

**SECTION 7.0
BIOLOGICAL RESOURCES**

7.1 INTRODUCTION

This section of the Draft Environmental Impact Report (EIR) provides information on biological resources located in the south coast study region (SCSR). Policies and regulations at the federal, state, and local levels that influence biological resources are also discussed. Impacts to biological resources that may result from the proposed Integrated Preferred Alternative (IPA) are identified. Mitigation measures to avoid, minimize, or compensate for these potentially significant impacts will be presented.

7.1.1 Regulatory Framework

Laws and Regulations pertaining to species and habitat protection and management are described below.

7.1.1.1 Federal Laws, Regulations or Policies

7.1.1.1.1 Federal Endangered Species Act. The Federal Endangered Species Act (ESA) protects fish and wildlife species that have been identified by the United States Fish and Wildlife Service (USFWS) or National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries) as threatened or endangered. Endangered refers to species, subspecies, or distinct population segments that are in danger of extinction through all or a significant portion of their range. Threatened refers to species, subspecies, or distinct population segments that are likely to become endangered in the near future. The ESA is administered by the USFWS and NOAA Fisheries. In general, NOAA Fisheries is responsible for protection of ESA-listed marine species and anadromous fishes, whereas listed, proposed, and candidate wildlife and plant species are under USFWS jurisdiction. The ESA was preceded by the Lacey Act of 1900, the Bass Act of 1926, the Migratory Bird Act of 1918, the Endangered Species Preservation Act of 1966, and the Endangered Species Conservation Act of 1969. Amendments to the 1973 ESA were made in 1978, 1979, 1982, and 1988.

7.1.1.1.2 Marine Mammal Protection Act. All marine mammals are protected under the Marine Mammal Protection Act (MMPA). It prohibits, with certain exceptions, the take of marine mammals in U.S. waters and by U.S. citizens on the high seas, as well as the importing of marine mammals and marine mammal products into the U.S.

7.1.1.1.3 Migratory Bird Treaty Act. The Migratory Bird Treaty Act (MBTA) (16 United States Code [USC] Section 703) enacts the provisions of treaties between the United States, Great Britain, Mexico, Japan, and former Soviet Union and authorizes the U.S. Secretary of the Interior to protect and regulate the taking of migratory birds. It establishes seasons and

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bag limits for hunted species and protects migratory birds, their occupied nests, and their eggs (16 USC 703; 50 CFR 10, 21). Most actions that result in taking or permanent or temporary possession of a protected species constitute violations of the MBTA. Examples of permitted actions that do not violate the MBTA are the possession of a hunting license to pursue specific game birds, legitimate research activities, display in zoological gardens, bird-banding, and other similar activities. The USFWS is responsible for overseeing compliance with the MBTA, and the U.S. Department of Agriculture's Animal Damage Control Officer makes recommendations on related animal protection issues. Take under the MBTA is also a state law violation (California Fish and Game Code 3513).

7.1.1.1.4 Federal Sustainable Fisheries Act. The Sustainable Fisheries Act (Public Law 104-297) of 1996 reauthorized and amended the Magnuson Fishery Conservation and Management Act (now Magnuson-Stevens Fishery Conservation and Management Act). The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) was initially enacted in 1976 to define fisheries jurisdiction within federal waters and create the NOAA structure for federal fisheries management. The revisions provided in the 1996 law brought major changes to requirements for preventing overfishing and revitalizing depleted fisheries, mostly through the scientific management and reporting conducted via fisheries management reports.

7.1.1.1.5 Federal Pacific Coast Groundfish Regulations. Federal jurisdiction over Pacific Coast groundfish was established by the Magnuson-Stevens Act of 1976 and implemented in 1982 with the adoption of the initial Pacific Coast Groundfish Fishery Management Plan (Groundfish FMP) (Pacific Fishery Management Council 2008). The Groundfish FMP, which was most recently amended in 2005, seeks to provide a balance between conservation, prevention of overfishing, and maximization of the fisheries' resources. The plan covers 88 species of fish, including sharks, roundfish, groundfish, and flatfish; sets limits on harvest levels; establishes policies for periodic review and revision of regulatory requirements and limitations; and outlines programs for rebuilding depleted stocks. Management considerations such as licensing and permitting, size and bag limits, and net restrictions are outlined for commercial and recreational activities.

Highly migratory species (HMS) are fish that move great distances in the ocean to feed or reproduce. In their migrations, they may pass through the waters of several nations and the high seas. Their presence depends on ocean temperatures, availability of food, and other factors. Highly migratory species are sometimes called "pelagic," which means they do not live near the sea floor, or "oceanic," which means they live in the open sea. They are harvested by U.S. commercial and recreational fishers and by foreign fishing fleets. Only a small fraction of the total harvest of most stocks is taken within U.S. waters.

The Pacific Fishery Management Council (Council) recently developed an FMP for West Coast HMS fisheries. The FMP covers north Pacific albacore, yellowfin, bigeye, skipjack,

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and northern bluefin tunas; common thresher, pelagic thresher, bigeye thresher, shortfin mako, and blue sharks; striped marlin and Pacific swordfish; and dorado (also known as dolphinfish or mahi-mahi). Because these species migrate across international boundaries, they are mainly managed through regional organizations such as the Inter-American Tropical Tuna Commission, which includes countries catching HMS in the Eastern Pacific.

The Department of State, along with NOAA Fisheries, takes a lead role in negotiations at the international level. The Council provides a way for domestic constituents to channel management recommendations to the international level.

Coastal pelagic species include northern anchovy, market squid, Pacific bonito, Pacific saury, Pacific herring, Pacific sardine, Pacific (chub or blue) mackerel, and jack (Spanish) mackerel. “Pelagic” means these fish live in the water column as opposed to living near the sea floor. They can generally be found anywhere from the surface to 1,000 meters (547 fathoms) deep. Five of these species (Pacific sardine, Pacific mackerel, market squid, northern anchovy, and jack mackerel) are managed under the Council’s coastal pelagic species Fishery Management Plan.

Market squid, which make up the largest portion of the coastal pelagic species fishery, are fished at night with the use of powerful lights that attract the squid to the surface. They are either pumped directly from the sea into the hold of the boat or caught with an encircling net.

Coastal pelagic species are found in the Exclusive Economic Zones (EEZ) of Canada, Mexico, and the U.S., as well as in international waters outside the U.S. EEZ. Within the U.S. EEZ, sardines are caught by U.S. commercial fisheries, by party and charter boats, and by anglers. The coastal pelagic species FMP was recently amended to include krill species and to prohibit their harvest.

7.1.1.1.6 Essential Fish Habitat. The Magnuson-Stevens Act defines essential fish habitat (EFH) as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” NOAA Fisheries guidelines state that “adverse effects from fishing may include physical, chemical, or biological alterations of the substrate, and loss of, or injury to, benthic organisms, prey species and their habitat, and other components of the ecosystem.” The coastal pelagic EFH includes habitats for five species: Pacific sardine (*Sardinops sagax*), Pacific mackerel (*Scomber japonicus*), northern anchovy (*Engraulis mordax*), jack mackerel (*Trachurus symmetricus*), and market squid (*Loligo opalescens*). The Pacific Coast groundfish EFH includes habitats for 83 species of groundfish. The EFH for Pacific Coast groundfish is defined as the aquatic habitat necessary to allow for groundfish production to support long-term sustainable fisheries and for groundfish contributions to a healthy ecosystem. Descriptions of groundfish EFH for each of the 83 species and their life stages result in more than 400 EFH identifications. When these EFHs are taken together, the groundfish EFH includes all waters from the mean higher high water line and the upriver

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extent of saltwater intrusion in river mouths, along the coast of Washington, Oregon, and California seaward to the boundary of the exclusive economic zone (EEZ). Under the law of the sea, an exclusive economic zone (EEZ) is a sea zone over which a state has special rights over the exploration and use of marine resources. It stretches from the seaward edge of the state's territorial sea out to 200 nautical miles from its coast. The seven "composite" EFH identifications are as follows: estuarine, rocky shelf, non-rocky shelf, canyon, continental slope/basin, neritic zone, and the oceanic zone.

Pacific salmon EFH includes habitat for three species of Pacific salmon (*Oncorhynchus* sp.): Chinook (*O. tshawytscha*), Coho (*O. kisutch*), and Puget Sound pink salmon (*O. gorbuscha*). Puget Sound, Coho, and Chinook salmon EFH does not occur in the SCSR. The EFH for these salmon includes the waters and substrate necessary for salmon production to support a long-term sustainable salmon fishery. In the estuarine and marine areas, salmon EFH extends from the nearshore and tidal submerged environments within state territorial waters to the full extent of the EEZ. The Pacific salmon EFH also includes all streams, lakes, ponds, wetlands, and other currently viable water bodies and most of the habitat historically accessible to salmon.

Habitat areas of particular concern (HAPCs) are described in the regulations as subsets of EFH that are rare, particularly susceptible to human-induced degradation, especially ecologically important, or located in an environmentally stressed area. These include estuaries, canopy kelp, seagrass, and rocky reef habitats. Although designated HAPCs are not afforded additional protection under the Magnuson-Stevens Act, potential impacts on HAPCs are considered in consultation regarding federal projects that may affect designated HAPCs.

7.1.1.1.7 Essential Fish Habitat Closures Areas. In June 2006, EFH protection measures were amended to include implementation of discrete area closures for specific gear types. Closure areas were identified by the Pacific Fishery Management Council with the intention of minimizing adverse effects of fishing on groundfish EFH, and included EFH, HAPC, and EFH conservation areas. Of these, only the EFH conservation areas are closed to specific types of fishing.

7.1.1.1.8 Non-trawl and Trawl Rockfish Conservation Areas. The coast wide commercial rockfish (*Sebastes* sp.) conservation area (RCA) was established in January 2003 by NOAA Fisheries to protect and assist in rebuilding of stocks of lingcod (*Ophiodon elongatus*) and seven species of rockfishes. Within the RCA in the SCSR, take and possession of federal groundfish species and ocean whitefish (*Caulolatilus princeps*) is prohibited with the following gear types: trawl nets, traps, hook and line gear (including longline gear), set gill and trammel nets, and spear. Trawl and non-trawl RCAs vary seasonally and regionally. Effective protection equivalent to that of a marine protected area (MPA) occurs where the RCA is closed year-round to particular gear types.

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7.1.1.1.9 Cowcod Conservation Areas.¹ The first stock assessment of cowcod (*Sebastes levis*) was completed in 1999, the results of which led to cowcod being declared “overfished.” Soon after, management measures were taken by both state and federal agencies to curb the catch of cowcod statewide. In the Southern California Bight (bight), access to the shelf has been restricted by implementation of depth-based Cowcod Conservation Areas. The Cowcod Conservation Areas, implemented in 2001 (Title 14 of the California Code of Regulations Section 27.28(d)), prohibit most bottom-fishing deeper than approximately 20 fathoms (36 m). The bight is the area where cowcod are most abundant, where adult habitat is most common, and where catches are highest.

The closed area includes a 4,200-square-mile area off the Palos Verdes Peninsula extending southwards about 90 miles and westward another 50 miles. A smaller area, the “43-fathom spot,” which lies 40 miles offshore of San Diego and extends northward and offshore to cover 100 square miles, was also designated as part of the closure area.

Cowcod are also managed as a no-retention fishery (i.e., take is prohibited) in the commercial and recreational sectors statewide. Catches after 2000 are less than one metric ton per year, indicating that the effort to minimize cowcod catch has been effective. At no time may rockfish, lingcod (*Sebastes levis*), and associated species (cabezon [*Scorpaenichthys marmoratus*], greenlings of the genus *Hexagrammos*, California scorpionfish [*Scorpaena guttata*], California sheephead [*Pimelometopon pulchrum*], and ocean whitefish) be taken or possessed while fishing in waters 20 fathoms or greater in depth as described by general depth contour lines in the Cowcod Conservation Areas.

7.1.1.2 State Laws, Regulations, or Policies

7.1.1.2.1 California Endangered Species Act. Under the California Endangered Species Act (CESA), the Department has jurisdiction over threatened or endangered species that are formally listed by the state. The CESA is similar to the ESA both in process and substance, with the intention of providing additional protection to threatened and endangered species in California. The CESA does not supersede the ESA, but operates in conjunction with it. Species may be listed as threatened or endangered under both acts, in which case the provisions of both state and federal laws apply, or under only one act. Under the ESA, habitat

¹ Title 14 of the California Code of Regulations Section 27.50. Cowcod Conservation Areas for recreational fisheries are defined as waters which are 20 fathoms in depth and deeper within each of the following two areas. Area 1, generally located around Santa Barbara and San Nicholas Islands and southward (Department 2010g), is an area south of Point Conception that is bound by straight lines connecting the following points in the order listed: 33°50' N, 119°30' W. long.; 33°50' N, 118°50' W.; 32°20' N, 118°50' W; 32°20' N, 119°37' W; 33°00' N, 119°37' W; 33°00' N, 119°53' W; 33°33' N, 119°53' W.; 33°33' N, 119°30' W; 33°50' N, 119°30' W. Area 2, generally located southeast of San Clemente Island (Department 2010g), is a smaller area west of San Diego that is bound by straight lines connecting the following points in the order listed: 32°42' N, 118°02' W.; 32°42' N, 117°50' W; 32°36' 42" N, 117°50' W; 32°30' N, 117°53'30" W; 32°30' N, 118°02' W; 32°42' N, 118°02' W (Department 2010h).

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is protected, while under CESA it is not. Also, independent of the CESA, state law has established “protected” status for certain statutorily identified birds (California Fish and Game Code 3511), mammals (FGC 4700), reptiles and amphibians (California Fish and Game Code 5050), and fish (California Fish and Game Code 5515).

7.1.1.2.2 California Marine Life Management Act. The Marine Life Management Act (MLMA) (Assembly Bill 1241; Statutes of 1998, Chapter 1052) was enacted to promote sustainable marine fisheries, primarily through fishery management plans (FMPs) based on the best readily available scientific and other relevant information. Rather than assuming that exploitation should continue until damage has become clear, the MLMA shifts the burden of proof toward demonstrating that fisheries and other activities are sustainable. Also, rather than focusing on single fisheries management, the MLMA requires an ecosystem perspective including the whole environment. FMPs are prepared by the Department and submitted with implementing regulations for review and approval by the California Fish and Game Commission (Commission). FMPs have been prepared for abalone (*Haliotis* spp.), herring, squid, white seabass (*Atractoscion nobilis*), and nearshore fisheries.

7.1.1.2.3 Recreational Rockfish Conservation Areas. Current California recreational fishing regulations for popular groundfishes limit catch within particular depth zones (specified regionally). These regulations leave certain areas within state waters restricted from fishing year-round. Although most essential groundfish habitat conservation areas are primarily outside of state waters, as of March 31, 2010, the southern management area has severely restricted take of recreational groundfish for following species: canary rockfish (*Sebastes pinniger*), cowcod, and bronzespotted (*Sebastes gilli*) and yelloweye rockfishes (*Sebastes ruberrimus*). The southern management area also contains cowcod conservation areas in which fishing for federally-managed groundfish species is closed year round.

7.1.1.2.4 Ocean Sport Fishing Regulations. The Commission sets hunting and sport fishing regulations including seasons, bag limits, methods and areas of take. Rules are subject to change year to year, and regulations are easily accessible from the Commission. Species that are regulated by ocean sport fishing regulations include many species of finfish, invertebrates, mollusks, crustaceans, and marine plants (Department 2010h).

7.1.1.2.5 California Fish and Game Commission Fishing Regulations. The Commission regulated sport and commercial fishing activities within the SCSR. These regulations are codified in the California Code of Regulations, Title 14. Natural Resources. The regulations are summarized in the Commercial Fishing Digest and Ocean Sport Fishing regulations booklet. The booklets include catch limits for species or species groups, size limits, seasonal closures, area closures (including a list of all state MPAs), gear restrictions, and depth restrictions. Regulations for groundfish species—including rockfish, cabezon, greenlings, and lingcod—are listed for each of five groundfish management areas along the coast. The recreational fisheries for lingcod, rockfish, sub-groups of rockfish, California scorpionfish,

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cabezon, kelp and rock greenlings, California sheephead, ocean whitefish, and other federal groundfish may close early if the annual harvest guideline for any one species or species group is met or is expected to be met prior to the end of the year.

7.1.1.2.6 State Fishery Management Plans.

Abalone Recovery and Management Plan. Severe declines in abalone abundance resulted in total closure of recreational and commercial abalone fishing south of San Francisco, and there are serious concerns about the potential for extinction of the white abalone. The Abalone Recovery and Management Plan (ARMP) was adopted by the Commission in December 2005. The ARMP provides a cohesive framework for the recovery of depleted abalone populations in Southern California, and for the management of the northern California recreational fishery and future fisheries. All of California's abalone species are included in this plan: red abalone (*Haliotis rufescens*), green abalone (*H. fulgens*), pink abalone (*H. corrugate*), white abalone (*H. sorenseni*), pinto abalone (*H. kamtschatkana*, including *H. k. assimilis*), black abalone (*H. cracherodii*), and flat abalone (*H. walallensis*). A recovery and management plan for these species is needed to manage abalone fisheries and prevent further population declines throughout California, and to ensure that current and future populations will be sustainable. The ARMP includes: a) an explanation of the current scientific knowledge of the biology, habitat requirements, and threats to abalone; b) a summary of recovery goals, including alternative conservation and management goals and activities; c) alternatives for allocating harvest between recreational and commercial abalone harvesters; d) an estimate of time and costs required for meeting interim and long-term recovery goals for each species; e) an estimate of the time necessary to meet interim recovery goals, and a description of triggers for review and amendment of strategies; and f) a description of objective, measurable criteria by which to determine whether the goals and objectives of the recovery strategy are being met (Department 2005a).

Abalone take is prohibited in all of the SCSR. The north coast (north of the mouth of San Francisco Bay) is open for the take of red abalone; abalone report cards are required for everyone taking or attempting to take abalone. Abalone report cards (but not fishing licenses) are now required for people under 16 years of age and for those taking abalone on free fishing days. This regulation change will improve the Department's accounting of abalone taken in the fishery.

Market Squid Fishery Management Plan. The commercial market squid (*Loligo opalescens*) fishery is one of the most important in the state of California in terms of landings and revenue. The fishery generates millions of dollars to the state annually from domestic and foreign sales. In addition to supporting the commercial fishery, the market squid resource is an important forage item for seabirds, marine mammals, and other fish taken for commercial and recreational purposes. It is also important to the SCSR marine recreational fishery as a popular bait species. In 2001, the legislature approved SB 209 (Sher), Chapter

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318, Statutes of 2001, which established permanent management authority of the market squid fishery to the Commission. The statutes also require the Commission to manage the squid fishery under the guidelines set forth by the MLMA. The goals of the Market Squid Fishery Management Plan (Market Squid FMP) are to manage the market squid resource to ensure long-term resource conservation and sustainability, and to develop a framework for management that will be responsive to environmental and socioeconomic changes. The Market Squid FMP establishes the management program for California's market squid fishery and procedures by which the Commission will manage the market squid resource (Department 2005b).

Nearshore Fishery Management Plan. The Nearshore Fishery Management Plan (Nearshore FMP) is placed within the context of the MLMA goals, objectives, policies, and mandates. The Department developed a set of goals and objectives for management of the nearshore fishery through the Nearshore FMP. The five goals are to: ensure long-term resource conservation and sustainability; employ science-based decision-making; increase constituent involvement in management; balance and enhance socioeconomic benefits; and identify implementation costs and sources of funding. Each goal is accompanied by objectives, all of which are based directly upon the MLMA.

Nineteen species of nearshore finfish are management under the Nearshore FMP. The species chosen depended on criteria such as changes in catch levels, special biological characteristics, and special habitat needs.

Management measures are developed for each species, including ways to prevent overfishing, rebuild depressed stocks, ensure conservation, and promote habitat protection and restoration (Department 2002a).

White Seabass Management Plan. White seabass are recovering off California from low population levels in the mid to late 1900s. The current recovery is occurring under management designed to provide for moderate harvests while protecting young white seabass and spawning adults through seasonal closures, gear provisions, and size and bag limits. Concern over the decline in white seabass landings and conflict between recreational and commercial fishermen over this resource resulted in legislation requiring the development of a White Seabass Fishery Management Plan (WSFMP). The plan was developed in 1995 through the cooperative efforts of academic and federal fishery scientists, consultants, and fishery constituents. It was subsequently adopted by the Commission in 1996; however, regulations to implement the WSFMP were not adopted at that time. California enacted the MLMA in 1998, granting broader regulatory authority to the Commission for specified commercial fisheries, including white seabass. The MLMA declared that the WSFMP shall remain in effect until amended, but it must be brought into conformance with the MLMA on or before January 1, 2002. This deadline was later extended in order to incorporate the recommendations of the peer review panel. Long-term research goals include development of

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more sophisticated stock assessments and models, expansion of hatchery-reared white seabass studies, collection and analyses of more socioeconomic data, cooperative research with Mexico, and implementation of an ecosystem-based management approach (Department 2002b).

California Spiny Lobster Fishery Management Plan. The Department is working to identify resources and partners that will help develop a California Spiny Lobster Fishery Management Plan (lobster FMP). The Department is considering the California spiny lobster (*Panulirus interruptus*) because it is a key species that supports important recreational and commercial fisheries in the Southern California marine ecosystem. An FMP for lobster also provides an opportunity to integrate any new MPAs on the south coast, implemented under the MLPA, with the management of the species. The plan would eventually be considered by the Commission.

7.1.2 Environmental Setting

The SCSR includes unique ecosystems and encompasses habitats and species that are important for regional marine biodiversity, sustainable resource use, and natural heritage. The Southern California Bight hosts a wide diversity of species, including at least 481 species of fish, 492 species of algae, 4 species of seagrass, 4 species of sea turtles, 195 species of birds, at least 33 species of cetaceans, 7 species of pinnipeds, and over 5,000 species of invertebrates. Several of these species have special status under California and/or the ESA, including white abalone (*Haliotis sorenseni*), tidewater goby (*Eucyclogobius newberryi*), green sea turtles (*Chelonia mydas*), California brown pelicans (*Pelecanus occidentalis californicus*), California least terns (*Sternula antillarum brownii*), Southern sea otters (*Enhydra lutris nereis*), and Guadalupe fur seals (*Arctocephalus townsendi*) (Department 2009a).

This diverse assemblage of species reflects the wide range of habitats in the SCSR. These habitats include the following: deep ocean basins; offshore islands and ridges; estuarine and intertidal environments; biogenic habitats, such as kelp forests and seagrass beds, which host numerous species; and geologic processes, such as oil seeps, that create unique ecological conditions. Some habitats, such as soft-bottom kelp beds which have existed off Santa Barbara County, are found in few other places in the world. A dynamic oceanographic context further increases the biological complexity of the bight, with complicated current patterns, upwelling, retention zones, freshwater plumes, and the interaction of warm and cold biogeographic regimes all playing a role. These unique species, habitats, and oceanographic conditions have contributed to the establishment of several state and federal management areas within the SCSR. Nearly half of the existing state MPAs in California are located within the SCSR as well as 31 state parks (Department 2009a).

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Ecological reserves are established to provide protection for rare, threatened, or endangered native plants, wildlife, aquatic organisms, and specialized terrestrial or aquatic habitat types. Public entry and use of ecological reserves shall be compatible with the primary purposes of such reserves, and subject to the following applicable general rules and regulations, except as otherwise provided for in the special area regulations.

The regulations for ecological reserves can be found in California Code of Regulations Title 14, Section 630, and in Fish and Game Code Section 1580–1586. These regulations are different from those for MPAs. In cases where removal of an MPA designation occurs in an area overlain by an ecological reserve, a change in MPA protection will not result in loss of ecological reserve protections. The following ecological reserves are located within the SCSR (Department 2010f):

- Agua Hedionda Lagoon
- Ballona Wetlands
- Batiquitos Lagoon
- Bolsa Chica Wetlands
- Goleta Slough
- San Dieguito Lagoon
- San Elijo Lagoon
- Upper Newport Bay

Three areas managed by the National Park Service (NPS)—the Santa Monica Mountains National Recreation Area (established in 1978), the Cabrillo National Monument (established in 1913), and the Channel Islands National Park (established in 1980)—are also located within, or adjacent to, the SCSR. In particular, the Channel Islands have been recognized for their unique ecological conditions. Anacapa and Santa Barbara islands were established as National Monuments in 1938 and in 1949; 1 nautical mile around each of these islands was included within the monument boundary. In 1977, the Channel Islands National Monument was designated by United Nations Educational, Scientific, and Cultural Organization (UNESCO) as a part of the International Man and Biosphere Reserve program. In 1980, Anacapa, Santa Barbara, Santa Rosa, Santa Cruz, and San Miguel islands and 1 nautical mile surrounding each of the islands were designated as Channel Islands National Park. Also in 1980, the Channel Islands National Marine Sanctuary was established. Additionally, the Tijuana River National Estuarine Research Reserve and the Tijuana Slough National Wildlife Refuge were designated a Ramsar site, or wetland of international importance, in 2005. It is one of only 24 Ramsar sites in the United States (Department 2009a).

There are several national wildlife refuges located within the SCSR, including Seal Beach National Wildlife Refuge, San Diego Bay National Wildlife Refuge, and Tijuana Slough National Wildlife Refuge. The National Wildlife Refuge System, managed by the USFWS, is a system of public lands and waters set aside to conserve America’s fish, wildlife and plants (USFWS 2010).

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7.1.2.1 Ecosystems and Habitats

Ecosystems and habitats in the SCSR include intertidal zones, rocky reefs, sandy or soft ocean bottoms, kelp forests, submarine canyons, seagrass beds, underwater pinnacles, and seamounts. Seamounts do not occur within state waters, and other habitats, such as pinnacles, are not well mapped. Unique habitats and features also exist within the SCSR such as purple hydrocoral, elk kelp, oil seeps, and shallow hydrothermal vents (Department 2009a).

Habitats found within the SCSR are illustrated on Figures 7-1 through 7-12, and quantified in Tables 7.1-1 and 7.1-2.

**TABLE 7-1
DEPTH ZONES IDENTIFIED BY THE MLPA
MASTER PLAN SCIENCE ADVISORY TEAM**

| Meters (m) | Fathoms (Fm) | Feet (Ft) |
|--------------------|---------------------|---------------------|
| Intertidal | Intertidal | Intertidal |
| Intertidal to 30 m | Intertidal to 16 fm | Intertidal to 98 ft |
| 30 m to 100 m | 16 fm to 55 fm | 98 ft to 328 ft |
| 100 m to 200 m | 55 fm to 109 fm | 328 ft to 656 ft |
| Greater than 200 m | Greater than 109 fm | Greater than 656 ft |

Source: Department 2009a.

Note: All depth figures above and throughout this document have been converted from the SAT guidelines, which are provided in meters. The above numbers have been converted from meters and are rounded to the nearest whole number. For reference, 1.00 m = 0.55 fm = 3.28 ft.

**TABLE 7-2
DEPTH ZONE AS A PERCENT OF SOUTH COAST STUDY REGION**

| Depth Zone | Area (Mi²) | Percentage of Study Region |
|---|------------------------------|-----------------------------------|
| Intertidal to 98 feet (0 to 16 fm) | 702.75 | 29.89% |
| 98 to 328 feet (16 to 55 fm) | 933.37 | 39.70% |
| 328 to 656 feet (55 to 109 fm) | 275.29 | 11.71% |
| 656 feet and deeper (109 fm and deeper) | 438.49 | 18.65% |

Source: Department 2009a.

7.1.2.1.1 Depth Categories. Based on information about fish depth distributions in California, the MLPA Master Plan Science Advisory Team (SAT) has recommended categorizing habitats as they are represented in the depth zones identified in Table 7-1.

The intertidal zone includes habitats such as sandy beaches, rocky shores, tidal flats, and coastal marsh that are subject to periodic tidal inundation. In the 0- to 98-foot depth zone,

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light penetrates to support photosynthetic activity. Beyond 98 feet, light penetration diminishes and different assemblages of species occur. The 328–656-foot depth zone is the approximate depth of the shelf-slope break, which is an area of high diversity characterized by both shelf and slope assemblages. At 656 feet and below, the continental slope drops down to the abyssal plain where deep sea communities occur.

Several of the seven habitats mentioned in the MLPA occur in only one depth zone, while others may occur in several depth zones. The area of each depth zone range within the SCSR is provided in Table 7-2, based on the Department (Department 2008b) delineation of depth zones using Geophysical Data System 91m resolution data. Most of the SCSR is less than 328 feet in depth, although there are significant portions that are deeper, especially on the edges of the basins and canyons of the bight. Subregion 1 (the Santa Barbara coast) is the shallowest portion of the SCSR, with a maximum depth of 911 feet. Subregion 7 (the southern Channel Islands) is the deepest portion of the SCSR, with a maximum depth of 3,938 feet off the northeast corner of San Clemente Island. A number of deeper basins lie between the Channel Islands, outside of state waters, the deepest of which lies between Santa Cruz, San Nicolas, and Santa Barbara Islands (Department 2009a).

7.1.2.1.2 Intertidal Zones. The shoreline represents a transition zone between the marine and terrestrial environments and includes many important intertidal ecosystems and communities. Intertidal zones that have been mapped as linear features along the coastline include rocky shores, sandy beaches, tidal flats, coastal marsh along the shores of estuaries and lagoons, and manmade structures such as piers, jetties, and seawalls. Sandy beaches dominate the shoreline although rocky areas also are present, especially on the Channel Islands. Marsh and tidal flat habitats are less common in the SCSR and generally found in sheltered bays and estuaries. The amount of area of shoreline habitats within the SCSR is summarized in Table 7-3 (Department 2009a).

7.1.2.1.3 Rocky Shores. Rocky shore habitats and their associated ecological assemblages make up less than 25 percent of the SCSR shoreline (not including manmade hardened shorelines). Along the mainland coast, rocky shores are relatively rare and are mostly found in the vicinity of headlands such as Point Conception, Palos Verdes, La Jolla Point, and Point Loma. In contrast, much of the shoreline of the eight Channel Islands is dominated by rocky coast. Exposed rocky cliffs and platforms are the most common types of rocky shores, whereas sheltered rocky shores are relatively rare. The amount of shoreline habitat within the SCSR is summarized in Table 7-4 (Department 2009a).

Rocky intertidal communities, from the splash zone to the lower intertidal zone, vary in composition and structure with tidal height and wave exposure and with underlying geology. Mussel beds (*Mytilus* spp.), algal beds (*Endocladia muricata*, *Hesperophycus californicus*, *Silvetia compressa*, and many other species), and surfgrass (*Phyllospadix* spp.) are distributed patchily along rocky shores and support high biodiversity as these organisms

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**TABLE 7-3
TOTAL HABITAT BY TYPE OCCURRING IN STATE WATERS
IN THE STUDY REGION AND STATEWIDE**

| Habitat | Amount in Study Region | % of SCSR Area | Amount in State Waters | % of State Waters Area |
|---|------------------------------|-------------------|------------------------------|------------------------------|
| Total area (area, sq mi) | 2,350.88 | | 6,947 | |
| Total shoreline (length, mi) | 1,046.45 | | 2,826.5 | |
| Shoreline habitats (length, mi) ¹ | | | | |
| Intertidal: rocky shores | 280.72 | 26.83% | 944 | 33.40% |
| Intertidal: sandy beaches | 379.63 | 36.28% | 1,293.5 | 45.76% |
| Intertidal: coastal marsh | 59.49 | 5.69% | 320.3 | 11.33% |
| Intertidal: tidal flats | 28.76 | 2.75% | 280.3 | 9.92% |
| Hard and Soft Bottom Habitats and Canyon (Area, sq mi)² | | | | |
| Total hard- and soft-bottom and canyon habitat | 1,667.54 | | 6,947 | |
| Rocky habitat 0–98 feet | 111.73 | 4.75% | 209.1 | 3.01% |
| Rocky habitat 98–328 feet | 47.79 | 2.03% | 233.7 | 3.36% |
| Rocky habitat 328–656 feet | 3.89 | 0.17% | 139.3 | 2.01% |
| Rocky habitat >656 feet | 2.16 | 0.09% | 144.2 | 2.08% |
| Total rocky habitat (all depths) | 165.57 | 7.04% | 726.2 | 10.45% |
| Soft bottom habitat 0–98 feet | 437.18 | 18.60% | 2,023.3 | 29.12% |
| Soft bottom habitat 98–328 feet | 672.06 | 28.59% | 3,033.7 | 43.67% |
| Soft bottom habitat 328–656 feet | 158.39 | 6.74% | 385.4 | 5.55% |
| Soft bottom habitat >656 feet | 234.34 | 9.97% | 593.7 | 8.55% |
| Total soft bottom (all depths) | 1,501.97 | 63.89% | 6,036.1 | 86.89% |
| Underwater pinnacles | NA | | NA | |
| Estuarine and Nearshore Habitats (Area, sq mi) | | | | |
| Kelp 2005 | 30.4 | 1.29% | 42.2 | 0.60% |
| Kelp 2004 | 31.1 | 1.32% | 45.5 | 0.70% |
| Kelp 2003 | 26.3 | 1.12% | 49.3 | 0.70% |
| Kelp 2002 | 13.1 | 0.56% | 36.6 | 0.50% |
| Kelp 1999 | 11.6 | 0.49% | 23 | 0.30% |
| Kelp 1989 | 17.8 | 0.76% | 53.6 | 0.80% |
| Average kelp | 21.7 | 0.92% | 41.7 | 0.60% |
| Estuary | 42.95 | 1.83% | 148.5 | 2.10% |
| Seagrass: surfgrass (Length, mi, % of shoreline) | 72.43 | 6.92% | NA | |

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**TABLE 7-3 (CONTINUED)
TOTAL HABITAT BY TYPE OCCURRING IN STATE WATERS
IN THE STUDY REGION AND STATEWIDE**

| Habitat | Amount in Study Region | % of SCSR Area | Amount in State Waters | % of State Waters Area |
|---------------------------------|--|-------------------|------------------------------|------------------------------|
| Seagrass: eelgrass ³ | 4.69 | 0.20% | 41.7 | 0.60% |
| Oceanographic Habitats | | | | |
| Upwelling center ⁴ | 1 major center at Point Conception | | 5 major centers | |
| Retention area | Gyre within Southern California Bight acts as a retention zone | | NA | |
| Freshwater plume | Coastal river mouths | | NA | |

Source: Department 2009a.

1. Shoreline percentages may add up to more than 100 percent since more than one type can be present in a given location. Not all shoreline types, such as hardened shorelines, are listed here. Please see below for a list of all shoreline types and their distances in the SCSR.
2. Substrate data represent a union of data collected by Rikk Kvittek from the Seafloor Mapping Lab at California State University Monterey Bay, Fugro Pelagos Incorporated, United States Geological Survey (USGS), Ocean Imaging, and the San Diego Association of Governments (SANDAG).
3. Eelgrass data is comprised of mapped eelgrass in bays and estuaries and does not include areas of eelgrass on the open coast, for which only simple presence/absence data are available.
4. Upwelling occurs when surface waters, driven offshore by prevailing westerly winds, are replaced by deep, cold, nutrient-rich waters that flow up over the continental shelf to the surface. Major upwelling centers in the state include: Cape Mendocino, Point Arena, Davenport, Point Sur, Point Conception.

create structure to which larval organisms can settle and juveniles can find protection from predators and harsh environmental conditions. Such areas are sometimes characterized as “biogenic habitats.” In addition, intertidal boulders, platforms, cliffs, and tidepools are home to many species of snails, algae, barnacles, mussels, anemones, crabs, sea stars, and fish. Also, the mostly rocky shores of the Channel Islands and sandy beaches near rocky points on the mainland coast host a number of rookery/haulout sites for pinnipeds, including harbor seals (*Phoca vitulina richardsi*), California sea lions (*Zalophus californianus californianus*), and Northern elephant seals (*Mirounga angustirostris*), as well as colony/roosting areas for seabirds, including pigeon guillemots (*Cepphus Columba*), pelagic cormorants (*Phalacrocorax pelagicus*), Brant’s cormorants (*Phalacrocorax penicillatus*), and Xantus’s murrelets (*Synthliboramphus hypoleucus*) (Department 2009a).

The following rocky shore types have been mapped in the SCSR by NOAA for the Environmental Sensitivity Index program (Department 2009a):

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**TABLE 7-4
SUMMARY OF THE AMOUNT OF SHORELINE HABITATS IN SCSR**

| Shore Type | Length in Study Region (mi) | Percentage of Total Shoreline in SCSR |
|--|--------------------------------|--|
| Exposed rocky cliffs | 125.4 | 12.0% |
| Wave cut rocky platforms | 150.6 | 14.4% |
| Exposed wave cut platforms in bedrock | 4.1 | 0.4% |
| Sheltered rocky shores | 0.6 | 0.1% |
| Fine to medium grained sand beaches | 246.3 | 23.5% |
| Coarse-grained sand to granule beaches | 59.5 | 5.7% |
| Mixed sand and gravel beaches | 29.2 | 2.8% |
| Gravel beaches | 105.8 | 10.1% |
| Salt marshes | 59.5 | 5.7% |
| Exposed tidal flats | 20.4 | 2.0% |
| Sheltered tidal flats | 14.3 | 1.4% |
| Sheltered manmade structures | 191.4 | 18.3% |
| Exposed seawall (manmade) | 12.4 | 1.2% |
| Riprap (manmade) | 135.4 | 12.9% |
| Total shoreline length in SCSR | 1,046.45 | 100% |

Source: Department 2009a.

- **Exposed Rocky Cliff:** A steep intertidal zone (greater than 30 degrees slope) with little width and little sediment accumulation. Strong vertical zonation of intertidal communities; barnacles, limpets, mussels, and algae are key species groups associated with exposed rocky cliffs. Over half of the rocky shoreline in the SCSR falls into this category.
- **Wave-cut Rocky Platform:** Includes flat rocky bench of variable width with irregular surface and tidepools. The shore may be backed by scarp or bluff with sediments or boulders at base. There may be some sediment accumulation in pools and crevices. Habitat supports rich tidepool and intertidal communities; barnacles, limpets, rockweed, mussels, turfweed (*Endocladia muricata*), and surfgrass are key species groups associated with wave-cut rocky platforms. Nearly half of the rocky shoreline in the SCSR falls into this category. A small amount, near Point Conception, is cut into bedrock.
- **Sheltered Rocky Shores:** This describes bedrock shores of variable slope (cliffs to ledges) that are sheltered from wave exposure. Algae, sea anemones, barnacles, and snails are key species groups associated with sheltered rocky shores. Sheltered rocky shores (not including manmade hardened shoreline) are rare in Southern California and exist in limited locations on Santa Cruz and Santa Catalina islands.

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7.1.2.1.4 Sandy Beaches. Over one third of the SCSR is covered by sandy shorelines with the majority of the mainland coast dominated by nearly continuous sandy beaches. Sandy beach communities are structured in large part by grain size, slope of the beach, and wave energy. Most Southern California beaches are made up of fine-grained sand, however a significant number of coarse-grained gravel beaches exist on the Palos Verdes headland. Beaches with intermediate-sand-grain sizes also exist throughout the SCSR. Beaches are dynamic systems that change with wind and waves; generally, sand is eroded from beaches in the winter and re-deposited in the summer, resulting in annual changes in beach slope and width. Seasonal fluctuations in sand abundance are affected by the creation of hardened shores and of sand-retention structures such as groins. Sandy beaches also change over time, and these long-term changes and erosion rates are also affected by what backs the beach. Beach nourishment, the intentional addition of sand to beaches, occurs within the SCSR in several locations. A variety of invertebrates live in the sand and in wracks of decaying seaweed and other detritus on the sand surface, although accumulation of these materials is moderated in many locations. Snails, bivalves, crustaceans, insects, spiders, isopods, amphipods, and polychaetes are among the organisms that inhabit sandy beaches, and several serve as food sources for larger vertebrates, including the federally endangered western snowy plover. Other species, including the western snowy plover and California least tern and many pinnipeds, utilize sandy beaches for resting or rearing young. Sandy beaches play a central role in the lifecycle of some fish species, such as the California grunion (*Leuresthes tenuis*), which lays its eggs on Southern California beaches throughout the SCSR (Department 2009a).

Beach types in the SCSR have been mapped as linear shoreline features and classified based on grain size (Department 2009a):

- **Fine- to Medium-grained Sand Beach:** A flat, wide, and hard-packed beach which undergoes significant seasonal changes in width and slope. Upper beach fauna are scarce; lower beach fauna include sand crabs. These beaches make up nearly one-fifth of the SCSR and a large percentage of the mainland shore.
- **Coarse-grained Sand Beach:** A moderate-to-steep beach of variable width with soft sediments. It may be backed by dunes or cliffs; fauna are scarce. These beaches are less abundant in the SCSR than fine-grained and gravel beaches. They are often located near river mouths and estuaries.
- **Mixed Sand and Gravel Beach:** A moderately sloping beach with a mix of sand and gravel, possibly including zones of pure sand, pebbles, or cobbles. The sand fraction of such beaches may be transported offshore in winter. More stable substrata support algae, mussels, and barnacles. This is the least abundant beach type in Southern California, occurring mostly in the Channel Islands and in isolated pockets on the mainland coast.

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- **Gravel Beach:** A beach composed of sediments ranging from pebbles to boulders, often steep and with wave-built berms. Lower stable substrata host attached algae and small invertebrates. Gravel beaches, including boulder beaches, make up approximately one-tenth of the shoreline in the SCSR, occurring on the mainland as well as offshore islands, with large portions on Palos Verdes, Santa Catalina, and San Clemente. Although intertidal boulder fields are included with gravel beaches, they can be ecologically similar to rocky intertidal habitats.

7.1.2.1.5 Coastal Marsh and Tidal Flats. Coastal marshes support high levels of productivity and provide habitat for many species. Marshes also regulate the amount of fresh water, nutrient, and sediment inputs into the estuaries and improve water quality through filtration and other natural mechanisms (such as plant uptake). The position of marshes throughout the SCSR along estuarine margins and their dense stands of persistent plants also make them essential for stabilizing shorelines and for storing floodwaters during coastal storms. Vegetation patterns and dominant species in coastal brackish marshes vary with salinity, which is defined by precipitation patterns and changes in freshwater inputs. Tidal flats and marshes occur throughout the SCSR and are often associated with coastal creeks and rivers as well as bays and estuaries (e.g., Santa Clara River, Upper Newport Bay, and San Diego Bay). Constituting less than three percent of the SCSR, these sandy or muddy expanses that are exposed during low tides provide important foraging grounds for shorebirds due to the abundance of invertebrates such as clams, snails, crabs, and worms. The following shoreline types have been mapped as linear features of the coastline (Department 2009a) (see Table 7-4):

- **Salt Marshes:** Intertidal areas with emergent salt marsh vegetation. The width of marsh varies from a narrow fringe to extensive areas and provides important habitat for a variety of species. Salt marsh occurs throughout the SCSR, including Carpinteria, Point Mugu, upper Newport Bay, Bolsa Chica, and numerous other estuaries within the SCSR.
- **Exposed Tidal Flats:** Include intertidal flats composed of sand and mud, occurring in bays and lower sections of rivers. The presence of some wave exposure generally results in a higher presence of sand than in sheltered tidal flats. Sediments in tidal flats are generally water saturated with the presence of infaunal community that attracts foraging shorebirds. Exposed tidal flats are used by birds as roosting sites. Exposed tidal flats are generally more abundant than sheltered tidal flats in the SCSR.
- **Sheltered Tidal Flats:** Include intertidal flats composed of silt and clay, such as mudflats. Present in calm-water habitats and sheltered from wave exposure, they are frequently bordered by marsh. Soft sediments support large populations of worms, clams, and snails, making them important foraging grounds for migrating shorebirds. Sheltered tidal flats are relatively rare in the SCSR.

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- **Hardened (Human-built) Shorelines:** Nearly one-third of the SCSR shoreline is composed of jetties, seawalls, and other manmade structures. Shorelines in and around major ports and harbors, especially the ports of Long Beach and San Diego, tend to be dominated by this shoreline type (Department 2009a).

7.1.2.1.6 Estuaries and Lagoons. Estuaries form at the mouths of rivers and streams where freshwater and saltwater meet. Specific characteristics of estuaries vary based on salinity. This salinity may change seasonally and over longer timeframes depending upon freshwater inputs and creation or removal of barriers between the estuary and the open coast. Two kinds of estuaries exist within the SCSR: bodies of water that are permanently or semi-permanently open to the ocean, and bodies of water that are seasonally separated from the sea by sand bars. The latter of these types, known as “barbuilt estuaries,” generally have a low level of freshwater inputs and are referred to as “lagoons.” Estuaries in the SCSR contain open water and soft-bottom habitats, as well as coastal marsh and tidal flats and eelgrass beds. The SCSR contains at least a portion of nearly 40 estuaries and lagoons. The largest estuaries in the SCSR include Anaheim Bay, Newport Bay, and San Diego Bay, which are large systems with significant habitat diversity, including mudflats, shallow areas, and deeper channels. Several other estuaries, such as Mugu Lagoon and Bolsa Chica Wetlands, are relatively large, while most other estuaries and lagoons are under 0.5 square miles in area. Many of these smaller estuaries are seasonally closed to tidal influence by sand bars. The southern portion of the SCSR, particularly from the Long Beach waterfront to the California/Mexico border, has a number of medium- to small-sized estuaries and lagoons. The aerial extent of estuaries in the entire SCSR totals 36.6 square miles, or 1.6 percent of the region. The location and extent of some estuaries and lagoons have changed in recent years as a result of coastal restoration projects. Estuarine restoration projects within the SCSR that have occurred in recent years include efforts within Mugu Lagoon, the Ballona Wetlands, Malibu Lagoon, Bolsa Chica Wetlands, and the Tijuana River Estuary, among others. Throughout the SCSR, especially in the vicinity of major ports and harbors, areas that were historically estuaries have been lined with seawalls, riprap, and other manmade structures (Department 2009a).

Estuaries and lagoons are productive coastal ecosystems that play a key role as nursery habitat for many coastal invertebrates and fish. Estuaries in the SCSR tend to have low freshwater inputs, and therefore generally lack freshwater and anadromous species, such as salmon. Exceptions include small runs of Pacific lamprey as well as small runs of federally endangered Southern California steelhead (*Oncorhynchus mykiss irideus*). In addition, some estuaries host striped mullet, the only species in California to live mostly in freshwater and only return to the ocean to breed. Key species that spend most of their lives in Southern California estuaries include Pacific staghorn sculpin (*Leptocottus armatus*), bay blenny (*Hypsoblennius gentilis*), bay pipefish (*Syngnathus leptorhynchus*), arrow goby (*Clevelandia ios*), cheekspot goby (*Ilypnus gilberti*), shadow goby (*Quietula y-cauda*), as well as California killifish (*Fundulus parvipinnis*), spotted bass (*Micropterus punctulatus*), barred

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sand bass (*Paralabrax nebulifer*), and several species of anchovy (*Engraulis* spp.) and the federally endangered tidewater goby (*Eucyclogobius newberryi*). Species that utilize estuaries seasonally, or for part of their life cycle, include topsmelt (*Atherinops affinis*), California halibut (*Paralichthys californicus*), yellowfin croaker (*Umbrina roncador*), stingray (*Dasyatis* spp.), sharks, and several species of perch and turbot. In addition, coastal bays and estuaries in the region, such as the Tijuana River Estuary, San Diego Bay, Bolsa Chica Wetlands, Mission Bay, and Mugu Lagoon, are important parts of the Pacific Flyway and host thousands of shorebirds and waterfowl on their migrations. Since estuaries and lagoons provide important habitat linkages between marine, aquatic, and terrestrial habitats, their condition is closely tied to the condition of the surrounding watershed. Estuaries provide critical ecosystem services such as filtering sediments and nutrients from the watershed, stabilizing shorelines, and providing flood and storm protection. Estuaries are also utilized for many recreational activities such as fishing, boating, kayaking, wildlife viewing, and interpretation/education activities. The following are brief descriptions of some of the major estuaries and lagoons within the SCSR (Department 2009a):

- **Devereux Lagoon (Slough):** This lagoon and associated finger sloughs are part of 70 acres of wetland habitat inside the 117-acre Coal Oil Point Reserve owned by the University of California Natural Reserve System. The University of California, Santa Barbara's (UCSB) Long Range Development Plan designates the Coal Oil Point Reserve as an Environmentally Sensitive Habitat Area. As a part of the University of California Natural Reserve System, the area is reserved for habitat and wildlife preservation, public education, and academic research. The slough is tidally influenced only during short periods in the winter. A beach berm forms at the mouth of the slough during drier months. Five estuarine fish species are known to occur in the lagoon as well as several special-status coastal birds: common loon (*Gavia immer*), American white pelican (*Pelecanus erythrorhynchos*), brown pelican, double-crested cormorant (*Phalacrocorax auritus*), white-faced ibis (*Plegadis chihi*), osprey (*Pandion haliaetus*), southern bald eagle (*Haliaeetus leucocephalus*), northern harrier (*Circus cyaneus*), peregrine falcon (*Falco peregrinus anatum*), snowy plover (*Charadrius alexandrinus nivosus*), California gull (*Larus californicus*), elegant tern (*Thalasseus [Sterna] elegans*), and black tern (*Chlidonias niger*).
- **Goleta Slough:** Goleta Slough is a small estuary that is part of a larger fragmented wetland area around the UCSB campus and the Santa Barbara Municipal Airport. Within the wetlands area is approximately 101 acres of salt marsh, 15 acres of mudflat, and 4 acres of salt flat. Extensive areas of the historic marsh below the high tide line are isolated from tidal influence by berms and dikes. Tidal flooding is limited to the south-central portion of the slough, extending into several of the major tributaries. A beach berm is mechanically breached periodically to maintain tidal flooding. Fish species in the slough are predominately grunions (which spawn near the mouth), killifish, topsmelt, arrow goby, and mosquitofish (*Gambusia affinis*). Twenty special-status bird species

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have been identified: California brown pelican, southern bald eagle, peregrine falcon, snowy plover, sandhill crane (*Grus canadensis*), common loon, American white pelican, double-crested cormorant, whitefaced ibis, fulvous whistling-duck (*Dendrocygna bicolor*), harlequin duck (*Histrionicus histrionicus*), northern harrier, golden eagle, osprey, longbilled curlew (*Numenius americanus*), California gull (*Larus californicus*), elegant tern (*Thalasseus elegans*), and black skimmer (*Rynchops niger*), Belding's savannah sparrow (*Passerculus sandwichensis beldingi*), and California horned lark (*Eremophila alpestris actia*). The Goleta Slough Management Committee, composed of agency representatives, property owners, and public interest groups, has been established to make recommendations and review the Goleta Slough Ecosystem Management Plan and its ongoing implementation.

- **Carpinteria Salt Marsh:** This salt marsh and associated reserve are located in Santa Barbara County, due west of the city of Carpinteria, and 20 miles east of the UCSB campus. The total habitat area for the entire reserve is 230 acres, of which the University of California owns 120 acres. This reserve includes an estuary, extensive wetland and channel habitats, and some upland habitats. The reserve supports many sensitive plants, such as the salt marsh bird's-beak, and bird species such as the light-footed clapper rail (*Rallus longirostris levipes*) and Belding's Savannah Sparrow. It is also an important regional nursery area for California halibut (*Paralichthys californicus*) and other marine and estuarine fish. As part of the Ash Avenue Restoration Project, an on-site interpretative center, a teaching amphitheater, and a nature trail have been provided to enhance public outreach at the Carpinteria Salt Marsh Nature Park.
- **Mugu Lagoon:** Mugu lagoon is part of a wetlands area owned by the U.S. Navy and is within the Point Mugu Naval Air Warfare Weapons Station. The lagoon comprises 287 acres of open water, 128 acres of tidal flats, 40 acres of tidal creeks, and 944 acres of tidal marsh. The tidal connection is through an inlet in the barrier beach, which migrates seasonally. The tidal prism is described as large relative to the volume of water remaining in the lagoon at low tide. Fish surveys collected 18 species, with topsmelt, California killifish, mosquitofish, arrow goby, staghorn sculpin, and arroyo chub occurring most frequently. The following special-status birds have been reported within the lagoon: Pacific loon (*Gavia pacifica*), ashy storm-petrels (*Oceanodroma homochroa*) and black storm-petrels (*Oceanodroma melania*), American White and California brown pelicans, double-crested cormorant, least bittern, white-faced ibis, fulvous whistling-duck, harlequin duck, Barrow's goldeneye (*Bucephala islandica*), osprey, bald eagle, northern harrier, Swainson's hawk (*Buteo swainsoni*), peregrine falcon, sandhill crane, long-billed curlew, laughing gull (*Leucophaeus atricilla*), California gull, elegant tern, black tern, black skimmer, Xantus's murrelet, rhinoceros auklet (*Cerorhinca monocerata*), large-billed savannah sparrow (*Passerculus rostratus*), and tricolored blackbird (*Agelaius tricolor*). Harbor seals use the beach and sand bars near the lagoon mouth for hauling out

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and pupping. Several wetlands restoration projects have been undertaken by the Navy in the lagoon since 1995.

- **Malibu Lagoon:** The California Department of Parks and Recreation owns the Malibu Lagoon, which is located at the mouth of a canyon where Malibu Creek meets the Pacific Ocean, and comprises 28 acres of estuarine open water, tidal channels, and mudflats. An additional 18 acres of salt marsh are adjacent to the lagoon. Year-round flow, caused by irrigation water inputs, creates a higher summer water level than would occur naturally. Treated wastewater is discharged upstream of the lagoon as well, although it is prohibited during the dry season (April through November). A number of estuarine species, including California grunion, as well as endangered Southern California steelhead and tidewater gobies, utilize the estuary. Special-status birds, including the California brown pelican, California least tern, Double-crested Cormorant, California Gull, western snowy plover, and Elegant Tern, have been reported from the lagoon. Restoration efforts are underway to increase tidal circulation, create additional islands for bird usage, and expand salt marsh habitat.
- **Ballona Wetlands:** The Ballona Wetlands are adjacent to Marina Del Rey in Los Angeles County. The Ballona Wetlands are divided into three areas totaling 543 acres in size, although historically the wetlands covered over 2,000 acres. The Ballona Wetlands are divided by Ballona Creek and several major roads. There is also a Freshwater Marsh, built between 2001 and 2003 as part of mitigation for a nearby development project, on the southeastern edge of the wetlands. Ballona Creek is channelized through the wetlands; the sides are lined with concrete, paving stones, and riprap, although the channel bottom is not armored. The Ballona Creek watershed drains 130 square miles. Approximately 170 species of plants, 44 species of fish, and numerous bird species are found in and around the wetlands. California least terns and Peregrine Falcons, both endangered species, forage at Ballona Wetlands, while many other species of birds make their home there. Extensive restoration efforts have taken place in the wetlands in recent years, and continue today. Much of the area was recently designated the Ballona Wetlands Ecological Reserve by the Commission. Public access to the wetlands includes bike and walking trails.
- **Anaheim Bay:** Anaheim Bay is one of the largest estuaries in Southern California, with a total of 956 acres. Designated as a National Wildlife Refuge in 1972, this relatively undisturbed salt marsh is highly productive and has provided for rapid growth of some fish species. Fish species found within the bay include topsmelt, goby, anchovy, killifish, California grunion, and pipefish. Special-status birds found within the bay include California least tern and light-footed clapper rail, brown pelican, double-crested cormorant, western snowy plover, California gull, and elegant tern. The establishment of the U.S. Naval Weapons Station at Seal Beach has limited non-military access to the area and contributed to the preservation of this wetland. Dredging of the mouth of the bay has allowed for tidal flow.

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- **Bolsa Chica Wetlands:** Bolsa Chica historically encompassed 2,300 acres of tidally influenced wetlands and large expanses of freshwater wetlands, but this area has been greatly altered over the last 100 years. The Bolsa Chica Wetlands are located in the unincorporated portion of Orange County, surrounded by the city of Huntington Beach, and bordered to the west by the Pacific Coast Highway. Beginning in 1899, much of the historical marsh area had been removed from tidal influence through the construction of a dam, duck hunting ponds, oil drilling pads, and attendant access roads. However, in 2006 nearly 600 acres of Bolsa Chica were returned to tidal flow as the result of the construction of a new ocean inlet. The new inlet was part of a \$148-million restoration project begun in 2004. Inner and Outer Bolsa Bays are not connected to the newly restored wetland. Outer Bolsa Bay is directly connected to Huntington Harbor. Inner Bolsa Bay is owned by the Department and designated as an ecological reserve. The Bolsa Chica Ecological Reserve, which includes Inner Bolsa Bay, has a controlled tidal regime (through the use of flood gates to Outer Bolsa Bay), which fluctuates around mean sea level. A total of 18 different species of fish have been identified in the Outer Bolsa Bay; topsmelt and arrow gobies are the most abundant. California killifish, bay pipefish, Pacific staghorn sculpin, longjaw mudsuckers, diamond turbot, California grunion, and California halibut are also present. Forty-one fish species have been identified in the newly restored full tidal basin. Special-status bird species include: the common loon, American white pelican, California brown pelican, double-crested cormorant, reddish egret (*Egretta rufescens*), elegant tern, white-face ibis, light-footed clapper rail, western snowy plover, long-billed curlew, California gull, California least tern, black tern, elegant tern, black skimmer, and northern harrier. A state marine park exists within this wetland, in addition to the Bolsa Chica Ecological Reserve.
- **Huntington Beach Wetlands Complex:** The complex is located in Orange County near the mouth of the Santa Ana River. The entire complex includes the 168-acre muted tidal Newport Slough, which connects to the ocean through the tidal prism of the Santa Ana River. The Huntington Beach Wetlands Conservancy owns 118 acres of wetlands between the Santa Ana River and Newland Street. These wetlands are divided into parcels and include Talbert Marsh, Brookhurst Marsh, Magnolia Marsh, Newland Marsh, and the Waterfront Wetlands. The restored Talbert Marsh, 25 acres in extent, is the only portion of the wetlands complex connected directly to the ocean through an inlet on Huntington State Beach, and it serves as a refuge for hundreds of species of birds, fish, and other wildlife.
- **Upper Newport Bay:** Upper Newport Bay is located in the town of Newport Beach and receives water from a 154-mile watershed with San Diego Creek and Santa Ana-Delhi Channel draining into the bay. Many different habitat types exist in Upper Newport Bay, including brackish marshes, riparian zones, upland, open water, and mud flats. The diversity of these habitat types helps support a broad and diverse group of species. Upper Newport Bay is considered one of the most important birding sites in North America;

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approximately 200 resident birds inhabit the bay and another 30,000 birds may rest there during migratory season. The Upper Newport Bay Ecological Reserve was established in 1975 and consists of 752 acres of open space, and is managed by the Department. The Community-Based Restoration and Education Program was established in Upper Newport Bay to address environmental degradation within the estuary, including pollution from nonpoint and point sources and siltation. This program has initiated water quality monitoring, annual clean-up events, exotic weed eradication, and habitat restoration efforts.

- **San Mateo Creek and Lagoon:** San Mateo Creek is one of the few undammed creeks in Southern California, making it one of the few creeks where Southern California steelhead can be found. San Mateo Creek flows 22 miles from its headwaters to the Pacific Ocean where it exits just south of the city of San Clemente. At the mouth of San Mateo Creek lies the San Mateo Lagoon, located in the San Onofre State Park. The lagoon is a blind estuary protected from the Pacific Ocean by a sandbar that is breached only after heavy storms. A restoration project to return a sustainable population of Southern California steelhead to the creek has been initiated with funding from Proposition 12, passed in 2000.
- **Agua Hedionda Lagoon:** Agua Hedionda Lagoon is 388 acres in size and located in the city of Carlsbad. The associated 29-square-mile watershed drains into the lagoon via Aqua Hedionda Creek and Buena Creek. The lagoon hosts a number of species, including 81 species of birds, 91 species of fish, and at least 76 benthic invertebrate taxa. The lagoon has been divided into three sections due to transportation infrastructure of Interstate 5. Culverts connect the three sections of the lagoon. The Encina Power Plant, owned by NRG Energy, is situated along the southern edge of the two outermost lagoon sections. The power plant is permitted to withdraw up to 860 million gallons of seawater per day from the lagoon for once-through cooling. There is also a commercial aquaculture facility, Carlsbad Aquafarm, which uses the outer lagoon for growing oysters, mussels, clams, and other seafood, and the Hubbs Sea World Research Institute operates a lab facility on the northern edge of the lagoon which produces hatchery-reared white seabass for ocean enhancement. A portion of the inner lagoon is considered an impaired water body, as it exceeds standards for Coliform bacteria and sediment. The mouth of the lagoon is periodically dredged to maintain tidal flow.
- **Batiquitos Lagoon:** Batiquitos Lagoon is a tidal wetland situated between Carlsbad and Encinitas and is home to 185 bird species, 65 fish species, and a diverse group of marsh, wetland, and upland plants. This coastal lagoon includes upland, intertidal, and openwater habitats. The lagoon is 610 acres in size and associated with a particularly large watershed of 55,000 acres, which drains into the lagoon. As part of a mitigation plan with the Port of Los Angeles, the Batiquitos Lagoon Enhancement Project has been established in recent years, and restoration efforts took place from 1994 to 1997, which

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focused on removing sediment buildup, restricting further fine sediment deposition, and reestablishing tidal flow into the lagoon.

- **San Elijo Lagoon:** The San Elijo Lagoon is a shallow-water estuary located between Solana Beach and Encinitas which supports a well-established community of 319 species of birds, 23 species of fish, 20 species of amphibians and reptiles, and 400 different plants. An 80-square mile watershed drains into the lagoon, mainly via Escondido Creek. The lagoon has been altered by the construction of the railroad, Pacific Coast Highway, and Interstate 5, which all run through the wetland and divide it into restricted basins. Over time, land alteration, reductions in water circulation, loss of tidal flow, and increasing pollution from land uses has resulted in environmental impacts in the lagoon. Through a joint public-private partnership with the County of San Diego, state and federal agencies, and a local conservancy, the 1,000-acre San Elijo Lagoon Ecological Reserve was established in 1983. A need for restoration was identified in the early 1990s and efforts have included periodic dredging and reestablishment of tidal flow.
- **San Dieguito River Mouth Estuary:** The San Dieguito Lagoon is part of the San Dieguito River system, which is located in central San Diego County in the city of Del Mar. The lagoon extends to the Del Mar Beach, although it is often closed off by the beach berm. The watershed drainage area is 346 square miles. Surrounding land uses include undeveloped land (greatest area), open space, and urban areas (least area). Land-use impacts on San Dieguito Lagoon include urban runoff, historic sewage outfalls (closed in 1974), and sedimentation infill. Various restoration efforts have taken place to improve the health of the lagoon's ecosystem, including dredging sediment deposits to increase tidal flushing and keep the river outlet open to the ocean.
- **Los Peñasquitos Lagoon:** Los Peñasquitos Lagoon is 636 acres in size and located north of San Diego in between the cities of La Jolla and Del Mar. The majority of this lagoon is set aside as a state preserve and part of Torrey Pines State Natural Reserve. Approximately 60,000 acres of watershed drain into the lagoon from Carmel Creek and Los Peñasquitos Creek, as well as other small tributaries. Shallow channels, open water, marshes, mudflats, and tidal flats are the major habitats within the lagoon, which supports a broad range of plants, fish, birds, and invertebrates. Los Peñasquitos Lagoon has been degraded over the years due to various land-use changes and development that impeded tidal flow from Highway 1, and local railroad and sewer system development. Two sewage outfalls drain into Los Peñasquitos Lagoon. Urban runoff has contributed to degraded water quality while sedimentation has reduced ocean flow. In response to the anthropogenic impacts on this lagoon's ecosystem, an enhancement program was developed in 1983. This program was able to make open-space land acquisitions, dredge to restore tidal flow, restore habitat, and restore water flow under the infrastructure.
- **San Diego Bay:** San Diego Bay encompasses 22 square miles and is the third-largest bay-estuary system in the state of California, after San Francisco Bay and Humboldt Bay. San Diego Bay contains a number of diverse habitats, including tidal flats, salt marsh,

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and eelgrass beds, especially in the southern portion of the bay. These habitats support many fish species, including anchovy, topsmelt, stingray, bat ray, sand bass, and grunion. Eelgrass beds in San Diego Bay also support the threatened Pacific seahorse (*Hippocampus ingens*) and endangered green sea turtle (*Chelonia mydas*). Several federally listed bird species also utilize the bay, including California least tern, Light-footed Clapper Rail, California brown pelican, Least Bell's Vireo, and the western snowy plover. Sweetwater Marsh, located adjacent to the southern portion of San Diego Bay, encompasses 316 acres of habitat and is designated as a National Wildlife Refuge. The marsh is one of very few locations where salt marsh bird's beak grows.

- **Tijuana River Estuary:** The 2,500-acre estuary was established as a National Estuarine Research Reserve in 1981 and a Wetland of International Importance by the Ramsar Convention in 2005. The estuary is surrounded by the cities of Tijuana, Imperial Beach, and San Diego, and 75 percent of its watershed is in Mexico. Over 370 bird species use the Tijuana River Estuary, which is a key stopover location on the Pacific Flyway. These bird species include the endangered lightfooted clapper rail, California least tern, least Bell's vireo and the California brown pelican. The Tijuana River Estuary is highly variable due to extreme changes in streamflow between wet and dry years. The habitats found within the estuary include beaches, dunes, mud flats, salt marshes, and riparian zones. The estuary is home to at least 29 species of fish, including longjaw mudsucker, California killifish, and arrow goby. The Tijuana River Estuary has had problems with water quality and sedimentation and continues to be threatened by urban, agricultural, and industrial pollutants contained in inflows from the watershed.

7.1.2.1.7 Seagrass Beds. Seagrass habitats are extremely productive ecosystems that support an abundant and biologically diverse assemblage of aquatic fauna. The most common type of seagrass in estuaries and sheltered coastal bays in California is eelgrass (*Zostera marina*). A second variety of eelgrass occurs along the open coast in Southern California, *Zostera pacifica*. Eelgrass is a flowering plant that can form extensive and dense beds which provide a variety of important functions. The long leaves and dense, matted root system of eelgrass beds help prevent erosion and maintain stability in nearshore areas by slowing down water flow, which consequently enhances sediment accumulation and increases recruitment of animal species. Eelgrass beds also provide refuge, foraging, breeding, or nursery areas for invertebrates, fish, and birds. Eelgrass beds are known to be located in protected estuaries and bays throughout the SCSR (e.g., San Diego Bay, Newport Bay, Mission Bay, and Mugu Lagoon historically). Eelgrass beds are also located along the mainland coast and have been found at six of the eight Channel Islands (Santa Rosa, Santa Cruz, Anacapa, San Nicolas, Santa Catalina, and San Clemente islands). The distribution of seagrass along the SCSR has been mapped as linear segments that total 4.69 square miles, or 0.2 percent of the SCSR area, though this figure under-represents the amount of eelgrass present in the SCSR as it does not include open coast eelgrass beds (Department 2009a).

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The most common type of seagrass along the open coast is surfgrass (*Phyllospadix* spp.), also a flowering plant, which forms beds that fringe rocky coastline areas from the zero-tide level to approximately ten to fifteen feet below the zero-tide level. Surfgrass habitat in the SCSR is not well mapped, although its distribution has been mapped by Woodward-Clyde Consultants (1982) as linear segments that total 72 miles, or 6.9 percent of the shoreline, located mostly off the northern Channel Islands as well as off Point Conception, and along the San Diego County coast. Surfgrass serves as an important nursery habitat for a variety of fish and invertebrates, including the California spiny lobster (*Panulirus interruptus*), and as habitat for algae (Department 2009a).

7.1.2.1.8 Kelp Forests. Two different types of kelp forests occur in the state; giant kelp (*Macrocystis pyrifera*) and bull kelp (*Nereocystis lutkeana*), identified as separate habitats for the purposes of this document since each type of kelp forest hosts distinguishable assemblages of organisms. Except for a few records from San Miguel Island, bull kelp does not occur in Southern California; however, the related deepwater elk kelp (*Pelagophycus porra*) occurs at depths of 60–270 feet on rock and sand along the mainland (e.g., Point Loma) and at several of the Channel Islands (Santa Catalina, San Clemente, Santa Barbara, and Santa Cruz). Other kelps typically are smaller or low-lying and may be referred to as understory canopy kelps. These include palm kelps (*Eisenia arborea*, *Pterygophora californica*), boa kelp (*Egregia menziesii*), and oarweeds (*Laminaria* spp., *Agarum fimbriatum*). Giant kelp makes up the most well-known type of kelp forest in the SCSR (Department 2009a).

Giant kelp forms dense canopy areas that are utilized by many kinds of marine life. Giant kelp forests generally form over rocky substrate, thus they are somewhat limited within the SCSR. Areas of particular kelp abundance include Point Conception, Coal Oil Point, Point Dume, Palos Verdes Point, La Jolla Point, Point Loma, and the vicinity of the offshore islands, most notably San Miguel, Santa Rosa, San Nicolas, and San Clemente islands. Giant kelp forests within the SCSR are well mapped at fine-scale resolution. Total kelp abundance in the SCSR has ranged from a low of 12 square miles in 1999, to a high of 31 square miles in 2004. Kelp harvesting is allowed within the SCSR and regulated by the Department (Department 2009a).

Abundance of kelp varies seasonally over time and is affected by biotic and abiotic factors. Studies have shown that distribution and abundance of kelp beds are affected by climatic and oceanographic changes, abundances of grazers, and fishing and other anthropogenic influences. Grazers, especially sea urchins, can play a large role in the abundance and distribution of kelp. Urchin populations can be directly affected by predation by animals such as sea otters, by urchin fishing, and by higher ocean temperatures which may promote disease development or physiological stress which increases mortality. Lobsters and California sheephead, which also are commercially fished, play an important role in limiting urchin populations and, therefore, indirectly affect the abundance of kelp. Sea otters, a major

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urchin predator, are found only in small numbers in the SCSR. Reefs denuded of kelp by sea urchins (e.g., at Santa Barbara, Anacapa, and Santa Cruz islands) would probably return to productive kelp forests in the presence of sea otters or by high recruitment and increased abundance of larger individuals of other urchin predators such as California sheephead (Department 2009a).

Kelp forests are among the most productive marine habitats along the coast of California providing habitat, feeding grounds, and nursery areas for many species of fishes and invertebrates. Juveniles of many nearshore rockfish species occur in the mid-water or upper kelp canopy. Juveniles and adults of many nearshore rockfish species, as well as cabezon, greenlings, lingcod, and many other species, associate with bottom habitats in kelp forests. Giant kelp also provides nutrient subsidies to sandy beaches as wrack washed in tides, forming the basis of the detritus food chain for beach invertebrates and shorebirds (Department 2009a).

While most giant kelp is established on hard or rocky substrate, which allows newly-formed haptera (root-like structure) to attach, there have been documented cases of kelp utilizing polychaete worm tubes as substrate in the soft sediment. After such kelp organisms die, the attached holdfast remains, leaving a substrate for more kelp to grow from. Large giant kelp beds of this nature have grown in the nearshore water off of Santa Barbara County, and existed there until the early 1980s. After large storm events from the 1982/1983 El Niño, most of the giant kelp was ripped out of this area and this unique soft sediment kelp community was nearly wiped out. Subsequent restoration attempts were performed in this area.

During the 1950s and 1960s, forests of giant kelp that were once productive off Orange, San Diego, and Los Angeles counties began to deteriorate. Several factors may have contributed to this decline: pollution from domestic and industrial wastes, increased water turbidity from urban runoff, increased sea urchin grazing caused by a reduction in predators, storms, and low nutrients and high temperatures caused by El Niño conditions. In an attempt to reverse the decline of Southern California kelp forests, various kelp restoration projects have occurred in: Del Mar, in San Diego County; Newport Beach, Laguna Beach and at Reef Point in Orange County; along the inside of the Long Beach Breakwater, the Palos Verdes Peninsula, and Escondido Beach in Los Angeles County; and Carpinteria Reef, Tajiguas Kelp Habitat, and Gaviota and Hope Ranch in Santa Barbara County (Department 2009a).

As of 2008, three organizations have active kelp-restoration projects in the SCSR: Santa Monica Baykeepers works to restore kelp in Escondido Beach in Malibu and the Palos Verdes Peninsula, the Aquarium of the Pacific has been active in restoring Crystal Cove State Park and Laguna Beach sites, and MBC Applied Environmental Sciences has been restoring sites at Laguna Beach in Orange County. Several techniques have been used to reestablish and restore kelp beds that have either been lost or destroyed by natural or

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manmade processes. Some of these techniques include sea urchin control, kelp transplanting, competitive seaweed control, suitable substrate addition, using concentrated sporophyll bags to seed the restoration site, and securing plants into the sediment. Kelp also can be restored or introduced into areas through the use of properly designed artificial reefs. Artificial reefs, such as those at Mission Beach, Topanga, and Pitas Point may be designed to provide habitat for kelp. All three reefs listed above have produced kelp canopies. In 1999, Southern California Edison constructed an extensive experimental reef designed to recruit and sustain kelp canopies off San Mateo Point as part of an agreement to mitigate for canopies lost due to the operation of the San Onofre Nuclear Generating Station. This experiment proved to be successful and led to a larger reef which was completed in 2008. The reef was constructed with quarry rock from Santa Catalina Island and spans approximately 150 acres. This reef was designed specifically to mimic natural reefs (Department 2009a). See Figures 7-7 through 7-12 for additional information on kelp habitat coverage within the SCSR.

7.1.2.1.9 Purple Hydrocoral. Although not typically considered a habitat type, the SAT has included Purple hydrocoral on a list of key and unique habitats for the SCSR (Department 2009a). Little-known colonies of purple hydrocoral (*Stylaster californicus* [*Allopora californica*]) inhabit subtidal depths (up to 315 feet) from Vancouver Island (Canada) to central Baja California (Mexico). Hydrocoral colonies occur on current-swept rocky reefs and pinnacles. These purple or pink-red hydrocorals resemble small branching tropical staghorn coral (to 53 cm). Sessile, filter-feeding adults produce planktonic larvae with limited dispersal. Slow-growing (approximately 0.8 cm per year) colonies may live well over 30 years. At least four obligate commensals are supported by the hydrocoral colonies: two polychaetes, one snail, and one barnacle (Department 2002c).

Since this hydrocoral keeps its purple color when dried, it has been commercially harvested in the past for sale in shell shops. The fishery is presently closed and purple hydrocoral is a protected species. The slow growth and limited dispersal of the purple hydrocoral suggests that it may be particularly sensitive to disturbance and fishery pressure. Colony branches are easily broken by anchors and divers. Purple hydrocoral has no known predators. However, colonies are susceptible to overgrowth by algae or smothering by sedimentation. Purple hydrocoral is rare, at least within scuba diving depths. Its abundance in deepwater is largely unknown, although U.S. Department of the Interior, Bureau of Land Management (BLM) surveys assessed abundances at Tanner and Cortes Banks, south of San Nicolas Island (Department 2002a), while Love et al. (2010) surveyed this species at Farnsworth Bank, west of Santa Catalina Island. The latter study found a wide variety of fishes typical of nearshore Southern California reefs present in an area heavily colonized by purple hydrocoral.

7.1.2.1.10 Sandy/Soft Bottoms. Soft-bottom habitats are the predominant habitat on the continental shelf and slope throughout the SCSR. Nearshore and offshore environments include soft-bottom habitats in areas that range from flat expanses to slopes and basin areas. Soft-bottom habitats vary depending on the type of sediment; sediments made up of silt and

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clay are high in organic carbon, and polychaetes and gastropods dominate the infauna. By comparison, sediment composed mainly of sand particles has less organic carbon and the most common infauna are ostracods, amphipods, and pelecypods. Soft-bottom habitats can be highly dynamic in nature as sediments shift due to wave action, bottom currents, and geological processes (Department 2009a).

Soft-bottom habitats are more common, yet less diverse than hard-bottom habitats at all depth zones, covering over 60 percent of the entire SCSR. Soft-bottom species are generally bottom-dwelling invertebrates and fishes, and many have special adaptations for the habitat, such as flattened bodies and concealing coloration. The distribution of species in soft-bottom habitats is approximately 80 percent crustaceans, 10 percent microbenthos, 5 percent demersal fish, and 5 percent macrobenthos. In shallow waters, marine communities are less diverse in wave-influenced, ripple-marked sand habitats compared to calm-water, stable sand bottoms that can host a variety of invertebrates and fishes within and above the sand, as well as algae attached to worm tubes and eelgrass beds providing biogenic habitat. In deeper soft-bottom habitats, the population density lowers with depth, while the standing crop increases with depth; this makes for unique species assemblages at the various depths. Anthropogenic discharge has been associated with the degraded health and quality of soft-bottom habitat and studies have found demersal fish are negatively impacted by outfall discharge (Department 2009a).

7.1.2.1.11 Hard Bottom/Rocky Reefs. Hard-bottom habitats (also called rocky reefs) are much less common than soft substrata in the SCSR at all depth zones, covering about seven percent of the SCSR. The species that associate with hard bottoms differ greatly with depth and type of substratum; the amount of topographic relief changes with gravel, cobble, boulders, and smooth rock outcrop. Rocky reefs provide hard substratum to which kelp and other algae can attach in the nearshore zone (<100 feet depth). In addition, many invertebrates such as deep sea corals, sea fans, sponges, and anemones require hard substratum for attachment in deeper waters. In addition to attached organisms, the structural complexity of rocky reefs provides habitat and protection for mobile invertebrates and fish. Hard-bottom habitats in each depth zone are considered to be separate habitats due to differences in associated species. In addition, the ecological assemblages associated with rocky habitats also can be influenced by the type of rock, as for example, sedimentary versus granitic reefs, or size of substrata, such as cobble versus boulder. Rocky reefs in each of these geologically different zones support distinct ecological assemblages.

A number of artificial reef structures exist within the SCSR. These artificial reefs are designed to mimic rocky reef habitats and have been constructed from a variety of materials (Department 2009a).

7.1.2.1.12 Natural Oil Seeps. Natural oil seeps are found offshore in the bight from Point Conception to Huntington Beach. These seeps are not rare off Southern California, although

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they occur nowhere else in state waters (Department 2009a). In the area of Coal Oil Point, Santa Barbara County, seepage has been estimated to occur at a rate of 50 to 70 barrels of oil per day. In general, the oil released from seeps is moved by currents and wind to the shoreline, either on the mainland coast, or the Channel Islands. Studies have shown no lasting detrimental effect on the marine environment from these natural oil seeps (Department 2009a).

While oil seeps were not considered a habitat type in previous MLPA study regions, the SAT has included them on a list of key and unique habitats for the SCSR, and benthic communities and environmental conditions around oil seeps are considered to differ from those in surrounding areas (Department 2009a). For example, old tar mounds surveyed by a remotely operated vehicle off Point Conception were found to be heavily colonized by invertebrates and resembled reef communities found on submarine rock outcrops (Lorenson et al. 2007).

7.1.2.1.13 Underwater Pinnacles. Pinnacles are vertical rocky features that are scores of feet in diameter and height, with a cone-shaped geometry. Pinnacles can be distinguished from large boulders by their geologic origin. Pinnacles are generally a product of in-place erosional processes acting on rocky outcrops, while boulders are the result of erosional processes in other locations and resulting movement of large rocks. Pinnacles are located in state waters along the SCSR, especially near the Channel Islands, but have not been well mapped; they can be important bathymetric features that attract certain fish and invertebrate species. Pinnacles in the SCSR are not categorized separately from other hard-bottom habitats (Department 2009a).

7.1.2.1.14 Submarine Canyons. Several submarine canyons are located within the SCSR. The most important canyons are located in waters near Point Hueneme, Point Mugu, Point Dume, Santa Monica Bay, Palos Verdes Point, Huntington/Newport Beach, La Jolla, and at the Channel Islands. Submarine canyons provide areas of high bathymetric complexity, support unique deep water communities, and affect local and regional circulation patterns. Submarine canyon habitats receive sediment and detrital material from adjacent shallow areas and act as conduits of energy to deeper offshore habitats. Canyons provide habitat for young rockfish and flatfish that settle in nearshore waters to grow and move offshore as adults. In addition, concentrations of forage species found near submarine canyons are important for seabirds and marine mammals (Department 2009a).

7.1.2.1.15 Offshore Rocks and Islands. Southern California has several large offshore islands, as well as numerous offshore rocks, that play a significant role within the SCSR. Eight major islands, as well as many smaller rocks and islets, are located within the SCSR. While offshore rocks and islands are not identified as separate habitats, these areas do represent unique areas within the SCSR. Some of these islands and offshore rocks are described below.

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The Channel Islands. The Channel Islands comprise two distinct biogeographic regions. In the first of these, San Miguel, Santa Rosa, and San Nicolas islands, and the west side of Santa Cruz Island are bathed in the cooler, nutrient-rich waters of the California Current. In the other bioregion, the east end of Santa Cruz Island and Anacapa, Santa Barbara, Santa Catalina, and San Clemente islands are bathed in the warmer waters of the California Countercurrent and share a unique suite of associated species. The four northern Channel Islands—San Miguel, Santa Rosa, Santa Cruz, and Anacapa—and Santa Barbara Island in the southern Channel Islands, and their surrounding waters out to 1 nautical mile were designated as a National Park, and waters surrounding the islands up to 6 nautical miles offshore were designated as a National Marine Sanctuary in 1980 (Department 2009a).

A network of MPAs encompassing the historical reserve was established in state waters in 2003. The MPAs were expanded into federal waters in 2006 and 2007. There are 11 marine reserves and 2 marine conservation areas in state and federal waters around the 4 northern Channel Islands and Santa Barbara Island. MPAs encompass approximately 21 percent of the Channel Islands National Marine Sanctuary, leaving 79 percent open to consumptive recreational and commercial activities regulated by state and federal agencies (Department 2008b). The proposed Project IPA and alternatives do not include any changes to the existing Northern Channel Islands MPAs and Santa Barbara Island MPA.

Waters surrounding the Channel Islands are utilized by a number of consumptive and non-consumptive users. Consumptive and nonconsumptive uses are discussed in detail in the MLPA SCSR Regional Profile. Non-consumptive ocean activities are also popular in the Channel Islands; they include kayaking, whale watching, wildlife viewing, diving, and snorkeling (Department 2009a). Short descriptions of the islands are illustrated below.

- **San Miguel Island:** A part of Santa Barbara County, San Miguel is the westernmost of the Channel Islands and is 14.5 square miles in size. The U.S. Navy owns San Miguel Island, and manages it jointly with the Channel Islands National Park. It is closest of the Channel Islands to Point Conception. A large marine mammal haulout exists at Point Bennett and seabird breeding colonies reside at Prince Island, Castle Rock, and Richardson Rock. The island is surrounded by submerged pinnacles covered with invertebrates. Intertidal habitats surrounding San Miguel Island include significant amounts of sand habitat.
- **Santa Rosa Island:** A part of Santa Barbara County, Santa Rosa is the second largest of the Channel Islands at about 83 square miles in size. A large reef lies on the north side of the island at Talcott Shoal. The island is known for coastal terraces, sandy beaches, and the largest coastal lagoon in the Channel Islands, as well as a Torrey pine (*Pinus torreyana*) grove onshore. Sandy beaches on Santa Rosa provide breeding habitat for the western snowy plover (Department 2009a).

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- **Santa Cruz Island:** A part of Santa Barbara County, Santa Cruz is the largest of the Channel Islands at over 96 square miles in size. The island lies in a transition zone between cool waters of the California Current and warm waters of the California Countercurrent. There are large sea caves along cliffs on the island and a high degree of recreational use due to a large number of anchorages (Department 2009a).
- **Anacapa Island:** Anacapa Island, which lies within Ventura County, is the Channel Island closest to the mainland coast at a distance of 12 miles. It is just over 1 square mile in size. Giant sea bass aggregate on the north side of the island and California brown pelican, Xantus's Murrelet, and Western Gull have breeding colonies on the island. In addition, 130 sea caves on Anacapa provide nesting sites for many birds. Anacapa Island and its surrounding waters receive a high degree of recreational use (Department 2009a). In 1978, a small, no-take marine reserve was established by the state of California on the north side of Anacapa Island in an area protected by National Park regulations since 1968 (Department 2008b).
- **Santa Barbara Island:** A part of Santa Barbara County, Santa Barbara Island is the smallest of the Channel Islands at 639 acres (about one square mile). The island hosts a California sea lion rookery and over 11 species of breeding seabirds, including California brown pelican and Xantus's murrelet (Department 2009a).
- **Santa Catalina Island:** Is an area of Los Angeles County located 22 miles offshore of Los Angeles. Santa Catalina Island is approximately 75 square miles in size. Santa Catalina Island is one of three islands in the archipelago that is not part of the Channel Islands National Marine Sanctuary. However, it is an important visitor location with several permanent settlements, including Avalon and Two Harbors. Macrofauna around Santa Catalina Island are warm-water species, unlike the northern Channel Islands, where cold-water species are more typical. The island's Catalina Harbor is the largest offshore salt marsh of the seven marshes found along the islands in the SCSR. Intertidal habitats surrounding Catalina Island include 35 percent bedrock, 50 percent boulder beach, and 15 percent sand habitats (Department 2009a).
- **San Nicolas Island and San Clemente Island:** Both San Nicolas and San Clemente islands are owned by the U.S. Navy, and are about 22 square miles and 57 square miles in size, respectively. While both islands are more remote than the other six Channel Islands, their waters are utilized by both commercial and recreational fishing operations. The deepest point in the SCSR is located off the northwest corner of San Clemente Island. Aside from Santa Catalina Island, San Clemente is the only other island with macroinvertebrate communities dominated by warm-water species; intertidal habitats there include 69 percent bedrock, 17 percent boulder beach, and 14 percent sand. San Nicolas Island, located between the warm- and cold-water currents, has different macrofauna at various sites around the island. Intertidal habitats around San Nicolas Island include rock as well as significant amounts of sand (35 percent of the shoreline).

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(Department 2009a). There are two military closures on San Clemente Island where the designation and allowed uses have not been specified (MarineMap Consortium 2010).

Other Rocks/Islets. Statewide, over 20,000 islands, rocks, exposed reefs, and pinnacles are included in the California Coastal National Monument and managed by the BLM. The monument was designated by presidential proclamation in January of 2000 and extends along the entire California coast (1,100 miles). The monument was designed to protect the biological and geologic values of offshore rocks and islets and the important forage and breeding grounds of associated marine birds and mammals (Department 2009a).

7.1.2.1.16 Oceanographic Currents. The primary habitat for the SCSR's living marine resources is the California Current system. The California Current system is constantly changing in response to weather systems, seasonal heating and cooling processes, interannual episodes such as El Niño/La Niña events, and longer term or regime-scale climatic changes. The California Current is one of the world's major eastern boundary currents, has its origin in the mid-latitude west-wind-drift region of the North Pacific, and could be considered an equatorward-growing, surface extension of the North Pacific Current. The core of the California Current normally lies about 90 to 130 miles offshore of the shelf break, or continental margin. The fauna and productivity of the California Current system are heavily dependent upon the input of cool, low-salinity, high nutrient and plankton-rich waters from the mid-latitude North Pacific. The system has a sub-surface, poleward current (the Davidson Current) that is often at a maximum just offshore of, and somewhat deeper than, the shelf break. In the fall, poleward flow often extends to the surface in the southern portion of the California Current and surface poleward flow is not uncommon in the nearshore region over much of the system. The advection of warm, high-salinity, low-nutrient and plankton-poor water from the sub-tropics is largely responsible for the warm water flora and fauna and lower productivity characteristic of the nearshore region south of Point Conception (Department 2001).

Like other eastern boundary currents, the California Current has extensive coastal upwelling that is primarily driven by spring and summer winds resulting from temperature gradients between the relatively cool sea surface and the warming continental land mass. Equatorward winds, offshore Ekman transport, and coastal upwellings occur nearly all year off of Baja California and the offshore region of Southern California; however, within the bight, wind velocities are lower and offshore transport is much reduced. Wind velocities and upwelling are variable but tend to be at a maximum in the spring to early summer in the region between Point Conception (34.5°N) and the Oregon border (42°N). The duration and strength of upwelling-favorable winds diminishes northwards. Off the state of Washington (48°N) upwelling is relatively minor and is largely restricted to the late spring to early fall; winter storms there result in intense downwelling events. Downwelling events diminish in both magnitude and seasonal duration to the south; below Point Conception they are uncommon and usually of minor magnitude (Department 2001).

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Climatic fluctuations ranging from strong storms to seasonal cycles to El Niño/La Niña events to decadal changes or regime shifts alter the physical, chemical, and biological environment of California's marine waters. The average monthly sea surface temperatures (SST) in California waters range from a minimum of approximately 52 degrees Fahrenheit in February off northern California to a maximum of about 68 degrees Fahrenheit in August off Southern California. The pattern of sea surface temperatures in the California Current varies from a clearly latitude-dependent situation in the late winter, with isotherms being nearly east-west in orientation, to the distinct upwelling pattern of cold water near the shore and warmer water offshore in the late summer. Most of the area has mild winter SSTs, and cool summer SSTs caused by the summer upwelling. This results in a very small seasonal variation in SST, no more than 4 to 7 degrees Fahrenheit during the year. In contrast, the inter-annual variation in SSTs can be as large as the normal summer/winter difference; off San Francisco SST is colder during the summer in cold years than it is during the winter in warm years (Department 2001).

7.1.2.1.17 El Niño/La Niña Processes. El Niño is a term that describes large-scale changes in the atmospheric pressure system, trade winds, and sea surface temperatures of the entire tropical Pacific that occur at approximately three to four-year intervals. The cold water portion of the cycle is now referred to as La Niña. This cyclic process has traditionally been measured by the southern oscillation index, which is the difference between the atmospheric pressure at Tahiti (an approximation of the South Pacific High) and the atmospheric pressure at Darwin, Australia (near the Tropical Pacific Low). The southern oscillation index is therefore a measure of the variability of the atmospheric circulation in the South Pacific. The effects of El Niño events in California include reduced input of cold, nutrient-rich waters from the north and increased advection of warm, nutrient-poor waters of subtropical and tropical origin into the Southern California area. There may or may not be a reduction in upwelling-favorable winds; however, nutrient input to the surface waters from upwelling is decreased due to reduced nutrients in the subsurface waters and a depressed thermocline. Thus, during El Niños the California Current becomes more sub-tropical, and warm-water organisms enter the system in greater numbers. During La Niñas the environment is more sub-arctic and cold water organisms are favored (Department 2001).

7.1.2.1.18 Oceanographic Habitats. Oceanographic features such as upwelling centers, retention areas, and freshwater plumes have significant effects on ecological assemblages, productivity, recruitment, and a number of other biogeographic characteristics. The SCSR is within the bight, which is part of the west-coast-wide California Current system. However, the strong prevailing northerly winds that characterize the California Current system are found offshore in the bight, west of the islands and well away from the mainland coast – resulting in the absence of upwelling in the bight. The core of the California Current passes the bight west of the Channel Islands. The bight exhibits a counter-clockwise circulation comprising the southward California Current along the outer edge of the bight and the northward Southern California Countercurrent closer to the mainland. This Southern

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California Countercurrent brings warmer, low-chlorophyll waters into the bight, but also entrains recently upwelled waters from the Ensenada upwelling center (about 50 miles south of the U.S./Mexico border) (Department 2009a).

The circulation of the bight is largely driven by the winds offshore. In spring, winds are found closer to the coast leading to a tendency for southward flow through bight and coastal upwelling. As spring turns to summer, winds in the bight weaken but remain strong offshore, leading to a westward (offshore) migration of upwelling that is due to the wind-driven Ekman divergence now found mid-bight.

There is a surface divergence in the bight due to the strong offshore Ekman transport associated with northerly winds over the outer bight. An upward flux of deeper waters is expected, evident in the shallow thermocline found throughout the bight and a variety of features in which sub-thermocline waters are observed breaking the surface. Cold surface temperatures are observed in the wakes of many islands, as well as in headland wakes at Point Dume, Palos Verdes, and Point Loma – and more extensive upwelling is observed at times along the mainland coast. While a subsurface chlorophyll maximum characterizes much of the bight, surface chlorophyll plumes are visible nearshore, specifically downstream of upwelling sites (Department 2009a).

Circulation at depth is dominated by the California Undercurrent, which flows northward along the continental slope. The California Undercurrent is strongest in summer and fall and can be seen breaking the surface where the shelf is narrow. The northern end of the bight is characterized by intense upwelling at Point Conception, a major upwelling center at the end of the wind-driven coastal upwelling region that characterizes the central and northern California coast. This current separates from the mainland at Point Conception and flows past the westernmost Channel Islands, immersing San Miguel and Santa Rosa islands in cold nutrient-rich waters. At times this current will curve into the Santa Barbara Channel, transporting cold water along the northern shores of San Miguel, Santa Rosa and Santa Cruz islands. Thus, the Santa Barbara Channel and northern Channel Islands represent a dynamic region where two oceanographic regimes meet—cold northern waters mixing with warm southern waters—and the western end of the channel is characterized by strong fronts. The mainland coast is characterized by a warm westward flow, leading to a cross-channel shear in currents. In summer, one will often see the persistent Santa Barbara Channel Eddy (Department 2009a).

Over the shelf along the mainland south of the Santa Barbara Channel, water tends to flow southward, in contrast to the up-coast currents offshore and in the channel. Given the topographic complexity of the bight, one can expect topographic flow features such as island wakes and headland wakes. Santa Monica Bay exhibits clockwise mean circulation, with northward flows along the shelf edge and southward currents nearshore. Wind shadows can yield areas of warmer surface temperatures and stronger stratification (e.g., west of Santa

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Catalina Island). In contrast, the dynamics of current wakes can yield localized upwelling of cold waters, as discussed above (e.g., southwest of Palos Verdes) (Department 2009a).

This general bight circulation is not constant. Seasonal fluctuations have been described above, generally increasing in intensity through the summer. During winter, the region experiences southerly wind events and downwelling during the passage of cold fronts, although winds turn to westerly behind the cold front and this results in down-coast (southward) transport of runoff plumes. During fall, the relaxation of winds along the coast north of Point Conception is more frequent and one observes westward flow through the Santa Barbara Channel and up the mainland coast past Point Conception. The strongest northward flow around Point Conception is observed in El Niño years, when bight waters may be transported north to San Francisco. Internal tides are also important, given the shallow thermal stratification in this region. Over the inner shelf, this internal tidal energy is typically seen as packets of higher frequency internal waves that lead to cold sub-thermocline waters swashing shoreward and breaking the surface nearshore. This process has been shown to be important in nearshore larval dispersal, nearshore productivity and nearshore water quality (Department 2009a).

Surface waves in the bight are typically small, but they can be large at specific places and times. While much of the bight is sheltered from northerly swell generated in the storms in the northern Pacific, large swells generated at lower latitudes or during storms in the austral winter in the southern Pacific may enter and influence much of the bight. The Santa Barbara coast is well sheltered by the Channel Islands offshore and, likewise, the island coasts facing the mainland are characterized by low wave forcing (Department 2009a).

Circulation within harbors, bays and lagoons is important in shaping habitat and in the dispersal of larvae, eggs, and spores.

The larger bays in the region are best classed as low-inflow estuaries throughout the long dry season, with long-residence inner waters. The outer bays are typically well flushed by tides, and enhanced by thermal exchange in some bays. The smaller bar-built estuaries are typically closed in the dry season, with minimal hydrological links to the ocean via groundwater fluxes through the sand bar (Department 2009a).

7.1.2.2 Habitat Restoration Activities

Human degradation and water pollution impairs the breeding grounds for many species of sea life, and are substantial contributing factors to species decline. Impacts to coastal-dependent species include declines in the species' populations, reproductive problems, birth defects, behavioral changes, and increased susceptibility to disease. Healthy aquatic habitats depend upon the activities that occur nearby. Land use practices, population densities, point and nonpoint source discharges, agriculture, urbanization, industry, and recreation all influence the water quality and habitat of a specific locality or region (Department 2001).

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A number of efforts and initiatives are underway in the state to begin to curtail impacts and improve the quality and quantity of California's marine and estuarine habitats. These efforts include greater regulation of point and nonpoint source discharges, improved identification of toxic areas, increased emphasis on beneficial reuse opportunities for dredged materials, reduction of the frequency and extent of oil spills, development and coordination of large-scale water quality and habitat monitoring and assessment programs, restrictions on the import of non-indigenous species in ballast water, and increased marine habitat restoration and enhancement projects (Department 2001).

Habitat restoration efforts include, but are not limited to: fostering the growth of native plant species, removing invasive species, restoring estuarine substrata, restoring historical creek flow, beach nourishments, fisheries restoration, and reestablishing tidal exchange. The general goal of restoration projects is to bring the environment back to a natural, or pre-disturbance, condition. However, in practice, the outcomes of restoration projects are generally unpredictable, and such projects may require occasional maintenance (Department 2009a).

A large restoration tool used in the SCSR is the creation of artificial reefs to restore kelp beds. In the SCSR, there are at least 30 artificial reefs designed to mimic rocky reef habitats and to provide habitat for kelp. Artificial reefs can be constructed from a variety of materials such as sunken automobiles (Paradise Cove in 1958) and boxcars (Redondo Beach in 1958). Other efforts utilized tires or sunken ships, which proved less successful. Quarry rock and concrete boxes have been used in the most recent efforts and have been shown to attract and concentrate marine species. Since 1980, many of these quarry rock/concrete reefs have been constructed, including artificial reefs at Pendleton, Carlsbad, near the California/Mexico border (international artificial reef), Bolsa Chica, and Mission Bay. The most significant artificial reef project in recent years is the San Onofre Nuclear Generation Station Mitigation Project, offshore from San Clemente in Orange County. In 1999, an experimental reef covering an area of over 22 acres was completed and monitoring for the project began. Currently, expansion of this initial reef is underway with the expected size being 150 total acres (Department 2009a).

Potential benefits of artificial reefs include creation of new habitat and the potential to increase localized fish stocks. However, artificial reefs may also pose risks to marine ecosystems. Studies have found that artificial reefs can actually decrease fish stocks because the fishing effort increases around the reef. All these considerations are taken into account before an artificial reef can be placed in the ocean. An artificial reef cannot be constructed until it has gone through an extensive permit process. Proposed artificial reef projects must demonstrate how they minimize adverse environmental impacts (Department 2009a). Artificial reefs are discussed in Fish and Game Code Sections 6420–6425.

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7.1.2.3 Invasive Species

Invasive species are the second-largest threat to rare, threatened, or endangered species nationwide, second only to habitat destruction (Department 2001). Commercial fisheries nationwide are seeing significant impacts on local fish populations from invasive marine life. Indeed, coastal systems, including tidal flats and salt marshes, have been particularly susceptible, possibly because they are typically high-stress, species-poor environments. California water agencies have expressed alarm at the “potentially devastating” impacts that invasive species can have on California’s waters (Department 2001). Unlike threats posed by most chemical or other types of pollution, biological pollution by invasive species normally will have permanent impacts, as they are virtually impossible to eradicate once established. Specific environmental threats from invasive organisms include consumption of natives and their food sources, genetic dilution of native species through cross-breeding, alteration of the physical environment, introduction of non-native parasites and diseases, and poisoning of native species through bioaccumulation of toxics that are passed up the food chain (Department 2001). Introduced species may out-compete or alter local habitats to such an extent that they make it impossible for native species to survive. Introduced species are often predators, competitors, or parasites, and many introduced species can cause or carry disease. Regardless of the direct or indirect nature of the effect, non-native or nonindigenous aquatic species (NAS) can significantly impact human health, devastate fishery and aquaculture resources, and severely disrupt habitat and ecosystem stability (Department 2008a).

The discharge of ships’ ballast water from foreign ports is currently the single largest source of coastal, aquatic invasive species. However, in California, the fouling vector is most often attributed to the introduction of species to the state. In major ports and waters adjacent to ports, it is impossible to distinguish between fouling due to recreational boats and fouling due to commercial ships. Statewide, 165 species were probably introduced via fouling. Among those 165 species, 153 (93 percent) had both recreational boats and commercial ships as possible sources of introduction. Further assessment of the role of recreational boat fouling as an NAS vector is needed. Ballast water, however, is still a major vector of introductions. Ship ballast water discharge was the second largest category of potential vectors. This, in combination with impacts from fouling from ships’ hulls, indicates that shipping plays a substantial role in dispersal of species (Department 2008a).

A survey found that 53 to 88 percent of the aquatic invasive species introduced into San Francisco Bay in the last decade originated in ballast water discharges, and there is evidence that the number of ballast-related introductions of aquatic invasive species is steadily growing. According to estimates by the San Francisco Estuary Institute, between a half-billion and one billion gallons of ballast water are discharged into the San Francisco Bay/Delta Estuary each year by ships arriving from foreign ports. Aquaculture, unintentional introductions via recreational vehicles, deliberate introductions (i.e., to establish a fishery),

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and importation of live marine organisms for human consumption, bait, pets, or research are other important vectors of aquatic invasive species (Department 2001).

The Department has conducted numerous large-scale field surveys of California coastal waters that indicate all major harbor areas in California have received significant introductions of non-native or NAS. Each major commercial harbor area of the state has between 40 and 190 NAS and another 15 to 138 species that are possibly introduced via obscure or unknown sources. San Francisco Bay had more NAS (190) than any other estuary or harbor. Substantial numbers of introduced species were also found in the smaller ports and bays. Two broad-scale field surveys of the outer coast revealed only nine introduced species, far fewer than in estuaries. The majority of the species introduced to California appear to be native to the northwest Atlantic, the northwest Pacific and the northeast Atlantic. The number of species with unknown origins is substantial, and indicates a need for further research (Department 2008a).

Studies have shown that Southern California has the highest number of introduced species, especially compared to northern and central California bays and harbors. The two phyla with the highest number of introduced species from the epifaunal and infaunal samples were arthropoda (25 introduced species) and chordata (18 introduced species). The only phylum in which introduced species were identified from the water column surveys was arthropoda, which had 11 introduced zooplankton species (Department 2008a).

In Southern California, one main invasive species is a tropical seaweed (*Caulerpa taxifolia*). The invasive green algae dubbed the “killer algae,” was discovered in the waters of Southern California off Carlsbad in early 2000. Native to tropical waters, it became popular in the aquarium trade in the late 1970s and either escaped or was released into the Mediterranean Sea in the mid-1980s. It is now widespread throughout much of the northwestern Mediterranean. It appears that the algae found off Southern California is a clone of the released Mediterranean plant, and can grow in deeper and colder waters than the tropical populations. Its impacts have been compared to unrolling a carpet of astroturf across the sea bed. In areas where it has become well-established, it has caused economic and ecological devastation by overgrowing and eliminating native seaweeds, seagrass reefs, and other communities. Other problematic introduced algae include invasive wakame (*Undaria pinnatifida*; Department 2008d), invasive Japanese seaweed (*Sargassum muticum*; Department 2008d), and *S. filicinum*. In Southern California, the alga poses a major threat to eelgrass meadows and other benthic environments that are essential to the survival of native invertebrates, fish, and aquatic birds. If the alga spreads from the coastal lagoons to the nearshore reefs, it could inhibit the establishment of juveniles of many species, including kelp and the biota associated with kelp beds. Efforts to destroy this patch of algae have involved tarping off the area and injecting chlorine under the tarp (Department 2001).

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7.1.2.4 Areas of Biodiversity Significance

Spatial data is available to begin identifying specific locations in the SCSR that have high biodiversity significance based on the guidelines provided in the master plan framework and on results of regional scientific research and mapping efforts. Specific locations can be identified using existing maps, by overlaying relevant data layers, or conducting more sophisticated GIS analysis. Data showing areas of biodiversity are shown on Figures 7-13 through 7-18 (Marine Bird Breeding Colonies), Figures 7-19 and 7-20 (Marine Mammal Haulouts and Rookeries), and Figures 7-21 through 7-26 (Areas of Fish Biodiversity). The following is a partial list of types of areas that have regional biodiversity significance (Department 2009a):

- Areas where numerous habitats are found in close proximity and areas with unique combinations of habitats
- Areas of high bathymetric complexity which provide topographic relief and a variety of habitats in close proximity
- Rocky substrata in all depth zones, since rocky habitat is much less common than soft bottom habitat and is important for many species
- Rocky intertidal shores, especially wave-cut rocky platforms (which provide habitat at diverse tidal elevations), boulder fields, and rare sheltered rocky shores
- Sandy beaches utilized by California grunion, California least tern, western snowy plover, and other species, including areas above mean high tide
- Large kelp beds and nearshore rocky reefs
- Large or open estuaries (e.g., Anaheim Bay, Bolsa Chica, Mission Bay, San Diego Bay, and the Tijuana River Estuary) with eelgrass beds, tidal flats, and coastal marsh
- Marine areas off headlands, especially those with kelp forests
- Offshore islands and associated habitats
- Islets, offshore rocks, and underwater pinnacles
- Submarine canyons, which create areas of complex bathymetry
- Marine areas which offer retention adjacent to upwelling centers, especially those with kelp forests and rocky reefs
- Areas of smaller-scale, localized upwelling
- Areas of known species spawning aggregations and aggregations of juvenile individuals
- Seabird colonies and marine mammal rookeries and haulouts
- Areas of high seabird or fish diversity and/or density and abundance

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7.1.2.5 Special-status Species

Some species within the SCSR have been designated with a special status under either state or federal laws or regulations. Both the California state and federal endangered species acts provide special protections for a variety of fish, invertebrates, marine mammals, birds, and plants. Marine mammals are also afforded protection under the Marine Mammal Protection Act, and migratory seabirds and shorebirds in the SCSR are protected under the Migratory Bird Treaty Act. Direct take of some species has been prohibited by laws separate from the above acts and these laws are found in various section of the California Fish and Game Code. In addition, the Department maintains a list of taxa they are interested in tracking, regardless of the legal or protection status of that taxa. This list of “species at risk” or “special-status species” are those taxa considered to be of greatest conservation need. The Department has also designated certain vertebrate species as “Species of Special Concern” because declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction. Not all “Species of Special Concern” have declined equally; some species may be just starting to decline, while others may have already reached the point where they meet the criteria for listing as a “threatened” or “endangered” species under the state and/or federal endangered species acts. The section below includes descriptions of several special-status species that exist within the SCSR. A more comprehensive list of these species is included in Appendix E (Department 2009a).

7.1.2.5.1 Plants.

Salt Marsh Bird’s Beak. Salt marsh bird’s beak (*Cordylanthus maritimus* ssp. *maritimus*) grows in the higher reaches of coastal salt marshes to intertidal and brackish areas influenced by freshwater input. The interaction between tidal flows and local surface and subsurface freshwater flows is complex and important to the species’ survival. It is designated as an endangered species at both the state and federal levels. The population of this species has declined due to loss of habitat and non-native plant competitors. Historically, salt marsh bird’s beak was widespread in coastal salt marshes from Morro Bay in San Luis Obispo County to San Diego County and northern Baja California. Presently, it occurs only in scattered sites at fewer than 10 salt marshes. Half of the original occurrences are now extirpated. In California, it is currently found at the Tijuana River Estuary and Sweetwater Marsh in San Diego County, Upper Newport Bay and Anaheim Bay in Orange County, Ormond Beach and Mugu Lagoon in Ventura County, Carpinteria Marsh in Santa Barbara County, and Morro Bay in San Luis Obispo County. Salt marsh bird’s beak is found in the Department’s Upper Newport Bay Ecological Reserve (Department 2009a). It is both a federally- and state-listed endangered species. Additionally, it is included in the California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants on list 1B.2 (fairly endangered in California).

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Ventura Marsh Milk-vetch. Ventura marsh milk-vetch (*Astragalus pycnostachys* var. *lanosissimus*) is a short-lived, herbaceous perennial in the pea family (*Fabaceae*). It is both a state and federally listed endangered species. Historically, Ventura marsh milk-vetch occurred in back dune habitat, coastal meadows, and near coastal salt marshes from Ventura County to Orange County. Over the last century six historical occurrences have been known to exist. Ventura marsh milk-vetch was extirpated from these sites and was, therefore, thought to be extinct until a U.S. Fish and Wildlife Service biologist rediscovered it in June 1997 at a proposed development site. Today, this single population of Ventura marsh milk-vetch is the only known population to exist near the city of Oxnard, Ventura County, California. However, one source has reported Ventura marsh milk-vetch in the Ballona Wetlands (Department 2009a). It is listed by the state of California and the federal government as endangered. Additionally, it is included in the CNPS Inventory of Rare and Endangered Plants on list 1B.1 (seriously endangered in California).

Gambel's Water Cress. Gambel's water cress (*Nasturtium gambelii*) is a rhizomatous herb in the mustard family (*Brassicaceae*). It is both a state and federally listed endangered species. Additionally, it is included in the CNPS Inventory of Rare and Endangered Plants on list 1B.1 (seriously endangered in California). Gambel's water cress is threatened by habitat loss and erosion. It occurs in freshwater and brackish marshes in Santa Barbara, Los Angeles, and Orange counties (CNPS 2010). Species accounts exist from the late 1800s and early 1900s and are located in close proximity the SCSR in Cienega in the Los Angeles basin, Huntington Beach, and near the City of Santa Barbara where all previously existing populations are extirpated (CNPS 2010).

7.1.2.5.2 Gastropods.

Black Abalone. Found from Oregon to southern Baja California, the black abalone (*Haliotis cracherodii*) inhabits rocky intertidal areas (to depths of 20 feet in Southern California), often within the high energy surf zone. Adult black abalones congregate on rocks and in tidepools. Black abalone populations in Southern California remain severely depressed since the closure of the fishery in 1993. Black abalone density around San Clemente Island is approximately one abalone per 30,020 feet squared, or less than 0.1 percent of historic levels, with no evidence of recruitment. However, recent evidence shows some recruitment at San Nicolas and Santa Cruz islands. Current restoration research efforts have been focused on finding some sort of genetic-based disease resistance to withering syndrome, a disease that has devastated once-abundant black abalone populations, and successful captive propagation of the species for recovery out-planting. Black abalone is currently listed as a species of concern by the National Marine Fisheries Service (NOAA Fisheries). A draft black abalone status review report released by NOAA stated that black abalone is in danger of extinction throughout its range unless effective measures to counter the effects of withering syndrome are found. Black abalone was listed as an endangered species under the ESA as of February 13, 2009 (74 FR 1937) (Department 2009a).

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White Abalone. Ranging from Point Conception to central Baja California, Mexico, white abalone (*Haliotis sorenseni*) usually inhabit depths greater than 75 feet. They prefer deep rocky bottoms from 60 to 200 feet often associated with deep living kelp beds, such as *Pelagophycus porra* or elk kelp beds. They feed on bacteria, diatoms, and kelp. Baby abalone recruitment trackers deployed at Santa Cruz Island have been monitored at least once a year since their deployment in 2004, but no white abalone have yet been seen. A 2007 research cruise around Anacapa Island, Santa Barbara Island, and the east end of Santa Cruz Island found no live white abalone. White abalone is the first marine invertebrate to receive federal protection under ESA.

7.1.2.5.3 **Fish.**

Great White Shark. The great white shark (*Carcharodon carcharias*) is protected by the Department in all California waters since Jan. 1, 1994 through Assembly Bill 522 (AB 522).

This bill makes legislative findings and declarations regarding the importance of white sharks in maintaining the overall health and stability of California's marine ecosystem, and prohibits the take of white sharks for commercial or recreational purposes.

AB 522 allows the take of white sharks for scientific research or live display under permits issued by the Department of Fish and Game, and provides that white sharks may be taken incidentally by commercial fishing operations using set gill nets, drift gill nets, or roundhaul nets. Prohibits the severing of the pelvic fin from the carcass until after the shark is brought ashore.

This law was extended and amplified in 1997 (SB-144) to outlaw all directed efforts to lure Great Whites by any means in State waters.

Southern California Steelhead. Steelhead (*Oncorhynchus mykiss*) are an anadromous form of rainbow trout and historically a popular gamefish in California. Steelhead migrate to the ocean where they usually spend 2–6 years before returning to freshwater to spawn. Though the age at first migration varies, and can be as young as less than one year, some steelhead never migrate to the ocean. Known spawning populations of steelhead are found in coastal rivers and streams from San Mateo Creek in north San Diego County to the Smith River near the Oregon border. The present distribution of steelhead in California has been greatly reduced from historical levels. The decline of California steelhead appears to be part of a more prevalent west coast steelhead decline. This decline prompted NOAA Fisheries to list nearly all of California's steelhead populations under the Endangered Species Act. Statewide, the major factors contributing to steelhead decline in California include freshwater habitat loss and degradation, which has resulted mainly from three factors: inadequate stream flows, blocked access to historic spawning and rearing areas due to dams, and human activities that discharge sediment and debris into watercourses (Department 2009a).

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Southern California steelhead (*Oncorhynchus mykiss irideus*), the evolutionarily significant unit located within the SCSR (NOAA Fisheries 2005), are listed as an endangered species by the ESA. In addition, they are listed as a California Species of Special Concern by the Department. Southern California steelhead were formerly found in coastal drainages as far south as the Santo Domingo River in northern Baja California and were present in many streams and rivers of Southern California including San Mateo Creek (San Diego County), Malibu Creek (Los Angeles County), and Ventura River (Ventura County). As of 2005, the anadromous form of Southern California steelhead appears to be completely extirpated between the Santa Monica Mountains and the Mexican border except for a small population in San Mateo Creek in northern San Diego County (NOAA Fisheries 2005). Major adverse impacts to Southern California steelhead include fish migration barriers (dams and culverts, such as the Rindge Dam and Crag's Road crossing in Malibu Creek), urbanization, water impoundment and diversion, and invasive plant species (Department 2009a).

Giant Sea Bass (Black Sea Bass). Within California, giant sea bass (*Stereolepis gigas*), or black sea bass are rarely found north of Point Conception. Adult giant sea bass seem to prefer the edges of nearshore rocky reefs at depths of 35 to 130 feet. Giant sea bass reach a maximum size of 7 feet and 563 pounds. Estimated growth rates suggest that they take six years to reach 30 pounds, 10 years to reach 100 pounds, and 15 years to reach 150 pounds. Male fish have been observed to be mature at 40 pounds, and females at 50 to 60 pounds. Giant sea bass are susceptible to overfishing and suffered serious decline in numbers because they grow slowly and mature at a relatively old age (Department 2009a).

A 1981 law prohibited the take of giant sea bass for any purpose, with the exception that commercial fishermen could retain and sell two fish per trip. This law was amended to one fish per trip in 1988, and only if incidentally caught by gill or trammel net. Incidental mortality of giant sea bass was probably further reduced with the banning of inshore gillnets from state waters. Although the California population of giant sea bass remains well below historical levels, recent evidence indicates that giant sea bass may be staging a comeback. Currently, giant sea bass may not be taken by recreational anglers in California waters. All fish taken incidentally by recreational fishing activities must be immediately returned to the waters where taken (Department 2009a). Giant sea bass are a protected species in the state of California and have been labeled critically endangered by the International Union for the Conservation of Nature.

Tidewater Goby. The tidewater goby (*Eucyclogobius newberryi*), which is endemic to California, is distributed in brackish-water habitats along the California coast from Cocklebur Canyon in San Diego County to the Tillas Slough in Del Norte County. Historical ranges spread farther south to Agua Hedionda Lagoon within San Diego County. Tidewater goby is federally listed as an endangered species, although the 5-year review by the Ventura Fish and Wildlife Office in September 2007 recommended changing this listing to threatened. Tidewater goby feed on invertebrates and generally live 1 year. In addition,

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they are listed as a California Species of Special Concern by the Department. They reproduce throughout the year resulting in constant variability in local abundance and making accurate population estimates difficult. They are threatened by habitat loss or degradation and predation by native and exotic predators (Department 2009a).

Garibaldi. The garibaldi (*Hypsypops rubicundus*), California's official state marine fish, ranges from Monterey Bay to Guadalupe Island, Baja California. Garibaldi are territorial, sometimes using the same nest site for several years, and do not migrate. Their diet consists mainly of invertebrates. Garibaldi can range from shallow subtidal areas to depths of 95 feet. No commercial or recreational take of garibaldi is allowed, and current populations are in good condition (Department 2009a). Garibaldi is a protected species in the state of California.

7.1.2.5.4 **Reptiles.**

Sea Turtles. Four species of sea turtles (superfamily *Chelonioidea*) occur within the bight: green (*Chelonia mydas*), loggerhead (*Caretta caretta*), olive ridley (*Lepidochelys olivacea*), and leatherback (*Dermochelys coriacea*) turtles. Sea turtles spend most of their time at sea, and come ashore to nest on beaches. Sea turtles are not common within state waters of Southern California, although they are regularly sighted in the warm water effluent channel of the San Diego Gas and Electric Power Company in San Diego Bay. Green turtles forage in San Diego Bay. The San Gabriel River also has a small colony of green turtles, attracted by the warm-water effluent from the Los Angeles Department of Water and Power's Haynes Generating Station. Green turtles feed primarily on algae and seagrasses. Sightings of loggerhead, olive ridley, and leatherback turtles are rarer (Department 2009a). The loggerhead, olive ridley, and green sea turtle have been listed as threatened under the ESA. The leatherback sea turtle is listed as endangered under the ESA.

7.1.2.5.5 **Birds.**

Bald Eagle. The bald eagle (*Haliaeetus leucocephalus*) has historically nested on the Channel Islands, but disappeared completely by the 1960s. In 1980, a program to reintroduce bald eagles to Santa Catalina Island began through a partnership between federal and state agencies and nonprofit organizations. Those efforts have translocated dozens of bald eagles to Santa Catalina Island as chicks or eggs from wild nests on the mainland or from captive breeding. In 2002, the Channel Islands National Park and The Nature Conservancy began a successful reestablishment program for bald eagles. Sixty-one juvenile eagles were introduced to the park between 2002 and 2006. The first successful bald eagle nests occurred in 2006 on Santa Cruz Island. American bald eagles nest near bodies of open water and have a diverse diet consisting of fish, small mammals, birds, mollusks, and crustaceans. In 2007 they were delisted from the ESA and their current protection comes from the Bald and Golden Eagle Act. They remain listed as endangered by the California ESA and fully

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protected by the Department. On the west coast, they can be found from Baja California to Alaska. Within the SCSR, bald eagle prey includes rockfish, surfperch, cabezon, midshipman, California sheephead, bocaccio, gulls, California mussels, limpets, and other bivalves. On the Channel Islands, adults bring bocaccio and other rockfish, halfmoon, white seabass, California sheephead, topsmelt, other fish, gulls, and mammals back to the nest for juvenile eagles (Department 2009a).

American Peregrine Falcon. The American peregrine falcon (*Falco peregrinus anatum*) breeds from Alaska to Labrador, southward to Baja California and other parts of northern Mexico, and east across central Arizona through Alabama. In California, the American peregrine falcon is an uncommon breeder or winter migrant throughout much of the state. Active nests have been documented along the coast north of Santa Barbara, in the Sierra Nevada, and in other mountains of northern California. As a transient species, the American peregrine falcon may occur almost anywhere that suitable habitat is present (Garrett and Dunn 1981). In the Americas, the species winters from southern Alaska to Tierra del Fuego in southernmost South America (AOU 1998). Peregrine falcons in general use a large variety of open habitats for foraging, including tundra, marshes, seacoasts, savannahs, grasslands, meadows, open woodlands, and agricultural areas. Sites are often located near rivers or lakes (AOU 1998; Brown 1999; Snyder 1991). The diet of the American peregrine falcon primarily consists of birds that, while most are pigeonsized, can be as small as hummingbirds or as large as small geese (White et al. 2002). The principal cause of the American peregrine falcon population decline was the use of organochlorine pesticides, especially DDT and its metabolite DDE, which interfered with their calcium metabolism and resulted in eggs with thin shells that were easily broken (USFWS 2003). This species is a fully protected by the Department.

Ashy Storm-petrel. The total population size of the ashy storm-petrel (*Oceanodroma homochroa*) is less than 10,000 pairs and declining. Ashy storm-petrels feed on larval fish, squid, and zooplankton, and forage on the edges of upwelling zones and in waters just seaward of the continental slope. They generally nest in rocky crevices, such as those found around sea caves in the Channel Islands (Department 2009a). This species is currently considered a California Bird Species of Special Concern (breeding), priority 2 due to its population or range size being greatly reduced or its population or range size is moderately reduced and threats are projected to greatly reduce the taxon's population in California in the next 20 years. It is also considered a federal species of concern.

Belding's Savannah Sparrow. Belding's savannah sparrow (*Passerculus sandwichensis beldingi*) is found from Goleta south to El Rosario, Baja California. They were listed by the Department as endangered in 1974. They occupy coastal saltmarshes and estuaries where pickleweed (*Salicornia* spp.) is dominant. They eat a variety of crustaceans as well as seeds of pickleweed and may forage in other nearby habitats, including along rock jetties. This

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species breeds at Point Mugu, the Ballona Wetlands, Upper Newport Bay, and Bolsa Chica Estuary, among other locations (Department 2009a).

Black Storm-petrel. Pitman and Speich (1976) discovered the only known breeding site for black storm-petrel (*Oceanodroma melania*) in the United States on Sutil Island, an islet off Santa Barbara Island, in 1976. Only one nest was found, but an estimated 10 birds were heard in the vicinity, and the maximum number of breeding pairs was thought to be 10–15. The population may have been present previous to the discovery, and was estimated at 25 breeding pairs in later surveys. Black storm-petrels are most common in the warm coastal waters of the bight over the continental shelf off central California. They forage in surface waters near shore at thermal fronts adjacent to upwellings, tide rips, shelf-break fronts, and other areas of high ocean productivity. Their diet probably consists of small fish, crustaceans, and squid (Department 2009a). This species is listed as a California Bird Species of Special Concern (breeding).

California Brown Pelican. The California brown pelican (*Pelecanus occidentalis californicus*) was formerly listed as endangered under the ESA and CESA, but was removed from the lists in 2009. The California brown pelican was also protected as endangered under the California ESA, but officially delisted in November 2009. This species is fully protected species under §3511 of the Fish and Game Code and the Migratory Bird Treaty Act.

In California, the California brown pelican usually nests on two of the Channel Islands in Southern California: West Anacapa and Santa Barbara islands. Nest sites generally occur on the ground or in low shrubbery of steep coastal slopes on small islands, isolated from ground predators and human disturbance. California brown pelicans utilize local vegetation to build nests of sticks, grasses, and other debris each year. The majority of their diet is fish, primarily captured by plunge diving. California brown pelicans feed close to shore, primarily in shallow (<492 feet depth) waters of estuaries and the continental shelf, usually within 12.5 miles of shore. Their diet in the Channel Islands consists almost exclusively of small schooling fish; in particular, northern anchovy (*Engraulis mordax*) and Pacific sardine (*Sardinops sagax*). They also roost in groups during the day, on sand bars or jetties, or on manmade structures such as piers and docks. North American populations underwent dramatic declines during the 1960s and early 1970s due to eggshell thinning induced by dichloro-diphenyl-dichloroethylene (DDE), the primary metabolic breakdown product of the pesticide dichloro-diphenyl-trichloroethane (DDT). Although populations have recovered substantially from these declines, there is considerable interannual variation in productivity as related to prey availability, disturbance at colonies, and disease outbreaks. Breeding effort, productivity, and survival are lower during El Niño events. Nesting success on Santa Barbara and Sutil Island has been very high, with over 2,000 young chicks fledged from 2001 to 2003 (Department 2009a).

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California Least Tern. The California least tern (*Sternula antillarum browni*) is the subspecies of least terns nesting along the west coast of North America, from Baja California, Mexico, to San Francisco Bay. California least terns establish nesting colonies on sandy soils with little vegetation along the ocean, lagoons, and bays. Their nests are shallow depressions lined with shells or other debris. California least terns are generally present at nesting areas between mid-April and late September, often with two waves of nesting during this time period. California least terns feed on California killifish, sculpins, surfperch, silverside smelt, anchovy, Northern anchovy, Pacific saury (although not in years when other food is abundant), cabezon, and rockfish. Beach-nesting adults feed juvenile grunion and other small fish to their chicks. This species was listed as endangered by the U.S. Secretary of the Interior in 1970 and the Commission in 1971 due to a population decline resulting from loss of habitat, and is fully protected by the Department. It is also listed as endangered by the ESA. A survey in 2007 estimated 6,744 to 6,989 California least tern breeding pairs, which established nests, and produced 2,293 to 2,639 fledglings at 48 documented locations. Numbers of nesting California least terns were not uniformly distributed across all sites. Camp Pendleton, Naval Base Coronado, Los Angeles Harbor, and Batiquitos Lagoon represented 55 percent of the breeding pairs while Venice Beach, Camp Pendleton, Huntington Beach and Naval Base Coronado produced 52 percent of the fledglings (Department 2009a).

Coastal California Gnatcatcher. The coastal California gnatcatcher (*Polioptila californica californica*) occurs in coastal Southern California and Baja California year-round. The coastal California gnatcatcher typically occurs in or near sage scrub habitat which is composed of relatively lowgrowing, dryseason deciduous and succulent plants (Bontrager 1991). Their diet is primarily composed of spiders but is also composed of wasps, bees, and ants (Burger et al. 1999). Their population has declined due to widespread destruction of its coastal scrub habitat (Atwood 1990). The coastal California gnatcatcher is listed as threatened by ESA and as a Species of Special Concern by the Department.

Elegant Tern. Although thousands of elegant terns (*Thalasseus [Sterna] elegans*) from Mexico spend the summer and fall along the California coast, the only breeding colonies in the United States are at Bolsa Chica, Pier 400 at Terminal Island, and the salt work dikes at the south end of San Diego Bay. A limited breeding colony in the United States makes the elegant tern highly vulnerable to extirpation in this part of its range. Human disturbance at nesting sites also threatens the population. Elegant terns feed primarily on fish, such as topsmelt and anchovy, and forage in bays and protected areas (Department 2009a). This species is listed as a federal species of concern and is listed on the Department's Watch List.

Double-crested Cormorant. Double-crested cormorants (*Phalacrocorax auritus*) are found throughout the bight, although in Southern California they breed only on the Channel Islands. The Channel Islands' populations declined due to eggshell thinning from DDE contamination and, to some extent, human disturbance at nest sites, but the population is currently

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considered stable-to-increasing in California. Double-crested cormorants live in both fresh and saltwater environments. They eat primarily fish such as sardines and herring (Department 2009a). This species is listed on the Department's Watch List.

Golden Eagle. In North America, the golden eagle (*Aquila chrysaetos*) breeds locally from northern Alaska eastward to Labrador and southward to northern Baja California and northern Mexico. Golden eagles breed from late January through August with peak breeding occurring in March through July. Nest construction in Southern California occurs in fall and continues through winter (Dixon 1937). The species winters from southern Alaska and southern Canada southward through the breeding range (Grinnell and Miller 1944). The golden eagle requires rolling foothills, mountain terrain, and wide arid plateaus deeply cut by streams and canyons, open mountain slopes and cliffs, and rock outcrops (Zeiner et al. 1990). The food supply for this species includes medium to large mammals such as rabbits, hares, and squirrels, and it will also feed on reptiles, birds, and sometimes carrion (Olendorff 1976; Johnsgard 1990). A major threat to this species is human disturbance in the form of habitat loss as well as human development and activity adjacent to golden eagle habitat. Accidental deaths attributed to increased development include collisions with vehicles, power lines, and other structures; electrocution; hunting; and poisoning (Franson et al. 1995). The golden eagle is fully protected by the Department.

Light-footed Clapper Rail. The light-footed clapper rail (*Rallus longirostris levipes*) is distributed throughout coastal salt marsh habitat from Santa Barbara County, California to San Quintín Bay, Baja California, Mexico. They occur in approximately 24 California marshes where they are usually year-long residents, usually nesting in pickleweed (*Salicornia* spp.). They are omnivorous and opportunistic foragers that have a diet that includes insects, spiders, and isopods. Within its historical range the amount of suitable habitat has been severely reduced by conversion of its preferred saltmarsh habitat for other uses (USFWS 1979). This species is listed as endangered by ESA and CESA and is also listed as a fully protected species by the Department.

Osprey. Although ospreys (*Pandion haliaetus*) are found within the SCSR, few nesting locations exist in the area. Ospreys have been seen through the summer months at such former or potential nesting areas as Newport Bay (Orange County), and Buena Vista Lagoon (San Diego County). The removal of nesting trees, degradation of river and lake environmental quality, boating, and shooting may have contributed toward the decline of ospreys, which disappeared from Southern California before pesticides were introduced. Ospreys have a large global range, including every continent but Antarctica. They feed almost exclusively on fish, and nest near bodies of water. Some ospreys migrate to South America for the winter but do not nest there. Ospreys are protected under the Migratory Bird Act and are listed on the Department's Watch List, but are not currently listed as a species of special concern in California (Department 2009a).

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Western Snowy Plover. The western snowy plover (*Charadrius alexandrinus nivosus*) occurs throughout the SCSR, and its breeding range extends from Baja California, Mexico, to southern Washington State. During the winter, western snowy plovers are found on beaches, estuarine sand, and mud flats, and in manmade salt ponds; during the breeding season (March through September) they nest on beaches. Western snowy plovers feed on invertebrates in the wet sand and surf-cast kelp, and occasionally on insects from low-growing plants. The May 2006 coastal U.S. range-wide breeding season survey estimated 1,879 individuals with 1,719 of those birds seen in California (USFWS 2007). Human harassment and direct destruction of nest sites and breeding habitat, expanding predator populations, and introduced species contributed to the decline of western snowy plovers (Department 2009a). Poor reproductive success resulting from human disturbance, predation, and inclement weather combined with permanent or long-term loss of nesting habitat to urban development and the encroachment of introduced beach grass, has led to the decline in active nesting colonies as well as an overall decline in the breeding and wintering population of the western snowy plover along the Pacific coast of the United States. In Southern California, the very large human population and the resultant beach recreation activities by humans have precluded the western snowy plover from breeding on historically used beach strand habitat. As a result of these factors, the Pacific coast population of the western snowy plover was federally listed as a species threatened with extinction March 5, 1993 (58 Federal Register 12864). In addition, the western snowy plover is a California Species of Special Concern.

Xantus's Murrelet. Xantus's murrelet (*Synthliboramphus hypoleucus*) consists of two races. The northern race (*S. h. scrippsi*) is a fairly common breeder on the Channel Islands, while the southern race (*S. h. hypoleucus*) is a rare visitor to the southern offshore waters of California. For successful breeding Xantus's murrelet requires rocky, undisturbed islands with productive marine waters nearby. Larval fish are an important part of their diet, particularly northern anchovies (Department 2005c). This species is a federal species of concern and is listed as threatened by CESA.

Willow Flycatcher. The willow flycatcher (*Empidonax traillii*) consists of four or five subspecies. The different subspecies of willow flycatcher each occupy distinct breeding ranges and have subtle differences in color and morphology (Sogge et al. 1997), and possibly vocalizations. The southwestern willow flycatcher (*E. t. extimus*) is the subspecies present within the SCSR. In California, its breeding range extends from the Mexican border north and inland to the City of Independence in the Owens Valley east of the Sierra Nevada, to the South Fork Kern River in the San Joaquin Valley and coastally to the Santa Ynez River in Santa Barbara County (Craig and Williams 1998). The number of southwestern willow flycatchers in California has been estimated at approximately 200, recorded at 22 locations within 13 drainages (Finch et al. 2000). The southwestern willow flycatcher is a riparian-obligate species restricted to complex streamside vegetation. Native broadleaf-dominated and mixed native/exotic are the primary habitats used by southwestern willow flycatcher in California (Sogge et al. 1997). Willow flycatchers are insectivores and forage by aerially

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gleaning prey (capturing insects, for example, while hovering) from trees, shrubs, and herbaceous vegetation or by hawking (capturing in flight) larger insects (Ettinger and King 1980; Sanders and Flett 1989). The decline of southwestern willow flycatchers is primarily due to loss, fragmentation, and degradation of suitable riparian habitat resulting from urbanization, recreation, water diversion and impoundments, channelization, invasive plant species, overgrazing by livestock, and conversion of riparian habitat to agricultural land (USFWS 2002; Sedgwick 2000). The willow flycatcher is listed as endangered by the CESA, while the southwestern willow flycatcher is additionally listed as endangered by ESA.

7.1.2.5.6 Pinnipeds.

Harbor Seal. Harbor seals (*Phoca vitulina*) are widely distributed in the coastal areas of the northern Pacific and northern Atlantic. Harbor seals in the eastern Pacific range from the Pribilof Islands in Alaska to Isla San Martin off Baja California. Between the Mexican and Canadian borders, harbor seals have been managed as three separate stocks, one of which is the stock off California. After passage of the Marine Mammal Protection Act in 1972, harbor seal abundance grew rapidly until 1990, when stocks leveled off. There has been no net population growth in California since 1990. In 2002 the population was estimated at 27,863 animals. The southern Channel Islands have the largest concentration of harbor seals in California. The seals are year-round residents at most of the haulout sites, but their abundance varies seasonally, the highest numbers of seals being present during the breeding season (March-June) and the molt (June-July). San Nicolas Island, Point Conception, Mugu Lagoon, and Point Mugu are home to some of the largest haulout sites. Harbor seals also haul out on buoys, jetties, floating docks, and in harbors. Harbor seals eat a wide variety of pelagic and benthic prey, including small schooling fishes such as northern anchovy, many species of flatfishes, bivalves, and cephalopods. In Southern California, harbor seals were found to eat mostly rockfish, octopus, spotted cusk-eel, and plain midshipman (Department 2009a). In 1972, the MMPA made it illegal to hunt or harass any marine mammal, including seals, in U.S. waters. According to the MMPA, all seals and sea lions in U.S. waters are under the jurisdiction of NOAA Fisheries.

California Sea Lion. The range of the California sea lion (*Zalophus californianus*) extends from the Pacific coast of Baja California to southern British Columbia. These animals breed primarily on offshore islands in the southern part of their range from the Gulf of California to San Miguel Island. California sea lions can be seen around Santa Cruz, Anacapa, San Miguel, and Santa Rosa islands, and Seal Rocks at Santa Catalina Island. California sea lions also haul out on buoys, jetties, floating docks, and in harbors. In the late 1920s, only 1,000–1,500 California sea lions were counted on the shores of California. Since a general moratorium on hunting marine mammals was imposed with passage of the MMPA, the population has grown substantially to a current estimate of 237,000–244,000 animals. California sea lions are opportunistic feeders on a variety of prey, especially seasonally abundant schooling species such as Pacific hake, northern anchovy, Pacific sardine, spiny

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dogfish, and market squid. They tend to feed in cool upwelling waters of the continental shelf (Department 2009a).

Northern Elephant Seal. Elephant seals (*Mirounga angustirostris*) are found from Baja California to the Gulf of Alaska and Aleutian Islands, and the current population is over 150,000 animals. Elephant seals haul out two times per year, during the breeding season, December through March, and during the molt, April through August. They migrate north to feeding grounds twice a year. Most breeding sites are also molting haulout sites. In the SCSR, Northern elephant seal haulout sites are on San Miguel, San Clemente, Santa Rosa, Santa Barbara, and San Nicolas islands. Juvenile seals also haul out in high numbers at these traditional sites during the fall preceding the breeding season. When not on land, Northern elephant seals spend most of their time under water, and probably feed on deep-water, bottom-dwelling marine species such as rockfish, market squid, swell sharks, and ratfish. Pups feed on fish, squid, and small sharks (Department 2009a). This species is “fully protected” under the Fish and Game Code (§4700), which means that this species cannot be taken or possessed in California without a permit from the Commission.

Guadalupe Fur Seal. Guadalupe fur seals (*Arctocephalus townsendi*) are listed as threatened under the California ESA and ESA, fully protected by the Department, and depleted under the MMPA. The Guadalupe fur seal is a pelagic species throughout most of the year, occurring in Pacific Ocean waters from Isla de Guadalupe, Mexico, to the Channel Islands of Southern California. When ashore, this seal occupies rocky caves and crevices and sandy beaches. Breeding occurs solely on Isla Guadalupe from May to July. Male seals are occasionally observed on rocky beaches of the southern Channel Islands. It is believed that Guadalupe fur seals feed in deep waters on species of krill, squid, and small schooling fish. The most recent population estimate of 7,408 fur seals was made in 1994. Counts taken between 1954 and 1994 suggest that the rate of population growth as of 1994 was approximately 14 percent (Department 2009a).

In 1985 the Guadalupe fur seal was listed as threatened under the ESA. In addition, it is considered to be “depleted” and a “strategic stock” under the MMPA. Under the ESA and MMPA, NOAA Fisheries is responsible for the management and recovery of most marine mammal species including the Guadalupe fur seal. Even though it is required under the ESA, no recovery plan for this species has been prepared, nor has a recovery team been established. This species is fully protected under the Fish and Game Code (§4700), which means that this species cannot be taken or possessed in California without a permit from the Commission. In addition, this species is protected under the CESA. Under CESA, the Department is responsible for conserving, protecting, restoring, and enhancing endangered and threatened species and their habitat. Currently, no state-managed fisheries are known to be negatively impacting this species. The Department does not have any active research, management, or conservation programs for the Guadalupe fur seal.

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7.1.2.5.7 Fissipeds.

Southern Sea Otter. Once ranging from northern California to Japan to Punta Abreojos in Baja California Sur, southern sea otters (*Enhydra lutris nereis*) are rare within the SCSR and occur mostly along California's central coast. California sea otters are federally listed as a threatened species under the ESA. Additionally, this species is fully protected under the Fish and Game Code (§4700). The statewide population of sea otters was drastically reduced during the 18th and 19th centuries due to commercial hunting, and has been generally increasing from as few as 50 individuals in 1914. From 1987 to 1990, an effort was made to relocate 139 southern sea otters to San Nicolas Island. Because fewer than 25 sea otters were observed around the island 9 years after the last translocation, this effort was considered a failure. In 2003, however, 33 individuals were observed around San Nicolas Island. Sea otters in California rarely eat fish. Their diet is made up almost entirely of large invertebrates, including abalones, crabs, sea urchins, clams, snails, mussels, octopus, barnacles, scallops, sea stars, chitons, and worms. Current sightings of sea otters within the SCSR are relatively rare. Sightings of juvenile males and adult males are becoming more common in the northern portion of the SCSR. Male sea otters come south to feed, but return north to breed, and their movements are being monitored by surveys conducted by the U.S. Geological Survey. The coast south of Point Conception was identified as an "otter free" management zone in 1986 at the same time San Nicolas Island was identified as a translocation zone. Sea otters in the "no-otter" zone are subject to non-lethal removal. The USFWS released a biological opinion in 2000 stating that the continued, passive expansion of the sea otter's range was necessary for its survival and recovery. Currently, sea otters are not being removed, and the containment program is under review. A final Environmental Impact Statement was produced in 2009.

7.1.2.5.8 Cetaceans. The bight hosts a rich diversity of cetacean species (order *Cetacea*), with at least 33 species occurring within the SCSR. Blue whales (*Balaenoptera musculus*), humpback whales (*Megaptera novaeangliae*), and gray whales (*Eschrichtus robustus*) enter the SCSR following migration routes between warm southern waters and cold northern waters. Blue whales can be spotted from June to December as they migrate north. Gray whale northward and southward migrations overlap and animals can be seen heading both north and south off Southern California in January and February. Humpback whales (*Megaptera novaeangliae*; federally endangered) can be seen from spring until early fall, and their total United States west coast population is estimated at 597 individuals. Several other species vary seasonally in their abundance, with Pacific white-sided dolphin (*Lagenorhynchus obliquidens*), Risso's dolphin (*Grampus griseus*), and northern right whale dolphins (*Lissodelphis borealis*) more common in winter, and finback whales (*Balaenoptera physalus*) occurring more in the summer. Bottlenose dolphins (*Tursiops truncatus*) forage for bottom fish year-round in Santa Monica Bay. Common cetaceans found in the SCSR include gray whale, humpback whale, blue whale, finback whale (*Balaenoptera physalus*), sperm whale (*Physeter macrocephalus*), Baird's beaked whale (*Berardius bairdii*), and Minke

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whale (*Balaenoptera acutorostrata*), bottlenose dolphins, shortbeaked common dolphins (*Delphinus delphis*), and long-beaked common dolphins (*D. capensis*) (Department 2009a). Special status cetacean species whose ranges extend into the SCSR include the North Pacific right whale (*Eubalaena japonica*; federally endangered), sei whale (*Balaenoptera borealis*; federally endangered), sperm whale (*Physeter catadon* [*P. macrocephalus*]; federally endangered), and killer whale (*Orcinus orca*; federally endangered) (NOAA Fisheries 2010). All cetaceans are protected under the MMPA, and many are also protected under the ESA (Department 2009a).

7.1.2.6 Species Likely to Benefit from MPAs

The MLPA requires that species that are likely to benefit from MPAs be identified. The identification of these species will contribute to the identification of habitat areas that will support achieving the goals of the MLPA and inform MPA monitoring. The SAT assembled, reviewed, and refined the list of species likely to benefit the SCSR; this list is included as Appendix C. Species were considered if they met the following criteria:

- They occur in the SCSR.
- They are taken directly or indirectly in commercial or recreational fisheries.
- They have life history characteristics that make them more conducive to protection by MPAs, such as sedentary behavior, long life spans, slow growth, or associations with habitats that need additional spatial protection. An MPA would be expected to increase the species abundance or spawning biomass if the species is at an abnormally low abundance or abnormally low size frequency (i.e., below the range of natural fluctuations).

7.1.2.6.1 Depleted, Depressed, or Overfished Species.

Fish.

Groundfish (rockfishes, flatfishes, etc). The federal Pacific Coast Groundfish Fishery Management Plan, implemented by the Pacific Fishery Management Council in 1982, includes more than 90 species of bottom-dwelling marine fishes. Species and species groups managed under the Pacific Coast Groundfish Fishery Management Plan include all rockfishes occurring in the northeast Pacific Ocean (about 60 species), sablefish, thornyheads, lingcod, Dover sole and other flatfishes (not including California or Pacific halibut), Pacific whiting, and some sharks and rays. For federally managed fisheries, any stock assessed to be between 25 percent and 40 percent of unfished biomass is managed under “precautionary zone” management, where harvest rates are reduced to slow the depletion rate. Species currently managed under precautionary zone measures include cabezon, petrale sole, sablefish, and the California portion of the west coast blue rockfish and lingcod stocks (Department 2009a).

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The Pacific Fishery Management Council adopted new rebuilding analyses for seven rockfish species (*Sebastes* spp.) that are, or were previously, designated as “overfished” (less than 25 percent of their unexploited spawning population size remains). All seven of these species are known to occur in the SCSR, but only four of these commonly occur: bocaccio, cowcod, and canary and widow rockfishes. Cowcod are found from Baja California to Oregon, while bocaccio, widow rockfish, and canary rockfish ranges extend to Alaska. Juvenile bocaccio tend to settle in kelp beds after their pelagic larval stage and move to deeper rocky reefs (60 to 1,550 feet) as adults. Most adult bocaccio live at depths of 250 to 750 feet. Juvenile canary rockfish also tend to stay closer to the surface before moving to deeper benthic habitats as adults. In Southern California, canary rockfish are most abundant around depths of 500 feet, but go as deep as 900 feet. Widow rockfish juveniles stay near the surface after their pelagic larval stage, and move to deeper waters as adults. Most widow rockfish occur in depths of 450 to 750 feet but have been found as deep as 1,050 feet. Adult widow rockfish of the same size class tend to move together from area to area, and show seasonal movement among adjacent grounds. Cowcod juveniles prefer fine clay and soft sediment including oil platform shell mounds, oil pipelines, and other complex substrate at depths of 132 to 740 feet. Adult fish move to rocky reefs and isolated outcroppings from 300 to 1,620 feet but are most common around 495 feet. All four of these species of rockfish take years to reach reproductive maturity. The rebuilding process for most “overfished” rockfish species to reach healthy population levels is expected to require many years to decades. The commercial fishery for these species is generally regulated by a combination of depth-based area closures, trip limits, restricted access, gear restrictions, and in-season adjustments to prevent catches from exceeding harvest limits. The recreational fishery for these species is also regulated using depth-based area closures, bag limits, gear restrictions, and seasons (Department 2009a).

Southern California Steelhead. See Section 7.1.2.5.3.

Giant Sea Bass. See Section 7.1.2.5.3.

Great White Shark. See Section 7.1.2.5.3.

Gastropods. Gastropods are the most successful class of mollusks, by number of species. The earliest gastropods are known from Early Cambrian rocks more than 500 million years old, like most other orders of shelled animals. Gastropod shells consist of one piece that grows in a coiled pattern, the organism moving into larger chambers in the shell as it becomes larger.

Abalone. Seven species of abalone (*Haliotis* spp.) are found in California: red, white, black, green, pink, pinto, and flat. The Department applies the term “depleted” to five species of abalone within the SCSR. Two of these, the black and white abalone, are discussed in Section 7.1.2.3, Special-status Species. The California Legislature closed the commercial and recreational abalone fishery south of San Francisco Bay in 1997 due to a decline in the

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populations and the progression of disease. The Commission adopted the Abalone Recovery and Management Plan (ARMP) in December 2005. The ARMP outlines restoration strategies for depleted abalone stocks in central and Southern California and describes the management approach to be used for northern California red abalone and eventually for other recovered abalone stocks (Department 2009a). For more detailed information on black abalone (*Haliotis cracherodii*) and white abalone (*Haliotis sorenseni*), see Section 7.1.2.3, Special-status Species.

Red Abalone. These abalones, whose range extends from Oregon into Baja California, are exclusively subtidal in Southern California, and associated with rocky kelp habitat. The ARMP allows for the potential reopening of abalone fisheries at specific locations, such as San Miguel Island. Accordingly, the Department has initiated the necessary evaluation of San Miguel Island red abalone to help inform future decisions by the Commission, and has appointed members of an Abalone Advisory Group to support this work. Assessment surveys began in 2005 as part of the initial task of monitoring population recovery under the draft ARMP. Populations at Santa Rosa, Santa Cruz, and San Miguel islands do not yet meet the size range recovery criterion outlined in the ARMP.

Pink Abalone and Green Abalone. Both these species are found on open coast shallow rocky habitat from Point Conception to Bahia Magdalena, Baja California, Mexico. Pink abalone and green abalone feed on algae, and pink abalone are found at greater depths than green abalone, which center around 10 to 20 feet deep. There has been recent reproduction and recruitment success for green abalone; however recovery will take considerable time. A study off Point Loma found many pink abalone recruits, although the source of the recruits is unknown and the density of the population is much lower than the minimum spawning density needed for the population to persist. The Department began an aggregation study of pink and green abalone to monitor their growth rates, movement, and survival at Santa Catalina, San Clemente, and Santa Cruz islands in summer 2008. Surveys for pink and green abalone were conducted mostly at Anacapa and Santa Cruz islands, and revealed low densities of abalone. Higher densities of pink abalone were found at the east side of Santa Cruz Island. These densities were below the level of recovery.

Pinto and Threaded Abalone. Pinto abalone is uncommon in both southern and northern California, making up less than 1 percent of the population. Threaded abalone is the least common of the abalone species found off California and is rarely found north of San Diego County. Sea urchin divers reported a population of pinto abalone and a population of threaded abalone in the SCSR adjacent to Scripps Institute of Oceanography. Both species were not a major component of then commercial and recreational fisheries in California.

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7.1.2.6.2 Fished Species of Interest.

Fish.

Nearshore Finfish. The Department uses the term “finfish” to define fish that are aquatic vertebrates of the super class Pisces, breathing by gills throughout life, and having limbs in the form of fins. The California Nearshore Fishery Management Plan (2002) guides the management of 19 nearshore finfish species: rockfishes (black, black-and-yellow, blue, brown, calico, China, copper, gopher, grass, kelp, olive, quillback, and treefish), cabezon, California scorpionfish, kelp and rock greenlings, California sheephead and monkeyface prickleback. The first 16 of these 19 species are also included in the federal Pacific Coast Groundfish Fishery Management Plan (Department 2009a).

A restricted access program began in 2003 for the commercial nearshore fishery that affected the take of 10 nearshore species. The shallow nearshore group consists of black-and-yellow, China, gopher, grass, and kelp rockfishes; kelp and rock greenlings; California scorpionfish; California sheephead; and cabezon. A total statewide participant capacity goal of 61 permits was specified for these 10 species, although as of 2007, 186 permits remain with 155 of the permits actively fished (i.e., annual landings of permit species exceeded 100 pounds). A restrictive permit program also began for eight species of deeper nearshore rockfishes: black, blue, brown, calico, copper, olive, quillback, and treefish. Black rockfish is uncommon in the SCSR. The number of permits for these species decreased from 292 in 2003 to 239 permits in 2007 with 105 of the permits actively fished (i.e., annual landings of permit species exceeded 100 pounds) (Department 2009a).

California Sheephead. The California sheephead (*Semicossyphus pulcher*) occurs on nearshore rocky reef and kelp forests, and is found to depths of 280 feet. With the exception of 1982-1983 El Niño, the population seems to increase during El Niño conditions and this is reflected in increased recruitment. Although California sheephead range from Monterey Bay, California to the Gulf of California, Mexico, it is not common north of Point Conception. California sheephead begin life as female with older, larger females developing into secondary males. Female sexual maturity may occur in 3 to 6 years and fish may remain female for up to 15 years. While not clear, it is thought that the timing of the transformation to males involves population sex ratio as well as size of available males; sometimes it does not occur at all. California sheephead show high site fidelity and a small home range, but increase their movement range with warmer seasonal waters. California sheephead feed mainly on invertebrates including urchins and other echinoderms, mussels, clams, gastropods, crabs, spiny lobster, barnacles, squid, bryzoans, and polychaetes. The California sheephead is targeted by sport divers, anglers, and the live fish commercial industry. The recreational catch is regulated by seasonal depth closures, daily bag limit, and a minimum size limit. The commercial fishery is also regulated by an annual commercial allocation, broken into two-month cumulative trip limits and minimum size limit (Department 2009a).

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California Scorpionfish. The California scorpionfish (*Scorpaena guttata*) is a valuable commercial fish in Southern California. For many years, the fishery experienced a long decline, with peak catches of 223,000 pounds in 1925 and fluctuating catches thereafter. However, the rise of the live fish fishery in the 1990s led to the fishery's resurgence, as this species' bright red color and hardness after capture has made it a favorite target. Today, about 85 percent of the commercial California scorpionfish catch goes to the live fish fishery. Catches in 1998 totaled about 75,000 pounds valued at \$175,000. Most fish are taken in traps or by hook-and-line.

California scorpionfish are a moderately important part of the sport fishery in Southern California. They are taken primarily from party boats and private vessels, and occasionally from piers and jetties, mostly from Point Mugu southward.

California scorpionfish are easily distinguished from most other California fishes. They are a relatively heavy-bodied species, with strong head and fin spines, ranging in color from red to brown, often with purple blotches and always covered with dark spots. They reach a length of 17 inches. This species can be found in tide-pool depths to about 600 feet (usually in about 20–450 feet) from Santa Cruz to southern Baja California, and in the northern part of the Gulf of California. Preferring warmer water, the species is common as far north as Santa Barbara. While they are most abundant on hard bottom (such as rocky reefs, sewer pipes and wrecks), they are also found on soft-sediment habitats.

White Seabass. The white seabass (*Atractoscion nobilis*) is the largest member of the croaker family (*Sciaenidae*) in California, capable of reaching lengths over five feet and weights in excess of 90 pounds. White seabass range from Magdalena Bay, Baja California, Mexico to the San Francisco Bay area. They are also found in the northern Gulf of California, Mexico. Genetic data indicates that the white seabass population may be composed of several reproductive stocks. Fisheries related data suggests that the center of the white seabass population may have shifted southward since the inception of the fishery and presently appears to be off central Baja California (Department 2009a).

White seabass aggregate nearshore and around coastal islands to spawn. Spawning occurs from March to August and peaks in May, the majority of spawning events occurring over the two-hour period following sunset. Larvae have been collected from Santa Rosa Island, California to Magdalena Bay, Baja California. California Cooperative Oceanic Fisheries Investigations data collected between 1950 and 1978 revealed larval white seabass concentrations along the inshore areas of Sebastian Viscaïno and San Juanico Bays, Baja California, indicating that considerable spawning occurs off central Baja California. Kelp forest habitat is particularly important to white seabass spawning aggregations (Department 2009a).

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Young-of-the-year white seabass inhabit shallow coastal waters (12 to 30 feet deep) where they associate with drift algae along sandy ocean bottoms. Most juveniles between 1 and 3 years old occur in shallow, open coastal areas with a very small portion entering bays. Older juveniles are caught off piers and jetties and around beds of giant kelp. Adult white seabass occupy a wide range of habitats including kelp beds, rocky reefs, offshore banks, and sandy bottoms. White seabass mainly feed on highly mobile coastal pelagics such as herring, anchovies, and squid (Department 2009a).

Today, catches of white seabass are concentrated in the nearshore waters of the bight including the Channel Islands. Regulations covering white seabass include a minimum size limit (28 inches), closed seasons, bag limits, and fishing gear restrictions. Beginning in 1983, the Department initiated the Ocean Resources Enhancement and Hatchery Program to test the feasibility of raising white seabass for population enhancement. Over one million juvenile white seabass have been released into the wild, and the Department has verified over 100 legal-sized tag returns. Recent evidence indicates that the white seabass fishery in Southern California is returning due mainly to the nearshore commercial gill net ban that went into effect in 1994 (Department 2009a).

California Halibut. California halibut (*Paralichthys californicus*) is an important nearshore flatfish species in both the commercial and recreational fisheries of central and Southern California. California halibut prefer soft-bottom coastal habitats in depths less than 300 feet, and are greatest in abundance in depths of 100 feet or less. California halibut spawn in nearshore areas from approximately February to July. Fertilized eggs float in the upper 98 feet of the water column shoreward of the 250-foot isobath. At 30 days post-fertilization, the eggs hatch and the yolk-sac larvae emerge. The larvae are planktonic and they are typically concentrated in the upper 65 feet of the water column shoreward of the 250-foot isobath, although they have been collected from the sea surface down to a depth of 250 feet. The transformation of halibut larvae into juvenile fish coincides with their settlement in both nearshore protected habitats (i.e., bays and estuaries) and exposed open coast areas of Southern California approximately 20 days post-hatching (Department 2009a).

The adult halibut diet consists of nearshore finfish such as Pacific sardine, white croaker, and market squid. California halibut can grow to five feet in total length and weigh as much as 72 pounds. Results from extensive tagging studies conducted by the Department indicated juvenile and adult halibut remain localized within an 8-mile range but larger adult fish are known to travel over 200 miles. Their results also indicated halibut movement was conducted parallel to the coast line, and northward migrations were of significantly greater distances than southward. However, tagged halibut recaptures south of the international boundary with Mexico may have gone unreported, limiting our knowledge of southward migrations (Department 2009a).

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California halibut is taken commercially using three types of gear: bottom trawl, set gillnet, and hook-and-line. Gill and trammel nets are prohibited in state waters along the mainland within the SCSR and in waters less than 420 feet deep or within 1 nautical mile, whichever is less, around the Channel Islands. Currently, the mesh size must be at least 8.5 inches to harvest California halibut. Bottom trawling is prohibited in all state waters, except within the California Halibut Trawl Grounds. These trawl grounds are located in certain state waters not less than 1 mile from mainland shore from Point Conception (Santa Barbara County) to Point Mugu (Ventura County). Recreational anglers target halibut from shore and boat-based modes including Commercial Passenger Fishing Vessels (CPFVs), private and rental boats, and kayaks (Department 2009a).

Kelp Bass. Kelp bass (*Paralabrax clathratus*) is one of the most important recreationally fished nearshore species in the SCSR. The most productive California fishing areas for kelp bass in recent years have been off Point Loma and La Jolla in San Diego County, Dana Point and Laguna Beach in Orange County, Santa Catalina Island and Horseshoe Kelp in Los Angeles County, and around the Channel Islands in Santa Barbara and Ventura Counties. Kelp bass are targeted exclusively by sport anglers; the commercial harvest of this species has been illegal since 1953. Kelp bass are typically found in shallow water (surface to 150 feet) being closely associated with high relief structure, including kelp forests and rocky reefs. Kelp bass range throughout the water column, but seem to concentrate between 8 and 70 feet. Early tag-and-recapture studies showed little movement for the majority of tagged kelp bass and concluded that if they move at all, it is to nearby rocky reefs or short distances to gather into breeding assemblages. Acoustic tracking studies conducted at Santa Catalina Island revealed that kelp bass had relatively small home ranges and stayed in the same general area throughout the one year study. However, movement patterns of kelp bass can vary, as tagging studies in the northern portion of the bight indicated that kelp bass were quite mobile with some fish traveling as far as 50 miles. Kelp bass are carnivorous ambush predators, feeding on a variety of small fish and invertebrates, including other kelp bass, pipefishes, flatfishes, blacksmith, surfperch, crabs, squid, polychaetes, tunicates, and hydrozoans. Department surveys show that anglers catch a large number of age-classes, indicating a stable spawning population (Department 2009a).

Barred Sand Bass. Barred sand bass (*Paralabrax nebulifer*) have consistently ranked among the top 10 species in the Southern California marine sport fish catch. The major barred sand bass fishing sites include the Silver Strand, Del Mar, and San Onofre in San Diego County; Huntington Flats area off Orange County; the inshore portion of northern Santa Monica Bay off Pacific Palisades and Santa Monica in Los Angeles County; and the Ventura Flats area off northern Ventura County. Barred sand bass are targeted exclusively by sport anglers; the commercial harvest of this species has been illegal since 1953. Although lacking some of the sporting qualities of kelp bass, barred sand bass are much more susceptible to hook-and-line gear and are somewhat easier to catch. Sport anglers target large spawning aggregations of barred sand bass, which form over soft-bottom habitat at depths

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between 60 and 120 feet from June through August. Barred sand bass chiefly inhabit the shallow waters near the Southern California mainland and are rare north of Point Conception. While barred sand bass occur as deep as 600 feet, they are typically caught in depths less than 90 feet. Young sand bass are abundant in very shallow water (5 to 30 feet). Barred sand bass are usually closely associated with sand/rock interfaces of rocky reefs, kelp and seagrass beds, and artificial structures and are rarely found out over sandy expanses during non-spawning periods. Department tagging studies have revealed that barred sand bass are capable of movements of from five to 40 miles. Results from a recent acoustic tracking study of barred sand bass movements at Santa Catalina Island indicated they had small home ranges and that individuals remained in their home ranges throughout the one-year study. These results suggest that some barred sand bass may spawn within home ranges, while others migrate to large spawning areas. Barred sand bass are carnivorous ambush predators, feeding on a variety of small fish and invertebrates including surfperch, sardines, anchovies, midshipman, crabs, clams, and squid (Department 2009a).

Surfperch. The surfperch family (*Embiotcidae*) comprises a colorful set of fish that are fished primarily by recreational anglers. Surfperch ranks in the top ten most popular species in terms of the number of fish landed (kept and/or released) by recreational anglers fishing ocean waters. Surfperch also support a comparatively minor hook-and-line commercial fishery. Barred, redbtail, and calico surfperch may not be taken commercially south of Point Arguello. The barred surfperch (*Amphistichus argenteus*) is the primary species taken by recreational beach anglers in the SCSR. Barred surfperch are found along sandy beaches near sources of food and cover such as piers and jetties. Several species of surfperch prefer similar habitat while others prefer rocky reefs or kelp beds. Surfperch are usually found in 60 feet or less, although the pile perch and rubberlip surfperch will go to depths of 150 feet, and barred surfperch have been found as deep as 240 feet. Surfperch stay near the shoreline in relatively shallow water, making them vulnerable to coastal development and pollution (Department 2009a).

California Grunion. The grunion (*Leuresthes tenuis*) is a member of the New World silversides family, Atherinopsidae, along with the jacksmelt and topsmelt. They normally occur from Point Conception, California, to Point Abreojos, Baja California, but are now being found farther north to Monterey Bay, San Francisco Bay and Tomales Bay. These northern populations may not be self-sustaining, but rather occasionally re-colonized from Southern California populations. Genetic data indicate recent colonization in the northern sites and mobility between southern spawning sites. They inhabit the nearshore waters from the surf to a depth of 60 feet. Limited tagging studies indicate they are non-migratory, but neither do they show site fidelity. Spawning occurs from March through August, and occasionally in February and September. Peak spawning is late March to early June. The eggs are deposited during the highest tides of the month and incubate in the sand during the lower tide levels, safe from the disturbance of wave action, and hatch during the next high tide series about 10 days later. Despite local concentrations, grunions are not abundant within

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California. The most critical issue facing the grunion resource is the loss of spawning habitat caused by beach erosion, harbor construction, beach manipulation, and pollution. Grunions are not a commercially targeted species but make up a small portion of the commercial “smelt” catch. Sport fishers with a sport fishing license may take grunion using only their hands. There is no bag limit, but grunion may only be taken from June through March (Department 2009a).

Nearshore Sharks and Rays. Nearshore sharks and rays (Class *Chondrichthyes*) occur in shallow waters and utilize bays and estuaries as nursery sites. These species tend to grow slowly, live many years, and have low reproductive rates. In the eastern Pacific, Pacific angel sharks (*Squatina californica*) are found from southeastern Alaska to the Gulf of California and from Ecuador to Chile. Pacific angel sharks are bottom-dwelling species found at depths of three to over 600 feet. They are often found in sandy, soft bottoms between rocky reefs, and are sometimes taken in the commercial California halibut trawl fishery and discarded as bycatch. According to tagging studies, Pacific angel sharks often stay in the same vicinity as tagged, although angel sharks tagged at the islands did tend to move around the islands. Pacific angel sharks eat mostly queenfish, blacksmith and market squid. The Pacific angel shark fishery is regulated with gear restrictions and a minimum size limit. Sport and commercial fishermen take nearshore sharks and rays throughout California, except for the shovelnose guitarfish, which is rare north of Monterey Bay. Take of many shark, skate, and ray species occurs as bycatch, so some species are possibly taken and discarded in trawl and other fisheries because of their low value. Although not targeted by sport or commercial fishermen, the spiny dogfish probably makes up a significant amount of the bycatch in some fisheries. Bat rays are commonly taken by sport and commercial fishermen, and then discarded. Leopard sharks are primarily found in bays, estuaries, and shallow nearshore waters where they are easily taken by sport fishermen. Declines in the Pacific angel shark, thresher shark, spiny dogfish and soupfin shark fisheries were observed prior to effective management by the Department. Threats other than targeted fishing and bycatch include loss of nursery habit and illegal take of pups for marine aquaria trade (Department 2009a).

Invertebrates.

Market Squid. The market squid (*Loligo opalescens*) is found from Baja California, Mexico to Alaska. During the day, they are usually found at depths from 325 to 2,000 feet. They migrate to the top 325 feet of water at night. Spawning market squid aggregate over sandy areas from October to May in Southern California. Paralarvae are dispersed from spawning grounds and are found mostly inshore, but their later migration patterns are unknown. Juvenile squid feed on copepods and euphasiids like krill, but as adults eat fish, polychaete worms, squid, and crustaceans. Little is known about their population status, but it is suggested that their stock is replaced annually, and their life span is about 250 days. The commercial fishery for market squid is one of the largest in California, both by volume and value. Traditional fishing areas for squid are found within the Monterey Bay region of

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California north to Año Nuevo and the Farrallon Islands (northern fishery) and in the SCSR around the Channel Islands (southern fishery) including Santa Catalina Island. The southern fishery season operates during the fall and winter. The Commission adopted the Market Squid Fishery Management Plan in 2005. It established a restricted access program, which mandated permits for vessels participating in the fishery, a series of fishery control rules, and a seasonal harvest guideline of 107,047 metric tons (about 235.9 million pounds) (Department 2009a).

Red Sea Urchin. The red sea urchin (*Strongylocentrotus franciscanus*) is an echinoderm (along with sea stars) which feeds primarily on algae, including kelp. They are found from Baja California to Alaska in relatively shallow water (low-tide line to 300 feet). Red sea urchins prefer rocky ground near kelp and seaweeds. Sea urchins can dramatically reduce kelp abundance, creating urchin barrens. Red sea urchins are harvested for their roe, which is sold mostly as an export product to Japan, although recent years have seen a shift from export to domestic uses. Statewide landings of red sea urchins in 2007 were 11.2 million pounds, with 9.6 million pounds landed in Southern California, an amount near the long-term average. The statewide catch has remained in a relatively narrow range from 10.7 to 14.0 million pounds since 2002. A small amount of recreational take of sea urchins occurs from tide pool areas. The red sea urchin fishery is a restricted-access fishery with 300 permit holders, of whom about 120 are active divers (Department 2009a).

Rock Crab. Rock crabs are found from Baja California, Mexico to British Columbia, Canada and are found in low intertidal waters to depths of 300 feet or more. The commercial catch is made up of three species: the yellow rock crab (*Cancer anthonyi*), the brown rock crab (*C. antennarius*), and the red rock crab (*C. productus*). Upon landing, all three species are often categorized as “unspecified rock crab” (*Cancer* spp.) in catch statistics presented in this document. Brown and red rock crabs prefer rocky reefs, while yellow rock crabs prefer open sand or soft-bottom habitat. Rock crabs feed on a variety of invertebrates. Rock crabs have been known to move several miles, but no migration pattern or large-scale movement is apparent. Santa Barbara Harbor accounted for almost 68 percent of the fishery landings for this species between 2000 and 2007. Other notable rock crab ports are Avila-Port San Luis (north of the SCSR), Oxnard, Ventura, Redondo Beach, San Pedro, and the San Diego area ports. The commercial fishery, a limited entry fishery, has size restrictions and requires a valid general trap permit and either a southern or northern rock crab permit. The recreational fishery also has size restrictions and a bag limit of 35 crabs per day (Department 2009a).

California Spiny Lobster. California spiny lobsters (*Panulirus interruptus*) range from Manzanillo, Mexico to Monterey Bay. Adult spiny lobsters prefer rocky areas and are found from the intertidal zone to depths of 240 feet or more. Spiny lobster larvae drift with the current up to 350 miles offshore and to depths of over 400 feet. Adult lobsters forage at night, and feed on a variety of algae, fishes, and invertebrates, including urchins, snails, mussels, and clams. The commercial fishery for California spiny lobster uses baited traps that

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are individually buoyed and deployed along the mainland coast from Point Conception to the California border with Mexico and at all the Channel Islands. A large recreational fishery also thrives, involving skin and scuba divers, and anglers with hoop nets. The fishery is strongly influenced by the weather and El Niño and La Niña events. The commercial fishery is regulated with size limits, a season, gear requirements (escape ports on traps for undersized lobster), and permits. Recreational fishers are regulated with size limits, a season, daily bag limits, and gear regulations. Fishing intensity tends to be highest at the start of the season (in the fall) when fishing efficiency is the highest. The Commission approved a lobster report card in order to provide data on total recreational catch. The lobster report card has been required of all recreational lobster hunters, regardless of age or gear type, starting the fall of 2008 (Department 2009a).

CALobster, a research collaboration of commercial fishermen and marine biologists from UCSB, collects data on local lobster catches. CALobster strives to advance fishery research and management by fostering collaboration among scientists and fishermen. As part of these collaborative efforts, CALobster conducts studies in which lobster are tagged, released, and eventually recaptured. The studies provide information about where lobsters go and how fast they grow. The data may be valuable for understanding how marine reserves affect the lobster fishery, developing lobster population models, and integrating marine reserves into stock assessments. The researchers use traps to monitor California spiny lobster around the eastern Channel Islands. They deploy commercial lobster traps inside, nearby, and approximately 2 miles away from four reserves. Every trapped lobster is measured and then released with a numbered tag, which stays attached even after the lobster molts. The short-term goals of CALobster are to determine:

1. Sizes of spiny lobster and population age structure inside versus outside reserves
2. Number of lobster per trap inside versus outside reserves
3. Movement patterns near reserve borders and over greater distances

CALobster has determined that lobster populations inside reserves have higher proportions of large individuals; traps inside reserves consistently had equal or higher yields than traps outside; and recaptures suggest most movement is less than 0.7 mile, but some lobsters move long distances (Department 2008b).

Sea Cucumbers. The California sea cucumber (*Parastichopus californicus*), also known as the giant red sea cucumber, and the warty sea cucumber (*P. parvimensis*) are fished commercially in California. Both ranges extend south to Baja California, Mexico and north to Alaska and Monterey Bay respectively. The warty sea cucumber inhabits the low intertidal zone to 90 feet, the California sea cucumber to 300 feet. Sea cucumbers feed on organic detritus, sea stars, and small organisms in the nearshore rocky environment. Sea cucumbers move about 12 feet per day, but without pattern. The warty sea cucumber is fished almost

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exclusively by divers, and populations at fished sites have declined due to fishing mortality. The California sea cucumber is caught principally by trawling in federal waters adjacent to Southern California. Special permits to fish for sea cucumbers commercially were required beginning with the 1992–1993 fishing season. No significant sport fishery for sea cucumbers exists in California, and sport fishing regulations forbid their take in nearshore areas in depths less than 20 feet (Department 2009a).

Kellett's Whelk. The Kellett's whelk is a large subtidal snail (*Kelletia kelletii*) which occurs intertidally and is common subtidally to 230 feet on rocky reefs, gravel bottoms, kelp beds, and sand from Isla Asuncion, Baja California, Mexico to Monterey Bay. Spawning occurs in the spring, and during spawning the snails aggregate into groups of up to 20 individuals. The species is harvested commercially; Los Angeles and Orange County ports received over half the Kellett's whelk landings in 2006 followed by San Diego, Santa Barbara, and Ventura County ports. Although not one of the top five invertebrate fisheries by landings, the Kellett's whelk fishery is growing rapidly. No regulations exist regarding harvest of this species, except that Kellett's whelks cannot be taken within 1,000 feet from the shore unless it is incidental take by lobster and/or rock crab traps (Department 2009a).

7.1.2.7 Ecological Linkages/Associations

Watersheds and coastal waters have many complex ecological linkages/associations. Watersheds carry freshwater, nutrients, and sediments to bays, estuaries, and the ocean. In Southern California, growth of urban areas has significantly changed the nature of many watersheds. Many rivers and streams (e.g., the Los Angeles River) have been channelized, which has impacted the transport of sediment, nutrients, and pollution to coastal environments. Numerous smaller streams and rivers flow into small estuaries in which mixing and dilution occur. Many of the estuaries, bays, coastal lagoons, and remaining wetlands have high importance relative to their small size and the number of resident and migrating species associated with them. Studies have shown that some species, including flatfish, rely on intricate associations between estuarine and coastal environments during different life stages. Some examples of critical ecological associations along the SCSR are described below for selected marine species (Department 2009a).

7.1.2.7.1 Marine Fish. Species such as sole, sablefish, hake, and rockfish live as adults on the continental shelf and slope or in submarine canyons. They produce pelagic larvae that recruit to estuaries, bays, kelp forests, rock outcrops, and cobble fields. Eelgrass beds are important for spawning and juvenile habitat for certain species, such as shiner perch and barred sand bass. The structure of eelgrass beds provides protection from predation for juvenile invertebrates and fishes. Bat rays, leopard and smoothhound sharks, plainfin midshipman, staghorn sculpin, several surf perch, jacksmelt, and topsmelt mate and bear their young in estuarine habitats.

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7.1.2.7.2 Anadromous Fish. This type of fish produces eggs and juveniles in fresh water. The juveniles then pass through estuarine environments to mature at sea and return through the estuaries as adults to migrate upstream in coastal rivers to reproduce. Rivers within the SCSR once supported large numbers of anadromous species. However, due to degradation of watersheds and freshwater ecosystems and the presence of barriers to fish passage, stocks of native anadromous fish, such as steelhead trout, are limited in Southern California.

7.1.2.7.3 Catadromous Fish. Members of this type of fish live in fresh water, but travel to marine environments to breed. Some estuaries in Southern California, such as the Ballona Wetlands, host striped mullet, one of the few catadromous species that exists in California.

7.1.2.7.4 Shorebirds and Waterfowl. This category of birds includes such species as Black-bellied plover, Black-necked stilts, killdeer, and ruddy ducks, and special-status species such as California least tern, western snowy plover and Belding's savannah sparrow. They inhabit coastal lagoons, estuaries, and salt marshes as well as areas near sandy beaches. Large numbers of shorebirds and diving ducks are attracted to eelgrass beds, where they feed on the eelgrass, fish, and invertebrate eggs and young. Many bird species use salt marshes, shallow intertidal flats, and lagoons during their annual migrations. The estuaries, bays, and sandy beaches of coastal California form part of the Pacific Flyway, one of the four principal bird migration routes in North America.

7.1.2.7.5 Marine Mammals. This category includes such species as California sea lions, northern elephant seals, harbor seals, and other marine fissipeds. These species have many haulout sites, as well as a few rookeries on secluded rocks and sand beaches, tidal flats, and estuaries in the SCSR.

7.1.2.7.6 Coastal and Estuarine Vegetation. This category includes plants such as macroalgal mats, cordgrass (*Spartina foliosa*), and pickleweed (*Sarcocornia pacifica*). For example, macroalgal mats composed primarily of *Macroystis*, *Ulva*, and *Enteromorpha* spp., may be carried on tides or currents to the open ocean, where they provide shelter and food for numerous organisms, notably juvenile fishes. Eventually, these mats may wash up on shore, where they supply nutrients to sandy beach and rocky intertidal communities.

7.1.3 Impact Analysis

Adaptive management is a part of the MLPA. The MLPA requires monitoring to determine whether its goals related to biological resources are being met. If the goals of the MPAs (see Section 2.4.1) and MLPA (see Section 3.2) are not being met, then either regulatory or management changes could occur to try and meet the goals.

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7.1.3.1 Methodology

The potential impacts to the SCSR biological resources by the proposed Project IPA were evaluated qualitatively, based on MPA establishment, modification, or removal.

7.1.3.2 Criteria for Determining Significance

The proposed Project IPA would result in a significant impact on biological resources if it would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service;
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service;
- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or
- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

7.1.3.3 Environmental Impacts

Potential Impact BIO-1: Adverse Impacts on Marine Species Populations and Habitats Outside MPAs from Displacement and Congestion of Fishing Effort Outside MPAs

The proposed Project IPA would not have a substantial adverse effect on any riparian habitat or other sensitive natural community (e.g., federally protected wetlands as defined by Section 404 of the Clean Water Act) identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.

Although implementation of state marine reserves (SMRs) and to a lesser extent state marine conservation areas (SMCAs) would reduce congestion of commercial and recreational

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fishing within those boundaries, continued commercial and recreational fishing activities would likely shift to areas outside of MPA boundaries. Fishing effort may become concentrated outside MPAs for several reasons. One reason is that MPAs may cause existing users to find alternate fishing grounds, leading to a possible concentration of existing fishing effort into surrounding waters. Alternately, effort may be attracted to the edges of MPAs in order to benefit from potential increases in catch or catch per unit effort. It is possible that either of these types of congestion could lead to negative population and habitat impacts outside the MPAs boundary (Department 2002c).

In 2003, a network of MPAs was established in the waters around the Northern Channel Islands. A 5 year review of these MPAs was presented to the Commission in 2008. Included in this review was a Department study on the impacts that MPAs had on CPFV effort and catch. The report used CPFV logbook data (1998–2006) before and after the Northern Channel Island MPAs were established. Results indicated that fishing effort increased in some areas and decreased in others. However, no trends were found suggesting that MPAs were directly responsible for losses or gains in catch over this time period and that fishing regulations and environmental conditions likely played larger roles in changes in recreational catch (Department 2008c). While the Department study did not detect any changes in recreational catch outside MPAs, other studies from different locations have reported increases in recreational and commercial catch. From 1985 to 2001, all new Florida records for black drum, and most records for red drum, have been for fish caught adjacent to the Merritt Island refuge (Roberts et al. 2001). Four years after closed areas were established on the Georges Bank, scallop (*Placopecten magellanicus*) biomass increased 14-fold within the closed areas (Murawski et al. 2000). Satellite tracking of vessels shows that scallop fisheries are now concentrated near reserves, and total landings are 150 percent of 1994 levels. McClanahan and Kaunda-Arara (1996) found a 110 percent enhancement of catch per unit effort in fishing grounds close to the Mombasa Marine National Park in Kenya. Ratikin and Kramer (1996) found highest catches and catch per unit effort inside the Barbados Marine Reserve and catches increased outside the reserve along a gradient approaching the boundary from both the north and the south. Russ and Alcalá (1996) found a gradual increase in densities of fish outside Apo Island reserve in the Philippines.

Data from existing reserves show that, in spite of the increased effort around reserves, the abundance of targeted species is highest in reserves and declines in proportion to distance from reserves. If the concentrated fishing effort around reserves caused local declines, the abundance of targeted species would be high within and distant from reserves, but low at the edges of reserves. Numerous reserves have been studied worldwide and this pattern has not been detected (e.g., Roberts and Hawkins, 2000). Thus, the positive effects of reserves on abundance appear to surmount any potential negative effects of displacement or concentration of boats around reserves (Department 2002c).

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Displaced or concentrated fishing effort at the edges of reserves also could impact habitat quality around reserves. If concentrated fishing at the edges of reserves reduces habitat quality, one would expect a corresponding decrease in abundance and diversity of species adjacent to reserves. As indicated above, this trend is not observed at the edges of reserves, which consistently support higher abundance and diversity of fishes and invertebrates than other sites distant from reserves. No published data on existing MPAs have shown negative environmental impacts due to displacement and compaction of fishing effort (Department 2002c).

The MPAs in the proposed project could contribute to increasing biomass, individual size, and reproductive potential of organisms, particularly for species with low dispersal and high reproduction. The broad scale ecosystem protection afforded to habitats within the proposed MPAs can also lead to increased resilience, further protecting biodiversity and associated ecosystem services. The proposed project includes all habitat types in all bioregions, encompassing at least some portion of the ranges of most species of interest. The MPAs in the proposed project could help sustain various fished populations, and provide areas of significantly higher reproductive capacity. Increased reproduction within the proposed MPAs may lead to long term fisheries benefits outside their boundaries. Based on this information, impacts of the proposed Project IPA related to concentration of fishing effort outside MPAs would be less than significant.

Although impacts would be less than significant, it should be noted that implementation of the Marine Protected Areas Monitoring Enterprise, an effort aimed at efficient, cost-effective MPA monitoring that meets MLPA requirements, would further lessen these impacts. The California Department of Fish and Game and other partners would engage resource managers, policy makers, researchers, stakeholders and the public in planning and implementing MPA monitoring of the emerging statewide MPA network.

Potential Impact BIO-2: Adverse Impacts on Marine Species Populations and Habitats Inside MPAs from the Removal of a Human Predator

The red sea urchin (*Strongylocentrotus franciscanus*) has been shown repeatedly to deforest large areas of shallow rocky reefs. To the extent that human harvest of red sea urchins can prevent deforestation of kelp forests, urchin harvest may protect or enhance the many functional roles of algae, their productivity and diversity of species associated with algal habitats. Conversely, many examples of urchin outbreaks and deforestation occur in regions where their natural predators have been heavily fished, often depleted, such that the role of urchin harvest could be compensated by protection of the other predators of sea urchins (California sheephead, spiny lobsters, sea stars, and others). Moreover, human harvest and these other predators may compete with one another for sea urchins, such that human harvest can diminish protection for these other species identified for protection within MPAs. It is expected that the proposed MPAs will result in the return of naturally balanced ecosystems

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that can be more resilient to sea urchin barrens (Department 2009b). In defining the expectation, it should be noted that the removal of human predation on urchin predators would likely replace human removal of urchins. Impacts relative to removal of a human predator would therefore be less than significant.

Potential Impact BIO-3: Impacts on Marine Species Populations and Habitats Inside MPAs Habitat Protection

Establishing MPAs would not be likely to create additional demand on marine species (including marine mammals and birds) or habitats inside the MPAs. There would be substantial biological resource benefits because of the increased habitat protection that would occur under the revised MPA network. There also is likely enough area protected within proposed MPAs to provide some benefits to some overfished populations that depend on the habitat types within the South Coast Study Region (SCSR) for some part of their life history, and to prevent further degradation of marine habitats that are vital to marine ecosystems of the SCSR.

The proposed Project IPA would protect the same or a larger area of all habitat types within the SCSR. Table 7-5 displays differences in the total area that is protected within MPAs in the various packages, ranging from approximately 181 square miles in the existing MPA structure to 412 square miles in Alternative 3 (figures include other types of closures in addition to MPAs). The most prominent differences between the proposed Project IPA and the existing MPA network include the total area protected and the percentage of area within SMRs, the most protective MPAs.

Marine biological resources within MPAs would be expected to benefit from the proposed Project, and impacts on species within the MPAs would be less than significant.

Potential Impact BIO-4: Impacts on Special-status Marine Species Resulting From Removal or Modification of Existing MPAs

The removal or modification of existing MPAs may impact the protection of a special-status marine species. Where existing MPAs are proposed for removal, increases in fishing effort could lead to increased take of special-status fishes. Special-status species that have regulatory protection beyond that offered by the existing MPA regulations (such as species listed as endangered, threatened, fully protected, etc.) could also be impacted, due to the increased potential for incidental take. Species-specific considerations are discussed below.

Salt Marsh Bird's Beak

Salt marsh bird's beak (*Cordylanthus maritimus* ssp. *maritimus*) grows in the higher reaches of coastal salt marshes to intertidal and brackish areas influenced by freshwater input. It is designated an endangered species at both the state and federal levels. The population of this

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**TABLE 7-5
TOTAL PROTECTED AREA BY ALTERNATIVE**

| Package | State Marine Park | | | State Marine Conservation Area | | | State Marine Reserve | | | Undesignated and Other ¹ | | | Total | | |
|----------------------|-------------------|---------|-----------|--------------------------------|---------|-----------|----------------------|---------|-----------|-------------------------------------|---------|-----------|-------|---------|-----------|
| | No. | Sq. Mi. | % of SCSR | No. | Sq. Mi. | % of SCSR | No. | Sq. Mi. | % of SCSR | No. | Sq. Mi. | % of SCSR | No. | Sq. Mi. | % of SCSR |
| Existing MPA | 8 | 2.7 | 0.1 | 19 | 17.8 | 0.8 | 15 | 161.0 | 6.9 | 0 | 0 | 0 | 42 | 181.5 | 7.7 |
| Proposed Project IPA | 0 | 0 | 0 | 20 | 76.55 | 3.3 | 28 | 274.07 | 11.7 | 2 | 36.68 | 1.6 | 50 | 387.3 | 16.5 |
| Alternative 1 | 0 | 0 | 0 | 17 | 53.11 | 2.3 | 33 | 307.76 | 13.1 | 2 | 36.68 | 1.6 | 52 | 397.54 | 16.9 |
| Alternative 2 | 0 | 0 | 0 | 12 | 58.82 | 2.5 | 25 | 282.77 | 12.0 | 2 | 36.68 | 1.6 | 39 | 378.27 | 16.1 |
| Alternative 3 | 0 | 0 | 0 | 9 | 57.85 | 2.5 | 30 | 291.1 | 12.4 | 4 | 63.72 | 2.7 | 43 | 412.67 | 17.6 |

¹ These areas include both undesignated and State Marine Recreational Managed Area (SMRMA), note that SMRMA is not an MPA designation, but rather a marine managed area designation.

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species has declined due to loss of habitat and non-native plant competitors. Historically, salt marsh bird's beak was widespread in coastal salt marshes from Morro Bay in San Luis Obispo County to San Diego County and northern Baja California. Presently, it occurs only in scattered sites at fewer than 10 salt marshes. Half of the original occurrences are now extirpated. Within the SCSR, it is currently found at Tijuana Estuary and Sweetwater Marsh in San Diego County, Upper Newport Bay and Anaheim Bay in Orange County, Ormond Beach and Mugu Lagoon in Ventura County, and Carpinteria Salt Marsh in Santa Barbara County. The interaction between tidal flows, and local surface and subsurface freshwater flows is complex and important to the species survival. Salt marsh bird's beak is found in the Upper Newport Bay Ecological Reserve. The Proposed IPA would not remove the Ecological Reserve designation from any area with that designation, and could afford additional protection by the establishment of the Upper Newport Bay SMCA. Impacts to this species would be less than significant; with the expansion of the proposed MPAs this species will be further protected and conserved.

Ventura Marsh Milk-vetch

Ventura marsh milk-vetch (*Astragalus pycnostachys* var. *lanosissimus*) species occurs in two very discrete locations within the SCSR. These species accounts are located inland in close proximity to the SCSR (Ballona Wetlands); however, they are not located within the existing MPAs or areas proposed for MPA designations under the proposed Project IPA. Thus, it is unlikely that the Project would affect this species.

Gambel's Water Cress

Gambel's water cress (*Nasturtium gambelii*) is both a state and federally listed endangered species. It occurs in freshwater and brackish marshes in Santa Barbara, Los Angeles, and Orange counties (CNPS 2010). These occurrences are located inland in close proximity to the SCSR; however, they are not located within the existing MPAs or in areas proposed for designation as MPAs under the proposed Project IPA. Additionally, these occurrence data exist from the late 1800s and early 1900s. Given the location and the time period of the occurrences, is unlikely that there would be adverse impacts to this species. If an unknown population were to exist in and MPA that was being removed or modified, both the federal and state protection already afforded this plant species would remain in effect. Impacts on this species would be less than significant, and the proposed expansion of the MPA network in the SCSR could further protect and conserve this species.

Gastropods (Black/White Abalone)

White abalone (*Haliotis sorenseni*) and black abalone (*Haliotis cracherodii*) are listed as endangered species under the ESA. Coastal development, such as residential areas, harbors, and coastal access points and large ocean discharges of municipal and industrial wastes contribute to the degradation and loss of nearshore habitat. Adult abalone depend primarily

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on drift algae while the main predators of adult abalone are fishes, otters and humans. In June 2007, NOAA Fisheries convened the Black Abalone Status Review Team who concluded that risks associated with withering syndrome are the primary cause for concern about the survival of black abalone as a species, and as such has no bearing on the proposed Project IPA.

Destruction, modification, or curtailment of habitat or range of white abalone was not an important factor in the decline of the species historically and is not believed to limit recovery of the population at this time. Currently, substrate destruction, suboptimal water temperatures, reduced food quantity and quality, and environmental pollutants/toxins are considered to be of relatively low severity and the effect of these threats on the species are relatively uncertain. In the future, potential risks imposed by substrate destruction may be averted through implementation of ESA Section 7 consultations and establishment of Marine Protected/Conservation Areas. The effects of long-term (or global) climate change on this species, either directly through water quality changes or indirectly through interactions with other species, including food items, is a potential threat (NOAA Fisheries 2008). However, the proposed IPA would not contribute substantially to any of these factors, and would therefore not result in significant impacts on this species. Existing federal protections, which would remain effective regardless of any changes to the state's MPA network, would minimize the potential for incidental take.

Southern Steelhead

Southern steelhead (*Oncorhynchus mykiss irideus*) are listed as an endangered species by the ESA and as a California Species of Special Concern by the Department and occur in some areas of the SCSR. Recreational and commercial take is prohibited under federal and state law, and ocean harvest is a rare event (NOAA Fisheries 2005). When caught these fish are required to be returned to the water immediately but mis-identification as well as the stress and possible injury experienced during landing may result in the death of some Southern California steelhead. Reduction in the population of a listed species from the proposed Project IPA may be considered a significant effect if the reduction is substantial. Although potential for impact occurs from incidental take during lawful fishing, overall the expansion of the proposed MPAs further protect and conserve this species.

Steelhead, like salmon, spend most of their lives in the ocean, then return to fresh water to spawn. They are known to aggregate in proximity to the mouth of coastal streams prior to spawning migration. The existing Big Sycamore Canyon SMR prohibits all take of marine life. Removal of this SMR, as proposed in the proposed Project IPA would reduce protection for the marine waters adjacent to Big Sycamore Creek, a known historical steelhead creek, by allowing fishing activities to occur in marine waters. As a result, the removal of Big Sycamore Canyon SMR could, during certain seasons, result in the incidental catch of steelhead during otherwise lawful fishing activity. The removal of other MPAs as proposed

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in the proposed project IPA would create no change to the existing potential for incidental catch of steelhead through lawful fishing activity. Overall, the expansion of the proposed MPAs would protect and conserve this species, and impacts would be less than significant.

Giant Sea Bass

Giant sea bass (*Stereolepis gigas*) are a protected species in the state of California and have been labeled critically endangered by the International Union for the Conservation of Nature and occur throughout the SCSR. Though protected from directed take under state law, giant sea bass are still occasionally caught incidental to other lawful fishing activity. When caught these fish are required to be returned to the water immediately but the stress and possible injury experienced during landing may result in the death of some giant sea bass. Some incidental allowances exist for commercial fisheries regarding incidental catch. Reduction in the population of a listed species from the proposed Project IPA may be considered a significant effect if the reduction is substantial. Although potential for impact occurs from incidental take during lawful fishing, overall the expansion of the proposed MPAs further protect and conserve this species. Although potential for impact occurs from incidental take during lawful fishing, overall the expansion of the proposed MPAs further protects and conserves this species.

Tidewater Goby

Tidewater goby (*Eucyclogobius newberryi*) are listed as endangered under the ESA and occur throughout the SCSR. In addition, they are listed as a California Species of Special Concern by the Department. This species is not subject to pressure from recreational or commercial fishing because of its size, and as such relies heavily on habitat for its continued success. Locations where this species is known to occur within the SCSR are not experiencing a change in protection status, and as such would not have an impact based upon the proposed Project IPA.

Sea Turtles

The loggerhead (*Caretta caretta*), olive ridley (*Lepidochelys olivacea*), and green sea (*Chelonia mydas*) turtle have been listed as threatened under the ESA. The leatherback sea turtle is listed as endangered under the ESA. Sea turtles are not common within state waters of Southern California except at certain times of the year near warm-water effluent channels of the San Diego Gas and Electric Power Company in San Diego Bay. The San Gabriel River also has a small colony of green sea turtles, attracted by the warm-water effluent from the Los Angeles Department of Water and Power's Haynes Generating Station. These species are rarely subject to incidental take and with the expansion of the proposed MPAs this species will be further protected and conserved. Impacts would be less than significant.

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Bald Eagle

In 2007, the bald eagle (*Haliaeetus leucocephalus*) was delisted from the Endangered Species Act and their current protection comes from the Bald and Golden Eagle Act. Additionally, they are listed as endangered by the CESA, and fully protected by the Department. While marine birds are not targeted by recreational or commercial fisheries, they can benefit both directly and indirectly from the establishment of MPAs. Direct benefits include reduced disturbance at breeding and roosting sites and lower probability of interaction with humans and fishing gear at foraging areas. Indirect benefits include reduced competition for important prey resources. The proposed Project IPA and its alternatives each provide an increased level of protection for seabirds (SAT 2009). With the expansion of the proposed MPAs this species will be further protected and conserved. The proposed Project IPA involves designation of a network of MPAs and impacts of the proposed Project IPA will be evaluated as a whole.

Bald eagles are opportunistic feeders. Fish comprise much of their diet, but they also eat waterfowl, shorebirds/colonial waterbirds, small mammals, turtles, and carrion. (Source <http://www.fws.gov/pacific/eagle/NationalBaldEagleManagementGuidelines.pdf>) As such, bald eagle prey species occurring within the SCSR would likely benefit from the proposed Project IPA. Impacts would be less than significant.

Golden Eagle

The golden eagle (*Aquila chrysaetos*) is fully protected by the Department. This species occupies rolling foothills, mountain terrain, and wide arid plateaus deeply cut by streams and canyons, open mountain slopes and cliffs, and rock outcrops (Zeiner et al. 1990). The food supply for this species includes medium to large mammals such as rabbits, hares, and squirrels, and it will also feed on reptiles, birds, and sometimes carrion (Olendorff 1976, Johnsgard 1990). Due to the golden eagle's primarily terrestrial habitat and food requirements, it would not commonly use the habitat within the SCSR, therefore the proposed Project IPA would not adversely affect this species.

American Peregrine Falcon

The American peregrine falcon (*Falco peregrinus anatum*) is fully protected by the Department. Peregrine falcons in general use a large variety of open habitats for foraging, including tundra, marshes, seacoasts, savannahs, grasslands, meadows, open woodlands, and agricultural areas. Sites are often located near rivers or lakes (AOU 1998; Brown 1999; Snyder 1991). Due to the American peregrine falcon's habitat and food requirements, it would not commonly use the habitat within the SCSR, therefore the proposed Project IPA would not adversely affect this species.

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Light-footed Clapper Rail

The light-footed clapper rail (*Rallus longirostris levipes*) is listed as endangered by ESA and CESA and is also listed as a fully protected species by the Department. The light-footed clapper rail is distributed throughout coastal salt marsh habitat from Santa Barbara County, California to San Quintín Bay, Baja California, Mexico. They occur in approximately 24 California marshes where they are usually year-long residents (USFWS 1979). In areas where this species has maintained historical breeding areas, removal of protection would likely result in a potential for impact; however, the federal and state protection already afforded this species would remain in effect. In areas where the expansion of the proposed MPAs would provide greater protection, the species will be further protected and conserved. The proposed Project IPA and its alternatives each provide an increased level of protection for seabirds (SAT 2009).

Ashy Storm-petrel

The ashy storm-petrel (*Oceanodroma homochroa*) is a California Bird Species of Special Concern (breeding) and a federal species of concern. This species' habitat is mainly offshore areas and rocky crevices such as those found near the sea caves in the Channel Islands. The proposed Project IPA and its alternatives each provide an increased level of protection for seabirds (SAT 2009), and impacts to this species would be less than significant. With the expansion of the proposed MPAs this species will be further protected and conserved.

Belding's Savannah Sparrow

Belding's savannah sparrow (*Passerculus sandwichensis beldingi*) is listed as endangered by the CESA. The coastal saltmarshes and estuaries would not lose any protection under the proposed Project IPA. Historic nesting sites at Point Mugu, the Ballona Wetlands, Upper Newport Bay, and Bolsa Chica would retain existing protection. With the expansion of the proposed MPAs this species will be further protected and conserved. Impacts to this species would be less than significant.

Black Storm-petrel

Black storm-petrel (*Oceanodroma melania*) is listed as a California Bird Species of Special Concern (breeding). The only known breeding site for black storm-petrel in the United States is on Sutil Island, an islet off Santa Barbara Island, in 1976. Only one nest was found, but an estimated 10 birds were heard in the vicinity. Black storm-petrels are most common in the warm coastal waters of the Southern California bight over the continental shelf off central California. The proposed Project IPA and its alternatives each provide an increased level of protection for seabirds (SAT 2009), and impacts to this species would be less than significant. With the expansion of the proposed MPAs this species would be further protected and conserved.

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California Brown Pelican

The California brown pelican (*Pelecanus occidentalis californicus*) was protected under both the ESA and the CESA due to diminishing populations stemming from exposure to organochloride pesticide residues. Since the time of the brown pelican's original listing, the U.S. Environmental Protection Agency (EPA) has placed a ban on the use of organochloride pesticides in the United States. As a result, the environmental residue levels of these persistent compounds have steadily decreased in most areas. Pesticide residue levels in brown pelican eggs have steadily decreased since they were first measured. There has also been a corresponding increase in the eggshell thickness and reproductive success of brown pelicans, as well as in many other avian predators such as bald eagles and peregrine falcons. Consequently, populations of brown pelicans on the west coast of the U.S. have substantially increased during the past two decades, and the species has been delisted under both the ESA and CESA. However, the species maintains status as a fully protected species under §3511 of the Fish and Game Code and is protected under the Migratory Bird Treaty Act.

Brown pelicans nest in colonies on offshore islands that are free of mammalian predators and human disturbance, are of sufficient elevation to prevent flooding of nests, and are associated with an adequate and consistent food supply. The proposed Project IPA and its alternatives each provide an increased level of protection for seabirds (SAT 2009). Impacts to this species would be less than significant.

California Least Tern

California least tern (*Sternula antillarum browni*) is listed as endangered by CESA, fully protected by the Department, and endangered under the ESA due to a population decline resulting from loss of habitat. During a survey within the SCSR in 2007, the numbers of nesting California least terns were found to be not uniformly distributed across the entire SCSR. Camp Pendleton, Naval Base Coronado, Los Angeles Harbor, and Batiquitos Lagoon represented 55% of the breeding pairs while Venice Beach, Camp Pendleton, Huntington Beach and Naval Base Coronado produced 52 percent of the fledglings. As the threat to this species is loss of habitat and human disturbance, modification to MPAs where a protection is removed could pose a threat to breeding colonies due to loss of forage areas or prey species. However, the existing regulatory protections maintained by this species would prohibit any take of this species, regardless of any changes to MPA boundaries. Impacts to this species would be less than significant. With the overall expansion of the proposed MPAs, an increase in protected forage area and prey species habitat may contribute to the further protection and conservation of this species.

Elegant Tern

Elegant tern (*Thalasseus [Sterna] elegans*) is listed as a federal species of concern and is listed on the Department's Watch List. This species breeds on flat rocky areas and is strongly

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tyed to the coast. It forages in inshore waters, estuarine habitats, salt ponds and lagoons, with some individuals venturing further offshore in the non-breeding season. The only breeding colonies in the United States are at Bolsa Chica, Pier 400 at Terminal Island, and the salt work dikes at the south end of San Diego Bay. As the threat to this species is limited breeding colonies in the U.S. and human disturbance, incorporation of breeding sites into the San Diego National Wildlife Refuge provides additional protection. Impacts to this species would be less than significant.

Xantus's Murrelet

Xantus's murrelet (*Synthliboramphus hypoleucus*) is a federal species of concern and is listed as threatened by CESA. There are two races of which the northern race (*S. h. scrippsi*) is a fairly common breeder on the Channel Islands, while the southern race (*S. h. hypoleucus*) is a rare visitor to the southern offshore waters of California. The MPAs on the Channel Islands will remain the same, therefore protection of this species would remain the same within its range. Due to the Xantus's murrelet's range and its infrequent utilization of the mainland, it would not commonly use the mainland coastal habitat within the SCSR, therefore the proposed Project IPA and its alternatives each provide an increased level of protection for this species (SAT 2009). With the expansion of the proposed MPAs this species would be further protected and conserved, and impacts would be less than significant.

Willow Flycatcher

The willow flycatcher (*Empidonax traillii*) consists of four or five subspecies. The southwestern willow flycatcher (*E. t. extimus*) is the subspecies present within the SCSR. The willow flycatcher is listed as endangered by the CESA, while the southwestern willow flycatcher is additionally listed as endangered by ESA. The southwestern willow flycatcher is a riparian-obligate species restricted to complex streamside vegetation. Native broadleaf-dominated and mixed native/exotic are the primary habitats used by southwestern willow flycatcher in California (Sogge et al. 1997). Due to the southwestern willow flycatcher's habitat requirements, it would not commonly use the habitat within the SCSR, therefore the proposed Project IPA would not adversely affect this species.

Coastal California Gnatcatcher

The coastal California gnatcatcher (*Polioptila californica californica*) is listed as threatened by ESA and as a Species of Special Concern by the Department. It occurs in coastal Southern California and Baja California year-round. The coastal California gnatcatcher typically occurs in or near sage scrub habitat which is composed of relatively low-growing, dry-season deciduous and succulent plants (Bontrager 1991). Due to the coastal California gnatcatcher's habitat requirements, it would not commonly use the habitat within the SCSR, therefore the proposed Project IPA would not adversely affect this species.

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Double-crested Cormorant

The double-crested cormorant (*Phalacrocorax auritus*) is listed on the Department's Watch List. During the last 20 years, double-crested cormorant populations throughout North America have been increasing. Improved breeding success due to reductions in human disturbance and persecution, and reductions in exposure to pollutants are believed responsible for population growth since the turn of the century. The proposed Project IPA provides an increased level of protection for seabirds (SAT 2009). With the expansion of the proposed MPAs this species will be further protected and conserved, and impacts would be less than significant.

Osprey

Ospreys (*Pandion haliaetus*) are protected under the Migratory Bird Act and are listed on the Department's Watch List. Upper Newport Bay (Orange County) and Buena Vista Lagoon (San Diego County) have both seen successful nesting and breeding of ospreys in the last several years. The proposed Project IPA and its alternatives each provide an increased level of protection for seabirds (SAT 2009). With the expansion of the proposed MPAs this species will be further protected and conserved, and impacts would be less than significant.

Western Snowy Plover

The Pacific coast population of the western snowy plover (*Charadrius alexandrinus nivosus*) is federally listed under the ESA as threatened. The western snowy plover is also a Bird Species of Special Concern in California. Human activities such as walking, jogging, running pets, horseback riding, and vehicle use are key factors in the ongoing decline in breeding sites and populations. The nesting season of the western snowy plover (March through September) coincides with the period of greatest human use (Memorial Day through Labor Day) on beaches of the west coast. Intensive beach use by humans may result in abandonment of nest sites, reductions in nest density, and reductions in nesting success.

In areas where the expansion of the proposed MPAs would provide greater protection, the species will be further protected and conserved, and impacts would be less than significant.

Pinnipeds

Harbor Seal, California Sea Lion, and Northern Elephant Seal. Harbor seals (*Phoca vitulina*), California sea lions (*Zalophus californianus*), and Elephant seals (*Mirounga angustirostris*) are protected under the MMPA. This act made it illegal to hunt any marine mammal in U.S. waters. The only exceptions include the following: native subsistence hunting and collecting or temporarily keeping of marine mammals for research, education, or public display. It is also illegal, albeit with lower penalties, to do anything that has the potential to disturb a harbor seal in the wild by causing disruption of its behavior patterns.

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With the expansion of the MPAs including no-take SMRs and SMCAs, this may reduce fishery interactions and fishing boat traffic within them. Additionally, because fishing will be prohibited in some areas, harbor seal and sea lion prey species may increase in abundance. Reduced fishing in these areas will result in less competition for food resources between humans and mammals. The proposed expansion and improved management of the MPA network within the SCSR would further conserve and protect this species, and impacts would be less than significant.

Guadalupe Fur Seal. Guadalupe fur seals (*Arctocephalus townsendi*) which mainly breed in Mexico at Isla Guadalupe and Isla Benito del Este, are not known to have specific haul-out sites or rookeries in California. The Guadalupe fur seal is listed as “threatened” under the ESA and CESA, “depleted” and “strategic” under the MMPA, and fully protected under the Fish and Game Code. As there are no established rookeries for this species within the SCSR, any expansion of the proposed MPAs would facilitate further protection and conservation. The proposed Project IPA would not impact this species.

Fissipeds

Southern Sea Otter. Southern sea otters (*Enhydra lutris nereis*) are recognized as “depleted” under the MMPA, and the species is listed as threatened under the ESA and fully protected under the California Fish and Game Code (§4700).

To manage the competition between sea otters and fisheries, the USFWS declared an “otter-free zone” stretching from Point Conception to the Mexican border. In this zone, only San Nicolas Island was designated as sea otter habitat, and sea otters found elsewhere in the area were supposed to be captured and relocated. These plans were abandoned after it proved impractical to capture the hundreds of otters that swam into the zone. Sea otter counts are conducted twice each year by the U.S. Geological Survey. With the expansion of the proposed MPAs this species will be further protected and conserved. Impacts would be less than significant.

Cetaceans

Gray Whale, Humpback Whale, Blue Whale, Finback Whale, Sperm Whale, Baird’s Beaked Whale, and Minke Whale, Bottlenose dolphins, Shortbeaked common dolphins, and Long-beaked common dolphins. Common cetaceans found in the SCSR include gray whale (*Eschrichtus robustus*), humpback whale (*Megaptera novaeangliae*; federally endangered), blue whale (*Balaenoptera musculus*), finback whale (*balaenoptera physalus*), sperm whale (*physeter macrocephalus*), Baird’s beaked whale (*Berardius bairdii*), Minke whale (*Balaenoptera acutorostrata*), bottlenose dolphins (*Tursiops truncatus*), short-beaked common dolphins (*Delphinus delphis*), and long-beaked common dolphins (*D. capensis*). Special status cetacean species whose ranges extend into the SCSR include the North Pacific right whale (*Eubalaena japonica*; federally endangered), sei whale (*Balaenoptera borealis*;

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federally endangered), sperm whale (*Physeter catodon* [*P. macrocephalus*]; federally endangered), and killer whale (*Orcinus orca*; federally endangered) (NOAA Fisheries 2010). All these species are protected under the MMPA. This act made it illegal to hunt any marine mammal in U.S. waters. The only exceptions include the following: native subsistence hunting and collecting or temporarily keeping marine mammals for research, education, or public display. It is also illegal, albeit with lower penalties, to do anything that has the potential to disturb a whale in the wild by causing disruption of its behavior patterns. These are migratory species passing through the SCSR, and the proposed Project would not result in any adverse impacts to these species.

Potential Impact BIO-5: Potential to Conflict with the Provisions of an Adopted Habitat Conservation Plan, Natural Community Conservation Plan, or Policies or Ordinances Protecting Biological Resources

Three habitat conservation plans (HCP) and Natural Community Conservation Plans (NCCP) are located adjacent to proposed MPAs, including the Central/Coastal Orange County NCCP (R.J. Meade Consulting, Inc. 1996), the Palos Verdes NCCP/HCP (URS 2004), and the San Diego County MHCP NCCP/HCP (specifically the San Diego MSCP – Incorporated Subarea Plans; City of San Diego 1997). The jurisdictional boundaries of these NCCP/HCPs extend to the Mean High Tide Line and do not include state waters; therefore, NCCP/HCP jurisdiction does not extend into the SCSR in these areas. Because NCCP/HCP jurisdiction does not extend into the SCSR, no conflicts associated with these NCCP/HCPs would occur. With the expansion of the proposed MPAs near these NCCP/HCPs, the adjacent area would be further protected and conserved.

The Central/Coastal Orange County NCCP (R.J. Meade Consulting, Inc. 1996) encompasses the proposed Upper Newport Bay SMCA. In the proposed Upper Newport Bay SMCA the existing regulated activities, including restrictions on swimming areas, boat speed, shoreline access and access fees, would remain the same as the existing Upper Newport Bay SMP. In addition, the proposed Upper Newport Bay SMCA regulations would allow routine maintenance, dredging, monitoring, research and education, and habitat restoration to continue. Since existing conditions would not be changed, there would be no associated conflicts with the Central/Coastal Orange County NCCP in this area. Additionally, the proposed Upper Newport Bay SMCA expands farther south than the existing Upper Newport Bay SMP boundary. With the expansion of the proposed MPA within the Central/Coastal Orange County NCCP, the area will be further protected and conserved.