

Cruise Report

U.S. Geological Survey Cruise Report 2015-688-FA

September 28 – October 1, 2015

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USGS

Summary

During September 28 – October 1, 2015, the Pacific Coastal and Marine Science Center of the U.S. Geological Survey (USGS) conducted a survey collecting bathymetry data offshore of the Santa Cruz County shoreline, from Point Santa Cruz to the Moss Landing Harbor jetty. 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. 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 patterns that control beach morphodynamics. 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-A1** and the California Department of Parks and Recreation.

The USGS research 2015-688-FA took place from September 28 – October 1, 2015. All operations took place during daylight hours between 08:42 AM and 2:18 PM Pacific Standard Time (PST). Bathymetric mapping was conducted using two PWC each equipped with a 200 kHz single beam echosounder and a GPS receiver. In accordance with the MBNMS permit, the PWC launched from Santa Cruz harbor and transited directly to the survey sites from Point Santa Cruz (Figure 1) to Moss Landing Harbor (Figure 2) and operated at speeds at, or less than, 4 knots once at the survey site. 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 & 2 show 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.

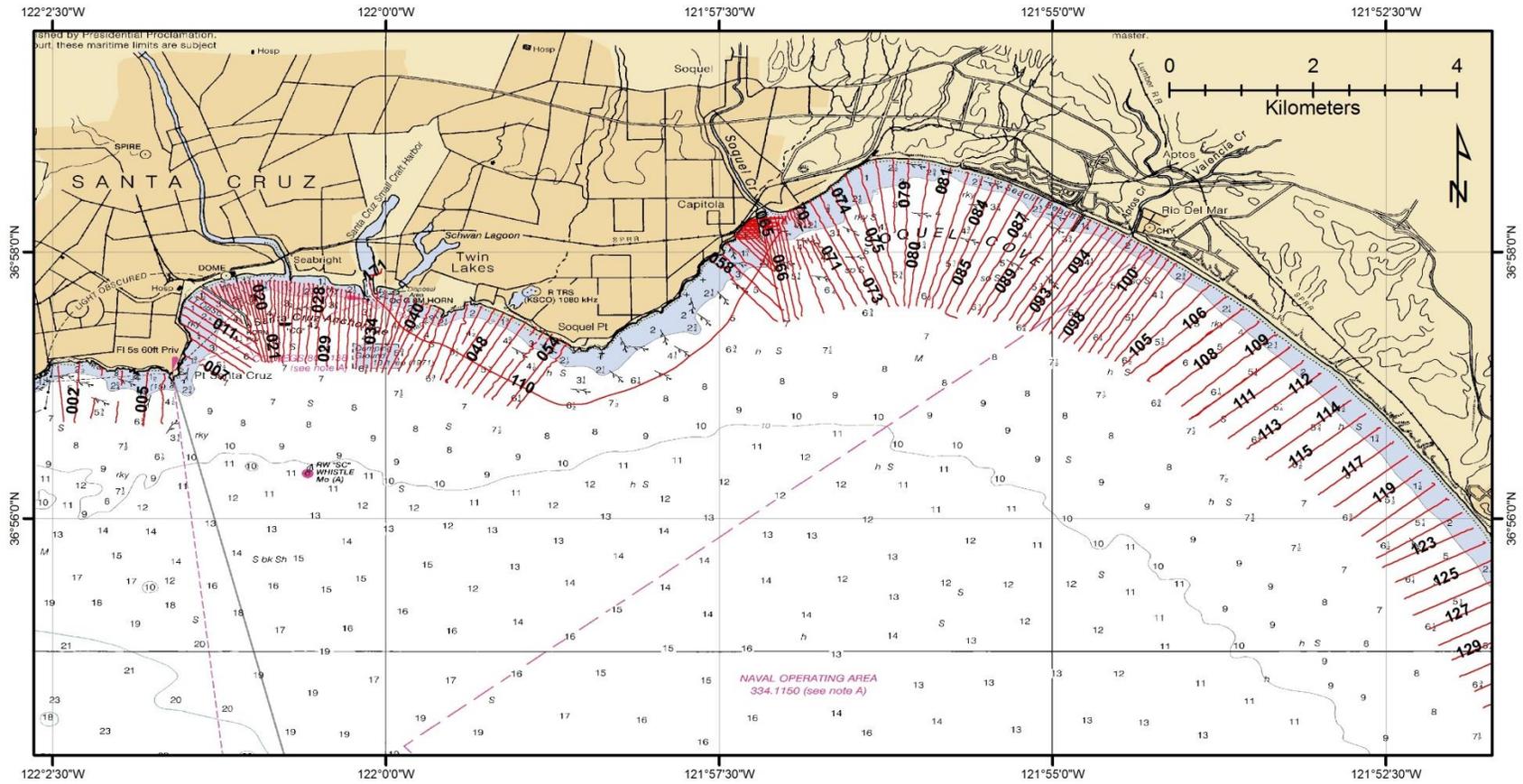


Figure 1. Northern extent of bathymetric data locations collected from September 28 – October 1, 2015 offshore of Santa Cruz County. Map projection is UTM Zone 10, meters.

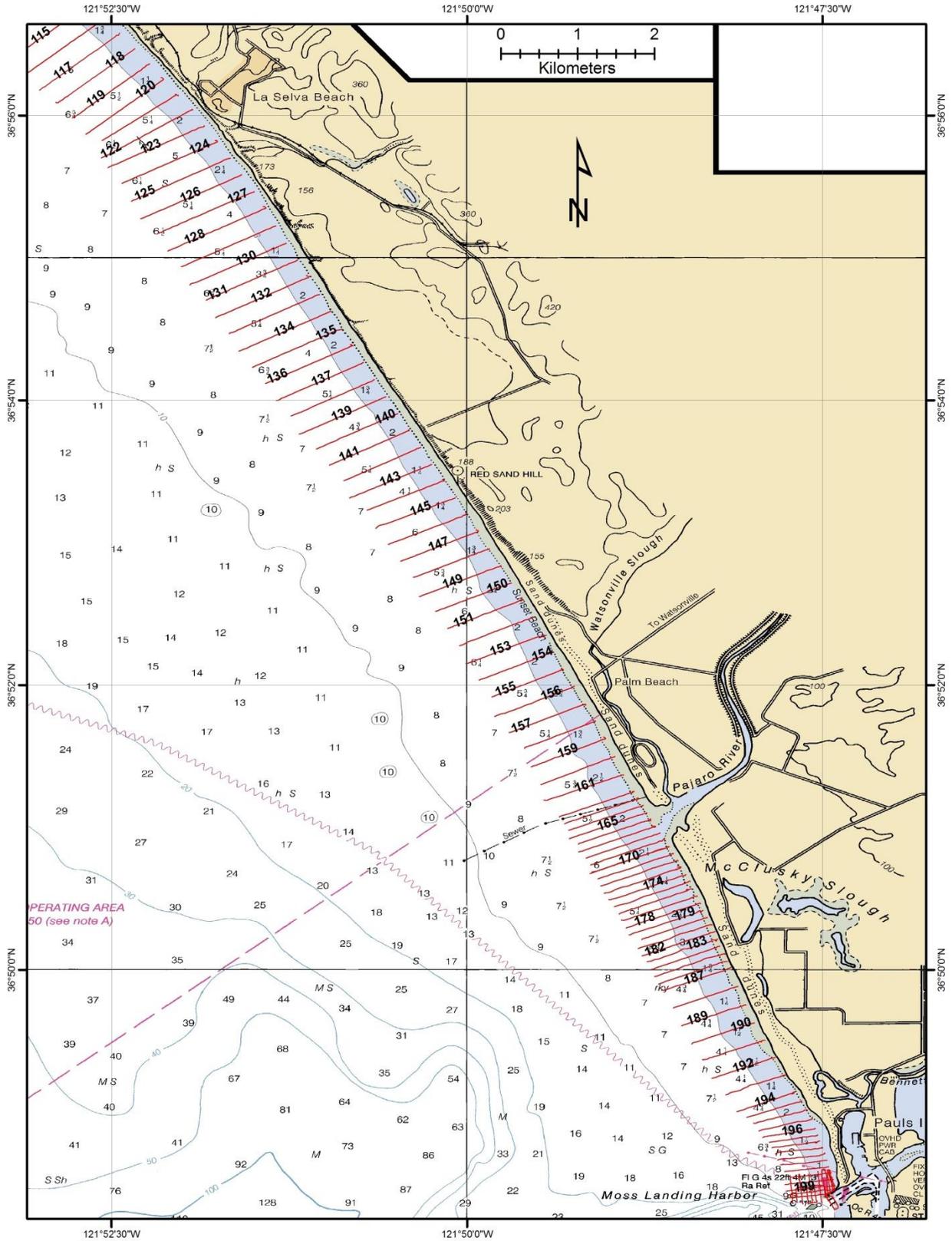


Figure 2. Southern extent of bathymetric data locations collected from September 28 – October 1, 2015 offshore of Santa Cruz County. Map projection is UTM Zone 10, meters.

Table 1. Survey track information.

Filename	Start Time (PST)	Start Latitude	Start Longitude	End Time (PST)	End Latitude	End Longitude
002_0842.RAW	9/28/2015 8:42	36.945365	-122.038877	9/28/2015 8:47	36.95272	-122.038422
003_0850.RAW	9/28/2015 8:50	36.952075	-122.035826	9/28/2015 8:51	36.951252	-122.035608
001_0850.RAW	9/28/2015 8:50	36.94548	-122.040297	9/28/2015 8:54	36.952402	-122.040959
004_0853.RAW	9/28/2015 8:53	36.951766	-122.033083	9/28/2015 8:55	36.950039	-122.033074
005_0858.RAW	9/28/2015 8:58	36.95157	-122.029888	9/28/2015 9:00	36.949794	-122.029977
003_0858.RAW	9/28/2015 8:58	36.945915	-122.036896	9/28/2015 9:00	36.948399	-122.036311
005_0901.RAW	9/28/2015 9:01	36.949595	-122.029982	9/28/2015 9:04	36.945035	-122.030318
004_0905.RAW	9/28/2015 9:05	36.945353	-122.033808	9/28/2015 9:07	36.947929	-122.033455
006_0906.RAW	9/28/2015 9:06	36.945231	-122.027953	9/28/2015 9:11	36.951375	-122.027825
005_0909.RAW	9/28/2015 9:09	36.944917	-122.030343	9/28/2015 9:13	36.951453	-122.029823
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007_0918.RAW	9/28/2015 9:18	36.950649	-122.020026	9/28/2015 9:20	36.952503	-122.023253
008_0921.RAW	9/28/2015 9:21	36.955972	-122.024494	9/28/2015 9:22	36.955927	-122.024342
007_0924.RAW	9/28/2015 9:24	36.953575	-122.024951	9/28/2015 9:25	36.953313	-122.0244
010_0929.RAW	9/28/2015 9:29	36.958854	-122.025579	9/28/2015 9:34	36.953088	-122.016406
009_0931.RAW	9/28/2015 9:31	36.952262	-122.016904	9/28/2015 9:37	36.957853	-122.025604
012_0936.RAW	9/28/2015 9:36	36.955366	-122.016371	9/28/2015 9:42	36.960533	-122.02451
011_0939.RAW	9/28/2015 9:39	36.959658	-122.025221	9/28/2015 9:44	36.953744	-122.01563
014_0943.RAW	9/28/2015 9:43	36.961746	-122.023073	9/28/2015 9:46	36.957727	-122.017867
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016_0949.RAW	9/28/2015 9:49	36.96023	-122.019613	9/28/2015 9:52	36.962592	-122.020789
013_0951.RAW	9/28/2015 9:51	36.961167	-122.02369	9/28/2015 9:55	36.9564	-122.01644
018_0953.RAW	9/28/2015 9:53	36.962836	-122.018557	9/28/2015 9:59	36.953072	-122.015506
015_0958.RAW	9/28/2015 9:58	36.961359	-122.021352	9/28/2015 9:59	36.961383	-122.021417
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088_1201.RAW	9/29/2015 12:01	36.972828	-121.917085	9/29/2015 12:09	36.958866	-121.926025
089_1202.RAW	9/29/2015 12:02	36.958524	-121.9254	9/29/2015 12:09	36.972291	-121.91569
090_1210.RAW	9/29/2015 12:10	36.958028	-121.924098	9/29/2015 12:17	36.971833	-121.914474
091_1210.RAW	9/29/2015 12:10	36.971131	-121.913211	9/29/2015 12:18	36.958135	-121.922097
093_1218.RAW	9/29/2015 12:18	36.957363	-121.920489	9/29/2015 12:26	36.970197	-121.91078
092_1219.RAW	9/29/2015 12:19	36.970526	-121.911998	9/29/2015 12:26	36.957751	-121.921177
094_1227.RAW	9/29/2015 12:27	36.956831	-121.919575	9/29/2015 12:34	36.969749	-121.909819
095_1227.RAW	9/29/2015 12:27	36.969199	-121.908668	9/29/2015 12:34	36.95685	-121.918031
097_1235.RAW	9/29/2015 12:35	36.955921	-121.915936	9/29/2015 12:41	36.968266	-121.906847
096_1235.RAW	9/29/2015 12:35	36.968686	-121.90781	9/29/2015 12:41	36.956473	-121.917073
098_1242.RAW	9/29/2015 12:42	36.955409	-121.915318	9/29/2015 12:49	36.96782	-121.905974
099_1242.RAW	9/29/2015 12:42	36.967294	-121.904915	9/29/2015 12:49	36.955231	-121.914014
101_1250.RAW	9/29/2015 12:50	36.954179	-121.912199	9/29/2015 12:56	36.96632	-121.903139
100_1250.RAW	9/29/2015 12:50	36.966692	-121.904362	9/29/2015 12:57	36.954287	-121.913439
103_1258.RAW	9/29/2015 12:58	36.965205	-121.90116	9/29/2015 13:05	36.953424	-121.910136
102_1259.RAW	9/29/2015 12:59	36.953986	-121.910976	9/29/2015 13:05	36.965833	-121.902262
105_1306.RAW	9/29/2015 13:06	36.952423	-121.907929	9/29/2015 13:12	36.962499	-121.897044
104_1306.RAW	9/29/2015 13:06	36.963919	-121.899353	9/29/2015 13:12	36.953055	-121.908912
106_1313.RAW	9/29/2015 13:13	36.951556	-121.907078	9/29/2015 13:19	36.961081	-121.895072
107_1314.RAW	9/29/2015 13:14	36.959469	-121.892768	9/29/2015 13:14	36.959457	-121.892965
108_1321.RAW	9/29/2015 13:21	36.958023	-121.891046	9/29/2015 13:27	36.948866	-121.902581
110_1334.RAW	9/29/2015 13:34	36.945903	-121.899321	9/29/2015 13:40	36.954825	-121.887154
109_1342.RAW	9/29/2015 13:42	36.956146	-121.888764	9/29/2015 13:42	36.956258	-121.88888
109_1354.RAW	9/29/2015 13:54	36.956216	-121.888848	9/29/2015 14:00	36.947383	-121.900575
107_1355.RAW	9/29/2015 13:55	36.959409	-121.893032	9/29/2015 14:01	36.95059	-121.904865
107_1401.RAW	9/29/2015 14:01	36.950483	-121.904523	9/29/2015 14:08	36.959544	-121.8931
110_1410.RAW	9/29/2015 14:10	36.970403	-121.950478	9/29/2015 14:59	36.96428	-122.000673
108_1418.RAW	9/29/2015 14:18	36.970226	-121.950574	9/29/2015 14:22	36.969349	-121.952762
110_0949.RAW	9/30/2015 9:49	36.946547	-121.898362	9/30/2015 9:55	36.954779	-121.887044
111_0957.RAW	9/30/2015 9:57	36.953095	-121.885304	9/30/2015 10:03	36.94471	-121.897042
110_0959.RAW	9/30/2015 9:59	36.945748	-121.899583	9/30/2015 10:06	36.954741	-121.887007
113_1006.RAW	9/30/2015 10:06	36.94207	-121.892371	9/30/2015 10:12	36.949859	-121.88121
112_1008.RAW	9/30/2015 10:08	36.951479	-121.883462	9/30/2015 10:13	36.943347	-121.894721
115_1014.RAW	9/30/2015 10:14	36.94645	-121.87757	9/30/2015 10:19	36.939704	-121.887152
114_1015.RAW	9/30/2015 10:15	36.940756	-121.890029	9/30/2015 10:21	36.948136	-121.879347
117_1021.RAW	9/30/2015 10:21	36.936314	-121.883479	9/30/2015 10:27	36.942976	-121.874043
116_1022.RAW	9/30/2015 10:22	36.94462	-121.876139	9/30/2015 10:28	36.93811	-121.88516
118_1029.RAW	9/30/2015 10:29	36.93488	-121.881529	9/30/2015 10:34	36.941157	-121.872265
119_1031.RAW	9/30/2015 10:31	36.939403	-121.870536	9/30/2015 10:35	36.933067	-121.879565
120_1036.RAW	9/30/2015 10:36	36.937766	-121.869243	9/30/2015 10:41	36.931134	-121.878043
121_1037.RAW	9/30/2015 10:37	36.930425	-121.876141	9/30/2015 10:42	36.93571	-121.867164
122_1042.RAW	9/30/2015 10:42	36.928387	-121.876203	9/30/2015 10:48	36.933998	-121.865541
123_1044.RAW	9/30/2015 10:44	36.932167	-121.864141	9/30/2015 10:48	36.927233	-121.875448
125_1050.RAW	9/30/2015 10:50	36.923303	-121.872703	9/30/2015 10:55	36.928336	-121.861093

124_1051.RAW	9/30/2015 10:51	36.930387	-121.862878	9/30/2015 10:56	36.925377	-121.873813
127_1058.RAW	9/30/2015 10:58	36.924446	-121.858299	9/30/2015 11:03	36.91951	-121.869652
126_1101.RAW	9/30/2015 11:01	36.921269	-121.871634	9/30/2015 11:07	36.926416	-121.859757
129_1104.RAW	9/30/2015 11:04	36.915663	-121.866817	9/30/2015 11:09	36.920429	-121.855748
128_1109.RAW	9/30/2015 11:09	36.922689	-121.857265	9/30/2015 11:14	36.917481	-121.86843
131_1111.RAW	9/30/2015 11:11	36.916441	-121.853218	9/30/2015 11:16	36.911722	-121.863929
130_1116.RAW	9/30/2015 11:16	36.913511	-121.865814	9/30/2015 11:22	36.918403	-121.854519
133_1118.RAW	9/30/2015 11:18	36.907824	-121.861223	9/30/2015 11:23	36.912368	-121.850638
132_1123.RAW	9/30/2015 11:23	36.914608	-121.852213	9/30/2015 11:28	36.909665	-121.862857
135_1127.RAW	9/30/2015 11:27	36.908313	-121.848017	9/30/2015 11:32	36.903864	-121.858508
134_1129.RAW	9/30/2015 11:29	36.905745	-121.860095	9/30/2015 11:36	36.910422	-121.849309
137_1133.RAW	9/30/2015 11:33	36.899998	-121.855691	9/30/2015 11:38	36.904423	-121.845491
136_1137.RAW	9/30/2015 11:37	36.906505	-121.847035	9/30/2015 11:42	36.901966	-121.856977
138_1140.RAW	9/30/2015 11:40	36.902458	-121.844212	9/30/2015 11:44	36.898176	-121.853976
140_1145.RAW	9/30/2015 11:45	36.894321	-121.851005	9/30/2015 11:50	36.898452	-121.841438
139_1147.RAW	9/30/2015 11:47	36.896054	-121.853014	9/30/2015 11:53	36.900416	-121.842871
142_1152.RAW	9/30/2015 11:52	36.89454	-121.838788	9/30/2015 11:56	36.890596	-121.847782
141_1155.RAW	9/30/2015 11:55	36.896518	-121.840242	9/30/2015 11:59	36.892424	-121.849472
143_1201.RAW	9/30/2015 12:01	36.888574	-121.847115	9/30/2015 12:06	36.8925	-121.83749
146_1207.RAW	9/30/2015 12:07	36.88314	-121.842604	9/30/2015 12:11	36.886705	-121.833472
144_1207.RAW	9/30/2015 12:07	36.89075	-121.83624	9/30/2015 12:11	36.88715	-121.845067
145_1212.RAW	9/30/2015 12:12	36.885014	-121.844059	9/30/2015 12:17	36.888588	-121.83471
148_1213.RAW	9/30/2015 12:13	36.882627	-121.830685	9/30/2015 12:16	36.879299	-121.839629
150_1218.RAW	9/30/2015 12:18	36.875308	-121.837027	9/30/2015 12:22	36.878609	-121.828127
147_1219.RAW	9/30/2015 12:19	36.884852	-121.832215	9/30/2015 12:23	36.881168	-121.841127
149_1224.RAW	9/30/2015 12:24	36.877059	-121.838955	9/30/2015 12:29	36.880482	-121.829343
152_1224.RAW	9/30/2015 12:24	36.87466	-121.825653	9/30/2015 12:28	36.871289	-121.834232
154_1230.RAW	9/30/2015 12:30	36.867252	-121.831946	9/30/2015 12:35	36.870603	-121.823221
151_1231.RAW	9/30/2015 12:31	36.876851	-121.827128	9/30/2015 12:35	36.873306	-121.835619
153_1236.RAW	9/30/2015 12:36	36.8692	-121.833483	9/30/2015 12:41	36.872211	-121.824251
156_1238.RAW	9/30/2015 12:38	36.866568	-121.820781	9/30/2015 12:41	36.863002	-121.830094
155_1243.RAW	9/30/2015 12:43	36.868549	-121.822269	9/30/2015 12:47	36.865295	-121.830443
158_1246.RAW	9/30/2015 12:46	36.859256	-121.826598	9/30/2015 12:50	36.862459	-121.818293
160_1252.RAW	9/30/2015 12:52	36.858354	-121.816022	9/30/2015 12:56	36.855013	-121.824685
157_1253.RAW	9/30/2015 12:53	36.861119	-121.828418	9/30/2015 12:57	36.86443	-121.819463
157_1257.RAW	9/30/2015 12:57	36.864426	-121.819456	9/30/2015 12:57	36.864317	-121.819458
162_1258.RAW	9/30/2015 12:58	36.851223	-121.822555	9/30/2015 13:02	36.854225	-121.81373
159_1258.RAW	9/30/2015 12:58	36.8606	-121.817347	9/30/2015 13:02	36.857085	-121.825845
164_1303.RAW	9/30/2015 13:03	36.852634	-121.812709	9/30/2015 13:07	36.849671	-121.821429
161_1304.RAW	9/30/2015 13:04	36.853223	-121.824331	9/30/2015 13:08	36.856174	-121.814968
166_1308.RAW	9/30/2015 13:08	36.848062	-121.820302	9/30/2015 13:12	36.851026	-121.811778
163_1309.RAW	9/30/2015 13:09	36.853446	-121.813464	9/30/2015 13:13	36.850446	-121.821922
168_1313.RAW	9/30/2015 13:13	36.849386	-121.810706	9/30/2015 13:17	36.846419	-121.819377
165_1314.RAW	9/30/2015 13:14	36.848692	-121.821372	9/30/2015 13:18	36.851723	-121.812259
169_1318.RAW	9/30/2015 13:18	36.845636	-121.818875	9/30/2015 13:22	36.848583	-121.810189
167_1319.RAW	9/30/2015 13:19	36.850148	-121.81165	9/30/2015 13:23	36.847131	-121.820266
170_1329.RAW	9/30/2015 13:29	36.8446	-121.818949	9/30/2015 13:33	36.847748	-121.809628
171_1408.RAW	9/30/2015 14:08	36.963514	-122.001892	9/30/2015 14:34	36.964567	-122.000514

170_1048.RAW	10/1/2015 10:48	36.844775	-121.818682	10/1/2015 10:52	36.84777	-121.809716
171_1053.RAW	10/1/2015 10:53	36.846904	-121.809159	10/1/2015 10:56	36.843979	-121.818013
173_1057.RAW	10/1/2015 10:57	36.842308	-121.81728	10/1/2015 11:01	36.845309	-121.808289
173_1101.RAW	10/1/2015 11:01	36.84531	-121.808287	10/1/2015 11:01	36.845357	-121.808716
172_1103.RAW	10/1/2015 11:03	36.84611	-121.808595	10/1/2015 11:06	36.843143	-121.817694
176_1105.RAW	10/1/2015 11:05	36.839852	-121.815511	10/1/2015 11:09	36.842813	-121.806948
174_1107.RAW	10/1/2015 11:07	36.841582	-121.816729	10/1/2015 11:11	36.844509	-121.807692
175_1111.RAW	10/1/2015 11:11	36.843673	-121.807188	10/1/2015 11:15	36.840722	-121.816075
177_1115.RAW	10/1/2015 11:15	36.839189	-121.815212	10/1/2015 11:19	36.841999	-121.806353
180_1118.RAW	10/1/2015 11:18	36.836875	-121.81288	10/1/2015 11:21	36.839455	-121.805155
178_1120.RAW	10/1/2015 11:20	36.841077	-121.805975	10/1/2015 11:24	36.838245	-121.814695
182_1122.RAW	10/1/2015 11:22	36.837844	-121.804292	10/1/2015 11:26	36.834971	-121.812849
179_1125.RAW	10/1/2015 11:25	36.837448	-121.814371	10/1/2015 11:28	36.840309	-121.805672
184_1127.RAW	10/1/2015 11:27	36.833409	-121.811715	10/1/2015 11:31	36.836111	-121.803718
181_1130.RAW	10/1/2015 11:30	36.838579	-121.804625	10/1/2015 11:34	36.835827	-121.813285
186_1132.RAW	10/1/2015 11:32	36.834332	-121.8028	10/1/2015 11:36	36.831679	-121.810887
183_1134.RAW	10/1/2015 11:34	36.834332	-121.812234	10/1/2015 11:38	36.836967	-121.803957
188_1137.RAW	10/1/2015 11:37	36.828877	-121.809157	10/1/2015 11:40	36.831406	-121.801558
185_1139.RAW	10/1/2015 11:39	36.835162	-121.80309	10/1/2015 11:43	36.83256	-121.811342
187_1143.RAW	10/1/2015 11:43	36.830968	-121.810536	10/1/2015 11:47	36.833642	-121.802427
190_1146.RAW	10/1/2015 11:46	36.824678	-121.807009	10/1/2015 11:49	36.827137	-121.799637
189_1149.RAW	10/1/2015 11:49	36.829207	-121.800631	10/1/2015 11:53	36.826796	-121.808178
192_1151.RAW	10/1/2015 11:51	36.823098	-121.797226	10/1/2015 11:54	36.820634	-121.804646
191_1154.RAW	10/1/2015 11:54	36.822843	-121.805755	10/1/2015 11:58	36.825106	-121.798398
194_1155.RAW	10/1/2015 11:55	36.816741	-121.801715	10/1/2015 11:59	36.819055	-121.794911
194_1159.RAW	10/1/2015 11:59	36.819056	-121.794903	10/1/2015 11:59	36.819056	-121.79489
193_1200.RAW	10/1/2015 12:00	36.820949	-121.796051	10/1/2015 12:03	36.818706	-121.803009
194_1.RAW	10/1/2015 12:00	36.818	-121.79409	10/1/2015 12:02	36.816076	-121.800538
196_1203.RAW	10/1/2015 12:03	36.813702	-121.798669	10/1/2015 12:06	36.814779	-121.792512
195_1205.RAW	10/1/2015 12:05	36.815418	-121.799751	10/1/2015 12:07	36.816949	-121.79346
196_1.RAW	10/1/2015 12:07	36.814024	-121.792219	10/1/2015 12:09	36.81315	-121.797916
195_1.RAW	10/1/2015 12:08	36.815852	-121.792842	10/1/2015 12:11	36.814481	-121.799124
196_2.RAW	10/1/2015 12:10	36.812543	-121.797603	10/1/2015 12:13	36.813293	-121.791972
197_1212.RAW	10/1/2015 12:12	36.811778	-121.797136	10/1/2015 12:15	36.812505	-121.791624
198_1214.RAW	10/1/2015 12:14	36.810318	-121.790932	10/1/2015 12:16	36.809712	-121.796124
197_1.RAW	10/1/2015 12:15	36.811951	-121.791421	10/1/2015 12:18	36.811071	-121.796937
198_1.RAW	10/1/2015 12:17	36.809085	-121.795444	10/1/2015 12:18	36.809585	-121.79062
197_2.RAW	10/1/2015 12:18	36.810513	-121.796583	10/1/2015 12:20	36.811056	-121.79111
198_2.RAW	10/1/2015 12:19	36.808823	-121.790391	10/1/2015 12:22	36.808183	-121.796082
199_1223.RAW	10/1/2015 12:23	36.808037	-121.790153	10/1/2015 12:26	36.807449	-121.795934
200_1225.RAW	10/1/2015 12:25	36.806617	-121.795813	10/1/2015 12:28	36.807177	-121.790791
199_1227.RAW	10/1/2015 12:27	36.806999	-121.795681	10/1/2015 12:29	36.807659	-121.790187
200_4.RAW	10/1/2015 12:30	36.8061	-121.791713	10/1/2015 12:32	36.809748	-121.792218
200_3.RAW	10/1/2015 12:33	36.809439	-121.793295	10/1/2015 12:35	36.806019	-121.792891
200_2.RAW	10/1/2015 12:36	36.805949	-121.793937	10/1/2015 12:38	36.809435	-121.79441
200_1.RAW	10/1/2015 12:38	36.809259	-121.795483	10/1/2015 12:40	36.805987	-121.795133
200_2A.RAW	10/1/2015 12:41	36.80613	-121.794642	10/1/2015 12:48	36.806283	-121.790992
200_4.RAW	10/1/2015 12:42	36.806988	-121.791153	10/1/2015 12:56	36.806676	-121.791411

Appendix A: Weather Observation Forms

Marine Environmental Variables Form

Dates: 9/29/2015 – 10/1/2015

Date	Time	Latitude	Longitude	Vessel Activity	Weather	Cloud Cover	Glare	Visibility	Wind Speed	Sea State	Swell Height	Monitors
9/28	755	36.952945	-122.041221	Transit	Drizzle	Overcast	None	5+ nm	Calm	Calm	0-1m	Andy O'Neill / Ana Rueda
9/28	1259	36.963474	-122.018355	Survey	None	Partly Cloudy	None	10+ nm (clear)	Calm	Calm	0-1m	Andy O'Neill / Ana Rueda
9/29	905	36.965965	-121.959730	Survey	None	Overcast	None	5+ nm	Calm	Calm	0-1m	Cordell Johnson / Ana Rueda
9/30	950	36.955286	-121.886633	Survey	Drizzle	Overcast	None	5+ nm	Calm	Calm	0-1m	Tim Elfers / Andy O'Neill / James Bishop
10/1	1045	36.847811	-121.809310	Survey	None	Overcast	None	5+ nm	Calm	Calm	0-1m	Tim Elfers / Jackson Currie/ James Bishop

Appendix B: Marine Wildlife Observations

Marine Wildlife Observations Form

Date: 9/28/2015

Monitor: Andy O'Neill / Ana Rueda

Time: 8:44 am	Latitude: 36.948895	Longitude: -122.040644
Weather: Overcast	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
Dolphins and seals near kelp beds.		

Time: 8:57 am	Latitude: 36.944098	Longitude: -122.035892
Weather: Overcast	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
Sea lions offshore line.		

Time: 9:08 am	Latitude: 36.949550	Longitude: -122.026953
Weather: Overcast	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
Seals near rock, survey vessels stayed clear.		

Time: 9:49 am	Latitude: 36.958733	Longitude: -122.018212
Weather: Overcast	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
Sea lions on floating dock.		

Marine Wildlife Observations Form

Date: 9/28/2015

Monitor: Andy O'Neill / Ana Rueda

Time: 1038 am	Latitude: 36.959266	Longitude: -122.006928
Weather: Overcast	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
Sea otter in kelp.		

Time: 1100 am	Latitude: 36.957911	Longitude: -121.998902
Weather: Overcast	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
Sea otter, sea lion, 9m water depth.		

Time: 1104 am	Latitude: 36.956235	Longitude: -121.998141
Weather: Overcast	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
Sea otter.		

Time: 1106 am	Latitude: 36.955870	Longitude: -121.999009
Weather: Overcast	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
2 Dolphins		

Marine Wildlife Observations Form

Date: 9/28/2015

Monitor: Andy O'Neill / Ana Rueda

Time: 1111 am	Latitude: 36.953098	Longitude: -121.997684
Weather: Overcast	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
Sea otter in 11m depth.		

Time: 1118 am	Latitude: 36.954469	Longitude: -121.994760
Weather: Overcast	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
1 dolphin.		

Time: 1153 am	Latitude: 36.954577	Longitude: -121.983207
Weather: Overcast	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
6-8 sea otters in kelp.		

Time: 1233 pm	Latitude: 36.958140	Longitude: -122.008940
Weather: Overcast	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
Dolphins in 6 meters depth.		

Marine Wildlife Observations Form

Date: 9/28/2015

Monitor: Andy O'Neill / Ana Rueda

Time: 1249 pm	Latitude: 36.957871	Longitude: -122.015148
Weather: Overcast	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
Sea otter at 6 meters depth.		

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9/28/2015

Marine Wildlife Observations Form

Date: 9/29/2015

Monitor: Cordell Johnson / Ana Rueda

Time: 0933 am	Latitude: 36.964585	Longitude: -121.953784
Weather: None	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
Sea otter in 6 meter depth.		

Time: 0936 am	Latitude: 36.966264	Longitude: -121.952881
Weather: None	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
2 Sea otters.		

Time: 936 am	Latitude: 36.968433	Longitude: -121.954433
Weather: None	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
Sea lion in 3 meters depth.		

Time: 949 am	Latitude: 36.969605	Longitude: -121.953578
Weather: None	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
Seal.		

Marine Wildlife Observations Form

Date: 9/29/2015

Monitor: Cordell Johnson / Ana Rueda

Time: 1015 am	Latitude: 36.964728	Longitude: -121.948257
Weather: Overcast	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
Seal in 3 meters depth.		

Time: 1022 am	Latitude: 36.969827	Longitude: -121.948067
Weather: None	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
Sea otter in 5 meters water depth.		

Time: 1033 am	Latitude: 36.969320	Longitude: -121.947259
Weather: None	Cloud Cover: Partly Cloudy	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
7 sea otters.		

Time: 1047 am	Latitude: 36.961180	Longitude: -121.939310
Weather: None	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
2 dolphins		

Marine Wildlife Observations Form

Date: 9/29/2015

Monitor: Cordell Johnson / Ana Rueda

Time: 1333 am	Latitude: 36.951235	Longitude: -121.904217
Weather: None	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
3 Dolphins.		

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Marine Wildlife Observations Form

Date: 9/30/2015

Monitor: Tim Efers / Andy O'Neill / James Bishop

Time: 1015 am	Latitude: 36.939707	Longitude: -121.887193
Weather: Overcast	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
Sea otter in 9m depth.		

Time: 1033 am	Latitude: 36.937284	Longitude: -121.873353
Weather: Drizzle	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
Dolphin in 3 meters depth.		

Time: 1033 am	Latitude: 36.918376	Longitude: -121.860431
Weather: None	Cloud Cover: Partly Cloudy	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
Dolphin in 3 meters water depth.		

Time: 1047 am	Latitude: 36.920957	Longitude: -121.860652
Weather: None	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
Pod of dolphins in 3 meters water depth.		

Marine Wildlife Observations Form

Date: 9/30/2015

Monitor: Tim Elfers / Andy O'Neill / James Bishop

Time: 1207 pm	Latitude: 36.885374	Longitude: -121.843011
Weather: Overcast	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
Mammal spotted.		

Time: 1231 pm	Latitude: 36.871976	Longitude: -121.825813
Weather: Overcast	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
Dolphin in 2 meters water depth.		

Time: 1320 pm	Latitude: 36.847934	Longitude: -121.811931
Weather: Overcast	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
Mammals.		

Time: am	Latitude:	Longitude:
Weather: Overcast	Cloud Cover: Overcast	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		

Marine Wildlife Observations Form

Date: 10/1/2015

Monitor: Tim Elfers / Jackson Currie / James Bishop

Time: 1112 am	Latitude: 36.840643	Longitude: -121.807381
Weather: None	Cloud Cover: Partly Cloudy	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		

Time: 1138 am	Latitude: 36.831620	Longitude: -121.807838
Weather: None	Cloud Cover: Partly Cloudy	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
Seal.		

Time: 1139 am	Latitude: 36.829507	Longitude: -121.807324
Weather: None	Cloud Cover: Partly cloudy	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
Pod of Dolphin		

Time: 1146 am	Latitude: 36.826976	Longitude: -121.800110
Weather: None	Cloud Cover: Partly cloudy	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		
Seal in 1 meter water depth.		

Marine Wildlife Observations Form

Date: 10/1/2015

Monitor: Tim Elfers / Jackson Currie / James Bishop

Time: 1154 am	Latitude: 36.819152	Longitude: -121.801518
Weather: None	Cloud Cover: Partly Cloudy	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		

Time: 1235 pm	Latitude: 36.808092	Longitude: -121.793143
Weather: None	Cloud Cover: Partly Cloudy	Glare: None
Visibility: 5+ nm	Wind Speed: calm	Sea State: calm
Swell Height: 0-1 feet	Survey Vessel Activity: Survey	
Marine Wildlife Observations and Interactions:		

Appendix C: Exhibit H

EXHIBIT H

Mitigation Monitoring Program

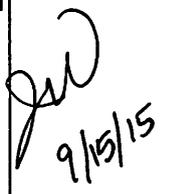
Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
Air Quality and Greenhouse Gas (GHG) Emissions (MND Section 3.3.3)						
MM AIR-1: Engine Tuning, Engine Certification, and Fuels.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

EXHIBIT H

Mitigation Monitoring Program

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
MM FISH-1: U.S. Coast Guard (USCG) and Harbormaster Notification.	All California waters; as a survey permit condition, the CSLC shall require Permittees to provide the USCG with survey details, including information on vessel types, survey locations, times, contact information, and other details of activities that may pose a hazard to mariners and fishers so that USCG can include the information in the Local Notice to Mariners, advising vessels to avoid potential hazards near survey areas. Furthermore, at least twenty-one (21) days in advance of in-water activities, Permittees shall post such notices in the harbormasters' offices of regional harbors.	No adverse effects to commercial fishing gear in place.	Notify the USCG and local harbormasters of planned survey activity. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Prior to survey.	JW 9/15/15
MM FISH-2: Minimize Interaction with Fishing Gear.	To minimize interaction with fishing gear that may be present within a survey area: (1) the geophysical vessel (or designated vessel) shall traverse the proposed survey corridor prior to commencing survey operations to note and record the presence, type, and location of deployed fishing gear (i.e., buoys); (2) no survey lines within 30 m (100 feet) of observed fishing gear shall be conducted. The survey crew shall not remove or relocate any fishing gear; removal or relocation shall only be accomplished by the owner of the gear upon notification by the survey operator of the potential conflict.	No adverse effects to commercial fishing gear in place.	Visually observe the survey area for commercial fishing gear. Notify the gear owner and request relocation of gear outside survey area. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Immediately prior to survey (prior to each survey day).	JW 9/15/15
MM FISH-1: USCG and Harbormaster Notification.	Outlined under Commercial and Recreational Fisheries (above)					JW 9/15/15

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

EXHIBIT H

Mitigation Monitoring Program

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
			ability to respond to worst-case spill.			
MM HAZ-1: Oil Spill Contingency Plan (OSCP) Required Information.	Outlined under Hazards and Hazardous Materials (above)					JW 9/15/15
MM HAZ-2: Vessel fueling restrictions.	Outlined under Hazards and Hazardous Materials (above)					JW 9/15/15
MM HAZ-3: OSCP equipment and supplies.	Outlined under Hazards and Hazardous Materials (above)					JW 9/15/15
MM BIO-9: Limitations on Survey Operations in Select MPAs.	Outlined under Biological Resources (above)					JW 9/15/15
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.	JW 9/15/15

EXHIBIT H

Mitigation Monitoring Program

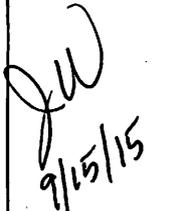
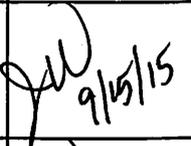
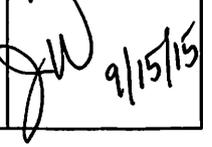
Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
MM BIO-9: Limitations on Survey Operations in Select Marine Protected Areas (MPAs).	All MPAs; prior to commencing survey activities, geophysical operators shall coordinate with the 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.	
MM HAZ-1: Oil Spill Contingency Plan (OSCP) Required Information.	Permittees shall develop and submit to CSLC staff for review and approval an OSCP that addresses accidental releases of petroleum and/or non-petroleum products during survey operations. Permittees' OSCP's shall include the following information for each vessel to be involved with the survey: <ul style="list-style-type: none"> • Specific steps to be taken in the event of a spill, including notification names, phone numbers, and locations of: (1) nearby emergency medical facilities, and (2) wildlife rescue/response organizations (e.g., Oiled Wildlife Care Network); • Description of crew training and equipment testing procedures; and • Description, quantities, and location of spill response equipment onboard the vessel. 	Reduction in the potential for an accidental spill. Proper and timely response and notification of responsible parties in the event of a spill.	Documentation of proper spill training. Notification of responsible parties in the event of a spill.	OGPP permit holder and contract vessel operator.	Prior to survey.	
MM HAZ-2: Vessel fueling restrictions.	Vessel fueling shall only occur at an approved docking facility. No cross vessel fueling shall be allowed.	Reduction in the potential for an accidental spill.	Documentation of fueling activities.	Contract vessel operator.	Following survey.	
MM HAZ-3: OSCP equipment and supplies.	Onboard spill response equipment and supplies shall be sufficient to contain and recover the worst-case scenario spill of petroleum products as outlined in the OSCP.	Proper and timely response in the event of a spill.	Notification to CSLC of onboard spill response equipment/supplies inventory, verify	Contract vessel operator.	Prior to survey.	

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Mitigation Monitoring Program

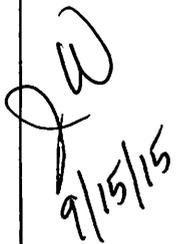
Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
<p>MM BIO-8: Reporting Requirements – Collision.</p>	<p>All State waters; if a collision with marine mammal or reptile occurs, the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

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Mitigation Monitoring Program

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
<p>MM BIO-6: Practical Limitations on Equipment Use and Adherence to Equipment Manufacturer's Routine Maintenance Schedule.</p>	<p>All State waters; geophysical operators shall follow, to the maximum extent possible, the guidelines of Zykov (2013) as they pertain to the use of subbottom profilers and side-scan sonar, including:</p> <ul style="list-style-type: none"> Using the highest frequency band possible for the subbottom profiler; Using the shortest possible pulse length; and Lowering the pulse rate (pings per second) as much as feasible. <p>Geophysical operators shall consider the potential applicability of these measures to other equipment types (e.g., boomer). Permit holders will conduct routine inspection and maintenance of acoustic-generating equipment to ensure that low energy geophysical equipment used during permitted survey activities remains in proper working order and within manufacturer's equipment specifications. Verification of the date and occurrence of such equipment inspection and maintenance shall be provided in the required presurvey notification to CSLC.</p>	<p>No adverse effects to marine mammals or sea turtles due to survey activities are observed.</p>	<p>Document initial and during survey equipment settings.</p> <p>Submit Final Monitoring Report after completion of survey activities.</p>	<p>OGPP permit holder.</p>	<p>Immediately prior to and during survey.</p>	<p>JW 9/15/15</p>
<p>MM BIO-7: Avoidance of Pinniped Haul-Out Sites.</p>	<p>The Marine Wildlife Contingency Plan (MWCP) developed and implemented for each survey shall include identification of haul-out sites within or immediately adjacent to the proposed survey area. For surveys within 300 meters (m) of a haul-out site, the MWCP shall further require that:</p> <ul style="list-style-type: none"> The survey vessel shall not approach within 91 m of a haul-out site, consistent with National Marine Fisheries Service (NMFS) guidelines; Survey activity close to haul-out sites shall be conducted in an expedited manner to minimize the potential for disturbance of pinnipeds on land; and Marine Wildlife Monitors shall monitor pinniped activity onshore as the vessel approaches, observing and reporting on the number of pinnipeds potentially disturbed (e.g., via head lifting, flushing into the water). The purpose of such reporting is to provide CSLC and California Department of Fish and Wildlife (CDFW) with information regarding potential disturbance associated with OGPP surveys. 	<p>No adverse effects to pinnipeds at haul outs are observed.</p>	<p>Document pinniped reactions to vessel presence and equipment use.</p> <p>Submit Final Monitoring Report after completion of survey activities.</p>	<p>OGPP permit holder.</p>	<p>Monitoring Report following completion of survey.</p>	<p>JW 9/15/15</p>

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Mitigation Monitoring Program

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

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Mitigation Monitoring Program

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials												
	<table border="1"> <thead> <tr> <th>Equipment Type</th> <th>Safety Zone (radius, m)</th> </tr> </thead> <tbody> <tr> <td>Single Beam Echosounder</td> <td>50</td> </tr> <tr> <td>Multibeam Echosounder</td> <td>500</td> </tr> <tr> <td>Side-Scan Sonar</td> <td>600</td> </tr> <tr> <td>Subbottom Profiler</td> <td>100</td> </tr> <tr> <td>Boomer System</td> <td>100</td> </tr> </tbody> </table> <p>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					<p>JW</p> <p>9/15/15</p>
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EXHIBIT H

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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.	JW 9/15/15
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.	JW 9/15/15
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.	JW 9/15/15