Cruise Report
U.S. Geological Survey Research Cruise 2016-613-FA
Ocean Beach, San Francisco, California
January 25, 2016

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USGS

Summary

On January 25, 2016, the Pacific Coastal and Marine Science Center of the U.S Geological Survey (USGS) conducted a single-beam bathymetric survey offshore of Ocean Beach, just south of the Golden Gate. The work was conducted using two Coastal Profiling Systems (CPS) (personal watercraft outfitted with custom GPS and echosounder survey equipment) out of Fort Baker, just inside and north of the Golden Gate. The survey was the thirty-eighth in a series of surveys in this area, starting in May 2004.

The shoreline of Ocean Beach, located in San Francisco, California, has been slowly retreating since the mid-1990's, with accelerated rates in certain areas. The U.S. Army Corps of Engineers, San Francisco City Department of Public Works and Department of the Environment, National Park Service, members of the USGS, and a citizens group have joined to form the Ocean Beach Task Force in an effort to address this problem. In 2004, we began conducting research and monitoring in Ocean Beach and other areas around the mouth of San Francisco Bay to obtain quantitative data on beach behavior and on processes affecting sediment transport. The ultimate goal of this project is to identify and quantify the physical processes that control nearshore and beach morphology, enabling the various government agencies involved to make the most informed management decisions possible. This research effort and data acquisition has already received authorization through the National Park Service/Golden Gate National Recreation Area under permit **GOGA-2012-SCI-0006.**

It was determined that the operating frequency of the sonar system (200 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 a marine wildlife monitor (MWO) was not required due to operational limitations of the personal watercraft used.

The USGS research cruise 2016-613-FA took place on January 25, 2016. All operations, including transits and surveying took place during daylight hours (0830 – 1330). Mapping was completed using hull-mounted 200-kHz , Odom 9 degree downward conical beam transducers and Odom Echotrac CV100 echo sounders at survey speeds of ~4 knots. While at sea, no sightings of wildlife were made, and no fishing gear (buoys) was observed. Track lines are shown in Figure 1 and start and end positions are given in Tables 1 and 2.

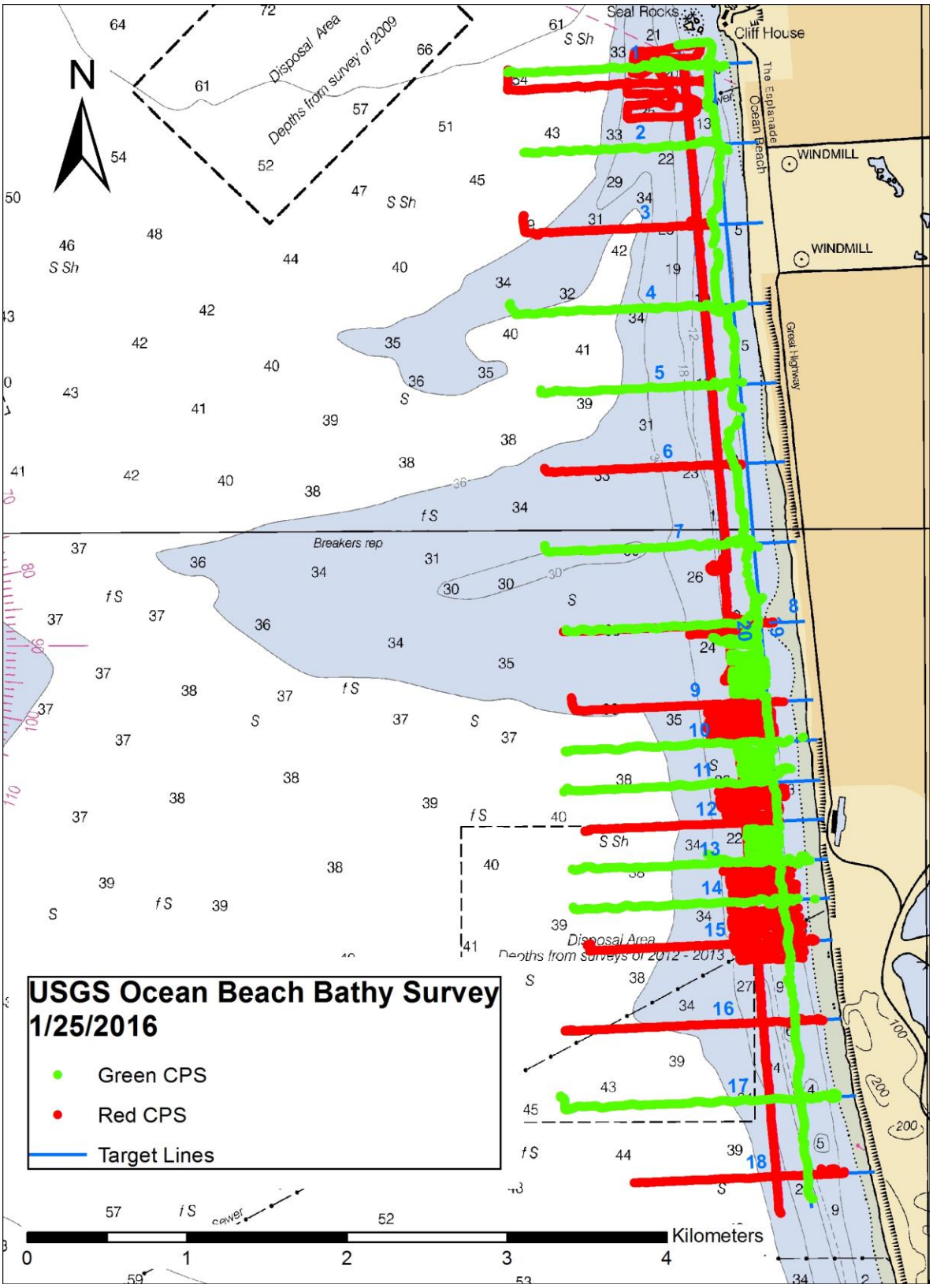

Figure 1. As-surveyed lines

Table 1. As-surveyed line endpoints

Line No.	Start		End	
	Lat	Lon	Lat	Lon
1	37.77579	-122.52936	37.77616	-122.51395
1A	37.77484	-122.52936	37.77518	-122.51525
2	37.77128	-122.52824	37.77164	-122.51422
3	37.76683	-122.52819	37.76716	-122.51478
4	37.76221	-122.52889	37.76268	-122.51275
5	37.75776	-122.52711	37.75830	-122.51281
6	37.75350	-122.52690	37.75366	-122.51293
7	37.74904	-122.52690	37.74919	-122.51236
8	37.74432	-122.52561	37.74478	-122.51072
9	37.73993	-122.52482	37.74030	-122.51000
10	37.73756	-122.52549	37.73831	-122.50862
11	37.73530	-122.52563	37.73652	-122.50952
12	37.73308	-122.52414	37.73361	-122.51034
13	37.73094	-122.52506	37.73137	-122.50819
14	37.72882	-122.52500	37.72919	-122.50786
15	37.72636	-122.52385	37.72686	-122.50788
16	37.72185	-122.52563	37.72235	-122.50734
17	37.71745	-122.52568	37.71801	-122.50638
18	37.71326	-122.52078	37.71376	-122.50590
19	37.71232	-122.50809	37.77742	-122.51501
20	37.71152	-122.51041	37.77706	-122.51719

Table 2. Partial intermediate lines, surveyed by offline distance from adjacent lines

Between Line #s	Start		End	
	Lat	Lon	Lat	Lon
North of 1				
a	37.77695	-122.52030	37.77743	-122.51504
b	37.77648	-122.52044	37.77652	-122.51621
1A and 2				
a	37.77462	-122.52088	37.77460	-122.51756
b	37.77394	-122.52079	37.77407	-122.51589
c	37.77325	-122.52087	37.77354	-122.51610

Table 2. Partial intermediate lines (cont.)

Between Line #s	Start		End	
	Lat	Lon	Lat	Lon
8 and 9				
a	37.74411	-122.51665	37.74440	-122.51201
b	37.74394	-122.51499	37.74390	-122.51182
c	37.74356	-122.51392	37.74354	-122.51184
d	37.74297	-122.51377	37.74302	-122.51171
e	37.74260	-122.51371	37.74263	-122.51138
f	37.74204	-122.51364	37.74210	-122.51152
g	37.74151	-122.51366	37.74169	-122.51125
h	37.74117	-122.51355	37.74130	-122.51127
i	37.74073	-122.51351	37.74059	-122.51122
9 and 10				
a	37.73970	-122.51541	37.73978	-122.51092
b	37.73924	-122.51525	37.73930	-122.51090
c	37.73883	-122.51543	37.73892	-122.51077
d	37.73837	-122.51522	37.73850	-122.51068
10 and 11				
a	37.73764	-122.51332	37.73758	-122.51078
b	37.73715	-122.51316	37.73721	-122.51101
c	37.73669	-122.51306	37.73669	-122.51094
d	37.73624	-122.51297	37.73625	-122.51102
11 and 12				
a	37.73525	-122.51465	37.73542	-122.50998
b	37.73481	-122.51458	37.73504	-122.50992
c	37.73437	-122.51443	37.73444	-122.51039
d	37.73392	-122.51412	37.73406	-122.51044
11 and 12				
a	37.73525	-122.51465	37.73542	-122.50998
b	37.73481	-122.51458	37.73504	-122.50992
c	37.73437	-122.51443	37.73444	-122.51039
d	37.73392	-122.51412	37.73406	-122.51044
12 and 13				
a	37.73314	-122.51261	37.73320	-122.51035
b	37.73268	-122.51262	37.73278	-122.51039
c	37.73221	-122.51216	37.73223	-122.51036
d	37.73171	-122.51250	37.73183	-122.51046

Table 2. Partial intermediate lines (cont.)

13 and 14				
a	37.73078	-122.51435	37.73094	-122.50947
b	37.73035	-122.51392	37.73054	-122.50958
c	37.72992	-122.51380	37.73000	-122.50920
d	37.72957	-122.51372	37.72958	-122.50925
14 and 15				
a	37.72852	-122.51377	37.72870	-122.50904
b	37.72812	-122.51375	37.72819	-122.50896
c	37.72756	-122.51368	37.72772	-122.50874
d	37.72709	-122.51367	37.72724	-122.50882
15 and 16				
a	37.72628	-122.51348	37.72637	-122.50871
b	37.72581	-122.51320	37.72587	-122.50877

Marine Environmental Variables Form

Date: 1/25/16_____ **Monitor:** __Dan Hoover_____

Time	Latitude	Longitude	Vessel Activity	Weather	Cloud Cover	Glare	Visibility	Wind Speed	Sea State	Swell Height	Comments
0830 – 1330 PST	37.7115 to 37.7774N	-122.5294 to -122.5059E	surveying	clear	clear	none	10 km	1-3 kts	Slight chop	1.5m	Observations based on general conditions throughout PWC survey. PWC operator does not have resources to make detailed weather observations

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	<u>All Counties</u>: 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.	11/18/15 GAS ENGINES JW
	<u>Los Angeles and Orange Counties</u>: 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.			
	<u>San Luis Obispo County</u>: 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.			
	<u>Santa Barbara County</u>: 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.			
	<u>Ventura County</u>: 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.			

<table>
<tr><th>Mitigation Measure (MM)</th><th>Location and Scope of Mitigation</th><th>Effectiveness Criteria</th><th>Monitoring or Reporting Action</th><th>Responsible Party</th><th>Timing</th><th>Implementation Date(s) and Initials</th></tr>
<tr><td>MM BIO-1: Marine Mammal and Sea Turtle Presence – Current Information.</td><td>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.</td><td>No adverse effects to marine mammals or sea turtles due to survey activities are observed.</td><td>Document contact with appropriate sources.

Submit Final Monitoring Report after completion of survey activities.</td><td>OGPP permit holder; Inquiry to NOAA and local whale watching operators.</td><td>Prior to survey.</td><td>11/18/15
JW</td></tr>
<tr><td>MM BIO-2: Marine Wildlife Monitors.</td><td>A minimum of two 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 two weeks in advance of the survey for their approval by the agencies. Survey operations shall not commence until the CSLC approves the MWMs.</td><td>Competent and professional monitoring or marine mammals and sea turtles; compliance with established monitoring policies.</td><td>Document contact with and approval by appropriate agencies.

Submit Final Monitoring Report after completion of survey activities.</td><td>OGPP permit holder.</td><td>Prior to survey.</td><td>11/18/15
JW</td></tr>
<tr><td>MM BIO-3: Safety Zone Monitoring.</td><td>Onboard 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:
<table>
<tr><th>Equipment Type</th><th>Safety Zone (radius, m)</th></tr>
<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>
</table></td><td>No adverse effects to marine mammals or sea turtles due to survey activities are observed; compliance with established safety zones.</td><td>Compliance with permit requirements (observers); compliance with established safety zones.

Submit Final Monitoring Report after completion of survey activities.</td><td>OGPP permit holder.</td><td>Prior to survey.</td><td>11/18/15
JW</td></tr>
</table>

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
	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 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 MWM aboard. The CSLC will consider such authorization on a case-by-case basis and 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.	Pre-survey request for nighttime operations, including equipment specifications and proposed use schedule. Document equipment	OGPP permit holder.	Approval required before survey is initiated. Monitoring Report following	11/18/15 JW

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
			use. Submit Final Monitoring Report after completion of survey activities.		comple-tion 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 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 marine wildlife monitors 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.	11/18/15 JW
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	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.	11/18/15 JW

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	inspection and maintenance shall be provided in the required presurvey notification to CSLC.					
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 observers 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.	11/18/15 JW
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	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.	11/18/15 JW

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
	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 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 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 will also be advised that an incident has occurred in State waters affecting a protected species.					
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.	11/18/15 JW

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
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.	11/18/15 JW
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.	11/18/15 JW
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 ability to respond to worst-case spill.	Contract vessel operator.	Prior to survey.	11/18/15 JW

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
MM HAZ-1: Oil Spill Contingency Plan (OSCP) Required Information.	Outlined under **Hazards and Hazardous Materials** (above)					11/18/15 JW
MM HAZ-2: Vessel fueling restrictions.	Outlined under **Hazards and Hazardous Materials** (above)					11/18/15 JW
MM HAZ-3: OSCP equipment and supplies.	Outlined under **Hazards and Hazardous Materials** (above)					11/18/15 JW
MM BIO-9: Limitations on Survey Operations in Select MPAs.	Outlined under **Biological Resources** (above)					11/18/15 JW
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 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 harbor-masters, and local dive shops of planned survey activity. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Prior to survey.	11/18/15 JW

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 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 harbor-masters of planned survey activity. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Prior to survey.	11/18/15 JW
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 ft) 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).	11/18/15 JW
MM FISH-1: USCG and Harbormaster Notification.	Outlined under **Commercial and Recreational Fisheries** (above)					11/18/15 JW

Acronyms/Abbreviations: CARB = California Air Resources Board; CDFW = California Department of Fish and Wildlife; CSLC = California State Lands Commission; cSEL = cumulative sound exposure level; dB = decibels; ft = feet; gal = gallon(s); LNM = Local Notice to Mariners; MPA = Marine Protected Area; MWCP = Marine Wildlife Contingency Plan; MWM = Marine Wildlife Monitor; m= meter(s); ms = millisecond(s); min = minute; NOAA = National Oceanic and Atmospheric Administration; NO_x = Nitrogen Oxide; OGPP = Offshore Geophysical Permit Program; OSCP = Oil Spill Contingency Plan; ppm = parts per million; lb = pound(s); rms = root mean square; SEL = sound exposure level; SPL = sound pressure level; USCG = U.S. Coast Guard