

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	
<input type="checkbox"/>	<input type="checkbox"/>	Geophysical Survey Permit Exhibit F
<input type="checkbox"/>	<input type="checkbox"/>	Survey Location (including a full-sized navigation chart and GPS coordinates for each proposed track line and turning point) Explanation: _____
<input type="checkbox"/>	<input type="checkbox"/>	Permit(s) or Authorization from other Federal or State agencies (if applicable) Explanation: _____
<input type="checkbox"/>	<input type="checkbox"/>	21-Day Written Notice of Survey Operations to Statewide Geophysical Coordinator/
<input type="checkbox"/>	<input type="checkbox"/>	U.S. Coast Guard Local Notice to Mariners/
<input type="checkbox"/>	<input type="checkbox"/>	Harbormaster and Dive Shop Notifications Explanation: _____
<input type="checkbox"/>	<input type="checkbox"/>	Marine Wildlife Contingency Plan Explanation: _____
<input type="checkbox"/>	<input type="checkbox"/>	Oil Spill Contingency Plan Explanation: _____
<input type="checkbox"/>	<input type="checkbox"/>	Verification of California Air Resources Board's Tier 2-Certified Engine Requirement Explanation: _____
<input type="checkbox"/>	<input type="checkbox"/>	Verification of Equipment Service and/or Maintenance (must verify sound output) Explanation: _____
<input type="checkbox"/>	<input type="checkbox"/>	Permit(s) or Authorization from California Department of Fish and Wildlife for surveys in or affecting Marine Protected Area(s) (if applicable) Explanation: _____

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

EXHIBIT F

PRESURVEY NOTIFICATION FORM

Applicant/Permittee's Mailing Address _____

Jurisdiction: Federal _____ State _____ Both _____
If State: Permit #PRC _____
Region: _____
Area: _____

Date: _____

GEOPHYSICAL SURVEY PERMIT

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

_____ (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 _____
2. Hours of Operation _____
3. Vessel Name _____
4. Vessel Official Number _____
5. Vessel Radio Call Sign _____
6. Vessel Captain's Name _____
7. Vessel will monitor Radio Channel(s) _____
8. Vessel Navigation System _____

9. Equipment to be used _____
- a. Frequency (Hz, kHz) _____
 - b. Source level (dB re 1 μ Pa at 1 meter (m) [root mean square (rms)]) _____
 - c. Number of beams, across track beamwidth, and along track beamwidth _____

 - d. Pulse rate and length _____
 - e. Rise time _____
 - f. Estimated distances to the 190 dB, 180 dB, and 160 dB re 1 μ Pa (rms) isopleths _____

 - g. Deployment depth _____
 - h. Tow speed _____
 - i. Approximate length of cable tow _____

Applicant's Representative:

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

BOEM Representative
 Joan Barminski
 Regional Supervisor
 Office of Strategic Resources
 770 Paseo Camarillo
 Camarillo, CA 93010
 (805) 389-7585

Other Federal Representative (if not BOEM):



Side Scan Sonar Survey Event Summation

11 March 2016

The event is a side scan sonar survey in Newport Bay, California to test deployment and methodologies of conducting side scan sonar survey from a small inflatable boat. Method development will support MBC's future surveys of waters too shallow for larger vessels.

1. Name of Contractor	MBC Applied Environmental Sciences
2. Type of Operation	Side Scan Sonar Survey
3. Location	Newport Bay, California
4. Start and End Dates	6 April 2016
5. Vessel (CF Numbers)	Inflatable (CF 0639JR)
6. Radio	Yes, VHF 16
7. Pertinent Information	Testing design and methods for conducting side scan sonar survey off an inflatable for very shallow areas.
8. Point of Contact	Eric Miller (714) 850-4830
9. Chart Number	18754
10. Map	Yes, See Below
11. Survey Track Lines and Area	See map for area. Track lines undefined and will be determined in-situ during testing.
12. Sonar specifications	See Certificate of Conformance
13. Engine Specifications	Yamaha 2-stroke gas engine 9.9 hp. Exempt from Exhibit C as a gas rather than diesel engine.

Side Scan Sonar Survey Event Summation

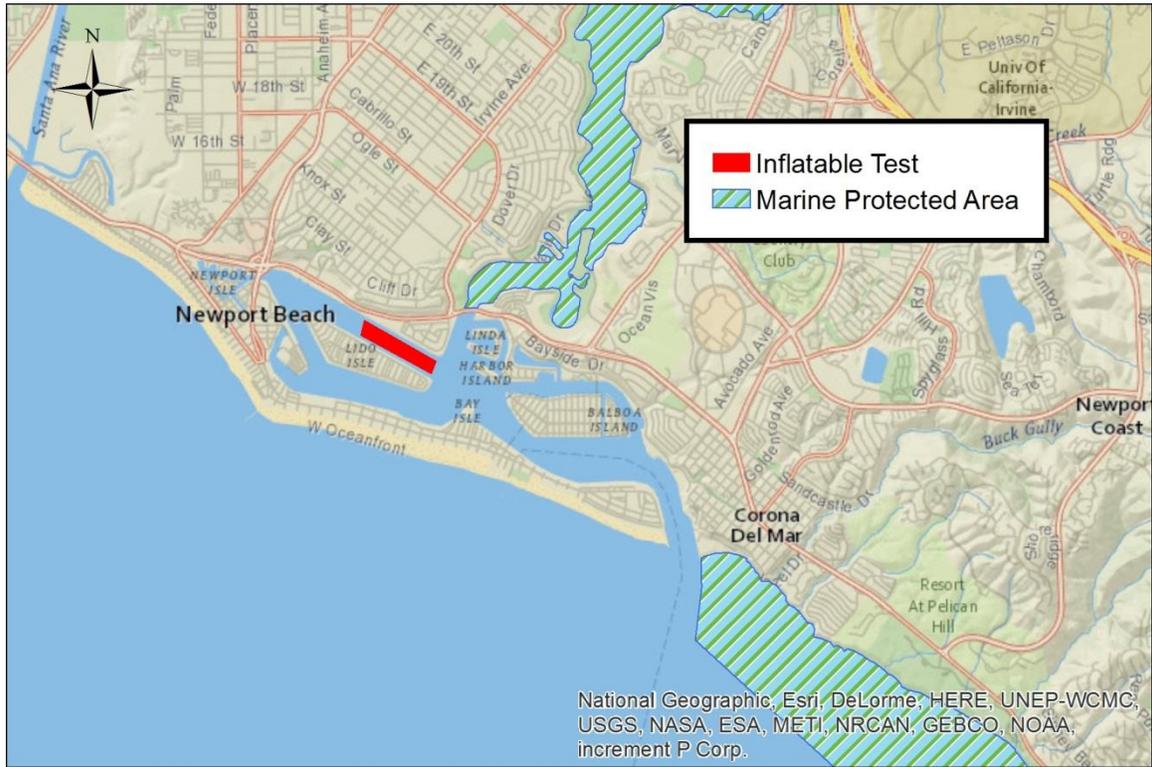


Figure 1. Areas in red will be surveyed during the test.

FW: LNM Request

Eric Miller [emiller@mbcnet.net]

To: Keen, Kelly@SLC

Thursday, March 17, 2016 9:59 AM

- Retention Policy: Enforced: Inbox 90 Day PermDelete (90 Days) Expires: 6/15/2016

Not sure why the bold red I put the dates in suddenly disappeared. I will have to check if our IT changed email settings to plain text.

Sincerely,
Eric

-----Original Message-----
From: Eric Miller [mailto:emiller@mbcnet.net]
Sent: Thursday, March 17, 2016 9:59 AM
To: D11LNM@uscg.mil
Cc: 'Eric Miller'
Subject: LNM Request

Revision in red..
Southern California-Newport Bay-Side Scan Sonar-MBC Applied Environmental Sciences will be conducting a side scan sonar survey on 5-7 April 2016 in Newport Bay, California near Lido Island. Our black inflatable (CF 0639JR) will be on scene monitoring VHF-FM Ch. 16. For further questions or details contact Eric Miller at (714) 850-4830. Chart 18754.

Cordially,
Eric

Eric F. Miller, MS
Senior Scientist
MBC Applied Environmental Sciences
3000 Red Hill Ave.
Costa Mesa, CA 92626
P: 714-850-4830 x216
F: 714-850-4840
MBC Website <<http://www.mbcnet.net/>>

Google Citations
<<http://scholar.google.com/citations?hl=en&user=4yzhpQ8AAAAJ>>
"It's what you learn after you know it all that counts." - John R. Wooden

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RE: Side Scan Sonar Survey

Eric Miller [emiller@mbcnet.net]

To: HarborPat@ocsd.org
Cc: 'Eric Miller' [emiller@mbcnet.net]; Keen, Kelly@SLC
Attachments: Exhibit F Presurvey Notifi~1.pdf (351 KB) [Open as Web Page]

Thursday, March 17, 2016 7:52 AM

Retention Policy: Enforced: Inbox 90 Day PermDelete (90 Days) Expires: 6/15/2016

Dear Lt. Alsobrook,

Please find the attached full presurvey notification form that summarizes all of the pertinent information regarding our survey. We will testing our design to deploy a side scan sonar from an inflatable in Newport Bay (map attached) during the April 5-7, 2016 period. Please let me know if any questions arise.

Sincerely,
Eric

From: Eric Miller [mailto:emiller@mbcnet.net]
Sent: Friday, March 11, 2016 3:14 PM
To: 'HarborPat@ocsd.org'
Cc: 'Eric Miller'
Subject: Side Scan Sonar Survey

Dear Lt. Alsobrook,

Per our California State Lands Commission Geophysical Survey Permit, we are requested to notify the harbormaster of our future survey activities. On 6 April 2016 (weather permitting) we will have a black inflatable (CF 0639JR) on the water in Newport Bay near Lido Island (map attached) to conduct a side scan sonar survey. We are testing the logistics of doing this survey off of our inflatable to support future eelgrass surveys that may be required in shallow waters where larger vessels cannot safely transit. Our work will occur between 0600 and 1800 hours. We will be mapping a small portion of the seafloor for training purposes with our survey team members. If you have any questions, feel free to contact me.

Cordially,
Eric

Eric F. Miller, MS
Senior Scientist
MBC Applied Environmental Sciences
3000 Red Hill Ave.
Costa Mesa, CA 92626
P: 714-850-4830 x216
F: 714-850-4840



FAX TRANSMITTAL SHEET

DATE: 3/18/16

NUMBER OF PAGES: 5
Including Cover Sheet

TO: Beach Cities Aquatic Center
ADDRESS: 4537 W. Coast Hwy
Newport Beach, CA 92663

FAX NO: 949-650-5783
TELEPHONE: 949-650-5440

FROM: Eric Miller
MBC Applied Environmental Sciences
3000 Red Hill Avenue
Costa Mesa, California 92626-4524

TELEPHONE: (714) 850-4830
FAX NO: (714) 850-4840
E-mail: emiller@mbcnet.net
Website: mbcnet.net

Subject: Survey Notification in Newport Bay

Per our California State Lands Commission Geophysical Survey Permit, we are requested to notify local dive shops of our future survey activities as a means to alert the dive community. This fax is to update you and your patrons that the survey will occur over the 5 and 7 April 2016 (weather permitting) we will have a black inflatable on the water in Newport Bay near Lido Island to conduct a side scan sonar survey. The coverage period allows for modifications and retesting until the technique is perfected. Our work will occur between 0600 and 1800 hours. We will be mapping a small portion of the seafloor for training purposes with our survey team members. If you have any questions, feel free to contact me. Eric Miller

MEMORY TRANSMISSION REPORT

TIME : 03-17-2016 07:11
FAX NO.1 :
NAME :

FILE NO. : 283
DATE : 03.17 07:09
TO : 19496505783
DOCUMENT PAGES : 5
START TIME : 03.17 07:09
END TIME : 03.17 07:11
PAGES SENT : 5
STATUS : OK

SUCCESSFUL TX NOTICE



FAX TRANSMITTAL SHEET

DATE: 3/18/16

NUMBER OF PAGES: 5
Including Cover Sheet

TO: Beach Cities Aquatic Center
ADDRESS: 4537 W. Coast Hwy
Newport Beach, CA 92663

FAX NO: 949-850-5783
TELEPHONE: 949-850-5440

FROM: Eric Miller
MBC Applied Environmental Sciences
3000 Red Hill Avenue
Costa Mesa, California 92626-4824

TELEPHONE: (714) 850-4830
FAX NO: (714) 850-4840
E-mail: emiller@mbcnet.net
Website: mbcnet.net

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MBC APPLIED ENVIRONMENTAL SCIENCES OIL SPILL AND MARINE WILDLIFE CONTINGENCY PLAN



April 2016

PRC 9306-Side Scan Survey



MBC *Applied Environmental Sciences*
Costa Mesa, California

PROJECT STAFF

MBC APPLIED ENVIRONMENTAL SCIENCES

Eric Miller – Project Manager

Robert Moore – Technical Manager

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Table 2. Contact list for marine wildlife monitoring. All project assets in the area will monitor VHF channel 13, 16, or 67.....9

Table 3. Local sightings of marine mammals courtesy of Captain Dave's Dolphin and Whale Watching Safari website. <http://www.dolphinsafari.com/sightingslog.html>. accessed 10 March 2016.9

MBC Applied Environmental Sciences Oil Spill and Marine Wildlife Contingency Plan

SECTION I. INTRODUCTION

The deployment, operation, and retrieval of MBC's side scan sonar results in potential impacts to the marine environment. Potential impacts include hydrocarbon spills (discussed in Section II), ship strike, harassment, and acoustic effects on sensitive marine life. Ship strikes and harassment could occur while the vessel is progressing through the side scan sonar transects. Acoustic effects could occur while the side scan sonar is operating. The following oil spill and marine wildlife contingency plan was developed to serve as the guidance document used by MBC during applicable activities in order to minimize any and all of the potential effects.

SECTION II. OIL SPILL CONTINGENCY PLAN

The release of hydrocarbons (fuel, lubricants, hydraulic fluid, etc.) into the marine environment can cause significant environmental damage. MBC minimizes the chances of such releases to the extent possible. All MBC vessels and equipment are maintained in accordance with manufacturer's specifications. Routine maintenance and inspections are conducted by MBC's boat captain to monitor for unusual wear or indications of potential failure in all systems that may cause an accidental hydrocarbon spill. All MBC vessels are inflatable or trailered; therefore all fueling is completed while the vessel is on the trailer and out of the water where all spills can be easily contained with no release to an aquatic environment. Only approved containers are to fuel the vessels. Each container is fitted with a short flexible hose to insert into the fueling port prior to inverting the can causing the fuel to flow. While fueling, absorbent pads (3M Type 156 Sorbent Pads) are placed to catch all possible spills. All spills are immediately cleaned using approved materials such as absorbent pads, fuel bibs, and cat litter. All absorbents will be disposed of in properly marked metal containers in accordance with Title 8 General Safety Orders Section 5545 and/or as required by the Costa Mesa Fire Department.

Training

Only staff that have been trained by MBC's Licensed U.S. Merchant Marine boat captain are allowed to fuel the vessels. Training includes: proper filling of fuel containers, correct deployment of absorbent pads around and under the fueling port, proper insertion of the flexible hose without fuel flowing out of the hose, stress the importance of focused attention on the fueling to monitor for spills so fueling may be stopped as soon as possible to minimize the spill, and the correct use of absorbent materials in addition to the absorbent pads for spills that exceed the deployed pads.

Vessel Description

MBC's vessels using petroleum fuels range from a 12-foot (ft) inflatable powered by an outboard motor to a 25-ft inboard diesel-powered vessel with an inboard fuel

Fuel capacities for each MBC vessel include: five gallons of gas for the outboard motor, 25 gallons of diesel (*R/V Kathryn M*), 50 gallons of diesel (*R/V Poco Loco*), and 130 gallons of diesel (*R/V Scorpaena*). Both the *Kathryn M* and the *Poco Loco* burn approximately 1.5 gallons of fuel per hour at side scan towing speeds. The *Scorpaena* burns approximately 2.0 gallons per hour at side scan towing speed.

Spill Cleanup Equipment Supply Storage

All vessels, other than the inflatables, will maintain a stock of no less than 30 absorbent pads and no less than 30 sealable plastic storage bags to contain soiled pads stored in the center console near the helm for quick access by the boat captain. Ten absorbent pads and 10 sealable plastic bags will be stored in a water tight box at the stern near the pilot aboard the inflatables when in use. One box of rubber gloves and one pair of safety glasses will be stored with the absorbent pads. A fire extinguisher will be present at all times during fueling and on the vessels. Appendix 1 contains an excerpt of the MBC corporate Safety and Health Manual relevant to oil spill prevention and response containing a checklist of actions and the list of agencies to be contacted in the event an accidental spill occurs.

Notifications

All spills will be reported as soon as the spill is contained to the Michael Mancuso and the project manager. The following information will be reported to Mr. Mancuso and the project manager:

- Your name
- Location
- Date
- Time
- Type of fuel spilled
- Approximate volume of fuel spilled
- Current disposition of spill (ongoing/contained/cleaned up)
- Possible health hazard
- Disposition of materials used to clean up spill
- Cause of spill, if known

Mr. Mancuso will, as needed, notify the appropriate local, state, and federal authorities as well as brief MBC's president. Any further legal obligations and responsibilities will be handled by MBC's president and/or his designee.

SECTION III. SENSITIVE SPECIES MONITORING AND MITIGATION PLAN

Relevant Regulations

Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA) prohibits the take of any marine mammal within the waters of the United States, defining “take” as: *harass, hunt, capture, collect, or kill, or attempt to harass, hunt, capture, collect, or kill any marine mammal. This includes, without limitation, any of the following: The collection of dead animals, or parts thereof; the restraint or detention of a marine mammal, no matter how temporary; tagging a marine mammal; the negligent or intentional operation of an aircraft or vessel, or the doing of any other negligent or intentional act which results in disturbing or molesting a marine mammal; and feeding or attempting to feed a marine mammal in the wild.*”

The 1994 amendments to the MMPA further define harassment as "any act of pursuit, torment, or annoyance which has the potential" to: (A) "injure a marine mammal or marine mammal stock in the wild", or (B) "disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering." Sections 101 and 102 of the MMPA prohibit intentional killing or harassment of marine mammals but allow incidental contact in the course of normal vessel operations.

Endangered Species Act

The portions of both the Federal and California Endangered Species Act (ESA) that pertain to geophysical surveys specifically prohibit (1) the take of organisms listed under the ESA and (2) damage to their critical habitat. Several whales and sea turtles common to southern California are listed under the ESA, which are described in the Species Summary below.

Section Species Summaries

Whales

Several species of whale are known to occur in the Southern California Bight and are therefore potentially impacted offshore geophysical surveys (Table 1 with taxonomic information). With the exception of the gray whale and blue whale, few whale species are reasonably likely to occur within the nearshore zone where MBC would work. Most whale species have predominant distributions and Southern California Bight habitat well offshore of the 30-m isobath. Gray whales transit through the Southern California Bight near the coast with their seasonal migrations occurring in the winter and spring. Blue whales are less common in the Southern California Bight than gray whales. Unlike gray whales, blue whales seasonally occur in the summer within the Southern California Bight and are therefore more likely to occur in the survey area than gray whales. In any regard, whales of any species are not likely to enter the protection zone (defined in the Marine Biological Resources Protection subsection).

Dolphins (various species)

Description: Several species of dolphin occur along the southern California coast with varying frequency. Pacific white sided (*Lagenorhynchus obliquidens*) and common dolphins (*Delphinus* spp.) are the most commonly encountered. Orcas (*Orcinus orca*) are often observed in spring while the gray whales are migrating north with calves. The presence of the orca is believed to be one reason gray whales migrate so close to shore, as this minimizes the chance of encountering orca pods further offshore. Due to their swimming ability, potential geophysical survey activities pose little real threat to healthy individuals. All dolphins common to southern California are protected under the MMPA, but not the ESA.

California Sea Lion (*Zalophus californianus*)

Abundance and Description in the Area: California sea lions are the most common pinniped (seals and sea lions) in southern California. They are present, often in large numbers, throughout bays, harbors, and coastal waters of southern California. California sea lions can be easily distinguished from the other common pinniped of the area, Pacific harbor seal (*Phoca vitulina*), by the presence of an external ear flap. It is present on California sea lions and absent on Pacific harbor seals. There is additional concern over the increasing frequency of sick and injured animals in southern California due to malnutrition and domoic acid poisoning. Behavior of these individuals can be more erratic and unpredictable, and more suspect to further injury than their healthy counterparts. California sea lions are protected under the MMPA, but not the ESA.

Migration: California sea lions are present along the California coast year-round.

Behavior: Curious by nature, California sea lions are commonly observed approaching boats and hauling out on any physical structure they can, including docks, boats, buoys, barges, etc. California sea lions are excellent swimmers with outstanding underwater agility. Their curious nature does, however, expose them to risk. It is expected that the California sea lions will be capable of evading the MBC geophysical survey vessel, but attention should be paid to ensure no animals are affected. Sick or injured individuals will require greater scrutiny.

TABLE 1. GREAT WHALES KNOWN TO OCCUR IN THE SOUTHERN CALIFORNIA BIGHT (SCB) AND THEIR MOST COMMON PROXIMITY TO THE COAST (HABITAT), KNOWN SEASONALITY IN THE AREA, AND POTENTIAL FOR IMPACT FROM MBC'S POTENTIAL GEOPHYSICAL SURVEYS.

Whale Species	SCB Habitat	SCB Seasonality	Potential For Impact
Gray whale (<i>Eschrichtius robustus</i>)	Nearshore	Fall-Spring	Possible/Unlikely

Blue whale (<i>Balaenoptera musculus</i>)	Nearshore to Offshore	Summer	Possible/Unlikely
Fin whale (<i>B. physalus</i>)	Offshore	Summer	Unlikely
Sei whale (<i>B. borealis borealis</i>)	Offshore	Fall-Spring	Very Unlikely
Humpback whale (<i>Megaptera novaeangliae</i>)	Offshore	Fall-Winter	Very Unlikely
Sperm whale (<i>Physeter macrocephalus</i>)	Far Offshore	Spring-Fall	Very Unlikely

Pacific Harbor Seal (*Phoca vitulina*)

Abundance and Description in the Area: Pacific harbor seals are typically less abundant than California sea lions. As their name implies, Pacific harbor seals are more commonly observed in the bays and harbors in southern California than along the open coast. When observed along the open coast, Pacific harbor seals are more common in the nearshore waters than offshore. Pacific harbor seals are typically smaller than California sea lions, with black or charcoal coat mottled with white patches, in addition to the lack of an ear flap.

Migration: Pacific harbor seals are present year-round in southern California.

Behavior: Pacific harbor seals are not as naturally curious as California sea lions, but they will approach boats seeking food. They are skilled swimmers and would be capable of evading the geophysical survey vessel and activities. Sick or injured individuals will require greater scrutiny.

Sea Turtles (various species)

Description and Abundance in the Area: Four sea turtle species have been observed in southern California: green sea turtle (*Chelonia mydas*), leatherback sea turtle (*Dermochelys coriacea*), Olive Ridley sea turtle (*Lepidochelys olivacea*) and loggerhead sea turtle (*Caretta caretta*). All are listed as either threatened or endangered under the Federal ESA. The San Gabriel River has been recently identified by the National Marine Fisheries Service (NMFS) as the site of a growing population of green sea turtles. This is in addition to a known population in San Diego Bay. Loggerheads, leatherbacks, and Olive Ridley sea turtles are uncommon in southern California, but they have been observed.

Migration: All sea turtles make extensive spawning migrations. Green sea turtles have been observed in both the summer and winter, with more sporadic observations of the remaining species. The Gulf of California and all along the Baja Peninsula are prominent spawning grounds for most sea turtles, but ongoing research by NMFS and academic researchers suggests some individuals may be residing in southern California.

Behavior: All sea turtles are relatively slow moving and capable of maintaining extended submerged periods. Their typically dark coloration, low profile, and swimming abilities can make them difficult to observe at a distance. This difficulty in identifying sea turtles provides for greater opportunity for accidental take during a survey. Therefore, care should be taken to monitor for their presence and once sighted, extreme caution should be used to ensure no take occurs. This includes temporarily halting all activities once an animal has been spotted within 600 meters (m) of the side scan survey area, the protection zone listed for side scan sonar in the California State Lands Commission's Data Collection Guidelines for Marine Wildlife Monitors (Appendix 2). Activities may resume if the animal has been observed swimming away from the survey area or no sightings have been made for 60 minutes.

Marine Biological Resources Protection

1. A National Marine Fisheries Service-certified marine mammal observer shall be onsite whenever a geophysical survey activity is underway. A single observer is sufficient for the equipment used by MBC as it all operates at ≥ 400 kHz. No protection zone is needed while using MBC's side scan sonar because its operational frequency (≥ 400 kHz) is above the known functional hearing range of marine mammals and sea turtles.
2. Survey activities shall be temporarily stopped as soon as can be safely achieved if a sea turtle or non-pinniped marine mammal is sighted on a potentially intersecting course with the vessel. Work may resume only when the animal's has safely transited away from the vessel's course. The vessel's crew will make no effort to divert the animal, but rather wait for the animal to proceed naturally. Pinnipeds are expected to commonly swim around the vessel. Vessel speeds while conducting a side scan survey will be ≤ 2 knots, presumably slow enough for pinnipeds to easily evade the vessel. No work will occur near pinniped haul out sites.

Monitoring Plan

Role of Marine Monitors

Most of MBC's staff has been certified as marine mammal monitors by the National Marine Fisheries Service. One staffer dedicated to marine wildlife monitoring will be onsite during all survey activities. The monitor will, to the extent possible, act to

prevent collisions with marine wildlife. All sightings will be logged on the standard form included in Appendix 2. The form available in Appendix 3, in addition to the collision reporting items listed below, will be completed, to the extent possible, in the event a sick or injured animal is sighted or if a collision has occurred. After completing the form, marine monitors will report it to the proper agency. The United States Coast Guard (USCG) will be notified if the animal poses a threat to mariners, such as an injured or dead great whale in the work area. Contact information for the California Department of Fish and Wildlife, National Marine Fisheries Service, and USCG are included in Table 2.

Collision Reporting

In the event a collision with a marine mammal or sea turtle occurs, the following will be recorded and reported:

1. Vessel location (latitude, longitude) when the collision occurred
2. Date and time of collision
3. Speed and heading of the vessel at the time of the collision
4. Observation of 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
5. Species of marine wildlife (if known)
6. Whether and observer was monitoring marine wildlife at the time of collision
7. Name of vessel, vessel owner, and captain officer in charge of the vessel at the time of collision

Current Biological Information

Current conditions (as of 10 March 2016) were compiled from Captain Dave's Dolphin and Whale Watching Safari website

(<http://www.dolphinsafari.com/sightingslog.html>) and communication with Ms. Monica DeAngelis at National Marine Fisheries Service Office of Protected Resources, Long Beach, CA. Her email response on 11 March 2016 reads:

I would say that you'd expect gray whales and their calves migrating close to shore during that time--it's the peak of the migration. Also: coastal bottlenose dolphin, common dolphin, pacific white-sided dolphin, Risso's dolphin, seals, sea lions, humpback whales, fin whales, minke whales, and blue whales.

TABLE 2. CONTACT LIST FOR MARINE WILDLIFE MONITORING. ALL PROJECT ASSETS IN THE AREA WILL MONITOR VHF CHANNEL 13, 16, OR 67.

Company	Staff/Position Name	Mobile Phone
DFW	Enforcement Dispatch Desk	562-598-1032
NMFS	Stranding Coordinator	562-980-4017
California State Lands Commission	Environmental Planning and Management	916-574-0748
USCG	VHF Marine Radio - Channel 16	

TABLE 3. LOCAL SIGHTINGS OF MARINE MAMMALS COURTESY OF CAPTAIN DAVE'S DOLPHIN AND WHALE WATCHING SAFARI WEBSITE. [HTTP://WWW.DOLPHINSAFARI.COM/SIGHTINGSLOG.HTML](http://www.dolphinsafari.com/sightingslog.html). ACCESSED 10 MARCH 2016.

Date	# of Trips	Bottlenose Dolphin	Common Dolphin	Pacific White-sided Dolphin	Risso's Dolphin	Whales	Other
4-Mar	4		150 Common Dolphins			59 Gray Whales, 2 Humpback Whales	
3-Mar	2		850 Common Dolphins	6 Pacific White-sided Dolphins		36 Gray Whales	
2-Mar	3		500 Common Dolphins			32 Gray Whales, 3 Humpback Whales, 1 Fin Whale	
1-Mar	2		400 Common Dolphins			23 Gray Whales	
29-Feb	3		2,000 Common Dolphins		19 Gray Whales, 3 Fin Whales, 1 Humpback Whale	19 Gray Whales, 3 Fin Whales, 1 Humpback Whale	
28-Feb	6		1,715 Common Dolphins			46 Gray Whales	

Marine Protected Areas and Pinniped Haul Out Sites

No surveys will be conducted in the Upper Newport Bay State Marine Conservation Area, the nearest marine protected area. All transects will occur within the lower bay. No pinniped haul out sites or rookeries are located in Newport Bay.

APPENDIX 1: MBC APPLIED ENVIRONMENTAL
SCIENCES' CORPORATE SPILL RESPONSE PLAN
PROCEDURES FOR OFFSHORE OPERATIONS



SPILL RESPONSE PLAN PROCEDURES FOR OFFSHORE OPERATIONS

Introduction: This Spill Response Plan (SRP) is in support of MBC Applied Environmental Sciences (MBC) offshore operations. The purpose of this SRP is to present the procedures and protocols that will be utilized in the event of a spill resulting from offshore survey activities.

For purposes of this SRP, a minor oil spill is defined as five barrels or less and a major spill is defined as more than five barrels. MBC vessels occasionally carry formalin, a hazardous material, used to preserve biological samples in the field. For this plan a minor spill is defined as less than 100 ml and a large spill more than 100 ml.

Spill sources of hydrocarbons are limited to leakage or spillage of fuel or lubricants from vessels or marine equipment used during offshore survey operations, with all volumes carried below the threshold for a major spill. The 24' research vessels (R/V) *SCORPAENA*, *KATHRYN M* and *POCO LOCO*, will be used to conduct offshore work. The fuel capacity of each vessel follows: *Scorpaena* - 130 gallons, *Kathryn M* - 25 gallons and the *Poco Loco* - 50 gallons. The *Kathryn M* and *Poco Loco* carry fuel in integral tanks built into the vessels' center consoles.

While all vessels are considered potential spill sources, the likelihood of a spill is remote because a spill could only occur if the hull of a vessel is breached in the area of the tanks or if a vessel sinks. The vessels are constructed with multiple watertight compartments to isolate flooding and reduce the risk of sinking should their hulls be punctured.

All vessel and equipment refueling will be conducted using Best Management Practices (BMPs) and will be performed in a manner best suitable to minimize the potential for fuel spillage.

Spill sources of hazardous materials are limited to leakage or spillage from carboys or sample containers or while dosing samples during offshore survey operations. Volumes carried potentially exceed the threshold for a large spill, although MBC vessels carry no more than about 12 liters of undiluted formalin on the vessels at any time. All carboys and squeeze bottles are stored in a secondary, sealed container when not in immediate use. To further prevent spillage, formalin transfers are conducted utilizing minimum-volume, narrow-mouthed

squeeze bottles to allow for precise dosing of the sample containers. In addition all carboys and squeeze bottles are stored in a secondary, sealed container when not in immediate use. Sample containers are dosed to a level of only 10% formalin. Sample containers are either plastic, shatterproof jars with plastic lid-liners to prevent spills if the jar is knocked over or soft plastic twirl packs which seal tightly with an integrated wire band. After dosing, jars are placed upright in boxes out of the immediate work area to prevent being knocked over. Samples in twirl packs are placed in a covered five-gallon plastic bucket which is sealed for safe storage to prevent spill or leakage. In addition to these precautions, when formalin is on an MBC vessel, the vessel also carries a supply of Formalex Green™, a commercially available, California State Certified reagent that neutralizes formalin to form non-hazardous polymeric colloidal solids safe for disposal. MBC vessels carry enough Formalex Green™ to neutralize all formalin on-board at any time, and keep a spray bottle on-hand at all times to neutralize any drips or small spills which might occur during transfers and dosing.

Spill Response Team: MBC's personnel on-site are responsible for reporting, containment, and clean up of any small spills using onsite equipment and procedures. The onsite team will be supervised by the vessel Captain.

Onsite Response Equipment: The onsite spill response team will have access to an appropriate quantity of absorbent pads, which will be maintained onboard. In the event of a spill, the Field Leader will immediately cease project operations in order to apply sorbent pads. If formalin is on the vessel, a sufficient amount of Formalex Green™ to neutralize the formalin will also be carried on the vessel with some available in a spray bottle for immediate use in the event of any drips or small spills which might occur.

Table 1 lists the minimum onsite spill response equipment that will be maintained onsite for emergency response of miscellaneous spills.

Table 1. Onsite Spill Response Equipment Inventory

Quantity	Equipment Type
30	3M Type 156 Sorbent Pads
30	Sealable Plastic Storage Bags
As-needed Volume	Formalex Green™

Notification: An important step in the response procedure is notification to others of an incident. Notification is essential to activate the response organizations, alert company management, obtain assistance and cooperation of agencies, mobilize resources, and comply with local, state, and federal regulations. The order of notification is based on the premise that those parties who can render assistance in controlling or minimizing the impacts of an incident should be notified before those that are remote from the incident. Table 2 presents a matrix for emergency Agency notification. The notification process encompasses the following categories:

- Emergency Agency notification
- Company notification/onsite spill response team activation
- Cleanup contractors (if required)
- Notification of other interested parties
- Periodic progress updates and reports (if necessary)

Table 2. Emergency Agency Notification Matrix

Type of Emergency	Agencies to be Notified	Telephone	Notification Criteria	Notification Time Frame	Information to Report
Spill to Land or Marine Waters	Oceanside Harbor Police	(760) 435-4000 VHF Radio 16	All spills to land or water	Immediately	<ol style="list-style-type: none"> 1. Location of release or threatened release 2. Qty Released 3. Type of spill 4. Your name & phone number
	USCG-San Diego Marine Safety Office	(619) 278-7670 VHF Radio 16			
	California Department of Fish and Game/ OSPR	(888) 334-2258			
	California Office of Emergency Services	(800) 852-7550			
	National Response Center	(800) 424-8802			
	State Lands Commission	(562) 499-6312			
	California Coastal Commission	Ellen Faurot-Daniels, (415) 904-5285 (work) (415) 201-5792 (pager).			
	Oiled Wildlife Care Network	(530) 754-9035			
	Minerals Management Service	(805) 389-7775 or (805) 389-7550	Spill entering federal waters only		
Medical Emergencies	Fire Department/ Ambulance	911	Medical assistance and/or transport required	ASAP	<ol style="list-style-type: none"> 1. Type of injury 2. Location 3. Condition 4. Action taken 5. No. of victims
	CalOSHA	(415) 737- 2932		As required	

The Lempert-Keene Seastrand Oil Spill Prevention and Response Act (SB 2040) requires notification of the California Office of Emergency Services when oil spills occur or threaten to occur from facilities, vessels, or pipelines into California marine waters. The California Code of Regulations implementing SB 2040 requires that the specific information shown in Table 3 be given to the agencies when making notifications.

Table 3. Information Checklist

Name of reporter. Facility name and location Date and time of the spill
Cause (if known -- don't speculate) and location of the spill Estimate of the volume of oil spilled and the volume at immediate risk of spillage Material spilled (e.g., crude oil), and any inhalation hazards or explosive vapor hazards, if known Prevailing sea conditions: <ul style="list-style-type: none"> • Wave height • Size and appearance of slick • Direction of slick movement • Speed of movement, if known Prevailing weather conditions: <ul style="list-style-type: none"> • Wind speed • Wind direction • Air temperature Measures taken or planned by personnel on scene <ul style="list-style-type: none"> • For containment • For cleanup Current condition of the facility Any casualties? <input type="checkbox"/> NOTE: When making reports, record the agency, name of person contacted, and the date and time of notification. Reporting of a spill shall not be delayed solely to gather all the information noted above.

All actions, including agency notification, should be recorded on the vessel's log book. A regulatory agency address directory is provided in Table 4. Essential agency notifications are further assured by the California Office of Emergency Services and the National Response Center, since they will notify related state and federal agencies. If a spill impacts navigable waters, notification of the National Response Center is mandatory and normally results in simultaneous notification of the U.S. Coast Guard. However, it is recommended that a call be made to the local U.S. Coast Guard office in San Diego at (619) 278-7670. Based on the spill trajectory analysis, if the spill is a threat to the shoreline, the appropriate fire department should also be contacted.

Table 4. Addresses of Regulatory Agencies

<p>NATIONAL RESPONSE CENTER U.S. Coast Guard Headquarters 2100 Second Street SW Washington, D.C. 20593</p> <p>MINERALS MANAGEMENT SERVICE Pacific OCS Regional Office & Camarillo District Office 770 Paseo Camarillo Camarillo, CA 93010</p> <p>U.S. COAST GUARD MSO, San Diego</p> <p>U.S. DEPARTMENT OF TRANSPORTATION 111 Grand Avenue, P.O. Box 23660 Oakland, CA 94623</p> <p>NATIONAL MARINE FISHERIES SERVICE 650 Capital Mall Sacramento, CA 95814</p> <p>OCEANSIDE POLICE, HARBOR UNIT 1540 Harbor Drive North Oceanside, CA 92054</p>	<p>CA DEPARTMENT OF FISH AND WILDLIFE Office of Spill Prevention and Response (OSPR) 1730 I Street PO Box 944209 Sacramento, CA 94244</p> <p>CALIFORNIA OFFICE OF EMERGENCY SERVICES 2800 Meadowview Road Sacramento, CA 95832</p> <p>CALIFORNIA DIVISION OF SAFETY AND HEALTH 1655 Mesa Verde Avenue, Room 150 Ventura, CA 93003</p> <p>CALIFORNIA STATE LANDS COMMISSION 330 Golden Shore, Suite 210 Long Beach, CA 90802</p> <p>CALIFORNIA COASTAL COMMISSION 45 Fremont, Suite 2000 San Francisco, CA 94105-2219</p>
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Company Notification: MBC requires that all emergencies be brought to the attention of corporate management and client. The vessel Captain or Field Leader will notify by radio or telephone appropriate corporate managers with an initial assessment of the extent and nature of the spill, and will activate additional company resources if necessary. The contact information for MBC is provided below:

D. Shane Beck, President	
Work:	714-850-4830
Cellular:	949-466-5029
E-Mail:	sbeck@mbcnet.net

Marine Spill Scenarios and Response Procedures for Minor Marine Spills: This scenario consists of minor spillage of oil or oily water (less than 5 barrels) from a vessel or deck equipment. Response will consist of deployment of sorbent pads that are stored on the vessels. Table 5 lists the response procedures for a minor marine spill.

Table 5. Minor Marine Oil Spill Response Procedures

Responsible Person	Action
Captain - Contractor	<ul style="list-style-type: none"> • Assess the spill size and type of material spilled. • Take action to contain the spill and prevent further spillage. • Inform the Project Superintendent as soon as possible as to the source of the spill, type of material spilled and status of control operations. • Maintain surveillance of source and oil slick. • Assist the onsite response team in implementing clean up procedures including deployment of sorbent pads and proper storage and disposal of oily debris and sorbent pads.
Field Leader - Contractor	<ul style="list-style-type: none"> • Account for all personnel and ensure their safety. • Determine if there is a threat of fire or explosion. • If a threat of fire or explosion exists, suspend all control and/or response operations until the threat is eliminated. • Assess the spill situation to determine the status of response operations, estimate spill volume, estimate speed and direction of oil slick movement and determine resource needs. • Notify the Project Manager.
Field Leader –Contractor	<ul style="list-style-type: none"> • Mobilize the onsite spill response team. • Notify appropriate agencies including: <ul style="list-style-type: none"> – Oceanside Harbor Police VHF 16, (76) 435-4000 – U.S. Coast Guard Marine Safety Office (510) 437-2943 – California Department of Fish and Game/OSPR (916) 445-0045 – National Response Center (800) 424-8802 – California Office of Emergency Services (800) 852-7550 – State Lands Commission (562) 499-6312 – Oil Wildlife Care Network (530) 754-9035 • Supervise response and clean up operations. • File written reports to appropriate agencies.

APPENDIX 2: DATA COLLECTION GUIDELINES FOR MARINE WILDLIFE MONITORS

Data Collection Guidelines for Marine Wildlife Monitors

California State Lands Commission (CSLC) staff has prepared this guidance document to help Marine Wildlife Monitors (MWMs) record data in a manner that meets the expectations of CSLC staff reviewers. Permittees shall provide these guidelines to onboard MWMs who are responsible for the visual monitoring of marine wildlife, including recording information on survey activities and observations of marine wildlife, and summarizing encounters with marine mammals and reptiles and subsequent actions taken during vessel transit and survey operations. In accordance with the Low Energy Offshore Geophysical Survey Program (OGPP) General Permit requirements, Permittees must submit a Post Survey Field Operations and Compliance Report to CSLC staff no more than 30 days after the completion of any survey activities, which includes the following information collected by MWMs:

- Descriptions of any encounters with marine mammals, reptiles, and/or unusual concentrations of diving birds/seabirds (e.g., species, group size, age/size/sex categories [if determinable], behavior, distance and bearing from vessel) and the outcome of those encounters;
- The number of times equipment shut-downs or vessel slow-downs were ordered due to animals being observed in the safety zone or due to poor visibility conditions;
- A summary of observations of pinniped behavior at haul-out sites, if applicable, and any recommendations made related to pinniped avoidance; and
- Number of collision events, if applicable, and the species and disposition of animal.

The goal of providing data collection guidelines, in addition to a **Marine Environmental Variables Form** and a **Marine Wildlife Observations Form** (see below), to MWMs is to ensure consistency in the documentation of marine wildlife observations and interactions during vessel transit and survey operations. MWMs should refer to the Permittee's **Marine Wildlife Contingency Plan** (MWCP) for additional information regarding MWM responsibilities and marine wildlife that could be expected within the project region.

I. General Information

Record the following information at the start of each shift, and when environmental variables and vessel activity change:

- Record your name, date, time, and environmental variables (refer to Section II)
- Note vessel activity (e.g., transiting, surveying)
- Record start and end times of vessel activity (e.g., start/end of transit, ramp-up)

II. Marine Environmental Variables

Record the following environmental variables on the **Marine Environmental Variables Form** (see below) at the beginning of each shift and if there are any changes during the observation period:

- Weather Conditions – Note weather conditions (e.g., clear, hazy, gray, fog, rain)
- Cloud Cover – Refer to **Table 1** to determine the approximate cloud cover

Table 1. Cloud Cover

Description	Percent (%)
Clear	0-10
Scattered	10-50
Broken	50-90
Overcast	90-100

- Glare – Record intensity (none, mild, medium, or severe) and direction relative to the vessel (e.g., 0° to 30°, or north/northeast)
- Visibility – Measured in kilometers (km) or nautical miles (nm)
- Wind Speed – Refer to **Table 2** to determine the approximate wind speed
- Sea State – Refer to **Table 2** to determine the approximate sea state
- Swell Height – Measured from the crest to the trough of the swell (meters)

Table 2. Beaufort Scale

Beaufort Scale	Wind (knots)	Wind Conditions	Sea Conditions
0	<1	Calm	Sea surface smooth and mirror-like
1	1-3	Light air	Scaly ripples, no foam crests
2	4-6	Light breeze	Small wavelets (0.2 m), crests glassy, no breaking
3	7-10	Gentle breeze	Large wavelets (0.6 m), crests begin to break, scattered whitecaps
4	11-16	Moderate breeze	Small waves (1 m), some whitecaps
5	17-21	Fresh breeze	Moderate waves (1.8 m) taking longer form, many whitecaps, some spray
6	22-27	Strong breeze	Larger waves (3 m), whitecaps common, more spray
7	28-33	Near gale	Mounting sea (4 m) white foam streaks off breakers
8	34-40	Gale	Moderately high waves (5.5 m) of greater length, edges of crests begin to break into spindrift, foam blown in streaks
9	41-47	Strong gale	High waves (7 m), sea begins to roll, dense streaks of foam, spray may reduce visibility
10	48-55	Storm	Very high waves (9 m) with overhanging crests, sea white with densely blown foam, heavy rolling, lowered visibility
11	56-63	Violent storm	Exceptionally high waves (11 m), foam patches cover sea, visibility more reduced
12	64+	Hurricane	Air filled with foam, waves over 14 m, sea completely white with driving spray, visibility greatly reduced

III. Marine Wildlife Observations

When a marine mammal or reptile is first sighted, record the following information on the **Marine Wildlife Observations Form** (see below):

- Time of initial sighting – 24-hour format
- Position of vessel – Latitude and longitude
- Distance (meters, kilometers) and bearing (relative to the geographical compass) to the animal(s)
- Species (or identification to the lowest possible taxonomic level) – If species cannot be determined, but species group can, please record, for example, “unidentifiable whale” or “unidentifiable dolphin.” In addition, if species cannot be determined, please record any distinguishing marks or characteristics (e.g., size and shape of dorsal fin, fluke shape, size and shape of blow, color, size)
 - Refer to **Appendix A** (California Marine Mammals) and **Appendix B** (California Sea Turtles) for information on marine mammals and reptiles that could be expected in California waters.
- Certainty of identification (unsure/possible, probable, definite)
- Number of individuals
- Age/size/sex categories (if determinable)
- Direction of animal’s travel relative to the survey vessel (e.g., toward vessel, away from vessel, parallel to vessel) – Draw/sketch, if necessary
- Behavior – Record behavior of animal(s) when first sighted *and throughout the observation period*; be as explicit and detailed as possible, and note any observed changes in behavior.
 - Examples of behaviors are: fast, moderate, or slow swimming; porpoising; bow riding; breaching/aerobatics; flipper slapping; tail slapping/lobtailing; spyhopping; diving (note whether fluke was raised); frequent/infrequent surfacings; feeding; milling; logging; avoiding/approaching survey vessel/equipment.
- If an animal enters the established safety zones (**Table 3**), please record the following additional information:
 - Time when first observed in safety zone
 - Time when observed exiting safety zone
 - What action was taken, if any, when the animal(s) was observed in the safety zone
 - Behavior of animal(s) in safety zone – (e.g., rapid breathing/increased surfacing, sudden/erratic change in behavior or direction)
 - Duration of power-down/shut-down, if required
 - Behavior of animal(s) after shut-down of geophysical equipment

Table 3. Safety Zone Monitoring by Equipment Type

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

- Activity of survey vessel (e.g., transit, equipment in operation [note type of equipment and operating parameters])
- Note the number and type (e.g., recreational/commercial fishing vessel, tanker) of other vessels in survey area

Marine Wildlife Observations Form

Date: _____

Monitor: _____

Time:	Latitude:	Longitude:
Weather:	Cloud Cover:	Glare:
Visibility:	Wind Speed:	Sea State:
Swell Height:	Survey Vessel Activity:	
Marine Wildlife Observations and Interactions:		

Time:	Latitude:	Longitude:
Weather:	Cloud Cover:	Glare:
Visibility:	Wind Speed:	Sea State:
Swell Height:	Survey Vessel Activity:	
Marine Wildlife Observations and Interactions:		

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Appendix A. California Marine Mammals

Species or Guild	Stock	Status and Species Account for California Waters	Probability of Encounter
<i>Mysticetes – Baleen Whales</i>			
Bryde's whale (<i>Balaenoptera edeni</i>)	Eastern Tropical Pacific	Bryde's whales along the California coast are likely part of a larger population inhabiting the eastern part of the tropical Pacific Ocean. As a result, a regular occurrence is likely to be very low.	Very low
Sei whale (<i>Balaenoptera borealis borealis</i>)	Eastern North Pacific	Endangered; sei whales are considered rare in California waters.	Low
Minke whale (<i>Balaenoptera acutorostrata scammoni</i>)	California/ Oregon/ Washington	Minke whales occur year-round along shelf waters in California and in the Gulf of California, occurring south of California in the summer/fall.	Low to Medium
Fin whale (<i>Balaenoptera physalus physalus</i>)	California/ Oregon/ Washington	Endangered; aggregations of fin whales occur year-round in Southern/Central California and the Gulf of California. Fin whale vocalizations are detected year-round off Northern California, with a peak in vocal activity between September and February. Although typically found over the slopes and continental shelves, fin whales have been regularly reported from shore during gray whale migration surveys.	Medium
Blue whale (<i>Balaenoptera musculus musculus</i>)	Eastern North Pacific	Endangered; the U.S. west coast represents one of the most important feeding areas in summer and fall for blue whales. Most of this stock is believed to migrate south to Baja California, the Gulf of California, and the Costa Rica Dome during the winter and spring.	Medium
Humpback whale (<i>Megaptera novaeangliae</i>)	California/ Oregon/ Washington	Humpback whales in the North Pacific feed in coastal California waters and migrate south to winter. The California/ Oregon/Washington stock includes humpback whales that feed along the U.S. west coast. Humpback whales are found throughout shelf waters, but have been reported with regularity inside the 100-m isobaths.	Medium

Species or Guild	Stock	Species Account for California Waters	Probability of Encounter
North Pacific right whale (<i>Eubalaena japonica</i>)	Eastern North Pacific	Endangered; North Pacific right whales primarily occur in coastal or shelf waters in northern latitudes. During winter, right whales occur in lower latitudes and coastal waters where calving takes place. Sightings have been reported as far south as central Baja California in the eastern North Pacific.	Low
California gray whale (<i>Eschrichtius robustus</i>)	Eastern North Pacific	Most gray whales in the Eastern North Pacific stock spend the summer feeding in the northern and western Bering and Chukchi Seas before migrating south in the fall along the coast of North America from Alaska to Baja California. The stock winters along the coast of Baja California, using shallow lagoons and bays for calving. The northbound migration generally takes place between February and May with cows and newborn calves migrating northward, primarily between March and June, well within 5 mi of the shoreline.	Seasonal: High to Low
<i>Odontocetes – Toothed Whales</i>			
Short-finned pilot whale (<i>Globicephala macrorhynchus</i>)	California/ Oregon/ Washington	Short-finned pilot whales were likely residents off Southern California; however, after a strong El Niño event in 1982-83, short-finned pilot whales virtually disappeared from this region. Since then, there have been infrequent sightings of pilot whales off the California coast.	Low to Medium
Killer whale (<i>Orcinus orca</i>)	Eastern North Pacific Offshore ²	Killer whales are wide-ranging species, with this stock ranging from the outer coasts of Washington, Oregon and California.	Low to Medium
Striped dolphin (<i>Stenella coeruleoalba</i>)	California/ Oregon/ Washington	Striped dolphins are typically sighted 100 to 300 nm from the California coast.	Medium

Species or Guild	Stock	Status and Species Account for California Waters	Probability of Encounter
Pygmy and dwarf sperm whales (<i>Kogia</i> spp.)	California/ Oregon/ Washington	Pygmy and dwarf sperm whales are distributed throughout deep waters and along the continental slopes of the North Pacific; however, little population data are available for these species. <i>Kogia</i> sightings may underestimate their presence due to their inconspicuous behavior. Due to their deep diving habits, they may be more susceptible to sound impacts than other species.	Low to Medium
Small beaked whales ¹ (Ziphiidae)	California/ Oregon/ Washington	At least five species of Mesoplodont whales have been recorded off the U.S. west coast. They are grouped here due to the infrequent records and difficulty of positive identification. Ziphid beaked whales are distributed widely throughout deep waters of all oceans, but have been seen primarily along the continental slope in western U.S. waters from late spring to early fall. They have been seen less frequently and are presumed to be farther offshore during the colder water months of November through April. Due to their deep diving habits, they may be more susceptible to sound impacts than other species.	Low to Medium
Sperm whale (<i>Physeter macrocephalus</i>)	California/ Oregon/ Washington	Endangered; sperm whales are widely distributed across the entire North Pacific during the summer, while in winter, the majority are thought to be south of 40° N (roughly Eureka, CA). Sperm whales are found year-round in California waters with peak abundances from April to June, and again from September to November. They are typically found on slopes in waters deeper than 200 m.	Medium
Bottlenose dolphin (offshore) (<i>Tursiops truncatus truncatus</i>)	California/ Oregon/ Washington	Offshore bottlenose dolphins are evenly distributed at distances greater than a few kilometers from the mainland and throughout the SCB.	Medium
Bottlenose dolphin (coastal) (<i>Tursiops truncatus truncatus</i>)	California Coastal	California coastal bottlenose dolphins are typically found within 1 km from shore from Point Conception south into Mexican waters.	High (South Coast region)

Species or Guild	Stock	Status and Species Account for California Waters	Probability of Encounter
Long-beaked common dolphin (<i>Delphinus capensis capensis</i>)	California	Long-beaked common dolphins are commonly found within 50 nm of the coast from Southern to Central California.	Medium
Short-beaked common dolphin (<i>Delphinus delphis</i>)	California/ Oregon/ Washington	Short-beaked common dolphins are the most abundant cetacean off California and can be seen in coastal and shelf waters up to 300 nm from shore.	High
Northern right whale dolphin (<i>Lissodelphis borealis</i>)	California/ Oregon/ Washington	Northern right whale dolphins are primarily seen in shelf and slope waters with seasonal movements into California waters during the colder water months.	Medium
Dall's porpoise (<i>Phocoenoides dalli dalli</i>)	California/ Oregon/ Washington	Dall's porpoises are commonly seen in shelf, slope, and offshore waters with occurrences common off Southern California in winter.	Medium (location, season)
Risso's dolphin (<i>Grampus griseus</i>)	California/ Oregon/ Washington	Risso's dolphins are commonly seen in shelf waters within the SCB and in slope and offshore waters of California.	Medium
Pacific white-sided dolphin (<i>Lagenorhynchus obliquidens</i>)	California/ Oregon/ Washington	Pacific white-sided dolphins are common along continental margins and offshore, with peak occurrences off California during the colder winter months.	Medium to High
Common dolphin (long- and short-beaked) (<i>Delphinus</i> spp.)	California/ Oregon/ Washington (short-beaked); California (long-beaked)	Many stock assessment and cetacean surveys list <i>Delphinus</i> species rather than distinguish between short- and long-beaked common dolphins; consequently, this species group has been considered as a whole in the density model.	High
Harbor porpoise (<i>Phocoena phocoena vomerina</i>)	Central California (incl. bay Stocks & N. California/ S. Oregon Stock)	Four geographic stocks in California waters are identified as separate stocks mainly due to varying fisheries pressures. The combined range extends from Southern Oregon/Northern California to Point Conception. Harbor porpoise are found almost exclusively in coastal and inland waters.	High

Species or Guild	Stock	Status and Species Account for California Waters	Probability of Encounter
<i>Pinnipeds – Seals and Sea Lions</i>			
Harbor seal (<i>Phoca vitulina richardsi</i>)	California	Harbor seals inhabit nearshore coastal and estuarine areas from Baja California to the Pribilof Islands in Alaska. In California, approximately 400 to 600 harbor seal haul-out sites are widely distributed on the mainland and on offshore islands, intertidal sandbars, rocky shores, and beaches. Rookeries are located from Santa Rosa to Mexico.	High
Northern elephant seal (<i>Mirounga angustirostis</i>)	California (breeding)	Northern elephant seals breed and give birth in California primarily on offshore islands from December to March from about San Francisco southward. Adults return to land between March and August to molt. Adults return to their feeding areas again between their spring/summer molting and their winter breeding seasons.	High (seasonal)
Northern fur seal (<i>Callorhinus ursinus</i>)	San Miguel Island	All northern fur seals in California waters are found along San Miguel Island off Southern California.	High (Channel Islands region)
California sea lion (<i>Zalophus californianus</i>)	California	California sea lions are distributed along the entire coastline year round, and breed on islands in Southern California.	High
Northern (Steller) sea lion (<i>Eumetopias jubatus</i>)	Eastern Pacific US	Threatened; rookeries for Steller sea lions (eastern DPS) are located between Cape Fairweather, Alaska and Ano Nuevo Island, California. Breeding takes place from May to July, outside of which they are widely dispersed.	High (seasonal)
Guadalupe fur seal (<i>Arctocephalus townsendi</i>)		Threatened; Guadalupe fur seals pup and breed mainly at Isla Guadalupe, Mexico, with a second rookery at Isla Benito del Este, Baja California. In 1997, a pup was born at San Miguel Island, California. Individuals have stranded or have been sighted as far north as Blind Beach, California, inside the Gulf of California, and as far south as Zihuatanejo, Mexico.	Extremely low

Species or Guild	Stock	Status and Species Account for California Waters	Probability of Encounter
Mustelid – Sea Otter			
Southern sea otter (<i>Enhydra lutris nereis</i>)	California	Threatened; southern sea otters occupy nearshore waters along the California coastline from San Mateo County to Santa Barbara County. A translocated colony has been established at San Nicolas Island, Ventura County.	High (location)
<p>¹ Includes <i>Mesoplodon</i> species and <i>Ziphiidae</i> species</p> <p>² Stocks overlap in some California waters; however, this stock encompasses the waters along the entire California coast</p> <p>Probability of encounter during low energy geophysical surveys is based on population estimates and distribution facts in the NOAA Stock Assessment Reports, and the density calculations are from the SERDP-SDSS density models and are not referenced from the NOAA Stock Assessment Reports. The probability of occurrence for marine mammal species in the Project area was determined based on the overall population density of the species, spatial and seasonal distribution patterns (particularly those associated with water depth), and species behavioral characteristics. These descriptors are partially subjective in that they assume an overall equal possibility of an OGPP operation occurring anywhere in State waters at any given time. Species with very low and low probability of occurrence (N= 3) during operations were those that have a low overall population density off the California coast combined with either a narrow seasonal occurrence, or are typically found well outside State waters (e.g., outside the 200 m isopleth). Species with a low to medium probability of occurrence are those that have (or have had) a documented population (seasonal or year round) in waters off the coast of California, but tend to occur at depths beyond those delineated as State waters. Species with documented sightings within State waters and those that use of shelf and slope waters or have a widely distributed resident population fell to the medium rather than low end of the occurrence scale. Species meeting both the low and medium criteria with behaviors that make them less conspicuous (e.g., deep diving, less gregarious), or lacking population data were given a higher occurrence rating as a precautionary approach. Species that have documented populations in State waters were given a high probability of occurrence even if found in a localized geographic region or only during specific seasons.</p>			

Appendix B. Sea Turtles of California

Taxonomic Classification and Common Name	Status and Species Account for California Waters	Presence in California Waters
Family – Cheloniidae		
Loggerhead sea turtle (<i>Caretta caretta</i>)	FE ¹ ; occupies three different habitats – oceanic, neritic, and terrestrial (nesting only) depending upon life stage; omnivorous.	Rare
Green sea turtle (<i>Chelonia mydas</i>)	FE; resident populations in San Diego County (San Diego Bay); aquatic, but known to bask onshore; juvenile distribution unknown; omnivorous.	Common
Pacific hawksbill sea turtle (<i>Eretmochelys imbricata bissa</i>)	FE; Rare in CA; pelagic; feeding changes from pelagic surface feeding to benthic, reef-associated feeding mode; opportunistic diet.	Rare
Olive ridley sea turtle (<i>Lepidochelys olivacea</i>)	FT ² ; primarily pelagic, but may inhabit coastal areas, including bays and estuaries; most breed annually, with annual migration (pelagic foraging, to coastal breeding/nesting grounds, back to pelagic foraging); omnivorous, benthic feeder.	Rare
Family – Dermochelyidae		
Pacific leatherback sea turtle (<i>Dermochelys coriacea</i>)	FE; pelagic, lives in the open ocean and occasionally enters shallower water (bays, estuaries); omnivorous (jellyfish, other invertebrates, vertebrates, kelp, algae); local aggregations evident (e.g., Monterey Bay); seasonal migrant.	Frequent
FE: Federally Endangered; FT: Federally Threatened ¹ North Pacific Ocean Distinct Population Segment (DPS) ² Coastal Mexico population endangered (threatened elsewhere)		

APPENDIX 3: MARINE MAMMAL AND REPTILE
COLLISION REPORTING

EXHIBIT D

MARINE MAMMAL AND REPTILE COLLISION REPORTING

If a collision with a marine mammal or reptile occurs, the Permittee shall document the conditions under which the accident occurred, including the following:

1. Vessel location (latitude, longitude) when the collision occurred;
2. Date and time of collision;
3. Speed and heading of the vessel at the time of collision;
4. 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;
5. Species of marine wildlife contacted (if known);
6. Whether an observer was monitoring marine wildlife at the time of collision; and
7. 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, Southwest Region, Long Beach, to obtain instructions. Although NOAA has primary responsibility for marine mammals in both State and Federal waters, the California Department of Fish and Wildlife will also be advised that an incident has occurred in State waters affecting a protected species.



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CERTIFICATE OF CONFORMANCE

CUSTOMER: MBC Applied Environmental Sciences

CONTRACT / PURCHASE ORDER NUMBER: 4435

EDGETECH SALES ORDER NUMBER: SO8935

We certify that the following items have met all product requirements and sound source verification as set forth in EdgeTech's approved assembly and Factory Acceptance Test documentation.

Model/Part #: 4125 Description: Side Scan Towfish Serial #: ETN49920

Tow Fish specifications:

(Dual Frequency – 600/1600 kHz)
Material Stainless Steel Construction
Tow Body dimensions 96 mm (3.75 in) OD, 980 mm (39 in) Length
Weight 15.4 Kg (34 Lbs) in air
(Optional weight available for deep operation)
Operating Depth 200 meters max.
Tow Speed 1-8 knots
Safety shear pin 420 Kg (930 Lbs)
Input power DC 70V, 50 watts maximum
Data link interface Ethernet, 10Mbit/s
Beam width 400 kHz Horizontal, 0.46°, All Sidelobes < -36dB
Vertical, 50°
Beam width 900 kHz Horizontal, 0.28°, All sidelobes < -36dB
Center Frequency 400 kHz/ 900 kHz
Sound Source Level: 210db//uPa

EdgeTech

By: _____

Date: March 27, 2015

EXPERIENCE SUMMARY

Mr. Miller is a student of California ecology with over 15 years of experience in ichthyology, fish ecology (marine and freshwater), and fisheries of southern California. Research has focused on the population dynamics, ecology, biogeography, life history, migration, reproductive development, and mating systems of fishes. Demonstrative experience in project design and management, database design and management, GIS, field collections (marine and freshwater), larval and adult fish taxonomy, larval and adult otolith-based research and analysis, data analysis, and technical writing. Mr. Miller is a certified marine mammal observer per the National Marine Fisheries Service.

EDUCATION

M.S., Biology, California State University, Northridge, 2004.
B.A., Biology, Pitzer College, Claremont, CA. 1999

Post-Graduate Studies:

Early Life History of Marine Fish, University of New England, August 2007

Seminars:

Introduction to CEQA, University of California, Irvine, September 2006

CEQA Primer: Preparing CEQA Documents, University of California, Irvine, November 2006

Basic GIS Techniques for Fish Biologists, American Fisheries Society, August 2007

Advanced GIS Techniques for Fish Biologists, American Fisheries Society, August 2007

PROFESSIONAL HISTORY

MBC Applied Environmental Sciences Senior Scientist. October 2007 - Present

MBC Applied Environmental Sciences Project Scientist. October 2005 – October 2007

MBC Applied Environmental Sciences Group Scientist. June 2004 – October 2005

California State University, Northridge. Laboratory instructor. 2002-2004.

California State University, Northridge, Nearshore Marine Fish Research Program,
Graduate Research Assistant. 2000-2004.

California Dept. of Fish and Game. Scientific Aide. 1999-2001.

Southern California Marine Institute. Research Assistant. 1995-2004.

PROJECT EXPERIENCE

Marine Mammal Monitoring. National Marine Fisheries Service-certified marine mammal observer monitoring construction projects in the Ports of Los Angeles and Long Beach to ensure no impacts to marine mammals as a result of construction activities and associated sound produced. Also designed marine mammal monitoring and protection plans for marine construction projects including riprap replacement at Pebbly Beach on Santa Catalina Island.

El Segundo Generating Station Chlorination and NPDES Effluent Monitoring. MBC was contracted to execute thrice-weekly sodium hypochlorite injections into the intake for Unit 4 to chlorinate the condenser to minimize biofouling growth. MBC also coordinated chemistry monitoring of the effluent to ensure all discharges were within NPDES permit limits. Mr. Miller acted as project manager overseeing all aspects of the project including: budget, field sampling, interaction with client and subcontractors, and reporting.

Pre-Construction Environmental Assessment for San Onofre Nuclear Generating Station Large Organism Exclusion Device Installation. MBC was contracted to survey,

analyze, and summarize the existing environmental conditions that could be impacted by the installation of a Large Organism Exclusion Device (LOED) over each intake structure at San Onofre Nuclear Generating Station (SONGS) required under the California State Once Through Cooling Policy provisions to minimize the take of marine mammals and sea turtles by coastal power plants. I oversaw project design, client interface, scheduling, implementation, and reporting. Results of the field surveys and an Essential Fish Habitat Assessment are required components.

Preparation of CEQA Documents for Permitting the Installation of Large Organism Exclusion Devices Over Each of San Onofre Nuclear Generating Station's Operating Intake Structures. As a subcontractor to AECOM, MBC provided technical support in the preparation of CEQA documents needed to permit the installation of a Large Organism Exclusion Device (LOED) over each of San Onofre Nuclear Generating Station's (SONGS) two operating intake structures. Installation of the LOEDs is necessitated to reach compliance with the California State Water Board's *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling* which requires minimization or elimination of the take of marine mammals and sea turtles. As project manager, I am tasked with providing technical support by analyzing and detailing relevant marine environmental conditions for the Independent Study to support the development of a Mitigated Negative Declaration (MND) and preparing a technical study to accompany the MND submitted to the State Lands Commission.

EI Segundo Generating Station Units 3&4 Diver Exclusion Barrier Replacement Permitting. Assisted EI Segundo Generating Station with the development of the applicable permits for the replacement of the existing diver exclusion barriers on the Units 3&4 discharge structure. Interfaced with the US Army Corps of Engineers, Los Angeles Regional Water Quality Control Board, and the California Coastal Commission. Prepared permits include a Coastal Development Permit (California Coastal Commission), Section 10 permit under the Rivers and Harbors Act (US Army Corps of Engineers), and a Section 401 Water Quality Certification (Los Angeles Regional Water Quality Control Board).

Summary of Potential Kelp Loading at San Onofre Nuclear Generating Station. I provided Southern California Edison's San Onofre Nuclear Generating Station engineers and environmental staff with estimates of potential giant kelp biomass that could be expected to load on a large marine organism exclusion device (LOED) being designed to fit over the cooling water intake structures in compliance with new State regulations. I designed a field study to acquire data needed to estimate the standing biomass in the surrounding area, reviewed historic kelp impingement data from the facility, reviewed storm direction, frequency, and intensity data over a corresponding period. From these data, daily estimated kelp loading estimates were derived for storm and non-storm periods including estimates based on wave directionality. These data were provided to engineers to be used in the LOED design to minimize potential down time resulting from flow restrictions due to kelp loading.

EI Segundo Generating Station Units 3&4 Marine Mammal Barrier Replacement Permitting. Assisted EI Segundo Generating Station with the development of the applicable permits for the replacement of the existing marine mammal barriers on the Units 3&4 intake structure. Interfaced with the US Army Corps of Engineers, Los Angeles Regional Water Quality Control Board, and the California Coastal Commission. Prepared permits include a

Coastal Development Permit (California Coastal Commission), Section 10 permit under the Rivers and Harbors Act (US Army Corps of Engineers), and a Section 401 Water Quality Certification (Los Angeles Regional Water Quality Control Board).

San Onofre Nuclear Generating Station Cumulative Marine Environmental Impact Assessment. Principal scientist and author charged with compiling, synthesizing, and analyzing all available data regarding the cumulative effect of SONGS once-through-cooling system impacts on the surrounding marine environment (intake and discharge) against the backdrop of all coastal once-through-cooling usage and other stressors, such as fishing and climate change. The project required a comprehensive analysis of impacts to plankton communities (including ichthyoplankton), fish populations (intake and discharge effects), oceanographic conditions, and kelp bed resources with direct comparisons to prior studies, such as the Marine Review Committee results.

Southern California Regional Monitoring Program – 2008 (Bight '08). Trawl committee member engaged in the analysis and report development documenting the results of the 2008 regional trawl survey. Author of alternative analysis section designed to be included as an appendix in the 2008 survey report to be evaluated for potential full implementation in future surveys.

Los Angeles Department of Water and Power Once-Through-Cooling Regulation Compliance. Assisted the LADWP with evaluation of regulatory compliance options to meet the requirements listed in approved and pending power plant once-through-cooling regulations at both the State and Federal levels. Analyses included characterizing the relationship between cooling water flow volumes and impingement mortality.

Alamitos Generating Station Copper Source and Dispersion Study. Principal scientist examining the dispersion and potential source of copper in the intake and discharge waters at Alamitos Generating Station. Study design incorporated discrete water sampling from both within the plant and the adjacent portions of the San Gabriel River and the Los Cerritos Channel. Comparative chemical analyses (EPA 6020 and EPA 1640m) were conducted on water samples to determine the ambient copper concentrations as well as their dispersion and potential source, if elevated levels were detected.

San Diego Creek Pre- and Post-Dredge Biological Assessment. Principal scientist charged with characterizing the fish community in San Diego Creek before and after maintenance dredging. Seine sampling was used to determine the presence/absence of native fishes and to determine relative community structure.

Los Angeles River Biological Characterization. Provided support to the principal scientist (Dr. Camm Swift) in sampling the unlined portions of the Los Angeles River to determine the presence and relative abundance of native fishes. In addition to the field effort, authored a technical report supplementing the field survey with an extensive literature review and analysis to detail historic trends in the riverine fish community.

Impingement and Entrainment Characterization Studies. Assisted in the development, implementation, managerial oversight, and analysis of a year-long study characterizing the impingement and entrainment of marine organisms at seven coastal power plants from the

Santa Monica Bay to San Clemente, California in support of the USEPA Clean Water Act Rule 316(b). Managed the impingement data entry, QA/QC, and analysis.

Impingement Database Summary. Compiled and analyzed 30 years fish and macroinvertebrate impingement data from the NRG El Segundo Generating Station. Analyzed trends in impingement rates for critical species that occurred from 1972 to 2003.

Fish and Macroinvertebrate Database Manager. Designed, managed, and maintained MBC's Access database for fish and macroinvertebrate data collected through various impingement and otter trawl surveys.

Program Manager. Provided managerial oversight for National Pollutant Discharge Elimination System monitoring for AES Alamosa, L.L.C. Generating Station, AES Huntington Beach, L.L.C. Generating Station, and AES Redondo Beach, L.L.C. Generating Station.

RESEARCH EXPERIENCE

2010-Present. Environmental regulation of southern California kelp bed dynamics.

2010-Present. Biological response to oceanographic regime shifts in southern California.

2009-Present. Patterns and trends in Southern California Bight demersal fish species occurring on the continental shelf and upper slope based on the four regional monitoring surveys (1994, 1998, 2003, and 2008).

2009-Present. Climate-driven changes in nearshore fish community dynamics.

2004-Present. The determination of growth, mortality, recruitment, and spatio-temporal trends exhibited by salema (*Xenistius californiensis*) from within the Southern California Bight.

2006-2008. Investigations of various life history facets for four common nearshore sciaenids including larval age and growth, larval mortality, adult age and growth, larval and adult ecology, batch fecundity, and reproductive seasonality.

2002-2004. The effect of group density on the captive spawning behavior of the spotted sand bass (*Paralabrax maculatofasciatus*).

2001-2004. Construction of the life history of black croaker (*Cheilotrema saturnum*) with Drs. Daniel Pondella and Larry Allen.

2000-2004. Captive breeding of spotted sand bass (*Paralabrax maculatofasciatus*).

2003-2004. Research cruise director for white seabass (*Atractoscion nobilis*) gill net sampling program for monitoring Ocean Resource Enhancement Hatchery Program (OREHP) under Drs. Larry Allen and Daniel Pondella.

2003. Research cruise director and lead fish taxonomist for Bight '03 trawl sampling for the Vantuna Research Group under Principal Investigator Daniel Pondella.

2000-2003. California Dept. of Fish and Game, Ocean Resource Enhancement Hatchery Program (OREHP) monitoring and assessment program under Dr. Larry Allen. Conducted gill net sampling for white seabass (*Atractoscion nobilis*) under Drs. Larry Allen and Daniel Pondella to monitor recruitment of hatchery reared individuals.

1997. Local fisheries survey of California coastline from Point Fermin to Malaga Cove directed by Dr. Milton Love and Dr. Michael Franklin, through the Southern California Marine Institute.

1996. Study of DDT levels in locally obtained white croaker (*Genyonemus lineatus*) for CRG Marine Laboratories commissioned by Heal the Bay through the Southern California Marine Institute, San Pedro, CA. Directed by Rich Gosset. Performed research according to specified protocol, dissected test subjects and properly prepared them for further testing, participated in over 60% of the total research program.

TECHNICAL PUBLICATIONS

Pondella, II, D.J., J.P. Williams, **E.F. Miller**. In Press. The ichthyoplankton of King Harbor, Redondo Beach, California 1974 - 2006. Prepared for the California Energy Commission, Public Interest Energy Research Program.

Miller, E.F. and K. Schiff. 2011. Spatial distribution of Southern California Bight demersal fishes in 2008. Southern California Coastal Water Research Project Annual Report. [PDF](#)

Miller, E.F., C.T. Mitchell, D.J. Pondella, II, and S. Goldberg. 2011. The life history parameters of common nearshore marine fishes. Prepared for the California Energy Commission, Public Interest Energy Research Program. [PDF](#)

PEER-REVIEWED PUBLICATIONS

Miller, E.F. in press. Description of conditions preceding the 2011 Redondo Beach, CA fish kill. J. Coast. Res.

Miller, E.F., D. Pondella, and S. Goldberg. in press. Life history and historic trends in Salema (*Haemulon californiense*). Calif. Coop. Oceanic Fish. Invest. Reports

Miller, E.F. and B. Erisman. 2014. Long-term trends of southern California's kelp and barred sand bass populations: a fishery-independent assessment. Calif. Coop. Oceanic Fish. Invest. Reports. [PDF](#)

Miller, E.F. and J.A. McGowan. 2013. Faunal shift in southern California's coastal fishes: a new assemblage and trophic structure takes hold. Estuarine, Coast. Shelf Sci. 127:29-36.

Miller, E.F. and K.C. Schiff. 2012. Descriptive trends in Southern California Bight demersal fish assemblages since 1994. Calif. Coop. Oceanic Fish. Invest. Reports. 53:107-131. [PDF](#)

Pondella, D.J. II, J.P. Williams, **E.F. Miller**, and J.T. Claisse. 2012. The ichthyoplankton of King Harbor, Redondo Beach, California, 1974-2009. Calif. Coop. Oceanic Fish. Invest. Reports. 53:95-106. [PDF](#)

Miller, E.F., D.G. Vilas, J.L. Rankin, and D. Pryor. 2011. Commercial fishery effort for California spiny lobster (*Panulirus interruptus*) off Orange County, California before State Marine Reserve implementation. Bull. Southern California Acad. Sci. 110:165-176. [PDF](#)

Moore, R.H., **E.F. Miller**, M.S. Love. 2011. Southern occurrence of the sand sole (*Psettichthys melanostictus*). Bull. Southern California Acad. Sci. 110:184-188. [PDF](#)

Miller, E.F., J.P. Williams, and D.J. Pondella, II. 2011. Queenfish (*Seriphus politus*) and white croaker (*Genyonemus lineatus*) larval growth parameters. Calif. Coop. Oceanic Fish. Invest.

Reports. 52:75-79. [PDF](#)

Miller, E.F. and K. Schiff. 2011. Spatial distribution of Southern California Bight demersal fishes in 2008. Calif. Coop. Oceanic Fish. Invest. Reports. 52:80-96. [PDF](#)

Miller, E.F., D.J. Pondella, II, D.S. Beck, and K.T. Herbinson. 2011. Decadal-scale changes in southern California sciaenids under different levels of harvest pressure. ICES Journal of Marine Science. 68:2123-2133. [PDF](#)

Erismann, B.E., L.G. Allen, D.J. Pondella II, J.T. Claisse, **E.F. Miller**, and J. Murray. 2011. The illusion of plenty: hyperstability and spawning aggregations mask declines in seabass fisheries of Southern California. Canadian Journal of Fisheries and Aquatic Sciences 68:1705-1716. [PDF](#)

Field, J.C., A.D. MacCall, S. Ralston, M.S. Love, and **E.F. Miller**. 2010. Bocaccionomics: The effectiveness of pre-recruit indices for assessment and management of bocaccio. Calif. Coop. Oceanic Fish. Invest. Reports. 51:77-90. [PDF](#)

Parnell, P.E., **E.F. Miller**, C.E. Lennert-Cody, P.K. Dayton, and T.D. Stebbins. 2010. The response of giant kelp (*Macrocystis pyrifera*) in southern California to low-frequency climate forcing. Limnology and Oceanography 55:2686-2702. [PDF](#)

Miller, E.F. 2010. Structural irregularities in sagittal otoliths of black croaker (*Cheilotrema saturnum*) from southern California. Bull. Southern California Acad. Sci. 109: 18-21. [PDF](#)

Miller, E.F., S. Goldberg, J. Nuñez, N. Burkes, and J. Kuratomi. 2009. The reproductive biology of two common surfzone associated sciaenids, yellowfin croaker (*Umbrina roncadore*) and spotfin croaker (*Roncadore stearnsii*), from southern California. Bull. Southern California Acad. Sci. 108:152-159.

Miller, E.F., J.P. Williams, D.J. Pondella, II, and K.T. Herbinson. 2009. Life history, ecology, and long-term demographics of queenfish. Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science. 1:187-199. DOI: 10.1577/C08-018.1. [PDF](#)

Miller, E.F., D.S. Beck, and W. Dossett. 2008. Length-weight relationships of select common nearshore coastal southern California marine fish. Bull. Southern California Acad. Sci. 107:183-186.

Miller, E.F., D.J. Pondella, II, L.G. Allen, K.T. Herbinson. 2008. The life history black croaker, *Cheilotrema saturnum*. Calif. Coop. Oceanic Fish. Invest. Reports. 49:191-201.

Pondella, D.J. II, J.T. Froeschke, L.S. Wetmore, **E. Miller**, C.F. Valle, and L. Medeiros. 2008. Demographic parameters of yellowfin croaker, *Umbrina roncadore*, (Perciformes:Sciaenidae) from the southern California Bight. Pacific Science 62:555-568.

Miller, E.F. and M.D. Curtis. 2008. First occurrence of a Pacific crevalle jack, *Caranx caninus*, north of San Diego, California. Bull. Southern California Acad. Sci. 107:41-43.

Miller, E.F. 2007. Post-impingement survival and inferred maximum thermal tolerances for common nearshore marine fish species of southern California. Bull. Southern California Acad. Sci. 106:193-207.

Miller, E.F. and L.G. Allen. 2006. Captive breeding of spotted sand bass, *Paralabrax maculatofasciatus*, in southern California. California Fish and Game. 92(2): 98-105.

Miller, E.F. and L.G. Allen. 2006. Observations on the mating behavior of captive spotted sand bass (*Paralabrax maculatofasciatus*). Bull. Southern California Acad. Sci. 105(1):17-29.

Miller, E.F. and M.P. Franklin. 2005. The effect of dietary supplemented L-arginine on the growth of juvenile hatchery reared white seabass, *Atractoscion nobilis*. California Fish Game 91(1): 47-52.

PROFESSIONAL AFFILIATIONS

Western Society of Naturalists (WSN).

American Fisheries Society (AFS).

American Fisheries Society-Early Life History Section (AFS-ELH)

Southern California Academy of Sciences (SCAS).

PEER-REVIEWER

California Cooperative Oceanic Fisheries Investigations Report

Bulletin of the Southern California Academy of Sciences

Revista de Biología Tropical/ International Journal of Tropical Biology and Conservation

EXPERIENCE SUMMARY

Over thirty years of experience studying marine environments throughout southern California, specializing in water quality monitoring and water and sediment chemistry sampling. Mr. Moore is also experienced in benthic, fish, and plankton sampling. Extensive field experience with fish and invertebrate taxonomic identification. Expertise in coastal kelp bed surveys and restoration, and eelgrass surveys and restoration in lagoons, harbors, and bays. Conducted numerous surveys for the invasive alga *Caulerpa*. Experienced in the use of multiple types of sampling equipment, field equipment calibration and maintenance, data analysis, and report preparation. Currently serving as Project Manager and Technical Writer on MBC projects and reports.

EDUCATION

B.A., Biology, University of California, Los Angeles, 1977

PROFESSIONAL HISTORY

MBC Applied Environmental Sciences. Senior Scientist 1989 to present.
Occidental College. Research Associate/Environmental Biologist, 1980-1989.

PROJECT EXPERIENCE

Marine Mammal Monitoring. Project manager and National Marine Fisheries Service-certified marine mammal observer monitoring construction projects in the Ports of Los Angeles and Long Beach to ensure no impacts to marine mammals as a result of construction activities and associated sound produced. Project management duties include oversight of project, interfacing with regulatory agencies and client, and problem solving.

Dredge Sampling and Stormwater Surveys. Project Manager and Field Director for water quality monitoring and sediment chemistry sampling for dredge projects for the City of Long Beach, Port of Los Angeles, Port of Long Beach, and in the Port of San Diego for the U.S. Navy and City of San Diego. Project Manager and Field Director for non-point source stormwater surveys collecting samples from receiving waters, end-of-pipe outfalls, and automated water samplers for the Port of Long Beach.

Radiological Monitoring for San Onofre Nuclear Generating Station. Project Manager and Field Director for monthly collection of ocean water samples, and semi-annual collection of kelp, sediment, and tissue samples of mollusc, crustacean, and fish species.

Coastal Generating Station NPDES Monitoring Studies. Project Manager and Field Director for quarterly and biannual NPDES monitoring studies at 11 coastal generating stations from Ventura County to San Diego County. Clients include the Los Angeles Department of Water and Power, Southern California Edison Company, AES Corporation, Houston Industries, NRG Energy, Inc., Reliant Energy, and Sempra Energy. These studies, ongoing since 1977, include water quality measurements, kelp density, sediment sample collection and analysis, intertidal and subtidal surveys, fish and macroinvertebrate trawls, fish transects, and benthic infauna and macrobiota studies. The results of all analyses and trends are presented in annual monitoring reports to the regulatory agencies.

Fish Return System Studies. Environmental Biologist for fish return system studies at the San Onofre Nuclear Generating Station. Responsible for setting fyke nets using scuba, collecting and identifying fish caught, and recording observations of fish behavior. Also directed deployment of 1,000-foot purse seine net, and collection and identification of fish caught.

Eelgrass Habitat Restoration. Field Director for eelgrass habitat restoration projects in harbors, bay, and estuaries throughout southern California. Assisted in the design and implementation of eelgrass surveys, restoration projects, and monitoring programs. Mr. Moore has participated in very large eelgrass transplant projects including over 10 acres in Mission Bay and more than 20 acres in San Diego Bay. To date, MBC has successfully planted over 1,500,000 ft² of eelgrass to the bays and harbors of southern California. Past projects include eelgrass restoration in Mission Bay for the City of San Diego, eelgrass restoration in Convair Lagoon resulting from PCB contamination, an extensive eelgrass restoration programs for the U.S. Navy at the U.S. Naval Amphibious Base, a multi-year eelgrass restoration and monitoring study off the south arm of the Embarcadero Marine Park in San Diego Bay, a multi-year eelgrass restoration and monitoring program at Sunroad Marina on Harbor Island, San Diego, and an eelgrass restoration program in Sunset Bay, Orange County.

Kelp Bed Monitoring and Restoration. Field Director for giant kelp habitat monitoring in Orange and San Diego Counties and restoration projects along the Orange County Coastline for California Department of Fish and Game resulting in 10 acres of kelp restored. A separate restoration project as mitigation for private industry resulted in about 20 acres of kelp restored.

PROFESSIONAL AFFILIATIONS

Southern California Academy of Science

RELATED PROFESSIONAL ACTIVITIES

Certified Open Water Diver
American Red Cross CPR/First Aid Certified
Certified *Caulerpa* Surveyor

PUBLICATIONS

Robert Moore, Eric Miller, Milton Love. 2011. Southern occurrence of the sand sole (*Psettichthys melanostictus*). Bull. Southern California Academy of Sciences 110(3). p184-188.

Robert Moore and Kevin Herbinson. 2002. First record of the armed grunt, *Conodon serrifer* (Haemulidae) in southern California. Calif. Dept. of Fish and Game 88(4). p 178-180.

Robert Moore. 1991. First record of the leather bass (*Epinephelus dermatolepis*, Boulenger) in southern California. Calif. Dept. of Fish and Game 77(3). p 145-147.

Milton S. Love, Meenu Sanhu, Jeffrey Stein, Kevin T. Herbinson, Robert H. Moore, Michael Mullin, John S. Stephens, Jr. 1989. Analysis of fish diversion efficiency and survivorship in the fish return system at San Onofre Nuclear Generating Station. NOAA Technical Report NMFS 76. 16 p.

EXPERIENCE SUMMARY

Seven years conducting environmental monitoring in southern California. Experienced in data collecting and analysis of nearshore marine surveys. Field experience in benthic infauna collection and laboratory sorting, fish and invertebrate taxonomic identification, otter trawls, plankton tows, water quality monitoring, and water and sediment chemistry sample collection. Demonstrated experience with a variety of sampling equipment and techniques.

EDUCATION

B.S., Ecology and Evolution, University of California Santa Barbara, 2005

PROFESSIONAL HISTORY

MBC Applied Environmental Sciences. Senior Technician, 2013 to present; Technician, 2007-2013; Associate Technician, 2006-2007; Assistant Technician, 2005-2006.

University of California, Santa Barbara, Marine Science Center. Intern and research assistant, 2004-2005.

PROJECT EXPERIENCE

Marine Mammal Monitoring. National Marine Fisheries Service-certified marine mammal observer monitoring construction projects in the Ports of Los Angeles and Long Beach to ensure no impacts to marine mammals as a result of construction activities and associated sound produced.

San Onofre Nuclear Generating Station Environmental Monitoring. Experience in entrainment and impingement monitoring studies. Monitoring includes use of plankton tow nets, data collection, length, weight, and sexing of fish and invertebrates when applicable. Participated in field monitoring of water quality conditions demersal fish abundances in support of the Station's NPDES permit. Conducted field observations of environmental conditions such as sea state, presence of red tide or petroleum slicks, and monitoring for wildlife activity such as seabirds and marine mammals.

Entrainment and Impingement Characterization Studies. Field leader for 316(b) impingement studies at four coastal generating stations in Los Angeles County in 2005-2006. Impingement responsibilities included fish and macroinvertebrate identification, weight and length measurements, and sex determination when applicable.

NPDES Monitoring. Participated in NPDES environmental monitoring for various generating station clients. Specific projects include: water quality monitoring, demersal fish and macroinvertebrate sampling, benthic infaunal collection and sorting, marine sediment collection for both chemical and grain size analysis.

Aquatic Toxicity laboratory. Experience in monitoring and maintaining aquatic toxicity tests following EPA protocols. Tests conducted with organisms *Pimephales promelas*, *Atherinops affinis*, and *Ceriodaphnia dubia*.

EXPERIENCE SUMMARY

Over ten years of experience in ecological monitoring, both terrestrial and marine. Proficient in data collecting and analysis of nearshore marine surveys, especially GIS-based spatial analysis. Serves as MBC's principle GIS analyst and technician in charge of map preparation and analysis.

EDUCATION

B.S., Forestry; minor in Environmental Ethics, Humboldt State University, 2003.
Certificate, GIS, California State University Fullerton Extended Education, 2008.

PROFESSIONAL HISTORY

MBC Applied Environmental Sciences. Technician, 2007 to present; Associate Technician, 2007 to 2007; Assistant Technician, 2006 to 2007.

USDA Forest Service, Pacific Northwest Research Station. Forestry Technician May 2005 to November 2005.

USDA Forest Service, Rocky Mountain Research Station. Forestry Technician, June 2004 to October 2004.

USDA Forest Service, Stanislaus National Forest. Information Receptionist, 2002 to 2003.

PROJECT EXPERIENCE

Marine Mammal Monitoring. National Marine Fisheries Service-certified marine mammal observer monitoring construction projects in the Ports of Los Angeles and Long Beach to ensure no impacts to marine mammals as a result of construction activities and associated sound produced.

Kelp Consortium. Image analyst and GIS technician charged with geoprocessing aerial photographs of coastal California from Santa Barbara to the US-Mexico border. Compiles images of giant kelp beds throughout the area, generates map series, and calculates kelp canopy area by California Department of Fish and Game kelp bed designation using Spatial Analyst in the desktop ArcGIS 10.1 platform.

Coastal Generating Station NPDES Monitoring Studies. Technician involved with data collection and report preparation for biannual NPDES water quality monitoring at 11 coastal generating stations from Ventura County to San Diego. Clients included the Los Angeles Department of Water and Power, Southern California Edison Company, AES Corporation, Houston Industries, NRG Energy, Inc., Reliant Energy, and Sempra Energy. Monitoring responsibilities sediment and infauna collection using van Veens, intertidal and subtidal surveys. The results of all analyses and trends are presented in annual monitoring reports to the regulatory agencies.

Entrainment and Impingement Studies. Technician for 316(b) entrainment and impingement studies at seven coastal generating stations from Los Angeles County to San Diego County in 2005-2006. Experienced with various plankton sampling gear such as wheeled bongo and manta nets. Impingement responsibilities included fish and macroinvertebrate identification, weight and length measurements, and sex determination when applicable.

Grunion Surveys. Technician involved with field observations at Strands Beach and El Segundo Generating Station.

Laboratory Analytical Bench Work. Responsible for sorting of benthic infauna and plankton samples.

Forest Inventory and Analysis. Technician responsible for collection data on status and trends in forest area and location; in the species, size, and health of trees; in total tree growth, mortality, and removals by harvest; in wood production and utilization rates by various products; and in forest land ownership.

Archeological Survey. Technician responsible for collection and mapping of sites where there has been historical Native American activity in the Darby Fire 2001 area.

RELATED PROFESSIONAL ACTIVITIES

CPR/First Aid Certification

EXPERIENCE SUMMARY

Three and a half years conducting environmental monitoring in southern California. Experienced in data collecting and analysis of nearshore marine surveys. Field team leader able to operate independently. Field experience in benthic infauna collection and laboratory sorting, fish and invertebrate taxonomic identification, otter trawls, plankton tows, water quality monitoring, and water and sediment chemistry sample collection. Demonstrated experience with a variety of sampling equipment and techniques.

EDUCATION

B.S., Biology, University of California Santa Barbara, 2009

PROFESSIONAL HISTORY

MBC Applied Environmental Sciences. Technician 2013–Present, Associate Technician, 2010–2013; Assistant Technician, 2009–2010.

University of California, Santa Barbara, Marine Science Center. Research assistant, 2008.

PROJECT EXPERIENCE

Marine Mammal Monitoring. National Marine Fisheries Service-certified marine mammal observer monitoring construction projects in the Ports of Los Angeles and Long Beach to ensure no impacts to marine mammals as a result of construction activities and associated sound produced.

San Onofre Nuclear Generating Station Environmental Monitoring. Monitoring includes use of plankton tow nets, data collection, length, weight, and sexing of fish and invertebrates when applicable. Conducted field observations of environmental conditions such as sea state, presence of red tide or petroleum slicks, and monitoring for wildlife activity such as seabirds and marine mammals.

Entrainment and Impingement Characterization Studies. Staff biologist for impingement characterization studies at coastal generating stations. Impingement responsibilities included fish and macroinvertebrate identification, weight and length measurements, and sex determination when applicable.

NPDES Monitoring. Participated in NPDES environmental monitoring for various generating station clients. Specific projects include: water quality monitoring, demersal fish and macroinvertebrate sampling, benthic infaunal collection and sorting, marine sediment collection for both chemical and grain size analysis. Conducts observations and identifications of marine birds and mammals during field surveys.

Aquatic Toxicity laboratory. Experience in monitoring and maintaining aquatic toxicity tests following EPA protocols. Tests conducted with organisms *Pimephales promelas*, *Atherinops affinis*, *Oncorhynchus mykiss*, *Ceriodaphnia dubia*, *Menidia beryllina*, *Americamysis bahia* (formerly *Mysidopsis*) and *Macrocyctis pyrifera*.

Marine Mammal Observer Monitored marine mammal activity to prevent harassment of species on construction sites in the Port of Long Beach.

EXPERIENCE SUMMARY

Two years conducting environmental monitoring in southern California. Efficient in data collecting and analysis of nearshore marine surveys. Experience in benthic infauna collection and laboratory sorting, fish and invertebrate taxonomic identification, otter trawl, and beach seines.

EDUCATION

B.S. Marine Biology: California State University, Long Beach. 2007
Relevant Coursework: Fisheries and Conservation, Marine Mammology.

PROFESSIONAL HISTORY

MBC Applied Environmental Sciences. Associate Technician, 2010-present; Assistant Technician, 2009-2010.

Ecorp Consulting, Inc. Aquatic Intern, 2007.

PROJECT EXPERIENCE

Marine Mammal Monitoring. National Marine Fisheries Service-certified marine mammal observer monitoring construction projects in the Ports of Los Angeles and Long Beach to ensure no impacts to marine mammals as a result of construction activities and associated sound produced.

Marine Mammal Care Center. Participated as an animal care assistant working largely with northern elephant seals, sea lions, and harbor seals documenting and improving their health for future release.

Coastal Generating Station NPDES Monitoring Studies. Staff biologist for quarterly and biannual NPDES monitoring studies at 11 coastal generating stations from Ventura County to San Diego County. Tasks include identification of fish and macroinvertebrate captured in trawls. Conducts observations and identifications of marine birds and mammals during field surveys.

Invasive Species Removal in the Santa Margarita River. Assisted on the identification and collection of invasive species using net and beach seines, electric shock fishing. Monitoring the population of native species found during surveys.

San Gabriel River Monitoring. Monitored for the presence of yearlings and Santa Ana suckers (*Catostomus santaanae*) during the structural improvement of a bridge. Monitors were on-site and monitoring during daylight hours for the duration of construction activities, including the pre- and post-job site preparation.

EXPERIENCE SUMMARY

Eight years of experience conducting environmental monitoring in southern California. Proficient in data collecting and analysis of nearshore marine surveys. Experience in benthic infauna collection and laboratory sorting, fish and invertebrate taxonomic identification, otter trawl, plankton tows, beach seines, water quality, and kelp restoration. Team leader on freshwater fish and invertebrate collection projects.

EDUCATION

B.A. Biology: Zoology concentration, Sonoma State University, 2003.
Stream and Wetland Assessment of Mitigation Protocol training workshop, May 2008

PROFESSIONAL HISTORY

MBC Applied Environmental Sciences. Senior Technician, 2011-present; Technician, 2007-2011; Associate Technician, 2006-2007; Assistant Technician, 2005-2006.

PROJECT EXPERIENCE

Marine Mammal Monitoring. National Marine Fisheries Service-certified marine mammal observer monitoring construction projects in the Ports of Los Angeles and Long Beach to ensure no impacts to marine mammals as a result of construction activities and associated sound produced.

Prima Deshecha Landfill Bioassessment Monitoring. Performed a streambed biological assessment to comply with State Water Resources Control Board General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities. Sampling and analysis followed the protocols described in the California Stream Bioassessment Procedure (CSBP) and also incorporated Surface Water Ambient Monitoring Program (SWAMP) physical habitat assessment protocols.

Santa Clara River Fish Collection. Used a variety of techniques, collected fish from the mouth of the Santa Clara River for fish tissue bioaccumulation analysis. Sampling was conducted in coordination with State Parks, the manager of the collection area. Sampling was conducted so as to minimize impacts to sensitive fish species in the river.

Calleguas Creek Watershed Monitoring. Conducted water sampling and collection of sediment, fish and mussel tissue samples for analysis of nutrients, contaminants and toxicity in Mugu Lagoon, at the mouth of the Calleguas Creek watershed. Conducts quarterly water sampling and water quality analysis in the lagoon, coordinating with the local environmental manager to reduce the potential for harassment of sensitive species during sampling.

Northern Elephant Seal Population Demographics. Participated as a research assistant working with principle investigators documenting the length and weight of young northern elephant seals (*Mirounga angustirostris*).

San Onofre Nuclear Generating Station Environmental Monitoring. Collect ocean water samples monthly for radiological monitoring. Field leader for 316(b) entrainment and impingement monitoring study in 2006-2007. Monitoring included use of plankton tow nets, data collection, length, weight, and sexing of fish and invertebrates when applicable. Lead biologist during Fish Chase and Heat Treatments, which include identifying and enumerating fish and invertebrates returned back to the ocean.

Coastal Generating Station NPDES Monitoring Studies. Staff biologist for quarterly and biannual NPDES monitoring studies at 11 coastal generating stations from Ventura County to San Diego County. Clients include the Los Angeles Department of Water and Power, Southern California Edison Company, AES Corporation, NRG Energy, Inc., and Reliant Energy. These studies, ongoing since 1977, include water quality measurements, kelp density, sediment sample collection and analysis, intertidal and subtidal surveys, fish and macroinvertebrate trawls, fish transects, and benthic infauna and macrobiota studies. The results of all analyses and trends are presented in annual monitoring reports to the regulatory agencies.

RELATED PROFESSIONAL ACTIVITIES

PADI Open Water Diver Certification
CPR/First Aid Certification
Oxygen First Aid for SCUBA Diving Injuries Certification
Southern California Association of Marine Invertebrate Taxonomist (SCAMIT) Member
Surface Water Ambient Monitoring Program (SWAMP) Workshop

EXPERIENCE SUMMARY

Five years conducting environmental monitoring in southern California. Efficient in data collection and analysis of nearshore marine surveys. Experienced in stormwater sampling, benthic infauna collection and laboratory sorting, fish and invertebrate taxonomic identification and collection, eelgrass and *Caulerpa* surveys, otter trawl, and beach seines.

EDUCATION

B.S. Marine Biology: California State University, Long Beach. 2010
USC Wrigley Institute of Environmental Studies, Catalina Island. 2009
Relevant Coursework: Fisheries and Conservation Biology, Ecology of Marine Communities.

PROFESSIONAL HISTORY

MBC Applied Environmental Sciences. Associate Technician, 10/2010 - Present.
CSULB - Biological Sciences. Assistant Marine Technician, 1/2008 - 9/2008

PROJECT EXPERIENCE

Marine Mammal Monitoring. National Marine Fisheries Service-certified marine mammal observer monitoring construction projects in the Ports of Los Angeles and Long Beach to ensure no impacts to marine mammals as a result of construction activities and associated sound produced.

Coastal Generating Station NPDES Monitoring Studies. Staff biologist for quarterly and biannual NPDES monitoring studies at 11 coastal generating stations from Ventura County to San Diego County. Tasks include identification of fish and macroinvertebrate captured in trawls. Conducts observations and identifications of marine birds and mammals during field surveys.

Oceanographic and Biological Studies. Conducted field studies for a proposed desalination facility offshore Marine Corps Base Camp Pendleton (Oceanside). Study components included: measurements of temperature by thermistor chain, measurement of currents by acoustic Doppler current profilers (ADCPs), trawls, subtidal reef surveys, sediment grabs, and water quality profiles.

Eelgrass and *Caulerpa* Surveys. Conducted eelgrass (*Zostera marina*) and *Caulerpa* surveys in Queensway Bay, Long Beach Harbor, Alamitos Bay, Newport Bay, Del Mar Boat Basin (Oceanside), and San Dieguito Lagoon.

Dredge Sampling and Stormwater Surveys. Staff biologist for water quality monitoring and sediment chemistry sampling for dredge projects for the City of Long Beach, Port of Los Angeles, Port of Long Beach, and in the Port of San Diego for the U.S. Navy and City of San Diego. Staff biologist for non-point source stormwater surveys collecting samples from receiving waters, end-of-pipe outfalls, and automated water samplers for the Port of Long Beach.

Assistant Marine Technician. Assisted CSULB graduate students with field research gaining extensive on-the-water experience and exposure to southern California oceanographic conditions and marine fauna including fishes, invertebrates, mammals (pinnipeds, whales, and dolphins), and algae.

RELATED PROFESSIONAL ACTIVITIES

SCUBA Certifications: PADI Basic Open Water, NAUI Advanced Open Water, AAUS Rescue and Scientific Diving. Certified *Caulerpa* diver.

Additional abilities and knowledge of: small boat operations; boating safety education, CPR, First Aid, O2 administration, kayaking, swimming, beach seines, trawls, fishing: pole, long line; fish, elasmobranch & invertebrate handling, measuring and dissection, GPS, ArcGIS, Minitab, Word, Excel, PowerPoint, underwater photography, transects and quadrats, habitat analysis, marine species identification.