Cruise Report

U.S. Geological Survey Cruise Report 2014-687-FA

December 18, 2014

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USGS

Summary

On December 18, 2014, the Pacific Coastal and Marine Science Center of the U.S. Geological Survey (USGS) conducted a survey collecting bathymetry data offshore of the mouths of the San Lorenzo River and Soquel Creek. The work was conducted using two personal water craft (PWC) out of the Santa Cruz harbor. This survey is part of a series designed to document changes in shoreline position and coastal morphology in northern Monterey Bay related to episodic, seasonal and interannual processes. The majority of the California coastline is actively eroding and major storms (El Niño) have caused significant shoreline retreat and property damage. Erosion has been accelerated by human alterations to the environment (RAC, 1995) and during the next 100 years sea level is projected to rise ~1 m in California (NRC, 2012), making it increasingly important to understand the complex sediment transport and sedimentation patters that control beach dynamics. The West Coast of the United States is among the least understood of the coastal environments, because high wave energy has limited the use of traditional monitoring methods used to study processes controlling sediment transport. The Santa Cruz Littoral Cell has a wide range of coastal morphologic settings, wave exposure, river influences, levels of coastal development and flooding vulnerabilities, making it an excellent opportunity to understand how different sites respond on storm and interannual time scales. This research project has received authorization through the Monterey Bay National Marine Sanctuary under permit MBNMS-2014-029 and the California Department of Parks and Recreation.

The USGS field activity 2014-687-FA occurred on December 18, 2014. All operations were conducted during daylight hours between 07:19 and 09:39 AM Pacific Standard Time (PST) . Bathymetric data were collected using two PWCs each equipped with a 200 kHz single beam echosounder and a GPS receiver. In accordance with the MBNMS permit, the PWCs launched from Santa Cruz harbor and transited directly to the survey sites off the mouth of the San Lorenzo River (Figure 1) and Soquel Creek (Figure 2) and operated at speeds at, or less than, 4 knots while surveying. Fueling occurred prior to launching the PWC and did not land on the shoreline. Prior to operation, the U.S. Coast Guard and two MBNMS points of contact were notified of the plan and purpose for the survey. Figures 1 and 2 shows the location of the survey track lines, with track line time and starting and ending locations listed in Table 1. Weather observations are provided in Appendix A and marine wildlife observations are provided in Appendix B. Exhibit H is provided in Appendix C.

References

National Research Council, 2012. Sea-Level Rise for the Coastal of California, Oregon, and Washington: Past, Present, and Future. Washington, DC: The National Academies Press.

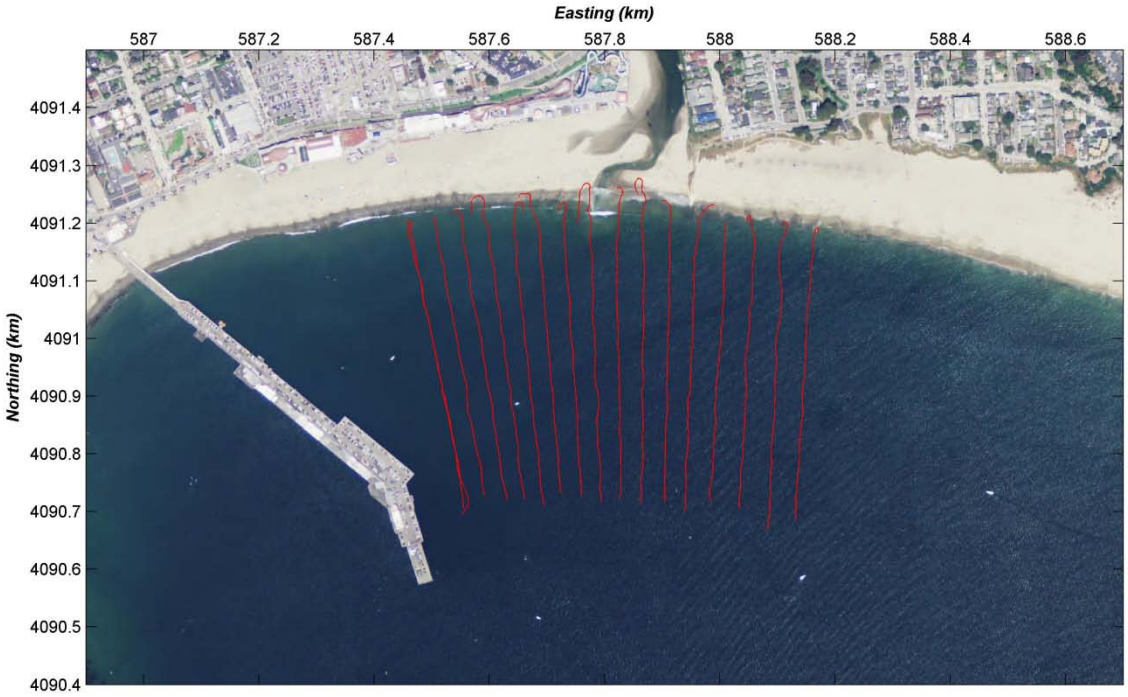

Figure 1. Locations of bathymetric data collected on Dec. 18, 2014 offshore of the San Lorenzo River mouth. Map projection is UTM Zone 10, meters.

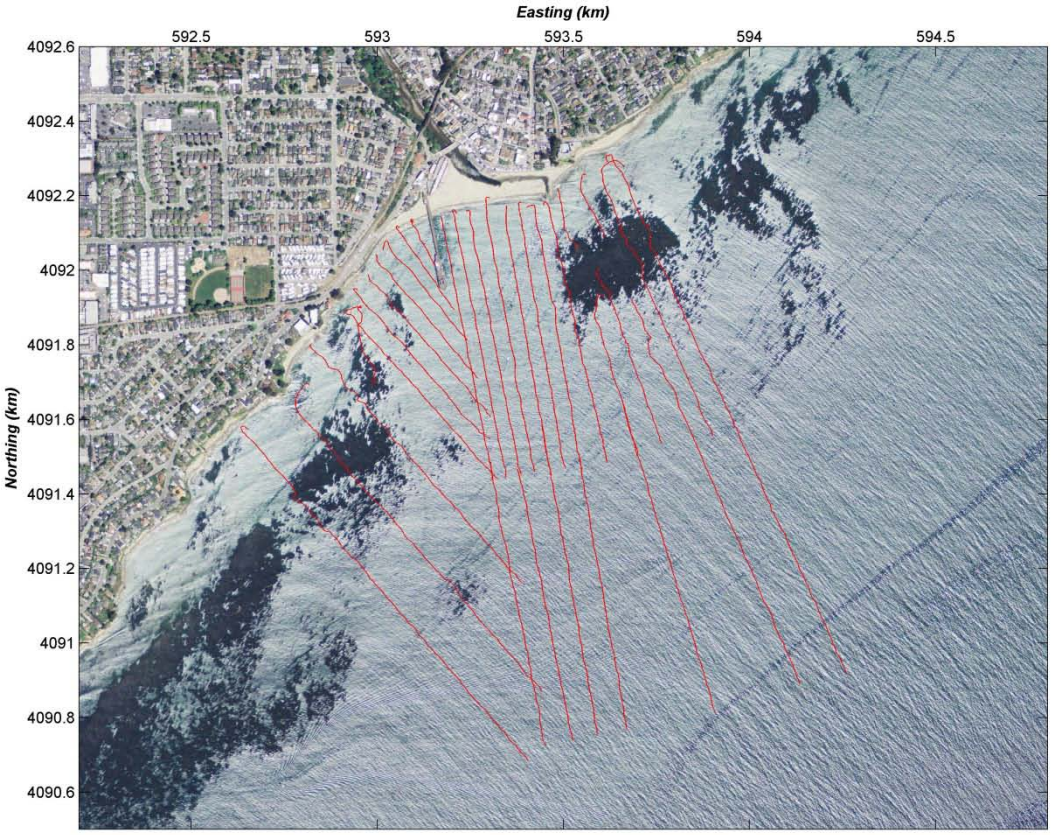

Figure 2. Locations of bathymetric data collected on Dec. 18, 2014 offshore of the Soquel Creek mouth. Map projection is UTM Zone 10, meters.

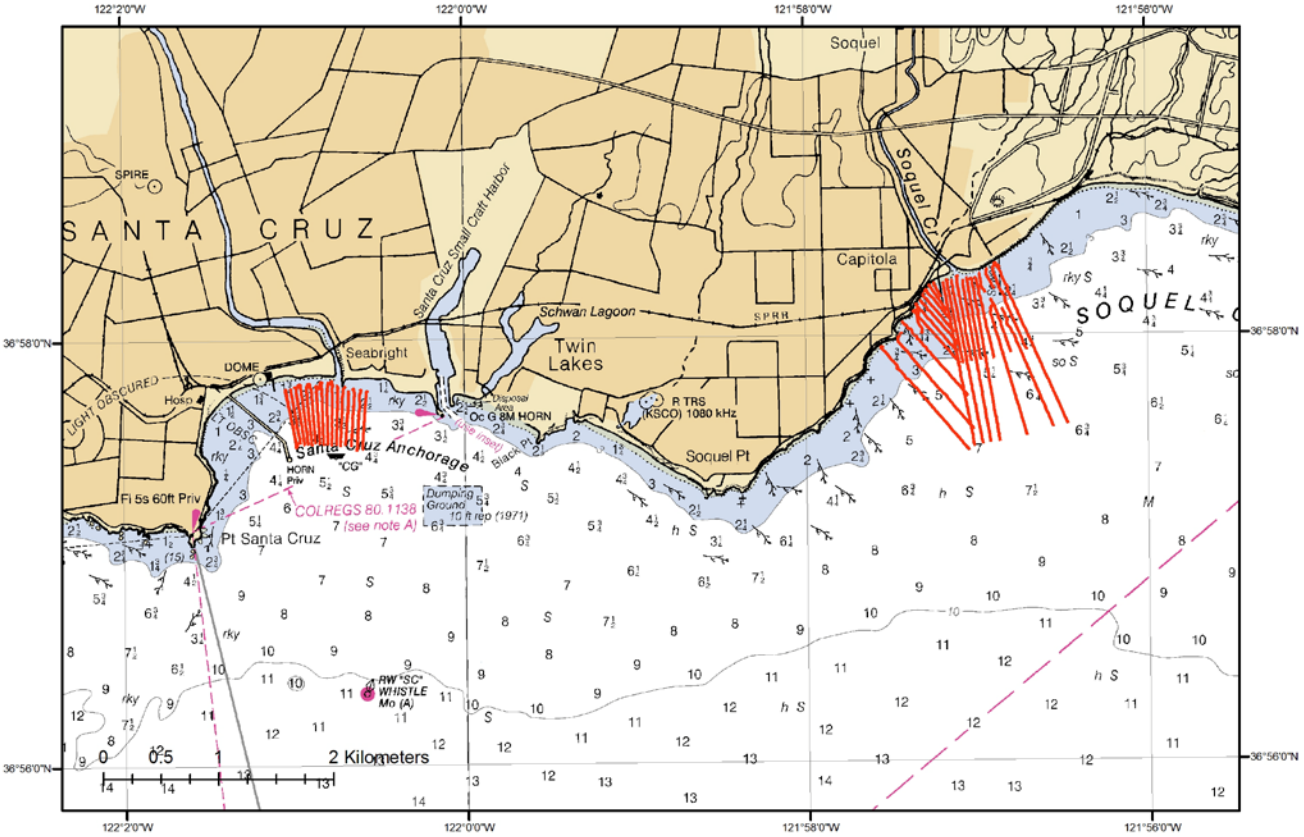

Figure 3. Locations of bathymetric lines

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Table 1. Survey track line information

Filename	Start Time (PST)	Start Latitude	Start Longitude	End Time (PST)	End Latitude	End Longitude
mb14_line019_br.nc	12/18/2014 7:18	36.95836	-122.01651	12/18/2014 7:22	36.96283	-122.01746
mb14_line019_b.nc	12/18/2014 7:21	36.95827	-122.01655	12/18/2014 7:24	36.96284	-122.01748
mb14_line019_1_b.nc	12/18/2014 7:23	36.96294	-122.01707	12/18/2014 7:26	36.95856	-122.01611
mb14_line020_b.nc	12/18/2014 7:25	36.96297	-122.01666	12/18/2014 7:27	36.95850	-122.01567
mb14_line020_1_b.nc	12/18/2014 7:26	36.95850	-122.01532	12/18/2014 7:29	36.96299	-122.01629
mb14_line021_b.nc	12/18/2014 7:29	36.95840	-122.01495	12/18/2014 7:33	36.96302	-122.01532
mb14_line021_1_b.nc	12/18/2014 7:31	36.96322	-122.01540	12/18/2014 7:34	36.95860	-122.01462
mb14_line022_b.nc	12/18/2014 7:34	36.96302	-122.01462	12/18/2014 7:37	36.95854	-122.01422
mb14_line022_1_b.nc	12/18/2014 7:34	36.95844	-122.01383	12/18/2014 7:38	36.96283	-122.01423
mb14_line023_b.nc	12/18/2014 7:39	36.95848	-122.01348	12/18/2014 7:43	36.96334	-122.01347
mb14_line023_1_b.nc	12/18/2014 7:39	36.96325	-122.01305	12/18/2014 7:42	36.95840	-122.01307
mb14_line024_1_b.nc	12/18/2014 7:43	36.95831	-122.01221	12/18/2014 7:46	36.96306	-122.01157
mb14_line024_b.nc	12/18/2014 7:45	36.96313	-122.01259	12/18/2014 7:47	36.95844	-122.01260
mb14_line025_1_b.nc	12/18/2014 7:47	36.96278	-122.01093	12/18/2014 7:50	36.95833	-122.01115
mb14_line025_b.nc	12/18/2014 7:48	36.95844	-122.01169	12/18/2014 7:52	36.96280	-122.01136
mb14_line026_1_b.nc	12/18/2014 7:52	36.95814	-122.01006	12/18/2014 7:55	36.96261	-122.00956
mb14_line026_b.nc	12/18/2014 7:53	36.96274	-122.01026	12/18/2014 7:56	36.95798	-122.01060
mb14_line061_1_b.nc	12/18/2014 8:09	36.96542	-121.95186	12/18/2014 8:12	36.96904	-121.95581
mb14_grid001_b.nc	12/18/2014 8:10	36.96678	-121.95540	12/18/2014 8:12	36.96861	-121.95594
mb14_line061_b.nc	12/18/2014 8:12	36.96861	-121.95594	12/18/2014 8:16	36.96444	-121.95165
mb14_line062_1_b.nc	12/18/2014 8:13	36.96988	-121.95525	12/18/2014 8:16	36.96687	-121.95221
mb14_line062_b.nc	12/18/2014 8:17	36.96593	-121.95184	12/18/2014 8:21	36.96942	-121.95548
mb14_line063_1_b.nc	12/18/2014 8:18	36.96854	-121.95289	12/18/2014 8:20	36.97055	-121.95454
mb14_line064_b.nc	12/18/2014 8:20	36.97067	-121.95415	12/18/2014 8:21	36.96964	-121.95349
mb14_line063_b.nc	12/18/2014 8:21	36.97001	-121.95502	12/18/2014 8:24	36.96780	-121.95252
mb14_line065_1_b.nc	12/18/2014 8:24	36.96447	-121.95141	12/18/2014 8:28	36.97086	-121.95280
mb14_line065_b.nc	12/18/2014 8:26	36.96439	-121.95186	12/18/2014 8:30	36.97080	-121.95327
mb14_line066_1_b.nc	12/18/2014 8:29	36.97123	-121.95180	12/18/2014 8:33	36.96461	-121.95053
mb14_line066_b.nc	12/18/2014 8:31	36.97091	-121.95249	12/18/2014 8:35	36.96454	-121.95094
mb14_line067_1_b.nc	12/18/2014 8:34	36.96468	-121.94960	12/18/2014 8:38	36.97111	-121.95085
mb14_line067_b.nc	12/18/2014 8:36	36.96469	-121.95007	12/18/2014 8:41	36.97103	-121.95128
mb14_line068_1_b.nc	12/18/2014 8:39	36.97105	-121.95016	12/18/2014 8:43	36.96481	-121.94834
mb14_line068_b.nc	12/18/2014 8:44	36.97098	-121.95069	12/18/2014 8:48	36.96465	-121.94910
mb14_line069_1_b.nc	12/18/2014 8:45	36.96526	-121.94668	12/18/2014 8:49	36.96948	-121.94855
mb14_line069_b.nc	12/18/2014 8:49	36.96496	-121.94743	12/18/2014 8:53	36.96885	-121.94836
mb14_line070_1_b.nc	12/18/2014 8:54	36.96542	-121.94515	12/18/2014 8:58	36.97195	-121.94774
mb14_line069_b2.nc	12/18/2014 8:56	36.96996	-121.94916	12/18/2014 8:58	36.97145	-121.94975
mb14_line071_b.nc	12/18/2014 9:00	36.97208	-121.94823	12/18/2014 9:09	36.95963	-121.94119
mb14_line070_b.nc	12/18/2014 9:01	36.97177	-121.94887	12/18/2014 9:03	36.97027	-121.94838
mb14_line070_b2.nc	12/18/2014 9:05	36.96874	-121.94753	12/18/2014 9:11	36.95940	-121.94260
mb14_line069_b2.nc	12/18/2014 9:11	36.95874	-121.94516	12/18/2014 9:15	36.96617	-121.94782
mb14_line068_b2.nc	12/18/2014 9:16	36.95833	-121.94783	12/18/2014 9:20	36.96489	-121.94918
mb14_line067_b2.nc	12/18/2014 9:16	36.96572	-121.95029	12/18/2014 9:20	36.95821	-121.94873
mb14_line065_b2.nc	12/18/2014 9:21	36.95797	-121.95027	12/18/2014 9:26	36.96486	-121.95186
mb14_line066_b2.nc	12/18/2014 9:21	36.96469	-121.95106	12/18/2014 9:25	36.95809	-121.94946
mb14_line059_b.nc	12/18/2014 9:31	36.95926	-121.95036	12/18/2014 9:37	36.96675	-121.95730
mb14_line060_b.nc	12/18/2014 9:32	36.96188	-121.95089	12/18/2014 9:39	36.96773	-121.95721
mb14_line058_b.nc	12/18/2014 9:39	36.96569	-121.95913	12/18/2014 9:45	36.95762	-121.95083

Appendix A: Weather Observation Forms

Marine Environmental Variables Form

Date: 12/18/2014_____ **Monitor:** _Andrew Stevens_____

Time	Latitude	Longitude	Vessel Activity	Weather	Cloud Cover	Glare	Visibility	Wind Speed	Sea State	Swell Height	Comments
07:25	36.964042	-122.011872	Active Surveying	Showers	Overcast	none	good	Light breeze	Calm	0.5 m	Boats surveying San Lorenzo R. mouth
08:56	36.97178	-121.950253	Active Surveying	Cloudy	Overcast	none	good	Light breeze	Calm	0.8 m	Boats surveying Soquel Cr. mouth

Appendix B: Marine Wildlife Observations

Marine Wildlife Observations Form

Date: 12/18/2014 _____ Monitor: Andrew Stevens

Time: 07:59	Latitude: 36° 57.53269' N	Longitude: 122° 00.99063' W
Weather: Showers	Cloud Cover: Overcast	Glare: None
Visibility: Good	Wind Speed: Light breeze	Sea State: Calm
Swell Height: 0.5m	Survey Vessel Activity: Bathy survey	
Marine Wildlife Observations and Interactions: 3 California sea lions observed swimming toward Santa Cruz pier; distance approx. 40m. Numerous sea lions observed hauled out on pier understructure.		

Time: 08:45	Latitude: 36° 57.50704' N	Longitude: 122° 00.62089' W
Weather: Showers	Cloud Cover: Overcast	Glare: None
Visibility: Good	Wind Speed: Light breeze	Sea State: Calm
Swell Height: 0.5m	Survey Vessel Activity: Transit	
Marine Wildlife Observations and Interactions: 1 sea lion swimming west; distance approx. 20m.		

Appendix C: Appendix H

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.	12/15/14
	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.			

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.	Neglected to Notify
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.	Imme-diately prior to survey (prior to each survey day).	12/15/14
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

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)					12/15/14
MM HAZ-2: Vessel fueling restrictions.	Outlined under **Hazards and Hazardous Materials** (above)					12/15/14
MM HAZ-3: OSCP equipment and supplies.	Outlined under **Hazards and Hazardous Materials** (above)					12/15/14
MM BIO-9: Limitations on Survey Operations in Select MPAs.	Outlined under **Biological Resources** (above)					12/15/14
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.	Neglected to Notify

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 CLSC, 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.	12/15/14
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' OSCPs shall include the following information for each vessel to be involved with the survey: • 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.	12/15/14
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.	12/15/14
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.	12/15/14

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
MM BIO-8: Reporting Requirements – Collision.	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: • 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. 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.	No adverse effects to marine mammals or sea turtles due to survey activities are observed.	Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Monitoring Report following comple-tion of survey.	12/15/14

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
MM BIO-6: Practical Limitations on Equipment Use and Adherence to Equipment Manufacturer's Routine Maintenance Schedule.	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: • 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. 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.	No adverse effects to marine mammals or sea turtles due to survey activities are observed.	Document initial and during survey equipment settings. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Imme-diately prior to and during survey.	12/15/14
MM BIO-7: Avoidance of Pinniped Haul-Out Sites.	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: • 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.	No adverse effects to pinnipeds at haul outs are observed.	Document pinniped reactions to vessel presence and equipment use. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Monitoring Report following comple-tion of survey.	12/15/14

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 comple-tion of survey.	12/15/14
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.	Imme-diately prior to survey.	12/15/14

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
						12/15/14

Equipment Type	Safety Zone (radius, m)
Single Beam Echosounder	50
Multibeam Echosounder	500
Side-Scan Sonar	600
Subbottom Profiler	100
Boomer System	100

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.

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

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.	12/15/14
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.	12/15/14
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.	12/15/14