

**FINAL REPORT**  
**MARINE WILDLIFE MITIGATION MONITORING**

**Fiber-optic Cable Survey**  
**Los Osos and Manchester Beach, California**

*prepared for*

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**September 2015**

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## 1.0 Executive Summary

AT&T and Verizon contracted with Global Marine Systems, Limited (GMSL) to conduct eight submarine fiber-optic cable surveys off the California coast in the summer of 2015. Regulatory agencies at state and federal levels were concerned that the survey operations might harm marine wildlife. In particular, a potential for collision between the survey ship and marine mammals and turtles existed. Moreover, whales could become entangled in the Remotely Operated Vehicle (ROV) umbilicus. The agencies were also concerned about the potential impacts of an oil or fuel release. Finally, they wanted to be certain that if the survey ship approached a pinniped rookery or haul-out area, disturbances would be minimal.

As the permitting process continued, AT&T contracted with the Marine Mammal Consulting Group, Inc. (MMCG), an independent firm based in Santa Barbara, California, to help with mitigation planning for the overall project as well as mitigation monitoring during the survey of Asia–America Gateway (AAG) Segment 5, the first cable segment that was surveyed. The use of Marine Wildlife Monitors (MWMs) during this initial survey was required under earlier permit conditions for that particular cable survey. MMCG was also tasked to train Designated Crew Member Monitors (DCMMs) during this first survey. Under permit conditions imposed by the California State Lands Commission (CSLC), the DCMMs were to perform mitigation monitoring during the subsequent seven cable surveys. Since numerous requirements from various regulatory agencies had to be met, MMCG prepared a Marine Wildlife Mitigation Monitoring and Training Plan which presented all of the agencies' requirements in an orderly, easy-to-access document (MMCG 2015). This served as a convenient reference during training and as the surveys continued.

A total of 14 species of marine mammals was observed. A total of 784 sightings was made by the monitors. Each sighting represented anywhere from one animal to over a hundred animals. The total number of marine mammals seen was tallied and came to 9,534. Noteworthy observations included a total of 36 fin whales off Los Osos, south of Morro Bay, California, along with 58 northern fur seals and on one occasion, a pod of 30 killer whales. Two Steller sea lions and a sperm whale were noted off Manchester Beach.

No adverse impacts or reports of such impacts occurred during this project. On five occasions, monitors took action to avoid potentially adverse impacts to marine mammals. On seventeen occasions, alerts were made but no action proved necessary. The mitigation measures proved to be effective.

## 2.0 Introduction

AT&T contracted with GMSL to conduct eight submarine fiber-optic cable surveys off the California coast in the summer of 2015. Regulatory agencies at state and federal level were concerned that the survey operations might harm marine wildlife. In particular, a potential for collision between the survey ship and marine mammals and turtles existed. Moreover, whales could become entangled in the ROV umbilicus. The agencies were also concerned about the potential impacts of an oil or fuel release. Finally, they wanted to be certain that if the survey ship approached a pinniped rookery or haul-out area, disturbances would be minimal.

CSLC was the lead regulatory agency for this project. Other state and federal agencies also were involved, directly or indirectly. Collectively, the regulatory agencies imposed various

conditions on this operation for the protection of marine mammals and turtles, particularly threatened and endangered species. Some conditions were spelled out in the CSLC Offshore Geophysical Permit Program (OGPP) project requirements (OGPP 2014). Some of these conditions were summarized in a Marine Wildlife Contingency Plan prepared for these surveys (GMSL 2015). This plan also outlined training requirements for DCMMs, who were to watch for marine wildlife and take appropriate steps when necessary to avoid adverse impacts to such wildlife.

As the permit process continued, AT&T contracted with MMCG, an independent firm based in Santa Barbara, California, to help with mitigation planning. MMCG was also selected to perform marine wildlife mitigation monitoring during the survey of AAG Segment 5, the first cable segment that was surveyed. The use of MWMs during this individual survey was required under earlier permit conditions for this project. Finally, MMCG was tasked to train the DCMMs during this first survey. The DCMMs were to perform mitigation monitoring during the subsequent seven surveys. *Wave Venture* kept in daily contact with MMCG during the subsequent surveys to ensure accurate data collection. MMCG, in turn, was able to provide additional advice for the DCMMs when needed throughout the entire project.

The OGPP stipulated that MWMs were not required aboard vessels conducting survey activities that utilized only non-pulse or non-acoustic generating, passive survey equipment (e.g. ROV, magnetometers, or gravity meters). Since GMSL was to use an ROV positioned about 1 meter (m) above the seabed, with cable depth detection equipment that operated only in the space between the ROV and the seabed rather than in the water column, MWMs were not considered necessary for these surveys (OGPP 2014).

At the request of CSLC, MMCG made a clarification to the GMSL Marine Wildlife Contingency Plan concerning mitigation measures to be employed near pinniped rookery and haul-out sites (MMCG 2015). Finally, NOAA Fisheries (also called National Marine Fisheries Service or NMFS), had a number of standard requirements for such projects, not all of which had been included in previous documents.

Rather than having the monitors and DCMMs sift through various documents or consult with the regulatory agencies to find out about all of the mitigation requirements, MMCG prepared a Marine Wildlife Mitigation Monitoring and Training Plan which presented all of the agencies' requirements in an orderly, easy-to-access document (MMCG 2015). (These requirements are summarized herein.) The plan served as a convenient reference during training and as the surveys continued.

This report provides background on the cable networks. It discusses the cable routes, the vessel employed in the surveys, the ROV used to survey the cables, and the survey schedule. It also describes the regulatory background for this project and lists the regulatory agencies involved. It summarizes various marine mammals and turtles reported in the region and their protected status.

The next section of the report provides details of the mitigation monitoring methods, including watch schedules, equipment used by the monitors, communications, both aboard the vessel and from ship to shore, protocols developed to avoid interactions between the cable survey operations, marine mammals, and turtles, other mitigation measures, data recording, and reporting procedures. Woven into this are details about the training of the DCMMs.

In the results and discussion section, the marine mammal sightings are listed by species and include numbers of animals observed, location, seasons, behavior, and other relevant information. This section also describes how actions were taken to avoid adverse interactions between the survey ship and marine mammals and the effectiveness of such actions. Anecdotal sightings of other wildlife are also discussed.

The conclusions and recommendations section summarizes the effectiveness of the mitigation measures and makes recommendations for similar projects in the future. The report concludes with acknowledgments and a list of literature citations.

## 3.0 Background

### 3.1 Fiber-optic Cables at Los Osos and Manchester Beach

Six fiber-optic cable segments make landfall at Los Osos, just south of Morro Bay, California. These cables form links in networks that connect the west coast of America with Hawaii and other Pacific islands, Asia, Australia, and New Zealand. Two more cable segments make landfall at Manchester Beach, just north of Pt. Arena, California. One of these connects with Japan, while the other goes to Los Osos. Collectively, these eight segments are used for digital transmission of video, data, and voice telecommunications. All eight segments were surveyed by GMSL. The segments were surveyed in the following order:

1. Asia-America Gateway, Segment 5 (Los Osos): 11 through 21 July
2. Japan-U.S., Segment 1 (Los Osos): 21 through 28 July
3. China-U.S., Segment 7 (Los Osos): 28 July through 5 August
4. Southern Cross, Segment D (Los Osos): 5 to 6 August; 9 to 14 August
5. Japan-U.S., Segment 9 (Los Osos): (14 through 19 August)
6. China-U.S., Segment E2 (Los Osos): (19 through 25 August)
7. Japan-U.S., Segment 8 (Manchester Beach): (26 August to 29 August)
8. Japan-U.S., Segment 9 (Manchester Beach): (29 to 31 August)

*Note:* Japan-U.S. Segment 9 does actually extend from Los Osos to Manchester Beach, California, rather than directly to Asia. China-U.S., Segment E2 extends from Los Osos north to Bandon, Oregon. All other cable segments surveyed extend west to Hawaii or Asia.

### 3.2 Cable Survey Ship *Wave Venture*

In 1999, *Wave Venture* was converted into a cable-laying and survey ship by GMSL. It is registered in London. It is presently based in Victoria, British Columbia, Canada. *Wave Venture* is 141.5 m (464 ft.) long and can accommodate up to 62 persons including crew. It has a single variable pitch propeller, two stern thrusters, and three bow thrusters. Its cruising speed is 12.5 knots. *Wave Venture* is equipped with an ROV and can deploy a plow for cable burial.

### 3.3 Remotely Operated Vehicle (ROV)

An ROV was used from near the cable termini out to about 1830 m (6000 ft.) of water depth at each site. The ROV was electrically controlled from *Wave Venture* from an umbilicus. No floats were needed for the umbilicus to provide buoyancy; the umbilicus descended straight down through the water column from the starboard side of *Wave Venture*. The role of the ROV was to

survey the cable routes to ensure that the cables remained buried at design depth and that no loops or suspensions were present, which could have posed a risk to the cables themselves from chafing. This also could have posed an entanglement hazard for marine mammals, particularly sperm whales (Heezen 1957), for fishing gear, and for vessels inadvertently anchoring along the cable route.

### 3.4 Schedule

Originally, the schedule called for the MWMs (also called Marine Mammal Observers [MMOs]) to board *Wave Venture* in San Francisco, California on 3 July 2015. Various circumstances resulted in the departure date being delayed until 10 July 2015. The survey of AAG Segment 5 began off Los Osos on 11 July 2015. This first survey was completed on 21 July 2015, whereupon the MWMs were shuttled into Morro Bay, then they returned to the MMCG base in Santa Barbara, California. After this, the surveys resumed in the order and schedule presented in Section 3.1. The final transit, from Manchester Beach back to San Francisco, was completed on 31 August. Both transits and surveys continued 24 hours a day throughout this project.

### 3.5 Regulatory Background

All marine mammals are protected under the Marine Mammal Protection Act of 1972 (MMPA) and its amendments. Under the MMPA, the “taking” of any marine mammal is prohibited. “Take” is defined as “to harass, hunt, capture, or kill any marine mammal.” In the 1994 amendments, “harassment” was divided into two levels: Level A harassment meant “any act of pursuit, torment or annoyance which has the potential to injure a marine mammal or a marine mammal stock in the wild.” Level B meant any act that “has the potential to 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” (MMPA 1972, amended 1994, 16 U.S.C., § 1431 *et seq.*). Takes are allowed under special conditions, such as an Incidental Harassment Authorization (IHA). No IHA was required this time because the mitigation measures sufficiently reduced the chances of takes.

Some stocks of marine mammals are listed as threatened or endangered under the federal and state endangered species acts (ESAs). Further, some populations or stocks of vertebrates, or parts of populations or stocks of vertebrates, may be considered Distinct Population Segments (DPSs). Such segments represent discrete populations or stocks of a species or subspecies that are significant to other populations or stocks of the same species or subspecies. As one example, the California-Oregon-Washington stock of humpback whales (*Megaptera novaeangliae*) is just one of 14 worldwide DPSs recognized by NOAA Fisheries.

Several stocks of listed marine mammals are classified as strategic under the MMPA. The definition of strategic is complex, but in this report it refers to a stock that is being adversely impacted by human activities and may not be sustainable. Such stocks are considered to be of strategic importance at a regional or population level. Some stocks are also considered depleted under the MMPA. All species listed under the ESA are also classified under the MMPA as strategic and depleted. Listed stocks considered strategic and depleted are summarized in Table 1, which follows below. Finally, some stocks may be considered vulnerable to decline because their numbers are low.

**Table 1:**  
**Occurrence of ESA-listed Marine Mammals and Turtles in Region**

Common Name	Scientific Name	Stock Size	Status
North Pacific right whale	<i>Eubalaena japonica</i>	26	Endangered ESA; strategic, depleted MMPA
Humpback whale*	<i>Megaptera novaeangliae</i>	1,918	Endangered ESA; strategic, depleted MMPA
Blue whale	<i>Balaenoptera musculus</i>	1,647	Endangered ESA; strategic, depleted MMPA
Fin whale	<i>B. physalus</i>	3,051	Endangered ESA; strategic, depleted MMPA
Sei whale	<i>B. borealis</i>	126	Endangered ESA; strategic, depleted MMPA
Gray whale Western Pacific stock	<i>Eschrichtius robustus</i>	Less than 100	Endangered ESA; strategic, depleted MMPA
Sperm whale	<i>Physeter macrocephalus</i>	2,106	Endangered ESA; strategic, depleted MMPA
Guadalupe fur seal	<i>Arctocephalus townsendi</i>	7,408	Threatened ESA; strategic, depleted MMPA
Southern sea otter	<i>Enhydra lutris nereis</i>	2,944	Threatened ESA; strategic, depleted MMPA
Green turtle	<i>Chelonia mydas</i>	Unknown	Threatened ESA
Loggerhead turtle	<i>Caretta caretta</i>	Unknown	Threatened ESA
Olive ridley turtle	<i>Lepidochelys olivacea</i>	Unknown	Threatened ESA
Leatherback turtle	<i>Dermochelys coriacea</i>	Unknown	Endangered ESA

Sources: Carretta et al. 2015; Allen and Angliss 2015; Hatfield and Tinker 2014; NMFS and USFWS 1998a-d.

\*The California-Oregon-Washington stock of humpback whales was proposed for delisting in 2015 but remained endangered throughout this project.

All marine mammals, including those listed under the ESA, are protected under the MMPA. They are also protected under the California Fish and Game Code. Some 33 species of cetaceans—whales, dolphins and porpoises—have been reported off the California coast. Seven species of pinnipeds—seals and sea lions—have been reported there as well. The southern sea otter (*Enhydra lutris nereis*) ranges from central to southern California but normally does not occur near Pt. Arena, which is close to where the two northern cables make landfall in northern California.

Four species of turtles have been reported off the California coast. The olive ridley (*Lepidochelys olivacea*), the green (*Chelonia mydas*), and the loggerhead (*Caretta caretta*) are listed as threatened under the ESA, while the leatherback (*Dermochelys coriacea*) is endangered (NMFS and USFWS 1998a through d). The first three species are rare off central and northern California, although they can appear there during Niño events, such as the event that was occurring during this project. The leatherback ranges from Peru to Alaska along the continental slope and can appear in some numbers off Monterey Bay, California.

The following regulatory agencies were directly or indirectly involved in this project:

- California State Lands Commission (CSLC), lead agency;
- California Coastal Commission (CCC);
- California Department of Fish and Wildlife (CDFW);
- Regional Water Quality Control Board (WQCB);
- U.S. Army Corps of Engineers (ACOE);
- U.S. Coast Guard (USCG);
- NOAA Fisheries (also National Marine Fisheries Service or NMFS);
- U.S. Fish and Wildlife Service (USFWS).

## 4.0 Mitigation Monitoring Methods

### 4.1 Personnel Selection

The MWMs from MMCG had considerable experience in offshore mitigation monitoring as well as with working with marine mammals. They had been approved by the regulatory agencies in previous years. The DCMMs were selected by GMSL. These included Mario C. Sayas, Jr., Ronmike P. Belarmino, and Jayson P. Lim. The MMCG instructors explained to the DCMMs that the training would enable them to perform marine wildlife mitigation monitoring after the MMCG instructors left the ship. They also explained that such training did not qualify them as NOAA-approved MWMs; instead the training was designed to fulfill CSLC requirements for marine wildlife mitigation monitoring only for the remaining seven cables that were to be surveyed during this project.

### 4.2 Briefings

Briefings were held at the MMCG base between MMCG's principals and its MWMs. These briefings covered MMCG's Marine Wildlife Mitigation Monitoring Plan as well as procedures to be used in training the DCMMs. Prior to the departure of *Wave Venture* from San Francisco, a briefing was held between the captain, ship's officers, ROV superintendent, AT&T and GMSL representatives, the MMCG monitoring team, and other interested shipboard personnel. Preliminary topics included personnel safety concerns, communications, points of contact, responsible parties, accommodations, and general ship operations. Various laws were explained pertaining to the protection of marine mammals and the importance of avoiding adverse impacts. The marine mammal monitoring requirements were discussed. The ability of the monitors to stop the project operations if it appeared likely that an adverse impact could occur was emphasized. Stress was placed on working together to avoid impacts. The ship's crew was encouraged to report every marine mammal sighting immediately to the monitors on watch. Protocols for avoiding marine mammal interactions with ROV operations were discussed. The requirement of briefing any new crew members who might come aboard as the

surveys progressed was also explained. MMCG's Marine Wildlife Mitigation Monitoring Plan and various supporting documents were given to the attendees.

The plan served as an informative reference for the DCMs after they had undergone the initial training and were on their own. It covered in some detail the training goals summarized in the original plan (GMSL 2015) and addendums to that plan (MMCG 2015) requested by CSLC:

- Familiarization with applicable laws and regulations;
- Describing marine mammal species found in California project areas;
- Summarizing the seasonality of their occurrences;
- Methods of detecting and identifying marine mammals;
- Methods of avoiding potential adverse impacts, including:
  - Collision with the ship, both while underway to project sites and while surveying;
  - Injuries from the propeller, both while underway to project sites and while surveying;
  - Entanglement in the ROV umbilicus;
  - Procedures to be taken in the event of a fuel, oil, or chemical release that impacted marine mammals;
  - Disturbances to pinniped rookeries and haul-outs.
- Reporting procedures.

### 4.3 Watches

Watches were set by the MWM supervisor according to *Wave Venture's* schedule. Care was taken to keep the division of watches equitable, with both monitors and DCMs serving about the same amount of time each day. Watches were maintained 24 hours a day, 7 days a week. They were kept from port en route to each site, and from each site back to port. Watches were not posted when the vessels were kept in berths or anchored in harbors. During each survey, constant vigilance was maintained.

Watches were generally held in the highest points of the vessel with the most panoramic views. In severe weather conditions, monitors could stay inside the bridge for safety reasons but were free to roam from side to side to maintain all-around surveillance.

### 4.4 Equipment

In certain parts of the ship, the monitors were required to don hardhats and steel-toed boots. They were equipped with night vision binoculars for monitoring in darkness. For daytime spotting, monitors were equipped with 7X50 waterproof, low light binoculars. At least one pair of binoculars with a compass and range-finding reticule was included in each watch for establishing relative bearings and distances of animals from the vessel. These binoculars were calibrated for range prior to departure from San Francisco. The monitors also were equipped with a handheld GPS unit as well as with a portable weather measuring device. This device recorded wind speed and direction, and temperature. Vessel coordinates and weather data could have been obtained from the bridge, but this would have interrupted the monitoring effort.

## 4.5 Communications

Monitors on the vessels were equipped with handheld “company” radios for communications between one another. In this manner, one monitor could be easily reached by the other monitor. These radios had a beeper feature so that monitors off watch could be summoned in the event of an emergency. Each monitor also carried a handheld marine VHF radio for communications with the bridge crew (VHF Channel 08: intership channel) and with other vessels (appropriate other channels). The handheld VHF radios also had ship-to-shore capabilities (telephone links). Both sets of radios were kept charged and were regularly tested to ensure that they were functioning properly.

The MMCG team was equipped with standard digital cellular telephones. In addition, they were equipped with a satellite telephone. Both telephone systems had multiple power supply and charging circuits. Both telephones had voice mail and text capabilities. The two telephone systems ensured excellent communications throughout the project. As a backup, *Wave Venture* also had satellite telephones as well as long-range, single-sideband marine radios and VHF marine radios. All ships’ radios also had ship-to-shore capabilities (telephone links). The DCMMs were able to use communications equipment aboard *Wave Venture*.

With the extensive communications capabilities, reliable means of communications were maintained 24 hours a day throughout the project. Reliable communications with many backups are essential for operations conducted well offshore, out of range of some conventional land-based systems such as cellular telephones.

## 4.6 Mitigation Measures

### 4.6.1 Zones of Influence

In offshore projects involving potential hazards to marine mammals, zones are set up at various ranges around the hazard. Numerous terms have been used to describe these zones. Several of the terms discussed in this section have been included in the lists of mitigation measures for clarity.

An exclusion zone generally refers to a range from a site inside of which either the animals, vessel traffic, or both are at risk. An exclusion zone refers to the Closest Point of Approach (CPA) that any vessel can make to a site without being in danger or jeopardizing operations within the exclusion zone. This can be applied to general vessel traffic, including commercial or recreational vessels, to project vessels, or even to animals. For this project, an exclusion zone of 91 m (300 ft.) was imposed for pinniped rookery and haul-out areas. The ship was prohibited from approaching such areas any closer than 91 m. In other words, it was excluded from a 91 m radius of such sites.

“Safety zone” is very misleading because people think that animals within this zone are safe. In reality, safety zone refers to the outer limit of a zone that is hazardous. For this reason, we prefer “hazard zone,” meaning that any animal within this zone is in a hazardous area and is at risk. For collision and entanglement hazards, any animal within 305 m (1000 ft.) of the survey ship was in the hazard zone, meaning the danger of collision or entanglement was imminent and immediate action generally had to be taken to avoid impacts. In the case of pinniped rookeries and haul-out areas, the hazard zone was 300 m (984 ft.).

A warning or buffer zone refers to a radius beyond the hazard zone that is established to provide a warning or “heads-up” to project personnel that animals are approaching the hazard zone. This puts the crew on the alert that action may be necessary to prevent mishaps. This can be set at a given range, or for this project, set at the discretion of the monitor and depending on circumstances. For example, whales half a mile from the ship that continued to remain at the same distance should be kept under watch in case they started to move toward the ship. The crew should be advised of their presence but not put on readiness to take immediate action. Conversely, whales half a mile away moving rapidly toward the ship may not surface again until they are well within the hazard zone. In such cases, the crew should be advised that they may have to take immediate action to avoid impacts, or they may even be asked to take action even though the whales were outside the hazard zone when last seen. Such a circumstance falls under the catchall mitigation measure that follows later that reads, “The monitor shall have the authority to stop all project activities if, in the opinion of the monitor, project operations have the potential to threaten or ‘take’ a marine mammal.”

A safe zone is represented by the range from a hazard beyond which animals are considered to be safe. Please note that this term has an entirely different meaning than safety zone. For this project, the safe zone can be set by the monitor but would likely be 1 nm and beyond from the vessel.

All zones are subject to the limits of visibility. This is why one of the mitigation measures below calls for heightened vigilance when visibility is less than 1 nm. It is understood that spotting marine wildlife at this range at night, even with night vision equipment, is virtually impossible unless an animal surfaces under a full moon on a clear, calm night and the observer happens to be looking in that direction.

For some projects, zones are set up based on takes under the MMPA (please see Section 3.1). These include both Level A and Level B zones. If an animal strays into either zone, it is considered “taken” under the MMPA and/or ESA. Such zones are generally set up for projects involving loud underwater sounds, such as pile-driving, underwater explosives, geophysical airguns, or low and mid-frequency sonar. No such zones are needed for this project, although Level A and Level B takes could occur (e.g., a whale being struck by the ship or a whale being frightened by the approach of the ship).

#### **4.6.2 General Roles of the Monitors**

The following understanding of each monitor’s role was provided to the captain and crew:

- The monitor’s primary job is to make every reasonable effort to help ensure that no takes of marine mammals occur. Since the operation of the ship and the actions of wild animals cannot be directly controlled by the monitor, no guarantees are possible;
- The monitor shall always establish and maintain communications with the officer of the watch during project operations;
- It is the monitor’s sole responsibility to request that preventative measures be taken if, in his or her opinion, potential for an adverse impact, injury, or death to a marine mammal exists;
- If potential for an adverse impact exists, the monitor shall immediately get to the best possible vantage point for helping to avoid such an impact. In no instance shall the monitor’s position compromise personnel safety concerns;

- If potential for an adverse impact exists, the monitor may request that other monitors and available crew members assist in watching for the animal that is at risk;
- When preventative measures are requested and when they are terminated is entirely up to the monitor's discretion, although the monitor will allow resumption of operations as soon as, in his or her opinion, no significant danger exists for marine mammals.

#### 4.6.3 Measures for Ship to Avoid Potential Collisions (Ship Strikes)

The captain and crew were given copies of the following procedures to be employed while in transit or during surveys:

- Maintain a watch for marine mammals at all times while vessel is underway, whether in transit or during surveys;
- Do not approach any whales closer than 100 m;
- Do not cut in front of a whale;
- Do not separate a whale mother-and-calf pair;
- If a whale is observed on an intersect course, reduce speed until the whale has safely passed;
- If a whale is moving on a parallel course, maintain a steady speed and course but do not go faster than the whale;
- If a whale becomes evasive or defensive, stop the vessel until the whale has left the area;
- While under way at cruising speed, provide a wide berth from any seals, sea lions, or sea otters;
- If dolphins begin riding the bow wave of the vessel as it approaches the project site, slow down or stop until the animals have left;
- During each survey, proceed along a linear path, tracking each cable route at a slow and consistent speed. This speed will be significantly slower in relation to transit speeds maintained by marine mammals and will be only a little above the speed necessary to maintain steerage;
- In the unlikely event that a collision occurs, immediately notify appropriate regulatory agencies as defined in the Marine Wildlife Mitigation Monitoring Plan. Provide the date, time and place of collision, vessel name, owner and operator, immediate contact information, species involved, status of animal, heading of animal if animal is moving, and onsite weather, sea conditions, and visibility. Digital photographs of animal shall be taken, showing as much detail as possible, and immediately sent to the regulatory agencies.

*Wave Venture* used approved vessel transit lanes when approaching and exiting San Francisco and when underway to and from the project site. The cruising speed of *Wave Venture* was 12.5 knots, although the average speed was often less than that. With the ROV deployed during surveys, the speed ranged from 0.1 to as much as 0.9 knot, or an average of perhaps 0.5 knot. For perspective as to just how slow 0.5 knot was, Humans walk at an average of 2.7 knots. A human can be hurt walking into a tree at that speed. But 0.5 knot represents an 81 percent reduction in that speed, which would not hurt even a human, much less a whale, especially since it would be cushioned by the water and by its own mass. We point this out to emphasize that hazards from the ship crashing into a whale during surveys were virtually nonexistent; the only collision hazard would have come from a fast-moving whale slamming into the ship. The thrusters and other machinery always made some noise which whales could certainly hear even

if they couldn't see the ship while traveling underwater. Thus, the primary hazard during surveys was not from collision but from the propeller, which could be stopped; in fact, in moderate conditions, the ship often proceeded by use of the thrusters alone.

#### **4.6.4 Measures for Monitors to Avoid Potential Collisions (Ship Strikes)**

The methods employed by the monitors to avoid ship strikes included:

- A NOAA Fisheries-approved monitor shall be on watch during the first transit and cable survey operation;
- Both the MWM and the DCMM (hereinafter monitor) shall have a 360-degree view of the water during survey operations;
- If environmental conditions (e.g., high sea state) preclude the monitor from seeing out at least 1 nm, the monitor shall require available personnel to maintain heightened vigilance for any approaching marine mammals or turtles;
- All ship's personnel shall be briefed so they know to report any whale sightings to the monitor immediately;
- Such personnel shall have means of immediately communicating any sightings to the monitor;
- If environmental conditions preclude the monitor from seeing at least 100 m from the vessel, the monitor shall have the authority to order cessation of all project operations until visual conditions improve;
- The monitor shall maintain verbal or radio communications with the officer on deck during all watches;
- During nighttime operations, the monitor shall use low-light binoculars or night vision equipment, whichever is more effective;
- The monitor shall have the authority to stop all project activities if, in his sole opinion, project operations have the potential to threaten or "take" a marine mammal;
- The monitor has sole responsibility for determining whether a collision appears imminent, to request that steps be taken to prevent any collision, to determine when any chance of an collision has passed, and to request that the ship be returned to normal operations following a potential collision;
- If a marine mammal or turtle appears to be approaching any project operation, the monitor shall make the ship captain and crew aware that actions to reduce the possibility of collision may be necessary;
- If a marine mammal or turtle is observed within the 305 m (1,000 ft.) hazard zone, the monitor shall advise the ship captain and crew to prepare to take action to reduce the possibility of a collision;
- It is understood that smaller marine mammals, such as dolphins, routinely approach vessels closely and may even ride the bow wake. The approach of such animals will not require taking action to avoid them unless, in the opinion of the monitor, action is necessary to prevent adverse impacts;
- If a collision appears imminent, the monitor shall request that the speed of the vessel, if it is underway, be reduced as quickly and as much as possible;
- If a collision appears imminent, the monitor shall position himself in the best possible vantage point for helping the crew avoid the collision while still maintaining communications with the officer on deck;
- If a collision appears imminent, the monitor shall immediately request that the other monitors join in the watch;

- If a collision is likely, the monitor shall also request that available crew members aboard the survey ship take up observation positions to help report sightings to the monitor so that appropriate actions may be taken to avoid any impact. Such crew members shall have means of immediately communicating with the monitor;
- In the unlikely event that a collision does occur, the monitor or captain shall immediately notify appropriate regulatory agencies. The date, time, and place of collision, vessel name, owner and operator, immediate contact information, species involved, status of animal, heading of animal if animal is moving, and onsite weather, sea conditions, and visibility will be provided. Digital photographs of animal shall be taken, showing as much detail as possible, and immediately sent to the regulatory agencies;
- A verbal report shall be followed by a written report;
- Reports shall be communicated to the federal and state agencies listed below:

**Federal:**

Justin Viezbicke  
California Stranding Network Coordinator  
NOAA Fisheries  
Long Beach, CA 90802  
(562) 980 3230 office  
(562) 506 4317 cell  
(808) 313 2803 alternate cell  
justin.viezbicke@noaa.gov

Justin Greenman  
Assistant Stranding Network Coordinator  
NOAA Fisheries  
(562) 980 3264 office  
(562) 506 4315 cell  
justin.greenman@noaa.gov

**State:**

California Department of Fish & Wildlife  
Long Beach, CA 90802  
(562) 590 5132

California State Lands Commission  
Division of Environmental Planning and Management  
Sacramento, CA  
(916) 574 0748  
slc.ogpp@slc.ca.gov

**4.6.5 Limitations of ROV Vessels**

Each vessel has its own capabilities and limitations, and each captain has his own set of personnel safety concerns. Accordingly, protocols were worked out between the MMCG team and the captain that took into consideration safety concerns and the limitations of the vessel. The following lists some of the limitations of ROV vessels:

- An ROV vessel cannot stop immediately or completely despite its extremely slow speed, although every reasonable effort shall be made by the crew to slow as rapidly and much as possible. Thus, the monitor must allow time for the vessel to slow. Speed can be drastically reduced in as little as one minute or less, however;
- The extent and speed of slowing are dependent upon weather, sea conditions, and safety factors;
- Power will always be maintained to the thrusters and main propulsion. Some slight forward momentum will usually be necessary to maintain control and position of the vessel. This actually amounts to less motion than if the ship were stopped and drifting, thus risks to marine mammals are minimal. Also, by maintaining position with the thrusters, risks of injury can be greatly reduced. The spinning of the main propeller, even in neutral pitch, can be stopped if necessary. (In this case, parts of the surveys were made using only the thrusters, with the propeller stopped);
- The amount of scope and tension for the ROV umbilicus is dependent upon weather, sea conditions, depth, and safety considerations. (The umbilicus normally hung straight down under the weight of the ROV, so the odds of an entanglement were greatly reduced);
- Shutting down electrical power to the ROV umbilicus requires considerable time and will not be requested unless an animal were entangled.

#### **4.6.6 Measures to Avoid Potential Entanglements**

The same procedures described in Section 4.6.4 above were employed to reduce the chances of a whale becoming entangled during cable survey operations. In addition to these measures, the following specific procedures to avoid entanglement were to be initiated if a whale ventured within the 305 m (1000 ft.) hazard zone:

- During survey operations, as the vessel maintains position, the amount of scope in the ROV umbilicus shall be reduced as much as possible;
- During survey operations, as the vessel maintains position, when possible the ROV shall be lifted well clear of the sea floor to minimize the amount of umbilicus in the water column;
- In the unlikely event that a marine mammal becomes entangled in the umbilicus, the monitor shall request that power be shut down as soon as possible;
- In the unlikely event that an entanglement does occur, the monitor or captain shall immediately notify appropriate regulatory agencies. The date, time, and place of collision, vessel name, owner and operator, immediate contact information, species involved, status of animal, and onsite weather, sea conditions, and visibility shall be provided. Digital photographs of animal shall be taken, showing as much detail as possible, and immediately sent to the regulatory agencies;
- A verbal report shall be followed by a written report;
- The captain and ROV operator shall be consulted for advice as to what actions would be safe or possible for their personnel to perform (e.g., slacking or cutting a cable) in the event of a disentanglement effort involving the ship's crew;
- Immediately following completion of such a disentanglement effort, a verbal report shall be made to the regulatory agencies, followed by a written report.

As a professional courtesy, the monitors were instructed to report any marine mammals or turtles that were observed tangled in fishing gear, mooring lines, and other materials *not*

connected with this project. They were to take photographs of the entangled animal and immediately relay relevant details to NOAA Fisheries (please see Section 4.6.4 above). As of early July of this year, 26 entangled whales had already been reported off the California coast.

#### **4.6.7 Measures to Avoid Potential Impacts from Oil or Fuel Releases**

In the unlikely event that a spill occurred and marine mammals, turtles, and/or sea birds became oiled, the following measures were to be taken:

- The monitor shall immediately notify the appropriate regulatory agencies;
- In the event a sea bird becomes oiled, the monitor shall immediately contact the local sea bird rescue group so that a rescue procedure could be worked out. If requested, crew members may rescue the sea bird and arrange for immediate transport to the nearest authorized care center;
- The regulatory agencies shall be kept apprised of any such rescue efforts and notified when such efforts are complete. Verbal and written reports shall be sent to the agencies once such efforts are complete.

#### **4.6.8 Avoidance of Pinniped Rookeries and Haul-outs**

CSLC requested that all pinniped rookery and haul-out sites in or near the project areas be located and identified. The commission further requested that measures be proposed to reduce or avoid impacts to such haul-out sites should survey ships be operating near such sites. This issue had been addressed in an earlier project document as MM [Mitigation Measure] BIO-7, Avoidance of Pinniped Haul-out Sites (OGPP 2014). This mitigation measure imposed various conditions for the survey vessel and mitigation monitors to follow. The purpose of these conditions was to provide CSLC and CDFW with information regarding potential disturbances associated with cable surveys.

- The monitor shall observe pinniped activity onshore if the survey ship approaches within the 300 m (984 ft.) hazard zone of any haul-out site;
- The monitor shall observe and report on the number of pinnipeds potentially disturbed (e.g., head lifting or flushing into the water);
- Survey activity close to haul-out sites shall be conducted in an expedited manner to minimize the potential for disturbance of pinnipeds on land;
- The survey ship shall not approach any closer than the 91 m (300 ft.) exclusion zone of any haul-out site.

At Los Osos, the nearshore termini of several fiber-optic cable survey routes were located over 1 nm (1852 m) from the nearest pinniped haul-out site. This haul-out site was on some rock outcrops near Corallina Cove in Montaña de Oro State Park, south of the cable termini. Here, small numbers of Pacific harbor seals hauled out to rest and get warm. From the cable termini, the cable survey route extended northwest, then west and progressively farther away from this haul-out site. Even assuming that harbor seals could have discerned the survey vessel at this range, it was extremely unlikely that any disturbance would occur. Since the seals haul out among the rocks, it was more likely that the ship was hidden from view. Considering that the haul-out site was more than six times the distance at which any mitigation measures had been proposed, no further measures were considered necessary. Harbor seals also hauled out in the nearby Morro Bay Estuary and along the mudflats of the bay, but these sites were hidden from

view of the cable survey routes by a long stretch of sandy beach bordering the west side of the bay and by the breakwaters at the entrance to the bay. Moreover, these sites were even farther away from the cable survey routes.

Two other cable routes to be surveyed were off Manchester Beach, northeast of Pt. Arena more than 2 nm (3704 m) and northwest from the mouth of Brush Creek. From its terminus, Japan-U.S. Cable Segment 9 extended west-northwest from shore, then after passing north of Pt. Arena, veered west-southwest. At no point was it closer than 2 nm from Pt. Arena. Japan-U.S. Cable Segment 8 traveled north, then north-northwest of Pt. Arena, eventually veering to the north-northwest and offshore. It was consistently farther from Pt. Arena than the other cable segment. The closest haul-out sites to the two cable survey routes were just off Pt. Arena and farther south, where varying numbers of harbor seals hauled out depending on tides and sea conditions. Other sites existed north of the cable termini some 3 nm (5556 m). Considering the distance of these sites from the cable survey routes, no disturbances to the harbor seals were anticipated and no further mitigation measures were deemed necessary.

#### 4.7 Data Recording

All marine mammal and turtle observations were recorded. Data sheets designed for this project included the date and time of each sighting, the monitor's name, and the ship name. The location of each sighting was noted, using the ship's differential Global Positioning System (DGPS) or the monitor's own handheld GPS. The genus and species of each animal was mentioned, along with the number of animals. Their behavior was noted, along with their heading if they were moving. Age categories and sex were noted when possible. Additional information, such as the direction, range and bearing of the animal(s) from the observer, along with its heading, was included. The remarks section included notes as to when each operation began and ended, and the nature of each operation (e.g., in transit, on station, ROV down, ROV up for maintenance, etc.). Anecdotal information was recorded on other wildlife, particularly sea birds, along with any association such wildlife had with marine mammals or with project operations.

Weather data were also recorded and updated periodically throughout each 24-hour period. These included date, time, monitor's name, ship's name, and location. Percentage and type of cloud cover was noted, along with visibility. Swell direction and height was recorded, along with wind direction and velocity.

Each time an alert was made and/or action had to be taken to prevent a potentially adverse impact, a detailed report was filled out. This both ensured that the effectiveness of such actions could be analyzed later, but also served as a record of essential information that would be needed in case an impact actually did occur. These incident reports included:

- Date;
- Monitor's name;
- Ship's position at time of incident;
- Time animal sighted;
- Species;
- Number of animals;
- Animal's behavior;
- Closest distance of animal to ship;

- Type of hazard (e.g., collision, entanglement, etc.);
- Whether all monitors notified;
- Time bridge and/or ROV watch notified;
- Time all-stop implemented;
- Time animal definitely clear of hazard;
- Time all-stop lifted;
- Effectiveness of all-stop;
- Bridge watch's and/or ROV supervisor's names and titles;
- Time captain, GMSL, MMCG, and/or NOAA Fisheries notified (if impact occurred);
- Description of action taken:
- Names and titles of responding parties;
- Photographs taken? Photographer's name(s);
- Descriptive narrative of action taken (as many pages as needed).

Other details needed in the event of an adverse impact, such as weather conditions on site, and vessel name and contact numbers, were included on other forms.

#### **4.7 Reporting**

Marine mammal sighting reports, weather reports, and incident reports were transmitted daily to MMCG. Verbal communications were made by telephone as necessary.

### **5.0 Results and Discussion**

#### **5.1 Marine Mammal Sightings**

A total of 14 species of marine mammals was observed. A total of 784 sightings was made by the monitors. Each sighting represented anywhere from one animal to over a hundred animals. The total number of marine mammals seen was tallied and came to 9,534.

Whenever possible, resightings of animals were noted. Resightings of animals were excluded from the totals presented below. In many cases, however, it was impossible to determine whether an animal or group of animals had been seen previously because both the vessel and the animals usually moved constantly. Unless individuals had distinctive markings, it was not possible to distinguish one individual from the next. Thus the total numbers of some species are likely somewhat higher than the actual number of animals present at any one time. The main purpose of the observations was detection with the goal of avoiding impacts. Counting the animals observed served only to provide an idea of the relative abundance of each species present at any one time rather than to estimate local numbers.

In essence, the surveys represented transect lines: six off Los Osos and two off Manchester Beach. Although the seasonal abundance and distribution of marine mammals is well known by whale watch boats operating out of Morro Bay near the coast, areas farther offshore receive very little attention, aside from periodic NOAA shipboard surveys which cover long, widely spaced transect lines at moderate speeds. The area west of Manchester Beach receives even less attention from whale watch boats, which operate only during the gray whale migration period out of Noyo Harbor at Fort Bragg, some 40 nm to the north of Manchester Beach. Movements of several species of whales off the coast are mostly south to north and back again, so conducting transects from east to west often cut across such movements.

The very slow speed of the cable surveys (approximately 0.5 knot) meant that a good chance existed of seeing animals with long dive durations, such as sperm whales (*Physeter macrocephalus*), beaked whales, and northern elephant seals (*Mirounga angustirostris*), had they been present. Of these, only one sperm whale was seen.

Since an El Niño Southern Oscillation event was occurring at the time of the cable surveys, some anomalies in regional and seasonal distribution of species was expected. Often during such conditions, species with southern affinities range farther north than usual. As an example, record numbers of Guadalupe fur seals had already stranded in southern and central California during the first half of 2015. By comparison, years sometimes go by with no Guadalupe fur seal strandings anywhere in California. During this project, warmer water species, such as long-beaked common dolphins (*Delphinus capensis*) were seen off Los Osos, but not off Manchester Beach. Some colder water species, such as Dall's porpoises (*Phocoenoides dalli*) and northern right whale dolphins (*Lissodelphis borealis*) were not seen at all.

Identifying species during the cable surveys, particularly threatened and endangered species, initially was considered important since any impacts to these populations would have been serious. However, all the large cetaceans identified to species level during this project, with the exception of the minke whale (*Balaenoptera acutorostrata*), were endangered. Large cetaceans that could not be identified to species and sometimes even to genus level were most likely endangered as well, simply because such sightings were made at similar times and places that positive identifications to species level were possible. Figures 1, and 3 through 6, reveal that clusters of known species are overlapped by unknown species, suggesting that the unknowns were most likely either humpbacks, or in the case of Los Osos, fin whales farther offshore. Moreover, in a number of cases, whales that could not be identified to species level during the first sightings were positively identified as endangered whales during subsequent sightings. No listed species of pinnipeds were seen during this project, nor were any turtles noted. Sea otters were reported close to shore at Los Osos.

To aid in recognizing species, identification keys were included in MMCG's Marine Wildlife Mitigation Monitoring Plan. In addition, a modern field guide, featuring many distinguishing features, was used throughout this project by MWMs and DCMMs alike. Notes were added to this field guide by Peter Howorth, one of MMCG's principals who has worked with marine mammals for about five decades. Later, Howorth provided detailed, illustrated identification packets for species that were not easy to identify (e.g., long-beaked versus short-beaked common dolphins, discussed later).

It should be remembered that the MWMs and DCMMs were together only during the transit from San Francisco to Los Osos and during the first survey. Each of the three DCMMs only saw a few species, sometimes only for brief moments. Identifying any species of often closely related animals at a glance takes considerable experience.

On a number of occasions, distant individual animals or animals seen at night could not be identified as to species, either by the MWMs or the DCMMs. Some animals were seen very briefly, sometimes only as a blow quickly carried away by the wind. These sightings were narrowed down as much as possible. For example, rorquals in the genus *Balaenoptera*, which include blue, fin, sei, Bryde's (*Balaenoptera edeni*), and minke whales off California, were not always possible to identify other than as members of this genus, especially when animals were detected only briefly from their blows, backs, and/or dorsal fins at a distance in windy conditions. When the genus was known, such as *Balaenoptera*, but the species was not, then the animal

was noted by genus and the abbreviation for an unknown species was used, as in *Balaenoptera* sp. (*B. sp.*).

The same convention was used when common dolphins (*Delphinus*) could not be identified to species level, as in *Delphinus* sp. (*D. sp.*). Differentiating between these two species of dolphins is not easy, so Howorth made up some special identification information forms to help the DCMMs discern the subtle differences. These packets described the characteristic features that could be observed in the field and included illustrations of such features. This method appeared to help, with improved levels of recognition after the identification packets were put to use.

When whales of a given species were fairly abundant in an area, it was not unreasonable to assume that unidentified whales in the same area at the same time may have been of the same species. Nonetheless, unless positive identifications were made, such whales were still considered unknowns. Depending on the quality of the observation, each unknown species of marine mammal was recorded as an unknown *Balaenoptera*, a large cetacean, a dolphin, or a pinniped. Unknowns were relatively uncommon in terms of overall sightings, however, with positive identifications obtained of most species.

### 5.1.1 Sightings during Transits

When transiting from port to the survey areas and from one survey line to the next, a request was made to reduce speed to 10 knots or less in areas where whales were concentrated and to change course if necessary to avoid such concentrations. Ten knots is a speed at which authorities generally concur that whales often can avoid ships, or if struck, survive the collision. In some areas, notably on the East Coast, such speed reductions are mandatory at certain times and places. In this case, such speed reductions were voluntary.

Standard, approved approaches into and out of San Francisco Bay were followed in accordance with sailing instructions. These approaches had been changed in July 2013 to avoid areas where whales concentrated. This was done through the U.S. Coast Guard and NOAA Marine Sanctuaries with the concurrence of the International Maritime Organization (IMO). While in San Francisco Bay, *Wave Venture* was moored at an approved anchorage. After weighing anchor and once clear of the approaches, *Wave Venture* paralleled the coast, generally staying over 20 nm offshore until due west of Los Osos, and later, Manchester Beach, whereupon the ship headed east toward shore. The sightings made during transits were mainly along a narrow corridor that paralleled the coast and only reflect what was seen along this corridor rather than what may have been present toward shore or farther seaward from the transit routes. Also, what might appear to be concentrations of whales in some areas is simply where concentrations of whales were noted in daytime; nighttime sightings were understandably less frequent. Finally, in some cases, whales could not be identified, but the majority of such animals were most likely humpbacks, since nearby sightings of whales that could be identified were indeed humpbacks (please see Figure 1).

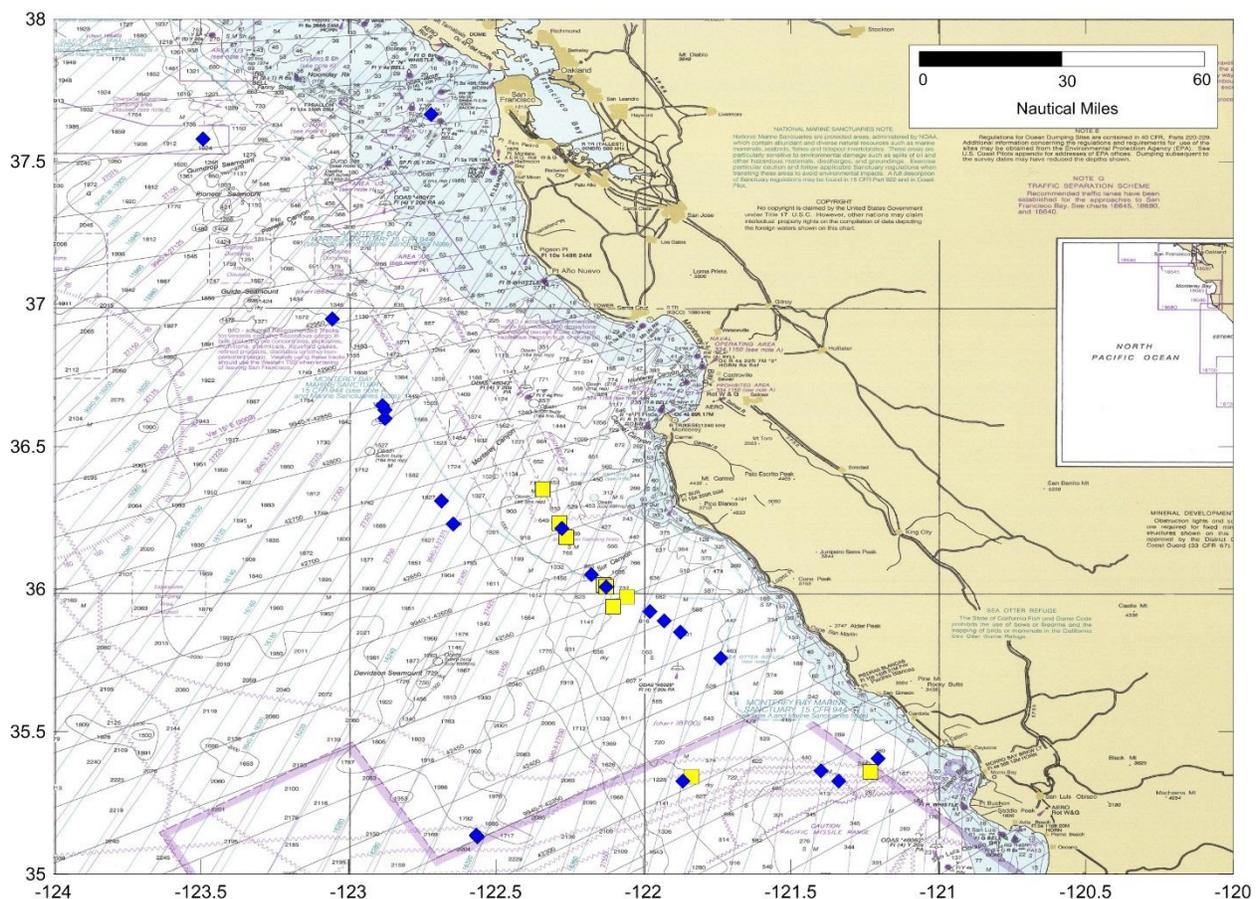
Table 2 below shows the abundance of marine mammals by species and by transit dates. The period of time between the first and last transits is too short to show seasonality, but it does reveal temporal distribution during this project. Figure 1 depicts the geographic distribution of whales along the transit routes.

**Table 2:  
Marine Mammal Abundance off California by Transit Dates**

<b>Species</b>	<b>10-11 July S.F. to Los Osos</b>	<b>21 July Los Osos to Morro Bay (shuttle)</b>	<b>6-7 August Los Osos to S.F.</b>	<b>8-9 August S.F. to Los Osos</b>	<b>25-26 August Los Osos to Manchester Beach</b>	<b>31 August Manchester Beach to S.F.</b>
Humpback whale	17	0	1	3	10	0
Blue whale	0	0	0	0	0	0
Fin whale	0	0	0	0	0	0
Minke whale	0	0	0	0	0	0
Gray whale	0	0	0	0	0	0
Unknown large cetacean	9	0	0	1	0	0
Unknown <i>Balaenoptera</i>	0	0	0	0	0	0
Sperm whale	0	0	0	0	0	0
Killer whale	2	0	0	0	0	0
Risso's dolphin	0	0	0	2	0	0
Common dolphin (no species ID)	0	0	140	0	10	0
Short-beaked common dolphin	40	0	0	0	28	0
Long-beaked common dolphin	0	0	0	0	5	0
Pacific white-sided dolphin	4	0	0	0	0	0
Northern right whale dolphin	0	0	0	0	0	0
Dall's porpoise	0	0	0	0	0	0
Harbor porpoise	0	0	0	0	0	0
Unknown dolphin	43	0	0	0	0	0
California sea lion	18	4	0	3	9	5
Steller sea lion	0	0	0	0	0	0
Northern fur seal	0	0	0	0	0	0
Guadalupe fur seal	0	0	0	0	0	0
Pacific harbor seal	0	0	0	0	0	0
Northern elephant seal	0	0	0	0	0	0
Unknown pinniped	0	0	1	0	0	0
Southern sea otter	0	4	0	0	0	0

Noteworthy sightings en route included two killer whales (*Orcinus orca*) travelling slowly west about 2.5 nm south of Sur Canyon, an undersea feature southwest of Pt. Sur. Two humpback whales had been observed about 0.5 nm north of the killer whales, but the killer whales did not appear to be heading toward them. These sightings were made on 11 July 2015.

The following tables show only the total number of animals of various species observed. They do not reveal the number of sightings of each species. Quite a number of sightings were of single animals, but sightings of dolphins often represented many animals during a single sighting. The number of sightings versus number of animals seen is summarized in Table 5. Upon completion of the survey of the first cable (AAG Segment 5) on 21 July 2015 and the training of the DCMMs, the MWMs and Paul Stalley, a GMSL representative, were shuttled from *Wave Venture* off Los Osos into Morro Bay, where they continued their travels on land. This passage, which only covered about 3 nm, was made on a small craft called *Brita Michelle*. The MWMs continued to monitor for marine wildlife on their way to shore aboard the shuttle craft. Meanwhile, the DCMMs aboard *Wave Venture* began monitoring during the first of seven more cable surveys (please see subsection 5.1.2 below).



**Figure 1: Sightings of Whales along Transit Routes**  
(Humpback whales in blue; unknown large cetaceans in yellow)

### 5.1.2 Sightings during Surveys off Los Osos, California

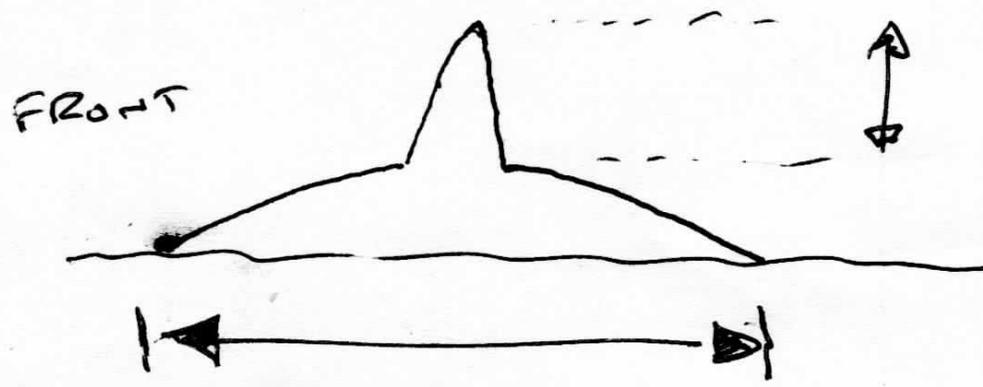
Table 3 below shows the relative abundance of marine mammals off Los Osos by species and by survey dates. The period of time between the first and last surveys is too short to show seasonality, but it does reveal temporal distribution during this project. Figures 3 through 5 depict the geographic distribution of species within the survey areas. A comparison of these three figures will reveal that sightings of unknown large cetaceans were made in much the same areas where humpback and fin whales were observed.

For the purposes of this report, transits from the end of one survey line to the next were considered part of the first survey line, since sometimes it was necessary to survey short sections of the original line that had been missed earlier.

Noteworthy sightings during the first survey included concentrations of fin whales (*Balaenoptera physalus*) from approximately 30 to 50 nm due west of Los Osos, along with 11 northern fur seals (*Callorhinus ursinus*) 31 nm out. Noteworthy sightings during the second survey included 16 northern fur seals the same general distance offshore. The third and fourth surveys revealed another 18 and 11 fur seals, respectively, possibly some of the same animals because they were in the same general area.

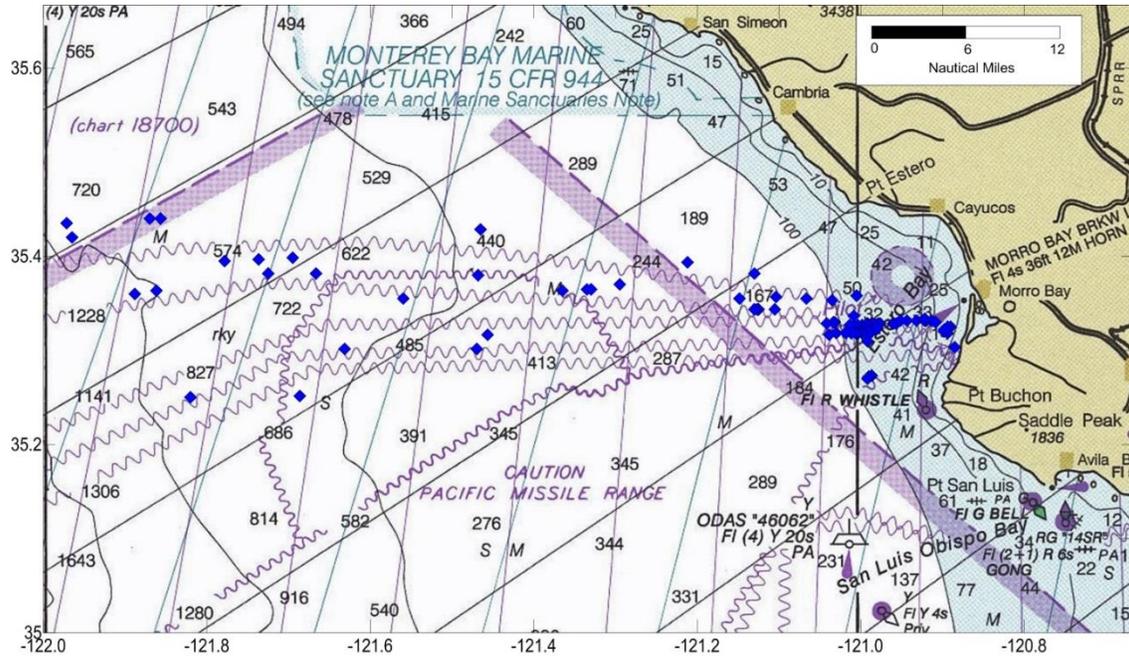
On the fifth survey, the DCMs reported 30 unidentified small cetaceans. By communicating back and forth with the DCMs, and upon the sending of a sketch of the back and dorsal fin of one of the larger specimens (please see Figure 2), MMCG concluded that the sketch undoubtedly depicted the dorsal fin of an adult male killer whale. The smaller animals in the pod, at first thought by the DCMs to be a different species, were identified as females, juveniles and calves of the same species. The overall cohesiveness of the pod, plus some displays of lobtailing and other behaviors, left little doubt as to the identity of this group of whales. In lieu of photographs, the sketch served very well.

In two other instances, digital photographs taken with cellular telephones were sent electronically to Howorth for identification purposes. These were not of the highest resolution, nor were they tight, close-up shots which would have been possible with a telephotos lens. Nonetheless, they provided enough detail for correct identifications to be made.

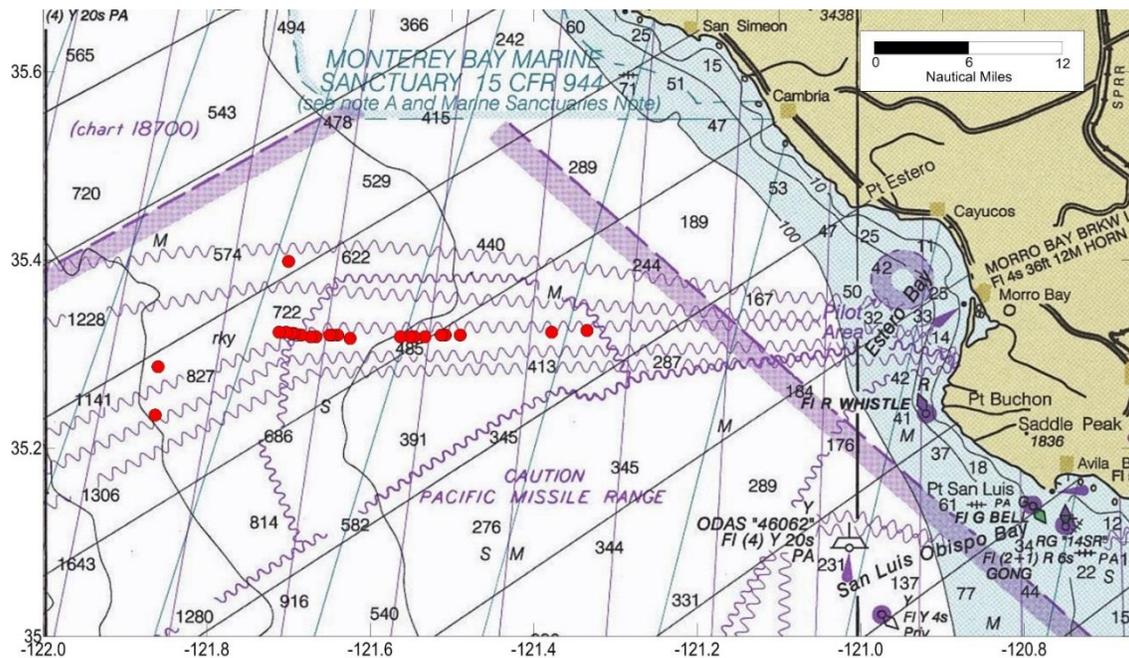


**Figure 2: Sketch of Adult Male Killer Whale**

On 11 August, a small humpback whale entangled in commercial crab fishing gear was spotted by a marine mammal rescue team off Monterey Bay. A satellite tag was attached pending later rescue efforts. The animal left the area, ultimately reaching as far south as central Baja California, Mexico. At this point, the whale headed north again. On the morning of 24 August, it appeared to be heading directly toward *Wave Venture* off Los Osos. The DCMMs were



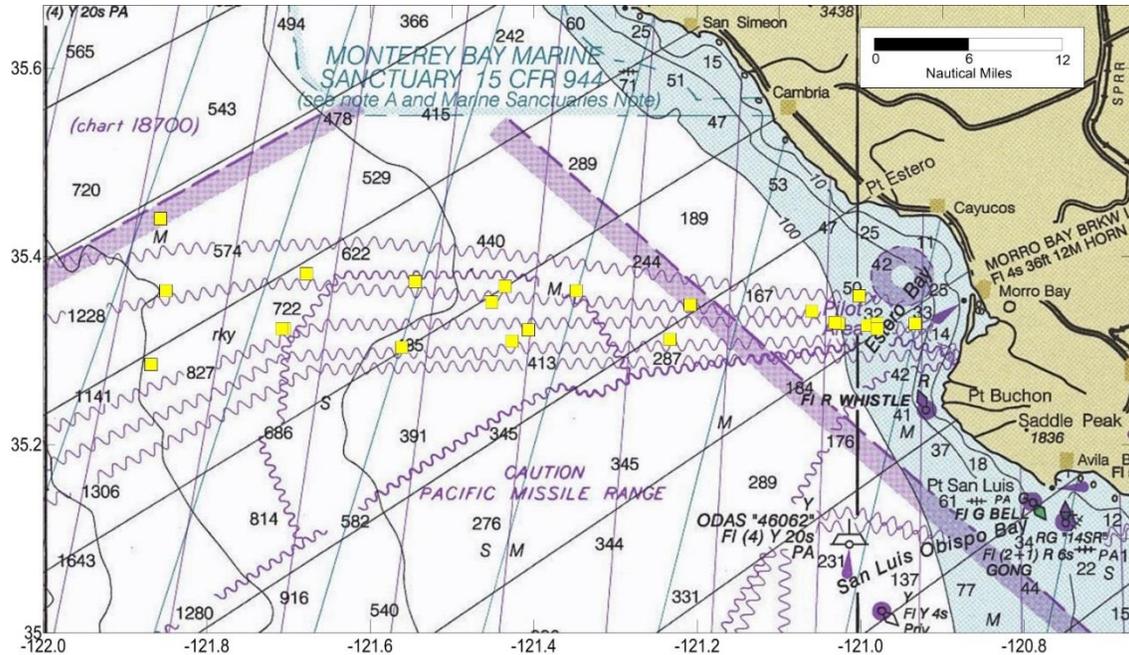
**Figure 3: Sightings of Humpback Whales off Los Osos, California**



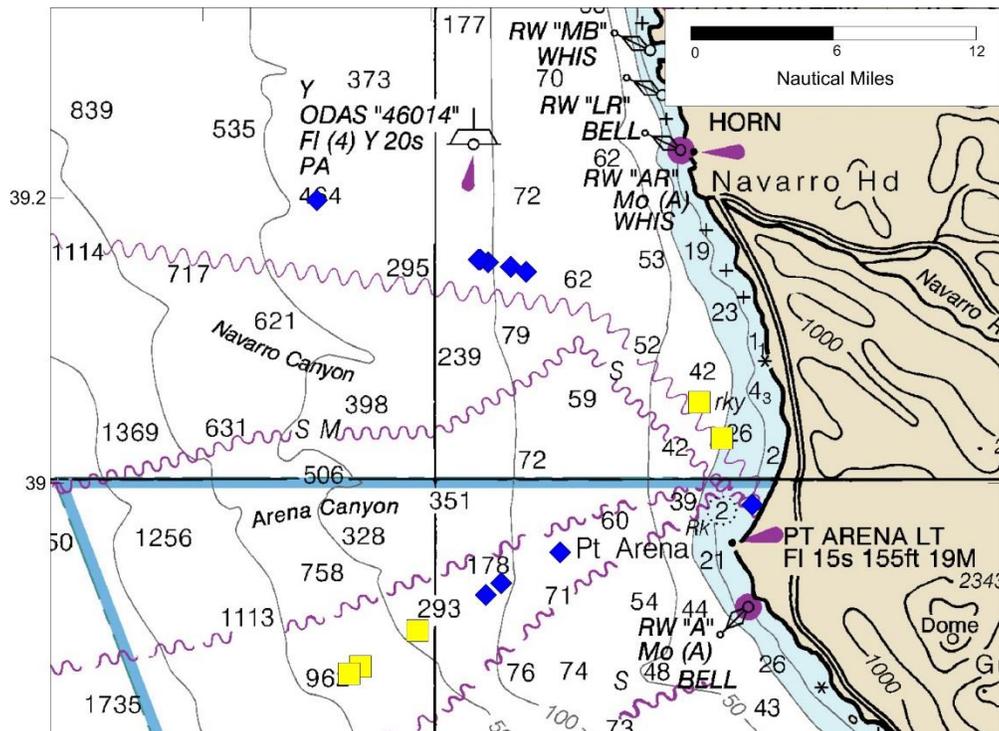
**Figure 4: Sightings of Fin Whales off Los Osos, California**

**Table 3:  
Marine Mammal Abundance off Los Osos by Survey Dates**

<b>Species</b>	<b>11-21 July</b>	<b>21-28 July</b>	<b>29 July-5 August</b>	<b>5-6 and 9-14 August</b>	<b>14-19 August</b>	<b>19-25 August</b>
Humpback whale	83	38	22	14	12	13
Blue whale	1	0	0	0	0	0
Fin whale	33	1	2	0	0	0
Minke whale	6	0	0	0	0	0
Gray whale	0	0	0	0	0	0
Unknown large cetacean	23	4	6	6	0	3
Unknown <i>Balaenoptera</i>	1	0	0	0	1	0
Sperm whale	0	0	0	0	0	0
Killer whale	0	0	0	0	30	0
Risso's dolphin	20	0	0	0	10	0
Common dolphin (no species ID)	376	1,201	3,869	383	172	127
Short-beaked common dolphin	1120	0	0	5	25	40
Long-beaked common dolphin	20	0	0	15	0	25
Pacific white-sided dolphin	70	0	0	18	42	32
Northern right whale dolphin	0	0	0	0	0	0
Dall's porpoise	0	0	0	0	0	0
Harbor porpoise	0	0	0	0	0	0
Unknown dolphin	399	200	75	0	0	0
California sea lion	112	50	22	51	33	41
Steller sea lion	0	0	0	0	0	0
Northern fur seal	11	16	18	11	0	2
Guadalupe fur seal	0	0	0	0	0	0
Pacific harbor seal	0	0	0	0	0	0
Northern elephant seal	0	0	0	0	0	0
Unknown pinniped	5	1	3	0	1	0
Southern sea otter	35	1	32	11	0	0



**Figure 5: Sightings of Unknown Large Cetaceans off Los Osos, California**



**Figure 6: Distribution of Whales off Manchester Beach, California  
(Humpback whales in blue; unknown large cetaceans in yellow)**

placed on alert to report any sightings of the whale. It passed less than 1 nm astern of *Wave Venture* late that same morning. It was not seen, but observation conditions were not ideal, with northwest winds from 18 to 26 knots that day. The following morning, *Wave Venture* was headed north toward Manchester Beach. Meanwhile, the same whale had been tracked going the same direction. While in transit, the ship passed the whale without any sightings. Nonetheless, this proved that the cable industry will cooperate with NOAA Fisheries in helping marine mammals in distress that had never been impacted by project activities.

**Table 4:**  
**Marine Mammal Abundance off Manchester Beach by Survey Dates**

Species	25-29 August	29-31 August
Humpback whale	7	5
Blue whale	0	0
Fin whale	0	0
Minke whale	0	0
Gray whale	0	0
Unknown large cetacean	1	3
Unknown <i>Balaenoptera</i>	0	0
Sperm whale	1	0
Killer whale	0	0
Risso's dolphin	0	0
Common dolphin (no species ID)	34	25
Short-beaked common dolphin	20	0
Long-beaked common dolphin	0	0
Pacific white-sided dolphin	0	30
Northern right whale dolphin	0	0
Dall's porpoise	0	0
Harbor porpoise	0	0
Unknown dolphin	0	0
California sea lion	12	8
Steller sea lion	2	0
Northern fur seal	0	0
Guadalupe fur seal	0	0
Pacific harbor seal	0	0
Northern elephant seal	0	0
Unknown pinniped	0	0
Southern sea otter	0	0

### 5.1.3 Sightings during Surveys off Manchester Beach, California

Table 4 above shows the relative abundance of marine mammals off Manchester Beach by species and by survey dates. Like the surveys off Los Osos, the period of time between

**Table 5:  
Summary of Marine Mammal Sightings by Area**

Species	In Transit		Los Osos		Manchester Beach		Total Sightings	Total Animals
	Sightings/Totals		Sightings/Totals		Sightings/Totals			
Humpback whale	24	31	126	182	11	11	161	224
Blue whale	0	0	1	1	0	0	1	1
Fin whale	0	0	26	36	0	0	26	36
Minke whale	0	0	2	6	0	0	2	6
Gray whale	0	0	0	0	0	0	0	0
Unknown large cetacean	9	9	32	42	4	4	45	55
Unknown <i>Balaenoptera</i>	0	0	2	2	0	0	2	2
Sperm whale	0	0	0	0	1	1	1	1
Killer whale	1	2	1	30	0	0	2	32
Risso's dolphin	1	2	2	30	0	0	3	32
Common dolphin (no species ID)	3	150	114	6,128	6	59	123	6,357
Short-beaked common dolphin	4	68	18	1,190	1	20	23	1,288
Long-beaked common dolphin	1	5	6	60	0	0	7	65
Pacific white-sided dolphin	1	4	11	162	1	30	13	196
Northern right whale dolphin	0	0	0	0	0	0	0	0
Dall's porpoise	0	0	0	0	0	0	0	0
Harbor porpoise	0	0	0	0	0	0	0	0
Unknown dolphin	3	43	11	674	0	0	14	717
California sea lion	26	39	252	309	16	20	294	368
Steller sea lion	0	0	0	0	2	2	2	2
Northern fur seal	0	0	39	58	0	0	39	58
Guadalupe fur seal	0	0	0	0	0	0	0	0
Pacific harbor seal	0	0	0	0	0	0	0	0
Northern elephant seal	0	0	0	0	0	0	0	0
Unknown pinniped	1	1	8	10	0	0	9	11
Southern sea otter	3	4	14	79	0	0	17	83
<b>Totals</b>							784 sightings	9,534 animals

the first and last surveys is too short to show seasonality. Figure 6, which follows, depicts the geographic distribution of species within the survey areas. Noteworthy sightings during the first survey included two Steller sea lions (*Eumetopias jubatus*) off Manchester Beach. One was 9.4 nm out; the other, 16.4 nm. A sperm whale was also seen there only 3.2 nm offshore.

#### 5.1.4 Summary of Marine Mammal Sightings

In Table 5, above, sightings represent the number of times one or more animals were seen. Resightings of the same animal or animals are not included in the total number of sightings. By the same token, the totals presented below represent the total number of animals seen but do not necessarily include the same animals seen repeatedly. This is because it was not always possible to tell whether the same animals were being seen more than once, so the totals may be somewhat inflated in some cases.

### 5.2 Avoidance of Marine Mammal – Cable Survey Ship Interactions

In MMCG's experience, California sea lions (*Zalophus californianus*) routinely approach vessels closely. Injuries to such animals, especially from very slow-moving vessels, are virtually unheard-of. Thus no action was deemed necessary when sea lions approached the vessels closely, which was often. Small cetaceans, notably dolphins and Dall's porpoises, also frequently approach vessels and sometimes bow-ride if the vessel is underway at moderate speed. Again, such approaches are commonplace and are not cause for alarm.

Whales approaching vessels closely are a cause for concern, which is why MMCG established protocols many years ago for avoiding adverse interactions between survey operations and whales. When distant whales appeared to be heading toward *Wave Venture*, the crew was put on alert by the monitor, ready to take action if necessary. Whenever it became clear to the monitor that the whales would pass the vessel without risk, the monitor took no further action other than to keep everyone on alert until any possible hazard had ended. On several occasions, whales passed within several hundred meters of *Wave Venture*, beyond the hazard zone, and no action was needed. Only when a situation appeared to be potentially hazardous for an animal did the monitor take further steps in accordance with permit conditions. Such actions are chronicled in the following subsections.

#### 5.2.1 11 July 2015: En Route San Francisco to Los Osos

At 0813 hours, two killer whales were observed by both MWMs and one of the DCMMs. This occurred approximately 2.5 nm south of Sur Canyon, an undersea feature southwest of Pt. Sur. *Wave Venture* was headed southeast at the time on its way to Los Osos. Three humpback whales had been passed earlier about 0.5 nm to the north. The killer whales were traveling slowly toward the west and were southwest of the ship when first seen. The bridge watch was notified immediately and responded right away by steering to port (east), directly away from the whales. The whales leisurely continued on their way without pause or incident. The all-clear was given at 0814. The whales were kept under observation as they receded in the distance, then *Wave Venture* made a gradual turn to resume its original course.

#### 5.2.2 11 July 2015: En Route San Francisco to Los Osos

At 1650 hours, *Wave Venture* was proceeding slowly eastward toward Los Osos. It was slightly less than 1 nm west of Pt. Buchon in an area that had been selected for some tests of the ROV

prior to commencing the first survey. Three humpback whales had been seen nearby several minutes earlier. Suddenly, a single humpback appeared off the starboard side. *Wave Venture* turned immediately to port, coming to a full stop in the process. All monitors on watch were alert to its presence. Shortly afterwards, the whale reappeared off the stern, milling about on the surface. At no time did it react to the ship's presence. By then the whale was outside the hazard zone, so the all-stop was lifted at 1654 hours and the ship continued on its way without incident.

### **5.2.3 12 July 2015: Los Osos, during Preliminary ROV Tests**

At 0518 hours, within 0.5 nm of the position indicated in the previous subsection, *Wave Venture* was crawling along when a juvenile humpback whale surfaced off the bow and began breaching, lobtailing, and flipper slapping. Two monitors notified the watchman, who immediately slowed the ship even further. (The ROV was on deck at the time.) Within less than a minute, the whale headed away from the ship and was well out of the hazard zone. The all-stop was lifted once it was clear that the whale was continuing on its way.

### **5.2.4 17 July 2015: Los Osos, during AAG Segment 5 Survey**

At 0625 hours, approximately 29 nm west of the Morro Bay breakwater, a humpback whale began breaching northwest of the starboard bow. The bridge and available monitors were notified. The ship was proceeding very slowly under thruster power only. About a minute later, the whale was seen well astern, still breaching, whereupon the all-clear was given and *Wave Venture* resumed its survey speed.

### **5.2.5 22 July 2015: Los Osos, during China-U.S. Segment 7 Survey**

At 0816 hours, approximately 6.5 nm west of the Morro Bay breakwater, five humpback whales that had been observed feeding near *Wave Venture* several minutes earlier (please see next section) began moving toward the ship, which was headed west at the time. The bridge was immediately notified and power to the propeller was reduced. The animals passed safely to the north. The all-clear was made at 0822.

## **5.3 Alerts Made but No Action Needed**

On numerous occasions, the bridge was alerted that whales were approaching the hazard zone or in the hazard zone. For various reasons, no action was necessary. Justification for this included:

- The ship was stopped, without the propeller rotating;
- The ship was surveying under thruster power alone, with the ROV umbilicus straight down and taut;
- The ROV was aboard the ship and only the thrusters were used to maintain position;
- The whale(s) headed away from the ship.

Table 6 below lists the dates and times during which the bridge was alerted, whether a Marine Wildlife Monitor (MWM) or a Designated Crew Member Monitor (DCMM) made the notification, and the species and numbers of whales involved.

All of the alerts were given off Los Osos. Worth noting is that the number and diversity of large whales appear to have diminished off Los Osos from the time the first survey started on 11 July and the time the surveys there ended on 25 August (please see Table 3). Fin whales were seen only on 16 through 19 July, 28 July, and 3 August.

**Table 6: Collision and Entanglement Hazard Alerts**

Date	Time	MWM or DCMM	Species	Number
12 July	0732	MWM	Humpback whale	1
13 July	0549	MWM	Humpback whale	1
13 July	0625	MWM	Humpback whale	1
13 July	0630	MWM	Humpback whale	1
13 July	1834	MWM	Humpback whale	1
17 July	1320	MWM	Fin whale	1
17 July	1817	MWM	Fin whale	2
18 July	0554	MWM	Fin whale	2
18 July	1512	MWM	Fin whale	1
18 July	1750	MWM	Fin whale	1
18 July	1841	MWM	Fin whale	1
21 July	2335	DCMM	Humpback whale	1
22 July	0805	DCMM	Humpback whale	5
29 July	1100	DCMM	Humpback whale	1
31 July	0256	DCMM	Humpback whale	1
31 July	0657	DCMM	Humpback whale	1
8 August	0700	DCMM	Humpback whale	1

#### 5.4 Reactions of Marine Mammals to Operations

In general, the vast majority of animals either appeared to be indifferent to *Wave Venture* or attracted to it. In some cases, sea lions and dolphins were attracted to fish that in turn had been attracted to the lights of *Wave Venture*. Dolphins sometimes rode the bow and stern wakes of *Wave Venture*. In several instances, whales approached the ship closely, causing an alert to be made or actions taken to avoid collision or entanglement (please see previous two sections).

#### 5.5 Turtle Sightings

No turtles were seen during this project.

#### 5.6 Other Wildlife Sightings

Although birds were not the subject of this mitigation effort, the monitors did record bird sightings anecdotally. The following birds were recorded in the field notes:

- California brown pelican (*Pelecanus occidentalis californicus*)
- Western gull (*Larus occidentalis*)

- Heermann's gull (*L. heermanni*)
- Black-footed albatross (*Diomedea nigripes*)
- Sooty shearwater (*Puffinus griseus*)
- Double-crested cormorant (*Phalacrocorax auritus*)
- Brandt's cormorant (*P. pencillatus*)
- Pelagic cormorant (*P. pelagicus*)

Small schooling fish were observed from *Wave Venture*, especially at night where lights shined into the water. During the day, California sea lions were occasionally noted feeding on small schooling fish and squid. No species of fish or squid could be identified because they were too far away.

## 5.7 Environmental Conditions

In general, environmental conditions were quite moderate, with visibility from a few hundred meters to virtually unlimited. Swell ranged from calm to 2.5 meters, with an average of less than 2.0 meters. Wind ranged from calm to a maximum of 27 knots. The wind averaged from the single digits into the teens, with only occasional events when it blew 20 knots or more. It rained on a few days, more so off Manchester Beach.

Only two noteworthy weather events occurred. At 0932 hours on 19 July, approximately 45 nm west of Morro Bay, a squall swept toward *Wave Venture*, bringing with it lightning strikes. For safety reasons, the monitors retired to the bridge until 1205, when the squall and lightning had passed. At 1405, another squall with lightning approached the ship, so the monitors again went inside. That squall passed at 1621 and the monitors resumed watch on the uppermost deck. More thunder and lightning reportedly occurred during the night of 6 to 7 August, so the DCMMs maintained watch inside the bridge.

## 6.0 Conclusions and Recommendations

No adverse impacts or reports of such impacts occurred during this project. On five occasions, monitors took action to avoid potentially adverse impacts to marine mammals. On seventeen occasions, alerts were made but no action proved necessary. The mitigation measures proved to be effective.

MMCG recommends that the mitigation measures employed during this project be continued in similar future projects. MMCG further recommends that spotters aboard cable ships report any marine mammals in distress, whether related to their operations or not.

As to the use of DCMMs, MMCG recommends again training such personnel in advance of each project. MMCG further recommends that daily contact be maintained with knowledgeable, NOAA-approved personnel so that any questions about procedures, species identification, and other matters can be answered. MMCG also recommends that future DCMMs be equipped with digital cameras with zoom telephoto lenses to aid in species identification. As discussed earlier, sketches can also be useful. Good field guides are helpful, but a trained eye can often distinguish between species with a glance at a photograph. Species identification can be critical in the unlikely event an adverse impact occurs, since some species are listed under the ESA and some only under the MMPA. The use of digital photographs in reports of adverse impacts will likely become a standard requirement soon anyway.

## 7.0 Acknowledgments

MMCG sincerely thanks captains John Tollady and Mark Nash, chief cable engineers Dai Davies and Barrie Shipley, and cable engineers Ges Hemmings and Antony Stefaniuk, all of *Wave Venture*. They were universally cooperative and helpful, and displayed a high degree of professionalism throughout this project. Special thanks also go to Paul Stalley, GMSL's assistant maintenance agreement manager, for his help prior to the project and during the period the MMCG personnel were aboard with him. Particular thanks go to the DCMs: Jayson P. Lim, Mario C. Sayas, Jr., and Ronmike P. Belarmino, who stood watches day and night, in fair weather and foul, and were always willing to take the time to relate further details of their observations when needed for clarification. Finally, thanks to *Wave Venture's* crew for their willingness to help spot a humpback whale entangled in fishing gear that had nothing to do with the cable survey project.

## 8.0 Literature Cited

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EXHIBIT H

Mitigation Monitoring Program

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
<b>Air Quality and Greenhouse Gas (GHG) Emissions (MND Section 3.3.3)</b>						
<b>MM AIR-1: Engine Tuning, Engine Certification, and Fuels.</b> The following measures will be required to be implemented by all Permittees under the Offshore Geophysical Permit Program (OGPP), as applicable depending on the county offshore which a survey is being conducted. Pursuant to section 93118.5 of CARB's Airborne Toxic Control Measures, the Tier 2 engine requirement applies only to diesel-fueled vessels.	<b>All Counties:</b> Maintain all construction equipment in proper tune according to manufacturers' specifications; fuel all off-road and portable diesel-powered equipment with California Air Resources Board (CARB)-certified motor vehicle diesel fuel limiting sulfur content to 15 parts per million or less (CARB Diesel).	Daily emissions of criteria pollutants during survey activities are minimized.	Determine engine certification of vessel engines.  Review engine emissions data to assess compliance, determine if changes in tuning or fuel are required.	OGPP permit holder and contract vessel operator; California State Lands Commission (CSLC) review of Final Monitoring Report.	Prior to, during, and after survey activities.  Submit Final Monitoring Report after completion of survey activities.	6/12/15 PS
	<b>Los Angeles and Orange Counties:</b> Use vessel engines meeting CARB's Tier 2-certified engines or cleaner; the survey shall be operated such that daily NO <sub>x</sub> emissions do not exceed 100 pounds based on engine certification emission factors. This can be accomplished with Tier 2 engines if daily fuel use is 585 gallons or less, and with Tier 3 engines if daily fuel use is 935 gallons or less.		Verify that Tier 2 or cleaner engines are being used.  Calculate daily NO <sub>x</sub> emissions to verify compliance with limitations.			
	<b>San Luis Obispo County:</b> Use vessel engines meeting CARB's Tier 2-certified engines or cleaner, accomplished with Tier 2 engines if daily fuel use is 585 gallons or less; all diesel equipment shall not idle for more than 5 minutes; engine use needed to maintain position in the water is not considered idling; diesel idling within 300 meters (1,000 feet) of sensitive receptors is not permitted; use alternatively fueled construction equipment on site where feasible, such as compressed natural gas, liquefied natural gas, propane or biodiesel.		Verify that Tier 2 or cleaner engines are being used.  Inform vessel operator(s) of idling limitation.  Investigate availability of alternative fuels.			6/12/15 PS
	<b>Santa Barbara County:</b> Use vessel engines meeting CARB's Tier 2-certified engines or cleaner, accomplished with Tier 2 engines if daily fuel use is 790 gallons or less.		Verify that Tier 2 or cleaner engines are being used.  Investigate availability of alternative fuels.			
	<b>Ventura County:</b> Use alternatively fueled construction equipment on site where feasible, such as compressed natural gas, liquefied natural gas, propane or biodiesel.		Investigate availability of alternative fuels.			

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<b>MM BIO-1:</b> Marine Mammal and Sea Turtle Presence – Current Information.	All State waters; prior to commencement of survey operations, the geophysical operator shall: (1) contact the National Oceanic and Atmospheric Administration Long Beach office staff and local whale-watching operations and shall acquire information on the current composition and relative abundance of marine wildlife offshore, and (2) convey sightings data to the vessel operator and crew, survey party chief, and onboard Marine Wildlife Monitors (MWMs) prior to departure. This information will aid the MWMs by providing data on the approximate number and types of organisms that may be in the area.	No adverse effects to marine mammals or sea turtles due to survey activities are observed.	Document contact with appropriate sources.  Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder; Inquiry to NOAA and local whale watching operators.	Prior to survey.	7/10/15 PS  10/27/15 PS
<b>MM BIO-2:</b> Marine Wildlife Monitors (MWMs).	Except as provided in section 7(h) of the General Permit, a minimum of two (2) qualified MWMs who are experienced in marine wildlife observations shall be onboard the survey vessel throughout both transit and data collection activities. The specific monitoring, observation, and data collection responsibilities shall be identified in the Marine Wildlife Contingency Plan required as part of all Offshore Geophysical Permit Program permits. Qualifications of proposed MWMs shall be submitted to the National Oceanic and Atmospheric Administration (NOAA) and CSLC at least twenty-one (21) days in advance of the survey for their approval by the agencies. Survey operations shall not commence until the CSLC approves the MWMs.	Competent and professional monitoring of marine mammals and sea turtles; compliance with established monitoring policies.	Document contact with and approval by appropriate agencies.  Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Prior to survey.	6/12/15 PS  10/27/15 PS
<b>MM BIO-3:</b> Safety Zone Monitoring.	Onboard Marine Wildlife Monitors (MWMs) responsible for observations during vessel transit shall be responsible for monitoring during the survey equipment operations. All visual monitoring shall occur from the highest practical vantage point aboard the survey vessel; binoculars shall be used to observe the surrounding area, as appropriate. The MWMs will survey an area (i.e., safety or exclusion zone) based on the equipment used, centered on the sound source (i.e., vessel, towfish), throughout time that the survey equipment is operating. Safety zone radial distances, by equipment type, include:	No adverse effects to marine mammals or sea turtles due to survey activities are observed; compliance with established safety zones.	Compliance with permit requirements (observers); compliance with established safety zones.  Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Prior to survey.	6/12/15 PS  10/27/15 PS

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Mitigation Monitoring Program

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials												
	<table border="1" data-bbox="562 312 1032 501"> <thead> <tr> <th>Equipment Type</th> <th>Safety Zone (radius, m)</th> </tr> </thead> <tbody> <tr> <td>Single Beam Echosounder</td> <td>50</td> </tr> <tr> <td>Multibeam Echosounder</td> <td>500</td> </tr> <tr> <td>Side-Scan Sonar</td> <td>600</td> </tr> <tr> <td>Subbottom Profiler</td> <td>100</td> </tr> <tr> <td>Boomer System</td> <td>100</td> </tr> </tbody> </table> <p data-bbox="510 528 1086 1166">If the geophysical survey equipment is operated at or above a frequency of 200 kilohertz (kHz), safety zone monitoring and enforcement is not required; however, if geophysical survey equipment operated at a frequency at or above 200 kHz is used simultaneously with geophysical survey equipment less than 200 kHz, then the safety zone for the equipment less than 200 kHz must be monitored. The onboard MWMs shall have authority to stop operations if a mammal or turtle is observed within the specified safety zone and may be negatively affected by survey activities. The MWMs shall also have authority to recommend continuation (or cessation) of operations during periods of limited visibility (i.e., fog, rain) based on the observed abundance of marine wildlife. Periodic reevaluation of weather conditions and reassessment of the continuation/cessation recommendation shall be completed by the onboard MWMs. During operations, if an animal's actions are observed to be irregular, the monitor shall have authority to recommend that equipment be shut down until the animal moves further away from the sound source. If irregular behavior is observed, the equipment shall be shut-off and will be restarted and ramped-up to full power, as applicable, or will not be started until the animal(s) is/are outside of the safety zone or have not been observed for 15 minutes.</p> <p data-bbox="510 1198 1086 1367">For nearshore survey operations utilizing vessels that lack the personnel capacity to hold two (2) MWMs aboard during survey operations, at least twenty-one (21) days prior to the commencement of survey activities, the Permittee may petition the CSLC to conduct survey operations with one (1) MWM aboard. The CSLC will consider such authorization on a case-by-case basis and</p>	Equipment Type	Safety Zone (radius, m)	Single Beam Echosounder	50	Multibeam Echosounder	500	Side-Scan Sonar	600	Subbottom Profiler	100	Boomer System	100					
Equipment Type	Safety Zone (radius, m)																	
Single Beam Echosounder	50																	
Multibeam Echosounder	500																	
Side-Scan Sonar	600																	
Subbottom Profiler	100																	
Boomer System	100																	

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Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
	factors the CSLC will consider will include the timing, type, and location of the survey, the size of the vessel, and the availability of alternate vessels for conducting the proposed survey. CSLC authorizations under this subsection will be limited to individual surveys and under any such authorization; the Permittee shall update the MWCP to reflect how survey operations will occur under the authorization.					
<b>MM BIO-4:</b> Limits on Nighttime OGPP Surveys.	All State waters; nighttime survey operations are prohibited under the OGPP, except as provided below. The CSLC will consider the use of single beam echosounders and passive equipment types at night on a case-by-case basis, taking into consideration the equipment specifications, location, timing, and duration of survey activity.	No adverse effects to marine mammals or sea turtles due to survey activities are observed.	Presurvey request for nighttime operations, including equipment specifications and proposed use schedule.  Document equipment use.  Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Approval required before survey is initiated.  Monitoring Report following completion of survey.	6/12/15 PS  10/27/15 PS
<b>MM BIO-5:</b> Soft Start.	All State waters; the survey operator shall use a "soft start" technique at the beginning of survey activities each day (or following a shut down) to allow any marine mammal that may be in the immediate area to leave before the sound sources reach full energy. Surveys shall not commence at nighttime or when the safety zone cannot be effectively monitored. Operators shall initiate each piece of equipment at the lowest practical sound level, increasing output in such a manner as to increase in steps not exceeding approximately 6 decibels (dB) per 5-minute period. During ramp-up, the Marine Wildlife Monitors (MWMs) shall monitor the safety zone. If marine mammals are sighted within or about to enter the safety zone, a power-down or shut down shall be implemented as though the equipment was operating at full power. Initiation of ramp-up procedures from shut down requires that the MWMs be able to visually observe the full safety zone.	No adverse effects to marine mammals or sea turtles due to survey activities are observed.	Compliance with permit requirements (observers); compliance with safe start procedures.  Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Immediately prior to survey.	6/12/15 PS  10/27/15 PS

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Mitigation Monitoring Program

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
<p><b>MM BIO-6:</b> Practical Limitations on Equipment Use and Adherence to Equipment Manufacturer's Routine Maintenance Schedule.</p>	<p>All State waters; geophysical operators shall follow, to the maximum extent possible, the guidelines of Zykov (2013) as they pertain to the use of subbottom profilers and side-scan sonar, including:</p> <ul style="list-style-type: none"> <li>Using the highest frequency band possible for the subbottom profiler;</li> <li>Using the shortest possible pulse length; and</li> <li>Lowering the pulse rate (pings per second) as much as feasible.</li> </ul> <p>Geophysical operators shall consider the potential applicability of these measures to other equipment types (e.g., boomer). Permit holders will conduct routine inspection and maintenance of acoustic-generating equipment to ensure that low energy geophysical equipment used during permitted survey activities remains in proper working order and within manufacturer's equipment specifications. Verification of the date and occurrence of such equipment inspection and maintenance shall be provided in the required presurvey notification to CSLC.</p>	<p>No adverse effects to marine mammals or sea turtles due to survey activities are observed.</p>	<p>Document initial and during survey equipment settings.</p> <p>Submit Final Monitoring Report after completion of survey activities.</p>	<p>OGPP permit holder.</p>	<p>Immediately prior to and during survey.</p>	<p>6/12/15 PS</p> <p>10/27/15 PS</p>
<p><b>MM BIO-7:</b> Avoidance of Pinniped Haul-Out Sites.</p>	<p>The Marine Wildlife Contingency Plan (MWCP) developed and implemented for each survey shall include identification of haul-out sites within or immediately adjacent to the proposed survey area. For surveys within 300 meters (m) of a haul-out site, the MWCP shall further require that:</p> <ul style="list-style-type: none"> <li>The survey vessel shall not approach within 91 m of a haul-out site, consistent with National Marine Fisheries Service (NMFS) guidelines;</li> <li>Survey activity close to haul-out sites shall be conducted in an expedited manner to minimize the potential for disturbance of pinnipeds on land; and</li> <li>Marine Wildlife Monitors shall monitor pinniped activity onshore as the vessel approaches, observing and reporting on the number of pinnipeds potentially disturbed (e.g., via head lifting, flushing into the water). The purpose of such reporting is to provide CSLC and California Department of Fish and Wildlife (CDFW) with information regarding potential disturbance associated with OGPP surveys.</li> </ul>	<p>No adverse effects to pinnipeds at haul outs are observed.</p>	<p>Document pinniped reactions to vessel presence and equipment use.</p> <p>Submit Final Monitoring Report after completion of survey activities.</p>	<p>OGPP permit holder.</p>	<p>Monitoring Report following completion of survey.</p>	<p>6/12/15 PS</p> <p>6/24/15 PS</p> <p>10/27/15 PS</p>

EXHIBIT H

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<p><b>MM BIO-8:</b> Reporting Requirements – Collision.</p>	<p>All State waters; if a collision with marine mammal or reptile occurs, the vessel operator shall document the conditions under which the accident occurred, including the following:</p> <ul style="list-style-type: none"> <li>• Vessel location (latitude, longitude) when the collision occurred;</li> <li>• Date and time of collision;</li> <li>• Speed and heading of the vessel at the time of collision;</li> <li>• Observation conditions (e.g., wind speed and direction, swell height, visibility in miles or kilometers, and presence of rain or fog) at the time of collision;</li> <li>• Species of marine wildlife contacted (if known);</li> <li>• Whether an observer was monitoring marine wildlife at the time of collision; and,</li> <li>• Name of vessel, vessel owner/operator, and captain officer in charge of the vessel at time of collision.</li> </ul> <p>After a collision, the vessel shall stop, if safe to do so; however, the vessel is not obligated to stand by and may proceed after confirming that it will not further damage the animal by doing so. The vessel will then immediately communicate by radio or telephone all details to the vessel's base of operations, and shall immediately report the incident. Consistent with Marine Mammal Protection Act requirements, the vessel's base of operations or, if an onboard telephone is available, the vessel captain him/herself, will then immediately call the National Oceanic and Atmospheric Administration (NOAA) Stranding Coordinator to report the collision and follow any subsequent instructions. From the report, the Stranding Coordinator will coordinate subsequent action, including enlisting the aid of marine mammal rescue organizations, if appropriate. From the vessel's base of operations, a telephone call will be placed to the Stranding Coordinator, NOAA National Marine Fisheries Service (NMFS), Southwest Region, Long Beach, to obtain instructions. Although NOAA has primary responsibility for marine mammals in both State and Federal waters, the California Department of Fish and Wildlife (CDFW) will also be advised that an incident has occurred in State waters affecting a protected species.</p>	<p>No adverse effects to marine mammals or sea turtles due to survey activities are observed.</p>	<p>Submit Final Monitoring Report after completion of survey activities.</p>	<p>OGPP permit holder.</p>	<p>Monitoring Report following completion of survey.</p>	<p>10/27/15 PS</p>

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Mitigation Monitoring Program

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
<b>MM BIO-9:</b> Limitations on Survey Operations in Select Marine Protected Areas (MPAs).	All MPAs; prior to commencing survey activities, geophysical operators shall coordinate with the CLSC, California Department of Fish and Wildlife (CDFW), and any other appropriate permitting agency regarding proposed operations within MPAs. The scope and purpose of each survey proposed within a MPA shall be defined by the permit holder, and the applicability of the survey to the allowable MPA activities shall be delineated by the permit holder. If deemed necessary by CDFW, geophysical operators will pursue a scientific collecting permit, or other appropriate authorization, to secure approval to work within a MPA, and shall provide a copy of such authorization to the CSLC as part of the required presurvey notification to CSLC. CSLC, CDFW, and/or other permitting agencies may impose further restrictions on survey activities as conditions of approval.	No adverse effects to MPA resources due to survey activities are observed.	Monitor reactions of wildlife to survey operations; report on shutdown conditions and survey restart.  Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder; survey permitted by CDFW.	Prior to survey.	6/26/15 PS  10/27/15 PS
<b>MM HAZ-1:</b> Oil Spill Contingency Plan (OSCP) Required Information.	Permittees shall develop and submit to CSLC staff for review and approval an OSCP that addresses accidental releases of petroleum and/or non-petroleum products during survey operations. Permittees' OSCP's shall include the following information for each vessel to be involved with the survey: <ul style="list-style-type: none"> <li>• Specific steps to be taken in the event of a spill, including notification names, phone numbers, and locations of: (1) nearby emergency medical facilities, and (2) wildlife rescue/response organizations (e.g., Oiled Wildlife Care Network);</li> <li>• Description of crew training and equipment testing procedures; and</li> <li>• Description, quantities, and location of spill response equipment onboard the vessel.</li> </ul>	Reduction in the potential for an accidental spill. Proper and timely response and notification of responsible parties in the event of a spill.	Documentation of proper spill training.  Notification of responsible parties in the event of a spill.	OGPP permit holder and contract vessel operator.	Prior to survey.	6/12/15 PS
<b>MM HAZ-2:</b> Vessel fueling restrictions.	Vessel fueling shall only occur at an approved docking facility. No cross vessel fueling shall be allowed.	Reduction in the potential for an accidental spill.	Documentation of fueling activities.	Contract vessel operator.	Following survey.	10/27/15 PS
<b>MM HAZ-3:</b> OSCP equipment and supplies.	Onboard spill response equipment and supplies shall be sufficient to contain and recover the worst-case scenario spill of petroleum products as outlined in the OSCP.	Proper and timely response in the event of a spill.	Notification to CSLC of onboard spill response equipment/supplies inventory, verify	Contract vessel operator.	Prior to survey.	6/12/15 PS  6/29/15 PS

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			ability to respond to worst-case spill.			
<b>MM HAZ-1:</b> Oil Spill Contingency Plan (OSCP) Required Information.	Outlined under <b>Hazards and Hazardous Materials</b> (above)					6/12/15 PS
<b>MM HAZ-2:</b> Vessel fueling restrictions.	Outlined under <b>Hazards and Hazardous Materials</b> (above)					10/27/15 PS
<b>MM HAZ-3:</b> OSCP equipment and supplies.	Outlined under <b>Hazards and Hazardous Materials</b> (above)					6/12/15 PS 6/29/15 PS
<b>MM BIO-9:</b> Limitations on Survey Operations in Select MPAs.	Outlined under <b>Biological Resources</b> (above)					6/26/15 PS
<b>MM REC-1:</b> U.S. Coast Guard (USCG), Harbormaster, and Dive Shop Operator Notification.	All California waters where recreational diving may occur; as a survey permit condition, the CSLC shall require Permittees to provide the USCG with survey details, including information on vessel types, survey locations, times, contact information, and other details of activities that may pose a hazard to divers so that USCG can include the information in the Local Notice to Mariners, advising vessels to avoid potential hazards near survey areas. Furthermore, at least twenty-one (21) days in advance of in-water activities, Permittees shall: (1) post such notices in the harbormasters' offices of regional harbors; and (2) notify operators of dive shops in coastal locations adjacent to the proposed offshore survey operations.	No adverse effects to recreational divers from survey operations.	Notify the USCG, local harbormasters, and local dive shops of planned survey activity.  Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Prior to survey.	6/12/15 PS  10/27/15 PS

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<b>MM FISH-1:</b> U.S. Coast Guard (USCG) and Harbormaster Notification.	All California waters; as a survey permit condition, the CSLC shall require Permittees to provide the USCG with survey details, including information on vessel types, survey locations, times, contact information, and other details of activities that may pose a hazard to mariners and fishers so that USCG can include the information in the Local Notice to Mariners, advising vessels to avoid potential hazards near survey areas. Furthermore, at least twenty-one (21) days in advance of in-water activities, Permittees shall post such notices in the harbormasters' offices of regional harbors.	No adverse effects to commercial fishing gear in place.	Notify the USCG and local harbormasters of planned survey activity.  Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Prior to survey.	6/12/15 PS  10/27/15 PS
<b>MM FISH-2:</b> Minimize Interaction with Fishing Gear.	To minimize interaction with fishing gear that may be present within a survey area: (1) the geophysical vessel (or designated vessel) shall traverse the proposed survey corridor prior to commencing survey operations to note and record the presence, type, and location of deployed fishing gear (i.e., buoys); (2) no survey lines within 30 m (100 feet) of observed fishing gear shall be conducted. The survey crew shall not remove or relocate any fishing gear; removal or relocation shall only be accomplished by the owner of the gear upon notification by the survey operator of the potential conflict.	No adverse effects to commercial fishing gear in place.	Visually observe the survey area for commercial fishing gear. Notify the gear owner and request relocation of gear outside survey area.  Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Immediately prior to survey (prior to each survey day).	10/27/15 PS
<b>MM FISH-1:</b> USCG and Harbormaster Notification.	Outlined under <b>Commercial and Recreational Fisheries</b> (above)					6/12/15 PS 10/27/15 PS

Acronyms/Abbreviations: CARB = California Air Resources Board; CDFW = California Department of Fish and Wildlife; CSLC = California State Lands Commission; dB = decibels; kHz = kilohertz; MPA = Marine Protected Area; MWCP = Marine Wildlife Contingency Plan; MWM = Marine Wildlife Monitor; m= meter(s); NOAA = National Oceanic and Atmospheric Administration; NO<sub>x</sub> = Nitrogen Oxide; OGPP = Offshore Geophysical Permit Program; OSCP = Oil Spill Contingency Plan; USCG = U.S. Coast Guard