EXHIBIT F

PRESURVEY NOTIFICATION FORM

Applicant/Permittee's Mailing Address:
Bruce Appelgate
Scripps Institution of Oceanography
University of California, San Diego
La Jolla, CA 92093

Date: 6/19/16
Jurisdiction: Federal ____ State ____ Both _X_
If Sate: Permit #PRC 9094
Region: II
Area: Avila Bay, CA

GEOPHYSICAL SURVEY PERMIT

Check one: ___X___New survey _____ Time extension of a previous survey

Bureau of Ocean Energy Management with San Diego State University (Applicant/Permittee) will conduct a geophysical survey offshore California in the survey area outlined on the accompanying navigation chart segment. If you foresee potential interference with commercial fishing or other activities, please contact the person(s) listed below:

FEDERAL WATERS (outside 3 nautical miles)

1) Applicant's representative
2) Federal representative (e.g., Bureau of Ocean Energy Management [BOEM] or National Science Foundation [NSF])

NOTE: Any comments regarding potential conflicts in Federal waters must be received by the Applicant's Representative and lead Federal agency within ten (10) days of the receipt of this notice.

STATE WATERS (Inside 3 nautical miles)

1) Permittee's representative
2) CSLC representative

NOTE: Any comments regarding potential conflicts in State waters should be received as soon as possible by the Permittee's representative, no more than fifteen (15) days after the receipt of this notice.

1. Expected Date of Operation July 11 to 20, 2016
2. Hours of Operation 7am to 7pm
3. Vessel Name R/V Point Loma
4. Vessel Official Number CF1702XC, CF21702X0075C
5. Vessel Radio Call Sign RV Point Loma
6. Vessel Captain's Name Neal Driscoll
7. Vessel will monitor Radio Channel(s) 16/19
8. Vessel Navigation System DGPS Furuno GP32

EXHIBIT F

9. Equipment to be used:

1. Reson 7125 multibeam bathymetry sonar

   a. Frequency (Hz, kHz) 200 kHz and 400 kHz

   b. Source level (dB re 1 μPa at 1 meter (m) [root mean square (rms)]) 220 dB

   c. Number of beams, across track beamwidth, and along track beamwidth 512 – 256 beams, 1-2 degrees along track, 0.5 degrees across track

   d. Pulse rate and length Max 50 Hz, 30 -300 microseconds, variable

   e. Rise time NA

   f. Estimated distances to the 190 dB, 180 dB, and 160 dB re 1 μPa (rms) isopleths: 190 dB – 24 m, 180 db = 53 m, 160 dB – 155 m. NOTE: This instrument is operated above 200 kHz.

   g. Deployment depth Pole mount depth 1.5 m

   h. Tow speed 6-7 kts

   i. Approximate length of cable tow NA pole mount

2. Edgetech 3200, 512 Chirp sub-bottom profiler

   a. Frequency (Hz, kHz) 1-16 kHz

   b. Source level (dB re 1 μPa at 1 meter (m) [root mean square (rms)]) 212 dB

   c. Number of beams, across track beamwidth, and along track beamwidth 1 beam, variable width depending on frequency range (16-41 degrees)

   d. Pulse rate and length pulse rate 1 per second; pulse length ranges from 5-30 ms

   e. Rise time NA

   f. Estimated distances to the 190 dB, 180 dB, and 160 dB re 1 μPa (rms) isopleths

   190 dB – 35 m; 180 dB – 50 m; 160 dB – 75 m

   g. Deployment depth 6 m

   h. Tow speed 4 kts

   i. Approximate length of cable tow 50 m

EXHIBIT F

2. Edgetech 4200 sidescan sonar

   a. Frequency (Hz, kHz) 400 kHz

   b. Source level (dB re 1 µPa at 1 meter (m) [root mean square (rms)]) 196 dB

   c. Number of beams, across track beamwidth, and along track beamwidth 1 beam, along track - 0.4 degrees, across track - 50 degrees

   d. Pulse rate and length pulse rate 1 per second; pulse length up to 10 ms

   e. Rise time 30 seconds, variable

   f. Estimated distances to the 190 dB, 180 dB, and 160 dB re 1 µPa (rms) isopleths

      190 dB – 2 m, 180 dB = 6 m, 160 dB – 40 m. NOTE: This instrument is operated above 200 kHz.

   g. Deployment depth 2-50 m

   h. Tow speed 4-6 kts

   i. Approximate length of cable tow 50-150 m

Applicants Representative:
Neal Driscoll
Scripps Institution of Oceanography
University of California
La Jolla, CA 92093
858-822-5026

California State Lands Representative
Richard B. Greenwood
Statewide Geophysical Coordinator
200 Oceangate, 12th Floor
Long Beach, CA 90802-4331
(562) 590-5201

UCSD Representatives:
Bruce Appelgate
Director, MARFAC
Scripps Institution of
Oceanography
UC San Diego
La Jolla, CA 92093

EXHIBIT G

California State Lands Commission Presurvey Notice Requirements for Permittees to Conduct Geophysical Survey Activities

All parts of the Presurvey Notice must be adequately filled out and submitted to the CSLC staff a minimum of twenty-one (21) calendar days prior to the proposed survey date to ensure adequate review and approval time for CSLC staff. Note that one or more of the items may require the Permittee to plan well in advance in order to obtain the necessary documentation prior to the Notice due date (e.g., permits from other State or Federal entities).

Please use the boxes below to verify that all the required documents are included in the Presurvey Notice. If "No" is checked for any item, please provide an explanation in the space provided. If additional space is needed, please attach separate pages.

Yes	No	
☒	☐	Geophysical Survey Permit Exhibit F
☒	☐	Survey Location (including a full-sized navigation chart and GPS coordinates for each proposed track line and turning point): Explanation:
☐	☒	Permit(s) or Authorization from other Federal or State agencies (if applicable) Explanation:
☒	☐	21-Day Written Notice of Survey Operations to Statewide Geophysical Coordinator/
☒	☐	U.S. Coast Guard Local Notice to Mariners
☒	☐	Harbormaster and Dive Shop Notifications Explanation:
☒	☐	Marine Wildlife Contingency Plan Explanation:
☒	☐	Oil Spill Contingency Plan Explanation:
☐	☒	Verification of California Air Resources Board's Tier 2-Certified Engine Requirement Explanation: Yanmar Diesel engines consume less than 10 gallons during 8 hours of surveying and transit from Avila Bay to study area is ½ hour of transit.

☒ ☐ Verification of Equipment Service and/or Maintenance (must verify sound output)
Explanation:

☐ ☒ Permit(s) or Authorization from California Department of Fish and Wildlife for surveys in or affecting Marine Protected Area(s) (if applicable)
Explanation: Surveys do not extend into any Marine Protected Areas

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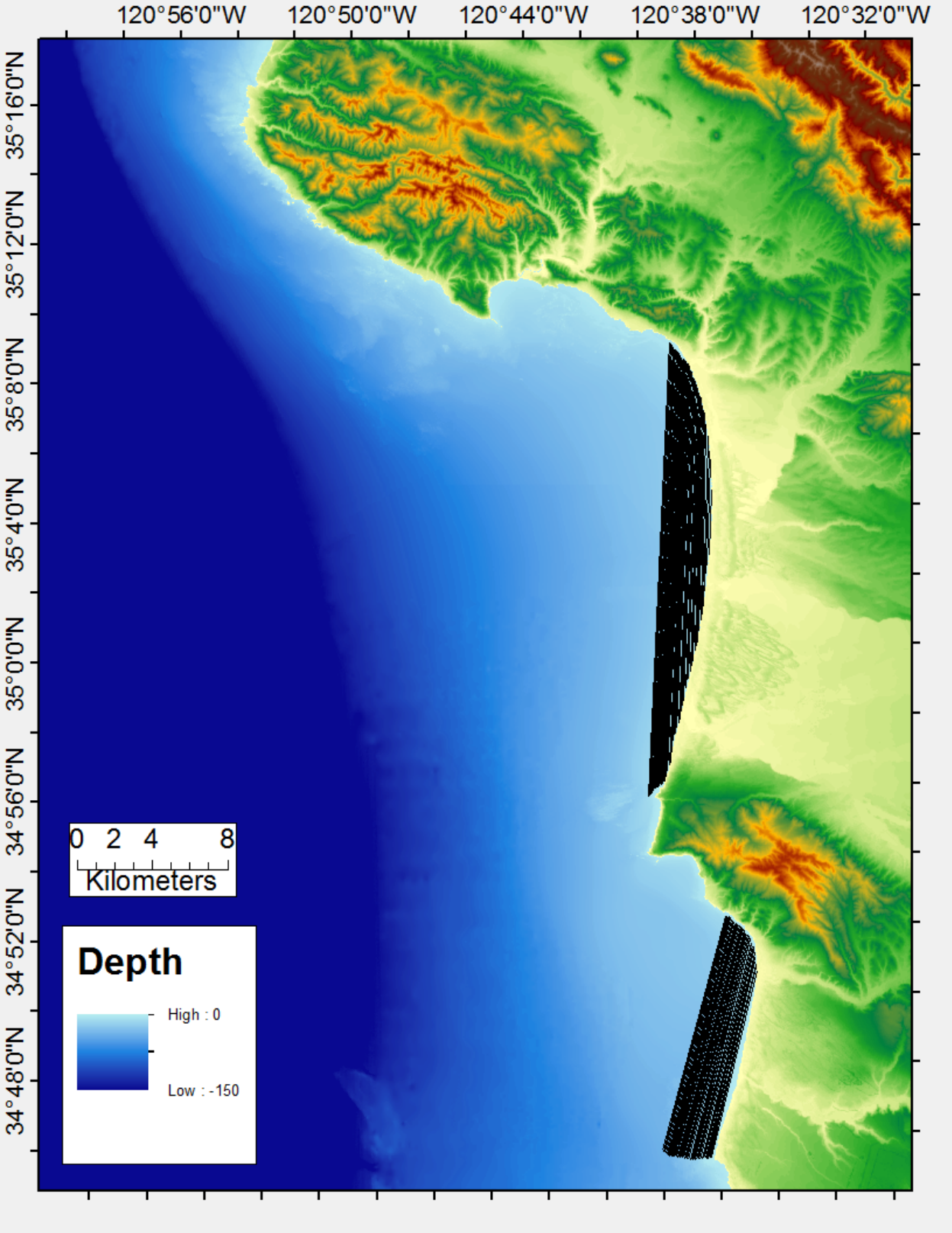
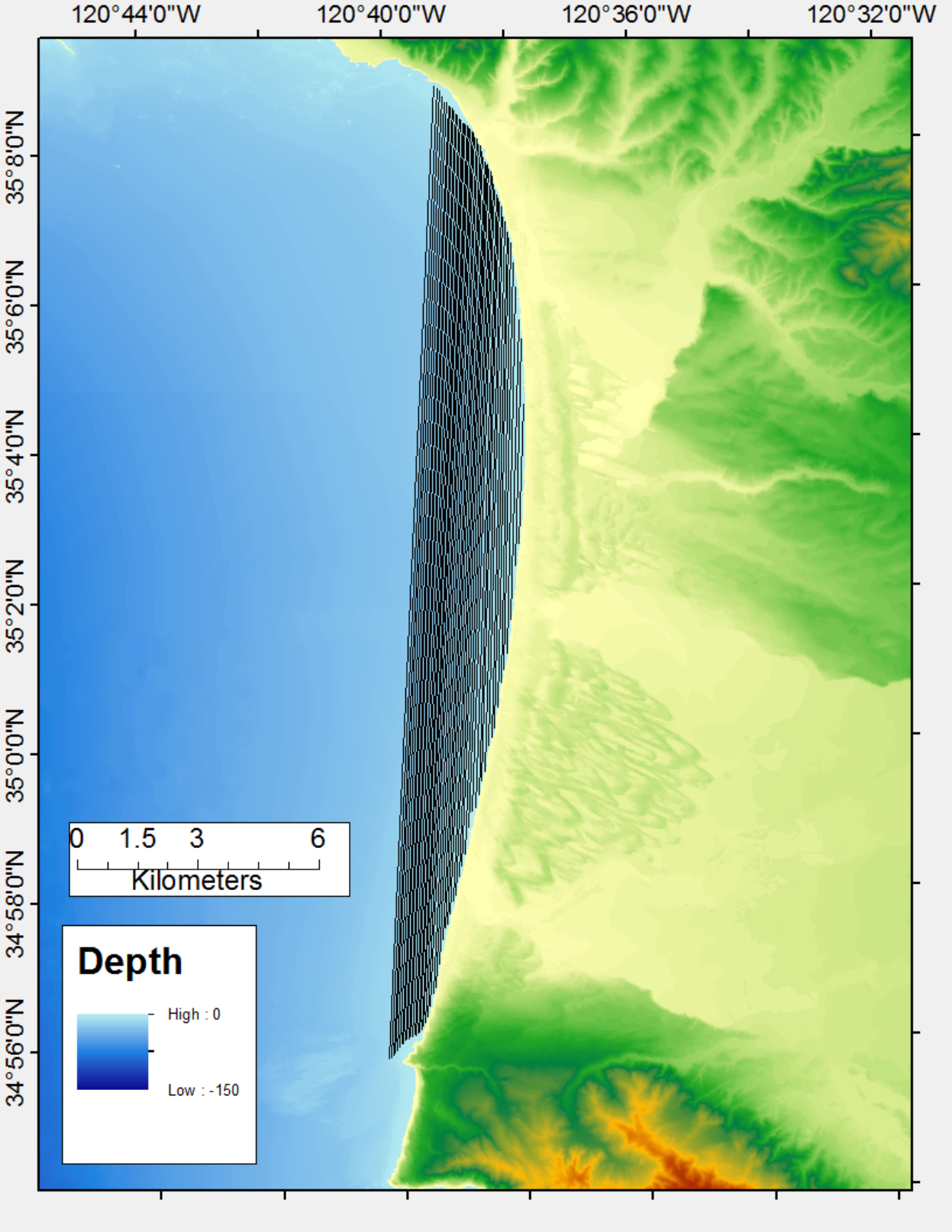
NOTE: CSLC staff will also require verification that current biological information was obtained and transmitted as outlined in Section 5 of this permit.

Dan Lawson (562-980-3209) at the NOAA Long Beach office on May 11, 2016 informed us regarding marine mammal activity within the survey area. NOAA confirmed that there has been no unusual marine wildlife activity in the vicinity of the survey beyond what we expect to encounter as documented in the Marine Wildlife Contingency Plan included in this notification package. We left a message for Dan Lawson on July 20, 2016 to secure an update on marine mammal activity.

Map 1: The above map shows the planned survey lines. See Tables 1 and 2 for survey line coordinates.

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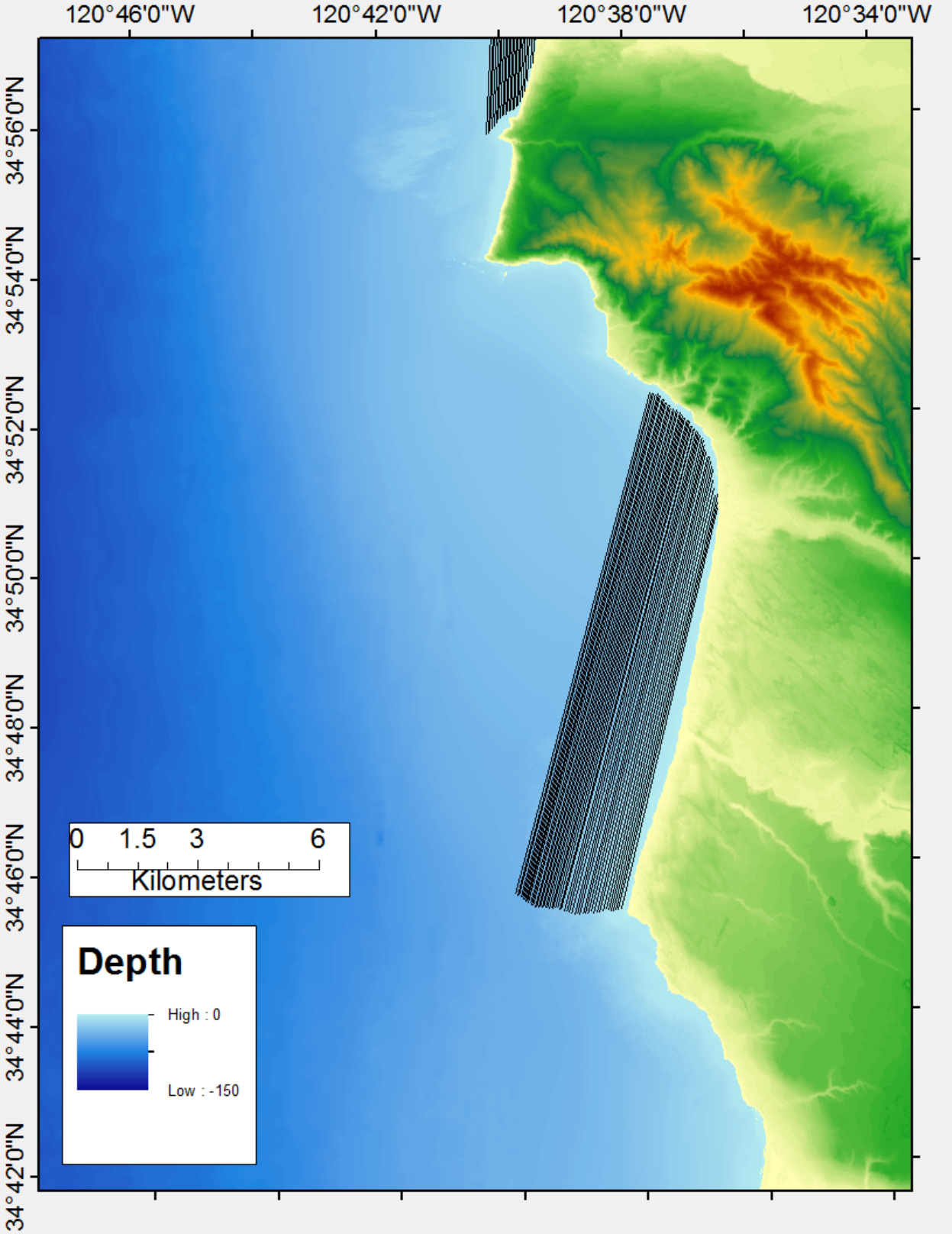
0 1.5 3 6
Kilometers
Depth
High : 0
Low : -150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34°42'0"N
0 1.5 3 6
Kilometers
Depth
High : 0
Low : -150

Table 1: The table below shows the start and end points in geographic decimal degrees for each line shown in the above map for the northern survey.

Lines	start_x	start_y	end_x	end_y
1	-120.668062	34.932959	-120.649378	35.143511
2	-120.648902	35.142632	-120.667508	34.933413
3	-120.666988	34.933774	-120.648442	35.142393
4	-120.64794	35.141961	-120.666448	34.934183
5	-120.647437	35.141521	-120.665989	34.934457
6	-120.665493	34.934689	-120.646997	35.140988
7	-120.646558	35.140418	-120.66502	34.935022
8	-120.664499	34.935274	-120.64612	35.13981
9	-120.645677	35.139353	-120.663983	34.935385
10	-120.663441	34.935535	-120.64519	35.138856
11	-120.644772	35.138582	-120.663001	34.935738
12	-120.644345	35.138283	-120.66256	34.936038
13	-120.643918	35.137984	-120.662085	34.936504
14	-120.661512	34.937395	-120.64352	35.137596
15	-120.643122	35.13723	-120.660914	34.938144
16	-120.660237	34.93965	-120.642699	35.136819
17	-120.642279	35.136274	-120.659457	34.941725
18	-120.658532	34.944842	-120.641864	35.13555
19	-120.641444	35.134983	-120.657902	34.945708
20	-120.656883	34.951126	-120.641065	35.133991
21	-120.655822	34.956757	-120.640596	35.133724
22	-120.640229	35.132282	-120.655016	34.958953
23	-120.654284	34.959993	-120.639832	35.131163
24	-120.639441	35.129855	-120.653478	34.962188
25	-120.652607	34.965198	-120.63906	35.12936
26	-120.638588	35.129182	-120.651872	34.96634
27	-120.650922	34.970675	-120.638264	35.128369
28	-120.637878	35.127715	-120.650118	34.972769
29	-120.649125	34.975708	-120.637486	35.12688
30	-120.637177	35.124697	-120.647935	34.981195
31	-120.636842	35.123395	-120.64686	34.985018
32	-120.636453	35.12247	-120.646009	34.985757
33	-120.636085	35.121545	-120.645029	34.988671
34	-120.635668	35.120854	-120.644087	34.991783
35	-120.63528	35.119875	-120.643131	34.993869
36	-120.642045	34.99973	-120.634797	35.117635
37	-120.634243	35.116336	-120.641257	35.001262
38	-120.640426	35.003567	-120.633814	35.114311
39	-120.63337	35.112816	-120.63942	35.008152
40	-120.638341	35.013726	-120.632954	35.111887
41	-120.637477	35.016468	-120.632328	35.10757
42	-120.631761	35.101714	-120.63656	35.020005
43	-120.631235	35.094441	-120.635328	35.027392

44	-120.630493	35.090339	-120.6338	35.0394
45	-120.630384	35.07575	-120.632595	35.044406
46	-120.668641	34.932117	-120.649967	35.143644
47	-120.650485	35.144579	-120.669237	34.931298
48	-120.669747	34.931119	-120.651069	35.146123
49	-120.670336	34.930545	-120.651764	35.146796
50	-120.67087	34.930291	-120.652625	35.147185

Table 2: The table below shows the start and end points in geographic decimal degrees for each line shown in the above map for the southern survey.

Line	Start_x	start_y	End_x	End_y
1	-120.65039	34.75603	-120.614292	34.861526
2	-120.614715	34.861998	-120.651089	34.755919
3	-120.651762	34.75603	-120.61515	34.862354
4	-120.615534	34.862838	-120.652585	34.756094
5	-120.653254	34.756399	-120.615865	34.863308
6	-120.61626	34.863434	-120.653895	34.756654
7	-120.654596	34.756862	-120.616542	34.863682
8	-120.61694	34.863948	-120.655357	34.757047
9	-120.65597	34.757205	-120.617243	34.864288
10	-120.617503	34.865026	-120.656497	34.757337
11	-120.639105	34.757045	-120.610478	34.845987
12	-120.639889	34.756743	-120.61062	34.847178
13	-120.610634	34.848705	-120.640607	34.756648
14	-120.611547	34.85418	-120.643214	34.756888
15	-120.611567	34.851921	-120.642566	34.756577
16	-120.641887	34.756611	-120.611399	34.850378
17	-120.641303	34.756631	-120.611234	34.848787
18	-120.611821	34.855116	-120.644211	34.756283
19	-120.612169	34.856025	-120.645025	34.756128
20	-120.612324	34.857161	-120.645834	34.756113
21	-120.646546	34.75622	-120.612877	34.857507
22	-120.613264	34.858158	-120.647297	34.756281
23	-120.613655	34.858681	-120.64819	34.755972
24	-120.648959	34.756049	-120.613646	34.860097
25	-120.613935	34.860875	-120.649657	34.755985
26	-120.617828	34.865426	-120.657028	34.757394
27	-120.657598	34.757323	-120.618282	34.865654
28	-120.618717	34.86591	-120.658137	34.757345
29	-120.65866	34.757378	-120.619116	34.866181
30	-120.619442	34.866523	-120.659155	34.75747
31	-120.659662	34.757561	-120.619692	34.867082
32	-120.620109	34.867353	-120.660173	34.757595
33	-120.660624	34.757674	-120.620637	34.867465
34	-120.621106	34.867752	-120.661093	34.757671
35	-120.661544	34.75775	-120.621616	34.867893

36	-120.622032	34.868179	-120.661997	34.757805
37	-120.662464	34.757838	-120.622485	34.86845
38	-120.622899	34.868808	-120.662915	34.757963
39	-120.663362	34.758183	-120.62326	34.869224
40	-120.623694	34.86951	-120.663766	34.758472
41	-120.664169	34.758749	-120.624166	34.869723
42	-120.624561	34.870125	-120.664575	34.758979
43	-120.66495	34.759148	-120.624885	34.870569
44	-120.625282	34.870912	-120.66526	34.759295
45	-120.665535	34.75963	-120.625695	34.871329
46	-120.62613	34.871585	-120.665865	34.759905
47	-120.666265	34.760136	-120.626677	34.871491
48	-120.627175	34.871577	-120.666713	34.760319
49	-120.667145	34.760464	-120.627613	34.871731
50	-120.628104	34.871901	-120.667624	34.760585

RE: Geophysical Survey of Offshore Oceano dunes.

Dear Statewide Geophysical Survey Coordinator:

The proposed survey is located offshore of Oceano (Figure 1). The survey area does not impact any Marine Protected Areas (MPA) (see Exhibit E.). We will acquire swath bathymetry and CHIRP subbottom data (penetration in nearshore sands is typically ~15 – 30 meters) to define the morphology and thickness of the sands offshore above the transgressive erosional surface. These data will provide constraints on the sediment type, thickness, and distribution offshore of the Oceano Dunes.

The sonar survey will image the bottom using a Reson 7125 swath system. The side scan sonar (Edgetech 4200) will be onboard and will only be used if the problems occur with the Reson 7125. A sub-bottom profiling system (Edgetech 512i) will determine the sub-surface geology. All of the sonar equipment that will be used during the survey is low energy. All the sonar equipment has been employed on surveys within the last few months and has performed to the manufacturer's specifications. In addition, we service the instruments between surveys – see equipment management section. Once on site and prior to deployment in the water, all equipment undergoes a visual inspection to make sure all connections are secure and there is no damage to any cables/connections or equipment. After a physical check of the equipment, the sonar devices are powered on deck and checked to make sure that everything is in working order. The manufacturer's internal system software will confirm the system is operating properly and there are no grounding, voltage or fault issues. Once all system checks are verified, the equipment is set to the minimal power settings (10% for the subbottom Edgetech CHIRP) and deployed. Once deployed, the equipment will be powered up slowly to obtain an optimal data set. Equipment maintenance and inspection is also described in detail. A description of the characteristics of the sonar equipment is provided in Exhibit F. Survey operations will occur only during daylight hours to enable marine mammal observers aboard to identify any marine life that may enter the survey area so that we may cease acoustic firing until the specified safety zone is cleared. The source energy level for this type of equipment

is low and the potential for impact to marine life is minimal. Two marine mammal observers will be onboard the research vessel Point Loma during data collection. A safety zone of 100 m will be observed during data collection.

The marine mammal observers' qualifications are contained in Appendix A.
The proposed survey window is from June 10 - 20, 2016. The actual survey in its entirety should only take 7-8 days. The additional days are to account for a weather window to safely navigate in the open ocean. The length of time operating the acoustic profiling equipment should only be ~6 hours per day. All required survey notifications will be contacted prior to the survey. The pre survey geophysical survey checklist is contained in Exhibit G. Please call if you have any questions regarding our proposed geophysical survey 858.822.5026 or 760.505.9661

neal driscoll <ndriscoll@ucsd.edu>

To: reg4sec@wildlife.ca.gov Cc: neal driscoll <ndriscoll@ucsd.edu>

July 11 - 20 Sonar Survey offshore Oceano, CA

Today at 3:09 PM

UNIVERSITY OF CALIFORNIA, SAN DIEGO UCSD

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GEOSCIENCES RESEARCH DIVISION
SCRIPPS INSTITUTION OF OCEANOGRAPHY
92093-0210

9500 GILMAN DRIVE
LA JOLLA, CALIFORNIA

19 July 2016

Notice to Mariners regarding UC San Diego Geophysical Survey

To Whom It May Concern:

I'm writing to notify you of upcoming sonar survey offshore Oceano, CA. This work will be conducted under a California State Lands Commission Geophysical Survey Permit PRC9094 and is a collaborative project between the Scripps Institution of Oceanography and the California Department of Recreation and Parks. The main goal of the research is to understand the sand thickness offshore the Oceano dunes. Onshore LiDAR surveys of the dunes will also be performed.

We will be operating surveys from Scripps' R/V Point Loma (32' length) with daily transits in and out of Avila Bay. The survey will include a multibeam and sub bottom Chirp sonar. The surveys will take place from July 11 - 20, 2016 with survey hours between 7am and 5pm. Planned survey lines and areas are shown on the attached maps. We will survey the northern area first and if time and weather permit, we also will survey the southern area.

If you have any questions or would like additional information, please contact me (ndriscoll@ucsd.edu; 858.822.5026)

Sincerely yours,

Neal Driscoll
Professor of Geology and Geophysics
Director of the Geosciences Program
Scripps Institution of Oceanography
University of California, San Diego
858.822.5026

SurveyMaps_Oceano_Project.pdf

neal driscoll <ndriscoll@ucsd.edu>

To: andreaL@portsanluis.edu, admin@portsanluis.com Cc: neal driscoll <ndriscoll@ucsd.edu>

July 11 - 20 Sonar Cruise Offshore Oceano, CA

Today at 3:12 PM

SurveyMaps_Oceano_Project.pdf

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Director of the Geosciences Program
Scripps Institution of Oceanography
University of California, San Diego
858.822.5026

neal driscoll <ndriscoll@ucsd.edu>

To: D11LNM@uscg.mil Cc: neal driscoll <ndriscoll@ucsd.edu>

Upcoming July 11 - 20 sonar cruise offshore Oceano, CA

Today at 3:13 PM

SurveyMaps_Oceano_Project.pdf

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GEOSCIENCES RESEARCH DIVISION
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92093-0210

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Professor of Geology and Geophysics
Director of the Geosciences Program
Scripps Institution of Oceanography
University of California, San Diego
858.822.5026

neal driscoll <ndriscoll@ucsd.edu>

To: info@enjoyAvilaBeach.com, jay@sleeplessInteractive.com Cc: neal driscoll <ndriscoll@ucsd.edu>

Upcoming July 11 - 20 Sonar Cruise offshore Oceano, CA

SurveyMaps_Oceano_Project.pdf

UNIVERSITY OF CALIFORNIA, SAN DIEGO UCSD

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We will be operating surveys from Scripps' R/V Point Loma (32' length) with daily transits in and out of Avila Bay. The survey will include a multibeam and sub bottom Chirp sonar. The surveys will take place from July 11 - 20, 2016 with survey hours between 7am and 5pm. Planned survey lines and areas are shown on the attached maps. We will survey the northern area first and if time and weather permit, we also will survey the southern area.

If you have any questions or would like additional information, please contact me (ndriscoll@ucsd.edu; 858.822.5026)

Sincerely yours,

Neal Driscoll
Professor of Geology and Geophysics
Director of the Geosciences Program
Scripps Institution of Oceanography
University of California, San Diego
858 822 5026

neal driscoll <ndriscoll@ucsd.edu>

To: info@slocoastkayaks.com Cc: neal driscoll <ndriscoll@ucsd.edu>

Today at 3:17 PM

Upcoming July 11 - 20 sonar cruise offshore Oceano, CA

SurveyMaps_Oceano_Project.pdf

UNIVERSITY OF CALIFORNIA, SAN DIEGO UCSD

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GEOSCIENCES RESEARCH DIVISION
SCRIPPS INSTITUTION OF OCEANOGRAPHY
92093-0210

9500 GILMAN DRIVE
LA JOLLA, CALIFORNIA

19 July 2016

Notice to Mariners regarding UC San Diego Geophysical Survey

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University of California, San Diego
858.822.5026

neal driscoll <ndriscoll@ucsd.edu> Today at 3:15 PM

To: info@enjoyAvilaBeach.com, jay@sleeplessInteractive.com Cc: neal driscoll <ndriscoll@ucsd.edu>

Upcoming July 11 - 20 Sonar Cruise offshore Oceano, CA

SurveyMaps_Oceano_Project.pdf

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MARINE WILDLIFE CONTINGENCY PLAN
Morphology and Sand Thickness Offshore Oceano Dunes
July 11-20, 2016

1.0 INTRODUCTION

This Marine Wildlife Contingency Plan (MWCP) is prepared in compliance with the Scripps institution of Oceanography's existing State Geophysical Permit PRC 9094. This plan is intended to provide guidance to vessel operators and scientific field personnel collecting geophysical data for a cooperative agreement between the California Department of Recreation and Parks and Scripps Institution of Oceanography.

This MWCP discusses mitigation efforts that are designed to reduce the impact of survey activities on marine wildlife, and is specific to the equipment, activities, and area proposed for this survey. The proposed monitoring and mitigation actions have been shown to be effective in reducing or eliminating potential impacts to marine mammals and reptiles, and follow the CSLC's guidelines set forth in its Mitigation Monitoring Program Exhibit B.

This MWCP includes measures that specify 1) the distance, speed, and direction transiting vessels will maintain when in proximity to marine wildlife; 2) qualifications, number, location and authority of onboard marine wildlife monitors; and 3) reporting requirements in the event of an incident, and following the completion of the survey.

1.1 Regulatory Basis

Species that are either currently in danger or soon likely to be in danger of extinction throughout all or a portion of its range are protected by the Endangered Species Act of 1973. The United States Fish and Wildlife Service (USFWS), and the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) implement the Endangered Species Act. A National Marine Sanctuaries Permit has been acquired from NOAA to use the equipment identified in this document to conduct scientific data acquisition in the Channel Islands National Marine Sanctuary. At the time of this mailing, the permit was in transit to San Diego State University from the NOAA office. Please see the attached email correspondence with Sean Hastings at NOAA (Pages 38-43). A copy of the permit will be submitted upon receipt.

1.2 Geophysical Survey Purpose and Objectives

The goal of this project is to define the thickness and architecture of the sand deposits offshore Oceano dunes. Understanding the nearshore wedge of sediment is important to determining beach stability as well as changes since the last transgression of sea level.

We contacted the NOAA Long Beach Office staff on May 11, 2016 to acquire information on the current composition and relative abundance of marine wildlife offshore as well as any pinniped haul out sites. We also called again on July 20th, 2016 to secure additional information regarding marine mammal activity, we left a message with Dan Lawson (562.980.3209). Additionally, one day prior to survey activities, the NOAA Long Beach office and local whale watching operations will be contacted to get an update on marine wildlife sightings in the area. This information will be conveyed to the captain and crew prior to the survey.

A review of environmental responsibility of project operations will be conducted

by the chief scientist in charge of the survey operations prior to commencing the first day of operations. When new personnel are added to the crew, this training will be repeated at least for those new to the crew. They will be made aware of their individual responsibility and will be shown how to be aware of possible environmental impacts and how to mitigate them during the geophysical survey operations. Information relating to seasonality, as an indication of the types of animals that might be in our survey area, at the time of survey work will also be presented to the crew. A copy of the Marine Wildlife Contingency Plan will be provided to the crew of our survey vessels.

All personnel will be expected to be consistently aware that they are to be alert to any presence of marine wildlife while they are performing their duties. There are a number of signs/indications of marine wildlife presence and each crew member will be responsible to maintain vigilance for those signs within the constraints of their project duties. Some of those indications are:

a. Sounds - such as splashing, vocalizations (by animals and birds), and blowing (breathing).
b. Visual indications - birds aggregating, changes in water character such as areas of rippled water, white water caused by splashing, changes in color or shape of the ocean surface

1.3 Survey Schedule and Layout

The Project schedule will be from July 11-20, 2016, with built in contingency days. The proposed mapping areas are along the inner continental shelf offshore Oceano, CA (Map 1). Daily activities will include a transit from Avila Bay to the survey location, deployment of geophysical gear, geophysical survey, recovery of gear, and transit back to Avila Bay. The Chirp profiler will be deployed from the side mounted J-frame and towed of the starboard rail. The sidescan sonar (if used – this is only for contingency if the Reson 7125 is not working) will be deployed from the stern of the ship using a mule post in the center of the vessel. Survey speeds for the Reson 7125 will be maintained at ~7 knots. After acquiring the swath bathymetery data, CHIRP data will be acquired at ~3-4 knots. We anticipate 8 hours at sea each day, including transit (1-2 hours round trip daily). The survey lines will only be collected when conditions are safe and swimmers, divers and paddlers not present. The shallowest depth of survey lines will be ~10 m. Survey data will be monitored in real-time aboard the vessel.

Our survey locations are illustrated in Maps 1, 2, and 3. Coordinates for each anticipated ship track line are included in Tables 1 and 2. All surveys are designed to fit our scientific goals, the safety of the crew and vessel, and our environmental mitigation plans.

2.0 SURVEY EQUIPMENT

We propose to use the following equipment to collect the required data:

1. Reson 7125 swath bathymetry system at 200 and 400 kHz.
2. Edgetech 3200, 512 towfish, 0.5-16 kHz swept pulse sub-bottom.
3. Edgetech 4200, 100 kHz or 400 kHz digital sidescan sonar (this will only be used as backup in the event of technical issues with the Reson 7125).

The Reson7125 and Edgetech sidescan sonar will be operated above a 200 kHz frequency and therefore do not require safety zone monitoring. The Edgetech Chirp profiler is a sub-bottom profiler and therefore has a safety zone radius of 100 meters. Equipment maintenance documentation is included in this notification.

3.0 MARINE WILDLIFE

The following discusses the marine wildlife that are most likely to be within the project region during survey operations, and the subsequent section (4.0) outlines the methods that will be instituted by the vessel operator and crew to reduce or eliminate potential impacts to marine wildlife during transit and survey operations.

Table 3-1 details the marine mammal species possibly occurring in the survey area, along with their status and population estimates and trends by stock. Table 3-2 describes the likelihood of occurrence within the project area according to the species' seasonality.

Table 3-1: Marine Mammal and Reptile Protection Status and Population Estimates and Trends by Stock

Common Name ***Scientific Name***	**Protected Status**	**Minimum Population Estimate**	**Current Population Trend**
Mysticeti			
North Pacific right whale *Eubalaena japonica*	FE, M	17 (based on-photo identification) (Eastern North Pacific Stock)	No long-term trends suggested
California grey whale *Eschrichtius robustus*	M	18,017 (Eastern North Pacific Stock)	Fluctuating annually
Humpback whale *Megaptera novaeangliae*	FE, M	1,878 (California/Oregon/Washington Stock)	Increasing
Minke whale *Balaenoptera acutorostrata*	M	202 (California/Oregon/Washington Stock)	No long-term trends suggested
Sei whale *Balaenoptera borealis*	FE, M	83 (Eastern North Pacific Stock)	No long-term trends suggested
Fin whale *Balaenoptera*	FE, M	2,624 (California/Oregon/Washington	Increasing off California

physalus		Stock)	
Blue whale *Balaenoptera musculus*	FE, M	2,046 (Eastern North Pacific Stock)	Unable to determine
Odonteceti			
Sperm whale *Physeter macrocephalus*	FP, FE	751 (California/Oregon/Washington Stock)	No long-term trends suggested
Dwarf sperm whale *Kogia sima*	M	Unknown (California/Oregon/Washington Stock)	No long-term trends due to rarity
Curvier's beaked whale *Ziphius cavirostris*	M	1,298 (California/Oregon/Washington Stock)	No long-term trends due to rarity
Baird's beaked whale *Berardius bairdii*	M	615 (California/Oregon/Washington Stock)	No long-term trends due to rarity
Mesoplodont beaked whales	M	576 (California/Oregon/Washington Stock)	No long-term trends due to rarity
Bottlenose dolphin *Tursiops truncatus*	M	684 (California/Oregon/Washington Offshore Stock) 290 (California Coastal Stock)	No long-term trends suggested
Striped dolphin *Stenella coeruleoalba*	M	8,231 (California/Oregon/Washington Stock)	No long-term trends due to rarity
Short-beaked common dolphin *Delphinus delphis*	M	343,990 (California/Oregon/Washington Stock)	Unable to determine
Long-beaked common dolphin *Delphinus capensis*	M	17,127 (California Stock)	Unable to determine
Pacific white-sided dolphin *Lagenorhynchus obliquidens*	M	21,406 (California/Oregon/Washington Stock)	No long-term trends suggested
Northern right whale dolphin	M	6,019 (California/Oregon/Washington	No long-term trends suggested

Lissodelphis borealis		Stock)	
Risso's dolphin *Grampus griseus*	M	4,913 (California/Oregon/Washington Stock)	No long-term trends suggested
Killer whale *Orcinus orca*	M	162 (Eastern North Pacific Offshore Stock) 354 (West Coast Transient Stock)	No long-term trends suggested Slight decrease sing mid-1990's
Short finned pilot whale *Globicephala macrorhynchus*	M	465 (California/Oregon/Washington Stock)	No long-term trends suggested
Dall's porpoise *Phcoenoides dalli*	M	32,106 (California/Oregon/Washington Stock)	Unable to determine
Pinnipeds			
Guadalupe fur seal *Arctocephalus townsendi*	FT, M	3,028 (Mexico Stock) Undetermined in California	Increasing
Northern fur seal *Callorhinus ursinus*	M	5,395 (San Miguel Island Stock)	Increasing
Pacific harbor seal *Phoca vitulina richardsi*	M	31,600 (California Stock)	Stable
California sea lion *Zalophus californianus*	M	141,842 (California Stock)	Unable to determine; increasing in most recent three year period
Northern elephant seal *Mirounga angustirostris*	M	74,913 (California Breeding Stock)	Increasing
Cyptodira			
Green turtle *Chelonia mydas*	FT	3,319 (Eastern Tropical Pacific)	Increasing
Loggerhead turtle *Caretta caretta*	FE	1,000 (California)	Decreasing
Olive Ridley turtle	FT	1.39 million (Eastern Tropical Pacific)	Increasing

Lepidochelys olivacea			
Leatherback turtle *Dermochelys coriacea*	FE	178 (California)	Decreasing

Marine Mammal Sources: NMFS 2008, 2011a. "stock assessment report"
Marine Turtle Sources: NMFS 2004, Marquez, et al. 2002, Eguchi et al. 2007, and Benson et al. 2007. Estimates are based on number of current numbers of nesting females.
Protected Status Codes: FE- Federally listed Endangered; FT- Federally listed Threatened; M- Protected under Marine Mammal Protection Act

Table 3-2. Marine Wildlife Species and Most Likely Periods of Occurrence within the Project Area

Species	Month of Occurrence											
	J	F	M	A	M	J	J	A	S	O	N	D
Mysticeti												
North Pacific right whale												
California grey whale												
Humpback whale												
Minke whale												
Sei whale												
Fin whale												
Blue whale												
Odonteceti												
Sperm whale												
Dwarf sperm whale												
Curvier's beaked whale												
Baird's beaked whale												
Mesoplodont beaked whales												
Bottlenose dolphin												
Striped dolphin												
Short-beaked common dolphin												
Long-beaked common												

dolphin												
Pacific white-sided dolphin												
Northern right whale dolphin												
Risso's dolphin												
Killer whale												
Short finned pilot whale												
Dall's porpoise												
Pinnipeds												
Guadalupe fur seal												
Northern fur seal												
Pacific harbor seal												
California sea lion												
Northern elephant seal												
Cyptodira												
Green turtle												
Loggerhead turtle												
Olive Ridley turtle												
Leatherback turtle												

	Not expected to occur
	Most likely to occur due to seasonal distribution
	Relatively uniform distribution

Sources: Bonnell and Dailey 1993, NMFS 2011, NCCOS 2007

4.0 ONBOARD MITIGATIONS

4.1 Fishing Gear Clearance

In addition to submitting the required Notice to Mariners that will advise commercial fishers of pending on-water activities, prior to the start of each survey the vessel will note and record the presence of deployed fishing gear within the survey area. No survey lines within 30 m (100 ft) of the observed fishing gear will be completed. The survey crew will not remove or relocate any fishing gear; removal or relocation will only be accomplished by the owner or by an authorized CDFG agent.

4.2 Marine Wildlife Monitoring

During the survey operations two trained marine wildlife monitor (MWM) will be onboard. The MWMs have been trained by a certified and registered MWM at Scripps Institution of Oceanography. Training included images of wildlife we expect to encounter, examples of data collection, review of CSLCs requirements for MWMs, and review of the authority of each MWM while aboard the vessel. For additional information on MWM qualifications, see Appendices A and B. The MWM will be provided with standard data collection sheets (Appendix C), binoculars, and reference documentation for marine mammal species. All monitoring activities will be documented and copies of

datasheets will be provided to CSLC upon completion of the survey.

The MWM is responsible for monitoring during the survey equipment operations. The MWM will monitor within the safety zone of 100 m radius for sub-bottom profiler geophysical equipment as identified in Section 2.0 of this mitigation plan. Sightings of marine mammals within the safety zone will be recorded with location, date & time, and species where identification is possible. The MWM will record daily weather conditions and any occasions where geophysical equipment was shut-down due to the presence of marine mammals.

The MWM shall have the authority to stop (i.e., shut down) survey operations if a marine mammal or reptile is observed within the specified safety zone. If an animal is sighted within the safety zone, the equipment must be shut down and not ramped-up to full power until the animal is sighted outside of the safety zone or has not been observed for 15 minutes.

The MWM 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 MWM. 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.

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 be conducted 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 MWM 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 MWM be able to visually observe the full safety zone.

4.3 Mitigations During Transit and Survey

The research vessel will transit during day-light hours from Avila Bay. During transits, there is a potential for encountering marine wildlife and the vessel operators will take every precaution to avoid close proximity to wildlife. If the vessel operator observes a large cetacean within the path of the transiting vessel, they will immediately slow the vessel and/or change course in order to avoid contact. Cetaceans (whales) vary in their swimming patterns and duration of dives and therefore all shipboard personnel will be watchful as the vessel crosses the path of a whale or anytime whales are observed in the area.

If whales are observed during transits, the vessel operator will institute the following

measures:

- Maintain a minimum distance of 100 m from large sighted whales;
- Do not cross directly in front of or across the path of sighted whales;
- When transit directions is parallel to whale path, maintain constant speed that is not greater than the whales speed, or alter transit direction away from whale path;
- Do not position the vessel in such a manner to separate female whales from their calves
- If a whale engages in evasive or defensive action, slow the vessel and move away from the animal or stop the vessel until the animal calms or moves out of the area.

During survey operations, the vessel will maintain survey a speed of approximately 4 knots for the CHIRP survey, 7 knots for the multibeam survey and will maintain a heading that coincides with survey track lines. If marine wildlife is observed within the vicinity of the vessel, the vessel operator will take precautions to avoid collision, ending and restarting the track line survey if necessary.

If a collision with marine wildlife occurs, the vessel operator will document the conditions under which the accident occurred, including the following:

- Location of the vessel when the collision occurred (latitude and longitude);
- Date and time;
- Speed and heading of the vessel;
- Observed conditions (e.g., wind speed and direction, swell height, visibility in miles or kilometers, and presence of rain or fog);
- Species of marine wildlife contacted; and
- Organization, vessel ID and name of master in charge of the vessel at time of accident.

In accordance with NOAA requirements, after a collision, the vessel should stop, if safe to do so. The vessel may proceed after confirming that it will not further damage the animal by doing so. The vessel will then communicate by radio or telephone all details to the vessel's base of operations. The BOEM or SDSU chief scientist will contact the Stranding Coordinator, NMFS, Southwest Region, Long Beach, to obtain instructions. Alternatively, the vessel captain may contact the NMFS Stranding Coordinator directly using the marine operator to place the call or directly from an onboard telephone, if available to:

NOAA Southwest Regional Stranding Coordinator
National Marine Fisheries Service
501 West Ocean Blvd, Suite 4200
Long Beach, CA 90802-4213
562-980-4017
Contact: Sarah Wilkin
Email: sarah.wilkin@noaa.gov

It is unlikely that the vessel will be asked to stand by until NOAA or CDFG personnel arrive, however this will be determined by the Stranding Coordinator. The vessel operator

is not allowed to aid injured marine wildlife or recover the carcass unless requested to do so by the NOAA Stranding Coordinator.

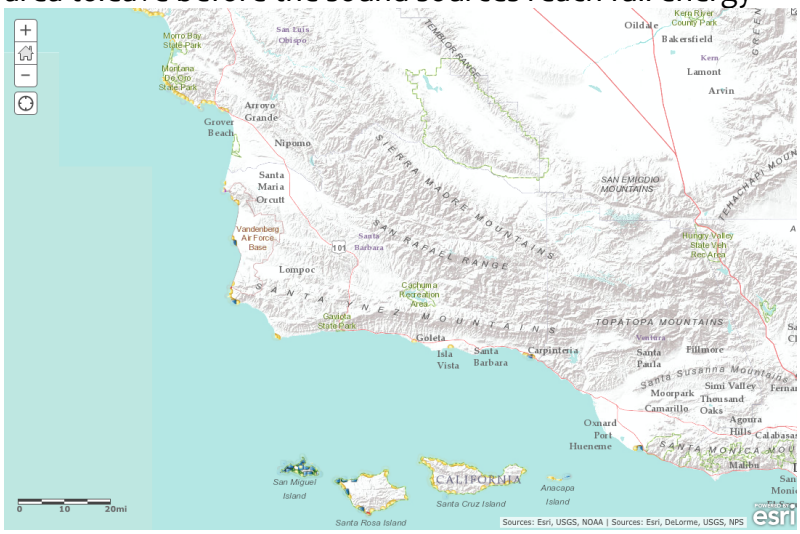
Reportswill be communicated to the federal and state agencies listed below:

Federal	**State**	**State**
Sarah Wilkin, Stranding Coordinator Southwest Region National Marine Fisheries Service Long Beach, California (562) 980-4017	Enforcement Dispatch Desk California Department of Fish and Game Long Beach, California (562) 590-5132	California State Lands Commission Division of Environmental Planning and Management Sacramento, California (916) 574-1938

4.4 Operational Measures

In addition to the procedures outlined above for MWMs (Section 4.2), the ship's crew will take the following precautionary measures to minimize impact to marine wildlife:

- Use a "soft start" technique at the beginning of survey activities each day (or following a shutdown) to allow any marine mammal that may be in the immediate area to leave before the sound sources reach full energy
- Not approach within 300 m of haul-out sites (consistent with NMFS guidelines) (Fig. 2-1);
- Expedite survey activity in this area in order to minimize the potential for disturbance of pinnipeds on land;
- Continuously monitor the survey area to ascertain the presence, species and location of any marine wildlife apparent in the intended survey area.
- Make every effort to maintain distance from sighted marine mammals and other marine wildlife;
- Do not cross directly in front of (perpendicular to) whales
- When paralleling large cetaceans, the vessel will operate at a constant speed that is not faster than that of the animals;



Pinniped haul out sites in Central California identified by colored points. The proposed survey area does not approach any identified haul out sites within 300 m

Source: NOAA NMFS, http://www.arcgis.com/home/webmap/viewer.html?webmap=2ff3fabe20cf4c83959cae1597500b09

- Care will be taken to ensure female whales are not separated from their calves; and, if a whale engages in evasive or defensive action, the vessel will reduce speed or stop until the animal calms or moves out of the area.
- The vessel operator will refrain from erratic operating behavior when transiting and will operate at 4 kts during surveys
- Limit the frequency, pulse length, and pulse rate whenever possible to reduce potentially harmful noises.

4.5 Monitoring Reporting

A post-survey field report will be submitted to CSLC staff as soon as possible but no more than 30 days after the completion of survey activities.

APPENDIX A:
MARINE WILDLIFE OBSERVER CERTIFICATIONS

Scripps Institution of Oceanography (SIO) at the University of San Diego, California has provided training for Marine Wildlife Monitors (MWMs) in support of low power geophysical surveys in California State Waters and Federal Waters under NOAA National Marine Fisheries (NMFS) jurisdictions. This training was provided for sea-going personnel, including research assistants and technical support staff, to support scientific geophysical surveys and to meet marine mammal mitigation obligations pursuant to California State Lands Commission (CSLC) and NMFS requirements.

The MWM training was conducted by certified MWM Michelle Lande, a marine biologist and staff scientist at SIO at the time of the training (resume and certification included). Ms. Lande holds a B.A. in biology (Wellesley College) and an M.A.S. in Marine Biodiversity and Conservation (SIO). She was trained and certified as an MWM during a 3-day workshop at RPS Group in Houston, Texas, and has all of the instructional material (handouts, identification manuals, slides, video, etc.) for teaching the workshop at SIO. Ms. Lande also has extensive experience working at sea, identifying marine wildlife, and working in environmental regulation.

The training was conducted during a one day workshop at SIO that covered multiple topics important for marine wildlife observation. These included identification of marine mammal species, normal and abnormal behaviors, status and trends of marine wildlife species, determination of safety zones for geophysical equipment, and the authority of the MWM to recommend equipment shutdown. The training included visual images, documentation of rules and regulations, and example datasheets. As part of the training, personnel performed typical MWM duties aboard an SIO vessel including continuous observation, wildlife identification, and data recording. Datasheets used for recording MWM activities and marine wildlife detections are included as Appendix C.

<u>Certified Marine Wildlife Monitors</u>
James Holmes
Shannon Klotsko
Jillian Maloney
Lana Graves
Gulsen Ukarcus
Valarie Sahakian

Michelle Lande

6120 Tarragona Dr. San Diego, CA 92115
619.246.4453
michelle.lande@gmail.com

Education

Scripps Institution of Oceanography, UCSD: *M.A.S., Marine Biodiversity and Conservation*, 2009
Wellesley College: *B.A., Biological Sciences*, 2006

Professional Experience

Biologist/Regulatory Specialist
AECOM, Inc.
San Diego, CA
2015- Present

- Conduct biological assessments, author biological technical reports and impact reports
- Complete regulatory permit applications
- Support CEQA and NEPA compliance
- Ensure MMPA, ESA, CESA compliance

Coastal Outreach Coordinator
Louisiana Wildlife Federation
Baton Rouge, LA
2014-2015

- Analyzed coastal restoration project proposals in the Louisiana Coastal Master Plan
- Provided comments on RESTORE Act rules, regulations and project proposals
- Provided recommendations in response to natural resource use permit applications
- Analyzed state natural resource legislation and represented LWF in the legislature
- Represented LWF at conferences, hearings, and public meetings

Protected Species Observer
Scripps Inst. of Oceanography
UC San Diego
San Diego, CA
2013

- Worked with CA State agencies on permit application
- Ensured research activities complied with protected species laws
- Prepared Marine Wildlife Contingency plan describing protected species mitigation
- Trained, scheduled, and supervised Protected Species Observers
- Collected, analyzed, and reported wildlife data from research cruises

Program Representative II
UC, Cooperative Extension
San Diego, CA
2011-2013

- Co-authored reports about water quality research conducted in San Diego Bay
- Distilled technical reports into 5 fact sheets for the general public
- Developed and executed an educational workshop series
- Represented the University at stakeholder meetings and public hearings
- Built and maintained databases of clientele and stakeholders
- Evaluated program effectiveness, reported to the University and funders
- Oversaw administrative tasks including budgets, purchasing, and contracts

CA Fisheries Technician
CA Dept. of Fish and Wildlife
San Diego, CA
2010-2011

- Collected coastal fisheries field data in San Diego County
- Compiled and edited data for entry
- Acted as liaison between the CA Dept. of Fish and Wildlife and the public

Naturalist
Safari Boat Excursions
Maui, HI
2006-2008

- Educated recreational anglers on the Marine Life Protection Act
- Detected wildlife during tours and narrated whale watches
- Designed and executed environmental education talks Communicated marine science and conservation on eco-tours
- Acted as boat crew and ensured safety of guests at sea

Outreach and Scientific Publications

Michelle Lande, Leigh Johnson, Sabrina Drill and Darren Haver. *2013*. Identification and Detection Best Management Practices for Aquatic Invasive Species for Southern California. *UCCE-SD* Field Guide 2013-1.

Carolynn Culver, Leigh Johnson and **Michelle Lande**. *2012*. The Influence of Boat Hull Coatings on Fouling Growth. *UCCE-SD/UC-SGEP* Fact Sheet 2012-2.

Carolynn Culver, Leigh Johnson and **Michelle Lande**. *2012*. Hull Fouling Species of Concern in Southern California Coastal Marinas. *UCCE-SD/UC-SGEP* Fact Sheet 2012-1.

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Leigh Johnson, Linda Fernandez and **Michelle Lande**. *2012*. Crossing Boundaries: Managing Invasive Species and Water Quality Risks for Coastal Boat Hulls in California and Baja California. *UCCE-SD/UC-SGEP* Technical Report # T-073.

Gregory B. Bissonette, **Michelle D. Lande**, Gabriela J. Martins, and Elizabeth Powell. *2012*. Versatility of the mouse reversal/set-shifting test: effects of topiramate and gender. *Physiology and Behavior*.

Michelle Lande, Leigh Johnson and Carolynn Culver. *2011.* Hull Fouling and Copper Tolerance- 2011 Scientific Review. *UCCE-SD/UC-SGEP* Fact Sheet 2011-5.

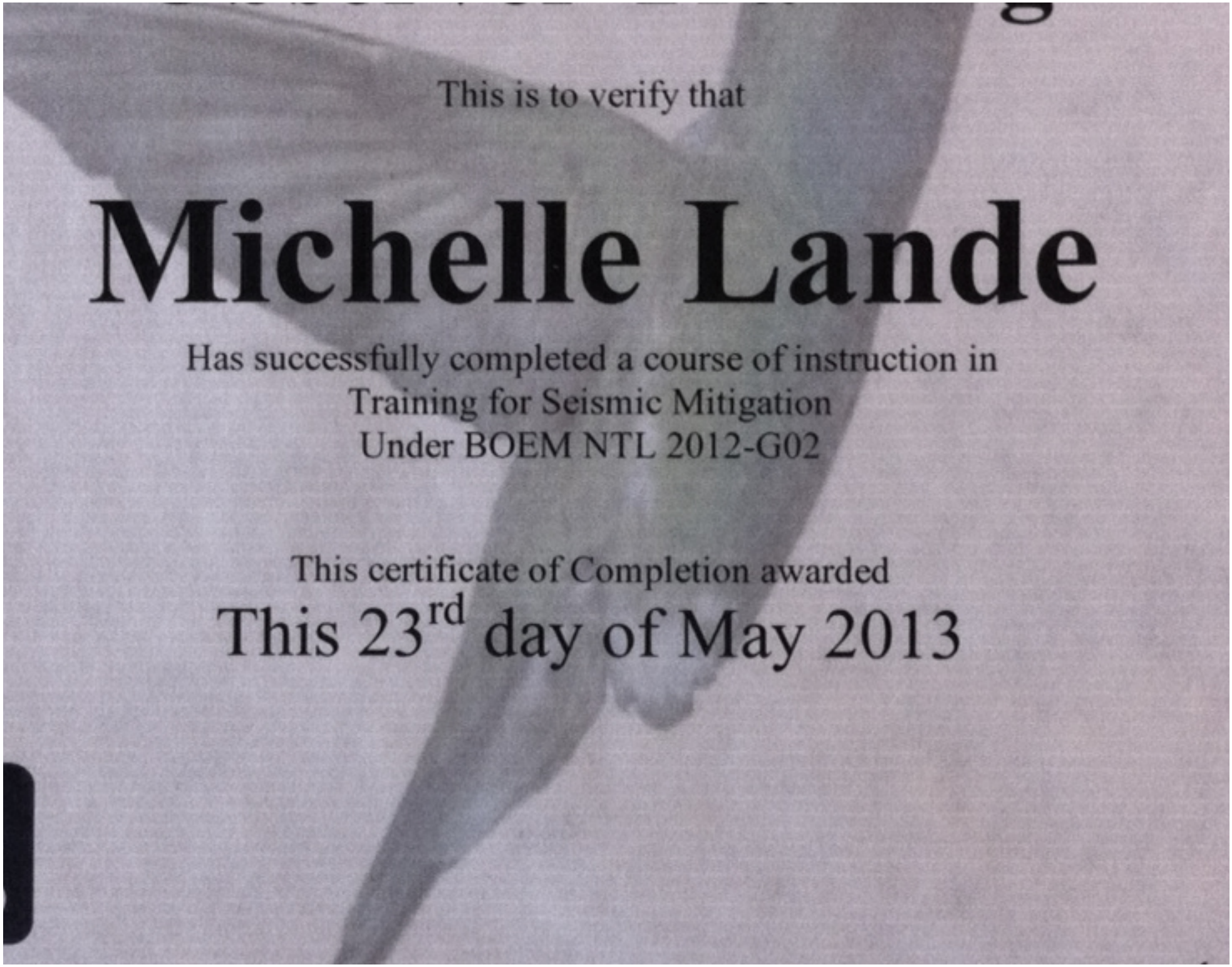
Margot L. Stiles, Julie Stockbridge, **Michelle Lande**, Michael F. Hirshfield. *2010.* Impacts of Bottom Trawling on Fisheries, Tourism and the Marine Environment. *Oceana*.

Skills and Certifications

Computer Skills: Microsoft Office (Word, Excel, Access, Outlook, PowerPoint), Adobe Media Suite (Photoshop, Illustrator, Premier, Audition), website content management (Wordpress, WesiteBuilder, SiteBuilder 3, Droople), ArcGIS, database management (Constant Contact, SPSS, VisualFoxPro, FileMakerPro), image processing (Analyze).

Research Skills: Marine science data collection, wildlife species identification, basic microbiology and behavior laboratory techniques

Certifications & Training: Protected Species Observer Training (June 23, 2013 at RPS Group, 411 N. Sam Houston Parkway, STE 400, Houston TX, 281-448-6188), Conflict Management & Mediation Training (UC), Essential Facilitation Training (UC), Supervisor 101 Training (UC), Grant Proposal Development Training (SDSU), SCUBA to Advanced Open Water Certification (SSI, PADI), CPR Certification (Red Cross).


This is to verify that
Michelle Lande
Has successfully completed a course of instruction in
Training for Seismic Mitigation
Under BOEM NTL 2012-G02
This certificate of Completion awarded
This 23rd day of May 2013

Effort Form to Record MWM activities, general conditions, and general survey information

Date	
Observer Location	
Observer Initials	
Start Time	
Start Lat	
Start Long	
Water Depth	
End Time	
End Lat	
End Long	
Compass Heading	
Vessel Speed	
Line Number	
Vessel Activity	
Array Volume	
Array Depth	
Precipitation	
Light/Dark	
Visibility	
Glare Severity	
Glare Direction	
Sea State	
Swell	
Wind Speed	
Wind Direction	
Comments/Notes	

Form Number:
Corresponding Forms:

Detection Form to Record Marine Wildlife Sightings and Vessel Response

Date	
Visual Detection Number	
Detection Method	
Detection Cue	
Common Name	
Scientific Name	
Family	
Certainty of Identification	
Number of Adults	
Number of Juveniles	
Total Number	
Bearing to Animals	
Number of Reticles or Eyeball	
Initial Behavior	
Behavior 2	
Animal Pace	
Direction of Travel	
Initial Heading of animal	
Final Heading of Animal	
Description	
Source Activity at Final Detection	
Time Animals Entered EZ	
Time Animals Left EZ	
Closest Distance of Animals to Source	
Closest Distance of Animals to Vessel	
Time at Closest Approach to Source	

Form Number:

Corresponding Effort Form:

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.			

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
MM BIO-1: Marine Mammal and Sea Turtle Presence – Current Information.	All State waters; prior to commencement of survey operations, the geophysical operator shall: (1) contact the National Oceanic and Atmospheric Administration Long Beach office staff and local whale-watching operations and shall acquire information on the current composition and relative abundance of marine wildlife offshore, and (2) convey sightings data to the vessel operator and crew, survey party chief, and onboard Marine Wildlife Monitors (MWMs) prior to departure. This information will aid the MWMs by providing data on the approximate number and types of organisms that may be in the area.	No adverse effects to marine mammals or sea turtles due to survey activities are observed.	Document contact with appropriate sources. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder; Inquiry to NOAA and local whale watching operators.	Prior to survey.	
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.	
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.	

<table>
<tr><th>Mitigation Measure (MM)</th><th>Location and Scope of Mitigation</th><th>Effectiveness Criteria</th><th>Monitoring or Reporting Action</th><th>Responsible Party</th><th>Timing</th><th>Implementation Date(s) and Initials</th></tr>
<tr><td></td><td>
<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>

If the geophysical survey equipment is operated at or above a frequency of 200 kilohertz (kHz), safety zone monitoring and enforcement is not required; however, if geophysical survey equipment operated at a frequency at or above 200 kHz is used simultaneously with geophysical survey equipment less than 200 kHz, then the safety zone for the equipment less than 200 kHz must be monitored. The onboard MWMs shall have authority to stop operations if a mammal or turtle is observed within the specified safety zone and may be negatively affected by survey activities. The MWMs shall also have authority to recommend continuation (or cessation) of operations during periods of limited visibility (i.e., fog, rain) based on the observed abundance of marine wildlife. Periodic reevaluation of weather conditions and reassessment of the continuation/cessation recommendation shall be completed by the onboard MWMs. During operations, if an animal's actions are observed to be irregular, the monitor shall have authority to recommend that equipment be shut down until the animal moves further away from the sound source. If irregular behavior is observed, the equipment shall be shut-off and will be restarted and ramped-up to full power, as applicable, or will not be started until the animal(s) is/are outside of the safety zone or have not been observed for 15 minutes.

For nearshore survey operations utilizing vessels that lack the personnel capacity to hold two (2) MWMs aboard during survey operations, at least twenty-one (21) days prior to the commencement of survey activities, the Permittee may petition the CSLC to conduct survey operations with one (1) MWM aboard. The CSLC will consider such authorization on a case-by-case basis and</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

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

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
MM BIO-6: Practical Limitations on Equipment Use and Adherence to Equipment Manufacturer's Routine Maintenance Schedule.	All State waters; geophysical operators shall follow, to the maximum extent possible, the guidelines of Zykov (2013) as they pertain to the use of subbottom profilers and side-scan sonar, including: • Using the highest frequency band possible for the subbottom profiler; • Using the shortest possible pulse length; and • Lowering the pulse rate (pings per second) as much as feasible. Geophysical operators shall consider the potential applicability of these measures to other equipment types (e.g., boomer). Permit holders will conduct routine inspection and maintenance of acoustic-generating equipment to ensure that low energy geophysical equipment used during permitted survey activities remains in proper working order and within manufacturer's equipment specifications. Verification of the date and occurrence of such equipment inspection and maintenance shall be provided in the required presurvey notification to CSLC.	No adverse effects to marine mammals or sea turtles due to survey activities are observed.	Document initial and during survey equipment settings. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Imme-diately prior to and during survey.	June 20, 2016
MM BIO-7: Avoidance of Pinniped Haul-Out Sites.	The Marine Wildlife Contingency Plan (MWCP) developed and implemented for each survey shall include identification of haul-out sites within or immediately adjacent to the proposed survey area. For surveys within 300 meters (m) of a haul-out site, the MWCP shall further require that: • The survey vessel shall not approach within 91 m of a haul-out site, consistent with National Marine Fisheries Service (NMFS) guidelines; • Survey activity close to haul-out sites shall be conducted in an expedited manner to minimize the potential for disturbance of pinnipeds on land; and • Marine Wildlife Monitors shall monitor pinniped activity onshore as the vessel approaches, observing and reporting on the number of pinnipeds potentially disturbed (e.g., via head lifting, flushing into the water). The purpose of such reporting is to provide CSLC and California Department of Fish and Wildlife (CDFW) with information regarding potential disturbance associated with OGPP surveys.	No adverse effects to pinnipeds at haul outs are observed.	Document pinniped reactions to vessel presence and equipment use. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Monitoring Report following comple-tion of survey.	

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
MM BIO-8: Reporting Requirements – Collision.	All State waters; if a collision with marine mammal or reptile occurs, the vessel operator shall document the conditions under which the accident occurred, including the following: • Vessel location (latitude, longitude) when the collision occurred; • Date and time of collision; • Speed and heading of the vessel at the time of collision; • Observation conditions (e.g., wind speed and direction, swell height, visibility in miles or kilometers, and presence of rain or fog) at the time of collision; • Species of marine wildlife contacted (if known); • Whether an observer was monitoring marine wildlife at the time of collision; and, • Name of vessel, vessel owner/operator, and captain officer in charge of the vessel at time of collision. After a collision, the vessel shall stop, if safe to do so; however, the vessel is not obligated to stand by and may proceed after confirming that it will not further damage the animal by doing so. The vessel will then immediately communicate by radio or telephone all details to the vessel's base of operations, and shall immediately report the incident. Consistent with Marine Mammal Protection Act requirements, the vessel's base of operations or, if an onboard telephone is available, the vessel captain him/herself, will then immediately call the National Oceanic and Atmospheric Administration (NOAA) Stranding Coordinator to report the collision and follow any subsequent instructions. From the report, the Stranding Coordinator will coordinate subsequent action, including enlisting the aid of marine mammal rescue organizations, if appropriate. From the vessel's base of operations, a telephone call will be placed to the Stranding Coordinator, NOAA National Marine Fisheries Service (NMFS), Southwest Region, Long Beach, to obtain instructions. Although NOAA has primary responsibility for marine mammals in both State and Federal waters, the California Department of Fish and Wildlife (CDFW) will also be advised that an incident has occurred in State waters affecting a protected species.	No adverse effects to marine mammals or sea turtles due to survey activities are observed.	Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Monitoring Report following comple-tion of survey.	

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' OSCPs shall include the following information for each vessel to be involved with the survey: • Specific steps to be taken in the event of a spill, including notification names, phone numbers, and locations of: (1) nearby emergency medical facilities, and (2) wildlife rescue/response organizations (e.g., Oiled Wildlife Care Network); • Description of crew training and equipment testing procedures; and • Description, quantities, and location of spill response equipment onboard the vessel.	Reduction in the potential for an accidental spill. Proper and timely response and notification of responsible parties in the event of a spill.	Documentation of proper spill training. Notification of responsible parties in the event of a spill.	OGPP permit holder and contract vessel operator.	Prior to survey.	
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.	

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

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.	
MM FISH-2: Minimize Interaction with Fishing Gear.	To minimize interaction with fishing gear that may be present within a survey area: (1) the geophysical vessel (or designated vessel) shall traverse the proposed survey corridor prior to commencing survey operations to note and record the presence, type, and location of deployed fishing gear (i.e., buoys); (2) no survey lines within 30 m (100 feet) of observed fishing gear shall be conducted. The survey crew shall not remove or relocate any fishing gear; removal or relocation shall only be accomplished by the owner of the gear upon notification by the survey operator of the potential conflict.	No adverse effects to commercial fishing gear in place.	Visually observe the survey area for commercial fishing gear. Notify the gear owner and request relocation of gear outside survey area. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Imme-diately prior to survey (prior to each survey day).	
MM FISH-1: USCG and Harbormaster Notification.	Outlined under **Commercial and Recreational Fisheries** (above)					

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

OIL SPILL CONTINGENCY PLAN
Morphology and Sand Thickness Offshore Oceano Dunes
July 11-20, 2016

1.0 INTRODUCTION
The survey operations will be conducted on Scripps' R/V Point Loma and it is anticipated that response to any operational spills will be quickly identified and response will be initiated quickly and efficiently by the vessel operator. Oil spills in United States (U.S.) marine waters shall be reported immediately.

2.0 OPERATIONAL SPILLS
Operational spills might involve one or more of the following substances carried on board the vehicles: (i) fuel and (ii) lube oil. The vessel is equipped with woven polypropylene sheets for rapid absorption of surface oil and protective gloves, and a disposal bag. All of the liquids (listed below) that could cause a hazardous spill are either in the fuel tank or in the vehicle engine. Spill occurrence will likely be during fueling, in the event of grounding or if any instance occurred that punctured the gas tank. In the event a spill occurred in the engine compartment, the absorbent sheets would be used to contain the hazardous liquids and the bilge would not be emptied until it could be pumped out at a hazardous waste facility. We do not anticipate a spill of greater than .25 gallons.

(i) Fuel:

Absorbent sheets, protective gloves, and a disposal bag shall be available for use in the event of a spill. If the fuel is spilled on the deck, it shall be immediately removed, bagged and disposed of at an appropriate hazardous waste reception facility. In the event of spillage in the water, the vessel master shall notify the Coast Guard and port facility.

(ii) Lube oil:

Absorbent sheets, protective gloves, and a disposal bag shall be available for use in the event of a spill. If the oil is spilled in the machinery space, it shall be immediately removed, bagged and disposed of at an appropriate hazardous waste reception facility. In the event of spillage in the water, the vehicle operator shall notify the Coast Guard and port facility.

3.0 EMPLOYEE TRAINING ON OIL SPILL CONTINGENCY PLAN
Prior to the launching of the vessel for any activities, all captain and crew members on the vessel will have read the Oil Spill Contingency Plan, understand procedures to be implemented in the event of an oil spill, and know where the oil spill clean up materials are located on the vessel.

4.0 VESSEL FUELING
All vessel fueling will be conducted at an approved docking facility. No cross vessel fueling will be performed. Appropriate spill avoidance measures during filling procedures will be observed.

5.0 PRIORITY ACTIONS TO ENSURE PERSONNEL AND VESSEL SAFETY
Safety of vessel and crew are paramount. In the event that a crewman's injuries require outside emergency assistance, the PCMG safety officer shall be contacted immediately and emergency personnel contacted. While awaiting emergency assistance, the on board vessel master or qualified vessel crew personnel will render first aid and/or CPR.

6.0 MITIGATING ACTIVITIES
If safety of both the vessel and the personnel has been addressed, the vessel master shall care for the following issues:

- Assessment of the situation and monitoring of all activities as documented evidence.

- Care for further protection of the personnel, use of protective gear, assessment of further risk to health and safety.
- Containment of the spilled material by absorption and safe disposal within leak proof containers of all used material onboard until proper delivery ashore, with due consideration to possible fire risk.
- Decontamination of personnel after finishing the cleanup process.

7.0 EMERGENCY CONTACTS FOR STATE AND FEDERAL AGENCIES

Emergency numbers for U.S.C.G. for the San Francisco and Central Coast Areas are:
Pacific SAR Coordinator - Alameda: 510-437-3700
Rescue Coordination Center, Alameda: 510-437-3700

Any oil spill in U.S. marine waters shall be reported immediately to the following state and agencies:
West Coast Oil Spill hot-line 800-OELS-911, *or*
Department of Fish and Game CalTIP 888-CFG-CALTip (Californians Turn In Poachers & Polluters) (888-334-2258). *and*
U.S. Coast Guard National Response Center 800-424-8802
California Office of Emergency Services (OES) 800-OILS-911 or 800-852-7550.

During the phone call, the following information will be given over the phone.
a. Name and telephone number of caller.
b. Spill location
c. What was spilled (oil, gas, diesel, etc.)
d. Estimated size of spill
e. The date & time spill was identified (same day).
f. Any oiled or threatened wildlife
g. Source of spill, if known h. Activity observed at the spill site

After taking the necessary actions, the spill will be reported in writing to the Governor's Office of Emergency Services on their forms.

Additionally, California Department of Fish and Game certified wildlife rescue/response organizations will be contacted about the spill. In the Southern California area, these include the following contacts:

Oiled Wildlife Care 1-877-UCD-OWCN	Network Animal Advocates 323-651-1336
California Wildlife Center 310-458-9453	South Bay Wildlife Rehab 310-378-9921

GEOPHYSICAL SOUND SOURCE SYSTEMS MAINTENANCE RECORDS
Morphology and Sand Thickness Offshore Oceano Dunes
July 11-20, 2016

Scripps Institution of Oceanography Marine Facility (MARFAC) operates an arsenal of remote sensing instruments ranging from swath bathymetry to multi-channel seismic systems. Data acquisition is world wide and such an operation requires extensive testing of the geophysical equipment before deployment by a talented group of marine technicians and engineers. SIO operates, maintains, and repairs all geophysical equipment employed to support their field campaigns.

Edgetech 512i Chirp sub-bottom sonar:
The 512i Edgetech CHIRP sonar is operated and owned by Scripps Institution of Oceanography and has been thoroughly checked, tested and calibrated according to the manufacturer's recommended procedures. The system is also sent back to Edgetech regularly to ensure the acoustic transducers are calibrated and perform to manufactures' specifications as well as upgrades to topside software and hardware.

The system includes;
1) a DF1000 towfish and topside unit
2) a X-Star subbottom sonar including:

a) a SB0512 tow fish with
i) 2 planar receiving arrays
ii) Woofer/tweeter transmitting pair covering the range of 0.5 -16 kHz
iii) 31" pressure housing containing matching transformers, 2 channel power amp, 2 channel receiving amp, matching transformers, 2 channel DGA and A/D converters and associated DSP processors, Pentium 2 computer, ADSL telemetry transceiver, 300 VDC to 48/12/5 VDC power supplies
iv) Pitch/Roll sensor

b) A shipboard interface unit (SIU) that provides 300 VDC power to fish and the ADSL telemetry transceiver, hardware and software diagnostics, and an Ethernet output. There is a Pentium host.

c) A topside Pentium processor with an ethernet input from the SIU. This performs the following
i) Subbottom image display during acquisition and playback
ii) Navigation interface
iii) Seg-Y storage of subbottom and navigation data

Prior to all cruises, the system undergoes a thorough evaluation of all components, cables, connectors and electronics for any signs of corrosion, wear and/or damage. Acoustic tests and calibration are performed to confirm system performance meets manufactures' specifications. The 512i Edgetech CHIRP system is fully compliant with Edgetech stated capabilities and specifications.

Edgetech 4200 Sidescan Sonar:

The Edgetech 4200 sidescan sonar is operated and owned by Scripps Institution of Oceanography and has been thoroughly checked, tested and calibrated according to the manufacturer's recommended procedures. The system is also sent back to Edgetech regularly to ensure the acoustic transducers are calibrated and perform to manufactures' specifications as well as upgrades to topside software and hardware.

Prior to all cruises, the system undergoes a thorough evaluation of all components, cables, connectors and electronics for any signs of corrosion, wear and/or damage. Acoustic tests and calibration are performed to confirm system performance meets manufactures' specifications. The Edgetech 4200 system is fully compliant with Edgetech stated capabilities and specifications.

RESON 7125 multibeam bathymetry sonar:

The RESON 7125 multibeam bathymetry sonar is operated and owned by Scripps Institution of Oceanography and has been thoroughly checked, tested and calibrated according to the manufacturer's recommended procedures. The system is also checked by RESON technicians regularly to ensure the acoustic transducers are calibrated and perform to manufacturers' specifications as well as upgrades to topside software and hardware.

Prior to all cruises, the system undergoes a thorough evaluation of all components, cables, connectors and electronics for any signs of corrosion, wear and/or damage. Acoustic tests and calibration are performed to confirm system performance meets manufactures' specifications. The RESON 7125 multibeam bathymetry system is fully compliant with RESON stated capabilities and specifications.