

Marine Wildlife Observation Report  
U.S. Geological Survey Research Cruise 2015-673-FA  
Northern Monterey Bay, California  
November 6, 9 and 10, 2015

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USGS

## Summary

On November 6, 9 and 10, 2015, 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 Snavelly* out of the Santa Cruz harbor. The survey was the sixth in a series of surveys that will take place over the 2014-2016 winter seasons 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**.

The Marine Mammal Protection Act (MMPA) requires that certain procedures be followed when using acoustic sources to collect bathymetry and backscatter data to minimize the impact on marine mammals. It has been determined that the operating frequency of the sonar system (234.5 kHz) is above the cutoff hearing threshold for marine mammals, therefore the CSLC has determined that the observance of a safety zone is not a requirement for this survey (personal communications, K. Keen, CSLC). Also, only one marine wildlife monitor (MWO) was required.

The USGS research cruise 2015-673-FA took place on November 6 and 9, 2015. 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, 10 sightings of wildlife were made including sea lions, sea otters, and a dolphin. During all wildlife sightings the crew did not observe any abnormal behavior and there was no risk of collision. Figure 1 shows the locations of the sightings and other operational notes in relation to the survey track lines. Table 1 summarizes the survey track line start and end of line. Table 2 summarizes the date, time, location, and wildlife observation.

## 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.

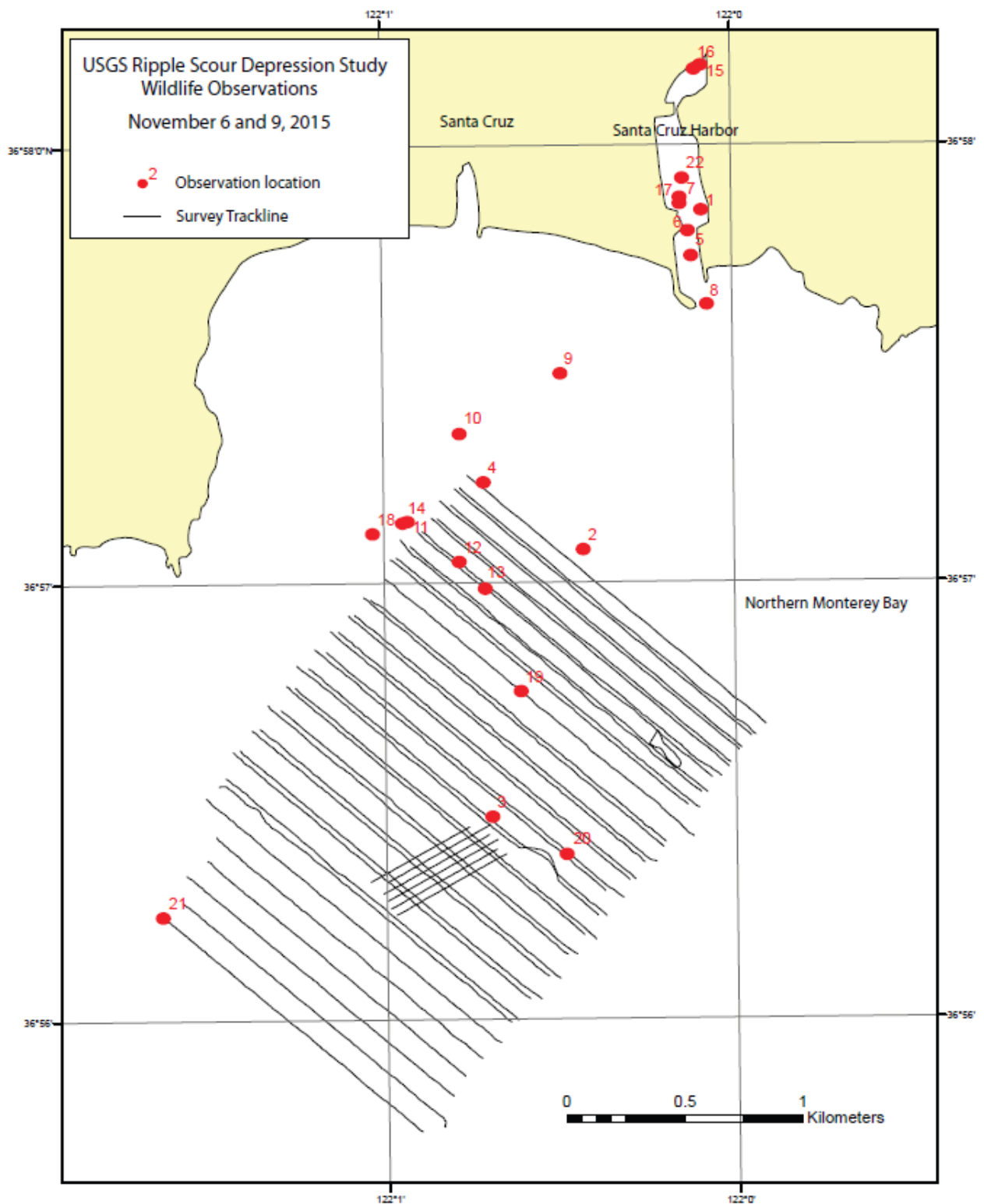


Figure 1. Marine Wildlife Sightings Map

**Table 1. Survey Track Lines**

<b>GMT Date</b>	<b>GMT Time</b>	<b>Longitude</b>	<b>Latitude</b>	<b>Line</b>
11/6/2015	21:14:11	122.01274	36.94069	SOL: patch_01
11/6/2015	21:16:39	122.01746	36.93861	EOL: patch_01
11/6/2015	21:17:44	122.01667	36.93858	SOL: patch_02
11/6/2015	21:20:24	122.01179	36.94075	EOL: patch_02
11/6/2015	21:21:00	122.01180	36.94039	SOL: patch_03
11/6/2015	21:23:29	122.01686	36.93815	EOL: patch_03
11/6/2015	21:24:13	122.01667	36.93788	SOL: patch_04
11/6/2015	21:26:51	122.01141	36.94019	EOL: patch_04
11/6/2015	21:27:36	122.01144	36.93983	SOL: patch_05
11/6/2015	21:30:13	122.01651	36.93758	EOL: patch_05
11/6/2015	21:30:59	122.01626	36.93733	SOL: patch_06
11/6/2015	21:33:38	122.01101	36.93964	EOL: patch_06
11/6/2015	22:57:06	121.99860	36.94453	SOL: SQR045
11/6/2015	23:05:55	122.01270	36.95409	EOL: SQR045
11/6/2015	23:06:29	122.01308	36.95364	SOL: SQR044
11/6/2015	23:14:52	121.99909	36.94413	EOL: SQR044
11/6/2015	23:15:50	121.99930	36.94409	SOL: SQR043
11/6/2015	23:24:38	122.01331	36.95358	EOL: SQR043
11/6/2015	23:29:42	122.01352	36.95298	SOL: SQR042
11/6/2015	23:38:12	121.99977	36.94364	EOL: SQR042
11/6/2015	23:39:00	121.99990	36.94354	SOL: SQR041
11/6/2015	23:47:56	122.01402	36.95313	EOL: SQR041
11/6/2015	23:48:35	122.01415	36.95245	SOL: SQR040
11/6/2015	23:56:50	122.00030	36.94308	EOL: SQR040
11/6/2015	23:57:36	122.00037	36.94291	SOL: SQR039
11/7/2015	0:06:30	122.01444	36.95248	EOL: SQR039
11/9/2015	16:27:09	122.01489	36.95196	SOL: SQR038
11/9/2015	16:36:38	122.00076	36.94256	EOL: SQR038
11/9/2015	16:37:43	122.00117	36.94251	SOL: SQR037
11/9/2015	16:45:57	122.01506	36.95192	EOL: SQR037
11/9/2015	16:47:04	122.01546	36.95141	SOL: SQR036
11/9/2015	16:56:05	122.00375	36.94431	EOL: SQR036
11/9/2015	16:57:00	122.00417	36.94381	SOL: SQR036
11/9/2015	16:58:41	122.00140	36.94193	EOL: SQR036
11/9/2015	17:07:24	122.00171	36.94194	SOL: SQR035
11/9/2015	17:16:00	122.01591	36.95166	EOL: SQR035
11/9/2015	19:09:47	122.01614	36.95096	SOL: SQR034
11/9/2015	19:18:56	122.00179	36.94137	EOL: SQR034
11/9/2015	19:19:36	122.00234	36.94147	SOL: SQR033

11/9/2015	19:27:50	122.01641	36.95089	EOL: SQR033
11/9/2015	19:28:34	122.01668	36.95018	SOL: SQR032
11/9/2015	19:37:48	122.00209	36.94026	EOL: SQR032
		missing SOL location of SQR031		
11/9/2015	19:47:22	122.01707	36.95025	EOL: SQR031
11/9/2015	19:48:46	122.01736	36.94937	SOL: SQR030
11/9/2015	19:57:20	122.00342	36.94007	EOL: SQR030
11/9/2015	20:04:44	122.00352	36.93986	SOL: SQR029
11/9/2015	20:14:11	122.01769	36.94946	EOL: SQR029
11/9/2015	20:15:15	122.01814	36.94881	SOL: SQR028
11/9/2015	20:24:07	122.00387	36.93931	EOL: SQR028
11/9/2015	20:24:42	122.00441	36.93928	SOL: SQR027
11/9/2015	20:33:48	122.01841	36.94877	EOL: SQR027
11/9/2015	20:34:33	122.01891	36.94816	SOL: SQR026
11/9/2015	20:43:15	122.00487	36.93864	EOL: SQR026
11/9/2015	20:44:06	122.00515	36.93861	SOL: SQR025
11/9/2015	20:52:38	122.01927	36.94817	EOL: SQR025
11/9/2015	20:53:49	122.01949	36.94739	SOL: SQR024
11/9/2015	21:01:58	122.00545	36.93794	EOL: SQR024
11/9/2015	21:02:45	122.00631	36.93820	SOL: SQR023
11/9/2015	21:11:02	122.02004	36.94748	EOL: SQR023
11/9/2015	21:11:35	122.02036	36.94677	SOL: SQR022
11/9/2015	21:19:47	122.00626	36.93726	EOL: SQR022
11/9/2015	21:20:25	122.00665	36.93727	SOL: SQR021
11/9/2015	21:29:17	122.02090	36.94688	EOL: SQR021
11/9/2015	21:30:13	122.02098	36.94604	SOL: SQR020
11/9/2015	21:39:00	122.00677	36.93636	EOL: SQR020
11/9/2015	21:45:18	122.00732	36.93652	SOL: SQR019
11/9/2015	21:54:13	122.02140	36.94611	EOL: SQR019
11/9/2015	21:55:08	122.02167	36.94518	SOL: SQR018
11/9/2015	22:02:46	122.00769	36.93580	EOL: SQR018
11/9/2015	22:03:23	122.00810	36.93577	SOL: SQR017
11/9/2015	22:11:54	122.02227	36.94537	EOL: SQR017
11/9/2015	22:16:36	122.02269	36.94448	SOL: SQR016
11/9/2015	22:24:56	122.00849	36.93487	EOL: SQR016
11/9/2015	22:25:33	122.00902	36.93496	SOL: SQR015
11/9/2015	22:34:30	122.02305	36.94441	EOL: SQR015
11/9/2015	22:35:14	122.02362	36.94367	SOL: SQR014
11/9/2015	22:43:35	122.00940	36.93410	EOL: SQR014
11/9/2015	22:44:12	122.00992	36.93409	SOL: SQR013
11/9/2015	22:53:48	122.02395	36.94360	EOL: SQR013
11/9/2015	22:54:49	122.02431	36.94260	SOL: SQR012

11/9/2015	23:03:09	122.01051	36.93328	EOL: SQR012
11/9/2015	23:03:42	122.01082	36.93321	SOL: SQR011
11/9/2015	23:13:19	122.02471	36.94225	EOL: SQR011
11/9/2015	23:14:44	122.02527	36.94184	SOL: SQR006A
11/9/2015	23:23:17	122.01135	36.93245	EOL: SQR006A
11/9/2015	23:24:36	122.01223	36.93184	SOL: SQR005A
11/9/2015	23:33:26	122.02478	36.94036	EOL: SQR005A
11/9/2015	23:34:48	122.02523	36.93946	SOL: SQR004A
11/9/2015	23:42:09	122.01308	36.93118	EOL: SQR004A
11/9/2015	23:48:12	122.01361	36.93041	SOL: SQR003A
11/9/2015	23:56:33	122.02622	36.93889	EOL: SQR003A
11/9/2015	23:57:24	122.02642	36.93786	SOL: SQR002A
11/10/2015	0:05:29	122.01403	36.92924	EOL: SQR002A
11/10/2015	0:06:32	122.01509	36.92906	SOL: SQR001A
11/10/2015	0:15:12	122.02746	36.93740	EOL: SQR001A

**Table 2. Marine Wildlife Observations**

Obs #	Date	Time (GMT)	Longitude	Latitude	Observation
1	11/6/2015	20:49:08	-122.00145	36.96401	leave dock
2	11/6/2015	20:57:49	-122.00719	36.95127	transiting survey area looking for fishing gear
3	11/6/2015	21:10:13	-122.01165	36.94109	sonar on, begin ramp-up
4	11/7/2015	0:10:09	-122.01195	36.95385	sonar off
5	11/7/2015	0:14:40	-122.00198	36.96248	no wildlife observed during surveying or transits
6	11/7/2015	0:15:25	-122.00212	36.96337	sea lion in harbor, on surface, 30-m distance, starboard side
7	11/9/2015	16:07:17	-122.00235	36.96444	sea otter, 10-m distance, inside harbor, transiting
8	11/9/2015	16:09:28	-122.00130	36.96055	sea lion 15 m off bow
9	11/9/2015	16:11:50	-122.00828	36.95800	sea otters, 7 of them 20 meter to the north
10	11/9/2015	16:13:32	-122.01307	36.95575	sea lion 10 m to the west
11	11/9/2015	16:21:06	-122.01557	36.95235	sonar on begin ramp up
12	11/9/2015	16:28:19	-122.01313	36.95081	do not see any fishing gear
13	11/9/2015	16:44:08	-122.01203	36.94986	sea lion, swimming south, 20-m distance, to the west
14	11/9/2015	17:16:35	-122.01578	36.95234	sonar off
15	11/9/2015	17:35:11	-122.00138	36.96980	back in harbor
16	11/9/2015	18:46:34	-122.00179	36.96964	heading back out
17	11/9/2015	18:51:21	-122.00242	36.96464	sea otter, in harbor, 30m distance, laying on surface
18	11/9/2015	19:06:34	-122.01722	36.95191	start ramping up soar power
19	11/9/2015	19:32:35	-122.01025	36.94585	dolphin, 20 m distance, jump, to the east
20	11/9/2015	21:00:26	-122.00807	36.93966	2-3 sea lions on 1-mile buoy, out of water, 60-m distance to the south"
21	11/10/2015	0:17:19	-122.02734	36.93734	sonar off
22	11/10/2015	0:28:10	-122.00236	36.96545	sea otter, 10-m distance, inside harbor, swimming, sonar off, transiting

## **Appendix A: Rippled Scour Depression Study Weather Observation Forms**



# Marine Environmental Variables Form

Date: 11/06/15

Monitor: Peter Dartnell

Time	Latitude	Longitude	Vessel Activity	Weather	Cloud Cover	Glare	Visibility	Wind Speed	Sea State	Swell Height	Comments
12:55	36.959	122.002	transit	1	0%	high	10 miles	12	1	0-1	
15:47	36.9528	122.0136	survey	2	0-10%	high	10 miles	12	2	1	

# Marine Environmental Variables Form

Date: 11/09/15

Monitor: Dartnell

Time	Latitude	Longitude	Vessel Activity	Weather	Cloud Cover	Glare	Visibility	Wind Speed	Sea State	Swell Height	Comments
8:23	36.95207	122.01548	stationary	4	90-100	low	10-miles	14	wavelets	1-2	
9:07	36.94276	122.00311	survey	5	100	low	1 mile	20	whitecaps	1-2	rain
11:09	36.95025	122.01470	survey	5	90-100	low	3 miles	5	confused	2-3	
15:49	36.93227	122.1669	survey	4	50-90	high	10 miles	14	wavelets	2-3	

## **Appendix B: Rippled Scour Depression Study Marine Wildlife Observation Forms**

# Marine Wildlife Observations Form

Date: 11/06/15

Monitor: Dartnell

Time: <u>16:25</u>	Latitude: <u>36.96388</u>	Longitude: <u>122.60220</u>
Weather: <u>1</u>	Cloud Cover: <u>0-10</u>	Glare: <u>high</u>
Visibility: <u>10 miles</u>	Wind Speed: <u>2</u>	Sea State: <u>1</u>
Swell Height: <u>0</u>	Survey Vessel Activity: <u>transit in harbor</u>	

## Marine Wildlife Observations and Interactions:

sea lion, on surface, 30-m distance,  
starboard side, sonar off

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

## Marine Wildlife Observations and Interactions:

# Marine Wildlife Observations Form

Date: 11.09/15

Monitor: Dartnell

Time: <u>8:07</u>	Latitude: <u>36.96284</u>	Longitude: <u>122.00214</u>
Weather: <u>2</u>	Cloud Cover: <u>90-100</u>	Glare: <u>low</u>
Visibility: <u>10 miles</u>	Wind Speed: <u>2</u>	Sea State:
Swell Height:	Survey Vessel Activity: <u>transit</u>	

Marine Wildlife Observations and Interactions:

sea otter, 10-m distance, inside harbor

Time: <u>8:09</u>	Latitude: <u>36.95911</u>	Longitude: <u>122.00423</u>
Weather: <u>2</u>	Cloud Cover: <u>90-100</u>	Glare: <u>low</u>
Visibility: <u>10 miles</u>	Wind Speed:	Sea State: <u>2</u>
Swell Height:	Survey Vessel Activity: <u>transit</u>	

Marine Wildlife Observations and Interactions:

sea lion, 18-m distance, on surface, inside harbor

# Marine Wildlife Observations Form

Date: 11/9/15

Monitor: Partnell

Time: <u>8:11</u>	Latitude: <u>36.95707</u>	Longitude: <u>122.01195</u>
Weather: <u>2</u>	Cloud Cover: <u>90-100</u>	Glare: <u>low</u>
Visibility: <u>10-miles</u>	Wind Speed: <u>3</u>	Sea State: <u>2</u>
Swell Height: <u>1-2</u>	Survey Vessel Activity: <u>transit</u>	

## Marine Wildlife Observations and Interactions:

6-7 sea otters, 20-m distance,  
on surface, to the north

Time: <u>8:13</u>	Latitude: <u>36.95486</u>	Longitude: <u>122.01511</u>
Weather: <u>2</u>	Cloud Cover: <u>90-100</u>	Glare: <u>low</u>
Visibility: <u>10-miles</u>	Wind Speed: <u>3</u>	Sea State: <u>2</u>
Swell Height: <u>1-2</u>	Survey Vessel Activity: <u>transit</u>	

## Marine Wildlife Observations and Interactions:

sea lion, 30-m distance, on surface,  
to the west

# Marine Wildlife Observations Form

Date: 11/9/15

Monitor: Dartnell

Time: <u>8:44</u>	Latitude: <u>36.95042</u>	Longitude: <u>122.01316</u>
Weather: <u>4</u>	Cloud Cover: <u>100</u>	Glare: <u>low</u>
Visibility: <u>10 m.ks</u>	Wind Speed: <u>15</u>	Sea State: <u>wavelets</u>
Swell Height: <u>1-2</u>	Survey Vessel Activity: <u>survey</u>	

## Marine Wildlife Observations and Interactions:

sea lion swimming south, 20-m distance,  
to the west

Time: <u>10:51</u>	Latitude: <u>36.96408</u>	Longitude: <u>122.00230</u>
Weather: <u>1</u>	Cloud Cover: <u>90-100</u>	Glare: <u>low</u>
Visibility: <u>5 miles</u>	Wind Speed: <u>3</u>	Sea State: <u>1 inside harbor</u>
Swell Height: <u>0</u>	Survey Vessel Activity: <u>transit</u>	

## Marine Wildlife Observations and Interactions:

sea otter on surface, 30 m distance  
inside harbor

# Marine Wildlife Observations Form

Date: 11/09/15

Monitor: Dartnell

Time: <u>11:33</u>	Latitude: <u>36.94501</u>	Longitude: <u>122.00859</u>
Weather: <u>5</u>	Cloud Cover: <u>90-100</u>	Glare: <u>low</u>
Visibility: <u>5 miles</u>	Wind Speed: <u>97</u>	Sea State: <u>5</u>
Swell Height: <u>2-3</u>	Survey Vessel Activity: <u>survey</u>	

Marine Wildlife Observations and Interactions:

dolphin, jump, 20-m distance, to the east

Time: <u>13:00</u>	Latitude: <u>36.93887</u>	Longitude: <u>122.00643</u>
Weather: <u>3</u>	Cloud Cover: <u>50-90</u>	Glare: <u>moderate</u>
Visibility: <u>5 miles</u>	Wind Speed: <u>5 kts</u>	Sea State: <u>large wavelets</u>
Swell Height: <u>2-3</u>	Survey Vessel Activity: <u>survey</u>	

Marine Wildlife Observations and Interactions:

2-3 sea lions on 1-mile buoy, out of water, 60-m distance to the south



# Marine Wildlife Observations Form

Date: 11/09/15

Monitor: Dartnell

Time: <u>16:28</u>	Latitude: <u>36.96618</u>	Longitude: <u>122.00255</u>
Weather: <u>1</u>	Cloud Cover: <u>50-90</u>	Glare: <u>low</u>
Visibility: <u>5 miles</u>	Wind Speed: <u>4</u>	Sea State: <u>1 inside harbor</u>
Swell Height: <u>0</u>	Survey Vessel Activity: <u>transit</u>	

## Marine Wildlife Observations and Interactions:

sea otter, 10-m distance, swimming on surface, sonar off, port side inside harbor


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 Weather Observation Forms**

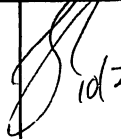


## EXHIBIT H

## 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
<b>Air Quality and Greenhouse Gas (GHG) Emissions (MND Section 3.3.3)</b>						
<b>MM AIR-1: Engine Tuning, Engine Certification, and Fuels.</b> 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.	<b>All Counties:</b> 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.	
	<b>Los Angeles and Orange Counties:</b> Use vessel engines meeting CARB's Tier 2-certified engines or cleaner; the survey shall be operated such that daily NO <sub>x</sub> 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 <sub>x</sub> emissions to verify compliance with limitations.			
	<b>San Luis Obispo County:</b> 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.			
	<b>Santa Barbara County:</b> 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.			
	<b>Ventura County:</b> 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
<b>MM FISH-1:</b> 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.	 10/21/14
<b>MM FISH-2:</b> 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).	 10/21/14
<b>MM FISH-1:</b> USCG and Harbormaster Notification.	Outlined under Commercial and Recreational Fisheries (above)					 10/21/14

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<sub>x</sub> = Nitrogen Oxide; OGPP = Offshore Geophysical Permit Program; OSCP = Oil Spill Contingency Plan; USCG = U.S. Coast Guard

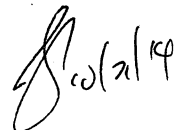
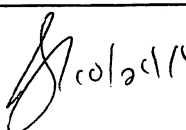
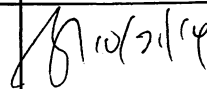
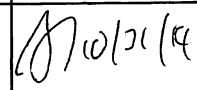
## EXHIBIT H

## 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
			ability to respond to worst-case spill.			
<b>MM HAZ-1:</b> Oil Spill Contingency Plan (OSCP) Required Information.	Outlined under Hazards and Hazardous Materials (above)					<i>[Signature]</i> 10/21/14
<b>MM HAZ-2:</b> Vessel fueling restrictions.	Outlined under Hazards and Hazardous Materials (above)					<i>[Signature]</i> 10/21/14
<b>MM HAZ-3:</b> OSCP equipment and supplies.	Outlined under Hazards and Hazardous Materials (above)					<i>[Signature]</i> 10/21/14
<b>MM BIO-9:</b> Limitations on Survey Operations in Select MPAs.	Outlined under Biological Resources (above)					<i>[Signature]</i> 10/21/14
<b>MM REC-1:</b> 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> 10/21/14

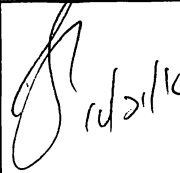
## EXHIBIT H

## 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
<b>MM BIO-9:</b> 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.	
<b>MM HAZ-1:</b> 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"> <li>• 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);</li> <li>• Description of crew training and equipment testing procedures; and</li> <li>• Description, quantities, and location of spill response equipment onboard the vessel.</li> </ul>	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.	
<b>MM HAZ-2:</b> 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.	
<b>MM HAZ-3:</b> 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.	

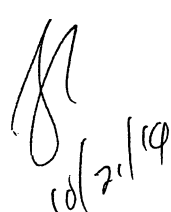
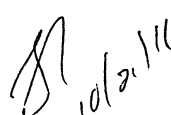
## EXHIBIT H

## 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
MM BIO-8: Reporting Requirements – Collision.	<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"> <li>• Vessel location (latitude, longitude) when the collision occurred;</li> <li>• Date and time of collision;</li> <li>• Speed and heading of the vessel at the time of collision;</li> <li>• 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;</li> <li>• Species of marine wildlife contacted (if known);</li> <li>• Whether an observer was monitoring marine wildlife at the time of collision; and,</li> <li>• Name of vessel, vessel owner/operator, and captain officer in charge of the vessel at time of collision.</li> </ul> <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>	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 completion of survey.	

## EXHIBIT H

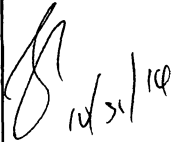
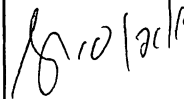
## Mitigation Monitoring Program

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
<b>MM BIO-6:</b> Practical Limitations on Equipment Use and Adherence to Equipment Manufacturer's Routine Maintenance Schedule.	<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"> <li>Using the highest frequency band possible for the subbottom profiler;</li> <li>Using the shortest possible pulse length; and</li> <li>Lowering the pulse rate (pings per second) as much as feasible.</li> </ul> <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>	No adverse effects to marine mammals or sea turtles due to survey activities are observed.	<p>Document initial and during survey equipment settings.</p> <p>Submit Final Monitoring Report after completion of survey activities.</p>	OGPP permit holder.	Immediately prior to and during survey.	
<b>MM BIO-7:</b> Avoidance of Pinniped Haul-Out Sites.	<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"> <li>The survey vessel shall not approach within 91 m of a haul-out site, consistent with National Marine Fisheries Service (NMFS) guidelines;</li> <li>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</li> <li>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.</li> </ul>	No adverse effects to pinnipeds at haul outs are observed.	<p>Document pinniped reactions to vessel presence and equipment use.</p> <p>Submit Final Monitoring Report after completion of survey activities.</p>	OGPP permit holder.	Monitoring Report following completion of 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
	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.	


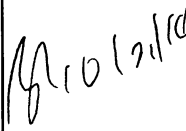
## EXHIBIT H

## 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												
	<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> <p>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>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					<div>8/21/14</div>
Equipment Type	Safety Zone (radius, m)																	
Single Beam Echosounder	50																	
Multibeam Echosounder	500																	
Side-Scan Sonar	600																	
Subbottom Profiler	100																	
Boomer System	100																	

# 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
<b>MM BIO-1: Marine Mammal and Sea Turtle Presence – Current Information.</b>	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.	
<b>MM BIO-2: Marine Wildlife Monitors (MWMs).</b>	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.	
<b>MM BIO-3: Safety Zone Monitoring.</b>	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.	