as compressed natural gas, liquefied natural gas, propane or biodiesel.	Verify that Tier 2 or cleaner engines are being used. Inform vessel operator(s) of idling limitation. Investigate availability of alternative fuels.				
	Santa Barbara County: Use vessel engines meeting CARB's Tier 2-certified engines or cleaner, accomplished with Tier 2 engines if daily fuel use is 790 gallons or less.	Verify that Tier 2 or cleaner engines are being used. Investigate availability of alternative fuels.				
	Ventura County: Use alternatively fueled construction equipment on site where feasible, such as compressed natural gas, liquefied natural gas, propane or biodiesel.	Investigate availability of alternative fuels.				

EXHIBIT H

Mitigation Monitoring Program

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
MM FISH-1: U.S. Coast Guard (USCG) and Harbormaster Notification.	All California waters; as a survey permit condition, the CSLC shall require Permittees to provide the USCG with survey details, including information on vessel types, survey locations, times, contact information, and other details of activities that may pose a hazard to mariners and fishers so that USCG can include the information in the Local Notice to Mariners, advising vessels to avoid potential hazards near survey areas. Furthermore, at least twenty-one (21) days in advance of in-water activities, Permittees shall post such notices in the harbormasters' offices of regional harbors.	No adverse effects to commercial fishing gear in place.	Notify the USCG and local harbormasters of planned survey activity. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Prior to survey.	 10/15/14
MM FISH-2: Minimize Interaction with Fishing Gear.	To minimize interaction with fishing gear that may be present within a survey area: (1) the geophysical vessel (or designated vessel) shall traverse the proposed survey corridor prior to commencing survey operations to note and record the presence, type, and location of deployed fishing gear (i.e., buoys); (2) no survey lines within 30 m (100 feet) of observed fishing gear shall be conducted. The survey crew shall not remove or relocate any fishing gear; removal or relocation shall only be accomplished by the owner of the gear upon notification by the survey operator of the potential conflict.	No adverse effects to commercial fishing gear in place.	Visually observe the survey area for commercial fishing gear. Notify the gear owner and request relocation of gear outside survey area. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Immediately prior to survey (prior to each survey day).	 10/15/14
MM FISH-1: USCG and Harbormaster Notification.	Outlined under Commercial and Recreational Fisheries (above)					

Acronyms/Abbreviations: CARB = California Air Resources Board; CDFW = California Department of Fish and Wildlife; CSLC = California State Lands Commission; dB = decibels; kHz = kilohertz; MPA = Marine Protected Area; MWCP = Marine Wildlife Contingency Plan; MWM = Marine Wildlife Monitor; m= meter(s); NOAA = National Oceanic and Atmospheric Administration; NO_x = Nitrogen Oxide; OGPP = Offshore Geophysical Permit Program; OSCP = Oil Spill Contingency Plan; USCG = U.S. Coast Guard

EXHIBIT H

Mitigation Monitoring Program

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
MM BIO-9: Limitations on Survey Operations in Select Marine Protected Areas (MPAs).	All MPAs; prior to commencing survey activities, geophysical operators shall coordinate with the CSLC, California Department of Fish and Wildlife (CDFW), and any other appropriate permitting agency regarding proposed operations within MPAs. The scope and purpose of each survey proposed within a MPA shall be defined by the permit holder, and the applicability of the survey to the allowable MPA activities shall be delineated by the permit holder. If deemed necessary by CDFW, geophysical operators will pursue a scientific collecting permit, or other appropriate authorization, to secure approval to work within a MPA, and shall provide a copy of such authorization to the CSLC as part of the required presurvey notification to CSLC. CSLC, CDFW, and/or other permitting agencies may impose further restrictions on survey activities as conditions of approval.	No adverse effects to MPA resources due to survey activities are observed.	Monitor reactions of wildlife to survey operations; report on shutdown conditions and survey restart. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder; survey permitted by CDFW.	Prior to survey.	
MM HAZ-1: Oil Spill Contingency Plan (OSCP) Required Information.	Permittees shall develop and submit to CSLC staff for review and approval an OSCP that addresses accidental releases of petroleum and/or non-petroleum products during survey operations. Permittees' OSCP's shall include the following information for each vessel to be involved with the survey: <ul style="list-style-type: none"> • Specific steps to be taken in the event of a spill, including notification names, phone numbers, and locations of: (1) nearby emergency medical facilities, and (2) wildlife rescue/response organizations (e.g., Oiled Wildlife Care Network); • Description of crew training and equipment testing procedures; and • Description, quantities, and location of spill response equipment onboard the vessel. 	Reduction in the potential for an accidental spill. Proper and timely response and notification of responsible parties in the event of a spill.	Documentation of proper spill training. Notification of responsible parties in the event of a spill.	OGPP permit holder and contract vessel operator.	Prior to survey.	
MM HAZ-2: Vessel fueling restrictions.	Vessel fueling shall only occur at an approved docking facility. No cross vessel fueling shall be allowed.	Reduction in the potential for an accidental spill.	Documentation of fueling activities.	Contract vessel operator.	Following survey.	
MM HAZ-3: OSCP equipment and supplies.	Onboard spill response equipment and supplies shall be sufficient to contain and recover the worst-case scenario spill of petroleum products as outlined in the OSCP.	Proper and timely response in the event of a spill.	Notification to CSLC of onboard spill response equipment/supplies inventory, verify	Contract vessel operator.	Prior to survey.	

EXHIBIT H

Mitigation Monitoring Program

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
			ability to respond to worst-case spill.			
MM HAZ-1: Oil Spill Contingency Plan (OSCP) Required Information.	Outlined under Hazards and Hazardous Materials (above)					<i>[Signature]</i> 10/15/14
MM HAZ-2: Vessel fueling restrictions.	Outlined under Hazards and Hazardous Materials (above)					<i>[Signature]</i> 10/15/14
MM HAZ-3: OSCP equipment and supplies.	Outlined under Hazards and Hazardous Materials (above)					<i>[Signature]</i> 10/15/14
MM BIO-9: Limitations on Survey Operations in Select MPAs.	Outlined under Biological Resources (above)					<i>[Signature]</i> 10/15/14
MM REC-1: U.S. Coast Guard (USCG), Harbormaster, and Dive Shop Operator Notification.	All California waters where recreational diving may occur; as a survey permit condition, the CSLC shall require Permittees to provide the USCG with survey details, including information on vessel types, survey locations, times, contact information, and other details of activities that may pose a hazard to divers so that USCG can include the information in the Local Notice to Mariners, advising vessels to avoid potential hazards near survey areas. Furthermore, at least twenty-one (21) days in advance of in-water activities, Permittees shall: (1) post such notices in the harbormasters' offices of regional harbors; and (2) notify operators of dive shops in coastal locations adjacent to the proposed offshore survey operations.	No adverse effects to recreational divers from survey operations.	Notify the USCG, local harbormasters, and local dive shops of planned survey activity. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Prior to survey.	<i>[Signature]</i> 10/15/14

EXHIBIT H

Mitigation Monitoring Program

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
<p>MM BIO-8: Reporting Requirements – Collision.</p>	<p>All State waters; if a collision with marine mammal or reptile occurs, the vessel operator shall document the conditions under which the accident occurred, including the following:</p> <ul style="list-style-type: none"> • Vessel location (latitude, longitude) when the collision occurred; • Date and time of collision; • Speed and heading of the vessel at the time of collision; • Observation conditions (e.g., wind speed and direction, swell height, visibility in miles or kilometers, and presence of rain or fog) at the time of collision; • Species of marine wildlife contacted (if known); • Whether an observer was monitoring marine wildlife at the time of collision; and, • Name of vessel, vessel owner/operator, and captain officer in charge of the vessel at time of collision. <p>After a collision, the vessel shall stop, if safe to do so; however, the vessel is not obligated to stand by and may proceed after confirming that it will not further damage the animal by doing so. The vessel will then immediately communicate by radio or telephone all details to the vessel's base of operations, and shall immediately report the incident. Consistent with Marine Mammal Protection Act requirements, the vessel's base of operations or, if an onboard telephone is available, the vessel captain him/herself, will then immediately call the National Oceanic and Atmospheric Administration (NOAA) Stranding Coordinator to report the collision and follow any subsequent instructions. From the report, the Stranding Coordinator will coordinate subsequent action, including enlisting the aid of marine mammal rescue organizations, if appropriate. From the vessel's base of operations, a telephone call will be placed to the Stranding Coordinator, NOAA National Marine Fisheries Service (NMFS), Southwest Region, Long Beach, to obtain instructions. Although NOAA has primary responsibility for marine mammals in both State and Federal waters, the California Department of Fish and Wildlife (CDFW) will also be advised that an incident has occurred in State waters affecting a protected species.</p>	<p>No adverse effects to marine mammals or sea turtles due to survey activities are observed.</p>	<p>Submit Final Monitoring Report after completion of survey activities.</p>	<p>OGPP permit holder.</p>	<p>Monitoring Report following completion of survey.</p>	

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Mitigation Monitoring Program

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
<p>MM BIO-6: Practical Limitations on Equipment Use and Adherence to Equipment Manufacturer's Routine Maintenance Schedule.</p>	<p>All State waters; geophysical operators shall follow, to the maximum extent possible, the guidelines of Zykov (2013) as they pertain to the use of subbottom profilers and side-scan sonar, including:</p> <ul style="list-style-type: none"> Using the highest frequency band possible for the subbottom profiler; Using the shortest possible pulse length; and Lowering the pulse rate (pings per second) as much as feasible. <p>Geophysical operators shall consider the potential applicability of these measures to other equipment types (e.g., boomer). Permit holders will conduct routine inspection and maintenance of acoustic-generating equipment to ensure that low energy geophysical equipment used during permitted survey activities remains in proper working order and within manufacturer's equipment specifications. Verification of the date and occurrence of such equipment inspection and maintenance shall be provided in the required presurvey notification to CSLC.</p>	<p>No adverse effects to marine mammals or sea turtles due to survey activities are observed.</p>	<p>Document initial and during survey equipment settings. Submit Final Monitoring Report after completion of survey activities.</p>	<p>OGPP permit holder.</p>	<p>Immediately prior to and during survey.</p>	
<p>MM BIO-7: Avoidance of Pinniped Haul-Out Sites.</p>	<p>The Marine Wildlife Contingency Plan (MWCP) developed and implemented for each survey shall include identification of haul-out sites within or immediately adjacent to the proposed survey area. For surveys within 300 meters (m) of a haul-out site, the MWCP shall further require that:</p> <ul style="list-style-type: none"> The survey vessel shall not approach within 91 m of a haul-out site, consistent with National Marine Fisheries Service (NMFS) guidelines; Survey activity close to haul-out sites shall be conducted in an expedited manner to minimize the potential for disturbance of pinnipeds on land; and Marine Wildlife Monitors shall monitor pinniped activity onshore as the vessel approaches, observing and reporting on the number of pinnipeds potentially disturbed (e.g., via head lifting, flushing into the water). The purpose of such reporting is to provide CSLC and California Department of Fish and Wildlife (CDFW) with information regarding potential disturbance associated with OGPP surveys. 	<p>No adverse effects to pinnipeds at haul outs are observed.</p>	<p>Document pinniped reactions to vessel presence and equipment use. Submit Final Monitoring Report after completion of survey activities.</p>	<p>OGPP permit holder.</p>	<p>Monitoring Report following completion of survey.</p>	

EXHIBIT H

Mitigation Monitoring Program

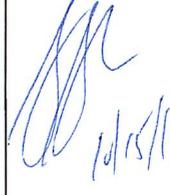
Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
	factors the CSLC will consider will include the timing, type, and location of the survey, the size of the vessel, and the availability of alternate vessels for conducting the proposed survey. CSLC authorizations under this subsection will be limited to individual surveys and under any such authorization; the Permittee shall update the MWCP to reflect how survey operations will occur under the authorization.					
MM BIO-4: Limits on Nighttime OGPP Surveys.	All State waters; nighttime survey operations are prohibited under the OGPP, except as provided below. The CSLC will consider the use of single beam echosounders and passive equipment types at night on a case-by-case basis, taking into consideration the equipment specifications, location, timing, and duration of survey activity.	No adverse effects to marine mammals or sea turtles due to survey activities are observed.	Presurvey request for nighttime operations, including equipment specifications and proposed use schedule. Document equipment use. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Approval required before survey is initiated. Monitoring Report following completion of survey.	
MM BIO-5: Soft Start.	All State waters; the survey operator shall use a "soft start" technique at the beginning of survey activities each day (or following a shut down) to allow any marine mammal that may be in the immediate area to leave before the sound sources reach full energy. Surveys shall not commence at nighttime or when the safety zone cannot be effectively monitored. Operators shall initiate each piece of equipment at the lowest practical sound level, increasing output in such a manner as to increase in steps not exceeding approximately 6 decibels (dB) per 5-minute period. During ramp-up, the Marine Wildlife Monitors (MWMs) shall monitor the safety zone. If marine mammals are sighted within or about to enter the safety zone, a power-down or shut down shall be implemented as though the equipment was operating at full power. Initiation of ramp-up procedures from shut down requires that the MWMs be able to visually observe the full safety zone.	No adverse effects to marine mammals or sea turtles due to survey activities are observed.	Compliance with permit requirements (observers); compliance with safe start procedures. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Immediately prior to survey.	

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Mitigation Monitoring Program

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials												
	<table border="1" data-bbox="485 302 976 500"> <thead> <tr> <th>Equipment Type</th> <th>Safety Zone (radius, m)</th> </tr> </thead> <tbody> <tr> <td>Single Beam Echosounder</td> <td>50</td> </tr> <tr> <td>Multibeam Echosounder</td> <td>500</td> </tr> <tr> <td>Side-Scan Sonar</td> <td>600</td> </tr> <tr> <td>Subbottom Profiler</td> <td>100</td> </tr> <tr> <td>Boomer System</td> <td>100</td> </tr> </tbody> </table> <p data-bbox="427 526 1032 1192">If the geophysical survey equipment is operated at or above a frequency of 200 kilohertz (kHz), safety zone monitoring and enforcement is not required; however, if geophysical survey equipment operated at a frequency at or above 200 kHz is used simultaneously with geophysical survey equipment less than 200 kHz, then the safety zone for the equipment less than 200 kHz must be monitored. The onboard MWMs shall have authority to stop operations if a mammal or turtle is observed within the specified safety zone and may be negatively affected by survey activities. The MWMs shall also have authority to recommend continuation (or cessation) of operations during periods of limited visibility (i.e., fog, rain) based on the observed abundance of marine wildlife. Periodic reevaluation of weather conditions and reassessment of the continuation/cessation recommendation shall be completed by the onboard MWMs. During operations, if an animal's actions are observed to be irregular, the monitor shall have authority to recommend that equipment be shut down until the animal moves further away from the sound source. If irregular behavior is observed, the equipment shall be shut-off and will be restarted and ramped-up to full power, as applicable, or will not be started until the animal(s) is/are outside of the safety zone or have not been observed for 15 minutes.</p> <p data-bbox="427 1218 1032 1404">For nearshore survey operations utilizing vessels that lack the personnel capacity to hold two (2) MWMs aboard during survey operations, at least twenty-one (21) days prior to the commencement of survey activities, the Permittee may petition the CSLC to conduct survey operations with one (1) MWM aboard. The CSLC will consider such authorization on a case-by-case basis and</p>	Equipment Type	Safety Zone (radius, m)	Single Beam Echosounder	50	Multibeam Echosounder	500	Side-Scan Sonar	600	Subbottom Profiler	100	Boomer System	100					 10/15/14
Equipment Type	Safety Zone (radius, m)																	
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Mitigation Monitoring Program

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
MM BIO-1: Marine Mammal and Sea Turtle Presence – Current Information.	All State waters; prior to commencement of survey operations, the geophysical operator shall: (1) contact the National Oceanic and Atmospheric Administration Long Beach office staff and local whale-watching operations and shall acquire information on the current composition and relative abundance of marine wildlife offshore, and (2) convey sightings data to the vessel operator and crew, survey party chief, and onboard Marine Wildlife Monitors (MWMs) prior to departure. This information will aid the MWMs by providing data on the approximate number and types of organisms that may be in the area.	No adverse effects to marine mammals or sea turtles due to survey activities are observed.	Document contact with appropriate sources. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder; Inquiry to NOAA and local whale watching operators.	Prior to survey.	 11/4/14
MM BIO-2: Marine Wildlife Monitors (MWMs).	Except as provided in section 7(h) of the General Permit, a minimum of two (2) qualified MWMs who are experienced in marine wildlife observations shall be onboard the survey vessel throughout both transit and data collection activities. The specific monitoring, observation, and data collection responsibilities shall be identified in the Marine Wildlife Contingency Plan required as part of all Offshore Geophysical Permit Program permits. Qualifications of proposed MWMs shall be submitted to the National Oceanic and Atmospheric Administration (NOAA) and CSLC at least twenty-one (21) days in advance of the survey for their approval by the agencies. Survey operations shall not commence until the CSLC approves the MWMs.	Competent and professional monitoring or marine mammals and sea turtles; compliance with established monitoring policies.	Document contact with and approval by appropriate agencies. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Prior to survey.	 10/15/14
MM BIO-3: Safety Zone Monitoring.	Onboard Marine Wildlife Monitors (MWMs) responsible for observations during vessel transit shall be responsible for monitoring during the survey equipment operations. All visual monitoring shall occur from the highest practical vantage point aboard the survey vessel; binoculars shall be used to observe the surrounding area, as appropriate. The MWMs will survey an area (i.e., safety or exclusion zone) based on the equipment used, centered on the sound source (i.e., vessel, towfish), throughout time that the survey equipment is operating. Safety zone radial distances, by equipment type, include:	No adverse effects to marine mammals or sea turtles due to survey activities are observed; compliance with established safety zones.	Compliance with permit requirements (observers); compliance with established safety zones. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Prior to survey.	 10/15/14