4.1 MARINE BIOLOGICAL RESOURCES

This section describes the environmental setting and potential impacts for important and/or sensitive marine biological resources in the project area. The project area encompasses the ocean waters within a radius of approximately 2 miles (3.2 km) of SONGS Unit 1. Within the project area are four marine ecological communities: the sandy beach community, rocky intertidal community, subtidal soft bottom community, and the subtidal hard bottom community. Marine biological resources include the habitat of the potentially affected community and associated species, including marine mammals, birds, and turtles. Each community will be described separately, including a discussion of physical and biological influences. The project footprint is defined as the geographic area that may be directly affected by the Proposed Project and is also described in this section.

4.1.1 Description of Resource/Environmental Setting

Regional Setting

The project area is located in the coastal zone of the Southern California Bight (SCB), which extends from Point Conception to a point just south of the border between the United States and Baja California (Figure 4.1-1). The distribution of species within the SCB is related to the complex hydrography and geology of the region. The mainland shelf, which extends from shore to approximately -650 feet (-200 m) MLLW, comprises 6 percent of the 40,000-square-mile (103,600 km^2) SCB. This is a region of abundant and valuable biological resources, especially in the shallow coastal zone.

Physical Setting

Many physical characteristics of the ocean environment affect marine biological communities and habitats. These factors – water temperature, salinity, water density, pH, dissolved oxygen, light, trace metals, nutrients, point source discharges, waves and currents – are discussed in detail in Section 4.3, Marine Water Quality.

Marine Biological Resources in Project Area

<u>Generalized Food Web</u>

Phytoplankton, which consists of single-celled algae suspended in the water column, comprises the base of most food chains in the SCB (Dailey et al. 1993), although benthic macroalgae, including kelp, are often more important in the vicinity of the

Figure 4.1-1 Surface Circulation of the California Current and California Countercurrent in the SCB

Proposed Project. Zooplankton consists of small animals, such as copepods and the larval stages of macroinvertebrates and fish, and consumes phytoplankton. Invertebrates and fish consume zooplankton and also eat each other. Benthic invertebrates and demersal fish, which live on the seafloor, graze on benthic algae, filter plankton from the water, and prey on other invertebrates and fishes. Many benthic organisms feed entirely on dead material that accumulates on the seafloor or is suspended in the water. Marine mammals, birds, and turtles feed on invertebrates, algae, and fishes. Over 5,000 species of benthic invertebrates, 481 fish species, 200 bird species, and 40 species of marine mammals inhabit the SCB (Dailey et al. 1993). The high diversity is due to a mixture of northern and southern fauna and flora that occurs in the SCB, and the wide range of habitats.

Marine Biological Communities

Marine biological communities are groups of plant and animal populations that live together, interact, and influence each other. Communities tend to be associated with certain habitat types (Nybakken 1988). Marine habitat types of the SCB include embayments, sandy beaches, hard bottom intertidal and subtidal habitats, soft bottom subtidal habitats, deep rocky substrate habitats, deep soft sediment habitats, and the pelagic open water zone (Dailey et al. 1993). The following sections describe the four marine biological communities within the project area: sandy beaches, rocky intertidal, subtidal soft bottom, and subtidal hard bottom. The intertidal zone is the area between the highest high tide and the lowest low tide. Areas that are permanently inundated are defined as subtidal. A general description of each habitat is provided below, as well as important physical and biological factors that affect community structure. Figures 4.1-2 and 4.1-3 show the habitat types present in the project area.

Sandy Beach Community

Physical Description

The sandy beach community includes the surf zone and the expanses of barren sand that extend landward from the high tide line, transitioning into the more stable fore dunes or bluffs. Sandy beach habitat is present in the vicinity of SONGS Unit 1 (Figure 4.1-3). It is a dynamic environment, with accretion of sediments in the summer and removal of sediments in the winter. The removal of sediments exposes cobble in the low intertidal area.

Figure 4.1-2 Bottom Habitat

Figure 4.1-3 Distribution of Rocky and Sandy Intertidal Habitats and Extent of Giant Kelp Canopy

Major Physical Factors

The major physical factors that affect the sandy beach community are beach stability and wave forces. Beach stability depends on sand accumulation and depletion, which are determined by the local sediment budget, balancing between sediment coming into the area versus the sediment lost to adjacent areas (CSLC 1998). From Dana Point to La Jolla, the sediment budget is mostly self-contained (CSLC 1998). The major sediment sources within this area are stream discharges into the ocean and erosion from oceanside bluffs. The major sediment sinks are the submarine canyons of Carlsbad and La Jolla (Moffatt and Nichol Engineers 2000). Both cross-shore (on- and offshore) and long-shore (up- and downshore) processes transport the sediment and determine the shoreline condition. Seasonally, larger waves during the winter months erode sand from the beach and deposit it offshore, resulting in a narrower beach. The gentler waves during the summer months carry sand shoreward and build up the beach, resulting in a wider beach. The annual and long-term net longshore sediment transport in the Oceanside Littoral Cell is predominantly towards the south.

Nutrients

Nutrients enter the sandy beach community by stream discharges, bluff and/or beach erosion, and upwelling currents. The input of nutrients to the sandy beach community is a continuous cycle. Winter storms containing precipitation and large waves contribute to increased freshwater stream discharge and bluff erosion. Upwelling from spring to summer in the San Diego County and Orange County coastal areas displaces surface waters offshore, resulting in replacement by colder, nutrient-rich, deeper waters (MEC 2000). Kelp wrack and other organic matter washed in from the sea also provide nutrients and foraging habitat for a variety of shorebirds, including gulls, sandpipers, and plovers (CSLC 1998).

Characteristic Biota

Most organisms in the sandy beach community are mobile and change position with changes in water level related to tides and/or waves (Thompson et al. 1993). Common invertebrates observed on sandy beaches in the SCB include beach hoppers (*Orchestodea* spp.), sand crabs (*Emerita analoga*), bean clams (*Donax gouldii*), olive snails (*Olivella biplicata*), and polychaete worms (Straughan 1977). Invertebrate abundance and diversity is higher at long, gently sloping, fine-grained beaches, compared to short and steep, coarse-grained beaches experiencing more erosion (Straughan 1977). A review of intertidal surveys for the sandy beach area in the vicinity of SONGS indicates that the only species found consistently is the sand crab (SCE

2003). Abundance was seasonal, with low abundance in the spring and high abundance in the late summer into winter. A few polychaete worms (*Lumbrineris* sp., *Euzonus dillonsis*, *Glycera* spp., and *Scolelepsis acuta*) were noted, but not in large concentrations. Small shrimp-like crustaceans or amphipods (*Euhaustorius washingtonianus*, *Mandibulophoxus gilesi*, and *Synchelidium rectipalmum*) were also collected on occasion.

Fish commonly found in the surf zone include California corbina (*Menticirrhus undulates*), barred surfperch (*Amphistichus argenteus*), queenfish (*Seriphus politus*), spotfin croaker (*Roncador stearnsii*), white croaker (*Genyonemus lineatus*), California halibut (*Paralichthys californicus*), shovelnose guitarfish (*Rhinobatos productus*), round stingray *(Urolophus halleri*), and California grunion (*Leuresthes tenius*) (USACE 1994; U.S. Navy 1997a). Due to the small beach exposed at high tide, it appears unlikely that the beach in front of SONGS is used for spawning by grunion. Grunion are typically found on long, gently sloping beaches with moderately fine sand. Grunion are managed as a game species by the CDFG and spawn from March to August.

Rocky Intertidal Community

<u>Physical Description</u>

Rocky intertidal habitat constitutes the smallest of all marine habitats in the SCB, existing as an extremely narrow fringe a few meters in extent between high and low water (Nybakken 1988). Approximately 14 percent of the coastline in San Diego County is estimated to be rocky (SANDAG 2000). Rocky intertidal habitat is present at the San Onofre State Beach, approximately 0.3 miles (0.4 km) upcoast of SONGS Unit 1. The intertidal zone is temporarily inundated with water, and immersion is related to tidal cycles, storm surge, and wave height. The rocky intertidal zone is a productive ecosystem that supports a diverse assemblage of fauna and flora. Hard substrate provides areas for attachment by fauna and flora, and elevation, complexity, and substrate type can determine community structure.

Physical and Biological Factors Regulating Rocky Intertidal Communities

Rocky intertidal communities are regulated by both abiotic (physical) and biotic factors. These factors create distinct zones of fauna and flora within the intertidal zone. Abiotic factors include water motion and atmospheric exposure, while biotic factors include predation/herbivory and competition. The following is a brief overview of these factors.

Water Motion

The degree of exposure to wave energy has long been recognized as a factor of major importance in structuring coastal communities (Lewis 1977). Wave action throws water higher on the shore than would normally occur as a result of the tide alone, extending the upper limits of the intertidal zone. Waves also smash and tear away objects from the substrate. During periods of enhanced wave energy, loose boulders and cobbles overturn and move, disturbing or removing resident organisms. Longshore currents can deposit and remove sediment, scouring organisms on the rocky substrate. The dynamics of sand movement and the presence of unstable boulders or cobbles can significantly modify rocky intertidal communities. Wave exposure thus proves to be limiting for certain organisms that are unable to sustain the force, and necessary to others that cannot exist other than in heavy wave areas (Nybakken 1988).

Atmospheric Exposure

For organisms to survive in the intertidal zone, they must have adaptations that allow them to tolerate exposure to air. Atmospheric exposure can result in water loss and can disrupt heat balance. Once a marine organism is exposed to air, it begins to desiccate, which is the process of losing water (Nybakken 1988). The simplest mechanism to avoid atmospheric exposure is to be mobile and simply move from the exposed area. In contrast, sessile organisms that cannot move from the area must adapt to the rigors of the environment. For example, bivalves and mollusks use their shells to balance heat and entrap water. In addition, certain species of algae can withstand severe water loss, while sea anemones can cover themselves with sand and shell fragments to maintain heat balance.

Predation/Herbivory

The dominant feeding groups in the rocky intertidal habitat are mollusks, crustaceans, sea urchins, and fishes. Water level limits the duration of feeding activity in rocky intertidal communities. As a result, these animals are generally active during high tide when they are covered with seawater (Nybakken 1988). Intertidal organisms are also subject to terrestrial predators like birds and beach dwelling mammals when they are exposed to the atmosphere.

Competition

In the rocky intertidal zone, benthic space is the most common resource that is in limited supply. Both physical and biotic factors govern this resource. Factors such as atmospheric exposure limit the types of organisms that reside in higher intertidal areas, while at lower tidal levels, biological factors such as predation play a larger role in determining community structure. Wave forces benefit organisms that can withstand their impact; alternatively, these forces can dislodge organisms providing bare space for colonization. Grazing and predation on settled organisms will also clear space, while dominant organisms will overgrow, uplift, or crush competitors for space.

Characteristic Biota

Green algae such as *Ulva* spp., *Chaetomorpha* spp., and *Enteromorpha* spp. colonize the upper-intertidal or splash zone (SANDAG 2000). Mid- to low-intertidal zones are dominated by *Corallina* spp. Persistent substrate in the low tidal zone and minus tide zone are characterized by a greater diversity of algae including coralline, red, and brown algae (SANDAG 2000). Sea palms (*Eisenia arborea)* and feather boa kelp (*Egregia menziesii*) are a few of the brown algae present in the lower intertidal zone. Surfgrass (*Phyllospadix torryei*) is a flowering plant that ranges from the intertidal to –20 feet (–6 m) MLLW. Surfgrass beds are considered sensitive habitats because they serve as nursery areas and shelter for many fish and invertebrate species.

Similar to algae and marine plants, macroinvertebrate abundance and diversity are dependent upon water level and physical forces. The upper intertidal zone is characterized by barnacles (*Cthamalus* spp*., Pollicipes polymerus*), mussels (*Mytilus* spp.), chitons (*Mopalia* spp.), limpets (*Lottia* spp.), and periwinkles (*Littorina* spp.) (SANDAG 2000). All of these organisms must withstand desiccation due to atmospheric exposure. Mid- to low-intertidal zones are characterized by a great diversity of invertebrates including green sea anemones (*Anthopleura xanthogrammica*), California spiny lobster (*Panulirus interruptus*), purple sea urchins (*Strongylocentrotus purpuratus*), sea hares (*Aplysia californica*), snails (*Kelletia* spp*., Lithopoma* spp.), and sea stars (*Pisaster* spp.) (Foster and Schiel 1985).

High-relief rocky intertidal communities, with complex habitat, typically support more abundant and diverse fish populations than those with low relief. High-relief substrate provides fish with shelter to avoid wave forces. A recent survey of rocky intertidal fishes between La Jolla and Ventura reported only 10 species (SBC 1984). The wooley sculpin (*Clinocottus analis*) was one of the few fish encountered in upper and mid-intertidal zones (MEC 2000). Garibaldi (*Hypsopops rubicundus*), blacksmith (*Chromis punctipinnis*), and black perch (*Embiotoca jacksoni*) were present in the lower intertidal zone. As water level rises, fish move into higher tidal zones grazing on algae and preying on invertebrates.

Soft Bottom Subtidal Community

Physical Description

Soft bottom or sandy subtidal habitat typically consists of sand or sand interspersed with occasional rocks and cobbles and includes the overlying water. Soft bottom habitat is generally a physically rigorous and structurally unstable environment because of wave action and shifting sand. This results in relatively low species diversity and abundance. Approximately 81 percent of the substrate in the project footprint consists of soft bottom habitat, which includes coarse-grained and fine-grained sediment with and without scattered rock, and sand waves (see Figure 4.1-2).

Ecological and Economic Importance

Soft bottom subtidal habitats are often considered to be less sensitive than other habitats in the SCB because of their relatively low species diversity and productivity. There are no special status species known to inhabit the sandy subtidal bottom communities of the SCB. Species such as sand stars (*Astropecten* spp.); sea pens (*Stylatula* spp.); sea pansies (*Renilla kollikeri*); sand dollars (*Dendraster excentricus*); and many species of stingrays, flatfishes, polychaetes, and crustaceans are commonly found on soft bottom habitat.

Subtidal sandy bottom habitats are economically important to nearshore fisheries. California halibut, white croaker, and other major fisheries species are fished in sand bottom habitats. The sand bottom habitat can be trawled with little risk of damage to nets, unlike reefs and other habitats. However, trawling is not conducted in the project area because regulations prohibit trawling in nearshore waters.

Characteristic Biota

Plankton

Plankton consists of algae (phytoplankton) and animals (zooplankton) small enough to be suspended in the water column. Plankton is transported from place to place by currents and is not closely associated with any particular bottom type. Plankton in both sand bottom and hard bottom habitats within the project area are not expected to be different than those found in other areas of the nearshore open coast in southern California.

Benthic Algae

Sandy subtidal bottom habitats generally have few macrophytes because there are few areas to provide secure attachment. Diatoms (single-celled algae) often form a thin layer over the sand in protected areas or in deeper water where sand is less disturbed by wave surge (Morin et al. 1985).

Macroinvertebrates

Macroinvertebrates are generally the most abundant and conspicuous members of the sandy subtidal bottom habitat (CSLC 1998). They can be described as epifaunal organisms, which live on the surface of the sediment, or infaunal organisms, which live in the sediment. They can also be characterized by their mode of feeding. A common mode is suspension feeding, where suspended plankton and detritus are strained from the water. Suspension feeders include sea pansies, sea pens, brittle stars, sand dollars, and clams. Another mode of feeding is deposit feeding, where detritus-laden sediments are ingested. Epifaunal organisms are generally suspension feeders, predators, or scavengers; whereas, infaunal species tend to be opportunistic detritivores or selected deposit feeders. Diving surveys conducted within the project footprint on the soft bottom habitat observed large polychaete worms (*Diopatra splendidissima*), large hermit crabs (*Isocheles pilosus*), spiny sea stars (*Astropectin* sp.), and spider crabs (Family Majidae) (SCE 2003).

Common infaunal invertebrates in soft bottom habitats are polychaete worms and small crustaceans (MEC 1987; Ambrose and Anderson 1990; Dailey et al. 1993; CSLC 1994). Benthic infauna samples collected from 30 locations within the project footprint contained a total of 6,647 individuals, representing 137 species in seven phyla (SCE 2003). Annelids were the most abundant phylum, with almost 84 percent of the individuals and more than 44 percent of the species. Arthropods were the next most abundant phylum with 13 percent of the individuals and 31 percent of the species, followed by mollusks with 2 percent of the individuals and 12 percent of the species. The other four phyla together represented less than 2 percent of the total abundance, but just over 12 percent of the species. Differences among stations were due to sediment grain size. Abundance and species richness were generally higher than average where sediments were finer, while lowest abundance and species richness occurred where sediments were coarsest (farther offshore and upcoast of the conduits).

Fish

In general, fish biomass in sandy subtidal bottom habitats is relatively low (Johnson et al. 1994; Eco-M 1997). Species that dominate biomass of trawl catches in sandy subtidal habitats typically include the white croaker; California halibut; shovelnose guitarfish; basketweave cusk-eel (*Ophidion scrippsae*); lizardfish (*Synodus variegates*); barred sandbass (*Paralabrax nebulifer*); northern anchovy (*Engraulis mordax*); queenfish; white surfperch (*Phanerodon frucatus*); walleye surfperch (*Hyperprosopon argenteum*); and several species of sanddab, sole, and turbot (Hague 1992; Johnson et al. 1994). Common fish species collected in trawl surveys in the vicinity of SONGS are shown in Table 4.1-1, while Table 4.1-2 shows the relative abundance of fishes and other organisms present along the pipeline corridor.

Physical and Biological Factors Regulating Soft Bottom Subtidal Communities

Populations in sandy subtidal communities alternate between periods of constant abundance and periods of rapid change, but species composition appears to persist over long periods (Morin et al. 1985). Factors regulating sandy subtidal bottom communities are discussed below.

Depth

Sandy subtidal communities are structured along a gradient that extends from the shallow turbulent surf zone to a more stable environment in deeper water. Sediment stability increases and sediment grain size generally declines along this gradient (MEC 1987). The gradient is maintained as a result of the decreasing influence of the wave surge on sediments with depth (Morin et al. 1985). Species distribution is affected by sediment stability and structure along the depth gradient (Morin et al. 1985). Suspension feeding epifauna and rapidly burrowing infauna dominate the biologically sparse shallow water zone. The abundance of most epifaunal animals declines with depth, and in water deeper than 33 feet (10 m) most of those present are predators or scavengers (Morin et al. 1985; Dailey et al. 1993). The abundance of infaunal animals, particularly polychaetes, generally increases with water depth (CSLC 1998). Fish assemblages also vary with depth. Schooling midwater species dominate just beyond the surf zone, while flatfishes are increasingly prevalent in deeper water (Dailey et al. 1993).

Table 4.1-1. Scientific and Common Names of Fish Species Collected in Trawl Samples in the Vicinity of SONGS

Scientific Name	Common Name
Amphistichus argenteus	barred surfperch
Anchoa compressa	deep bodied anchovy
Citharichthys stigmaeus	speckled sanddab
Citharichthys xanthostigma	longfin sanddab
Cymatogaster aggregata	shiner surfperch
Embiotoca jacksoni	black surfperch
Engraulis mordax	northern anchovy
Genyonemus lineatus	white croaker
Hyperprosopon argenteum	walleye surfperch
Hypsopsetta guttulata	diamond turbot
Menticirrhus undulatus	corbina
Paralabrax clathratus	kelp bass
Paralabrax nebulifer	barred sand bass
Paralichthys californicus	California halibut
Pleuronichthys ritteri	spotted turbot
Pleuronichthys verticalis	hornyhead turbot
Rhinobatus productus	shovelnose guitarfish
Roncador stearnsii	black croaker
Sardinops sagax	sardine
Scorpaenichthys marmoratus	California scorpionfish
Seriphus politus	queenfish
Syngnathus spp.	pipefish
Synodus lucioceps	lizardfish
Xystreurys liolepis	fantail sole

Table 4.1-2. Relative Abundance of Species by Habitat Type Observed Subtidally along the Conduit Corridor (from SCE 2003)

Group	Habitat Type		
	Hard Bottom		Soft
Species	Man-Made	Cobble	Bottom
Flowering Plants			
Phyllospadix torreyi	none	uncommon	none
Brown Algae			
Dicyota spp.	common	common	none
Egregia menziesii	uncommon	uncommon	none

Group	Habitat Type		
	Hard Bottom		Soft
Species	Man-Made	Cobble	Bottom
Macrocystis pyrifera	uncommon	uncommon	none
Sargassum muticum	common	uncommon	none
Zonaria spp.	common	uncommon	none
Red Algae			
Bossiella spp.	common	common	none
Calliarthron spp.	common	common	none
Corallina spp.	common	common	none
Lithothmnium spp.	common	common	none
Pessonella spp.	common	common	none
Plocamium spp.	common	common	none
Rhodomenia spp.	common	common	none
Bryozoans			
Anthropora spp.	common	common	none
Bugula spp.	common	common	none
Crisia spp.	common	common	none
Membranopora spp.	common	common	none
Rhycozoan spp.	common	common	none
Sponge			
Acarnus spp.	uncommon	common	none
Hymenamphiastra spp.	common	common	none
Plocamia spp.	common	common	none
Hydroids			
Agalophenia spp.	common	uncommon	none
Anthropleura spp.	uncommon	uncommon	none
Epiactus spp.	common	uncommon	none
Muricea californica	common	common	none
Muricea fructosa	uncommon	uncommon	none
Polychaetes			
Diopatra ornata	uncommon	common	uncommon
Diopatra splendidissima	none	uncommon	common
Dodecaceria fewksi	common	common	none
Mollusks			
Chama arcana	common	uncommon	none
Crassodoma spp.	common	uncommon	none
Kelletia kelletii	common	common	uncommon
Megastrea spp.	uncommon	uncommon	none
Octopus bimaculatus	uncommon	common	none

Group	Habitat Type		
	Hard Bottom		Soft
Species	Man-Made	Cobble	Bottom
Pododesmus spp.	common	none	none
Pseudochama exogyra	common	uncommon	none
Pteria sterna	uncommon	uncommon	none
Pteropurpura festiva	common	common	none
Tegula spp.	common	common	none
Zonaria spadicea	uncommon	uncommon	none
Echinoderms			
Astropectin spp.	none	none	common
Pisaster brevispinus	none	none	uncommon
Pisaster giganteus	uncommon	uncommon	none
Strongylocentrotus francisanus	common	uncommon	none
Strongylocentrotus purpuratus	common	uncommon	none
Parastichopus spp.	uncommon	uncommon	none
Crustaceans			
Balanus spp.	common	common	none
Isocheles pilosus	none	none	common
Loxorhynchus giganteus	uncommon	uncommon	none
Majidae	none	uncommon	common
Panulirus interruptus	common	common	uncommon
Tunicates			
Aplidium spp.	common	common	none
Cystodytes spp.	common	common	none
Didemnum spp.	common	uncommon	none
Trididemnum spp.	common	uncommon	none
Fish			
Amphisticus argenteus	uncommon	uncommon	none
Chromis punctipinnis	common	uncommon	none
Embiotoca jacksoni	common	common	none
Gibbonsia elegans	common	common	none
Halichores semicinctus	common	common	none
Hypsopops rubicundus	common	uncommon	none
Micrometrus minimus	uncommon	uncommon	none
Oxyjulis californicus	common	common	none
Paralabrax clathratus	uncommon	uncommon	none
Paralabrax nebuifer	common	common	none
Paralichthys californicus	none	uncommon	none
Pleuronichthys spp.	none	uncommon	none

Group	Habitat Type		
	Hard Bottom		Soft
Species	Man-Made	Cobble	Bottom
Scorpeana guttata	common	common	uncommon
Semicossyphus pulcher	common	uncommon	none

Water Motion

Sandy subtidal communities are affected by water motion primarily created by wave action and currents. Wave size is affected by factors such as exposure to prevailing winds and storm events (CSLC 1998). Average wave height is generally higher during the winter and lower during the summer seasons along the SCB. Higher wave energy may lead to an offshore shift in the distribution of the community. During winter, when periods of stormy weather tend to be frequent, sand dollars and populations of other sand-dwelling species are carried by wave surge to deeper water (Merrill and Hobson 1970; Morin et al. 1985). Drift algae and food material transported from land generally increase during the winter as a result of increased storm activity. After a storm, the sand bottom may be littered with pieces of formerly attached algae and surf grass (Fager 1968).

Hard Bottom Subtidal Community

Physical Description

Within the project area, two main hard substrata are present in the subtidal zone: cobble/boulder fields and man-made structures, including the surrounding riprap (quarry rock used to protect and support the terminal structures). Approximately 18 percent of the substrate in the project footprint consists of hard bottom habitat (cobble, rock, concrete structure, riprap) (Figure 4.1-2). Cobble fields within the project footprint range in size from 540 square feet (50 m^2) to several hundred square meters and were separated by either hard-packed fine or coarse sands typically surrounding the cobble areas (SCE 2003).

Biological Description

Rocky subtidal communities support a diverse assemblage of fauna and flora. One of the most conspicuous plants, giant kelp (*Macrocystis pyrifera*), can form a floating surface canopy, creating a vertical habitat, which can be composed of multiple layers. Giant kelp occurs along the west coast of North America from Baja California to central California. Within the SCB, giant kelp occurs along the coast and near the Channel

Islands in waters that range from 25 to 65 feet (8 to 20 m) in depth. Smaller kelp species grow only a few feet from the substrate and can form an understory or secondary canopy below a giant kelp canopy, e.g., *Pterygophora californica*, *Laminaria* spp. Turf or encrusting algae can form a tertiary layer below the understory canopy, e.g., *Rhodymenia*, *Plocamium*.

Substrate relief can affect community structure. Fish and invertebrates are generally less common on low-relief reefs than high-relief reefs due to the lack of structural complexity (Patton et al. 1994). High-relief reefs typically support more diverse communities that include perennial species such as sea fans (*Muricea* spp.), sea palms, sponges, and sea stars; these reefs also attract a variety of fishes such as garibaldi, blacksmith, and black perch (SANDAG 2000). In contrast, very low-relief areas exposed to varying degrees of sedimentation can exhibit reduced species diversity consisting mainly of opportunistic and annual turf vegetation due to high levels of scour and disturbance. However, some species such as surfgrass, which is a perennial species, can tolerate moderate levels of sedimentation.

<u>Ecological and Economic Importance</u>

Rocky subtidal communities are highly complex and productive biological systems. Similar to coral reefs and tropical forests, kelp forests are recognized as major centers of biological diversity and productivity (Foster and Schiel 1985; Dailey et al. 1993). The kelp forests of the SCB are among the most productive and species rich environments in the coastal waters of southern California (CSLC 1998). Over 50 fish species, 130 species of plants, and almost 800 species of invertebrates are known to inhabit kelp forests in southern California and northern Baja California (Foster and Schiel 1985). Most fish and invertebrate species found in kelp forests also occur in rocky habitats lacking kelp, but these species are generally more abundant when kelp is present (Foster and Schiel 1985; Dailey et al. 1993). Many species of invertebrates, fishes, birds, and marine mammals use rocky subtidal communities as nurseries and/or major foraging centers. Giant kelp is also commercially harvested for use in a variety of food products, pharmaceuticals, adhesives, paper products, paints and finishes, rubbers, and textiles (SANDAG 2000).

<u>Historical Trends and Current Status</u>

Kelp forests close to metropolitan areas in the SCB during the 1940s showed a decline in canopy coverage. This decline has been attributed to higher levels of wastewater discharge and overgrazing by sea urchins (Wilson and North 1983; Tegner and Dayton 1991). Overgrazing by sea urchins probably stemmed from population increases that resulted from heavy fishing on their predators, particularly California sheephead (*Semicossyphus pulcher*) and spiny lobster (CSLC 1998). During a major El Niño from 1957 to 1959, stress on kelp forests was intensified. In the 1960s, kelp forest restoration efforts were initiated at sites where kelp forests had previously flourished (CSLC 1998). In addition, improved sewage disposal practices and a growing fishery for red sea urchins relieved some of the stress on kelp forests.

Aerial photography has aided in monitoring kelp forests in the SCB (North et al. 1993). Twenty kelp beds along the Orange County and San Diego County coast have been surveyed from 1967 to present. Results of these surveys indicated that kelp forests are highly dynamic systems with substantial year-to-year variation in size (CSLC 1998). Major storms and El Niño conditions have generally caused the greatest reduction in kelp bed canopies (Tegner and Dayton 1987, 1991; North et al. 1993; Tegner et al. 1997). However, the surveys showed no general increase or decrease in kelp forest coverage.

Studies of the subtidal hard bottom habitat offshore of San Onofre have been conducted since 1963. The San Onofre Kelp Forest (SOK) is located in the vicinity of the project area, just offshore and downcoast of the SONGS Unit 3 diffusers (Figure 4.1-3). Less persistent kelp beds are sometimes present offshore of the SONGS Unit 1 intake conduit, upcoast of the Unit 2 diffusers. Analysis of giant kelp plant densities since 1978 from stations located throughout SOK indicate that this kelp forest is spatially and temporally variable, as different areas of SOK showed different recruitment periods and different periods of peak plant densities (SCE 2004).

Characteristic Biota

A wide variety of algae, fish, and invertebrates were observed during a survey conducted at the intake and discharge terminal structures and manhole risers (SCE 2003). Riprap was present around each structure and provides additional habitat for marine organisms. A few giant kelp, feather boa kelp (*Egregia menziesii*), and a variety of small red and brown upright and encrusting algae were also observed (Table 4.1-2). A few conspicuous mollusks were also observed such as the giant turban (*Megastraea*), chestnut cowry (*Zonaria spadicea*), dog whelk (*Kelletia kelletii*), blue spotted octopus (*Octopus bimaculatus*), turban snails (*Tegula* sp.), and the festive snail (*Pteropurpura festiva*). No white, black pink, green, or red abalone (*Haliotis* sp.) were observed during the survey. Echinoderms, such as purple and red sea urchins (*Strongylocentrotus purpuratus* and *S*. *francisanus*) and seastars (*Pisaster* spp.), were present. Also observed were lobsters (*Panulirus interruptus*) and a diverse assemblage of fishes (Table 4.1-2).

With some variation, depending on the relief and complexity of the structure and size of the cobble field, a large to small subset of the same species present on the man-made structures was present in the cobble areas (SCE 2003). Invertebrates were found in large numbers; particularly conspicuous were the spiny lobster and sheep crab (*Loxorhynchus giganteus*). Encrusting bryozoans and tunicates were also observed on much of the cobble habitat. At several of the inshore areas, surfgrass was present in medium to dense concentrations over portions of the cobble structure. The amount of surfgrass was not large, covering approximately 750 square feet (70 m^2).

Physical and Biological Factors Regulating Hard Bottom Subtidal Communities

Rocky subtidal communities are regulated by both physical factors and biotic interactions. The physical factors include substrate, water motion, water temperature and nutrients, light availability, and sedimentation. Biotic interactions include herbivory and competition. The following is a brief overview of these factors.

<u>Substrate</u>

Substrate height (low or high relief), texture (smooth, cracked, or pitted), size, and composition (cobble, boulder, sandstone, mudstone, basalt, or granite) are important qualities that influence marine life associated with rocky habitats. Substrate with higher relief, greater texture, and larger size generally have richer marine assemblages (SANDAG 2000). In contrast, low-relief habitats can be subjected to physical scouring from seasonal sediment movement, resulting in lower diversity and abundance of marine organisms.

The seafloor beneath the SOK is composed primarily of cobble (small moveable rocks) and sand (SCE 2004). Thus, the main substratum available for kelp attachment is cobble, which proves unstable as the attached kelp plants grow. Boulder, a more stable substratum for kelp attachment, occurs in similar, relatively low proportions at stations within the SOK. The proportions of cobble and sand differ considerably among areas within the forest, but the relatively high proportions of sand, in comparison to other southern California kelp forests, create a seafloor with changing substratum constituents and considerable sand scour. Sand movement is a very important factor in the ability of kelp to establish and survive. If an area that normally has acceptable hard substratum is covered by sand, it will not support kelp. In addition to sand, the predominant hard substratum at the SOK is cobble, a substratum more prone to movement by bottom surge, particularly when kelp is attached.

Water Motion

Water movement is very important in distributing nutrients and food materials to rocky subtidal communities. During storm events, high velocity waves have been reported to destroy the canopy of giant kelp forests and remove entire kelp plants (Ebeling et al. 1985). Once the kelp plants are removed from the substrate, the blade and stipe can become entangled with other plants, increasing drag and resulting in the widespread removal of the forest (Dailey et al. 1993). At San Onofre, where kelp attaches to cobbles, storm waves often move entire kelp plants with attached cobbles to other locations, including the beach (Foster and Schiel 1985). Storm surge can also move cobbles or boulders, agitating and disturbing the benthic rocky subtidal community. In turn, removal of adult kelp plants by storm disturbance can benefit colonizing organisms competing for benthic space. Wave exposure can also benefit giant kelp by reducing kelp herbivores such as urchins and open the canopy to light, which improves growth and survival of young kelp plants (Ebeling et al. 1985; Foster and Schiel 1985).

Water Temperature and Nutrients

Water temperature and nutrients, which strongly affect growth and recruitment of giant kelp, are treated together because they are related; cold water generally has an adequate supply of nutrients, while warm water generally has an inadequate supply. Nutrient limitations are often considered to be the most important constraint on the growth of kelp (Foster and Schiel 1985). Growth and survival of kelp is highly seasonal because of seasonal patterns of nutrient supply by currents. During summer and fall, kelp is exposed to warm, nutrient-poor water and the canopy is reduced, while during winter and spring, cold, nutrient-rich water supports rapid growth (Dailey et al. 1993). El Niño and La Niña events interrupt the seasonal pattern. During El Niño events, nutrient-poor water is present all year and often results in drastic declines in kelp canopy. La Niña events result in unseasonably cold, nutrient-rich flows that encourage rapid kelp growth (North et al. 1993).

Light Availability

The growth and survival of giant kelp and other plants are dependent on light availability. Light availability in rocky subtidal communities is controlled by depth, turbidity, and shading effects from both giant kelp and other macrophytes (Dean and Schroeter 1985). The reduction of light with depth is the primary factor affecting the lower depth limit of kelp and other plants.

Sedimentation

Sedimentation affects all life stages of giant kelp and other macroalgae. Sedimentation can interfere with attachment of young kelp and smother kelp spores, gametophytes, and young sporophytes (Devinney and Volse 1978). Adult plants may be damaged or killed by partial burial (Foster and Schiel 1985). Current-driven sediments scour kelp and damage tissues. Sediment scour can benefit kelp plants by eliminating sessile invertebrates such as sea fans that compete with kelp plants for attachment sites (CSLC 1998). Suspended sediments also increase turbidity, which reduces light availability for kelp and other algae.

Herbivory

High populations of animals that feed on living kelp can greatly reduce the kelp forest canopy. Species that feed on living kelp plants include sea urchins, snails, and the fish species opaleye (*Girella nigricans*) and halfmoon (Foster and Schiel 1985; Dayton et al. 1992). Other fish species, such as senorita and garibaldi, browse on kelp to remove invertebrates that reside on the plants but may severely damage the kelp plants in the process (Bernstein and Jung 1980; Foster and Schiel 1985). However, senoritas may also benefit kelp by removing detrimental species that feed on or encrust the kelp plants (CSLC 1998). A variety of fish predators control the fish herbivore populations. California sheephead and spiny lobster control the urchin populations. Urchin grazing on live kelp is related to the availability of detrital food material. When urchins have an adequate supply of drift algae, they tend to remain within reef crevices and not feed on living kelp (CSLC 1998). However, when the drift kelp is not available, urchins may emerge from the safety of crevices and form feeding aggregations that remove entire kelp stands (Tegner and Dayton 1991; Dayton et al. 1992).

Competition

Interspecific and intraspecific competition influences the structure of the rocky subtidal community. Macroalgae compete for light, and macroalgae and sessile invertebrates compete for attachment sites (CSLC 1998). Upper canopy kelp can shade lower stature plants and juvenile kelp within the kelp bed. For example, stalked kelp (*Pterygophora californica*) is an understory plant common in the SOK and competes with giant kelp for attachment sites and light (Dailey et al. 1993). Dense stands of stalked kelp have been shown to inhibit the recruitment of young giant kelp (Dailey et al. 1993).

Marine Mammals, Birds, and Turtles

This section provides a description of the general biology of mammal, bird, and turtle species that are likely to occur within and near the project area. The section begins with a discussion of the marine mammals found in the SCB and includes a brief description of the species that may be affected by project activities. Next is a discussion of the bird species that are likely to occur in the area, followed by a description of avian use of kelp forests in California. Finally, there is a short section on sensitive turtle species that have the potential to occur in the project area.

The study area for marine mammals, birds, and turtles encompasses the marine waters from Los Angeles to San Diego because this area includes all probable transit routes for construction and support vessels. Detailed discussion will focus on species that would likely occur within the project vicinity, as those species would more likely be influenced by project activities.

Marine Mammals

Several species of marine mammals occur in nearshore waters of the SCB. California sea lions (*Zalophus californacus*) and harbor seals (*Phoca vitulina*) are found in these waters (U.S. Navy 1997a, 1997b). Bottlenose dolphins (*Tursiops truncatus*) and common dolphins (*Delphinus delphis*) occur in the surfzone and offshore waters. Risso's dolphins (*Grampus griseus*) and Pacific whitesided dolphins (*Lagenorhynchus obliquidens*) occur seasonally in the SCB. In addition, California gray whales (*Eschrichtius robustus*) migrate seasonally through the SCB. December through February, the gray whales migrate south to places in Baja Mexico, and from February through May, they migrate north to Alaskan waters.

<u>Status and Trends of Marine Mammals</u>

All marine mammals are protected by the Federal Marine Mammal Protection Act of 1972 (MMPA). The MMPA prohibits the intentional taking, import, or export of marine mammals without a permit. Several of the species that occur within the SCB are also protected under the Federal Endangered Species Act of 1973 (ESA). A species that is listed as threatened of endangered under the ESA is categorized as depleted under the MMPA. Unintentional take of a depleted species is allowed by permit only if the activity is determined to have a negligible impact. Intentional take of a depleted species is only allowed under a scientific research permit.

None of the four species most likely to occur within the project area are currently listed as threatened or endangered or as depleted under the MMPA. The gray whale, which migrates through the project area, was removed from the endangered species list in June 1994.

Life History and Feeding Ecology of Marine Mammals in the Project Area

California Sea Lion

The California sea lion is the most abundant pinniped in the SCB (Dailey et al. 1993). This species is a year-round resident of the SCB, with a peak summer population of approximately 87,000 individuals (Dailey et al. 1993). Within the SCB, the California sea lion breeds in large colonies, or rookeries, on San Miguel and San Nicolas islands, with smaller breeding colonies on Santa Barbara and San Clemente islands. Breeding occurs from May to August. Most males migrate northward in later summer after the breeding season and return to the rookeries in early spring. Females and young tend to remain near the rookeries or migrate southward at the end of the summer.

California sea lions are gregarious and are often observed in small groups swimming, porpoising, surfing waves, or resting on shore. They tend to prefer haul-out sites that have limited human access, and the appearance of a person can frighten the group into the water. Sea lions seem to be habituated to constant or low frequency sounds, but they have been known to be alarmed by sudden loud noises.

Sea lions are opportunistic feeders, foraging mainly on fish and cephalopods such as Pacific whiting, market quid, rockfish, anchovy, mackerel, octopus, and several pelagic squid (Dailey et al. 1993). Their dietary composition varies by season, location, and fluctuations in average water temperatures caused by El Niño events. Groups of California sea lions have occasionally been observed passing through or foraging along the fringe of kelp forests (Foster and Schiel 1985).

Pacific Harbor Seal

The harbor seal is the most common pinniped in the world, occurring both in the Atlantic Ocean and Pacific Ocean. The Pacific harbor seal ranges from Herchcel Island, Alaska to Baja California (Dailey et al. 1993). The eastern Pacific harbor seal (*Phoca vitulina richardsi*) is the subspecies that occurs within the SCB. The population in California was estimated at approximately 40,000 individuals in 1997. Breeding season in California is from March to June, with peak pupping in April and May. Harbor seals maintain haul-out sites on both mainland and island coasts that have unrestricted access to the water. They are sensitive to human disturbance but will reoccupy a site once they no longer feel threatened.

The Pacific harbor seal forages alone or in small groups close to shore in relatively shallow coastal waters (less than 650 feet [200 m]). They prey on benthic and epibenthic fish and have been observed foraging in kelp forests, particularly if this habitat is located near coastal haul-out sites (Foster and Schiel 1985). Harbor seals have been observed in the kelp beds within the project area.

Bottlenose Dolphin

The bottlenose dolphin occurs in the eastern north Pacific Ocean from the equator north to central California (Dailey et al. 1993). Two distinct populations occur in the SCB, one coastal and one offshore. The coastal form generally inhabits waters within 0.6 mile (1 km) of the shore and would be most likely to occur within the project area. This species is known to form small resident groups that occupy distinctive home ranges, with little overlap between groups (Dailey et al. 1993). Bottlenose dolphins remain within the SCB year-round, with seasonal shifts in population size and distribution between Orange County and Ensenada, Mexico. The coastal population was estimated to have 240 bottlenose dolphins in 1983 by NMFS (Dailey et al. 1993). There has not been a comprehensive study of the feeding habits of bottlenose dolphins in the SCB; however, it is believed that they feed opportunistically on a wide variety of fishes, cephalopods, and crustaceans (Dailey et al. 1993).

Gray Whale

Two distinct populations of gray whales occur in the North Pacific Ocean, a western and an eastern stock. The eastern stock occurs along the eastern Pacific coastline and is known as the California gray whale. In June 1994, the eastern pacific population was removed from the Federal Endangered Species List, due to recovery of population numbers to near the estimated sustainable population size.

The California gray whale migrates through the SCB twice each year, traveling between its feeding grounds in Alaska and breeding rounds in Baja California. The southern migration through the SCB occurs from December through February, with pregnant females moving through the area first. The northward migration begins in February and lasts through May, peaking in March (Dailey et al. 1993). Solitary animals generally lead the northbound migration with cow-calf pairs following 1 to 2 months later (Foster and Schiel 1985). Gray whales migrate within 125 miles (200 km) of the shoreline and many are sighted within 9 miles (15 km) of shore (Dailey et al. 1993). On the northbound migration, cow-calf pairs are believed to more closely follow the shoreline rather than the offshore route (Foster and Schiel 1985; Dailey et al. 1993). Gray whales have been observed within the project area.

Gray whales feed primarily on benthic organisms, although migrating whales will also feed opportunistically on large schools of fish, such as anchovies. The whales roll on one side and then skim the ocean bottom when feeding, screening the sediment through their baleens for food items. In general, gray whales are not known to feed while migrating to and from the summer breeding lagoons; however, there have been several reports of juvenile gray whales and cow-calf pairs skimming dense kelp beds for food while passing through the SCB (Foster and Schiel 1985; Dailey et al. 1993). Cow-calf pairs may also use kelp forests for cover to avoid predatory killer whales (Foster and Schiel 1985).

Marine Birds

Approximately 200 different species of birds utilize the coastline along the SCB (CSLC 1998). The majority of these species are migratory while some are present year-round. Their habitats can be grouped into three categories: ocean, shoreline, and wetland. Ocean species are most often observed more than 0.6 miles (1 km) offshore and rarely utilize inland habitats. Shoreline birds are found within 0.6 miles (1 km) of the coast and utilize beaches, rocky shores, jetties, bays, and harbors. Wetland habitats include marshes, estuaries, and mudflats. The closest wetland habitat to the project area is the outlet of San Mateo Creek, located approximately 1 mile (1.6 km) north of the project area.

Status and Trends of Marine Birds

Special-status marine birds are those species that fall under one or more of the following categories:

- officially listed as Endangered, Threatened, or Rare under the California Endangered Species Act (CESA) or federal Endangered Species Act (ESA);
- candidates for State or Federal listing under the ESA or CESA;
- species that meet the criteria for listing, even if not currently listed, as described in section 15380 of the State CEQA Guidelines;
- species that are biologically rare, have limited distribution, or are currently declining throughout their range;
- populations that are threatened with extinction in California, even if widely distributed outside of California; and

- species closely associated with a habitat that is in rapid decline, threatened, or rare.

Two federally and state listed endangered species that have the potential to occur in the project area are California least tern (*Sterna antillarum browni*) and brown pelican (*Pelecanus occidentalis californicus*). A review of the California Natural Diversity Database (CNDDB) list of "Special Animals" also identified several California species of special concern that may occur within the project area or that have the potential to be affected by project activities. These species include the black storm petrel (*Oceanodroma melania*), double-crested cormorant (*Phalacrocorax auritus*), western snowy plover (*Charadrius alexandrinus nivosu*), California gull (*Larus californicus*), elegant tern (*Sterna elegans*), common loon (*Gavia immer*), white-faced ibis (*Plegadis chihi*), wood stork (*Mycteria Americana*), yellow rail (*Coturnicops noveboracensis*), California black rail (*Laterallus jamaicensis coturniculus*), light-footed clapper rail (*Rallus longirostris levipes*), and long-billed curlew (*Numenius americanus*).

Life History and Feeding Ecology of Special-Status Bird Species

Special-status bird species with a potential to be affected by the project can be categorized by the habitat in which they are most commonly observed. The biology of these species is discussed below.

Ocean

Ocean species are those birds that spend most of their time more than 0.6 miles (1 km) offshore and rarely utilize inland habitats. These species have the potential to be directly affected by project activities. The only special-status ocean bird that may occur within the project area is the black storm petrel.

Black Storm Petrel. The black storm petrel is a California Species of Special Concern and is present year-round in the SCB, with peak population occurring late summer to fall (Dailey et al. 1993). This species generally prefers to forage within 12 miles (20 km) of the shoreline and therefore is the most commonly observed storm petrel. Storm petrels forage by capturing small invertebrates and fish at the water surface. The only known nesting colony of black storm petrels in the United States is located on Santa Barbara Island, well to the west of the project area.

Shoreline

Shoreline habitat includes beaches, rocky coastline, jetties, and the waters within 0.6 miles (1 km) of the coast. Several species listed within this category are also found in other habitats but are primarily observed along the shoreline. Special-status species that occur in this habitat and have the potential to be affected by project activities include brown pelican, double-crested cormorant, western snowy plover, California gull, elegant tern, California least tern, and common loon.

Brown Pelican. The brown pelican is listed both federal and state listed endangered. The brown pelican occurs year-round along the coast of southern California but is most common from June to October. Nesting takes place from March to early August on the Channel Islands where the young are tended by both parents. After breeding, adults disperse from nesting colonies along the entire California coastline. Brown pelicans forage in warm shallow water, generally within 12 miles (20 km) of the coastline (Dailey et al. 1993). Anchovies are their main prey. Pelicans are often observed foraging at the seaward fringe of coastal kelp forests (Foster and Schiel 1985). They feed most often in the early morning or late afternoon and roost during other periods on the rocky coast of both the mainland and the Channel Islands. Brown pelicans were observed transiting and feeding in the vicinity of the project area during surveys conducted in 2003 (SCE 2003).

Double-crested Cormorant. The double-crested cormorant is a California Species of Special Concern. This species is common year-round along the SCB coastline. The double-crested cormorant has been known to nest on rocky cliffs of the mainland coast and the Channel Islands, but nesting has declined in recent years (Dailey et al. 1993). Nesting occurs from April to July or August, with the young being tended by both parents. This species feeds mainly on fish but will also take crustaceans and amphibians. Foraging generally occurs in waters less than 30 feet (9 m) deep where the cormorant will dive and pursue prey for up to 30 seconds. This species may forage opportunistically at the edge of a kelp forest (Foster and Schiel 1985).

Western Snowy Plover. The western snowy plover is federal listed threatened and a California Species of Special Concern. This species occurs year-round along the sand and cobble beaches of the SCB. Nest sites typically occur in flat, open areas with sandy or saline substrates; vegetation and driftwood are usually sparse or absent. The breeding season extends from mid-March through mid-September, with nest initiation and egg laying occurring from mid-March through mid-July. Birds often nest in exactly the same location as the previous year. The nesting habitat for this species has been severely disturbed by human development and occupation of historic nest sites. Nest sites are presently found at undisturbed sites in San Diego County, at Vandenberg Air Force Base, and on some Channel Islands (Dailey et al. 1993). The Santa Margarita River, located on MCB Camp Pendleton and approximately 10 miles (16 km) from SONGS, typically supports half of all nesting pairs of snowy plovers within San Diego

County (A. N. Powell, U.S. Geological Survey, unpublished data). Snowy plovers feed in small groups along the beach surfline. The main prey items are insects, small crustaceans, and marine worms (Dailey et al. 1993).

California Gull. The California gull is a California Species of Special Concern. This species is common along the SCB coast during fall and winter, with numbers peaking from January through March. In the spring, most California gulls leave the coast for inland breeding areas (Dailey et al. 1993). The main threat to this species is from the lowering of Mono Lake, which has opened their nesting island to predators. California gulls are opportunistic foragers that will feed on garbage, carrion, various invertebrates, and fishes. When foraging in coastal waters, this species will generally be found within 12 miles (20 km) of shore.

Elegant Tern. The elegant tern is a California Species of Special Concern. This species arrives in the SCB from Mexican breeding grounds in June and is common in coastal areas through October. The only known breeding site in the United States is located at the southern end of San Diego Bay (CSLC 1998). Elegant terns are most often observed along the beaches of southern California and are rarely seen more than 2.5 miles (4 km) offshore (Dailey et al. 1993). This species forages by diving into shallow ocean waters for small fish. Elegant terns have been observed roosting and foraging in kelp forests off the coast of California (Foster and Schiel 1985).

California Least Tern. The California least tern is federal and state listed endangered. This species arrives in California in late April to breed and is fairly common along the coastline near estuaries and lagoons through August. Breeding colonies in southern California are located along marine estuarine shores that are free from human disturbance. Least terns will abandon their nests if disturbed during nesting season. The closest known nesting colony to the project area is the Santa Margarita River estuary, approximately 10 miles (16 km) south on MCB Camp Pendleton. Foraging occurs in estuaries, lagoons, and in the ocean, especially near lagoons. The primary prey species are anchovy, silversides, and smelt. California least terns have been observed roosting and foraging in the San Onofre kelp forest (CSLC 1998).

Common Loon. The common loon is a California Species of Special Concern. This species winters along the coast of southern California from November through May. The common loon feeds mostly on fish but will sometimes feed on aquatic plants and algae. It forages by diving underwater and pursues prey to water depths of 200 feet (61 m). The common loon may utilize kelp forests with open canopies for foraging (Foster and Schiel 1985).

Wetland

Wetland habitat includes estuaries, marshes, and mudflats. The estuary at the mouth of San Mateo Creek is the only notable wetland habitat in the vicinity of the project area. Special-status species that occur in wetland habitat and have the potential to be affected by project activities include white-faced ibis, wood stork, yellow rail, California black rail, light-footed clapper rail, long-billed curlew. Since San Mateo Creek is located over 1 mile (1.6 km) away for the project area and deposition impacts are expected to be very localized and offshore, these species only have minimal chance to be affected by project activities and therefore will not be discussed in further detail.

Marine Birds Associated with Kelp Forests

Foster and Schiel (1985) attempted to quantify avian use of California's kelp forests by researching existing publications and numerous personal communications with species experts. As a result of their research, they split avian use of kelp forests into three distinct categories: kelp forest, drift kelp, and kelp wrack. A kelp forest is a community of living macroalgae attached to a rocky substrate. Drift kelp is detached kelp floating in the ocean. Kelp wrack is detached kelp that is deposited on the beach by waves. Certain bird species are associated with each of these distinct categories. The following is a more detailed description of each kelp forest category, along with a list of birds that may utilize it.

Kelp Forests. The kelp forest habitat is composed of three separate subcategories: surface canopy, midwater and bottom, and seaward fringe. The surface canopy is the well-developed floating mat that birds can utilize as a perch. A variety of avian species use this mat as both a roost for resting and a perch for foraging. Birds that use this subhabitat include elegant tern, Heermann's gull, western gull, Bonaparte's gull, great blue heron, snowy egret, willet, wandering tattler, and northern phalarope (Foster and Schiel 1985).

The midwater and bottom subcategory is the area of kelp forest below the canopy that is utilized by diving avian species for foraging habitat. A study of the stomach contents of Brandt's cormorants from the coast of San Diego found that they fed almost exclusively on fish species that inhabit the midwater of kelp forests (Foster and Schiel 1985). Other species that use this subhabitat include pelagic cormorant, and horned and eared grebes.

The third category of the kelp forest is the seaward fringe. This ecotone between the kelp forest and open water supports a high diversity of bird species. Dense concentrations of invertebrates and fishes occur on the seaward fringe, attracting a variety of bird species. Avian species that utilize this subhabitat include brown pelicans, common loon, western grebe, Brandt's cormorant, pelagic cormorant, surf scoter, white-winged scoter, guillemot, and common murre (Foster and Schiel 1985).

Drift Kelp. Drift kelp consists of detached kelp that floats in the ocean. It can occur as single strands or as a large mat of multiple strands. Plankton and small fishes often concentrate around drift kelp in pelagic water (Foster and Schiel 1985). The red and northern phalarope are known to forage around drift kelp well away from shore. Other marine birds may utilize drift kelp for roosting sites.

Kelp Wrack. Drift kelp that is deposited on beaches, usually due to winter storm events, is called kelp wrack. Kelp wrack supports a diversity of invertebrates, such as kelp flies, maggots, beetles, and various crustaceans, that serve as prey for a variety of birds. Some of the birds that forage on kelp wrack include sanderlings, lack and ruddy turnstones, common crow, starling, Brewer's blackbird, black phoebe, house sparrow, and yellow-rumped warbler (CSLC 1998).

<u>Turtles</u>

Several species of federal listed threatened and endangered sea turtles could potentially occur within the project area. There are no known nesting beaches for these species in the United States, but they have been observed off the coast of southern California (CSLC 1998). These are the endangered leatherback sea turtle (*Dermochelys coriacea*), the threatened green sea turtle (*Chelonia mydas*), loggerhead sea turtle (*Caretta caretta*), and olive ridley sea turtle (*Lepodochelys olivacea*). Sightings are extremely rare and it is unlikely that they would be affected by project activities.

Invasive and Non-Native Species

The following section describes invasive and non-native marine species that have been identified in the SCB.

<u>Caulerpa taxifolia</u>

Dubbed "killer algae," the seaweed *Caulerpa taxifolia* was discovered in June 2000 in a coastal lagoon in Carlsbad, California, within San Diego County. (NMFS 2001). An aggressive clone of this species has already proven to be highly invasive in the Mediterranean Sea, where the governments of France, Spain, Monaco, and Italy have been unable to control its spread. The first confirmed American occurrence of this invasive species in California has caused considerable alarm. The resulting press coverage of the issue led to discovery of a second infestation of *Caulerpa taxifolia* in Huntington Harbor in Orange County (about 75 miles [121 km] north of the Carlsbad occurrence). Efforts are underway to eradicate *Caulerpa taxifolia* from California and control its spread before the infestation reaches the magnitude seen in the Mediterranean. *Caulerpa taxifolia* is a green alga native to tropical waters that typically grows to small size and in limited patches. In the late 1970s this species attracted attention as a fast-growing and decorative aquarium species that became popular in the saltwater aquarium trade.

This alga poses a substantial threat to marine ecosystems in southern California, particularly to the extensive eelgrass meadows and other benthic environments that make coastal waters such a rich and productive environment for fish and birds (NMFS 2001). The eelgrass beds and other coastal resources that could be directly impacted by an invasion of *Caulerpa* are part of a food web that is critical to the survival of numerous native marine species. *Caulerpa taxifolia* has not been found outside of bays and/or estuaries in southern California and should not be a major concern to the construction activities. *Caulerpa* was not observed at the project area during dive surveys conducted in 2003 (SCE 2003).

<u>Undaria pinnatifida</u>

Undaria pinnatifida is a golden brown kelp native to the Japan Sea. It has been introduced in Australia, New Zealand, and Europe and has now spread to the California coastline. It has most recently been found in the Santa Barbara harbor. In Japan it is known as wakame and is extensively cultivated as a fresh and dried food plant. However, it has the potential to become a major pest in our coastal waters. *Undaria* grows to between 3 to 7 feet (1 and 2 m) tall and is found in sheltered harbor waters on rocks, breakwaters, and marine debris from the low-tide mark to 50 feet (15 m). A mature plant has a distinctive, spiraled (frilly), spore-producing structure at its base. It also has an obvious central stem to 4 inches (10 cm) wide that extends for the length of the plant. The blade may be up to 3.1 feet (1 m) wide and extends from the tip of the plant for half the length of the plant. *Undaria* was not observed at the project area during dive surveys conducted in 2003 (SCE 2003).

4.1.2 Essential Fish Habitat

The Magnuson-Stevens Act defines Essential Fish Habitat (EFH) as those waters and substrates necessary (required to support a sustainable fishery and the managed species) to fish(es) for spawning, breeding, feeding, or growth to maturity, i.e., full life cycle (16 U.S.C. Section 1802). These waters include aquatic areas and their associated physical, chemical, and biological properties used by fishes and may include areas historically used by fishes. Substrate types include sediment, hard bottom, structures underlying the waters, and associated biological communities. The Proposed Project is located within an area designated as EFH for two Fishery Management Plans (FMP), including Pacific Coast Groundfish and Coastal Pelagic Species.

The Pacific Coast Groundfish FMP manages 83 species over a large and ecologically diverse area. These species occupy diverse habitats at all stages of their life histories, including larval dispersion that may have an extremely large EFH such as rockfishes that have pelagic eggs and larvae. In contrast, some species may have a discrete or narrow EFH such as some adult rockfishes, which can show strong affinities for specific locations/habitats. The FMP also identifies both fishing-related and non-fishing-related activities that may cause adverse impacts to EFH. For example, non-fishing-related activities that potentially affect groundfish EFH include, but are not limited to, dredging, fill, excavation, mining, impoundment, discharge, water diversions, thermal actions, actions that contribute to non-point source pollution and sedimentation, and introduction of potentially hazardous material.

Detailed life history information on 83 groundfish species along the California coast is presented in the FMP. Diving and trawling surveys indicated that few of these species are present in the vicinity of the Proposed Project (Tables 4.1-1 and 4.1.2). Of the species in the groundfish FMP, the California scorpionfish (*Scorpaena guttata*) was found in association with hard substrate habitats in the project area.

The FMP for Coastal Pelagic Species (CPS) includes five species (4 finfish and 1 invertebrate), including northern anchovy (*Engraulis mordax*), jack mackerel (*Trachurus symmetricus*), Pacific sardine (*Sardinops sagax*), Pacific (chub) mackerel (*Scomber japonicus*), and market squid (*Loligo opalescens*). These species all have wide distributions throughout California, and are taken directly or indirectly with a variety of fishing gear. Gear used to commercially harvest CPS by directed fishing methods include round-haul nets such as purse seines, drum seines, lampara nets, and dip nets. CPS can also be taken incidentally in midwater trawls, pelagic trawls, gill nets, trammel nets, trolls, pots, and hook-and-line techniques.

Coastal pelagic species covered in the FMP are found in variable abundance and densities, and are targeted by commercial fishermen. The managed pelagic species likely to occur within the project area are Pacific sardine, Pacific mackerel, northern anchovy, and jack mackerel.

Existing Habitat Conditions

The habitat in the vicinity of the SONGS Unit 1 intake and discharge conduits includes intertidal and subtidal sandy substrate, and hard bottom subtidal substrate, e.g., bedrock, riprap, on top of or immediately adjacent to the discharge conduits. Project actions that could impact fish habitat include: (1) changes in substrata, (2) impacts on vegetation (food) habitat, and (3) impacts on water quality. The following provides a summary of the FMP species and where they might be expected relative to the project location.

Biological Descriptions for Groundfish and Coastal Pelagic Species

Northern Anchovy

Northern anchovy range from British Columbia to the Gulf of California. Larvae and juvenile individuals are abundant in nearshore and estuarine areas while adults dominate the oceanic populations. The species is not migratory but do move inshore-offshore and along the shore on a seasonal basis. Spawning occurs throughout the year depending upon location. In southern California, spawning occurs between January and May. Larvae feed on planktonic organisms such as copepod eggs and nauplii, dinoflagellates, rotifers, ciliates, and foraminifers. Juveniles and adults generally eat phytoplankton, planktonic crustaceans, and fish larvae. Northern anchovy are very abundant in the California current and provide food for a wide variety of fish, birds, and marine mammals. They are considered an indicator of environmental stress due to their response to low dissolved oxygen and water-soluble fractions of crude oil (Emmett et al. 1991).

Pacific Sardine

Pacific sardine is a wide-ranging species found throughout the Atlantic Ocean and Pacific Ocean. This pelagic species, commonly found offshore, exhibits seasonal migration. Older adults travel from Baja California and southern California spawning areas to feeding grounds in the northern Pacific coastal waters. Juveniles remain in the nearshore waters of southern California. Sardines can be the most abundant species in nearshore waters. Spawning occurs year-round with a peak from April to August in southern California. Sardines feed on both phytoplankton and zooplankton. Numerous fishes, birds, and marine mammals consume adult sardines, while larvae are eaten by planktivores (NMFS 1998).

Pacific Mackerel

Pacific mackerel is also a pelagic species ranging from Banderas Bay, Mexico to southeastern Alaska in the eastern Pacific Ocean. Spawning occurs between Eureka, California and Cabo San Lucas, Baja California between 2 and 200 miles (3 and 320 km) offshore. Peak spawning occurs between late April and July. Reproduction is closely correlated with available food, occurring independent of seasons. Mackerel feed on zooplankton, small fishes, fish larvae, squid, and pelagic crustaceans. Marine mammals, large fishes, and birds feed on Pacific mackerel. Because they are larger, Pacific mackerel are less important as forage than Pacific sardine and northern anchovy (NMFS 1998).

Jack Mackerel

Jack mackerel is a schooling species ranging throughout the northwestern Pacific from Cabo San Lucas, Baja California to the eastern Aleutian Island, Alaska. Juveniles are found near shore while other adults are generally oceanic. Spawning occurs between February and October off California. They forage on large zooplankton, squid, and anchovy. Larger fish such as tuna and billfish consume Jack mackerel (NMFS 1998).

California Scorpionfish

California scorpionfish range from Santa Cruz, California to Uncle Sam Bank, Baja California. This benthic species is found on both sandy and rocky substrates. Juvenile fish live in shallow habitats with dense algae and encrusting organisms. Spawning occurs between May and September with peak spawning in July. Egg masses float near the water surface (EFH 1998).

4.1.3 Other Special Status or Species of Concern

California Grunion

The California grunion is common south of Point Conception, California to Magdalena Bay, Baja California in nearshore waters from the surf to a depth of 60 feet (18 m). Grunion travel from their habitat in nearshore waters to specific sandy beaches just after certain full and new moons in conjunction with spawning. Grunion on San Diego beaches are typically found on the long, gently sloping beaches with moderately fine grain size and sand depths typically ranging up to 2 to 3 feet. Grunion are managed as a game species by the CDFG. Their spawning season occurs from March to August, with the peak season falling between late March and early June.

Grunion eggs are deposited in the sand during the highest tide and incubated in the lower levels, safe from wave action. They are kept moist by residual water in the sand and hatch during the next high tide series when they are inundated with seawater and agitated by the rising surf. This occurs in approximately 10 days. It is not known if grunion utilize the sandy beaches in the vicinity of SONGS for spawning. The beach directly in front of SONGS is dynamic and experiences seasonal sediment movement, with sand present during the summer months and cobble present during the winter.

Abalone Species

Abalone occur in coastal water intertidally to 200 feet (61 m) in depth. They are found in boulder and rock habitat, and are generally associated with kelp forests. Several species may be found occupying the same coastal range, but are usually separated by depth. Red abalone occur along the entire California coastline, while pink, green, and white abalones are associated with the warm, temperate water south of Point Conception. Black abalone occur from San Francisco to Baja California.

The decline and, in most cases, closure of California's abalone fisheries in the late 20th century is due to a variety of factors, primarily commercial and recreational fishing, disease, and natural predation. Withering Syndrome, a lethal bacterial infection, has caused widespread decline among black abalone in the Channel Islands. Withering Syndrome also affects red, pink, green and white abalones in captivity, but the syndrome's impact on wild stocks is not fully known.

Commercial and recreational fishing have reduced abalone populations as well. Five species of abalone were commercially fished: red, pink, green, black and white. When combined, landings for these five species give the impression of a stable fishery; however, individual species landings actually rose and fell in a sequential manner (known as serial depletion). Thus, as landings dwindled for one species, the decline was compensated for by an increase in landings for another species, and the true extent of depletion was not detected until much later.

The black abalone fishery was closed in 1993. Fishing for pink, green, and white abalones (southern California species) was closed in 1996 following stock collapse, and all fishing south of San Francisco was closed in 1997 with the passage of AB 663 (Thompson). This law created a moratorium on taking, possessing, and landing abalone for commercial or recreational purposes in ocean waters south of San Francisco, including all offshore islands.

The following is a brief summary of the abalone species that occur in southern California and may be affected by the Project.

Black Abalone

Black abalone (*Haliotis cracherodii*) usually inhabit surf-battered rocks and crevices from the intertidal zone to shallow subtidal zone down to 20 ft (6 m). It is a long-lived species, attaining an age of 25 years or more. Now a rare species, the black abalone was abundant in California until the mid-1980's. It once occurred in such high concentrations that individuals were observed stacked on top of one another. Density studies conducted at the Channel Islands indicate significant declines attributed to Withering Syndrome. In the vicinity of Point Conception, Santa Barbara County, black abalone populations exhibited mortalities of 39 to 97 percent (CDFG 2001). In 1998, the NMFS added black abalone to the candidate species list for possible listing und the federal ESA.

Green Abalone

Green abalone (*Haliotis fulgens*) prefer shallow water from the low tide zone down to 25 feet (8 m). They are opportunistic drift algae feeders, and eat a variety of drift algae, but prefer red algae. Green abalone may occupy a particular site, called a home site or scar, and abalone larger than one inch seldom leave their home scar to forage, relying solely on drift algae. Smaller individuals actively forage but return to their home scar in the day. Now rare, the green abalone was once a common species in southern California.

Pink Abalone

Pink abalone (*Haliotis corrugata*) occur in a depth range from the lower intertidal zone to almost 200 feet (60 meters), but most are found from 20 to 80 feet (6 to 24 m). It has the broadest distribution of the southern California abalones. In the early 1950's, pink abalone comprised the largest segment of the abalone fishery, about 75 percent (CDFG 2001). By the early 1980's, the commercial pink abalone fishery had expanded throughout its range and the landings dwindled to virtually nothing. Surveys at San Clemente, Santa Catalina, and Santa Barbara Islands in 1996 and 1997 indicated that there were few abalone remaining.

Red Abalone

Red abalone (*Haliotis rufescens*) is the largest abalone in the world and is associated with rocky kelp habitat ranging from the intertidal to the shallow subtidal depths. In southern California, they are exclusively subtidal, restricted to areas of upwelling along the mainland and the northwestern Channel Islands. In central and southern California, red abalone had declined the least of all five species by the time the fishery was closed in 1997. A successful red abalone sport fishery continues in northern California, where SCUBA and commercial take have been prohibited.

White abalone

The white abalone (*Haliotis sorenseni*) is a federal endangered species. This species is a deep-water marine snail, found between 80 and 200 feet (24 and 61 m) on rocky reefs from Point Conception, California to Punta Abreojos, Baja California. White abalone may live dozens of years and attain a length of about 10 inches (25 cm). Abalone are slow-moving creatures confined to a small area for their entire life. They reproduce by broadcasting their eggs and sperm into the seawater. For fertilization to occur, the spawners need to be within 3 feet (0.9 m) of a member of the opposite sex.

During the early 1970s, the Channel Islands were home to 1,000 to 5,000 white abalone per acre. Highly prized for their tender white meat, white abalone were harvested in an intense commercial and recreational fishery that developed during the 1970s, then quickly peaked and crashed as the abalone became increasingly scarce. The fishery for white abalone closed in 1996.

In the 1990s, less than one white abalone per acre could be found in surveys conducted by Federal and State biologists. The rarity of this species within its historical center of abundance prompted the NMFS to list it as a candidate species under the ESA in 1997. In May 2001, the white abalone became the first marine invertebrate to receive Federal protection as an endangered species.

White, red, and black abalone are not known to be present in the vicinity of SONGS; however, green abalone (*Haliotis fulgens*) and pink abalone (*Haliotis corrugata*) have been observed within the San Onofre kelp forest (SCE 2004). Take of any abalone species is prohibited in southern California under a 1997 State moratorium.

4.1.4 Regulatory Setting

Federal Policy

Endangered Species Act

No person subject to U.S. jurisdiction may "take" listed endangered or threatened species within the United States, its territorial seas, or on high seas.

Coastal Zone Management Act

The Coastal Zone Management Act declares that it will be the national policy to: "(1) preserve, protect, develop, and where possible, to restore or enhance, the resources of the Nation's coastal zone for this and succeeding generations; and (2) encourage and assist the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of the land and water resources of the coastal zone, giving full consideration to ecological values." Programs should provide for "the protection of natural resources, including wetlands, flood plains, estuaries, beaches, dunes, barrier islands, coral reefs, and fish and wildlife and their habitat, within the coastal zone."

Migratory Bird Treaty Act

The Migratory Bird Treaty Act states that "it is unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, kill, attempt to take, capture, or kill…any migratory bird, any part, nest, or eggs of any such bird…included in the terms of the conventions between the United States and Great Britain for the protection of migratory birds concluded August 16, 1916 (39 Stat. 1702), the United States and the United Mexican States for the protection of migratory birds and game mammals concluded February 7, 1936, and the United States and the Government of Japan for the protection of migratory birds and birds in danger of extinction, and their environment concluded March 4, 1972."

Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) was amended in 1996 to include a requirement to protect important marine and anadromous fish habitat. EFH was identified for managed species. A project's impact on EFH must be assessed. This assessment must include the following: (1) analysis of the effects, including cumulative effects, of the action on essential fish habitat, managed species in the area, and associated species by life history stage; (2) Federal agencies' views regarding the effects of the action on essential fish habitat; and (3) proposed mitigation.

Marine Mammal Protection Act

It is unlawful for any person subject to the jurisdiction of the United States or any vessel or other conveyance subject to the jurisdiction of the United States to "take" any marine mammal on the high seas. "Take" is defined to include harassment as well as hunting, killing, and capturing. The 1994 amendments to the MMPA further define harassment as "any act of pursuit, torment, or annoyance which has the potential" to: (A) "injure a marine mammal or marine mammal stock in the wild", or (B) "disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering." Sections 101 and 102 of the MMPA prohibit intentional killing or harassment of marine mammals but allow incidental contact in the course of normal vessel operations.

<u>Clean Water Act</u>

Additional criteria for significance have been identified from section 404(b)(1) of the Clean Water Act pertaining to dredged or fill materials. Project alternatives involve dredging or filling of material, and the possibility of increased turbidity of the waters is a potentially significant impact. These criteria include the following:

- in regard to threatened or endangered species, smothering, impairment or destruction of the habitat to which the species is limited. These include water quality, spawning, and rearing areas, cover, food supply, salinity, circulation patterns, and physical removal of habitat;
- a reduction in food web organisms by exposure to contaminants, promoting undesirable competitive species at the expense of indigenous species, smothering, exposure to high levels of suspended particles, destruction of spawning grounds and elimination of the lower trophic levels;
- damage to or destruction of habitats resulting in adverse effects on the biological productivity of wetland ecosystems by smothering organisms, altering hydrology, modifying substrate elevations, altering periodicity or water movement, causing successional change in vegetation, reducing nutrient exchange capacity, and altering current velocity;
- loss of values of recreational and commercial fisheries including harvestable fish, crustaceans, shellfish, and other aquatic organisms used by man; and
- degrading water quality by obstructing circulation patterns.

State Policy

<u>California Endangered Species Act</u>

The CESA (Fish and Game Code section 2050 et seq.) recognizes the importance of endangered and threatened fish, wildlife, and plant species and their habitats. Sections

2052-2098 of the Fish and Game Code "prohibit the 'taking' of any endangered, threatened, or rare plant and/or animal species unless specifically permitted for education or management purposes."

California Coastal Act

The California Coastal Act of 1976 provides for the long-term protection of California's coastline to maintain and enhance coastal resources. Section 30230 states the "marine resources shall be maintained, enhanced and where feasible, restored." The maintenance of the biological productivity and the quality of coastal water to maintain optimum populations of marine organisms is required under section 30231.

Fish and Game Code

There are additional regulations contained in the Fish and Game Code that apply to the Proposed Project and are not included in any of the above listed acts. The following is a summary of applicable regulations.

Section 1700:

It is the policy of the State to encourage the conservation, utilization and maintenance of ocean biological resources under their jurisdiction for the public's benefit. The State will also promote the development of local and distant-water fisheries based in California under international law. Objectives include the maintenance of populations of all species of aquatic organisms to insure their continued existence and support reasonable use.

Sections 1755 and 1801:

It is the policy of the State to maintain sufficient populations of all species of wildlife and native plants and the habitat necessary to ensure their continued existence for the beneficial use and enjoyment of the public. In addition, all species of wildlife and native plants will be perpetuated for their intrinsic and ecological values, as well as for their direct benefits to man.

Sections 3511 and 4700:

Fully protected birds and/or mammals or parts thereof may not be taken or possessed at any time and no provision of this code or any other law shall be construed to authorize the issuance of permits or licenses to take any fully protected bird and/or mammal and no such permits or licenses heretofore issued shall have any force or effect for any such purpose.

4.1.5 Significance Criteria

Adverse impacts to marine biological resources and the existing habitat(s) within the project area could result from direct and indirect physical disturbance or habitat alteration during disposition and anchoring, and from anchor line abrasion. Impacts to marine biological resources would be considered significant if they would result in one or more of the following effects:

- substantially impact fisheries protected under EFH designation;
- substantially impact biologically significant habitats such as surfgrass beds and kelp forests;
- substantially affect the habitat or population of a rare, threatened, or endangered species or species of concern;
- substantially affect the movement of any resident or migratory fish or marine wildlife;
- substantially impact the biological communities associated with the seafloor beyond the footprint of the offshore conduits;
- substantially affect a population of marine mammals, sea turtles, or seabirds;
- expose a marine mammal or sea turtle to contaminants that could cause acute toxicity or bioaccumulation; or
- result in an injury, mortality, or what could be considered a Level A take under the MMPA.

4.1.6 Impact Analysis and Mitigation

This section analyzes the effects of the Proposed Project on marine biological resources. First, the status and sensitivity of the marine biological resources in the project area were determined based on a review of existing literature, interviews with local experts, and consultation with regulatory agencies. These data were then analyzed with respect to potential project-related impacts; compliance with Federal and State statutes, regulations, and rules; and, where necessary, mitigation measures were identified.

Impact BIO-1. Effect on Essential Fish Habitat

Project activities could impact groundfish and pelagic Essential Fish Habitat by disturbing existing habitat from anchoring, excavation, and sedimentation (Class II).

Hard bottom habitat provides substrate for surfgrass, kelp, and other algae, and is Essential Fish Habitat for numerous managed fish species, including various life stages, i.e., larvae, juveniles. A detailed bathymetric and geophysical survey was conducted to identify sandy and hard bottom substrate, with the results used to prepare an anchor plan. The anchoring plan was designed to minimize or eliminate impacts to sensitive marine habitats, i.e., hard bottom substrate (Appendix D). The crane barge will be moored by three or four-point anchorages. Anchor wires will attach the anchor to winches fastened to the deck of the crane barge. A soft line will be attached to the crown of each anchor and connected to floating buoys to deploy and recover the anchor with minimal disturbance of the bottom. An anchor zone is designated in the anchor plan and consists of a 50-foot-diameter (15-m) circle where an anchor may be placed. In addition, a diving survey will be conducted prior to anchor deployment to verify that there would be no impacts to hard bottom substrate, and proposed anchorages will be moved as necessary.

Anchoring activities would disturb existing soft bottom habitats; however, no long-term significant impacts would occur, with recovery expected within several months. Groundfish species and pelagic species such as northern anchovy and Pacific sardine that are transient to the project area would be able to move away from disposition activities and return after completion. Due to the highly mobile nature of the fishes in the project area and the avoidance of sensitive hard bottom substrate, impacts to groundfish and pelagic Essential Fish Habitat from anchoring would be less than significant as these impacts would be localized and/or transient (Class III).

Impacts to groundfish and pelagic Essential Fish Habitat from excavation and sedimentation would occur by reducing foraging habitat, increasing turbidity, and decreasing water quality (Class II). Water quality impacts from project-induced turbidity and sedimentation would be significant and are discussed in Section 4.3. Mitigation measures to reduce turbidity and water quality impacts to less than significant levels are also discussed in Section 4.3. The removal of the vertical structures would also result in a minor long-term net loss of habitat. Due to the highly mobile nature of the groundfishes and pelagic fishes in the project area, these impacts would be localized and/or transient and less than significant (Class III).

Mitigation Measures for Impact BIO-1: Effects on Essential Fish Habitat

MM WAT-1a through 1d would apply to this impact.

Impact BIO-2. Effect on Biologically Significant Habitats

The Proposed Project could directly impact biologically significant habitats, such as surfgrass beds and kelp forests, by damaging the substrate, and increasing turbidity and sedimentation (Class II).

Small surfgrass beds were observed in the vicinity of manhole risers D-3 and I-3, and hard bottom substrate comprises approximately 19 percent of the habitat within the project footprint. Small stands of giant kelp or individual kelp plants may occasionally be present on hard substrate within the project area (SCE 2003).

Increased turbidity and suspended sediments can have both adverse and beneficial effects on plants and animals. Increased turbidity would reduce light penetration, which may reduce primary production and if persistent could lead to reduced growth and reproductive capacity. The potential benefits of increased turbidity and suspended sediments include higher primary production in areas where nutrients are limiting, if the suspended materials contain and release the limiting nutrients. Disturbance of the sediments could also benefit infaunal invertebrates by increasing the availability of detrital food material (CSLC 1998).

Increased sedimentation can bury surfgrass beds, hard bottom habitat, and kelp forests; however, surfgrass is found in dynamic nearshore areas that may undergo varying degrees of annual sedimentation and can therefore tolerate periods of increased sedimentation (SANDAG 2004). Potential effects of sedimentation on kelp forests are described in Section 4.1.1.

As described in BIO-1, hard bottom substrates would be not be impacted by project activities. Water quality impacts from project-induced turbidity and sedimentation would be potentially significant and are discussed in Section 4.3. Mitigation measures to reduce turbidity, sedimentation, and water quality impacts to less than significant levels are also discussed in Section 4.3. Collectively, impacts to surfgrass beds and kelp forests could be significant but would be less than significant if mitigation measures were implemented (Class II).

Soft bottom habitat is not considered a biologically sensitive habitat, as it is the most common habitat in the project area, and the species identified are abundant and widely distributed (SCE 2003). None of the species identified are federally or State listed as threatened or endangered, and they are generally considered to be opportunistic and would rapidly recolonize disturbed areas. Therefore, project related impacts on soft bottom habitats would be less than significant (Class III).

<u>Mitigation Measures for Impact BIO-2: Effects on Biologically Significant Habitats</u>

MM WAT-1a through 1d would apply to this impact.

Impact BIO-3. Effect on Biological Communities Associated with the Seafloor Beyond the Footprint of the Offshore Conduits

Proposed activities could result in indirect impacts to sensitive habitat beyond the footprint of the Proposed Project (Class II).

Rocky intertidal habitat is present approximately 0.25 miles (400 m) upcoast of SONGS, San Onofre kelp forest is located approximately 0.5 miles (0.8 km) offshore of the project area, and hard bottom substrate that supports surfgrass and giant kelp is located on the perimeter of the project footprint, both upcoast and downcoast of SONGS. Similar to BIO-2, activities may have indirect effects by increasing turbidity and sedimentation beyond the project footprint. This may lead to impacts from reduced productivity and burial of habitat (Class II). However, mitigation measures discussed in Section 4.3 would reduce potential turbidity and sedimentation impacts to less than significant levels.

<u>Mitigation Measures for Impact BIO-3: Effects on Biologically Sensitive Habitats Beyond the Footprint of the Offshore Conduits</u>

MM WAT-1a through 1d would apply to this impact.

Impact BIO-4. Threatened, Endangered, or Species of Concern

No impacts to habitat or populations of a rare, threatened, endangered, or species of concern are anticipated (Class III).

No federally or State listed species (marine mammals, sea turtles, and sea birds are discussed below) are present in the project area, and therefore impacts to threatened or endangered species would not be significant (Class III). No mitigation is required.

California grunion are considered a species of interest due to their unique spawning behavior and concern regarding loss of suitable spawning habitat. For the Proposed Project, the onshore conduits are reportedly buried under 13 to 30 feet (4 to 9 m) of cover, beginning at the existing seawall and terminating at the MLLW, a distance of approximately 65 feet (20 m). Cement plugs would be installed within the onshore conduit inside the underground segments. All plugging work would be performed from inside the SONGS Unit 1 facility and would not affect the sandy beach habitat bordering SONGS. Therefore, impacts to grunion would not be significant, and no mitigation is required (Class III).

Impact BIO-5. Effect on a Population of Marine Mammals, Sea Turtles, or Seabirds

No impacts on marine mammals, sea turtles, or seabirds are anticipated (Class III).

Marine Mammals

The marine mammals that would most likely occur in the area during the disposition period (April through September) are the California sea lion, Pacific harbor seal, and bottlenose dolphin. The project area may be utilized for foraging by these species.

There are several ways the Proposed Project could affect marine mammals and sea turtles: collision with water craft, direct injury from proposed activities, injury related to turbidity, exposure to contaminants, and interference with foraging.

Tugboats with barges would transport all equipment necessary for disposition, at speeds less than 9 miles per hour (8 knots). At that slow speed, marine mammals within the shipping route would easily avoid potential collision by moving out of the way of the oncoming tugboat and barge. Crew boats that would transport divers and other personnel from either Dana Point or Oceanside would travel at a greater speed, but the risk of collision with marine mammals would still be extremely low. Marine mammals are highly mobile and can avoid boat traffic. Marine mammals in the project area are also expected to be habituated to boat traffic, since boating is common in the area.

The mobility of the marine mammals is also important in addressing concern from direct injury from project activities and injury from turbidity. The activity will be localized and limited in extent at any one time. The initiation of activities may result in a startle response from marine mammals present in the project area, and they would be expected to avoid the immediate vicinity. California sea lions and bottlenose dolphins, however, are generally known to be curious and may investigate the activities but are likely to keep their distance. Pacific harbor seals are more wary and would likely stay well away, although they may return to a site from which they have been frightened once they become accustomed to the noise.

The proposed activities may cause any marine mammal present in the project area to leave the area. There are extensive alternative foraging areas adjacent to the project area, and the marine mammals can be expected to return to the area upon completion of the project. Therefore, the Proposed Project is expected to have less than significant impacts on marine mammals (Class III). No mitigation is required.

Marine Birds

The special-status marine birds most likely to occur in the vicinity of the project area include brown pelican, double-crested cormorant, western snowy plover, California gull, elegant tern, and occasionally, California least tern and common loon. All of these species feed on fish and may occasionally utilize the project area for foraging. No breeding colonies for any of the above listed species exist in the project area. Project activities may prevent several of the avian species from foraging in the project area by affecting the distribution of prey species; however, given the relatively small affected area, many other areas would be available that would provide high quality foraging habitat. Therefore, the disturbance to marine birds would be less than significant impact (Class III). No mitigation is required.

Sea Turtles

Since sightings of sea turtles are extremely rare in southern California, it is unlikely that they would be affected by project activities. Therefore, impacts on sea turtles from the Proposed Project would be less than significant (Class III). No mitigation is required.

Exposure to contaminants that could cause acute toxicity or bioaccumulation to marine mammals, sea turtles, and sea birds would be avoided by implementation of the *Oil Spill Response Plan* (Appendix G) as part of the Proposed Project design (Class III). No mitigation is required.

Table 4.1-3 summarizes the marine biology mitigation measures.

Table 4.1-3. Summary of Marine Biology Impacts and Mitigation Measures

Impact	Mitigation Measures
BIO-1: Effect on Essential Fish Habitat	**WAT-1a.** Use closed-cap dredge bucket. **WAT-1b.** Minimize sediment drop height to 10 feet (3 m) maximum. **WAT-1c.** Minimize spoil placement distance from excavation; create heightened spoil profile. **WAT-1d.** Minimize anchor dragging
BIO-2: Effect on biologically significant habitats	**WAT-1a.** Use closed-cap dredge bucket. **WAT-1b.** Minimize sediment drop height to 10 feet (3 m) maximum.

Impact	Mitigation Measures
	WAT-1c. Minimize spoil placement distance from excavation; create heightened spoil profile. **WAT-1d.** Minimize anchor dragging
BIO-3: Effect on biological communities associated with the seafloor beyond the footprint of the offshore conduits	**WAT-1a.** Use closed-cap dredge bucket. **WAT-1b.** Minimize sediment drop height to 10 feet (3 m) maximum. **WAT-1c.** Minimize spoil placement distance from excavation; create heightened spoil profile. **WAT-1d.** Minimize anchor dragging
BIO-4: Threatened, endangered, or species of concern	No mitigation required.
BIO-5: Effect on a population of marine mammals, sea turtles, or sea birds	No mitigation required.

4.1.7 Alternatives

The potential impacts of alternatives were evaluated in light of the goals of the applicable governmental plans and policies, and the significance thresholds defined in Section 4.1.4.

4.1.7.1 Complete Removal of Conduits Alternative

The Complete Removal Alternative would require excavating, removing, and disposing of the entire SONGS Unit 1 cooling water system (all structures, foundations, and other components). This alternative would have greater consequence on the marine environment due to its larger footprint and duration (up to 1 year).

The onshore portion of this work would require as much as 2 acres (0.8 ha) of beachfront for staging and storage of construction materials and equipment, which could pose potential marine biological impacts. The 300-foot-long (91-m) trestle required for removing the conduits and terminal structures would also involve sheet-pile barriers extending 400 feet (122 m) from the beach along the north and south perimeters of the conduits. The placement of these structures, coupled with the clamshell dredging of approximately 15,000 CY (11,500 m^3) of seabed could result in a variety of potentially significant marine biological impacts. In addition, the removal of the pipe sections, the backfilling of sidecast sediments back into the excavation trenches, and the import/placement of 12,000 CY (9,175 m^3) of additional material would cause significant impacts to marine biological resources.

Construction work in the offshore area would create similar impacts as those expected in the nearshore area. Approximately 120,000 CY (91,746 m^3) of sediments would be excavated and an additional 80,000 CY (61,164 m^3) of imported material would be required for backfill. The offshore operations would also require 12 months of construction, which would be conducted concurrently with the onshore activities.

Impact BIO-ALT-1. Effect on Essential Fish Habitat

The Complete Removal Alternative could impact groundfish and pelagic Essential Fish Habitat by disturbing existing habitat from anchoring, excavation, sedimentation, and removal of structures (Class I).

This alternative, like the Proposed Project, would temporarily impact juvenile and adult fishes. The difference lies in the much larger excavation area and duration, which would increase the likelihood of turbidity and sedimentation impacts, and the burial of surfgrass habitat and hard bottom substrate along the nearshore portions of the conduit footprint. This would be considered a significant impact due to the long-term net loss of fish habitat. There are no mitigation measures for habitat loss that would reduce the impact to a less than significant level (Class I) however, the following mitigation measures would lessen the turbidity and sedimentation impacts.

<u>Mitigation Measures for Impact BIO-ALT-1: Effects on Essential Fish Habitat</u>

MM WAT-1a through 1d would apply to this impact.

Impact BIO-ALT-2. Effect on Biologically Significant Habitats

The Complete Removal Alternative could directly impact biologically significant habitats such as surfgrass beds and kelp forests by damaging the substrate, and increasing turbidity and sedimentation (Class I).

As discussed in BIO-ALT-1, this alternative would damage existing surfgrass beds and bury hard bottom substrate, which would be considered a significant impact. There are no mitigation measures for this habitat loss that would reduce this impact to a less than significant level (Class I); however, the following mitigation measures would lessen the turbidity and sedimentation impacts.

<u>Mitigation Measures for Impact BIO-ALT-2: Effects on Biologically Significant Habitats</u>

MM WAT-1a through 1d would apply to this impact.

Impact BIO-ALT-3. Effect on Biological Communities Associated with the Seafloor Beyond the Footprint of the Offshore Conduits

The Complete Removal Alternative could result in indirect impacts to sensitive habitat beyond the project footprint (Class II).

Similar to BIO-2, the Complete Removal Alternative may have indirect effects by increasing turbidity and sedimentation beyond the project footprint. This may lead to reduced productivity and burial of habitat. However, mitigation measures discussed in Section 4.3 would reduce potential turbidity and sedimentation impacts to less than significant levels (Class II).

<u>Mitigation Measures for Impact BIO-ALT-3: Effects on Biologically Sensitive Habitats Beyond the Footprint of the Offshore Conduits</u>

MM WAT-1a through 1d would apply to this impact.

Impact BIO-ALT-4. Threatened, Endangered, or Species of Concern

The Complete Removal Alternative could impact habitat or population of a rare, threatened, endangered, or species of concern (Class II).

As discussed in BIO-4, grunion are the only species of concern in the project area. The Complete Removal Alternative would require 2 acres (0.8 ha) of beachfront, some of which may be suitable grunion spawning habitat, for staging and storage of construction materials and equipment. In addition, construction is expected to last approximately 12 months. If it is determined that the beach is suitable for grunion spawning, the loss of spawning habitat would be considered significant (Class II), but could be reduced to less than significant levels by implementation of the following mitigation measures.

<u>Mitigation Measures for Impact BIO-ALT-4: Threatened or Endangered Species or Species of Concern</u>

MM BIO-ALT-4a. **Preconstruction/Habitat Suitability Survey**. Prior to construction, a survey shall be conducted on the beach area designated to be used for staging and storage to determine if it is suitable for grunion spawning. The presence of cobble with little sand would indicate that the beach would be unsuitable for grunion spawning. If the site is determined to be unsuitable for grunion per this criterion, the California

Department of Fish and Game and other resource agencies shall be notified.

MM BIO-ALT-4b. **Grunion Monitoring.** If the beach is determined to be suitable for grunion spawning and construction overlaps with anticipated grunion runs, a qualified biologist shall be present every night for 6 hours during those dates. Monitoring shall occur for 2 hours prior to the anticipated run, during the published 2 hours, and for 2 hours following. If grunion are observed spawning, the Resident Engineer shall be notified and a buffer zone shall be established. The buffer zone shall extend 65 feet (20 m) shoreward of the high water mark at the spawning area and 100 feet (30 m) upcoast and downcoast (total 200 feet [60 m]). The buffer zone shall be in place a minimum of 14 days to allow the eggs to hatch, and surveys show no subsequent spawning has occurred in the same area. No activities shall occur within the buffer zone until the resource agencies approve.

Rationale for Mitigation

The habitat suitability survey will determine if the beach used for staging and storing disposition equipment would be suitable for grunion spawning. If the beach appears suitable for grunion spawning, then monitoring during grunion runs will document if the beach is utilized. If grunion are not observed, then disposition activities can proceed without concern for grunion spawning habitat. However, if grunion are observed, then the creation of a buffer zone will allow the eggs to incubate and hatch. Subsequent monitoring will be required as grunion generally use the same beach for subsequent spawning events.

Impact BIO-ALT-5. Effect on a Population of Marine Mammals, Sea Turtles, or Seabirds

No impacts on marine mammals, sea turtles, or seabirds are anticipated (Class III).

Similar to impacts associated with the Proposed Project as discussed in Section 4.1.5, impacts from the Complete Removal Alternative would be less than significant (Class III). No mitigation is required.

4.1.7.2 Removal of Nearshore Portion of Conduits Alternative

Similar to the onshore portion of the Complete Removal Alternative, this alternative would essentially involve the same scope of work, and impacts within the shoreline and nearshore area would be identical. Therefore, inshore hard bottom habitat that supports surfgrass and kelp would be buried or damaged. Sensitive hard bottom substrate and other man-made habitat located offshore would not be altered from existing conditions as the terminal structures and associated riprap would be left in place. However, If the subalternative that removes all vertical structures consistent with the Proposed Project were adopted, this alternative would be similar to the Proposed Project in terms of man-made habitat loss; there would be a minor long-term net loss of under this alternative (Class III). No mitigation is required.

Impact BIO-ALT-6. Effect on Essential Fish Habitat

The Nearshore Removal Alternative could impact groundfish and pelagic Essential Fish Habitat by disturbing existing habitat (Class I).

This alternative, like the Complete Removal Alternative, would temporarily impact juvenile and adult fishes. There would be burial of surfgrass habitat and hard bottom substrate along the nearshore conduit footprint. This would be considered a significant impact due to the long-term net loss of essential fish habitat (Class I). There are no mitigation measures for habitat loss that would reduce this impact to a less than significant level; however, the following mitigation measures would lessen the turbidity and sedimentation impacts.

Mitigation Measures for Impact BIO-ALT-1: Effects on Essential Fish Habitat

MM WAT-1a through 1d would apply to this impact.

Impact BIO-ALT-7. Effect on Biologically Significant Habitats

The Nearshore Removal Alternative could directly impact biologically significant habitats such as surfgrass beds by damaging the substrate, and increasing turbidity and sedimentation (Class I).

As discussed in BIO-ALT-6, this alternative would damage existing surfgrass beds and bury hard bottom substrate, which would be considered a significant impact. There are no mitigation measures for habitat loss that would reduce this impact to a less than significant level (Class I); however, the following mitigation measures would lessen the turbidity and sedimentation impacts.

Mitigation Measures for Impact BIO-ALT-7: Effects on Biologically Significant Habitats

MM WAT-1a through 1d would apply to this impact.

Impact BIO-ALT-8. Effect on Biological Communities Associated with the Seafloor Beyond the Footprint of the Offshore Conduits

The Nearshore Removal Alternative could result in indirect impacts to sensitive habitat beyond the project footprint (Class II).

Similar to BIO-2, the Nearshore Removal Alternative would have indirect effects by increasing turbidity and sedimentation beyond the project footprint. This may lead to impacts from reduced productivity and habitat burial (Class II). However, mitigation measures discussed in Section 4.3 would reduce potential turbidity and sedimentation impacts to less than significant levels.

Mitigation Measures for Impact BIO-ALT-8: Effects on Biologically Sensitive Habitats Beyond the Footprint of the Offshore Conduits

MM WAT-1a through 1d would apply to this impact.

Impact BIO-ALT-9. Threatened, Endangered, or Species of Concern

The Nearshore Removal Alternative could impact habitat or population of a rare, threatened, endangered, or species of concern (Class II).

As discussed in BIO-4 and BIO-ALT-4, grunion are the only species of concern in the project area. If it is determined that the beach is suitable for grunion spawning, the loss of spawning habitat would be considered significant (Class II), but could be reduced to less than significant levels through the implementation of the following mitigation measures.

Mitigation Measures for Impact BIO-ALT-9: Threatened or Endangered Species or Species of Concern

MM BIO-ALT-4a and BIO-ALT-4b would apply to this impact.

Impact BIO-ALT-10. Effect on a Population of Marine Mammals, Sea Turtles, or Seabirds

No impacts on marine mammals, sea turtles, or seabirds are anticipated (Class III).

Similar to impacts discussed in Section 4.1.5, impacts from the Nearshore Removal Alternative would be less than significant (Class III). No mitigation is required.

4.1.7.3 Crush Conduits and Remove Terminal Structures Alternative

This alternative would be identical to the onshore portion of the Complete Removal Alternative, except the conduit would be crushed in place. The offshore portion of this alternative would use a crane barge to excavate the seabed material and riprap around the terminal structures, and then remove them down to the tops of the conduits. After the structures were removed, the crane would crush the remaining conduits and manhole risers. The rubble would remain, eventually being buried over time by migrating sediments transported by local currents.

Impact BIO-ALT-11. Effect on Essential Fish Habitat

Activities could impact groundfish and pelagic Essential Fish Habitat by disturbing existing habitat from anchoring, excavation, sediment transport, and noise (Class I).

Sidecasting dredged sand under the Crush Conduits Alternative would result in burial of surfgrass habitat and hard bottom substrate adjacent to the nearshore conduits. This would be a significant impact due to the long-term net loss of fish habitat. There are no mitigation measures for habitat loss that would reduce this impact to a less than significant level (Class I); however the following measures would lessen potential turbidity and sedimentation impacts.

<u>Mitigation Measures for Impact BIO-ALT-11: Effects on Essential Fish Habitat</u>

MM WAT-1a through 1d would apply to this impact.

Impact BIO-ALT-12. Effect on Biologically Significant Habitats

Activities could directly impact biologically significant habitats such as surfgrass beds and kelp forests by increasing turbidity and sedimentation (Class I).

As discussed in BIO-1 and BIO-2, this alternative would damage existing surfgrass beds and kelp forest by increasing turbidity and sedimentation. There are no mitigation measures for habitat loss that would reduce this impact to a less than significant level (Class I); however, the following mitigation measures would lessen potential turbidity and sedimentation impacts.

<u>Mitigation Measures for Impact BIO-ALT-12: Effects on Biologically Significant Habitats</u>

MM WAT-1a through 1d would apply to this impact.

Impact BIO-ALT-13. Effect on Biological Communities Associated with the Seafloor Beyond the Footprint of the Offshore Conduits

Activities could result in indirect impacts to sensitive habitat beyond the project footprint (Class II).

Similar to BIO-2, this alternative may have indirect effects by increasing turbidity and sedimentation beyond the project footprint. This may lead to reduced productivity and habitat burial (Class II). However, implementing the following mitigation measures would reduce potential turbidity and sedimentation impacts to less than significant levels.

<u>Mitigation Measures for Impact BIO-ALT-13: Effects on Biologically Sensitive Habitats Beyond the Footprint of the Offshore Conduits</u>

MM WAT-1a through 1d would apply to this impact.

Impact BIO-ALT-14. Threatened, Endangered, or Species of Concern

Activities could impact habitat or population of a rare, threatened, endangered, or species of concern (Class II).

As discussed in BIO-4 and BIO-ALT-4, grunion are the only species of concern in the project area. If it is determined that the beach is suitable for grunion spawning, the loss of spawning habitat would be considered significant (Class II); however, implementing the following mitigation measures would reduce the impacts to less than significant levels.

<u>Mitigation Measures for Impact BIO-ALT-14: Threatened or Endangered Species or Species of Concern</u>

MM BIO-ALT-4a and BIO-ALT-4b would apply to this impact.

Impact BIO-ALT-15. Effect on a Population of Marine Mammals, Sea Turtles, or Seabirds

No impacts on marine mammals, sea turtles, or seabirds are anticipated (Class III).

Similar to impacts discussed in Section 4.1.5, impacts from conduit crushing would not be significant (Class III). No mitigation is required.

4.1.7.4 Artificial Reef Alternative

The Artificial Reef Alternative would involve only dismantling the terminal structures down to the seafloor and placing a mammal barrier over the opening. The concrete sections would be placed adjacent to the existing rock riprap, creating a larger artificial reef, or the concrete sections could be removed and placed at another reef area in nearby coastal waters.

Impact BIO-ALT-16. Effect on Essential Fish Habitat

Artificial reef construction would have short-term impacts associated with dismantling of terminal structures but would provide long-term benefits by increasing habitat (Class IV).

The Artificial Reef Alternative, like the Proposed Project, would temporarily impact juvenile and adult fishes due to anchoring and dismantling of the vertical structures, but fish populations would not be affected by increased turbidity or sedimentation from excavation. Due to the highly mobile nature of the fishes in the project area, impacts to groundfish and pelagic Essential Fish Habitat would be less than significant as these impacts would be localized and/or transient. The long-term benefit would include the creation of additional hard bottom habitat that would provide refuge and spawning habitat (Class IV).

Impact BIO-ALT-17. Effect on Biologically Significant Habitats

The Artificial Reef Alternative would have no direct or indirect impacts to biologically significant habitats but would provide additional hard bottom substrate for colonization (Class IV).

As described in BIO-1, anchoring activities would not impact sensitive hard bottom substrates, and no excavation that would lead to increased turbidity or sedimentation would be required for the Artificial Reef Alternative. Since the concrete sections would be placed on sandy bottom habitat that supports a less diverse assemblage of nonsensitive species, short-term impacts to these species are anticipated but are not considered significant. Within a short period of time, recovery would occur in the soft bottom habitat, and the concrete sections would be expected to support a diverse assemblage of marine organisms (Class IV).

Impact BIO-ALT-18. Threatened, Endangered, or Species of Concern

The Artificial Reef Alternative would have no significant impact on habitat or population of a rare, threatened, endangered, or species of concern (Class III).

As discussed in BIO-4, grunion are the only species of concern in the project area. The Artificial Reef Alternative would not significantly impact grunion spawning as all activity would be conducted in offshore waters (Class III). No mitigation is required.

Impact BIO-ALT-19. Effect on a Population of Marine Mammals, Sea Turtles, or Seabirds

No impacts on marine mammals, sea turtles, or seabirds are anticipated (Class III).

Similar to impacts described in the Proposed Project discussion, impacts from the Artificial Reef Alternative would be less than significant (Class III). No mitigation is required.

4.1.7.5 No Project Alternative

Under the No Project Alternative, the SONGS Unit 1 intake and discharge conduits would remain in place in their existing condition; therefore, no significant impacts to marine biological resources would occur (Class III). No mitigation is required.

4.1.8 Cumulative Impacts

No significant impacts to Essential Fish Habitat, sensitive marine resources, hard bottom substrate, marine mammals, sea turtles, and sea birds, or grunion would be expected to occur due to the Proposed Project's activities following the implementation of mitigation measures. None of the cumulative projects identified in Section 4.0 would impact marine biological resources, and there would be no adverse cumulative effects.

4.1.9 References

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