Appendix E

Marine Wildlife Protection Plan

MARINE WILDLIFE PROTECTION PLAN

MC GLOBAL BP4 Fiber-optic Cable Installations off Hermosa Beach, California

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1.0 Introduction

This plan was designed as a stand-alone document to inform readers about mitigation measures to protect marine wildlife during submarine fiber-optic cable installation operations offshore from Hermosa Beach, California. This plan summarizes details of the project and identifies regulatory aspects pertaining to wildlife protection. It discusses marine wildlife of concern, potential impacts from project activities on such wildlife, and mitigation measures that can help avoid such impacts.

MC Global BP4 is a telecommunications firm based in Napa, California. It represents a consortium of large fiber-optic cable companies that will install and operate up to four transpacific submarine cables that will land at Hermosa Beach and cross the Pacific to various locations along the Pacific Rim. This project, which consists of four phases, will start in winter 2015 and be completed sometime before 2025.

The proposed submarine cable routes cross submerged coastal lands under the jurisdiction of the City of Hermosa Beach, from mean high water to 3 nautical miles (nm) offshore. From 3 nm offshore, the routes continue to a depth of approximately 5,904 feet (ft.) or 1,800 meters (m), the outer limit of the continental shelf. Before reaching the edge of the shelf, these submarine cable routes cross Santa Monica Bay and several offshore basins, ridges, and escarpments on the California borderland (ICF International 2015).

Such projects involve risks to marine wildlife, especially marine mammals and to a lesser extent, marine turtles. These risks include collision with project vessels that could result in blunt force trauma from the bow of the vessels or in injuries from the propellers. The submarine cables themselves, along with fishing gear snagged on such cables, pose risks of entanglement, and during the cable installation process, entanglement hazards include cables and umbilici leading to cable installation and cable burial devices. Oil or fuel releases also pose hazards to marine wildlife, while noise from various project operations can disturb wildlife.

The Marine Mammal Consulting Group, Inc. (MMCG), of Santa Barbara, California, was selected by ICF International to prepare this Marine Wildlife Mitigation Monitoring Plan. ICF International is a management, technology, and consulting firm based in Fairfax, Virginia, with several offices in California. The mitigation measures proposed in this plan are built on experience gained from numerous successful past and current cable installation and inspection projects (MMCG 2000-2015), along with supporting documents prepared during the planning process for this project (ICF International [ICF] 2015; City of Hermosa Beach 2015). The mitigation measures herein are designed to reduce hazards to marine wildlife to less than significant levels.

2.0 Background

2.1 Project Description

This section summarizes the marine elements of this project. Detailed descriptions are available in other documents, as are descriptions of the terrestrial elements of this project (Applied Marine Sciences [AMS] 2015; ICF 2015; City of Hermosa Beach 2015).

2.1.1 Fiber-optic Cable System

MC Global BP4 is a telecommunications firm based in Napa, California. It represents a consortium of large fiber-optic cable companies that will install and operate up to four transpacific submarine cables that will land at Hermosa Beach in Southern California. The project will be implemented in four phases, with one phase for each of the four cable systems. Each cable system will entail installing a fiber-optic cable system ultimately connecting various Pacific Rim locations to one of two locations in Hermosa Beach. One landing site will be just west of Neptune-Longfellow Avenue; the other just west of 25th Street. (Alternate landing sites at respective street right-of-ways could be used instead.) Buried terrestrial conduit systems will then connect the cable systems with a local telecommunications carrier.

Four directional bore pipes, one for each of the four cable systems, will be installed from shore. Two bore pipes will be placed at the Neptune-Longfellow Avenue location and two at the 25th Street location. Each bore pipe will extend from the eastern edge of the beach under the beach to approximately 4,000 ft. offshore in roughly 33 ft. (10 m) of water (ICF 2015; City of Hermosa Beach 2015).

The proposed submarine routes cross submerged coastal lands from mean high water to 3 nm offshore. These lands fall under the jurisdiction of the City of Hermosa Beach, the lead agency for this project. From 3 nm offshore, the routes continue to a depth of approximately 5,904 ft. (1,800 m), the outer limit of the continental shelf. The proposed routes cross Santa Monica Bay and several offshore basins, ridges, and escarpments located on the California Borderland before reaching the edge of the shelf (please see Figure 1). The proposed marine routes were selected to avoid the following known marine features:

- Santa Monica and Redondo canyons;
- Areas under consideration as part of Channel Islands National Marine Sanctuary;
- Explosives dumping areas;
- Fishery grounds associated with Tanner and Cortes banks;
- Contaminated sediments in Santa Monica Bay associated with the Palos Verdes shelf and the Hyperion sewage outfall;
- Commercial vessel anchoring and pilot boarding areas.

The first phase of the proposed project will involve installation of the Southeast Asia to United States (SEA–US) Cable System, which will connect the United States to Guam, the Philippines, and Indonesia at the 25th Street landing site. This is tentatively scheduled for the second or third quarters of 2016. The second phase, planned for early 2017, will consist of installing a system connecting the United States to China at the Neptune-Longfellow Avenue site. The two other cables will follow as additional connection points in other countries are identified. The third cable system is expected to be installed by 2020; the last, before 2025 (ICF 2015; City of Hermosa Beach 2015).

2.1.2 Cable Installation and Burial Methods

The submarine cable installation process will take place in several stages, some of which may occur simultaneously or overlap with others and most of which will require marine wildlife

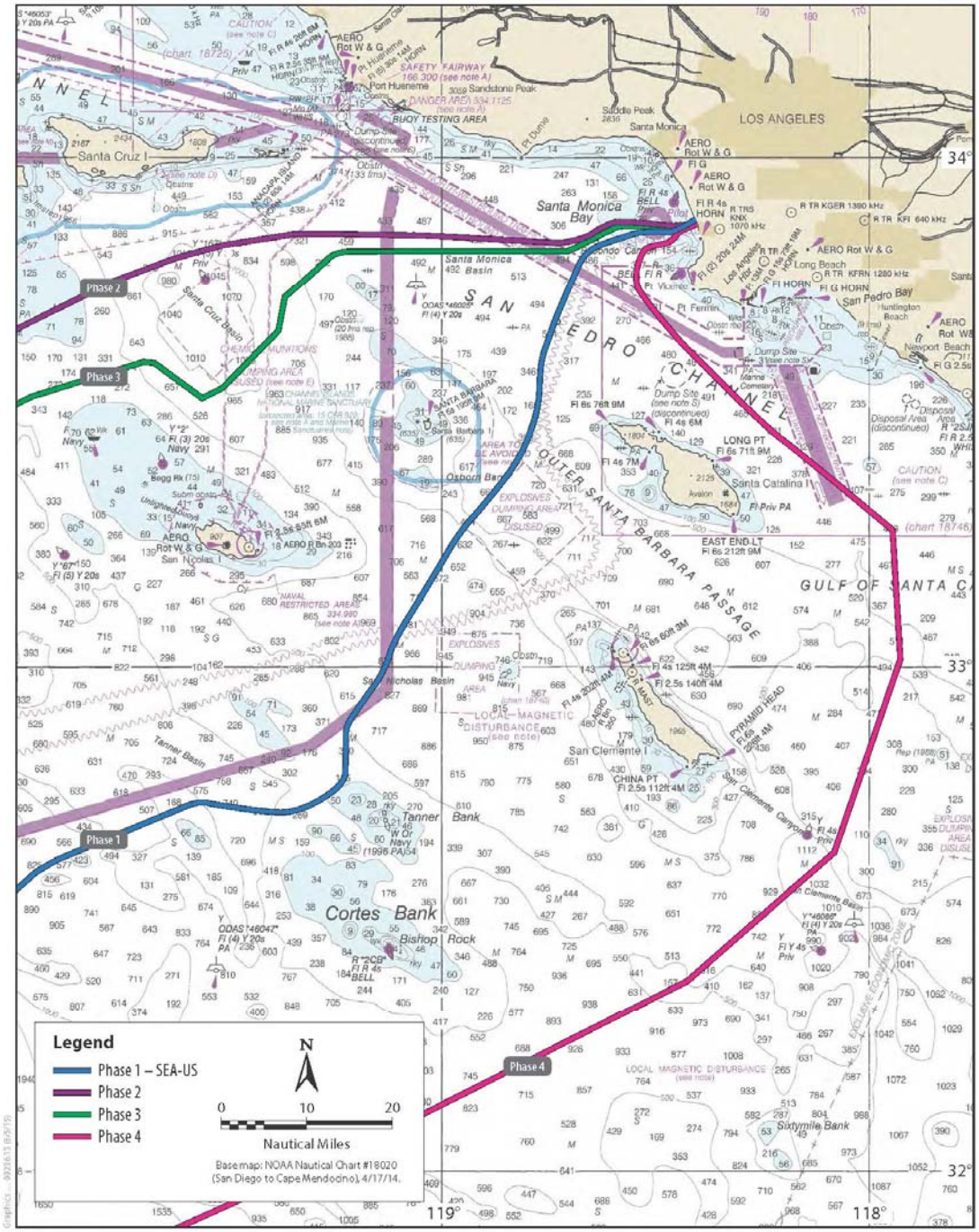

Figure 1
Bathymetric Chart Showing Cable Routes and Shipping Lanes

mitigation monitoring. The summaries below were gleaned from two planning documents, which provide considerably more detail (ICF 2015; City of Hermosa Beach 2015).

Installation of Bore Pipes Four, six-inch diameter bore pipes will lead from manholes at two shore locations to approximately 4,000 ft. (1,219 m) offshore in about 33 ft. (10 m) of water. These pipes will be installed using horizontal directional drilling (HDD) techniques. This process will take a week or so for each bore during daylight hours only, with additional time needed to install other infrastructure on shore. Once each bore reaches the appropriate distance offshore, the drill head will be guided to the surface of the sea floor, completing the bore. A heavy wire rope will be placed in the bore pipe during the final stage of the HDD process and attached to a hydraulic winch on shore. This will later be used to pull fiber-optic cables from the cable-laying ship to shore.

A work boat, which will serve as a dive platform, will moor within about 50 ft. (15.2 m) of the bore exit point. The boat will use a four-point mooring with an anchor spread of approximately 328 ft. (100 m). Divers staging from this boat will remove the drill head, excavate around the exit point, and install a one-way valve at the end of the pipe. The valve will keep seawater and sediments from entering the bore pipe until the fiber-optic cable is installed. This process will be repeated for each of the four bore pipes. A smaller work boat will set and retrieve anchors as well as shuttle crews between the dive boat and port. All anchors will be set and retrieved vertically to avoid dragging them across the sea floor.

Pre-lay Grapnel Run: For submarine cable installation operations, a grapnel is a device used to snag debris, such as discarded fishing gear, on the sea floor or a short distance beneath it so the debris can be raised to the surface, clearing the cable routes of such materials. Chain will be attached to the grapnel to ensure that the grapnel drags along the bottom. The grapnel will be towed by a large work vessel at less than 1 knot. When debris is hooked and towing tension increases, towing will stop and the grapnel will be brought aboard by winch. Debris recovered during the operation will be stowed on the vessel for later disposal in port. This operation will take place 24 hours a day and will take about one week for each cable route.

Before the grapnel run begins, surveys will be made of each cable route. The purpose of the surveys is to determine the maximum burial route option for the cable. The surveys will identify the makeup of the ocean floor including hard bottom areas so they can be avoided when the cable is laid. Precipitous canyons will also be pinpointed and avoided so the cables will not be suspended over the canyons. In general, the surveys will serve to route the cables to soft bottom areas where maximum burial can be achieved. Low-energy sonar will be used for the surveys.

Pulling the Fiber-optic Cable Ashore: The cable ship will position itself approximately 328 ft. (100 m) seaward of the end of the bore pipe into which the cable is to be pulled and clear of the dive vessel mooring. Divers will then install cable chutes to the end of the bore pipe. Floats will be attached to the wire rope inside the bore pipe, then a work boat will assist with feeding this rope to the cable ship, where it will be connected to the fiber-optic cable. The wire rope and the fiber-optic cable will then be pulled ashore by a heavy duty hydraulic winch near the beach manhole, where it will be secured. Divers will manage and monitor the pulling process from the work boat. Once the fiber-optic cable is secured on shore, the cable ship will proceed on its offshore course, laying cable as it goes. Landing the cable is expected to take a day or two, but it will go on 24 hours a day until completed.

Offshore Cable-laying: Beginning at the end of the bore pipe, the cable will be temporarily laid directly on the seafloor to a water depth of approximately 328 ft. (100 m). This segment will be buried later. Between 328 and 3,937 ft. (1,200 m), the cable will be buried with a plow. In areas where the plow cannot be used, a Remotely Operated Vehicle (ROV) will be employed (please see next sections). From 3,937 to 5,904 ft. (1,800 m) the edge of the Continental Shelf, the cable will simply be placed on the seafloor. Cable-laying will be conducted 24 hours a day and will require four to five weeks for each cable.

Burial by Plow: A cable-burying plow is a large, sophisticated piece of machinery designed to bury submarine cables beneath the sea floor. As it is towed, the plow mechanically buries the cable by slicing through the sediments at the same time the cable is fed through the plow shank into the bottom of the furrow. This is done in one continuous operation. The furrow will be approximately 3.3 ft. (1 m) wide and about the same depth. The plow is supported by two sled outriggers to a width of approximately 20 ft. (6.1 m). The trench created by the shank of the plow will naturally close under the combined weight of the sediments and the plow sleds, which transmit the weight of the plow to each side of the trench, effectively compacting the sediment. No further compacting will be required.

The plow will be lowered to the bottom by the cable ship once the fiber-optic cable has been secured on shore. Once on the bottom, divers will help load the cable into the plow's articulated feed chute and burial shank. The mechanical movements of the plow will be controlled by a shipboard operator watching the divers through a video camera mounted on the plow. Video signals and commands are relayed to the plow through an umbilicus connecting the plow to the cable ship. Once the ready signal is given, the ship will move away with the plow in tow, traveling at about 0.4 knot, 24 hours a day until 3,937 ft. of water is reached, whereupon the plow will be secured on board and the cable will be laid on top of the sea floor.

Burial by Divers: Sometime after the ship has left, divers will begin burying the cable from the bore pipe terminus in about 33 ft. of water out to about 98 ft. They will work only during daylight hours for an estimated four weeks. The divers will use handheld water jets to open a narrow trench beneath the cable. This will allow the heavy cable to drop into the furrow as it is opened. The disturbed sediments will then settle back over the cable, restoring the surface to its original grade. Depending on bottom conditions and where feasible, the cable will be buried to 3.3 ft. beneath the sea floor.

Burial by Remotely Operated Vehicle (ROV): A cable-burying ROV is a robotic device operated from a large vessel like the cable-laying ship. (ROV ships are sometimes called PLIB vessels, for Post-lay Inspection and Burial.) The ROV moves under its own power and is guided from the ship with an umbilicus leading to the ROV operator's station. Water jets on the ROV will loosen the sea floor sediments beneath the cable, allowing it to settle to a depth of about 3 to 4 ft. (0.9 to 1.2 m). The typical area of sea floor disturbed by this operation is about 15 ft. (4.6 m) wide. The disturbed sediments will eventually settle back over the area, restoring the original grade and leaving the cable buried.

The ROV will be operated 24 hours a day, estimated at about four weeks per cable. ROV operations will begin from one day to three weeks after the cable is laid on the sea floor. The ROV has a nominal speed of about 0.3 knot when jetting. However, the overall rate of forward progress depends on the number of passes needed to attain target burial depths, which in turn

is a function of sediment stiffness. Since up to three passes may be required, the overall rate of progress is sometimes as little as about 0.09 knot.

2.1.3 Survey, Grapnel, Cable-laying, and ROV Vessels

The research vessel Geo Resolution will be used for the offshore bathymetric surveys for Phase 1 of the project. Operated by EGS, an international group of survey firms, the ship is 224 ft. (68.4 m) long. The 44 ft. (13.4 m) catamaran *Pheory* will likely be used for the nearshore surveys for Phase 1 of the project. None of the other vessels to be used during this project have been identified as yet, although some examples were provided in the planning documents (ICF 2015; City of Hermosa Beach 2015). In past projects, ships used for grapnel, cable-laying, and ROV work involving fiber-optic cable installations along the continental shelf often were able to perform any of these three tasks. These ships generally were in the 400- to 500-ft. range, capable of remaining at sea during virtually any weather conditions in this region. Starting in 2001, Tyco Telecommunications had six purpose-built vessels made for transoceanic cable installations. Global Marine Systems, Ltd., has a small fleet of cable installation vessels stationed throughout the world. Both companies have figured prominently in past fiber-optic installation projects on the West Coast.

2.1.4 Support Vessels

According to the Applicant-prepared Environmental Document (APED), the dive support craft will be a 100- to 200-foot (30- to 60-m) vessel (ICF 2015). It will be accompanied by a smaller boat which will set and retrieve anchors as well as shuttle crews between the dive vessel and shore.

2.2 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 will be required for this project because the mitigation measures sufficiently reduce the chances of takes.

Some populations or 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 (DSPs). Such segments represent discrete populations or stocks of a species or subspecies that are significant to other populations or stocks of the species or subspecies. As one example, the California-Oregon-Washington stock of humpback whales is just one of fourteen 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 plan 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. This means that the population has fallen below optimum sustainable levels. 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 in Section 2.4, below. Finally, some stocks may be considered vulnerable to decline because their numbers are low.

2.3 Marine Wildlife Species of Concern

All marine mammal and marine turtle species are of concern during this project, not only because they are protected by the state as well as by the federal government, but also because any adverse impacts to such creatures could cause repercussions from the public, environmental groups, and the regulatory agencies. A spate of recent ship strikes and entanglements involving whales has only increased this concern, especially since a number of marine mammals and all turtles are listed as threatened or endangered under the federal and state endangered species acts (please see previous section). Ship strikes involving blue whales in particular are a major concern because the regional stock does not seem to be increasing. Authorities estimate that less than 10 percent of ship strikes are documented (NOAA, National Marine Sanctuaries [NMS] 2015). Entanglements of whales in synthetic materials have also greatly increased; in the first half of 2015, 26 entanglements were documented in California alone (Viezbicke 2015). An oil spill near Santa Barbara, California in May 2015, which resulted in a number of sea birds and marine mammals being coated with oil, has reopened concerns about risks of any oil release. Finally, anthropogenic noise in the world's oceans has become a matter of increasing concern to the regulatory agencies (Carretta et al. 2014).

2.4 Habitats and Shifting Populations

Cetaceans often occupy habitats from the continental shelf to pelagic waters, but some species, such as the coastal stock of common bottlenose dolphins (*Tursiops truncatus*) and the gray whale (*Eschrichtius robustus*) can be nearshore in distribution, ranging literally into the surf zone (Carretta et al. 2014). Pinnipeds haul out and bear their young on sandy and rocky shores, and all but the Pacific harbor seal (*Phoca vitulina richardii*) breed on land. At sea, pinnipeds occupy nearshore to pelagic habitats. The southern sea otter (*Enhydra lutris nereis*) frequents nearshore waters and only rarely hauls out on land. In summary, marine mammals occupy all marine habitats along the cable routes, except that no marine mammals or turtles come ashore on Hermosa Beach unless they are stranded because of health problems.

Movements of marine mammals in this region are precipitated mainly by the need to propagate and feed. Breeding, pupping, and calving areas can range from local to thousands of miles away. This means that some marine mammals must undergo lengthy migrations, hence they are only seasonal visitors to the region. Other marine mammals may breed and bear their young here but travel to other regions for food. A few remain in the region year-round.

Various species of marine mammals feed on benthic, midwater, or surface organisms, and sometimes a combination of two or all three types of organisms. Feeding areas vary greatly for

some species, depending on the availability of prey and water temperatures, which often are related. Some prey move with water masses and predators are forced to follow. This can be a seasonal phenomenon with some species of marine mammals. It can also be a localized phenomenon in which pockets of cold or warm water are found by marine wildlife. For example, green turtles (*Chelonia mydas*) are known to frequent or even inhabit warm water discharges near power plants in Southern California.

Shifts in water temperatures can also be the result of cyclic events such as the El Niño Southern Oscillation, in which temperatures are notably warmer than usual (El Niño), normal, or colder than usual (La Niña). The Southern California Bight is a transitional zone, in which the range limits of northern species overlap with those of southern species. Although this overlap is often seasonal or cyclic, sometimes temporary or permanent population movements occur during or after following major oceanographic events. This summer, hard-shelled turtles have been noted on a number of occasions off the northern Channel Islands (Menzies 2015). The apparently permanent northward displacement of coastal bottlenose dolphins following the 1982-1983 El Niño event is an example of a population shift, as is the disappearance of a breeding colony of Steller sea lions (*Eumetopias jubatus*) on San Miguel Island following the same El Niño event. The bottlenose dolphins remained south of Point Conception before this event, while the Steller sea lions were at the southern limits of their breeding range at the time. Climate change has been discussed on occasion as a possible cause for a more northern distribution in the eastern North Pacific stock of gray whales (Perryman et al. 2002; Moore et al. 2003; Moore 2008). This is but one species that may have been affected by climate change.

Thus, predicting the likelihood of any particular species appearing in a given area and time, especially over the period of this project, is difficult. Nonetheless, some assumptions can be made as to the increased possibility of tropical to temperate species appearing during warm water El Niño events versus subarctic to subtemperate species appearing during cold water La Niña events or during seasons when the water is usually colder, such as in late winter and spring. To aid in assessing the possibility of various species occurring with widespread water temperature changes, Tables 1 and 2 below include the seasonal and geographic distribution of each species, along with water temperature preferences for species at the edges of their range. In all, thirty-two species of cetaceans, six species of pinnipeds, one species of carnivore (the southern sea otter), and four species of marine turtles have been reported in the region.

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

Common Name/ Stock	Scientific Name	Seasonal Distribution/ Likelihood of Occurrence	Habitat	Stock Size	Status
North Pacific right whale/ Eastern North Pacific	*Eubalaena japonica*	No seasonality here/ virtually zero	Mainly Bering Sea and Gulf of Alaska; coastal to pelagic	28-31	Endangered ESA; strategic, depleted MMPA
Humpback whale/ California-Oregon-Washington	*Megaptera novaeangliae*	Year-round but mostly summer-fall/ likely	Central America to British Columbia; nearshore to pelagic	1918	Endangered ESA;* strategic, depleted MMPA
Blue whale/ Eastern North Pacific	*B. musculus m.*	Summer-fall/ likely	Gulf of Alaska to eastern tropical Pacific; coastal to pelagic	1647	Endangered ESA; strategic, depleted MMPA

Fin whale/ California-Oregon-Washington	*B, physalus p.*	Mostly summer-fall/ likely	California to Washington; coastal to pelagic	3051	Endangered ESA; strategic, depleted MMPA
Sei whale/ California-Oregon-Washington	*B. borealis b.*	Year round well offshore/ virtually zero	California to British Columbia; mostly pelagic	126	Endangered ESA; strategic, depleted MMPA
Sperm whale/ California-Oregon-Washington	*Physeter macrocephalus*	Year round well offshore/ unlikely	California to Washington; offshore often near trenches	971	Endangered ESA; strategic, depleted MMPA
Guadalupe fur seal/ Guadalupe Island	*Arctocephalus townsendi*	Occasional strandings/ virtually zero	Mexico to California; pelagic	7408	Threatened ESA; strategic, depleted MMPA
Southern sea otter/ California	*Enhydra lutris nereis*	Spring/ Very unlikely	California; nearshore	2944	Threatened ESA; strategic, depleted MMPA
Green turtle/ U.S. Pacific	*Chelonia mydas*	Late summer & fall; mainly El Niños/ nil	San Diego, California to Baja California; onshore to pelagic	Unknown	Threatened ESA
Loggerhead turtle/ U.S. Pacific	*Caretta caretta*	Late summer & fall; mainly El Niños/ possible	North Pacific; pelagic but juveniles off Southern California	Unknown	Threatened ESA
Olive ridley turtle/ U.S. Pacific	*Lepidochelys olivacea*	Late summer & fall; mainly El Niños/ nil	Central America to Southern California; nearshore to pelagic	Unknown	Threatened ESA
Leatherback turtle/ Eastern Pacific	*Dermochelys coriacea*	Summer & early fall/ unlikely	Peru to Alaska; continental shelf and slope	Unknown	Endangered ESA

Sources: Carretta et al. 2014; Allen and Angliss 2014; USGS 2014

*The California-Oregon-Washington stock and DPS of humpback whales was proposed for delisting in 2015.

Table 2: Occurrence of MMPA-listed Marine Mammals in Region

Mysticetes				
Common Name/ Stock	**Scientific Name**	**Seasonal Distribution/ Likelihood of Occurrence**	**Habitat**	**Stock Size**
Gray whale/ Eastern North Pacific	*Eschrichtius robustus*	January through May/ will be seen	Alaska to Baja California; nearshore coastal waters	19,126
Minke whale/ California-Oregon-Washington	*Balaenoptera acutorostrata scammoni*	Year-round/ likely	California to Washington; nearshore and continental shelf	478
Bryde's whale/ Eastern Pacific	*B. edeni*	Unknown but favors tropical and warm temperate waters/ nil	California to Washington; coastal to pelagic	12
Oceanic Dolphins				
Short-beaked common dolphin/ California-Oregon-Washington	*Delphinus delphis d.*	Year-round/ will be seen	Mainly California to Mexico; coastal to at least 300 nm offshore	411,211
Long-beaked common dolphin/ California	*Delphinus capensis c.*	Year-round/ will be seen	Central California to Baja California; usually within 50 nm of coast	107,216
Pacific white-sided dolphin/ California-Oregon-Washington northern and southern stocks	*Lagenorhynchus obliquidens*	Winter and early spring/ likely	California to Washington; coastal to pelagic	26,930

Striped dolphin/ California-Oregon-Washington	*Stenella coeruleoalba*	Unknown but favors tropical and warm temperate waters/ unlikely	California to Mexico; offshore waters	10,908
Pantropical spotted dolphin/ Eastern tropical Pacific (not a U.S. stock*)	*Stenella attenuata a.*	Eastern tropical Pacific/ Very unlikely except possible during strong El Niño event	Mexico to Central America; pelagic	Not available
Risso's dolphin/ California-Oregon-Washington	*Grampus griseus*	Year-round, more fall and winter/ likely	Washington to northern Baja California; coastal to offshore	6,272
Common bottlenose dolphin/ California-Oregon-Washington offshore stock	*Tursiops truncatus t.*	Year-round/ likely	California to Mexico; coastal to offshore	1006
Common bottlenose dolphin/ California coastal stock	*Tursiops truncatus t.*	Year-round/ likely	Central California to Baja California; within 500 m of shore	323
Northern right whale dolphin/ California-Oregon-Washington	*Lissodelphis borealis*	Fall and winter; favors colder water/ possible	Washington to California; coastal to continental slope	8,334
Killer whale/ Eastern North Pacific offshore and transient	*Orcinus orca*	Most often with spring gray whale migration/ possible	Alaska to California; coastal to 500 nm offshore	161
False killer whale/ Tropical Eastern North Pacific (not a U.S. stock)	*Pseudorca crassidens*	Late summer to early fall? Favors tropical and warm temperate waters/ unlikely	Southern California to Central America; coastal to pelagic	Unknown
Melon-headed whale/ Tropical Eastern North Pacific (not a U.S. stock*)	*Poponocephala electra*	Eastern tropical Pacific/ Very unlikely except possible during strong El Niño event	Mexico to Central America; pelagic	Not available
Short-finned pilot whale/ California-Oregon-Washington	*Globicephala macrorhynchus*	Year-round/ very unlikely	California to Mexico; coastal to pelagic	760
Porpoises				
Dall's porpoise/ California-Oregon-Washington	*Phocoenoides dalli d.*	Mostly winter with colder water/ likely	Washington to California; coastal to offshore	42,000
Sperm Whales				
Pygmy sperm whale/ California-Oregon-Washington	*Kogia breviceps*	Unknown/ nil	Washington to California; continental slope to pelagic	579
Dwarf sperm whale/ California-Oregon-Washington	*Kogia sima*	Unknown/ nil	Washington to California; continental slope to pelagic	Unknown
Beaked whales				
Baird's beaked whale/ Eastern North Pacific	*Berardius bairdii*	Late spring to early fall/ very unlikely	Washington to California; continental slope	847
Cuvier's beaked whale/ California-Oregon-Washington	*Ziphius cavirostris*	Year-round/ unlikely	Washington to California; continental shelf to pelagic	6,590
Mesoplodont beaked whales (six species)/ California-Oregon-Washington	*Mesoplodon* spp.	Unknown/ very unlikely	Washington to California; continental slope to pelagic	694
Pinnipeds				
California sea lion/ U.S. stock	*Zalophus californianus*	Year-round/ will be seen	Southeast Alaska to Baja California; onshore to continental slope	296,750
Steller sea lion/ Eastern Pacific**	*Eumetopias jubatus*	Year-round/ very unlikely	Central Gulf of Alaska to California; onshore to outer continental shelf	63,160 to 78,198

Northern fur seal/ California stock	*Callorhinus ursinus*	Year-round/ unlikely	San Miguel and Farallon islands; onshore to pelagic	12,844
Northern elephant seal/ California breeding stock	*Mirounga angustirostris*	Year-round/ possible	Aleutians (males) and Washington (females) to Baja California; onshore to pelagic	124,000
Pacific harbor seal/ California stock	*Phoca vitulina richardii*	Year-round/ likely	California; coastal	30,196

Sources: Carretta et al. 2014; Allen and Angliss 2014; USGS 2014

*Occasional reported interactions with U.S. tuna purse seine industry in eastern tropical Pacific. These stocks are managed separately under the MMPA.

**The Eastern Pacific stock of Steller sea lions was delisted from the ESA in December 2014.

3.0 Potential Impacts and Wildlife Protection Measures

3.1 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, sometimes leading to confusion. For clarity, several of the terms discussed in this section are included in various mitigation measures which follow.

An exclusion zone generally refers to a range from a site inside of which either the animals, vessels, or both are at risk. Exclusion zones for animals generally mean either that project operations must stop if animals are within the exclusion zone, or that vessels may not enter an exclusion zone where animals are habitually present, such as near pinniped rookeries. In the case of vessels, an exclusion zone refers to the Closest Point of Approach (CPA) that any vessel can make to a site without being in danger of jeopardizing the vessel itself or project operations within the exclusion zone. This can be applied to general vessel traffic, including commercial or recreational vessels. For this project, an exclusion zone of 1 nm to either side of the cable-laying vessel will be imposed, and 0.5 nm for the diving and ROV vessels (ICF 2015).

“Safety zone” is very misleading because people think that animals within this zone are safe. In reality, a so-called 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. Any animal within 1000 ft. (305 m) of project vessels, whether underway or not, is in the hazard zone, meaning a potential danger of collision or entanglement exists and that immediate action may need to be taken to avoid impacts.

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, depending on circumstances. For example, whales half a mile from the cable ship that continue to remain at the same distance should be kept under watch in case they start to move toward the ship. The crew should be advised of their presence but not told to take immediate action. Conversely, a 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 below 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 hazardous operation 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. For large cetaceans, this would likely be 1 nm and beyond from the vessel. Small cetaceans, pinnipeds, and sea otters are at little risk of ship strike or entanglement (please see Sections 3.2 and 3.3, below), so usually a safe zone is not necessary for them.

All zones are subject to the limits of visibility. This is why one of the mitigation measures that follows 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 2.2). 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 cable ship or a whale being frightened by the approach of the cable ship).

3.2 Ship Strikes

Both collisions between marine mammals and ships, as well as propeller injuries to marine mammals from ships, are considered ship strikes, yet distinctions between the two types of impacts and when they may occur are not always clear in mitigation planning. The following two subsections explain the differences, which are important considerations for such planning.

3.2.1 Collision

Between 1988 and 2012, 100 collisions between whales and ships were reported off the California coast, many of which were off Southern California. In 2007, five collisions between large commercial ships and blue whales in the Santa Barbara Channel and main approaches to the Los Angeles-Long Beach harbor precipitated widespread concern. As a result, shipping lanes in the Santa Barbara Channel were moved closer to the mainland coast to shift them away from areas frequented by blue whales as feeding grounds. Requests for voluntary speed reductions to 10 knots may now be made when whales are present. Also, Channel Islands National Marine Sanctuary, in cooperation with the Environmental Defense Center in Santa Barbara, California, initiated a speed reduction incentive in which shipping firms that reduced speed in the area to 12 knots or less were awarded $2500.00 per passage. Seven global shipping companies signed on for the program. The speed reduction may well have also reduced the number of ship strikes involving whales. This program also cut emissions of nitrous oxides in half; over 16 tons of the gas had been eliminated by May 2015.

During the period July through October 2010, two blue whales, including one with a fetus that died, one humpback whale, and two fin whales were killed in and around three national marine sanctuaries (Monterey Bay, Gulf of the Farallones, and Cordell Banks). As a result, shipping approaches to San Francisco Bay were shifted to avoid concentrations of whales, along with requests for voluntary speed reductions in the approaches when whales were present (NOAA, NMS 2015). San Francisco is mentioned here because many cable ships stage there.

Researchers have found that some whale species can avoid ships traveling at slower speeds, or if they are hit, may not sustain fatal injuries. Ship strikes involving fast-moving vessels often result in the whale being struck by the bow while the animal is on the surface. In the case of some blue whale strikes, this may occur when the animal is resting on the surface at night (Calambokidis et al. 2009). The collision results in major blunt force trauma to the whale.

Most modern ships have a bulbous protrusion beneath the bow. This greatly reduces the bow wake produced when the ship plows through the water, increasing hull speed and efficiency. Since the bow wave is all but gone, noise from the bow wave is also greatly reduced. The main noise comes from the propeller, which in large ships can be many hundreds of feet from the bow. Propeller noise is generally loudest to the sides and stern of vessels, so the noise of the approaching vessel may not be perceived as a threat by the whale. A number of dead whales have come into port draped over the bulbous bow of the ships. The greatest danger from collision--as distinguished from injuries from propellers--involves blunt force trauma from fast-moving ships rather than slower vessels.

Tyco Telecommunications and Global Marine Systems, Ltd., both operate small fleets of cable installation ships, some of which have been used on the West Coast in past cable projects. Tyco's new "Reliance Class" fleet consists of six 460-ft. (140 m) vessels that cruise at 13 knots. Global Marine has at least six ships worldwide, which range in maximum speed (service speeds were not available) of 12.5 to 17 knots. Many modern commercial ships can travel at well over 20 knots, while Navy ships are much faster. In general then, cable ships are not particularly fast. More importantly, project managers have agreed to keep the speed of the cable ships to 9 knots within 40 nm of shore to reduce air emissions, which has a mitigation benefit for marine wildlife. From Point Conception south, within the U.S. Exclusive Economic Zone (EEZ), which extends to 200 nautical miles offshore, project vessels more than 65 ft. (20 m) will be kept to 10 knots during transits. Finally, unlike other shipping, the cable installation vessels will have monitors aboard to watch for marine wildlife during transits to and from the project sites. The dive support and utility vessels, used for setting and removing moorings as well as for shuttling crews, are usually even slower than the cable ships, traveling at about 8 knots or less. They will also carry marine wildlife monitors.

During most cable-laying operations, the speed of the cable ship usually ranges from 0.3 to 0.4 knot. For perspective as to just how slow this is, humans walk at an average of 2.7 knots. A human can be hurt walking into a tree at that speed. But 0.35 knots, the average speed of a ship during cable installation operations, represents an 87 percent reduction in that speed, which would not hurt even a human, much less a whale, cushioned by the water and by its mass. ROV ships, because they must make multiple passes over the sea floor to bury cables, average much slower speeds.

We point this out to emphasize that hazards from a cable ship colliding into a whale during installation operations are virtually nonexistent; the only collision hazard would be from a fast-

moving whale crashing into the ship, which is essentially an immovable object like the tree in the analogy. The thrusters and other machinery always make some noise, which whales could certainly hear even if they couldn't see the ship while traveling underwater. The diving vessel will be moored in place over the cable bore pipe and will not move at all other than to make positioning adjustments by taking in or slackening mooring lines. Thus, the primary hazard during cable installation operations is not from collision but from the propeller, which will be discussed later.

In MMCG's experience, most marine mammals either appear indifferent to cable vessels or are attracted to them. California sea lions often display apparent curiosity toward vessels, routinely approaching closely. In some cases, fish and squid are attracted to the lights of cable ships at night and sea lions, dolphins, and porpoises can be attracted in turn. Sea lions, dolphins, and Dall's porpoises sometimes even are attracted to the wash of the cable ships' thrusters. Injuries to such animals, especially from very slow-moving vessels, are virtually unheard of. Small cetaceans, notably dolphins and Dall's porpoises, often approach vessels and bow-ride if the vessel is underway at moderate speed. Again, such approaches are commonplace and generally are no cause for alarm. Thus no action is usually necessary when sea lions or small cetaceans approach the vessels closely.

Whales approaching vessels closely are a cause for concern, which is why careful protocols have been established for avoiding adverse interactions between cable ships and whales (MMCG 2000-2015). When distant whales appear to be heading toward a cable ship, the crew will be put on alert by the monitor, ready to take action if necessary. If it becomes clear to the monitor that the whales will pass the vessel without risk, the monitor will take no further action other than to keep everyone advised until any possible hazard had ended. Sometimes, whales will keep on a steady course and pass within several hundred meters of the ship but beyond the 305 m hazard zone, so no action is needed. Only when a situation appears to be potentially hazardous for an animal will the monitor take further steps as described below.

Marine Wildlife Protection Measures for Crews of all Project Vessels during Transits and Operations:

- Maintain a watch for marine mammals at all times while vessels are underway;
- 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 or alter course 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;
- Reduced cruising/transit speeds:
    - Vessels larger than 65 ft. (20 m) will maintain a cruising speed of not more than 9 knots while transiting within 40 nm of shore during project operations and not more than 10 knots while transiting within the U.S. Exclusive Economic Zone south of Point Conception during project operations;

    - Craft 65 ft. (20 m) or less in length will maintain a cruising speed of not more than 10 knots when whales are within 1 nm ahead and at all times during the gray whale migration period from January through May.
- While under way at cruising speed, provide a wide berth from any seals, sea lions, or sea otters;
- If concentrations of whales are seen within 1 nm ahead, reduce transit speed further or alter course while maintaining watch on the whales;
- If dolphins begin riding the bow wave of the ship less than 1 nm from the project site, slow down or stop until the animals have left. It is understood that dolphins often ride the bow wave of ships underway, so no action is necessary while transiting from port up to within 1 nm from the project sites.

Marine Wildlife Protection Measures Employed by Monitor:

Each 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 following mitigation measures shall be applied by the monitor as appropriate:

- NOAA Fisheries-approved monitors shall always be on watch during all transit and cable installation operations;
- At least one monitor shall be on deck at all times
    - For 24-hour operations, three monitors are required, standing staggered watches;
    - For daylight-only operations, one monitor is required;
- The monitor shall have a 360-degree view of the water during 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 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 stop 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 any project activity if, in his or her sole opinion, such an operation has 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 allow the ship to return 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 300 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;
- Alternatively, if a collision appears imminent, the monitor may request that if possible, the course of the vessel be altered to avoid collision;
- If a collision appears imminent, the monitor shall get to the best possible safe 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 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. Immediately means right away, 24 hours a day, weekends and holidays included, and in minutes, not hours or days.
- The notification shall include the date, time, and place of collision, vessel name, owner and operator, immediate ship contact information, species involved, status of animal, heading of animal if animal is moving, and onsite weather, sea conditions, and visibility. Digital photographs of the 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 NOAA Fisheries as follows:

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

3.2.2 Injuries from Propellers

Injuries from ship propellers can be severe or fatal regardless of the speed of the vessel. A ship's propeller is so large and heavy that its inertia often will keep it spinning even when it strikes something in the water. It only takes one strike of a massive spinning blade to injure or kill an animal; multiple strikes from more than one blade inflict even more severe damage. Most cable ships have keels that extend for most of the hull length to at least the depth of the

propeller(s). Keels offer some protection from the propeller(s) but in themselves can still injure a whale in the event of a collision. Controllable pitch propellers, which can be pitched for forward or reverse motion, can be set for neutral pitch so the ship doesn't move. Nonetheless, the propeller still spins, so whales can still be injured. With some ships, however, the propeller can be stopped.

Some ships have one or two azimuth propellers or thrusters, in which a cylindrical cage, open at both ends, surrounds each propeller. Power to the propeller is transmitted from the engine through the hull with a vertical shaft ending in a right angle gear arrangement that turns the propeller. The entire assembly rotates, serving as a rudder as well. Since the propeller is caged, its blades cannot strike whales. Tyco Telecommunications' fleet of six Reliance Class cable ships, mentioned earlier, all have azimuth propellers. Global Marine Systems' cable ships all have keels. Some have open, controllable pitch propellers, while others have azimuth propellers. Global Marine's *Cable Innovator*, mentioned as an example in the APED, has azimuth propellers (ICF 2015).

All but the smallest cable-laying, cable-burying, and cable-inspecting vessels also have thrusters in addition to the main propulsion system. These are usually housed in tunnels within the hull, sometimes with gratings over the openings. Larger cable ships often have two bow thrusters, one on each side, and two stern thrusters, also with one on each side. These vessels are controlled with computer-controlled dynamic positioning systems (DPS). The DPS controls the ship's movements by monitoring wind, swell, and current over a given position or course, then applies appropriate power to the thrusters and/or propeller(s) to maintain its position or course. Since thrusters are housed in tunnels, they pose little threat to marine mammals. Depending on the ship's propulsion system and sea conditions, some vessels can continue operations under thruster power alone with no risk of propeller strikes. Depending on the vessel's propulsion equipment and sea conditions, appropriate measures will be taken by the ship's crew to reduce the chances of injuries to whales from the propeller(s).

The same mitigation measures employed by the monitor and discussed in Section 3.2.1 above shall be used to prevent injuries from propellers, except that with exposed propeller(s) the propeller(s) shall be stopped immediately if feasible and safe.

3.3 Entanglement

Entanglement in synthetic materials is a matter of considerable concern to the regulatory agencies. In just the first half of 2015, 26 whales were documented as entangled in various materials, including mooring lines, various commercial trap lines, fishing nets, and other materials (Viezbicke 2015). In the past, sperm whales (*Physeter macrocephalus*) have become snagged on transoceanic cables and drowned (Heezen 1957). Considering the manner in which the cables will be laid and/or buried on the sea floor for this project (please see Section 2.1.2), the likelihood of whales becoming entangled in the cable itself is extremely low. Moreover, the possibility that fishing gear and other materials becoming snagged on a submarine cable and in turn, entangling a marine mammal, will be minimized through modern cable installation practices. Finally, the cable routes will be publicized in Local Notices to Mariners, through fishing associations, through public meetings, and through other sources so that mariners can avoid the submerged cables (ICF 2015). Nonetheless, the cable installation and burial process carries its own risks of entangling whales, which are discussed below.

3.3.1 Grapnel

Monitors have not been required aboard vessels making grapnel runs prior to cable installation. This is because the grapnel is being towed under considerable tension with a very heavy line, wire rope, or chain--or a combination of such elements--thus no slack exists that could result in an entanglement. At the worst, a whale could possible collide with the towline while swimming. It is extremely unlikely that this could result in serious injury since the ship travels so slowly that virtually no danger exists of either the towline or the ship striking a whale. Finally, like all project vessels, the crew of the grapnel ship must watch for whales, following the mitigation measures discussed in Section 3.2.1, under *Mitigation Measures for Crews of all Project Vessels during Transits and Operations*.

3.3.2 Plow and ROV Cables and Umbilici

Vessels towing either plows or ROVs trail an umbilicus astern for controlling the plow or ROV from topside. Varying amounts of slack are required to prevent the umbilicus from becoming caught in the plow tow cable or to allow room for the ROV to maneuver. This presents a potential for entanglement. Each vessel towing a plow or an ROV is limited in its ability to maneuver quickly and to change its operation rapidly. The following limitations are understood:

- A cable-laying or ROV vessel cannot stop immediately or completely, although every reasonable effort should be made by the crew to slow as rapidly and as much as possible to avoid an impact. Thus, the monitor must allow time for the vessel to slow. However, speed can generally be significantly reduced in as little as one minute or less;
- The extent and speed of slowing are dependent upon speed, weather, sea conditions, and safety factors;
- Propulsion will always be maintained. Some slight forward momentum will usually be necessary to maintain control and position of the vessel. This often can amount to less motion than if the ship were stopped and drifting, thus risks to marine mammals are minimized. Also, by maintaining position only with the thrusters when possible, risks of injury from the propeller(s) can be reduced. The spinning of the main propeller(s), even in neutral pitch, can be slowed and sometimes stopped;
- The amount of scope and tension for the plow and ROV umbilici is dependent upon weather, sea conditions, depth, and safety considerations. Sometimes considerable scope is needed. In critical situations, the plow or ROV may be lifted clear of the sea floor as the vessel maintains position. By having the umbilicus hanging straight down under the weight of the plow or ROV, the odds of an entanglement can thus be reduced;
- Some umbilici are fitted with buoys to keep the section of the umbilici trailing off the stern of the ship clear of the propeller(s). When such buoys are tethered to the umbilicus with lines, the tether lines themselves present additional entanglement hazards, so they should be kept as short as possible. Streamlined buoys that encircle the umbilicus itself minimize entanglement hazards;
- Shutting down electrical power to the plow or ROV umbilicus requires time and will not be requested unless an animal is entangled.

Marine Wildlife Protection Measures to Avoid Entanglements during Plow and ROV Operations:

To reduce the chances of a whale becoming entangled during plow and ROV operations, the same procedures described in Section 3.2.1 shall be employed. In addition to these measures,

the following procedures will be initiated if a whale ventures within 305 m (1000 ft.) of any plow or ROV vessel:

- During operations, as the vessel maintains position, the amount of scope in the cable and umbilicus shall be reduced as much as practicable;
- During operations, as the vessel maintains position, if essential to avoid a possible impact, the plow or ROV shall be lifted clear of the sea floor to minimize the amount of cable and umbilicus in the water;
- In the unlikely event that a marine mammal does become entangled in a cable and/or umbilicus, the monitor will request that power be shut down as soon as possible;
- The monitor and crew shall take digital still and video photographs of the entangled animal, showing as much detail as possible;
- In the event of an entanglement, NOAA Fisheries shall be *immediately* notified as described in the Section 3.2.1. Digital or still photographs of the entanglement shall be sent electronically to the Stranding Coordinator;
- Based on the report and photography, the Stranding Coordinator may dispatch a marine mammal rescue team to the scene in an independent vessel;
- The officer in charge of plow or ROV operations shall be consulted for advice as to what actions would be safe or possible for his personnel to perform (e.g., slacking or cutting a cable) in the event of a disentanglement effort;
- It is understood that personnel safety concerns or weather and sea conditions may prevent any action; nonetheless, every reasonable effort will be made to safely disentangle any animal;
- Immediately following completion of the disentanglement effort, an additional verbal report will be made to the regulatory agencies, followed by a written report.

As a professional courtesy, we recommend that the monitors report any marine mammals or turtles that are observed tangled in fishing gear, mooring lines, and other materials *not* connected with this project, following the notification procedures described in Section 3.2.1. If possible, they should take photos of the entangled animal and immediately relay them to NOAA Fisheries.

3.3.3 Mooring Lines and Diving Hoses

Aside from taking in slack or tightening mooring lines to adjust the position of the dive vessel, once moored, the dive vessel will not move, therefore it cannot collide with a whale. If the dive vessel remains on the mooring in severe weather, which is very unlikely, it may use its propeller(s) to relive tension on the mooring lines, in which case the same procedures discussed in Section 3.2.1 shall be employed. The main hazard to whales from the dive vessel comes from possible entanglements in various lines, hoses, cables, and so on. In addition to applicable mitigation measures discussed in the previous section, the measures discussed below shall also be employed.

Marine Wildlife Protection Measures to Avoid Entanglements during Diving Operations:

- All lines, hoses, and other potential sources of entanglement shall be removed from the water as soon as the need for such materials has ended;
- All mooring and buoy lines shall be kept as taut as feasible to reduce the chances of entanglement;

- All lines and hoses shall be brought aboard if an entanglement appears imminent, except if such an operation may compromise personnel safety.

3.4 Oil and Fuel Releases

Depending upon their duty—coastal and inland waters versus transoceanic cable laying—a sampling of some existing cable ships reveals that they can carry anywhere from approximately 6,000 to as much as 100,000 gallons (over 200 to about 3250 metric tons) of fuel oil. Both cable ships and dive support vessels are equipped with oil spill containment equipment and have established, approved oil spill contingency plans in place for dealing with any releases of fuel, lubricants, or chemicals.

Marine Wildlife Protection Measures for Oil or Fuel Releases:

In order to respond in the unlikely event of a release, the following measures shall be taken:

- Contractual arrangements with spill response organizations, which can respond to a spill with the appropriate equipment, shall be established and maintained if required;
- In the event of a spill, the monitor shall *immediately* notify the appropriate regulatory agencies as stipulated in the vessel's Oil Spill Contingency Plan;
- In the event a marine mammal or turtle becomes oiled, the monitor shall immediately notify NOAA Fisheries, following the procedures covered in Section 3.2.1;
- In the event a sea bird becomes oiled, the monitor will immediately contact the local sea bird rescue group so that a rescue procedure can be worked out. If requested and if feasible, crew members may be allowed to rescue oiled sea birds and arrange for swift transport to the nearest authorized care center;
- The regulatory agencies shall be kept apprised of any such rescue efforts and provided with verbal and written reports once such efforts are complete.

3.5 Noise from Vessels

Although vessel noise could affect the behavior of marine mammals in the immediate area, the impact would be less than significant because of the isolated and short-term nature of the noise. Marine mammals are sensitive to noise and may actually avoid vessels operating in the project area. Moreover, the slow speeds of the vessels, both in transit and while engaged in cable installation activities, will further reduce noise levels.

Marine Wildlife Protection Measures to Reduce Possible Noise Impacts:

- The monitor will observe the area around the sonar survey vessel for half an hour prior to the start of the survey. If no animals are present within the 1,000 ft. (305 m) hazard zone, power to the sonar will be ramped up to warn any marine mammals in the area;
- If any animals surface within the hazard zone during the ramp-up, the operation will be stopped until the animals are clear of the hazard zone, then the ramp-up may resume;
- Once marine mammals or turtles are observed, regardless of their range, the monitors will closely note their behavior, specifically looking for changes in behavior that may be attributable to noise from the sonar or from the vessels themselves;

- The monitor has sole responsibility for determining whether noise from vessel operations is adversely affecting the observed marine mammals, to request that steps be taken if necessary to reduce noise, to determine when the potential for disturbance has passed, and to request that the vessel be returned to normal operations following a potential noise disturbance;
- If a marine mammal or turtle is observed within 1,000 ft. (305 m) during cable installation operations, the monitor shall advise the ship captain and crew to begin taking actions to reduce operational noise whether any behavioral effects have been noted or not;
- The monitor may direct the vessel captain to reduce speed (if underway), to minimize the use of thrusters, and to shut down non-essential machinery to reduce noise if, in the opinion of the monitor, vessel noise is adversely affecting observed marine mammals or turtles;
- It is understood that smaller marine mammals, such as dolphins, routinely approach even noisy vessels closely and may even ride the bow wake. The approach of such animals will not require taking action unless, in the opinion of the monitor, action is necessary to prevent adverse noise impacts;
- The monitor will log any efforts initiated to reduce apparent noise effects and the results of such efforts.

4.0 Marine Wildlife Monitoring and Reporting Protocols

4.1 Monitor Selection

All monitors must complete required training to be certified as NOAA Fisheries-approved marine mammal and turtle monitors. They should have had direct experience in a project or projects involving maintaining safe zones for marine mammals and turtles. They also should have logged enough sea time to ensure that being on the water for extended periods will not be problematic for them. A monitor who suffers from chronic seasickness cannot perform the job, regardless of how qualified the person may be. The sole task of the monitors is to observe marine mammals and turtles at the project site and to shut down operations if necessary.

4.2 Briefings

Before the project commences, monitors shall be briefed at their base to ensure that they understand the project requirements and their roles and responsibilities. Prior to the start of this project, meetings will be held involving the monitors and key personnel for the marine cable installation operations. The purpose of these meetings will be to establish responsibilities of each party, define the chains of command, discuss communication procedures, stress personnel safety concerns, and explain steps that can to taken to avert adverse impacts to marine wildlife. For plow and ROV vessels, such meetings may take place on the vessels prior to departure. For the dive and dive support vessels, such meetings will take place before the vessels leave port.

This plan will be provided to meeting participants. Various laws pertaining to the protection of marine mammals will be explained, along with the absolute necessity of avoiding adverse impacts. Stress will be placed on working together to avoid impacts. The entire complement of each vessel will be encouraged immediately to report every marine mammal sighting to the monitor on watch.

Additional briefings may also be conducted between the monitors and crew during transits to the project sites and throughout operations. Available crew members will be briefed so they know to report any marine mammal or turtle sightings to the monitor. They will also be briefed as to means of communicating such sightings to the monitor. New personnel shall be briefed upon arrival. After work commences, daily briefings may be held between the vessel operators and the monitors. These briefings often include a discussion on vessel safety and the work operations expected to take place that day but can also include discussions of mitigation efforts.

4.3 Watches

Each vessel will have its own schedule of crew shifts and meals. Once each vessel's schedule is determined, watches will be set by the monitor in charge and maintained either 24 hours a day or during daylight hours, as appropriate. Care will be taken to keep the division of watches equitable, with all monitors serving about the same amount of time each day. Constant watches will be kept from port en route to each site, from site to site, and back to port. While at each work site, constant vigilance will be maintained. Watches will not be posted when the vessel is berthed or anchored in a harbor.

Watches will be maintained in the highest point of the vessel with the most panoramic view. In severe weather conditions, monitors may stay inside the bridge or wheelhouse for safety reasons but must be able to roam from side to side to maintain all-around surveillance.

4.4 Equipment

Monitors will wear Coast Guard-approved life vests, hardhats, and steel-toed boots when, if, and where required. They will be equipped with night vision binoculars for monitoring in darkness. For daytime spotting, monitors will be equipped with 7X50 waterproof, low light binoculars. These binoculars will have a built-in compass and range-finding reticule for establishing relative bearings and distances of animals from the vessel.

Other equipment will include hand-held GPS units and weather stations. This is to allow monitors not inside the bridge or wheelhouse to record the position of the ship relative to any animals sighted as well as to note onsite weather (please see Section 4.6.3, below). The reason for this is to allow uninterrupted observations. Going back and forth to the bridge or wheelhouse is both distracting and time-consuming.

4.5 Communications

Monitors aboard the cable-laying and ROV ships will be equipped with handheld "company" radios for communications between one another. In this manner, one monitor can be easily reached by the other monitor with no disturbance to regular ship communications. These radios have a beeper feature so that the monitor off watch can be summoned in the event of an emergency. Each monitor will also have a handheld marine VHF radio for communications with the bridge crew and with other vessels. The handheld VHF radios have ship-to-shore capabilities (telephone links).

Each monitor will also be equipped with a standard digital cellular telephone. The monitors will also have at least one satellite telephone between them. Both telephone systems should have

multiple power supply and charging circuits. Both telephones should have voice mail capabilities. The two telephone systems will ensure adequate communications throughout each phase of the project. As a backup, the larger vessels have satellite telephones as well as long-range, single-sideband marine radio and VHF marine radios. All ships' radios also have ship-to-shore capabilities (telephone links). Most ships have e-mail as well as facsimile (fax) capabilities.

With these extensive capabilities, communications can be maintained 24 hours a day throughout the project, regardless of how far offshore the ship is. Reliable communications with multiple backups are essential for such mitigation efforts.

Aboard the dive vessel and support boat, the monitor shall have a cellular phone and access to each vessel's VHF or single sideband radio. If necessary, the monitor should also be able to bring a handheld VHF radio.

4.6 Data Recording and Reporting Requirements

With the exception of the first item below, data must be recorded continually on various report forms throughout all monitoring efforts. These data are vital to analyzing the effectiveness of the mitigation monitoring. Such data may be requested at any time by the regulatory agencies, so data recording must be kept up to the minute. The reporting requirements are covered in detail below.

4.6.1 Daily Reports

Though not required, it can be extremely helpful to have monitors check in with their base by telephone at a predetermined time period on a daily basis. They can also send in data on a regular basis. The primary function of such check-ins is to ensure that every aspect of the monitoring is going smoothly and everyone is apprised of progress. Also, should a representative of a regulatory agency inquire as to the progress of a project, how the monitoring is going, what species animals are being seen, etc., an up-to-date answer can be readily provided.

Every project is different, and every operation is different, sometimes even during the same project. Decisions sometimes have to be made to change monitoring methods. Data entries sometimes need clarification—and memories about one particular observation out of many fade very quickly. The daily check-ins can also be helpful in planning logistics around projects that rarely have exact timetables. This can include resupplying monitors if needed, providing replacement equipment in the event of breakdowns, and even switching out monitors if the project is extended well beyond expectations.

4.6.2 Marine Mammal and Turtle Sighting Reports

All marine mammal and turtle observations will be recorded. Data sheets shall include the date and time of each sighting, the monitor's name and the ship name. The location of each sighting will be noted, using the monitor's own handheld GPS or the ship's differential GPS. The genus and species of each animal will be recorded, along with the number of animals. Their behavior will be noted, together with their heading if they are moving. Age categories and sex will be noted when possible. The direction, range, and bearing of the animal(s) from the observer will

be recorded. The remarks section may include more details of the sightings. Anecdotal information will be recorded on other wildlife, particularly sea birds, along with any association such wildlife had with marine mammals or with project operations. Finally, the remarks section also will include notes as to when each operation began and ended, and the nature of each operation (e.g., in transit, on station, plow or ROV down, plow or ROV up for maintenance, etc.). Alternatively, a separate form may be used for noting project operations.

Whenever possible, resightings of animals will be noted. Resightings of animals will be excluded from the total count of animals seen. In some cases, however, it will be impossible to determine whether an animal or group of animals has been seen previously because both the vessel and the animals usually will be constantly moving. Also, unless individuals have distinctive markings, it may not possible to distinguish one individual from the next. Thus the total numbers of some species could be somewhat higher than the actual number of animals present at any one time. The main purpose of the observations is detection with the goal of avoiding impacts, however. Counting the animals observed serves only to provide an idea of the relative abundance of each species present at any one time rather than to estimate local numbers.

Identifying species, particularly threatened and endangered species, is very important since any impacts to ESA-listed species is very serious. Nonetheless, distant animals cannot always be identified as to species. Some animals will be seen very briefly, sometimes only as a blow quickly carried away by the wind. These sightings will be narrowed down as much as possible. For example, Balaenopterid whales may not always possible to identify other than as Balaenopterids, especially when animals are detected only from their blows at a distance in windy conditions. The identity of some animals may be recorded simply as an unknown large cetacean, small cetacean, or pinniped.

4.6.3 Weather Reports

Weather data will be recorded and updated periodically throughout each 24-hour period. These will include the date, time, monitor's name, ship's name, and location. Percentage and type of cloud cover will be noted, along with visibility, and the direction and percentage of glare. Swell direction and height will be recorded together with wind direction and velocity. If a drastic change in weather appears, such as the wind filling in from 5 knots to 25 knots, or a fog bank suddenly enveloping the vessel, this shall be immediately noted.

4.6.4 Incident Reports

Each time action has to be taken to prevent a potentially adverse impact, a detailed report must be filled out. This both ensures that the effectiveness of such actions can be analyzed later and also serves as a record of essential information that will be needed in case an impact actually does occur. These incident reports shall include:

- 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 plow or ROV watch notified;
- Time all-stop implemented;
- Tine animal definitely clear of hazard;
- Time all-stop lifted;
- Effectiveness of all-stop;
- Bridge watch's and/or plow or ROV supervisor's names and titles;
- Time vessel captain and NOAA Fisheries notified (if impact occurred);
- Description of action taken:
- Names and titles of responding parties;
- Photos 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, are included in the previous section. The vessel name and contact information for the vessel must also be provided.

4.6.5 Final Report

A draft report will be submitted to the City of Hermosa Beach within 30 days of the completion of each of the four phases of this project. Review comments from the City will be addressed within 15 days of receipt, then re-submitted to the City. The next draft of the report will then be submitted to designated regulatory agencies for their review. Within 15 days of any such review comments, the final draft will be submitted.

All versions of the final report will be submitted in a format acceptable to the regulatory agencies. In addition to an executive summary and introduction, the final report will include the following sections:

- A brief project description and general background;
- A description of the mitigation monitoring methods;
- A results section, including:
    - A summary of marine mammal and turtle species seen during the project;
    - A summary of environmental conditions;
    - Detailed descriptions of any incidents during which action had to be taken to avoid adverse impacts;
    - Detailed descriptions of successful avoidance of adverse impacts.
- A discussion section, including:
    - Relevant comments on species diversity, relative abundance, and seasonality;
    - Analyses of the effectiveness of the mitigation measures.
- Conclusions made from the mitigation monitoring effort;
- A recommendations section, suggesting any changes in mitigation monitoring methods;
- A literature cited section.

The report will also include photos, tables, graphs, and other such graphics as needed.

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