

Appendix A: Summaries by Subregion

Appendix A presents highlights and basic information on the ecological and socioeconomic setting and existing managed areas in each of the seven subregions. Table I-1 shows habitats present within each of the seven subregions and the proportion of each habitat that lies within each subregion. Note that subregions were created for the ease of displaying information on maps and are not related to the bioregions identified by the SAT.

The information presented here is a result of a joint fact-finding effort with the South Coast Regional Stakeholder Group and their constituents. This appendix builds on information found in the regional profile and incorporates local knowledge gathered from stakeholders. This appendix complements and is supported by the regional profile. For example, key impaired water bodies in this appendix were those water bodies highlighted by stakeholders as areas they felt were of concern. A complete list of 303(d) impaired water bodies in the south coast study region can be found in Appendix F. While subsections of this appendix represent stakeholders' intimate knowledge of their region, they may not represent an exhaustive list of every activity or important area (e.g. uses/activities at each public access point, important recreational and/or commercial fishing areas). The local knowledge represented in this appendix can help inform MPA planning by providing a more detailed picture of the ecological and socioeconomic settings of the seven subregions.

Appendix A incorporates comments provided by the National Park Service and the following RSG members: Merit McCrea, Bruce Steele, Jack Peveler, Gerry Richter, Buck Everingham, Dave Weeshoff, Lia Protopapadakis, Joel Greenberg, Mike Gauger, Sarah Abramson, Carl Mayhugh, Garth Murphy, Mike McCoy, Jack Engle, Norris Tapp, Calla Allison, Mary Jane Foley.

The following members of the Fishermen's Information Network provided Bruce Steele with comments: Mike Thompson, Louie Zimm, John Law, Mark Wisch and Rick Oefinger.

Joe Cassiola and Rick Doesburg (fishermen) provided Norris Tapp with comments, and Volker Hoehne and Laleh Mohajerani provided comments to MLPA Initiative staff.

Table A-1. Subregional summary of habitats

Habitat	#1	#2	#3	#4	#5	#6	#7	Total
Total Area (mi2)	225.85	178.90	279.38	176.19	202.88	645.27	642.41	2,350.88
Total Shoreline Length (mi)	69.91	78.55	249.05	108.23	187.34	190.79	162.57	1,046.45
Minimum Depth (ft)	0	0	0	0	0	0	219	N/A
Maximum Depth (ft)	911.00	2,023.00	2,640.00	1,871.00	1,303.00	2,378.00	3,938.00	N/A
Sandy or Gravel Beaches (mi)	38.07	44.57	57.01	43.72	66.65	56.49	73.12	379.63
Rocky Intertidal and Cliff (mi)	25.73	1.35	12.63	8.91	10.86	134.30	86.94	280.72
Coastal Marsh (mi)	3.38	9.36	15.44	11.16	20.16	0	0	59.49
Coastal Marsh Area (mi2)	0.47	1.23	1.77	0.90	1.74	0.01	0	6.11
Tidal Flats (mi)	0.59	1.99	2.79	11.17	11.49	0	0.72	28.76
Surfgrass (mi)	0	0	0	0	0	68.72	3.71	72.43
Eelgrass (mi2)	0	0	0.15	0.04	4.50	0	0	4.69
Estuary (mi2)	0.71	2.64	10.99	4.08	24.53	0	0	42.95
Soft 0 - 30m (mi2)	50.12	71.90	105.38	70.40	60.68	58.26	20.44	437.18
Soft 30 - 100m (mi2)	145.04	46.86	73.95	41.81	40.19	190.36	133.85	672.06
Soft 100 - 200m (mi2)	11.30	15.09	12.10	19.36	17.08	23.50	59.96	158.39
Soft 200 - 3000m (mi2)	0.30	17.75	32.42	31.62	13.72	1.77	136.76	234.34
Hard 0 - 30m (mi2)	10.03	3.09	7.60	3.33	23.25	31.19	33.23	111.73

Hard 30 - 100m (mi2)	0.73	0.16	1.39	0.30	3.56	11.37	30.29	47.79
Hard 100 - 200m (mi2)	0.11	0.01	0.12	0.02	0.67	1.7	1.26	3.89
Hard 200 - 3000m (mi2)	0	0.48	0.60	0.01	0.10	0	0.96	2.16
Kelp Canopy 1989 (mi2)	3.39	0.42	0.87	0.75	2.58	4.85	4.93	17.8
Kelp Canopy 1999 (mi2)	0.58	0.23	0.50	0.05	2.33	3.33	4.57	11.58
Kelp Canopy 2002 (mi2)	1.70	0.53	0.47	0.59	2.58	3.84	3.34	13.05
Kelp Canopy 2003 (mi2)	3.23	0.48	0.62	0.54	4.04	8.79	8.59	26.30
Kelp Canopy 2004 (mi2)	1.80	0.53	0.48	0.14	1.55	12.80	13.78	31.09
Kelp Canopy 2005 (mi2)	2.40	0.32	0.67	0	0	14.47	12.51	30.38
Kelp Canopy 2006 (mi2)	1.72	0.12	0.97	0.01	1.11	5.68	6.13	15.74
Average Kelp Canopy (mi2)	2.12	0.38	0.66	0.30	2.03	7.68	7.69	20.85
Linear Kelp (mi)	19.64	5.81	9.38	0.80	10.18	60.54	76.10	182.46

^Shoreline length is based on the Environmental Sensitivity Index (ESI) database.

A.1 Government Point to Rincon Point (Subregion 1)

Subregion 1 covers 225 square miles, with 70 miles of coastline facing south with a slight west-to-southeast curve. Coal Oil Point, Goleta Point, and Santa Barbara Point are the major promontories in this subregion. The coast faces the Santa Barbara Channel and northern Channel Islands. Prominent coastal features include: Cojo Anchorage, Naples Point, Edgecliff Point, Fernald Point, Loon Point, Sand Point, Rincon Point.

A.1.1 Ecological Setting

Shoreline: Mostly narrow, sandy beaches backed by cliffs and rocky shores, protected from ocean swells by the northern Channel Islands.

Estuaries: Devereux Slough, UCSB Campus Lagoon, Goleta Slough, and Carpinteria Salt Marsh.

Seagrass: Surfgrass occurs on many rocky reefs and rock outcrops on sand in the deep intertidal to shallow subtidal zone. Eelgrass occurs at Gaviota, Tajiguas, Refugio, Corral/El Capitan, Ellwood, Isla Vista, Goleta Beach, Hendry's, and Santa Barbara.

Kelp: Kelp beds found throughout subregion, concentrated around Point Conception, off Naples, and from around Coal Oil Point to the east side of Santa Barbara Point. Kelp is also found at Tajiguas and Carpinteria Reef.

Rock/Sand Bottom: Rocky reef off Naples, hard substrate around Carpinteria and east of Government Point. Hard substrate along the 100 meter contour from Government Point to Goleta Point. Hard substrate also exists along the shoreline from Isla Vista to Hollister Ranch. Rare cobbled boulder/river rock reef and cove at Rincon Point.

Depth Range Zones: Mostly soft bottom in the 30-100 meter depth range.

Oceanographic Habitats: Upwelling center at Point Conception, which also marks the boundary where the cool California Current meets the relatively warmer California Countercurrent. The subregion begins at the most northern portion of the Southern California Bight. During the upwelling season (March through September), cold, nutrient-rich waters are brought to the surface near Point Conception, the upwelling center, and move eastward along the western edge of the Santa Barbara Channel (Hickey 2000, Atkinson et al. 1986).

Grunion Spawning Beaches: Goleta Beach, Hendry's Beach, Leadbetter, Stearn's Wharf/East Beach, Butterfly Beach, Carpinteria State Beach.

Seabird Colonies: Colony of Pelagic Cormorant, Black Oystercatcher, Western Gull, and Pigeon Guillemot at Point Conception, and high at-sea diversity from Point Conception to Goleta Point. Snowy Plover nesting areas include Coal Oil Point Reserve, Hollister Beach, Devereaux Beach, Goleta Beach, Carpinteria Beach, Point Castillo/Santa Barbara Harbor. Each estuarine habitat listed above also provides essential food for many bird species—some of which are species of special concern—including shorebirds, diving birds, waterfowl, and even raptors. These birds may be nesting, resident, migratory, or wintering; their food in these habitats includes various invertebrates, larvae, worms, etc, as well as juvenile fishes and smaller birds.

Marine Mammal Rookeries: Harbor seal rookery at Carpinteria. Harbor seal rookeries at Elwood pier, Dos Pueblos Ranch Beach, Edwards point and various other regions along Hollister ranch.

Marine Mammal Haulouts: Harbor seals haul out around Point Conception, Rincon Point, Carpinteria Bluffs, Carpinteria State Beach, Casitas Pier, Crescent Rock, and Nursery Beach in Carpinteria. Harbor seals have been recorded near Goleta Point, near Arroyo Burro Beach, and Coal Oil Point. California sea lions haul out at Carpinteria State Beach. Harbor seals also haul out between Elwood Pier and Dos Pueblos. Pinnipeds also haul out on offshore oil platforms and buoys, all accessible vessels moored in the anchorage east of Stern's wharf and the bait receiver dock at Santa Barbara harbor.

Other Areas for Marine Mammals: Sea otters occasionally range downcoast into this subregion as far east as UCSB Campus Point. Coastal bottlenose dolphins are commonly observed swimming near shore in this subregion. Gray whales cross into the study region here during their migration. Pacific white-sided dolphin, common dolphin, humpback whale, minke whale, and other migrating cetaceans are seen within state waters in this region.

Other Marine Life: Off Santa Barbara is a area of seasonal abundance of juvenile thresher sharks.

A.1.2 Land-Sea Interactions

Coastal watersheds: South Coast

Major rivers: Several coastal creeks, including Arroyo Burro, Mission Creek, Carpinteria Creek and Rincon Creek, are found in this subregion, but no major rivers.

Anadromous fish streams¹: Many creeks have suitable habitat, but barriers often prevent substantial use by steelhead. There is evidence that steelhead/rainbow trout use the following rivers and streams: Santa Maria River, Santa Ynez River, Gaviota, Arroyo Hondo, Arroyo Quemado, Dos Pueblos Canyon, Goleta Slough, Mission Creek, Montecito, San Ysidro, Romero, Arroyo Paredon, Carpinteria, Rincon.

Hardened shoreline: Goleta Beach (riprap), Santa Barbara Harbor (riprap), Sheffield (riprap), Sandyland Cove (riprap)

Key impaired water bodies: Santa Barbara Harbor, estuaries and lagoons.

¹ Anadromous fish streams for all of the subregions referenced from: Becker, G.S and I.J. Reining, 2008. "Steelhead/rainbow trout (*Oncorhynchus mykiss*) resources south of the Golden Gate, California Cartography by D.A. Asbury." Center for Ecosystem Management and Restoration. Oakland, CA.

Major point sources: Chevron U.S.A. Inc. (desalination brine), Cultured Abalone Inc. (aquaculture wastewater), Goleta, Santa Barbara, Montecito, Summerland, and Carpinteria Wastewater Treatment Plants (treated sanitary wastewater).

Other issues: Nonpoint source pollution. Oil seeps, particularly offshore Coal Oil Point to Campus Point. Oil platform.

A.1.3 Socioeconomic Setting

Counties: Santa Barbara

Coastal towns/ports/harbors: Goleta, Santa Barbara/Santa Barbara Harbor, Montecito, Summerland, Carpinteria.

Public access areas, boat ramps, piers, etc: Coastal access is restricted from Government Point to just west of Gaviota State Park. Gaviota State Park (campground, fishing, beach, boat hoist), Refugio State Beach (campground, surfing, fishing, diving, swimming), bike path between Refugio and El Capitan State Beaches, El Capitan State Beach (campground, surfing, swimming), parking and path to the beach at Bacara Resort and Spa, Coal Oil Point Natural Reserve (beach, surfing, wildlife viewing, swimming, snorkeling), Isla Vista County Park (stairs to beach, diving, swimming dogs allowed, snorkeling), Isla Vista Beach (stairs and ramp to beach, tidepools, surfing, diving, swimming), University of California, Santa Barbara (beaches, surfing), Goleta Beach County Park (fishing, pier/hoist, permanent swim buoys, kayaking, bbq pits, volleyball nets), Arroyo Burro Beach County Park (surfing, dog-free zone one side/dog zone one side, diving, snorkeling), Mesa Lane Stairs (to beach, surfing), One Thousand Steps (beach access), Shoreline Park (stairs to shore), Leadbetter Beach (surfing, bbq pits, swimming, volleyball nets), West Beach, Harbor Sand-spit (surfing), Stearns Wharf (fishing), Chase Palm Park, East Beach (volleyball nets, swimming), bike path/boardwalk from Leadbetter Beach to East Beach with continuous beach access, three public stairways to the beach south of Channel Drive (Santa Barbara), Hammonds Beach (surfing), Miramar Beach (surfing), Lookout County Park (beach), Carpinteria Salt Marsh Nature Park, Carpinteria City Beach, Carpinteria State Beach (Chumash Indian interpretive display, campground, motor-home sites, surfing), Tar Pits Park (accessed through Carpinteria State Beach) is a Chumash Indian historical site, Rincon Beach County Park (surfing culture heritage site).

Commercial fisheries: Some of the major commercial fisheries landed in Santa Barbara Port are spiny lobster, sea urchin, crab, California halibut, and California sheephead. Live fish fishery for nearshore spp. halibut, some spot prawn, ridgeback shrimp, white seabass. sharks. Also CPFV fishery for finfish, predominantly rockfishes by number.

Consumptive recreational use: Major recreational fisheries occurring in subregion 1 include surfperches, rockfishes, scorpionfish, sculpins, flatfishes, kelp and sand basses, white seabass, ocean whitefish, pacific barracuda, bonito, lingcod, mackerel, white croaker, chromis, medialuna, opaleye, neotropical silversides (smelts), lobster, crab, mussels, urchins, clams, rock scallops, some bird hunting for sea ducks, bait fisheries for sardines and anchovies, grunion, sand crabs, and various elasmobranch species.

Non-consumptive recreational use (surfing, diving, kayaking, wildlife viewing, beaches, etc.): Important areas include state beaches, Santa Barbara waterfront and beaches, Campus Point beaches, Coal Oil Point beaches, Goleta Beach, Arroyo Burro/Hendry's Beach, Carpinteria County and State Beaches, Rincon Point. Wildlife viewing from boats leaving from the Santa Barbara Harbor. Bird-watching at Devereux Slough, UCSB Campus Lagoon, Goleta Slough, Santa Barbara Harbor, Carpinteria Salt Marsh, and along accessible beaches. Diving and snorkeling at Tajiguas, Refugio, Campus Point, Arroyo Burro, Mesa Lane, and from boats at accessible kelp beds. Surf

culture heritage site at Rincon, and surfing locations throughout the subregion and especially at Hollister Ranch. Tidepooling at Gaviota, Arroyo Hondo, Refugio, El Capitan, Ellwood, Santa Barbara, Carpinteria. Whale watch vessels, much diving, kayaking and sailing associated with at least some level of fishing and recreational harvest of renewable resources.

A.1.4 Research and Monitoring

Research institutions: University of California, Santa Barbara; Santa Barbara City College; Santa Barbara ChannelKeeper.

Existing monitoring sites: Intertidal: MARINE Core and PISCO Biodiversity sites at Government Point, Alegria, Arroyo Hondo, Coal Oil Point, Carpinteria and Mussel Shoals.

Subtidal: PISCO monitoring sites at Alegria Beach, Arroya Quemada, Buelto, Carpinteria, Coal Oil Point, Cojo, Ellwood, and Naples.

CRANE monitoring sites at Cojo and Naples.

Reef Check diver surveys at Isla Vista Reef, Naples Reef and Refugio State Beach.

A.1.5 Existing MPAs, Marine Managed Areas, and Coastal Protected Areas

Existing state MPAs: Refugio SMCA and Goleta Slough SMP.

Rockfish Conservation Areas (RCAs) and other fishery closures: Halibut Trawl Grounds from around Gaviota State Park to Point Hueneme (past Rincon Point). The Rockfish Conservation Area that restricts recreational fishing from March through December extends seaward from the 60 fathom (110 meter) depth contour throughout the subregion. The Rockfish Conservation Areas that restrict commercial trawl and non-trawl fishing cross into the subregion in several areas.

Other marine managed areas: Aquaculture leases.

Coastal protected areas: Gaviota State Park, Refugio State Beach, El Capitan Ranch Park, El Capitan State Beach, Coal Oil Point Reserve, Isla Vista County Park, Window-to-the-Sea Park, Isla Vista Beach, University of California, Santa Barbara, Goleta Beach County Park, Arroyo Burro Beach County Park, Douglas Family Reserve, La Mesa Park, Shoreline Park, Leadbetter Beach, West Beach, Chase Palm Park, East Beach, Andree Clark Bird Refuge, Hammonds Beach, Miramar Beach, Lookout County Park, Santa Monica Creek Trail, Carpinteria Salt Marsh Nature Park, Carpinteria City Beach, Carpinteria State Beach, Tar Pits Park, Carpinteria Bluffs Nature Park and Rincon Beach County Park.

A.1.6 Other Issues

Oil seeps (offshore & onshore), oil platform, oil terminal off Goleta, oil processing facilities.

A.2 Rincon Point to Point Dume (Subregion 2)

Subregion 2 covers 177.7 mi² and 78.6 miles of coastline oriented northwest to southeast with freshwater input from the Ventura and Santa Clara Rivers. The northern half of subregion 2 faces the Channel Islands, which creates a channel which large pelagic species use as a transit corridor and where they congregate to feed. Prominent coastal features include: Pitas Point, Pierpont Bay,

Ventura Harbor, Channel Islands Harbor, Port Hueneme, Middle Point, Laguna Point, Point Mugu, Sequit Point, and Point Dume.

A.2.1 Ecological Setting

Shoreline: Mostly narrow, sandy beaches backed by cliffs and rocky or rock revetment shores.

Estuaries: Ventura River, Santa Clara River, Mugu Lagoon, Zuma Lagoon.

Seagrass: Surfgrass beds occur at County Line, Leo Carrillo, Nicholas Canyon, and Point Dume. Surfgrass occurs on many rocky reefs and rock outcrops on sand at 0-5 meter depth range. Outer coast eelgrass occurs at Leo Carrillo, San Nicolas, Los Alisos, Lechuza, and Trancas.

Kelp: Small patches along the shore in the northern portion of the subregion, and to the east and west of Sequit Point. Kelp exists over most hard bottom in depths of less than 20m, some reaching the surface at times. Kelp beds are present along the westward facing headlands of the Malibu Coast around county Line, Staircase Beach, Leo Carrillo, Nicholas Canyon, Point Dume, and Latigo.

Rock/Sand Bottom: Most of the subregion is soft substrate. Nearshore rocky reefs exist scattered from Point Mugu to Point Dume, and Deer Creek and Carrillo Beach have rocky bottom areas. There is a cobbled boulder reef and cove at the mouth of the Ventura River.

Depth Zones: The majority of the subregion is soft substrate from 0 to 100 meters depth. There are submarine canyons off Point Hueneme, Point Mugu, and Point Dume.

Oceanographic Habitats: The counter-clockwise circulating gyre called the Southern California Eddy is offshore.

Grunion Spawning Beaches: Emma Wood State Beach, Ormond State Beach, Ventura State Beach/Ventura, Hueneme Beach, Hollywood Beach, Silver Strand Beach (Oxnard), County Line Beach, McGrath State Beach, Leo Carrillo State Beach, Broad Beach, El Sol Beach, Zuma Beach.

Seabird Colonies: Santa Clara River (Least Tern), Mugu Lagoon (Least Tern). Also, Ormond Beach and Hollywood Beach adjacent to Channel Islands Harbor are designated Endangered Species Habitat and are Snowy Plover and Least Tern nesting areas. Snowy Plovers nest at San Buenaventura Beach, Mandalay Bay/Santa Clara River Mouth, Hollywood Beach, Ormond Beach, Mugu Lagoon Beach and Zuma Beach. Each estuarine habitat listed above also provides essential food for many bird species—some of which are species of special concern—including shorebirds, diving birds, waterfowl, and even raptors. These birds may be nesting, resident, migratory, or wintering; their food in these habitats includes various invertebrates, larvae, worms, etc, as well as juvenile fishes and smaller birds.

Marine Mammal Rookeries: Point Mugu Lagoon (harbor seals)

Marine Mammal Haulouts: Mugu Lagoon and Point Mugu Lagoon (harbor seals). Pinnipeds also haul out at all offshore oil platforms and buoys, some docks within harbors including the bait docks within each harbor.

Other Areas for Marine Mammals: Harbor seals forage within the study region around Point Mugu Lagoon. Coastal bottlenose dolphins forage in this subregion (Bearzi 2004) and are seen along the coast. Gray whales are also commonly seen along this stretch of coast during their migration.

A.2.2 Land-Sea Interactions

Coastal watersheds: Pitas Point, Ventura River, Buenaventura, Santa Clara-Calleguas, Oxnard, Calleguas, Ventura Coastal Streams, Santa Monica Bay.

Major rivers: Ventura River, Santa Clara River. Treated sewerage effluent into Santa Clara River and Santa Rosa Creek provides for perennial flow in those drainages.

Anadromous fish streams: Ventura and Santa Clara rivers, Arroyo Sequit (steelhead)

Hardened shoreline: La Conchita Beach (riprap), from Pitas Point south to Ventura Harbor, Channel Islands Harbor, Hueneme Point, Laguna Point, and sections east of Point Sycamore Cove Beach to about County Line Beach. There is significant sandbagging occurring at Broad beach (near Trancas).

Key impaired water bodies: Harbors, estuaries, lagoons. Channel Islands Harbor (lead, zinc), Mugu Lagoon (endosulfan), Point Hueneme Harbor (DDT, PCB), Santa Clara Estuary (chem A, coliform, toxaphene) and Ventura River Estuary (algae, eutrophic, trash, coliform).

Major point sources: Ormond Beach Generating Station and Ocean Vista Power Station (cooling water), and Oxnard Wastewater Treatment Plant (treated sanitary wastewater). Dredge spoils from Ventura Harbor, Mandalay Bay Generation Station and Ventura Waste Water Treatment Center adjacent to Ventura Harbor.

Other issues: Nonpoint source pollution. Oil platform, Camrosa treatment and the Thousand Oaks facility at the headwaters of Santa Rosa creek (discharges nutrient-rich waters).

A.2.3 Socioeconomic Setting

Counties: Ventura, Los Angeles

Coastal towns/ports/harbors: Ventura/Ventura Harbor, Oxnard-Channel Islands Harbor, Port Hueneme seaport.

Public access areas, boat ramps, piers, etc: La Conchita Beach (surfing, fishing), Mussel Shoals Beach (surfing), Sea Cliff Beach, Hobson County Park (campground, beach, surfing, fishing), Rincon Parkway North and South (campground, beach, surfing, fishing), Faria County Park (campground, beach, surfing, fishing, surfing), Solimar Beach, (surfing), Emma Wood State Beach (campground, surfing, fishing, surfing), Ventura County Fairgrounds Beach (surfing), Ventura Fishing Pier, Surfer's Point at Seaside Park (surfing, beach, surfing), Promenade Park (surfing, beach, boardwalk), San Buenaventura State Beach, Marina Park (beach access), Peninsula Beach, McGrath State Beach (campground, fishing), Mandalay County Park (beach), Oxnard Shores (surfing, beach), Oxnard State Beach (surfing), Hollywood Beach (surfing, fishing), Peninsula Park (boat dock), Channel Islands Harbor (ramp, hoist, beach, fishing), Silver Strand Beach (fishing jetty, surfing), Port Hueneme Beach Park (fishing), Port Hueneme Fishing Pier, Ormond Beach (fishing), Point Mugu Beach, Thornhill Broome Beach (campground), Sycamore Canyon Campground, Sycamore Cove Beach, County Line Beach (fishing, surfing, scuba, free-diving), Staircase Beach (surfing, tidepooling, scuba, free-diving), Leo Carrillo State Beach (campground, fishing, surfing, tidepooling, diving), Nicholas Canyon County Beach (surfing, scuba), Robert H. Meyer Memorial State Beaches (beachgoing, picnicking), Zuma Beach County Park (surfing, fishing, beachgoing, swimming, scuba, free-diving), Point Dume State Beach (surfing, fishing, surfing, tidepooling, scuba, free-diving), and Point Dume State Preserve (surfing, beach, scuba).

Commercial fisheries: Some of the major commercial fisheries landed in subregion 2 are market squid, Pacific sardine, mackerel/anchovy, sea urchin, sea cucumber, rock crab, California halibut, ridgeback prawn, Pacific bonito, spiny lobster, and tuna.

Consumptive recreational use: Major recreational fisheries in subregion 2 include surfperches, rockfishes, halibut, kelp and sand basses, white seabass, ocean whitefish, pacific barracuda, bonito, lingcod, mackerel, white croaker, chromis, medialuna, opaleye, neotropical silversides (smelts), spiny lobster, crab, mussels, urchins, clams, rock scallops, grunion, sand crabs, and various elasmobranch species. There are bait fisheries for sardines and anchovies. Bird hunting targets sea ducks, puddle ducks, and geese. Important areas include the Malibu coastline, wrecks and fish havens offshore of Ventura to Channel Islands harbors. Sycamore Canyon, Zuma beach, and other Ventura County beaches for Pismo clams and Rincon for little neck clams.

Non-consumptive recreational use (surfing, diving, kayaking, wildlife viewing, beaches, etc): Beaches and surfing locations abound in subregion 2. Big surf spots in the subregion include Rincon, Ventura Overhead, Surfers Point, C-street (Promenade Park), Silver Strand (between Channel Islands Harbor and Port Hueneme), County Line, Leo Carrillo, Zuma Beach and Point Dume. Santa Clara Estuary Natural Preserve is popular for bird-watching. Campgrounds at Rincon Parkway North and South are heavily used. Trips to the Channel Islands, especially Anacapa Island, for diving, kayaking, and wildlife viewing leave from Ventura Harbor and Channel Islands Harbor. Diving and snorkeling from boats at accessible kelp beds. Tidepooling at Mussel Shoals and along Point Mugu to Point Dume. The northern Malibu coast is heavily used for beachgoing, swimming, surfing, kayaking, and other non-consumptive recreational uses. Point Dume and Leo Carrillo are also popular scuba and free-diving locations.

A.2.4 Research and Monitoring

Research institutions: Channel Islands National Marine Sanctuary, Channel Islands National Park, Santa Barbara ChannelKeeper, California State University Channel Islands, Channel Islands Marine Research Institute (CIMRI), Oxnard College. There is a White Seabass Enhancement Program located in Channel Islands Harbor.

Existing monitoring sites: Intertidal: MARINe Core and PISCO Biodiversity sites at Mussel Shoals and Old Stairs.

Reef Check diver surveys at Lechuza and Leo Carrillo North.

The Vantuna Research Group at Occidental College has monitoring sites at Leo Carrillo, Nicholas Canyon, El Matador, Encinal Canyon and Point Dume.

Bight '08 Rocky Reef Survey (Soledad, Deep Hole, Leo Carrillo to Encinal, and Point Dume). LA County Sanitation District (Deep Hole, Leo Carrillo, and Point Dume).

A.2.5 Existing MPAs, Marine Managed Areas, and Coastal Protected Areas

Existing state MPAs: Big Sycamore Canyon SMR (unique because starts offshore and has regulations that prevent even non-consumptive recreational uses).

RCAs and other fishery closures: Halibut Trawl Grounds from Rincon Point to Point Mugu with a break at Point Hueneme. The Rockfish Conservation Area that restricts recreational fishing from March through December extends seaward from the 60 fathom (110 meter) depth contour throughout the subregion. The Rockfish Conservation Areas that restrict commercial trawl and non-

trawl fishing cross into the subregion in several areas. There is an intersection of recreational, trawl, and non-trawl Rockfish Conservation Areas in the southern portion of the study region.

Other marine managed areas: Point Mugu to Point Dume is an Area of Special Biological Significance. There is a military restricted area off Laguna Point.

Coastal protected areas: La Conchita Beach, Mussel Shoals Beach, Sea Cliff Beach, Hobson County Park, Faria County Park, Solimar Beach, Emma Wood State Beach, Ventura County Fairgrounds Beach, Seaside Park, Promenade Park, San Buenaventura State Beach, Marina Park, Peninsula Beach, Santa Clara Estuary Natural Preserve, McGrath State Beach, Mandalay County Park, Oxnard State Beach, Hollywood Beach, Peninsula Park, Bubbling Springs Park, Silver Strand Beach, Port Hueneme Beach Park, Ormond Beach, Point Mugu Beach, La Jolla Valley, Thornhill Broome Beach, Sycamore Canyon Campground, Sycamore Cove Beach, County Line Beach, Staircase Beach, Leo Carrillo State Beach, Nicholas Canyon County Beach, Charmlee County Park, Robert H. Meyer Memorial State Beaches, Zuma Beach County Park, Point Dume State Beach, and Point Dume State Preserve.

A.2.6 Other Issues

Oil platform.

A.3 Point Dume to Newport Beach (Subregion 3)

Subregion 3 covers 283.8 mi² and 246.4 miles of coastline oriented northeast to southwest with only one major promontory: the Palos Verdes Headland. Between Point Dume and Palos Verdes Point lies Santa Monica Bay. Prominent coastal features include: Little Dume/ Dume Cove, Santa Monica Bay, Marina del Rey, Redondo Canyon, Bluff Cove (slide area), Rocky Point (Palos Verdes Point), Point Vicente, Portuguese Bend (slide area), Point Fermin, Los Angeles/Long Beach Harbor/Terminal Island, Bolsa Chica, Santa Ana Rivermouth, Newport Jetties.

A.3.1 Ecological Setting

Shoreline: Subregion 3 is lined mostly by sandy beaches. Broad fine- to medium-grain sandy beaches exist on either side of Palos Verdes. Palos Verdes is a rocky headland at the south end of Santa Monica Bay where coarse-grained gravel beaches can be found. Point Dume is another rocky headland and rocky reefs can be found along the northern part of Santa Monica Bay eastward to Topanga.

Estuaries: Malibu Lagoon, Topanga Lagoon, Del Rey Lagoon, Los Angeles Harbor/Long Beach Harbor, Colorado Lagoon, San Gabriel River, Anaheim Bay, Bolsa Chica, Talbert Marsh, Santa Anna Rivermouth.

Seagrass: There is surfgrass at Little Dume, Surfrider (Malibu Lagoon), Topanga, Sunset, Malaga Cove), Bluff Cove, along the Palos Verdes Estates Shoreline Preserve, Abalone Cove, Royal Palms, and Point Fermin. Surfgrass is known to occur on many rocky reefs and rock outcrops on sand at 0-5 meter depth range. Outer coast eelgrass is known to occur at Point Dume, Paradise Cove, and Santa Monica Bay. Embayment eelgrass known in outer LA Harbor, Los Alamitos Bay, and Anaheim Bay/Sunset Bay/Huntington Harbor/Talbert Marsh.

Starting at the entrance to Huntington Harbor continuing east to the Huntington Beach Pier there are significant areas of Eelgrass/Surfgrass along the shoreline in 1-3 fathoms.

Kelp: East of Point Dume is a persistent kelp bed, and north of Palos Verdes Point in Santa Monica Bay, and along the rocky shores to the southeast of Palos Verdes Point. There is also an extensive amount of kelp canopy located all along most of the shoreline and out half a mile from shore from Point Vicente to Point Fermin. Patchy kelp beds in good years can extend east of Point Dume to Malibu Lagoon. Kelp also exists off Escondido Beach in Malibu.

Rock/Sand Bottom: Some hard substrate can be found throughout the entire subregion, including areas off Huntington Beach, the south end of Palos Verdes headland, Point Dume, in addition to the area outside the complete breakwater structure of San Pedro Bay, and off Santa Monica where several artificial reefs are sited. There are at least 20 artificial reefs in subregion 3, including some in Santa Monica Bay and several in the southern end of the subregion near Newport Beach. In the Bolsa Chica artificial reef system there are at least eight separate reefs over a one-half-square-mile area, in depths ranging from 75 to 95 feet of water. The remaining artificial reefs are scattered down the coast of Huntington Beach to just below the Santa Ana river entrance. There are also innumerable uncharted rocks, small reefs, wrecks, and submerged kelp areas throughout the entire subregion. There is a rare cobbled river rock reef and cove at Malibu Creek.

Depth Zones: Mostly soft bottom in the subtidal zone north and south of Palos Verdes. There are two submarine canyons in Santa Monica Bay, but only the one off Redondo Beach starts in state waters. There are two deep marine canyons off Orange County, Newport Canyon which starts at the Newport Pier and the San Gabriel Canyon off Huntington Beach. Most of the subregion is soft substrate under 100 meters deep, except off Palos Verdes Point where there are depths of more than 200 meters, and off Point Vicente where depth reaches 800 meters in state waters.

Oceanographic Habitats: Santa Monica Bay, Los Angeles/Long Beach Harbors. White Point on the Palos Verdes peninsula has a unique intertidal and shallow subtidal vent community with the filamentous sulfide bacteria *Beggiatoa* at the base of its food chain. While sulfide bacteria are found also at oil seeps, White Point is unique in that the other vents are co-located with oil seeps. Steep submarine canyons at Point Dume and Redondo Beach anchor the two ends of Santa Monica Bay, upwelling clean water and nutrients, and funneling forage species up and down these trophic super-highways to the deep.

Grunion Spawning Beaches: Little Dume/Malibu Riviera, Paradise Cove Beach, Escondido Beach, Latigo Shores, Malibu Surfrider, Las Flores Beach, Topanga Beach, South Topanga, Will Rogers State Beach, Temescal Beach, Chautauqua Beach, Venice Beach, Dockweiler State Beach, Manhattan Beach, Hermosa Beach, Redondo Beach, Portuguese Bend, Cabrillo Outer and Inner Beach, Long Beach, Seal Beach, Huntington Beach, Sunset Beach, Bolsa Chica State Beach, Newport Beach.

Seabird Colonies: Venice Beach (Least Tern – in fenced-off area), Anaheim Bay (Least Tern), San Gabriel River (Least Tern), Bolsa Chica (Least Tern, Caspian Tern, Royal Tern, Elegant Tern, Forster's Tern, Black Skimmer), Huntington Beach (Least Tern), Newport Bay (Least Tern), Ballona Wetlands (Belding's Savannah Sparrows, Elegant Terns). Snowy Plovers have been sighted at Malibu Lagoon, Santa Monica State Beach North, Dockweiler State Beach North and South, Hermosa Beach North and South, Corral Beach, Huntington Beach, Bolsa Chica Wetlands, Crystal Cove and Newport Beach. Many other birds are visitors to these locations which are along the Pacific Flyway. Each estuarine habitat listed above also provides essential food for many bird species—some of which are species of special concern—including shorebirds, diving birds, waterfowl, and even raptors. These birds may be nesting, resident, migratory, or wintering; their food in these habitats includes various invertebrates, larvae, worms, etc, as well as juvenile fishes and smaller birds.

Marine Mammal Rookeries: None.

Marine Mammal Haulouts: Throughout the entire subregion, sea lions haul out on rock jetties, navigational buoys, anchoring buoys, public and private docks, boats, any hardened shorelines and sometimes on beaches. Often, one or two animals at a time will haul out on the rocky shores in any one of the many coves on the Palos Verdes Peninsula. Sea lions and seals also haul out on the breakwaters and jetties at Santa Monica, Marina del Rey and Redondo Beach; on Flat Rock and Point Vicente; and at the live bait receivers at Malibu, Marina del Rey and Redondo Beach.

Other Areas for Marine Mammals: Common, coastal bottlenose, Pacific whiteside and Risso's dolphins are regularly seen foraging throughout the entire subregion. Additionally, California gray whales, blue whales, fin whales and humpback whales migrate through coastal areas within state water boundaries.

Other Marine Life: "Clam bed" spawning areas are located off Huntington Beach and in Santa Monica Bay.

A.3.2 Land-Sea Interactions

Coastal watersheds: Santa Monica Bay, Dominguez Channel, Los Angeles River, San Gabriel River, Santa Ana River

Major rivers: Los Angeles River, San Gabriel River, Santa Ana River

Anadromous fish streams: Malibu Creek, Topanga Canyon, Los Angeles River, San Gabriel River, (steelhead).

Hardened shoreline: There are patches of hardened shoreline throughout Santa Monica Bay, the most significant being at Marina Del Rey and Redondo Beach. Los Angeles and Long Beach Harbors also have significant amounts of hardened shoreline, as do Alamitos Bay, and Huntington Harbor.

Key impaired water bodies: Malibu Lagoon Marina Del Rey Harbor, Los Angeles/Long Beach Harbors, Alamitos Bay, Anaheim Bay, other estuaries and lagoons.

Malibu Beach and Surfrider Beach have historically had dozens of beach-site days receive posted warning for nonpoint source with both non-human and human fecal contamination (SCCWRP 2007). There have been frequent beach closures in the Huntington Beach area as well in recent years due to fecal coliform contamination of unknown origin, also the Santa Ana river mouth is listed by the State of California as a hotspot for bacterial contamination.

Also: Malibu lagoon – eutrophic, pH, viruses, benthic [toxicity]; Los Angeles/Long Beach [inner] – benthic, Cu, sediment toxic, DDT, Zn; Los Angeles/Long Beach [outer, inside breakwater] – sed. toxic; Marina Del Rey Harbor – DDT, Dieldrin; Palo Verde Shoreline Park Beach – pesticides; Santa Monica Bay at outfall sites – PCB, DDT, sediment toxic; San Pedro Bay near/offshore – chlordane, chromium, Cu, DDT, PAHs, PCBs, sediment toxic, Zn; San Gabriel River Estuary – Cu; Colorado Lagoon – chlordane, DDT, Dieldrin, coliform, Pb, PAHs, PCBs, sediment toxic, Zn; Dominguez Channel Estuary – NH₃, benthic, benzo- pyrene, benzoanthracene, chlordane, chrysene, coliform, Dieldrin, Pb, Phenanthrene, pyrene, Zn; Los Angeles Harbor/Fish Harbor – many pollutants.

Major point sources: Platforms Esther and Eva (treated sanitary waste from oil platform), AES Huntington Beach (cooling water), Sewage Treatment Plant – Orange County (treated sanitary wastewater), Scattergood Generating Station, El Segundo Generating Station, and AES Redondo Beach Generating Station (cooling water), Hyperion WWRP (treated sanitary wastewater), El Segundo Refinery (refinery wastewater), Los Angeles County JWPCP Carson NP (treated Sanitary wastewater).

Other issues: The Montrose Settlements Restoration Program (MSRP) fund is to be used to mitigate the effect of years of DDT and PCB releases into the southern California marine environment. In this subregion, the soft-bottom areas adjacent to White's Point and other locations at the Palos Verdes Peninsula are among the most severely impacted. A key component of the restoration program, yet to be implemented, is the construction of artificial reefs to replace recreational fishing opportunities and fish consumption lost due to contaminated soft bottom species. The preferred alternative for this reef construction includes adjacent areas in the Santa Monica Bay.

Nonpoint source pollution is an issue in this subregion.

A.3.3 Socioeconomic Setting

Counties: Los Angeles, Orange

Coastal towns/ports/harbors: Malibu, Pacific Palisades, Santa Monica, Venice, Playa del Rey, El Segundo, Manhattan Beach, Los Angeles, Redondo Beach, Hermosa Beach, Torrance, Palos Verdes Estates, Rancho Palos Verdes, San Pedro, Long Beach, Belmont Shores, Seal Beach, Huntington Beach, Newport Beach

Public access areas, boat ramps, piers, etc.: Paradise Cove (beach, fishing, surfing, scuba, free-diving), Escondido Beach (fishing, kayaking, scuba), Dan Blocker County Beach (fishing), Malibu Lagoon State Beach (surfing culture heritage site, wildlife viewing), Malibu Pier (fishing), Zonker Harris Accessway, Las Tunas State Beach (fishing), Topanga State Beach (fishing, surfing), Will Rogers State Beach (surfing, fishing), Santa Monica State Beach (fishing, swimming, surfing, beachgoing), Santa Monica Municipal Pier (stairs to beach, surfing, fishing), Venice City Beach (surfing, beachgoing, swimming, fishing), Venice Fishing Pier (fishing, surfing), Burton Chase Park (fishing), Fisherman's Village (fishing, kayaking), Mother's Beach (swimming, fishing), Promenade Walkway, Admiralty Park, Marina del Rey Harbor (sailing, rowing, kayaking, wildlife viewing, fishing), Del Rey Lagoon Park (wildlife viewing, picnicking/playground), Dockweiler State Beach (campground, fire pits, fishing, surfing, beachgoing), El Segundo Beach (fishing, surfing, hang gliding, beachgoing), El Porto Beach (fishing, surfing, beachgoing), Manhattan County Beach (surfing, fishing, beachgoing, swimming, scuba, free-diving), Manhattan Beach Municipal Pier (fishing, surfing, beachgoing, scuba), Hermosa City Beach (surfing, fishing), Hermosa Beach Municipal Pier (fishing, surfing, fishing), King Harbor (boat ramp, surfing, fishing, kayaking), Seaside Lagoon (swimming), Redondo Sportfishing Pier (fishing), Redondo Beach Municipal Pier (surfing, fishing), Monstad Pier (fishing), Redondo County Beach (fishing, surfing, beachgoing, swimming, scuba, free-diving), Torrance County Beach (fishing, surfing, free-diving, scuba, seasonal buoys for swimming), Palos Verdes Estates Shoreline Preserve (surfing, fishing, scuba, free-diving), Malaga Cove (beach, fishing, surfing, scuba, free-diving), Point Vicente Fishing Access, Long Point (beach, fishing, scuba, free-diving), Abalone Cove Beach (fishing, scuba, tidepooling), Ocean Trails (fishing), Royal Palms County Beach (fishing, tidepooling, surfing, scuba, free-diving), Cabrillo Beach (fishing, beachgoing, swimming), Cabrillo Fishing Pier, Ports O'Call Village (fishing), Los Angeles Harbor (fishing, hoist), Long Beach Harbor (fishing), South Shore Public Boat Launch, Queensway Bay (campground), Rainbow Harbor (wildlife viewing, sailing, fishing), Shoreline Park (fishing), Downtown Shoreline Marina (public docks), Long Beach City Beach (fishing), Belmont Shore (beach, fishing), Alamitos Peninsula (fishing), Alamitos Bay (hoist, boat launch, sailing), Alamitos Bay Marina (launch ramp, hoist, sailing), Marine Park (beach), Marine Stadium (fishing, beach, launch ramp), Seal Beach (surfing, fishing), Seal Beach Pier (surfing, fishing), Surfside Beach (surfing), Sunset Beach (surfing, fishing), Huntington Harbour (fishing, launch ramp, public slips, beach), Trinidad Island (beach), Sunset Aquatic Marina (boat ramp), Bolsa Chica State Beach (campground, surfing, fishing), Huntington Beach Pier (surfing, fishing), Huntington City Beach (surfing, swimming, fishing, campground, fire pits), Huntington State Beach (disabled access, surfing, fishing, five-acre Least Tern Preserve), Santa Ana Rivermount Beach (surfing, fishing).

Commercial fisheries: Important commercial fisheries include market squid, tuna, swordfish, Pacific sardine, rock crab, California sheephead, bonito, barracuda, yellowtail, scorpionfish, sea urchin, mackerel/anchovy, California spiny lobster, California halibut, spot prawn, and thornyhead and sablefish. Important fishing areas include outside of Santa Monica Bay, Big Kelp Reef (south of Dume), Topanga Beach, Torrance Beach, Portuguese Bend, Point Fermin, Horseshoe Kelp, 150 spot (outer oil rigs) and Izors Reef.

Consumptive recreational use: Major recreational fisheries occurring in subregion 3 include kelp bass, barred sandbass, spotted bay bass, California sheephead, halibut, scorpionfish, yellowtail, white sea bass, barracuda, bonito, mackerel, halfmoon, blacksmith perch, rockfish, ling cod, cabezon, grunion, spiny lobster, shark (thresher, mako, blue), and jacksmelt. Important areas include Santa Monica Bay, Horseshoe Kelp off Los Angeles Harbor, Huntington Flats off Huntington Beach, and Bolsa Chica. The outer breakwater of Los Angeles/Long Beach Harbors is about eight miles long and is fished and lobstered extensively. Also important inside are Island Chaffee and the oil islands Freeman, White and Grissom.

Non-consumptive recreational use (diving, kayaking, wildlife viewing, beaches, etc): All of the numerous beaches and access points draw large crowds in this subregion, especially in the southern half of the region. Diving, surfing, swimming and kayaking sites are plentiful. Bird-watching at estuaries, lagoons, harbors and along accessible beaches. Huntington Beach is the self-proclaimed surfing capital of southern California, site of the US amateur surfing championships. Every inch of coastal ocean in this subregion with a rideable wave is consistently surfed. Major surfing beaches include Surfrider Beach at Malibu Lagoon, Topanga, Sunset Blvd, El Porto to Torrance Beach, Haggerty's at Malaga Cove, Bluff Cove, Bolsa Chica, Huntington Cliffs, Huntington Pier, Santa Anna Rivermouth, and Newport Jetties. Kayakers launch from Marina del Rey, King Harbor, and Bluff Cove. Scuba diving and snorkeling classes use King Harbor and the dive spots along the Malibu coast for shore diving. All coves in Palos Verdes are popular for recreational diving/snorkeling.

A.3.4 Research and Monitoring

Research institutions: Pepperdine University (Grunion.org), Heal the Bay, Long Beach Marine Institute, Marine Mammal Center at Fort MacArthur, Santa Monica Baykeeper, Santa Monica Bay Restoration Commission, Southern California Marine Institute, University of California, Los Angeles; Marine Science Center, University of Southern California Sea Grant, Occidental College and Southern California Academy of Sciences, LACSD. Also California State Universities at Northridge, Los Angeles, and Long Beach. Los Angeles City and Orange County Sanitation Districts have large ocean research and monitoring programs.

Existing monitoring sites: Intertidal: MARINE Core and PISCO Biodiversity sites at Paradise Cove, Whites Cove, and Point Fermin.

Subtidal: PISCO sites: Point Fermin, Resort Point, and Shaw's Cove.

CRANE sites: King Harbor, Malibu, Point Vincente, and Rocky Point.

Reef Check diver surveys at Big Rock, Malaga Cove, Christmas Tree Cove/Crystal Cove, Hawthorne Reef/Point Vicente, 120 Reef, and Abalone Cove.

Bight '08 Rocky Reef (Little Dume, Flat Rock, Rocky Point and Ridges, Bunker Point to White's Point, and Inner and Outer Horseshoe Kelp San Pedro).

Vantuna Research Group at Occidental College monitoring sites: Little Dume, Escondido, King Harbor, Flat Rock, The Ridges, Rocky Point, Point Vicente, Long Point, Bunker Point, Three Palms, White's Point, Point Fermin, West Rock Quarry, and Underwater Arch.

LA County Sanitation District (Little Dume, off Malibu Lagoon, King Harbor, Flat Rock, Rocky Point and Ridges, Point Vicente, Bunker Point to White's Point, Cabrillo, Pier 400, Angel's Gate, LA Federal Breakwater, Inner and Outer Horseshoe Kelp San Pedro)

A.3.5 Existing MPAs, Marine Managed Areas, and Coastal Protected Areas

Existing state MPAs: Abalone Cove SMP, Point Fermin SMP, Bolsa Chica SMP, Upper Newport Bay SMP, Robert E. Badham SMCA, and Irvine Coast SMCA.

RCAs and other fishery closures: The Rockfish Conservation Area that restricts recreational fishing from March through December extends seaward from the 60 fathom (110 meter) depth contour throughout the subregion. The Rockfish Conservation Areas that restrict commercial trawl and non-trawl fishing cross into the subregion in several areas. There is an intersection of recreational, trawl, and non-trawl Rockfish Conservation Areas at Point Dume and Palos Verdes Point. Commercial fishing using set lines, trammel or gill nets, and handlines with more than 15 hooks attached to any one fishing line and one fishing line attached to another fishing line has been prohibited in Santa Monica Bay within one mile of the mainland shore (Schroeder and Love 2002, FGC §9026-9029, §8694, §8725, §8757, §8780(b)). Troll lines are allowed in Santa Monica Bay (FGC §9025.5). Traps are banned from most areas of the bay. Finfish and hagfish traps may not be used within 750 feet of any piers, jetties, and breakwaters, but are allowed outside that area (FGC §9001, §9001.7(g)). Spot prawn traps are also allowed in Santa Monica Bay (FGC §9001, §9015). Commercial take of rock crabs and lobster is also not allowed (CCR T14 §122(a)(2), FGC §8282).

Other marine managed areas: There is a restricted area south of Marina del Rey Harbor.

Coastal protected areas: In addition to the county; state; and city beaches listed as coastal access points; there are also Malibu Bluffs State Park; Topanga Canyon State Park; Malibu Creek State Park; Peter Strauss Ranch; Rocky Oaks; Paramount Ranch; Circle X Ranch; Arroyo Sequit; Ramirez Canyon Park; Escondido Canyon Natural Area; Solstice Canyon; Cold Creek Canyon Preserve; Will Rogers State Historic Park; Temescal Canyon Park; Palisades Park; Ballona Lagoon Walkway; Audrey E. Austin, Jr. Memorial Park; Vista Del Mar Park; Veterans Park; Point Vicente Park; Frank A. Vanderlip, Sr. Park; Friendship Community Regional Park; Point Fermin Park and Lighthouse; Angels Gate Park; Lookout Point Park; John S. Gibson, Jr. Park; Bixby Park; Bluff Park; Colorado Lagoon; Huntington Beach Wetlands (Talbert Marsh); and Santa Ana River Trail. The area seaward of LAX is an El Segundo blue butterfly preserve where access to the bluffs is prohibited.

A.3.6 Other Issues

Beach grooming, oil platforms, oil processing facilities, shipping, and harbor operation. The special high-chlorophyll-a phytoplankton production and retention habitats of Santa Monica and Long Beach Bays, which are also impaired water bodies: these two shallow, sheltered, soft-bottomed bays are year-round spawning, juvenile rearing and adult foraging habitat for coastal pelagic species and a biodiverse array of algae-consuming fishes and invertebrates, together forming the forage base for a wide range of resident and pelagic predator species from birds and sea mammals to the finned mainstays of the local recreational and commercial fisheries. For decades, healing these productive, high-human-use and impacted bays has been the objective of an ongoing area-wide effort by fishermen, coastal communities, environmental groups, universities, and city, state, and federal agencies.

A.4 Newport Beach to Agua Hedionda (Subregion 4)

Subregion 4 covers 176.6 mi² and 108.2 miles of coastline oriented northwest to southeast with major promontories being Dana Point and San Mateo Point. Other coastal features include: Newport Harbor, Abalone Point, Dana Point Harbor and Oceanside Harbor.

A.4.1 Ecological Setting

Shoreline: Subregion 4 is made up almost entirely of sandy beaches backed by wave cut platforms, with some rocky shores scattered in the northern half of the region (above Dana Point).

Estuaries: San Mateo Creek Lagoon, Upper Newport Bay, Buena Vista Lagoon, Agua Hedionda Lagoon, Santa Margarita River, and San Luis Rey River

Seagrass: A large percentage of the coastal shores, from the entrance to Newport Harbor east to Dana Point, have concentrations of eelgrass/surfgrass in depths to two to three fathoms.

Surfgrass is known to occur on many rocky reefs and rock outcrops on sand at zero-to-five meter depth range. Outer coast eelgrass not known. Embayment eelgrass known at Newport Bay, Oceanside Harbor, Agua Hedionda Lagoon, and San Onofre State Park. Reefpoint (Muddy Creek), Rockpile, and Brooks Street also have eelgrass.

Kelp: Persistent kelp beds in the Corona Beach area of Newport Beach, Crystal Cove, Laguna Beach, South Laguna Beach, Capistrano Beach, San Clemente, above and at Dana Point and San Mateo Point, and two large patches offshore and east and west of San Onofre to Oceanside Harbor. Persistent kelp off Thousand Steps (between Aliso Beach and Three Arch Bay), off Monarch Bay and Salt Creek (above Dana Point). Also large beds from two miles north of Las Flores Creek to half a mile south ("Yellowtail Kelp and Barn Kelp"), at depths of 30 feet to 65 feet. Other scattered inshore kelp beds are off Camp Pendleton. Additional inshore kelp beds from Buena Vista Lagoon, Carlsbad to Agua Hedionda Lagoon, in 30 to 60 feet.

Rock/Sand Bottom: There is hard-bottom substrate east (south) of Newport Harbor to the area south of Dana Point, and an intermittent strip offshore from Dana Point to San Mateo Point. San Onofre, Oceanside and Carlsbad also have some hard substrate next to the coast. There are several coral reefs present from Newport Harbor south to Dana Point. There are four artificial reefs in this subregion; one northwest of San Mateo Point, one off San Onofre, and two offshore from Oceanside. Most of the subtidal areas are sandy. There are large areas of hard bottom from San Mateo Point to Oceanside which are associated with persistent kelp beds. San Mateo Point to San Onofre is a cobbled-river-rock/boulder reef created by San Mateo and San Onofre Creeks, 2.4 miles long, intertidal and subtidal, creating two rocky sheltered coves.

Depth Zones: The majority of the subregion is soft substrate from 0 to 100 meters. North of Dana Point is deeper, and two submarine canyons run south from Newport Beach.

Oceanographic Habitats: California Countercurrent runs along the coast.

Grunion Spawning Beaches: Crystal Cove Beach, Crescent Bay Beach, Laguna Beach, Salt Creek Beach, The Strand/Dana Point, Doheny State Beach, Doheny State Beach South, San Clemente State Beach, Poche Beach, Tressels Beach, Red Beach, Camp Pendleton Beaches, Oceanside Harbor Beach, Oceanside City Beach, North Carlsbad Beach, Tamarack Beach.

Seabird Colonies: Newport Bay (Least Tern), Santa Margarita (Least Tern), Santa Ana River (Least Tern), Crystal Cove (Snowy Plover), Aliso Creek (Least Tern), Buena Vista Lagoon (Least

Tern), Agua Hedionda (Least Tern). Snowy Plovers have been sighted at San Onofre Beach, Aliso/French Creek Mouth, Santa Margarita River Estuary, San Luis Rey River mouth and Agua Hedionda Lagoon/Beach. Many other birds are visitors to these locations and roost on offshore rocks and outcroppings along the Pacific Flyway. Each estuarine habitat listed above also provides essential food for many bird species—some of which are species of special concern—including shorebirds, diving birds, waterfowl, and even raptors. These birds may be nesting, resident, migratory, or wintering; their food in these habitats includes various invertebrates, larvae, worms, etc, as well as juvenile fishes and smaller birds.

Marine Mammal Rookeries: None mapped.

Marine Mammal Haulouts: Throughout the entire subregion sea lions haul out on jetties, channel buoys, mooring buoys, navigational buoys, anchoring buoys, public and private docks, boats throughout the subregion, and occasionally on beaches. The eight large mooring buoys off Encina Power Plant in Carlsbad usually have 20 to 50 sea lions hauled out on them. Sea lions and seals haul out on Reef Point, Abalone Point (Little Irvine Cove), Emerald Bay, Seal Rock (off Crescent Bay Point), San Juan Rocks (off Dana Point Headlands).

Other Areas for Marine Mammals: Common, coastal bottlenose, Pacific whiteside and Risso's dolphins are regularly seen foraging throughout the entire subregion. Additionally, California gray whales, blue whales, fin whales and humpback whales frequent coastal areas within state water boundaries. Crystal Cove shoreline has been the site of a dolphin birthing circle.

Other Marine Life: "Clam bed" spawning areas are present from San Clemente pier to 1 mile south of San Onofre and Oceanside Harbor to 6 miles north, from depths of 50 feet to 125 feet.

A.4.2 Land-Sea Interactions

Coastal watersheds: Santa Ana River, San Juan, Santa Margarita, San Luis Rey, Carlsbad

Major rivers: Santa Ana River, San Juan Creek, San Mateo Creek, Santa Margarita River, San Luis Rey River.

Anadromous fish streams: San Juan Creek, San Mateo Creek, San Luis Rey (steelhead)

Hardened shoreline: There is extensive hardened shoreline at Newport Harbor, Dana Point Harbor, Camp Pendleton Boat Basin/Oceanside Harbor, Carlsbad, and Agua Hedionda.

Key impaired water bodies: Newport Harbor and Bay, Oceanside Harbor, San Luis Rey

River Mouth, Buena Vista Lagoon, Agua Hedionda Lagoon; other estuaries and lagoons. North end of Dana Point Harbor and Doheny Beach are recognized by the State of California as bacterial contamination hotspots from both local and watershed-related sources. The sewer outfall off Dana Point is very close to shore here. Local runoff from development all along the Laguna shoreline is a major source of habitat degradation in the nearshore area.

Also: Newport Beach to Agua Hedionda; Anaheim Bay (Dieldrin, Ni, PCBs, sed. toxicity);

Balboa Beach (DDT, Dieldrin, PCBs); Huntington Harbor (Chlordane, Cu, Pb, Ni, pathogens, PCBs, sed. toxicity); Newport Bay (lower) (Chlordane, Cu, DDT, metals PCBs, sed. toxicity);

Newport Bay (upper) Ecological Reserve (Chlordane, Cu, DDT, PCBs, sediment toxicity).

Major point sources: SONGS Units 1,2, and 3 (cooling water), Oceanside Ocean Outfall (treated sanitary wastewater), Aliso Ocean Outfall (treated sanitary wastewater), SERRA Ocean Outfall (treated sanitary wastewater), Encina Power Plant (cooling water).

Other issues: Newport Harbor, Dana Harbor.

A.4.3 Socioeconomic Setting

Counties: Orange, San Diego

Coastal towns/ports/harbors: Newport Beach/Newport Harbor, Corona Del Mar, Newport Coast, Laguna Beach, Dana Point, Dana Point Harbor, Capistrano Beach, San Clemente, Oceanside/Oceanside Harbor, Carlsbad

Public access areas, boat ramps, piers, etc: Newport Beach and Pier (surfing, fishing), Balboa Beach and Pier (fishing), West Jetty View Park (surfing, fishing), Balboa Pavilion (fishing), Balboa Island (fishing), Newport Harbor Beaches, Newport Harbor (fishing), Newport Dunes Resort (campground, boat launch, lagoon, fishing), Bayside Drive County Beach (surfing, fishing), China Cove Beach, Rocky Point (surfing, beach), Corona Del Mar State Beach (surfing, fishing), Little Corona Del Mar Beach (fishing, tidepools), Camp Del Mar (boat launch, recreation area), Crystal Cove State Park (campgrounds, historic district lodging, beach fishing, surfing, tidepools), Laguna Beaches (surfing, fishing, tidepools), Stair access (unless otherwise noted) with MPA regulation sign at every access point: Crescent Bay (two access points), Shaw's Cove, Boat Canyon (Fisherman's Cove), Diver's Cove, Picnic Beach (Wheelchair), Monument Point, Rockpile Beach, Main Beach (two access points), Sleepy Hollow, Cleo Street, St. Ann's, Thalia Street, Anita Street, Oak Street, Brooks Street, Cress Street, Mountain Road, Bluebird Street, Agate Street, Pearl Street, Woods Cove, Moss Cove, Victoria (two access points, wheelchair access), Christmas Cove, Goff Island (wheelchair access), West Street (three access points), Table Rock, Main Beach (surfing), Treasure Island Beach and Blufftop Park (wheelchair access), Aliso Beach (surfing, fishing), Camel Point and West Street Beaches (surfing, fishing), Table Rock Beach (surfing, fishing), 1000 Steps Beach (fishing). Also Salt Creek Beach Park (surfing, fishing), Three Arch Cove Beach (surfing, fishing), Doheny State Beach (surfing, campground, fishing, tidepools), Capistrano Beach Park (surfing, fishing), Poche Beach (surfing), San Clemente City Beach (surfing, fishing), San Clemente Municipal Pier (surfing, fishing), San Clemente State Beach (campground, surfing, fishing), San Onofre State Beaches North and South (surfing heritage culture site, campground, fishing, tidepools), Camp Pendleton Beach Access (campground, surfing, fishing), Harbor Beach (campground, fishing), Oceanside City Beach (surfing, fishing), Oceanside Pier (surfing, fishing), Oceanside Harbor (fishing, boat launch ramp), South Oceanside Beach (fishing), Carlsbad City Beach (surfing, fishing), Carlsbad State Beach (surfing, fishing), Encina Fishing Area, Dana Point Harbor (fishing, launch ramp) and Dana Point jetty (fishing), US Navy LCAC (hovercraft) station, Camp Pendleton (includes very large beach launching ramp), Encina outfall jetties (fishing), Agua Hedionda Lagoon (YMCA recreation area, kayaking, float tubing, Snug Harbor Marina and launch ramp, Bristol Cove Marina and launch ramp, fishing).

Commercial fisheries: Aquaculture in Agua Hedionda and Carlsbad Lagoon produces oysters clams, abalone, and mussels. White seabass hatcheries. Important commercial fisheries include thornyhead and sablefish, spiny lobster, sardine, Pacific hagfish, rock crab, halibut, shark (mako, thresher, soupfin), white seabass, bonito, barracuda, scorpionfish, sea urchin, spot prawn, swordfish, mackerel/anchovy, rock crab, croakers, market squid, and California sheephead. There are commercial live bait suppliers for anchovy, sardine and squid. Important fishing areas include the whole area from Newport Beach to Carlsbad, which is used at various times by commercial and recreational fisheries. There is also a black-market aquarium trade.

Consumptive recreational use: Major recreational fisheries occurring in subregion 4 include kelp bass, barred sandbass, spotted bay bass, California sheephead, halibut, rockfish, scorpionfish, yellowtail, white sea bass, barracuda, bonito, mackerel, halfmoon, blacksmith perch, ling cod, cabezon, grunion, shark (thresher, mako, blue), yellowfin, bluefin and skipjack tuna, whitefish, spiny lobster, corbina, rock scallop, clam and jacksnelt. Important areas include the whole area from Newport Beach to Carlsbad, which is used at various times by commercial and recreational fisheries.

Non-consumptive recreational use (surfing, diving, kayaking, wildlife viewing, beaches, etc): State, county and city beaches are heavily used in this subregion. Many popular diving, surfing, swimming, snorkeling, paddling, boating, hiking, kayaking and tidepooling sites along the coast, and wildlife viewing in the estuaries. Bird-watching occurs at many of the estuaries and along accessible beaches. Diving and snorkeling from beaches and from boats at accessible kelp beds. Parasailing, whale watching, wilderness tours, special events (surf contests, weddings, photo shoots, filming, etc.).

A.4.4 Research and Monitoring

Research institutions: University of California, Irvine; California State University, Fullerton. Weston Solutions, MBC Applied Environmental Sciences, Coastal Resources Management, Aquarium of the Pacific.

Existing monitoring sites: Intertidal: MARINe Core and PISCO Biodiversity sites at Crystal Cove, Shaw's Cove, Treasure Island, and Dana Point.

CRANE: Dana Point, San Mateo Point, San Onofre, Barn Kelp, and Carlsbad.

Weston Solutions: Little Corona del Mar, Morning Canyon, Crystal Cove, and Heisler Park.

Coastal Resources Management: Little Corona del Mar, Morning Canyon, Crystal Cove, and Heisler Park.

California State University, Fullerton: sites along Orange County.

Orange County Marine Protected Area Council: sites along Orange County.

A.4.5 Existing MPAs, Marine Managed Areas, and Coastal Protected Areas

Existing state MPAs: Upper Newport Bay SMP, Robert E. Badham SMCA, Crystal Cove SMCA, Irvine Coast SMCA, Heisler Park SMR, Laguna Beach SMCA, South Laguna Beach SMCA, Niguel SMCA, Dana Point SMCA, Doheny SMCA, Doheny Beach SMCA, Agua Hedionda Lagoon SMR.

RCAs and other fishery closures: The Rockfish Conservation Area that restricts recreational fishing from March through December extends seaward from the 60 fathom (110 meter) depth contour throughout the subregion. The Rockfish Conservation Areas that restrict commercial trawl and non-trawl fishing cross into the subregion in several areas. There is an intersection of recreational, trawl, and non-trawl Rockfish Conservation Areas in the northern portion of the subregion and along the outside of the southern portion. Point Loma and La Jolla both have no-take areas.

Other marine managed areas: Newport Beach Area of Special Biological Significance, Irvine Coast Area of Special Biological Significance, Heisler Park Area of Special Biological Significance, restricted areas off Camp Pendleton, California Least Tern nesting sites at Camp Pendleton.

Coastal protected areas: Buena Vista SMP, Upper Newport Bay Ecological Reserve, Crescent Bay Point Park, Heisler Park, Ruby Street Park, Ken Sampson Lookout, Heritage Park, Lantern Bay Park, Louise Leyden Park, Linda Lane City Park, Leslie Park, Camp Joseph H. Pendleton Marine Corps Base, Buccaneer Park, Buena Vista Lagoon Ecological Reserve, Maxton Brown Park. Newport Beach Area of Special Biological Significance, Irvine Coast Area of Special Biological Significance, Heisler Park Area of Special Biological Significance. Crystal Cove Underwater Park, Bureau of Land Management National Coastal Monument (all offshore rocks protected).

A.4.6 Other Issues

Camp Pendleton Marine Base, beach grooming, lack of public access and potential use conflict with MPAs resulting in siting/size/spacing effects on area MPAs.

A.5 Agua Hedionda to California/Mexico Border (Subregion 5)

Subregion 5 covers 203.3 mi² and 187.64 miles of coastline oriented north to south with the major promontories Point La Jolla and Point Loma. Prominent coastal features include: Teramar Reef/Point, Encinitas Point, La Jolla Bay, Goldfish Point, Point La Jolla, Seal Rock, Bird Rock, False Point, Point Medanos, Mission Bay Channel and Mission Bay, Point Loma, and San Diego Bay.

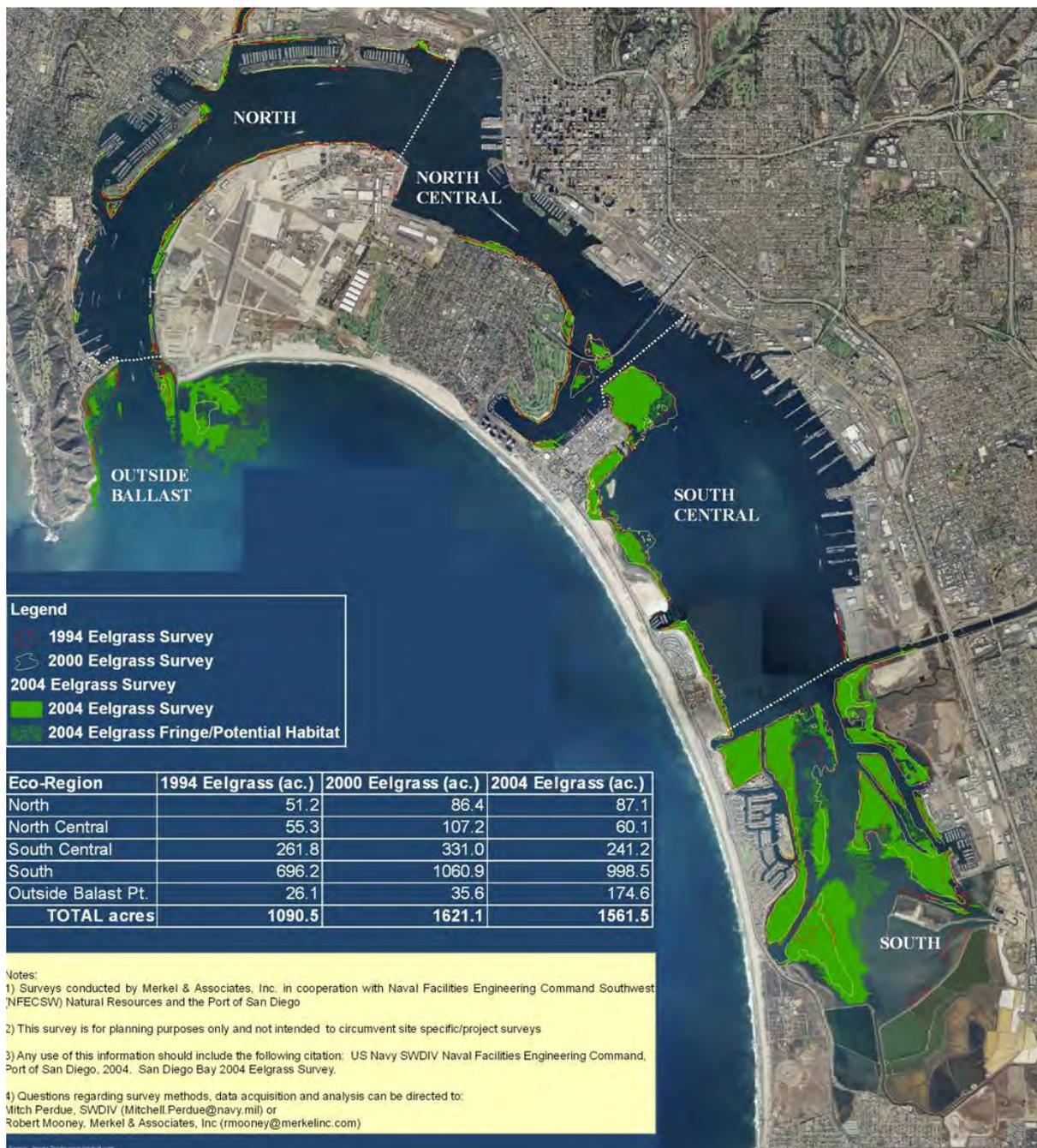
A.5.1 Ecological Setting

Shoreline: Sandy beaches backed by wave cut platforms and mostly sandy subtidal areas, except around the rocky points of La Jolla and Point Loma. From La Jolla to Carlsbad there are many rock points with tide pools including Torrey Pines, Solana Beach, Cardiff, Swami's, and Leucadia.

Estuaries: Batiquitos Lagoon, San Elijo Lagoon, San Dieguito Lagoon, Los Peñasquitos Lagoon, Mission Bay, San Diego Bay, Sweetwater Marsh, and the Tijuana Estuary

Figure A-1. Eelgrass surveys: 1994, 2000, and 2004. Mission Bay, Batiquitos Lagoon

In 2004, approximately 64% of San Diego Bay's eelgrass was in the South region, 15% in South Central region, 9% in the North and North Central regions, and 11% outside Ballast point. Figure and data courtesy of Merkel & Associates (2004 study for the Unified Port of San Diego).



Seagrass: Surfgrass occurs on many hard rocky reefs and rock outcrops on sand at depths to five meters. Extensive surfgrass areas occur off portions of La Jolla and Point Loma, Tijuana River Sloughs, Pacific Beach Point to La Jolla Cove, 10th to 15th streets in Del Mar, Fletcher Cove in Solana Beach, Tide Park/Seaside State Park, Cardiff Reef at San Elijo Lagoon, the whole Pipes area from Cardiff to Swamis, Boneyard at Swami's to about H Street in Encinitas, Stone Steps and Grandview access points in Leucadia, and at Tamarack Point and Tamarack in Carlsbad. Outer coast eelgrass is known to occur off La Jolla and Point Loma. Embayment eelgrass occurs in Batiquitos Lagoon, Mission Bay, and San Diego Bay.

Kelp: The largest kelp beds in California are the Point Loma Kelp bed and the La Jolla Kelp bed. There are smaller scattered kelp beds close to shore from south of Solana Beach to Agua Hedionda. Deepwater elk kelp occurs along the offshore margins of the La Jolla and Point Loma giant kelp forests. Elk kelp also occurs along the offshore margins of *Macrocystis* beds at Imperial Beach. Large linear kelp beds in 20 feet to 70 feet of water from Carlsbad to Torrey Pines State Park with a few spots of open water. There are also kelp beds off Imperial Beach Pier.

Rock/Sand Bottom: The rocky points coasts of La Jolla and Point Loma provide for hard bottom habitat and in the 0-to-30 meter depth range in the northern (middle) portion of the subregion. South of Point Loma the coast is dominated by soft bottom from 0 to 30 meters depth. There are six artificial reefs in the subregion 5; one off Batiquitos Lagoon, two off Torrey Pines, and three artificial reef complexes off Mission Bay. The Mission Bay artificial reefs are a complex of reefs including 3 ships, one sunken Naval Electronics Lab and approximately 20 mounds composed of either quarry rock, concrete bridge rubble or pilings. Mission Beach group has about 15 individual reefs and one of them has its own kelp bed. The Pacific Beach group has about 12 reefs. The Torrey Pines reef is mostly sanded over with little structure. There is a large cobbled-rock/boulder reef at the mouth of the Tijuana River. There is also International Reef located on U.S. border but outside of the study area.

Depth Zones: A submarine canyon reaches the nearshore area near La Jolla. Most of the subregion waters are at depths of less than 100 meters. There is a submarine canyon off Agua Hedionda Lagoon in Carlsbad; depth 120 feet to over 1200 feet, and "Del Mar Ridge," a hard-bottom shelf, in depths of 125 feet to over 300 feet, from one to three miles offshore Del Mar.

Oceanographic Habitats: The southward-moving California Current bends shoreward near San Diego and northward along the Southern California Bight as the Southern California Counter Current. San Diego Bay is the third-largest bay/estuary complex in California, and the largest in southern California. In addition, there are significant differences in the community composition of San Diego Bay as compared to other southern California bays. San Diego Bay is unique in that it is the northernmost range for many tropical/subtropical fish. Furthermore, the south bay represents a relatively large area of somewhat natural bay habitat. Along the San Diego County coast the current changes direction for weeks at a time. La Jolla Canyon is a rockfish nursery and the only area where large quantities of juvenile rockfish can be found in the region. In addition this canyon is a pupping ground for thresher, white, leopard, and angel sharks, and has a major market squid spawning area.

Sea Turtles: San Diego Bay is a natural habitat for the endangered green sea turtle (*Chelonia mydas*). San Diego Bay is the northernmost year-round habitat for green sea turtles, and the only year-round green sea turtle habitat on the west coast of the United States. The first scientific studies of the turtles in San Diego Bay began in the 1970s (Stinson 1984). Peter Dutton, the Director of the National Marine Fisheries Marine Turtle Research Group, suggested that winter capture-recapture estimates indicate the local population is likely to be between 60 and 100 individuals, although as many as 148 individuals (Dutton et al. unpublished data) may frequent the Bay. Presence of turtles recorded during tracking studies does appear to indicate a preference for areas of San Diego Bay that are warmer and within or near the eelgrass beds mapped in 2004 by Merkel & Associates in the southern section of the bay (Mayhugh et al. unpublished data).

Grunion Spawning Beaches: Moonlight Beach, Solano Beach, Del Mar City Beach, Leucadia Beach, San Elijo State Beach, La Jolla Shores Beach, Cardiff By The Sea Beach, Scripps Beach, Black's Beach, Marine Street Beach, Pacific Beach/Tourmaline St., Crystal Pier, South Mission Beach, Mariner's Basin, Ocean Beach, Shelter Island, North Beach NAB, Coronado City Beach, Silver Strand Beach, Imperial Beach.

Seabird Colonies: Batiquitos Lagoon (Least Tern), San Elijo Lagoon (Least Tern), Los Peñasquitos (Least Tern), San Diego River/Mission Bay (Least Tern), Point Loma Peninsula (Cormorant spp.),

North San Diego Bay (Western Gull, Least Tern), South San Diego Bay (Caspian Tern, Elegant Tern, Forester's Tern, Least Tern, Black Skimmer), Tijuana River mouth (Least Tern), Del Mar (Least Tern), Sweetwater River (Least Tern), and La Jolla (Brandt's Cormorant, Western Gull). Many other birds are visitors to these locations which are along the Pacific Flyway. Snowy Plovers have been sighted at Agua Hedionda Lagoon/Beach, South Carlsbad Beach, Batiquitos Lagoon, San Elijo Lagoon Beach, San Dieguito Lagoon/Beach, Los Peñasquitos Lagoon/Beach, Mission Bay (Bonita Cove, Fiesta Island), South Mission Beach, Ocean Beach, NAS North Island, NAB Coronado/Silver Strand State Beach, NAB Delta Beach Bay, South San Diego Bay Marine Biological Study Area, Western Salt Company, Tijuana River Beach, Sweetwater National Wildlife Refuge. Each estuarine habitat listed above also provides essential food for many bird species—some of which are species of special concern—including shorebirds, diving birds, waterfowl, and even raptors. These birds may be nesting, resident, migratory, or wintering; their food in these habitats includes various invertebrates, larvae, worms, etc, as well as juvenile fishes and smaller birds.

Marine Mammal Rookeries: Harbor seals at Children's Pool (Casa Beach) and Point Loma Cave, California sea lions use the cave next to Goldfish Point.

Marine Mammal Haulouts: Harbor seals haul out at Children's Pool, Seal Rock, Point La Jolla Reef, Zuniga Jetty, Point Loma caves, and the Hotel Del Coronado Jetty. California sea lions haul out along La Jolla Point, in La Jolla Cove, Goldfish Point and adjoining cave, at Point Loma (and north of the Point Loma Wastewater Treatment Plant) and Zuniga Jetty, in addition to navigation buoys, docks, boats and bait facilities (San Diego and Mission Bay bait barges).

Other Areas for Marine Mammals: Harbor seals forage around their rookeries. Harbor seals and sea lions also forage around recreational fishing vessels and in the kelp forests throughout the subregion. They are commonly found in Mission Bay and San Diego Bay. Harbor seals forage in Point Loma Kelp Beds and along the inside of Point Loma under Cabrillo National Monument. Sea lions forage on outside edge of both Point Loma and La Jolla Kelp Beds and in La Jolla Canyon. Coastal bottlenose dolphins forage along surf line from SIO Pier north to Del Mar. Pacific whiteside dolphins forage along coast from 20 to 40 fathoms during winter months. Common dolphins forage from 30 to 100 fathoms much of the year. Risso's dolphins are occasionally seen offshore when squid is present. Gray whales migrate through the Subregion on their way south to their breeding bays in Mexico, including through kelp forests. Historically they bred in San Diego Bay as well.

Other Marine Life: "Clam bed" spawning areas are located off Imperial Beach. Imperial Beach is also an area of seasonal abundance of juvenile thresher sharks. There is a leopard shark aggregation site at La Jolla.

A.5.2 Land-Sea Interactions

Coastal watersheds: Carlsbad, San Dieguito, Los Peñasquitos, San Diego, Sweetwater, Pueblo San Diego Bay, Otay, Tijuana

Major rivers: Escondido Creek, San Dieguito River, San Diego River, Sweetwater River, Otay River, Tijuana River

Anadromous fish streams: None

Hardened shoreline: Mission Bay and San Diego Bay have extensive hardened shoreline. There is also hardened shoreline at Encinitas, Solana Beach, La Jolla and Point Loma. There is patchy hardened shoreline between Mission Bay and the Point Loma Peninsula, particularly along cliffs below residential areas.

Key impaired water bodies: Batiquitos Lagoon, San Elijo Lagoon, San Dieguito Lagoon, Los Peñasquitos Lagoon, back corners of Mission Bay, San Diego Bay, Sweetwater Marsh, the Tijuana Estuary, and other smaller estuaries and lagoons. Shelter Island Yacht Harbor (high copper load in sediments), Chollas Creek area (high E.Coli counts), East Mission Bay near Hilton Hotel (elevated E.coli, low oxygen); Children’s Pool (High fecal coliform from hauled-out Harbor Seals). Tijuana River: during large rainstorms the treatment plant for outfall from Tijuana is commonly overrun and the river is contaminated and the beaches north and south are closed. Also: Agua Hedionda Lagoon (coliform, sediment/silt); Los Peñasquitos Lagoon (sediment/silt); Mission Bay (eutrophic, Pb, coliform); San Diego Bay (Cu, sediment toxicity, Zn, PAHs, PCBs, coliform); San Elijo Lagoon (eutrophic, coliform, sediment/silt); Santa Margarita Lagoon (eutrophic); Tijuana River Estuary (eutrophic, coliform, Pb, Low DO, Ni, pesticides, thallium, trash, turbidity).

Major point sources: San Elijo WPCF (treated sanitary wastewater), Point Loma Ocean Outfall (treated sanitary wastewater), South Bay Wastewater Treatment Plant (treated sanitary wastewater), Scripps Institution of Oceanography (marine lab and public aquarium waste seawater). Carlsbad (treated sewage outfall pipeline). At Imperial Beach, the Tijuana sewage outfall spills out into 90 feet of water above the border and has visible discharge.

Other issues: Nonpoint source pollution. A recent court case allows the city of San Diego to dredge the area around Casa Beach (Children’s Pool, built in 1931 as a safe place for children to swim). Seal fecal matter and lack of water flow have rendered this area unsafe for swimming.

A.5.3 Socioeconomic Setting

Counties: San Diego

Coastal towns/ports/harbors: Leucadia, Encinitas, Cardiff-by-the-Sea, Solana Beach, Del Mar, La Jolla, Mission Beach, Pacific Beach, Ocean Beach, San Diego, National City, Chula Vista, Coronado, Imperial Beach. The San Diego County ports include San Diego, Mission Bay, Point Loma (Commercial Basin) and Glorietta Bay Marina.

Public access areas, boat ramps, piers, etc: South Carlsbad State Beach (surfing, fishing, diving), Grandview Beach (surfing), Beacon’s Beach (surfing, fishing), Encinitas Beach (surfing, fishing), Stone Steps Beach (surfing, fishing), Moonlight Beach (swimming, surfing), Swami’s (beach, surfing, fishing), San Elijo State Beach (surfing, campground, fishing), Cardiff State Beach (surfing, fishing), Tide Beach Park (surfing, fishing), Fletcher Cove Park (surfing, fishing, beach), stairway to beach at Seascape Surf and Del Mar Shores Terrace (surfing, fishing), Del Mar City Beach (surfing, fishing), Del Mar Bluffs City Park (surfing, beach, fishing), Torrey Pines State Beach (surfing, fishing), Black’s Beach (fishing), Scripps Beach and Tidepools (surfing), La Jolla Shores Beach-Kellogg Park (surfing, swimming, fishing, boat/kayak launch, scuba diving), walkway to beach at La Jolla Bay, La Jolla Cove (beach, surfing, swimming, fishing), Ellen Scripps Park (rocky shore, surfing), Children’s Pool Beach, Coast Boulevard Park (beach access), Nicholson Point Park (beach access, surfing, fishing), Marine Street Beach (surfing, fishing), Dunemere (surfing), Little Point (surfing) Windansea Beach (Historic Surf Culture site), Big Rock (surfing), La Jolla Strand Park (surfing, beach), Hermosa Terrace Park (beach, surfing, fishing), Bird Rock (surfing, tidepools, fishing), Sun Gold Point (surfing, fishing, sheltered rocky beach), Tourmaline Surfing Park (surfing, fishing), Pacific Beach Park (surfing, fishing), PB Pier (surfing), Mission Beach Park (surfing, swimming, fishing), Bonita Cove (swimming, fishing), Ventura Cove (beach), Santa Cara Point and El Carmel Point (boat launch/fishing), Dana Landing and Quivira Basin (boat launch/fishing), Fiesta Island (fishing, beach), East Shore (fishing, beach), De Anza Cove (fishing, beach), Sail Bay (beach), Riviera Shores (beach), Crown Point Shores (beach), Mission Jetties (surfing, swimming), Ski Beach, Dog Beach (surfing), Ocean Beach Park (surfing, fishing), Ocean Beach Municipal Fishing Pier (surfing), Ocean Beach City Beach (surfing), Sunset Cliffs Park (beach access, surfing), San Diego Bay entrance

Ralph's (surfing, fishing), Shelter Island (beach, fishing), Shelter Island municipal pier, Cabrillo National Monument (tidepools), Spanish Landing Park (beach, fishing), Harbor Island (fishing), Broadway Pier, G Street Pier (fishing), Embarcadero Marina Park (fishing), Coronado Tidelands Regional Park (beach, kayak access), Centennial Park (fishing), Glorietta Bay Park (boat launch, beach), Coronado City Beach (surfing, fishing), Coronado Shores Beach (surfing, fishing), L.M. "Pep" Pepper Park (public ramp, fishing), Chula Vista Launching Ramp (fishing), Silver Strand State Beach (campground, surfing, fishing), Imperial Beach (surfing, fishing), Imperial Beach Pier (fishing, surfing), Border Field State Park (beach, Tijuana Sloughs surfing culture heritage site, fishing).

Commercial fisheries: Important fisheries include market squid; tuna; sea urchin; swordfish; spiny lobster; Pacific sardine; sharks, skates, and rays (excluding white and angel sharks); rock crabs; anchovy; Pacific hagfish; white seabass; thornyhead and sablefish; spot prawn; California halibut; barracuda; spotted sand bass; California sheephead; clams; and various surf-fishing species. There is hook-and-line fishing for barracuda, yellowtail, Pacific Bonito, Pacific Mackerel, and white seabass. Every area in this subregion is important to someone or some group. Areas important for hook-and-line barracuda fishing include the outside edge of Point Loma and La Jolla Point and Point Loma Kelp Beds as well as the 30-fathom curve from Point Loma, and Torrey Pines during barracuda migrations. In addition to fish, scuba divers consume spiny lobster, crabs, and scallops. Important areas for groundfish include a Ling Cod fishery in the Elk kelp at south La Jolla and along the coast from Mission Bay to the Sea Buoy at San Diego Bay entrance. Cabezon are taken along the surf line along Point Loma and scorpionfish (sculpin) are caught at Imperial Beach. There are live bait suppliers in this subregion also. For the small boat fleet, La Jolla and Point Loma kelp are the closest, most economical, and safest productive areas from Mission and San Diego Bays.

Consumptive recreational use: Major recreational fisheries occurring in subregion 5 include kelp bass, barred sandbass, California sheephead, barracuda, bonito, white seabass, whitefish halibut, rockfish, scorpionfish, yellowtail, spiny lobster and lingcod. Important areas include the 15-fathom line off Imperial Beach for barred sandbass and barracuda; Point Loma for kelp bass, barracuda, and bonito; 10-17 fathoms from San Diego #1 to kelp off Mission Bay Jetties; Point La Jolla 12 to 17 fathoms from off Crystal Pier to La Jolla Cove; North Point La Jolla area is important as the only dependable area along the mainland coast for white sea bass and yellowtail. There is also an active small-boat, light-tackle fishery in Mission Bay and Outer San Diego Bay for spotted sand bass, barred sand bass, halibut, mackerel, shortfin corvina, bonito and barracuda. And a winter small boat light tackle fishery in the back part of San Diego Bay for halibut, bonito, jacksmelt, mackerel, yellowfin croaker, and spotted sand bass. For CPFV, La Jolla and Point Loma kelp are the closest, most economical and safest productive areas from Mission and San Diego Bays. La Jolla offers kayakers the safest ocean launch conditions in the region. Most recreational fishing in the kelp beds is done during the summer months for yellowtail, barracuda, bonito, and kelp bass.

Non-consumptive recreational use (surfing, diving, kayaking, wildlife viewing, beaches, etc): State, county, and city beaches have high attendance rates. Surfing, sailing, diving, tidepooling, and beach going are some of the common non-consumptive activities in the subregion. Shore-based non-consumptive diving occurs along the length of the subregion. Boat-based non-consumptive diving mainly occurs at La Jolla Point, Point Loma, and Wreck Alley, a series of man-made artificial reefs off of Mission Beach. Kayaking occurs at San Diego Bay, Mission Bay, La Jolla Shores, La Jolla Point, and Point Loma. Bird-watching occurs in the estuaries and along accessible beaches. In this subregion, every beach is surfable because there are no islands or peninsulas to block the waves and the coast faces westerly and receives north, west and south swells with equal force. Tidepooling at La Jolla and Point Loma, particularly at the south end Cabrillo National Monument. CPFVs also offer economical ocean access for whale watching, bird watching, scientific groups (SEACAMP – San Diego) and burial-at-sea memorials.

A.5.4 Research and Monitoring

Research institutions: Scripps Institution of Oceanography; NOAA Southwest Fisheries Science Center; University of California, San Diego; San Diego State University, Hubbs/Sea World Research Institute; California State University, San Marcos; Oceanic Research Exploration and Discovery Foundation (ORED).

Existing monitoring sites: CRANE: Cardiff, Encinitas, La Jolla, Point Loma North and Point Loma South.

Intertidal: MARINE Core and PISCO Biodiversity sites at Cardiff Reef, Scripps Reef, Point Loma North and South, and Cabrillo National Monument (3 zones), False Point, La Jolla and Sunset Cliffs.

Reef Check does diver surveys at La Jolla Cove, North Hill Street and Broomtail Reef.

The green sea turtles in San Diego Bay are monitored, as are several bird sites, in particular endangered species, by the U.S. Fish and Wildlife Service. NOAA, Southwest Fisheries monitors white abalone populations. The Tijuana River Estuarine Research Reserve also conducts monitoring. Kelp forest monitoring has been conducted for about 40 years throughout the Point Loma and La Jolla beds by Scripps Institution of Oceanography.

A.5.5 Existing MPAs, Marine Managed Areas, and Coastal Protected Areas

Existing state MPAs: Batiquitos Lagoon SMP, Encinitas SMCA, Cardiff-San Elijo SMCA, San Elijo Lagoon SMP, San Dieguito Lagoon SMP, San Diego-Scripps SMCA, La Jolla SMCA, and Mia J Tegner SMCA.

RCAs and other fishery closures: The Rockfish Conservation Area that restricts recreational fishing from March through December extends seaward from the 60 fathom (110 meter) depth contour throughout the subregion. The Rockfish Conservation Areas that restrict commercial trawl and non-trawl fishing cross into the subregion in several areas. There is an intersection of recreational, trawl, and non-trawl Rockfish Conservation Areas at the study region boundary in the northern portion of subregion 5 that continues south outside the study region boundary.

Other marine managed areas: City Underwater Park (to the east of Point La Jolla, an Area of Biological Significance); San Diego-La Jolla Underwater Park; Scripps Shoreline Underwater Reserve; San Diego-La Jolla Ecological Reserve and Area of Special Biological Significance; and large Restricted Area from Point Loma south and offshore.

Coastal protected areas: Cabrillo National Monument, Torrey Pines State Reserve, Torrey Pines State Reserve Extension, La Jolla Hermosa Park, Calumet Park, North Island Naval Air Station, Naval Amphibious Base Coronado, Naval Base San Diego, South Bay Marine Biological Study Area, Sweetwater Marsh National Wildlife Refuge, and Tijuana River National Estuarine Research Reserve.

A.5.6 Other Issues

Large US Navy and Air Force presence at San Diego with many maneuvers and training exercises may affect MPA placement and levels of protection.

Recreational fishers are willing to comply with reduced daily bag limits and increases in minimum size or they advocate slot limits for some slower growing species, e.g. kelp bass. Only six to seven miles of the subregion are regularly fished by boat-based anglers, the majority of that effort taking

place from June through Labor Day. Seventy-five percent of the income for the Mission Bay half-day fleet is generated during this time, which is also the peak of recreational boat activity in the San Diego area. Economies created by fishing activities, shore- or boat-based, trickle down through the local community in the form of expenditures for bait, fuel, clothing, lodging, maintenance, repairs, food etc. Pelagic species (yellowtail, barracuda and bonito), kelp bass and barred sand bass are the favored fisheries during the spring-to-summer season for boat-based anglers. Surf and bay fishing is done year-round for spotted bass, halibut, and various perch species.

La Jolla and Point Loma kelp beds are critical access areas due to their proximity to Mission Bay and San Diego Bay. Other available areas may be six or more miles' travel distance, resulting in less fishing time for some and increased travel costs (fuel/oil consumption).

Heated water from Chula Vista Power Plant in south San Diego Bay may provide refuge for green turtles and sub-tropical/tropical fishes during colder winter months.

A.6 Northern Channel Islands (Subregion 6)

Subregion 6 covers 645.22 square miles and 190.8 miles of coastline divided between San Miguel, Santa Rosa, Santa Cruz, and Anacapa Islands. The islands face the mainland to the north and are oriented east-west. Anacapa Island is closest to the mainland at a distance of about 11 miles. Prominent coastal features include: on San Miguel Island: Point Bennett, Tyler Bight, Crook Point, Cardwell Point, Prince Island, Cuyler Harbor, Wilson Rock, Castle Rock and Harris Point; on Santa Rosa Island: Sandy Point, Cluster Point, South Point, Johnsons Lee, East Point, Skunk Point, Bechers Bay, Carrington Point, Talcott Shoal, and Brockway Point; on Santa Cruz Island: West Point, Fraser Point, Forney's Cove, Black Point, Kinton Point, Morse Point, Puente Arena, Gull Island, Laguna Harbor, Bowen Point, Sandstone Point, Smugglers Cove, San Pedro Point, Scorpion Anchorage, Coche Point, Chinese Harbor, Prisoners' Harbor, Pelican Bay, Diablo Point, Profile Point, Painted Cave, and Arch Rocks; on the three islets (West, Middle, and East Anacapa) that make up Anacapa Island: Cat Rock, East Fish Camp, Arch Rock, Cathedral Cove, and Frenchy's Cove.

A.6.1 Ecological Setting

Shoreline: Mostly rocky shoreline backed by cliffs, some rocky-to-sandy beaches, and sandy beaches in coves. Shore substrate composition: San Miguel Island: 64% bedrock, 0% boulder, 36% sand; Santa Rosa Island: 62% bedrock, 5% boulder, 33% sand; Santa Cruz Island: 66% bedrock, 15% boulder, 19% sand; Anacapa Island: 70% bedrock, 15% boulder, 15% sand. There are 130 seacaves on Anacapa Island and many also on Santa Cruz Island, including well-known Painted Cave.

Estuaries: A coastal lagoon is located on the east side of Santa Rosa Island. Another small tidal impoundment occurs at the eastern end of San Miguel Island near Starlight Rock.

Seagrass: Surfgrass is known to occur around all four islands, on many rocky reefs and rock outcrops on sand at the zero-to-five-meter depth range. The northwestern and northeastern sides of Santa Cruz Island do not have surf grass, and neither does the western point of San Miguel Island. Outer coast eelgrass locations have been identified (none at San Miguel Island), but incompletely mapped, including Beecher's Bay, East End, Skunk Point, and Johnson's Lee areas of Santa Rosa Island; Forney Cove, Prisoners' Harbor, Canada del Agua, Scorpion Cove, Little Scorpion, and Smugglers Cove areas of Santa Cruz Island; and Frenchy's Cove to Middle Anacapa at Anacapa Island. Forests of giant kelp (*Macrocystis*) occur on most rock reefs at about 6-23 meter depths around all four islands, except where sea urchins have overgrazed the kelp.

Kelp: San Miguel Island has extensive persistent kelp beds around it, especially all along the south side, around north of Point Bennett and up around to Harris Point, at Castle Rock, off Crook Point, and around Cuyler Harbor. The western half of Santa Rosa Island is surrounded by large extensive kelp beds. There are also substantial kelp beds from South Point east past Ford Point, and in Beecher's Bay, and off Skunk Point. Santa Cruz and Anacapa Islands have generally narrower surrounding depth shelves suitable for giant kelp than Santa Rosa and San Miguel Islands. The steeply sloping north side of Santa Cruz Island results in mostly thin bands of kelp along shore. Kelp forests are larger along the south side, with substantial beds in areas around Sandstone Point, Gull Island to Kinton Point, and Frazer Point. Fraser Point, Morse Point, and at and to the west of Sandstone Point are kelp beds on Santa Cruz Island. There is also a kelp bed from Point Arena to Gull Island and at Yellow Banks on Santa Cruz Island, and smaller kelp beds are persistent around the island. Rock reefs along eastern portion of Santa Cruz Island as well as most of Anacapa Island have been largely overgrazed by sea urchins during the past two decades, resulting in relatively few persistent kelp beds. The south side of Anacapa Island has more suitable shelf to support kelp (when urchins are not overgrazing) than the north side. Bull kelp (*Nereocystis*) occurs at only one location at the Channel Islands – at the west end of San Miguel Island (its southern distributional range limit). Deepwater elk kelp (*Pelagophycus*) has been found in only one area of the northern Islands: offshore of Yellowbanks, along the outside edge of the giant kelp forest.

Rock/Sand Bottom: The northern Channel Islands are largely ringed with hard substrate, with the most extensive reefs extending into deep water at Anacapa Island, the east and west ends of Santa Cruz Island, and the western portions of Santa Rosa and San Miguel. The majority of the subregion is soft substrate. There is a submarine canyon to the south of San Miguel/Santa Rosa Islands and between Santa Rosa and Santa Cruz islands. Large, relatively shallow-water reefs are found off the west end of San Miguel Island, at Talcott Shoal on the north side of Santa Rosa Island and off Yellowbanks at the southeast end of Santa Cruz Island. San Miguel Island has numerous submerged pinnacles with others off Santa Rosa Island. Notable offshore islets, rocks and pinnacles/reefs include Richardson Rock, Castle Rock, Westcott Shoal, Oil Spring, Wilson Rock and Prince Island at San Miguel Island; Bee Rock, Talcott Shoal, Rodes Reef, and pinnacles off East Point at Santa Rosa Island; Gull Island and Scorpion Rock off Santa Cruz Island; and Cat Rock and Arch Rock off Anacapa Island in its vicinity, especially off its northwestern coastline.

Depth Zones: Over half the study area is soft substrate at 30 to 100 meters' depth, hard substrate occurs from zero to thirty meters around the islands.

Oceanographic Habitats: San Miguel, Santa Rosa, and the western portion of Santa Cruz islands are bathed in the cooler, nutrient-rich waters of the California Current and are more characteristic of the Oregonian biogeographic province. The east portion of Santa Cruz and Anacapa islands are bathed in warmer waters of the California Countercurrent.

Grunion Spawning Beaches: Grunion spawning areas are not well known, but grunion eggs have been found at Smuggler's Cove, Pozo Beach, Prisoners' Harbor and Christy Beach on Santa Cruz Island and Beecher's Bay on Santa Rosa Island.

Seabird Colonies: San Miguel Island: Point Bennett (Brandt's Cormorant, Pelagic Cormorant, Western Gull, Cassin's Auklet, Snowy Plover), Harris Point to Cuyler Harbor (Brandt's Cormorant, Pelagic Cormorant, Western Gull, Pigeon Guillemot), Prince Island (Leach's Storm-Petrel, Ashy Storm-Petrel, Double-crested Cormorant, Brandt's Cormorant, Pelagic Cormorant, Black Oystercatcher, Western Gull, Pigeon Guillemot, Xantus's' Murrelet, Cassin's Auklet), and Castle Rock (Ashy Storm-Petrel, Brandt's Cormorant, Pelagic Cormorant, Black Oystercatcher, Western Gull, Pigeon Guillemot, Cassin's Auklet). Santa Rosa Island: Carrington Point (Brandt's Cormorant, Pelagic Cormorant, Western Gull, Cassin's Auklet), off Brockway Point (Brandt's Cormorant, Pelagic Cormorant, Black Oystercatcher, Western Gull, Pigeon Guillemot), Skunk Point (Black Oystercatcher, Royal Tern, Black-bellied Plover, Sanderling, Snowy Plover). Santa Cruz Island:

Scorpion Rock (Ashy Storm-Petrel, Black Oystercatcher, Western Gull, Pigeon Guillemot, Cassin's Auklet), Coche Point (Western Gull), Spit Rock (Ashy Storm-Petrel, Black Oystercatcher, Cassin's Auklet), west of Morse Point (Ashy Storm-petrel, Brandt's Cormorant, Pelagic Cormorant, Western Gull) and Gull Island (Ashy Storm-Petrel, Brandt's Cormorant, Black Oystercatcher, Western Gull, Xantus's Murrelet, Cassin's Auklet). Anacapa Island: West Anacapa (Brown Pelican, Double-crested Cormorant, Pigeon Guillemot), Middle Anacapa (Brandt's Cormorant, Pelagic Cormorant, Western Gull), and East Anacapa (Western Gull). There are breeding pairs of America Bald Eagles on Santa Cruz Island. Each habitat listed above also provides essential food for many bird species—some of which are species of special concern—including shorebirds, diving birds, waterfowl, and even raptors. These birds may be nesting, resident, migratory, or wintering; their food in these habitats includes various invertebrates, larvae, worms, etc, as well as juvenile fishes and smaller birds.

Marine Mammal Rookeries: San Miguel Island: west of Simonton Cove (California sea lion), east of Castle Rock (California sea lion, Northern elephant seal), south and southeast of Castle Rock (Northern elephant seal), Castle Rock (California sea lion, Northern fur seal), Point Bennett area (California sea lion, Northern elephant seal, Northern fur seal), Ferrelo Point to Tyler Bight (California sea lion, Northern elephant seal), southern shoreline between Tyler Bight and Cardwell Point (Northern elephant seal), northeast of Crook Point (California sea lion), Cardwell Point (California sea lion, Northern elephant seal), northwest of Bay Point (Northern elephant seal), Cuyler Harbor (Northern elephant seal), just south of Harris Point (California sea lion, Northern elephant seal), East and West Simonton Cove (Northern elephant seal). Santa Rosa Island: Northern elephant seals at Sandy Point, east of Sandy Point, southwest of Brockway Point, and between Sandy Point and South Point. Santa Cruz Island: Gull Island (California sea lion). Anacapa Island: south shoreline of East Anacapa (California sea lion).

Marine Mammal Haulouts: Guadalupe fur seals haul out at Peterson Cove on San Miguel Island. Harbor seals, Northern elephant seals, Northern fur seals, and California sea lions haul out on the entire San Miguel Island. Harbor seals and Northern elephant seals haul out at and around South Point, Brockway Point, Sandy Point, East Point, Ford Point, Cluster Point, Carrington Point, Corral Point, and between Sandy Point and South Point on Santa Rosa Island. California sea lions haul out at and around South Point and between Cluster Point and South Point. California sea lions haul out at Gull Island at Santa Cruz Island. Also on Santa Cruz Island, harbor seals haul out at and around West Point, Arch Rock, Profile Point, Fraser Point, West Point, Black Point, Kinton Point, San Pedro Point, Sandstone Point, Bowen Point, Coche Point, Prisoners Harbor, Diablo Point, Gull Island, Ladys Harbor, Laguna Harbor, Platts Harbor, Smugglers Cove, Posa Anchorage, Twin Harbors, Valley Anchorage, Puente Arena, between Chinese Harbor and Prisoners Harbor, between Morse Point and Laguna Harbor, and between Twin Harbors and Platts Harbor. California harbor seals haul out on the south shoreline of East Anacapa Island. Harbor seals haul out on the south shore of Middle and West Anacapa Island, east and southwest of Cat Rock Point, and north and northeast on West Anacapa Island.

Other Areas for Marine Mammals: Blue whales, humpback whales and gray whales enter the study region following migration routes between warm southern waters and cold northern waters, and can be seen from the Channel Islands, along with dolphins. Harbor seals forage around their rookeries. Dolphins, particularly Risso's dolphins, can be found inshore especially at Santa Cruz and Santa Rosa Islands when squid are spawning.

Other Marine Life: In southern California, white sharks have been caught offshore of islands with pinniped rookeries, and females may come to the islands offshore of southern California to give birth.

A.6.2 Land-Sea Interactions

Coastal watersheds: Each island is a watershed.

Major rivers: none

Anadromous fish streams: none

Hardened shoreline: none

Key impaired water bodies: none

Major point sources: none

Other issues: Oil seeps north of Anacapa Island and near Chinese Harbor on Santa Cruz Island.

A.6.3 Socioeconomic Setting

Counties: Santa Barbara, Ventura

Coastal towns/ports/harbors: None

Public access areas, boat ramps, piers, etc: Cuyler Harbor on San Miguel Island (landing, campground, beach), Beecher's Bay on Santa Rosa Island (landing, campground, beach), no permit needed east of property line between Prisoners Harbor and Valley Anchorage on Santa Cruz Island (8 anchorages, 2 campgrounds, beaches), East Anacapa landing cove (campground), and Frenchy's Cove (landing, beach) on West Anacapa.

Commercial fisheries: Some of the major commercial fisheries are mackerel and anchovy, California sheephead, white seabass, Pacific bonito, nearshore rockfish, sea cucumbers, spiny lobster, market squid, red urchin, and spot prawn. Live fish fishery for nearshore spp. halibut, white seabass, sharks. Also CPFV fishery for finfish, predominantly rockfishes by number. Important areas include all rocky bottom areas, squid spawning beds, and sandy embayments.

Consumptive recreational use: Major recreational fisheries occurring in subregion 6 include kelp bass, ocean whitefish, California sheephead, rockfish, lingcod, halibut, California scorpionfish, white seabass, spiny lobster, barracuda, and calico bass. Also, the south side of Anacapa Island for yellowtail. Other important areas include all rocky bottom areas, squid spawning beds, and sandy embayments. Not important are submarine canyons.

Non-consumptive recreational use (diving, kayaking, wildlife viewing, beaches, etc): Important areas include the north side of Santa Cruz and Anacapa for diving and kayakers. Each island has a campground, and there is wildlife viewing around the islands. Scuba diving from private and commercial party boats focuses on kelp reefs around all four islands, but most diving occurs at Anacapa and Santa Cruz islands due to proximity to mainland and milder weather/sea conditions. Whale watching cruises around the islands and in the channel between the islands and the mainland are popular. Whale watch vessels, much diving, kayaking, and sailing are associated with at least some level of fishing and recreational harvest of renewable resources.

A.6.4 Research and Monitoring

Research institutions: none

Existing monitoring sites: CRANE sites: East Isle, Middle Isle, West Isle, Cat Rock, and Southwest lighthouse on Anacapa Island; Crook Point, Cuyler, Harris Point, and Tyler Bight on San Miguel Island; Cache Point, Forney, Gull Isle, Hazards, Painted Cave, Pelican, Scorpion, Valley, and Yellowbanks on Santa Cruz Island; Beacon Reef, Bee Rock, Chickasaw, Cluster Point, Johnsons Lee, Jolla Vieja, Monacos, and Rodes Reef on Santa Rosa Island.

MARINE has a biodiversity monitoring site at Valley on Santa Cruz Island, and core survey sites at Otter Harbor, Harris Point, Orizaba Cove, Scorpion Rock and Middle East Anacapa Island. MARINE has core survey/biodiversity monitoring sites at Cuyler Harbor and Crook Point on San Miguel Island; NW Talcott, Fossil Reef, Johnson's Lee, Ford Point, and East Point on Santa Rosa Island; Prisoners' Harbor, Fraser Cove, Forney Cove, Trailer and Willows Anchorage on Santa Cruz Island; and Cat Rock, Frenchy's Cove and Middle West Anacapa Island.

PISCO has subtidal monitoring sites at Cathedral Cove, Landing Cove, Middle Isle and West Isle on Anacapa Island; Prince Island (north and south), Crook Point (east and west), Cuyler (east side and west side) and Hare Rock on San Miguel Island; Carrington (central, east and west) on Santa Rosa Island; Forney, Hazards, Painted Cave (east, west, and central) and Pelican Bay on Santa Cruz Island.

PISCO has annual intertidal monitoring sites at NW Talcott, Johnson's Lee, Fossil Reef, East Point and Ford Point on Santa Rosa Island; Cuyler Harbor and Crook Point on San Miguel Island; Cat Rock, Frenchy's Cove and Middle Anacapa Island; Prisoners', Fraser, Forney, Blue Gum on Santa Cruz Island.

PISCO has additional moored monitoring sites at South Anacapa, Carrington, Hazards, Hazards-West, Landing Cove, Morse Point, Pelican Bay, San Miguel Island Bay, San Miguel Island north and south, Scorpion, South Point and Smugglers.

Reef Check does diver surveys at Cathedral Cove, East Point, Elk Ridge, Judith Reserve, Pelican Anchorage and Tyler Bight.

There are 27 KFM monitoring sites on the four islands. Seabird and pinniped monitoring occurs at various sites on all islands. Sand Beach and snowy plover monitoring on 9 beaches at Santa Rosa Island.

A.6.5 Existing MPAs, Marine Managed Areas, and Coastal Protected Areas

Existing state MPAs: Richardson Rock SMR, Judith Rock SMR, Harris Point SMR, South Point SMR, Carrington Point SMR, Skunk Point SMR, Painted Cave SMCA, Gull Island SMR, Scorpion SMR, Footprint SMR, Anacapa Island SMCA, Anacapa Island SMR.

RCAs and other fishery closures: The Rockfish Conservation Area that restricts recreational fishing from March through December extends seaward from the 60 fathom (110 meter) depth contour throughout the subregion. The Rockfish Conservation Areas that restrict commercial trawl and non-trawl fishing circle the islands. There is an intersect of recreational, trawl, and non-trawl RCAs surrounding these four islands.

Other marine managed areas: San Miguel Island Special Closure, Anacapa Island Special Closure, Channel Islands National Marine Sanctuary (six nautical miles off the coast of each island). The entire region is included in Area of Special Biological Significance.

Coastal protected areas: Channel Islands National Park includes all four islands in subregion 6. The Nature Conservancy owns 76% of Santa Cruz Island.

A.6.6 Other Issues

To be determined.

A.7 Southern Channel Islands (Subregion 7)

Subregion 7 covers 642.4 mi² and 162.6 miles of coastline divided between Santa Barbara, Santa Catalina, San Nicolas, and San Clemente islands. Prominent coastal features include: Webster Point, Sutil Island, Arch Point, and Shag Rock on Santa Barbara Island; Lands End, Lobster Point, Two Harbors Isthmus, China Point, Salta Verde Point, Seal Rocks, White Cove, Long Point, Isthmus Cove, Lover's Cove, Avalon Harbor, Casino Point, Lion Head, and Arrow Point on Santa Catalina Island; Dutch Harbor and Begg Rock off San Nicolas Island; Castle Rock, West Cove, Seal Cove, China Point, Pyramid Cove, Pyramid Head, Wilson Cove, and Northwest Harbor on San Clemente Island.

A.7.1 Ecological Setting

Shoreline: Predominantly bedrock or boulder beaches, with sandy beaches in coves. Beaches typically narrow, backed by steep or moderate sloping cliffs. Shore substrate composition: Santa Catalina Island 35% bedrock, 50% boulder, 15% sand; Santa Barbara Island 74% bedrock, 22% boulder, 4% sand; San Nicolas Island 61% bedrock, 5% boulder, 35% sand; and San Clemente Island 69% bedrock, 17% boulder, 14% sand. Numerous and various-sized coves located around the islands, particularly at Santa Catalina and San Clemente Islands, have larger portions of sand than the other Channel Islands (Littler and Littler 1979). San Nicolas and Santa Barbara Islands are mostly rocky.

Estuaries: Catalina Harbor (offshore salt marsh; this is the only fiddler crab habitat on the Channel Islands).

Seagrass: Surfgrass occurs around all four islands, on many rocky reefs and rock outcrops on sand at zero-to-five-meter depth range. Outer coast eelgrass locations have been identified (none at Santa Barbara Island), but incompletely mapped, including Catalina Harbor, 10 lee side coves, East End, and Palisades area (largest bed on Channel Islands) at Santa Catalina Island; Coast Guard Beach at San Nicolas Island; Northeast Airstrip, Wilson Cove, South of NOSC Pier, White Rock/Bryce Canyon, and Fish Hook Cove at San Clemente Island.

Kelp: Persistent forests of giant kelp (*Macrocystis*) occur on most rock reefs at about 6-25 meter depths around all four islands, except where sea urchins have overgrazed the kelp. Narrow band of persistent kelp canopy occur around Santa Catalina Island, with canopy much reduced during warm-water periods. Similar situation on lee side of San Clemente Island, but more extensive kelp reefs on windward side and at both ends. Santa Barbara Island is surrounded by offshore reefs that support kelp, but the kelp forests have been largely overgrazed by sea urchins during the past two decades. Extensive persistent kelp canopy surrounds San Nicolas Island, particularly on the northwestern portions and at its southeastern edge. Deepwater elk kelp (*Pelagophycus*) occurs at all four islands. The tall morph that attaches to rock reef (along the outside edge of the giant kelp forest) occurs on the windward side of San Clemente, at several locations at Santa Barbara Island, and from a single known record at the southeast end of San Nicolas Island. The short, soft-bottom morph occurs along the lee sides of Santa Catalina and San Clemente Islands.

Rock/Sand Bottom: A submarine canyon lies off the west side of Santa Catalina Island. The deepest point in the study region lies off the northwest corner of San Clemente Island. Large, relatively shallow-water reefs are found off Santa Barbara Island and especially off San Nicolas

Island. Notable offshore islets, rocks, and pinnacles/reefs include Farnsworth Bank, Eagle Rock, Indian Rock, Eagle Reef, Ship Rock, Bird Rock, Isthmus Reef, and Church Rock at Santa Catalina Island; Sutil Island, Shag Rock, Arch Reef, and pinnacles/reefs off Webster Point, Arch Point, and South End at Santa Barbara Island; Begg Rock and reefs/pinnacles off northwest end, southeast end, and northeast side at San Nicolas Island; and Castle Rock, Nine Fathom Bank, Bird Rock, and rocks/reefs/pinnacles off west side and in Pyramid Cove. A seamount is located off the windward side of Santa Catalina Island, and the Catalina Canyon lies to the north.

Depth Zones: About a third of the area is hard substrate from 30 to 200 meters depth and a quarter of it is soft substrate from 200 to 3000 meters depth. Santa Catalina and San Clemente Islands have very steep bathymetry near their coastlines, with extensive cliff-like submerged topography that descend to deep basins within state waters.

Oceanographic Habitats: Santa Barbara is the peak of a larger submerged bank. San Nicolas is situated on a similar offshore bank. Both islands are mostly rocky and support diverse marine life. Santa Catalina is located between the Santa Monica-San Pedro basin and the Catalina Basin and supports warm-water species. San Clemente has a relatively shallow slope to the west and a much steeper slope to the east, and also supports warm-water species. The deepest point in the study region is located off the northwest corner of San Clemente Island. San Nicolas Island is located between these warm-water sites and cold-water sites, like Santa Barbara Island. Farnsworth Bank is the only completely submerged pinnacle in the study region.

Grunion Spawning Beaches: Avalon Harbor, Cat Harbor, Little Harbor, Ben Weston Beach, Isthmus Cove and Big Fisherman's Cove.

Seabird Colonies: Shag Rock (Western Gull, Xantus's Murrelet), Santa Barbara Island (Ashy Storm-Petrel, Black Storm-Petrel, Brown Pelican, Double-crested Cormorant, Brandt's Cormorant, Pelagic Cormorant, Black Oystercatcher, Western Gull, Pigeon Guillemot, Xantus's Murrelet, Cassin's Auklet), Sutil Island (Ashy Storm-Petrel, Black Storm-Petrel, Double-crested Cormorant, Brandt's Cormorant, Pelagic Cormorant, Black Oystercatcher, Western Gull, Pigeon Guillemot, Xantus's Murrelet, Cassin's Auklet), Bird Rock off Santa Catalina Island (Western Gull), San Nicolas Island (Brandt's Cormorant, Black Oystercatcher, Western Gull), Bird Rock off San Clemente Island (Brandt's Cormorant, Western Gull), and Seal Cove on San Clemente Island (Brandt's Cormorant, Western Gull). There are also breeding pairs of American Bald Eagles on Santa Catalina Island. Each estuarine habitat listed above also provides essential food for many bird species—some of which are species of special concern—including shorebirds, diving birds, waterfowl, and even raptors. These birds may be nesting, resident, migratory, or wintering; their food in these habitats includes various invertebrates, larvae, worms, etc, as well as juvenile fishes and smaller birds.

Marine Mammal Rookeries: China Point (California sea lion), Mail Point (California sea lion, northern elephant seal), Northwest Harbor Islet (California sea lion), Seal Cove (California sea lion), and Tiki (California sea lion) on San Clemente Island; west, southwest, southeast side and southern shoreline of the east side (California sea lion), Webster Point area and south of Webster Point (California sea lion, northern elephant seal), northeast of Elephant Seal Cove (northern elephant seal), north end of the west side (California sea lion, northern elephant seal), Elephant Seal Cove (California sea lion, northern elephant seal), east side of Santa Barbara Island (California sea lion, northern elephant seal); north shoreline (northern elephant seal), south shorelines east of Dutch Harbor (California sea lion, northern elephant seal), south shoreline northwest and southeast of Grenadier Point (California sea lion, northern elephant seal), south Vizcaino Point area and southeast of Vizcaino Point (California sea lion, northern elephant seal) on San Nicolas Island. Harbor seals also breed on all the islands.

Marine Mammal Haulouts: Almost the entire coastline of San Nicolas Island and Santa Barbara Island. Arrow Point, Ben Weston, Bird Rock, China Point, Church Rock, Salta Verde, Seal Rocks,

Ship Rock, and West End on Catalina Island. China Point, Northwest Harbor, and Seal Cove on San Clemente Island.

Other Areas for Marine Mammals: Blue whales, humpback whales and gray whales enter the study region following migration routes between warm southern waters and cold northern waters, and can be seen from the Channel Islands, along with several species of dolphins. Harbor seals forage around their rookeries. Community of sea otters around San Nicolas Island.

Other Marine Life: In southern California, white sharks have been caught offshore of islands with pinniped rookeries, and females may come to the islands offshore of southern California to give birth. There are leopard shark aggregation sites on Santa Catalina Island at Big Fisherman's Cove, Shark Cove, Howland's Landing, and Empire Landing.

A.7.2 Land-Sea Interactions

Coastal watersheds: Each island is a watershed.

Major rivers: None

Anadromous fish streams: None

Hardened shoreline: Avalon Bay and southeast of Avalon, White Cove, Two Harbors on Santa Catalina Island, one location in the eastern section of San Nicolas Island, and two locations in the northeastern section of San Clemente Island.

Key impaired water bodies: Avalon Beach (fecal coliform), Catalina Harbor

Major point sources: Avalon Wastewater Treatment Plant (treated sanitary wastewater), Pebbly Beach Desalination Plant (desalination brine), USC Wrigley Institute Marine Science Center (marine lab waste seawater), San Nicolas Island (desalination brine), San Clemente Island (treated sanitary wastewater) and San Nicolas Island west end (spent uranium).

Other issues: To be determined.

A.7.3 Socioeconomic Setting

Counties: Los Angeles, Ventura

Coastal towns/ports/harbors: Avalon and Two Harbors on Santa Catalina Island.

Public access areas, boat ramps, piers, etc: Santa Barbara Island (campground, beach, ranger's station); Hamilton Cove (pier), Descanso Beach (private, open to public May-September, swimming, kayaking, snorkeling), Avalon Bay (beach, pier/hoist, fishing, scuba, snorkeling, swimming), Crescent Beach (disabled access), Two Harbors Campground, Parson's Landing Campground (beach), Two Harbors (dock, beach, fishing), Catalina Harbor (dock, fishing, snorkeling, kayaking, swimming), Little Harbor Campground (beach), Ben Weston Beach on Santa Catalina Island (swimming, surfing/boogie boarding).

Commercial fisheries: Some of the major commercial fisheries are Pacific sardine, mackerel and anchovy, nearshore rockfishes, California sheephead, cabezon, swordfish, spiny lobster, market squid, red urchin, and spot prawn. Important areas include all areas not already closed to fishing.

Consumptive recreational use: Major recreational fisheries occurring in subregion 7 include kelp bass, rockfish, surfperch, ocean whitefish, white seabass, California sheephead, halibut, yellowtail, scorpionfish, lingcod, barracuda, Pacific bonito, and spiny lobster. Important areas include Italian Gardens, White's Landing, Bird Rock and Ship Rock, Empire Landing, Farnsworth Bank and Eagle Reef around Catalina Island; all around Santa Barbara Island; Seal Cove and the southeast tip of San Clemente Island; and all other areas not already closed to fishing. Fisherman, divers, snorkelers, and other recreational users use every little rocky point to every patch of kelp around Santa Catalina Island.

Non-consumptive recreational use (diving, kayaking, wildlife viewing, beaches, etc.): Santa Catalina Island is a popular diving location, with boat-accessible dive sites around the island and extensive recreational use all along lee side, with activities concentrated around Avalon, Two Harbors, and leased coves. The Avalon Underwater City Park is used heavily by divers and snorkelers. Guided Discoveries, Inc. and Boy Scouts of America own camps on the island. Catalina also supports high levels of recreational kayaking and is a popular sailing destination from the south coast study region mainland. San Nicolas, San Clemente, and Santa Barbara islands all have diving sites around them that are accessible by boat. Access to San Nicolas and San Clemente Islands is often limited by military activities. Santa Barbara Island is part of Channel Islands National Park and Channel Islands National Marine Sanctuary, with visitor and camper access by Park concessionaire boats. Snorkeling, kayaking, sailing and camping are also very popular at sites around the island.

Non-consumptive/consumptive non-recreational use: San Nicolas and San Clemente islands are owned and operated by the U.S. Navy as testing/training facilities.

A.7.4 Research and Monitoring

Research institutions: University of Southern California, Philip K. Wrigley Marine Science Center, and Catalina Island Conservancy on Santa Catalina Island, and Channel Islands National Park on Santa Barbara Island.

Existing monitoring sites: CRANE monitoring sites at Intakes, Isthmus Reef, Little Harbor, Lobster Bay, Catalina Harbor, East Quarry, Johnson's Rocks, Pin Rock, Ripper's Cove, West Kelp, and West Quarry on Santa Catalina Island. CRANE monitoring sites at South Kelp and Arch Point on Santa Barbara Island, Sand Spit and Dutch Harbor on San Nicolas Island, and China Point, Little Flower, and Pyramid Cove on San Clemente Island.

MARINE biodiversity monitoring sites at Thousand Springs and Marker Poles on San Nicolas Island. MARINE core survey/biodiversity monitoring sites Landing Cove and Sea Lion Rookery on Santa Barbara Island and at Bird Rock and Little Harbor on Santa Catalina Island.

PISCO biodiversity monitoring sites at Bird Rock, Blue Cavern Cove, and Howlands Landing. PISCO annual intertidal monitoring sites on San Nicolas Island at Marker Poles, Santa Barbara Island at the Sea Lion Rookery and Landing Cove, and Santa Catalina Island at Bird Rock, Blue Cavern Cove, Howlands Landing, and Little Harbor.

Reef Check diver surveys at Casino Point, Isthmus Reef, Ship Rock and Intake Pipes on Santa Catalina Island.

The U.S. Fish and Wildlife Service monitors sea otters around San Nicolas Island, and the U.S. Navy monitors Snowy Plovers and other seabirds and performs kelp forest monitoring around San Clemente Island. USGS has monitoring sites in intertidal and subtidal areas on San Nicolas Island, and there are KFM sites on Santa Barbara and San Clemente islands.

A.7.5 Existing MPAs, Marine Managed Areas, and Coastal Protected Areas

Existing state MPAs: Santa Barbara Island SMR, Catalina Marine Science Center, Farnsworth Bank SMCA, and Lover's Cove SMCA.

RCAs and other fishery closures: Cowcod Conservation Area overlaps San Nicolas and Santa Barbara Islands. The Rockfish Conservation Area that restricts recreational fishing from March through December extends seaward from the 60 fathom (110 meter) depth contour throughout the subregion. The Rockfish Conservation Areas that restrict commercial trawl and non-trawl fishing circle Santa Catalina and San Clemente islands. There is an intersection of recreational, trawl, and non-trawl Rockfish Conservation Areas around Santa Catalina and San Clemente islands. The shoreward side of Santa Catalina Island is closed to most other forms of commercial fishing, especially lobster (FGC 8258) and purse seine (FGC 8754, 8755).

Other marine managed areas: Arrow Point to Lion Head Special Closure, state waters around Santa Barbara Island are part of the Channel Islands National Marine Sanctuary (to six nautical miles offshore), Avalon City Underwater Park (extends from Lovers Cove east of Avalon to the west side of Hamilton Cove half a mile above Casino Point) on Santa Catalina Island (no take, no boats). The U.S. Navy limits access around San Nicolas and San Clemente islands, including some areas that are permanently closed. Santa Barbara Island Area of Special Biological Significance, San Nicolas Island and Begg Rock Area of Special Biological Significance, San Clemente Island Area of Special Biological Significance, Santa Catalina Island Area of Special Biological Significance (4 Subareas). The City of Avalon on Catalina Island also has a marine reserve that extends from Ring Rock east of Avalon Harbor to the east Break wall.

Coastal protected areas: Santa Barbara Island (part of Channel Islands National Park); San Nicolas Island; and San Clemente Island.

A.7.6 Other Issues

To be determined.

Appendix B. Spatial Data Layers Currently Available

This appendix contains information about the spatial data layers currently available, including extent, source, resolution, and a brief description of each layer.

How to Read the Table of Data Layers

There are data layers of the following types (presented in this order):

- Base
- Bathymetry
- Biology
- Charts
- Consumptive Use
- Cultural
- Habitat
- Management
- Non-consumptive Use
- Physical

“N” before the Layer Name indicates that this layer is not available for the South Coast Study Region. The data layer has been made available because it covers other California waters (See the Extent column). All layers without an “N” include the South Coast Study Region.

The Extent column indicates which California state waters are represented by the data layer.

- S stands for all California state waters.
- C stands for the Central Coast Study Region.
- N stands for the North Central Coast Study Region.

The Metadata and Resolution column tells more about the data layer:

- Y means that metadata is available with the data layer.
- N means that metadata is not available with the data layer.
- H means high resolution data
- M means medium resolution data
- L means low resolution data

The Source column indicates the source of the data, if it is known. The following acronyms and abbreviations are used in the Source column.

BLM:	U.S. Bureau of Land Management	MLML:	Moss Landing Marine Lab
CCC:	California Coastal Conservancy	NBA:	NOAA Biogeographic Assessment
Census:	U.S. Census Bureau	NMS:	National Marine Sanctuary - biogeographic data assessment
CFIS:	California Fisheries Information System	NOAA:	National Oceanic and Atmospheric Administration
CIWM:	Cal Interagency Watershed Mapping	PFMC:	Pacific Fishery Management Council
COS:	CSUMB - SRML & Ocean Imaging Multispectral & SANDAG & USGS	PSMFC:	Pacific States Marine Fisheries Commission
DFG:	California Department of Fish and Game	SWRCB:	State Water Resources Control Board
EFH:	essential fish habitat	Tenera:	Tenera, Inc.
GI:	GreenInfo	TNC:	The Nature Conservancy
GNIS:	U.S. Geographic Names Information System Locales	UCSB:	University of California, Santa Barbara
GS/N:L	U.S. Geological Survey & National Land Cover Data	USFWS:	U.S. Fish and Wildlife Service

Init.: Marine Life Protection Act Initiative

USGS: U.S. Geological Survey

KFAC: Kayak Fishing Association of California

Base Data

Layer Name	Description	Extent	Metadata &	
			Resolution	Source
California Coastline	Detailed coastline of California	SCN	Y-H	DFG
Geographic Names of California	U.S. Geographic Names Information System Locales	SCN	Y-H	GNIS
California Roads	TIGER Roads for California	SCN	Y-H	Census
MLPA Study Regions	Boundaries of State MLPA Study Regions	SCN	Y-H	DFG
South Coast Subregions	Boundaries of State MLPA South Coast Study Subregions		Y-H	DFG
Imagery	Various satellite imagery with resolution to .5 meters	SCN	Y-H	Varies
Data Type:	Bathymetry			
Depth Contours in Fathoms	10, 20, 30, 40, 50, 100, & 200 fathom contours	SCN	Y-L	DFG
Depth Contours 10m intervals	10 meter interval contours (10 - 600)	SCN	Y-L	DFG
Depth Contours 100m intervals	100 meter interval contours (100 - 4800)	SCN	Y-L	DFG
Depth Contours 30-100-200m intervals	30, 100, & 200 meter contours	SCN	Y-L	DFG
Depth Contours 30-50-100-200m intervals	30, 50, 100 & 200 fathom contours	SCN	Y-L	DFG
Bathymetric Imagery	Bathymetric imagery	SCN	No-H	

Bathymetry Data

Layer Name	Description	Extent	Metadata &	
			Resolution	Source
Depth Contours in Fathoms	10, 20, 30, 40, 50, 100, & 200 fathom contours	SCN	Y-L	DFG
Depth Contours 10m intervals	10 meter interval contours (10 - 600)	SCN	Y-L	DFG
Depth Contours 100m intervals	100 meter interval contours (100 - 4800)	SCN	Y-L	DFG
Depth Contours 30-100-200m intervals	30, 100, & 200 meter contours	SCN	Y-L	DFG
Depth Contours 30-50-100-200m intervals	30, 50, 100 & 200 fathom contours	SCN	Y-L	DFG
Bathymetric Imagery	Bathymetric imagery	SCN	No-H	

Biology Data

	Layer Name	Description	Extent	Metadata &	
				Resolution	Source
N	California Bird Colonies	Statewide bird colonies	CN	Y-M	NMS
	California Sealion Haulout Locations	Statewide California Sealion haulout locations	SCN	Y-H	NMS
	Harbor Seal Haulout Locations	Statewide Harbor Seal haulout locations	SCN	Y-H	NMS
	Persistent Kelp (Without 1989)	Kelp persistent using all years except 1989		No-M	UCSB
	Persistent Kelp (All Years)	Kelp persistence using all available years		No-L	UCSB
	Kelp Canopy Coverage in 1989	Kelp canopy cover fall 1989	SCN	Y-H	DFG

Biology Data

Layer Name	Description	Extent	Metadata &	
			Resolution	Source
Kelp Canopy Coverage in 1999	Kelp canopy cover fall 1999	SCN	Y-H	DFG
Kelp Canopy Coverage in 2002	Kelp canopy cover fall 2002	SCN	Y-H	DFG
Kelp Canopy Coverage in 2003	Kelp canopy cover fall 2003	SCN	Y-H	DFG
Kelp Canopy Coverage in 2004	Kelp canopy cover fall 2004	SCN	Y-H	DFG
Kelp Canopy Coverage in 2005	Kelp canopy cover fall 2005	SCN	Y-H	DFG
Kelp Canopy Coverage in 2006	Kelp canopy cover 2006	S	Y-H	DFG
Elk Kelp	Elk kelp locations		No-M	
Marine Mammal Rookeries	Pinniped rookeries of California	SCN	No-H	NBA
Marine Mammal Haulouts	Pinniped haulouts of California	SCN	No-H	NBA
N Seaotter Counts	Southern California seaotter counts	CN	No-L	unknown
Tidewater Goby Critical Habitat	Critical habitat for the tidewater goby	SCN	Y-L	USFWS
Pacific Angel Shark Habitat	Pacific angel shark habitat suitability model	SCN	Y-M	NMS
Adult Thresher Shark Habitat	Adult thresher shark habitat suitability model	SCN	Y-M	NMS
Juvenile Thresher Shark Habitat	Juvenile thresher shark habitat suitability model	SCN	Y-M	NMS
California Halibut Habitat	California halibut habitat suitability model	SCN	Y-M	NMS
Giant Seabass Habitat	Giant seabass habitat suitability model	SCN	Y-M	NMS
California Sheephead Habitat	California sheephead habitat suitability model	S	Y-M	NMS
Black Abalone Habitat	Black abalone habitat suitability model	SCN	Y-M	NMS
White Abalone Habitat	White abalone habitat suitability model	SC	Y-M	NMS
Red Abalone Habitat	Red abalone habitat suitability model	SC	Y-M	NMS
Purple Sea Urchin Habitat	Purple sea urchin habitat suitability model	SCN	Y-M	NMS
Red Sea Urchin Habitat	Red sea urchin habitat suitability model	SCN	Y-M	NMS
California Spiny Lobster Habitat	California spiny lobster habitat suitability model	SCN	Y-M	NMS
Rockcrabs Habitat	Rockcrabs of the genus Cancer habitat suitability model	SCN	Y-M	NMS
Sheep Crab Habitat	Sheep crab habitat suitability model	SCN	Y-M	NMS
Ridgeback Rock Shrimp Habitat	Ridgeback rock shrimp habitat suitability model	SCN	Y-M	NMS
Spot Shrimp Habitat	Spot shrimp habitat suitability model	SCN	Y-M	NMS
California Market Squid Habitat	California market squid habitat suitability model	SCN	Y-M	NMS
Warty Sea Cucumber Habitat	Warty sea cucumber habitat suitability model	SCN	Y-M	NMS
California Sea Cucumber Habitat	California sea cucumber habitat suitability model	SCN	Y-M	NMS
Boccaccio Larvae Distribution	Boccaccio larvae distribution off California	SCN	Y-M	NMS
Northern Anchovy Larvae Distribution	Northern anchovy larvae distribution off California	SCN	Y-M	NMS
Pacific Sardine Larvae Distribution	Pacific sardine larvae distribution off California	SCN	Y-M	NMS
Western Snowy Plover Locations	Historical snowy plover populations, breeding and wintering areas.	SCN	Y-M	DFG
Ashy Storm-Petrel Density	Ashy Storm-Petrel at-sea density	SCN	Y-M	NMS
Blue Whale Density	Blue whale at-sea density	SCN	Y-M	NMS
Bottlenose Dolphin Density	Bottlenose dolphin at-sea density	SCN	Y-M	NMS
Brown Pelican Density	Brown Pelican at-sea density	SCN	Y-M	NMS
Brandt's Cormorant Density	Brandt's Cormorant at-sea density	SCN	Y-M	NMS
Cassins Auklet Density	Cassins Auklet at-sea density	SCN	Y-M	NMS
Common Dolphin Density	Common dolphin at-sea density	SCN	Y-M	NMS
Dall's Porpoise Density	Dall's porpoise at-sea density	SCN	Y-M	NMS
Double-crested Cormorant Density	Double-crested Cormorant at-sea density	SCN	Y-M	NMS
Fin Whale Density	Fin whale at-sea density	SCN	Y-M	NMS

Biology Data

Layer Name	Description	Extent	Metadata &	
			Resolution	Source
Gray Whale Density	Gray whale at-sea density	SCN	Y-M	NMS
Harbor Porpoise Density	Harbor porpoise at-sea density	SCN	Y-M	NMS
Humpback Whale Density	Humpback whale at-sea density	SCN	Y-M	NMS
Minke Whale Density	Minke whale at-sea density	SCN	Y-M	NMS
Northern Right-whale Dolphin Density	Northern right-whale dolphin at-sea density	SCN	Y-M	NMS
Killer Whale Density	Killer whale at-sea density	SCN	Y-M	NMS
Pacific White-sided Dolphin Density	Pacific white-sided dolphin at-sea density	SCN	Y-M	NMS
Pelagic Cormorant Density	Pelagic Cormorant at-sea density	SCN	Y-M	NMS
Pigeon Guillemot Density	Pigeon Guillemot at-sea density	SCN	Y-M	NMS
Risso's Dolphin Density	Risso's dolphin at-sea density	SCN	Y-M	NMS
Xantus's Murrelet Density	Xantus's Murrelet at-sea density	SCN	Y-M	NMS
Fish Diversity	Composite fish diversity	SCN	Y-M	NMS
Fish Diversity - Trawl	Fish diversity in southern California using trawl data from the National Marine Fisheries Service	SCN	Y-M	NMS
Fish Assemblages - Trawl	Fish assemblages in southern California using trawl data from the National Marine Fisheries Service	SCN	Y-M	NMS
Fish Diversity in Kelp Forests- Scuba	Fish diversity in southern California using scuba surveys in kelp forests.		Y-M	NMS
Fish Assemblages in Kelp Forests	Fish assemblages in southern California kelp forests.		Y-M	NMS
Nearshore Fish Diversity - Trawl	Nearshore marine fish diversity in southern California using trawl information from the Southern California Coastal Water Research Project.		Y-M	NMS
Nearshore Marine Fish Assemblages	Nearshore marine fish assemblages in southern California		Y-M	NMS
Invertebrate Diversity	Invertebrate diversity in southern California		Y-M	NMS
Marine Invertebrate Assemblages	Marine Invertebrate assemblages in southern California		Y-M	NMS

Charts Data

Layer Name	Description	Extent	Metadata &	
			Resolution	Source
Anacapa Passage	NOAA Nautical Chart		No-H	NOAA
Gulf of Santa Catalina	NOAA Nautical Chart		No-H	NOAA
Point Dume to Purisima Point	NOAA Nautical Chart	C	No-H	NOAA
Port Hueneme to Santa Barbara	NOAA Nautical Chart		No-H	NOAA
Santa Cruz Island to Purisima Point	NOAA Nautical Chart	C	No-H	NOAA
San Clemente Island	NOAA Nautical Chart		No-H	NOAA
Santa Cruz Island	NOAA Nautical Chart		No-H	NOAA
Approaches to San Diego Bay	NOAA Nautical Chart		No-H	NOAA
San Miguel Passage	NOAA Nautical Chart		No-H	NOAA
Santa Monica Bay	NOAA Nautical Chart		No-H	NOAA
San Nicolas Island	NOAA Nautical Chart		No-H	NOAA
San Pedro Island	NOAA Nautical Chart	CN	No-H	NOAA
Santa Barbara	NOAA Nautical Chart		No-H	NOAA
Santa Barbara Island	NOAA Nautical Chart		No-H	NOAA
San Diego to Cape Mendocino	NOAA Nautical Chart	CN	No-H	NOAA

Charts Data

Layer Name	Description	Extent	Metadata &	
			Resolution	Source
San Diego to Santa Rosa Island	NOAA Nautical Chart		No-H	NOAA

Consumptive Use Data

Layer Name	Description	Extent	Metadata &	
			Resolution	Source
Commercial Passenger Fishing Vessel Effort (2005-2007)	Commercial Passenger Fishing Vessel Catch Per Unit Effort for Various Species for 2005-2007	SCN	No-L	CFIS
Commercial Passenger Fishing Vessel Catch (2004-2006)	California Recreational Fisheries Survey's (CRFS) sampled Commercial Passenger Fishing Vessel (CPFV) landings by 1' block for 2004, 2005, and 2006	SCN	Y-H	DFG
Surveyed Skiff Fishing Effort (2004,2005)	Summary of surveyed Skiff effort by 1' block for 2004 and 2005	SCN	Y-H	DFG
Skiff Catch	Skiff catch data for Southern California		No-L	DFG
N Kayak Fishing Sites	Locations of kayak fishing sites in Central and Northern California	CN	Y-H	KFACA
Kayak Fishing Areas	Southern California kayak fishing areas		Y-L	KFACA
Pier Fishing Sites	Pier fishing locations in Southern California		No-H	
Commercial Fishery Catch	Commercial Landing Receipts from Southern California Ports	SCN	Y-L	CFIS

Cultural Data

Layer Name	Description	Extent	Metadata &	
			Resolution	Source
California Counties	County boundaries of California	SCN	Y-H	DFG
California Cities	Coastal cities of California (from GNIS)	SCN	Y-H	USGS
California Geographic Points	255 geographic points (headlands) of California	SCN	Y-H	DFG
Coastal Access Point	Coastal access points from the California Coastal Access Guide	SCN	Y-H	CCC
N Harbors of California	Harbors of California - 5 major harbors on the Central Coast	C	Y-H	DFG
Ports of California	Ports of California - 194 port codes for recording landings of marine fisheries	SCN	Y-H	DFG
Piers and Jetties	Fishing Piers and Jetties of Southern California		Y-L	PSMFC
Kayak Launch Sites	Locations of kayak launch sites for Southern California		Y-H	KFACA
Ocean Outfalls	Ocean outfalls	SCN	No-H	SWRCB
Desalination Plants	Desalination plant locations	SCN	Y-H	DFG
Oil Platforms	2002 Oil Platforms		Y-H	DFG
Marine Research Institutes	Marine research institutions of the south coast		Y-M	UCSB
Shipwrecks	Shipwrecks of the United States	SCN	No-H	NOAA
Shipwrecks - South Coast	Shipwrecks within the south coast study region		No-H	Unknown
N Environmental Sensitivity Index	Environmental Sensitivity Index map for Central and Northern California shoreline	CN	Y-H	NOAA
Urban Areas	California urban areas from the 2000 Census	SCN	Y-H	Census

Habitat Data

Layer Name	Description	Extent	Metadata &	
			Resolution	Source
Artificial Reef Boundaries	Artificial reefs' bounding coordinates		No-H	unknown
Artificial Reef Centers	Artificial reefs' centroids		No-H	unknown
Coastal Marsh	Coastal marshes of California	SCN	No-H	TNC
Eelgrass	Zostera (eelgrass) beds of California	SCN	Y-H	TNC
Seagrass	Seagrass distribution off California	SCN	Y-H	NOAA
Surfgrass	Surfgrass of California	SCN	Y-H	Tenera
Estuaries	California estuaries	SCN	Y-H	TNC
N Substrate	Linear substrate classification	N	No-L	DFG
Benthic Substrate	Course scale benthic substrate	SCN	Y-L	NOAA
Benthic Substrate	Fine scale benthic substrate		Y-H	COS
Benthic Marine Habitat	Benthic Marine Habitat		Y-L	MLML
Benthic Marine Habitat - Observed	Benthic marine habitat observed by manned submersibles		Y-H	UCSB
Coastal Sensitivity to Oil Spills	Sensitivity of Coastal Environments and Wildlife to Spilled Oil	SCN	Y-H	NOAA

Management Data

Layer Name	Description	Extent	Metadata &	
			Resolution	Source
California Conservation Areas	California Conservation Areas	SCN	No-H	unknown
Cowcod Conservation Areas	Cowcod Conservation Areas		Y-H	DFG
Recreational Fisheries Survey Sites	California Recreational Fisheries Survey Sample Sites	SCN	No-H	DFG
Essential Fish Habitat	Essential Fish Habitat (EFH) boundaries from NMFS final rule to implement Amendment 19 to the Pacific Coast Groundfish Management Plan	SCN	Y-M	PFMC
Essential Fish Habitat Conservation Areas	Essential Fish Habitat (EFH) conservation areas from NMFS final rule to implement Amendment 19 to the Pacific Coast Groundfish Management Plan	SCN	Y-M	PFMC
Essential Fish Habitat Seaward of 700 Fathoms	The area seaward of the 700-fathom depth contour off Washington, Oregon, and California for NMFS' final rule implementing Amendment 19 to the Pacific Coast Groundfish Fishery Management Plan	SCN	Y-H	NOAA
California Coastal National Monuments	California Coastal National Monuments	SCN	Y-H	DFG
National Marine Sanctuaries of California	National Marine Sanctuaries of California	SCN	Y-H	NOAA
Halibut Trawl Closures	Halibut Trawl Closures		Y-H	DFG
Halibut Trawl Grounds	Halibut Trawl Grounds		Y-H	DFG
Halibut Trawl Grounds 2008	Halibut Trawl Grounds 2008		Y-H	DFG
Managed Kelp Beds	Administrative kelp beds	SCN	Y-M	DFG
California Legacy Project Land	Conservation and trust land ownership (terrestrial) - California Legacy Project	SCN	Y-H	TNC
1 Minute CRFS Microblocks	1' California Recreational Fisheries Survey microblocks	SCN	Y-M	DFG

Management Data

Layer Name	Description	Extent	Metadata &	
			Resolution	Source
CRANE Monitoring Sites	CRANE monitoring locations	C	Y-H	DFG
Marine Monitoring Sites	Monitoring sites for PISCO, LIMPET, CRANE, MARINe	SCN	Y-H	UCSB
Offshore Oil Bed Leases	Oil bed leases	C	Y-H	GI
Rockfish Conservation Area - 100fathoms	Rockfish Conservation Area boundaries - 100 Fathoms - 2008 Draft	SCN	Y-M	DFG
Rockfish Conservation Area - 150fathoms	RCA boundaries - 150 Fathoms - 2008 Draft	SCN	Y-M	DFG
Rockfish Conservation Area - 250fathoms	RCA boundaries - 250 Fathoms - 2008 Draft	SCN	Y-M	DFG
Rockfish Conservation Area - 50fathoms	RCA boundaries - 50 Fathoms - 2008 Draft	SCN	Y-M	DFG
Rockfish Conservation Area - 60fathoms	RCA boundaries - 60 Fathoms - 2008 Draft	SCN	Y-M	DFG
Rockfish Conservation Area - 75fathoms	RCA boundaries - 75 Fathoms - 2008 Draft	SCN	Y-M	DFG
Restricted Areas	Restricted areas (military, power plant, etc.)	SCN	Y-H	DFG
State Waters (Offshore Line)	Offshore line boundaries for California state jurisdiction	SCN	Y-H	DFG
State Waters (Polygon)	Boundaries for California state jurisdiction	SCN	Y-H	DFG
State Water Quality Protection Areas	State Water Quality Protection Areas 2003 (aka - areas of special biological significance)	SCN	Y-H	DFG
California Areas of Special Concern	California areas of special concern	SCN	No-H	
State Park Lands	California State Park lands	SCN	No-H	
Existing State Marine Protected Areas	Current California state marine protected areas	SCN	Y-H	DFG
Existing South Coast Marine Protected Areas	Existing marine protected areas in the south coast study region		Y-H	Init.

Non-consumptive Use Data

Layer Name	Description	Extent	Metadata &	
			Resolution	Source
Shore Dive Sites	Shore dive locations of Southern California		Y-H	UCSB

Physical Data

Layer Name	Description	Extent	Metadata &	
			Resolution	Source
Submarine Features	Point locations of submarine features	SCN	No-L	
Submarine Canyons	Submarine canyons	SCN	Y-M	EFH
Oil Seeps	Location of offshore oil seeps	SCN	Y-M	USGS
Offshore Rock Locations	Offshore rocks - national monuments managed by BLM	SCN	Y-H	BLM
California Watersheds	Watersheds of California - Calwater 2.2.1	SCN	Y-H	CIWM
Coastal Rivers and Streams	Rivers and streams of coastal California	SCN	Y-H	DFG
Impaired Rivers and Streams	303d listed impaired rivers of California - 2002	SCN	Y-H	SWRCB
Impaired Waterbodies	303d listed impaired waterbodies of California - 2002	SCN	Y-H	SWRCB
Tree Canopy	Tree canopy	SCN	Y-H	GS/NL
Land Cover	Land cover	SCN	Y-M	GS/NL

Physical Data

Layer Name	Description	Extent	Metadata &	
			Resolution	Source
Land Cover - NOAA CCAP	NOAA CCAP land cover	CN	No-M	NOAA
Impervious Land Cover	Impervious land cover	SCN	Y-M	GS/NL
Ocean Currents of 1999	Ocean currents of 1999	SCN	Y-L	NBA
Sea Surface Temperatures - 1993 - 2003	Sea surface temperatures, by year 1993 -2003	SCN	Y-L	NBA

Appendix C: Species Likely to Benefit from MPAs and Special-Status Species

This appendix contains two sections:

- C.1 Species likely to benefit from marine protected areas in the MLPA South Coast Study Region
- C.2 Special status species likely to occur in the MLPA South Coast Study Region

C.1 Species Likely to Benefit From MPAs

The Marine Life Protection Act requires that species likely to benefit from MPAs be identified; identification of these species will contribute to the identification of habitat areas that will support achieving the goals of the MLPA. The *California Marine Life Protection Act Master Plan for Marine Protected Areas* (DFG 2008) includes a broad list of species likely to benefit from protection within MPAs. The master plan also indicates that regional lists will be developed by the MLPA Master Plan Science Advisory Team (SAT) for each study region described in the master plan.

A list of species likely to benefit for the MLPA South Coast Study Region (Point Conception in Santa Barbara County to the California/Mexico border in San Diego County) has been compiled and approved by the SAT.

The SAT used a scoring system to develop the list of species likely to benefit. This scoring system was developed to provide a metric that is more useful when comparing species than a simple on/off the list metric. Each species was scored using “1” to indicate a criterion was met or “0” to indicate a criterion was not met. Species on the list meet the following filtering criteria:

- they occur in the study region,
- they must score a “1” for either the “Removal and Discards” or “Disturbance” criterion (possible high score of 2), which means they are either taken directly or indirectly in commercial or recreational fisheries, or are otherwise targeted for take or collection for other uses, or suffer reduced survival or reproductive output as a result of human disturbance, and
- they must score a “1” for either the “Feature Association” or “Limited Adult Home Range” criteria (possible high score of 2), which means a species biomass or abundance would increase due to the protection of features that species is known to favor, or the species has a limited or small adult home range.

Special-status species and species with abundance below the range of natural fluctuations also received a score of “1”, resulting in a highest possible score of 5. A higher score suggests a species is more apt to benefit from or respond to MPAs.

Table C-1. Species likely to benefit from MPAs

Common Name	Scientific Name	Total Score
Fish		
Surfperch, barred	<i>Amphistichus argenteus</i>	4
Bass, kelp	<i>Paralabrax clathratus</i>	4
Bass, barred sand	<i>Paralabrax nebulifer</i>	4
Scorpionfish, California	<i>Scorpaena guttata</i>	4
Bass, Giant sea	<i>Stereolepis gigas</i>	4

Appendix C

Common Name	Scientific Name	Total Score
Surfperch, shiner	<i>Cymatogaster aggregata</i>	3
Surfperch, rainbow	<i>Hypsurus caryi</i>	3
Groupers, Broomtail	<i>Mycteroperca xenarcha</i>	3
Steelhead	<i>Oncorhynchus mykiss</i>	3
Lingcod	<i>Ophiodon elongatus</i>	3
Bass, spotted sand	<i>Paralabrax maculatofasciatus</i>	3
Turbot, C-O	<i>Pleuronichthys coenosus</i>	3
Croaker, spotfin	<i>Roncador stearnsii</i>	3
Cabezon	<i>Scorpaenichthys marmoratus</i>	3
Rockfish, kelp	<i>Sebastes atrovirens</i>	3
Rockfish, brown	<i>Sebastes auriculatus</i>	3
Rockfish, aurora	<i>Sebastes aurora</i>	3
Rockfish, redbanded	<i>Sebastes babcocki</i>	3
Rockfish, gopher	<i>Sebastes carnatus</i>	3
Rockfish, copper	<i>Sebastes caurinus</i>	3
Rockfish, greenspotted	<i>Sebastes chlorostictus</i>	3
Rockfish, starry	<i>Sebastes constellatus</i>	3
Rockfish, darkblotched	<i>Sebastes crameri</i>	3
Rockfish, calico	<i>Sebastes dallii</i>	3
Rockfish, swordspine	<i>Sebastes ensifer</i>	3
Rockfish, pink	<i>Sebastes eos</i>	3
Rockfish, squarespot	<i>Sebastes hopkinsi</i>	3
Rockfish, freckled	<i>Sebastes lentiginosus</i>	3
Cowcod	<i>Sebastes levis</i>	3
Rockfish, blackgill	<i>Sebastes melanostomus</i>	3
Rockfish, vermilion	<i>Sebastes miniatus</i>	3
Rockfish, speckled	<i>Sebastes ovalis</i>	3
Bocaccio	<i>Sebastes paucispinis</i>	3
Rockfish, grass	<i>Sebastes rastrelliger</i>	3
Rockfish, rosy	<i>Sebastes rosaceus</i>	3
Rockfish, greenblotched	<i>Sebastes rosenblatti</i>	3
Rockfish, flag	<i>Sebastes rubrivinctus</i>	3
Rockfish, bank	<i>Sebastes rufus</i>	3
Rockfish, olive	<i>Sebastes serranoides</i>	3
Rockfish, treefish	<i>Sebastes serriceps</i>	3
Rockfish, pinkrose	<i>Sebastes simulator</i>	3
Rockfish, honeycomb	<i>Sebastes umbrosus</i>	3
Sheephead, California	<i>Semicossyphus pulcher</i>	3
Shark, Pacific angel	<i>Squatina californica</i>	3
Shark, leopard shark	<i>Triakis semifasciatus</i>	3
Seabass, white	<i>Atractoscion nobilis</i>	2
Croaker, black	<i>Cheilotrema saturnum</i>	2
Blacksmith	<i>Chromis punctipinnis</i>	2
Surfperch, black	<i>Embiotoca jacksoni</i>	2
Opaleye	<i>Girella nigricans</i>	2
Shark, horn	<i>Heterodontus francisci</i>	2
Sculpin, staghorn	<i>Leptocottus armatus</i>	2
Grunion, California	<i>Leuresthes tenuis</i>	2
Goby, bluebanded	<i>Lythrypnus dalli</i>	2
Goby, zebra	<i>Lythrypnus zebra</i>	2
Halfmoon	<i>Medialuna californiensis</i>	2

Common Name	Scientific Name	Total Score
Surfperch, rubberlip	<i>Rhacochilus toxotes</i>	2
Surfperch, pile	<i>Rhacochilus vacca</i>	2
Guitarfish, shovelnose	<i>Rhinobatos productus</i>	2
Rockfish, blue	<i>Sebastes mystinus</i>	2
Invertebrates		
California mussel	<i>Mytilus californianus</i>	4
Sea Hare (two species)	<i>Aplysia spp.</i>	3
Shrimp, Ghost	<i>Callinassa spp.</i>	3
Crab, Brown Rock	<i>Cancer antennarius</i>	3
Crab, Yellow Rock	<i>Cancer anthonyi</i>	3
Scallop, Rock	<i>Crassadoma gigantea</i>	3
Abalone, pink	<i>Haliotis corrugata</i>	3
Abalone, black	<i>Haliotis cracherodii</i>	3
Abalone, green	<i>Haliotis fulgens</i>	3
Abalone, red	<i>Haliotis rufescens</i>	3
Abalone, white	<i>Haliotis sorenseni</i>	3
Whelk, Kellets	<i>Kelletia kelletii</i>	3
Wavy Turban Snail	<i>Megastrea undosa</i>	3
Mussels (several spp.)	<i>Mytilus spp.</i> , <i>Septifer spp.</i> , <i>Brachydontus spp.</i>	3
Prawn, Spot	<i>Pandalus platyceros</i>	3
Lobster, Ca. Spiny	<i>Panulirus interruptus</i>	3
Cucumber, California Sea	<i>Parastichopus californicus</i>	3
Cucumber, Warty Sea	<i>Parastichopus parvimensis</i>	3
Sandcastle worm	<i>Phragmatopoma californica</i>	3
Ochre Star	<i>Pisaster ochraceus</i>	3
Clam, littleneck	<i>Protothaca staminea</i>	3
Prawn, Ridgeback	<i>Sicyonia ingentis</i>	3
Urchin, Red	<i>Strongylocentrotus fransiscanus</i>	3
Clam, manila	<i>Tapes philippinarum</i>	3
Clam, Pismo	<i>Tivela stultorium</i>	3
Clam, gaper	<i>Tresus nuttalli</i>	3
Shrimp, Mud	<i>Upogebia spp.</i>	3
Snail, Top (several spp.)	<i>Calliostoma, spp.</i>	2
Crab, Red Rock	<i>Cancer productus</i>	2
Clam, smooth chione	<i>Chione fluctifraga</i>	2
Clam, Cockle	<i>Clinocardium nuttallii</i>	2
Shrimp, Red Rock	<i>Crangon spp.</i>	2
Crab, sand	<i>Emerita analoga</i>	2
Squid, Market	<i>Loligo opalescens</i>	2
Owl Limpet	<i>Lottia gigantea</i>	2
Limpets	<i>Lottia spp.</i>	2
Crab, Spider (Sheep)	<i>Loxorhynchus grandis</i>	2
Giant Keyhole Limpet	<i>Megathura crenulata</i>	2
Snail, Southern Moon	<i>Naticidae polinises</i>	2
Octopus, two spot	<i>Octopus bimaculatus</i>	2
Octopus, two spot	<i>Octopus bimaculoides</i>	2
Clam, geoduck	<i>Panopea abrupta</i>	2
Urchin, Purple	<i>Strongylocentrotus purpuratus</i>	2
Clam, California jackknife	<i>Tagelus californianus</i>	2
Snail, Turban (several spp.)	<i>Tegula spp.</i> , <i>Lithopoma spp.</i>	2
Orange Puffball Sponge	<i>Tethya aurantia</i>	2

Common Name	Scientific Name	Total Score
Algae and Marine Plants		
	<i>Gelidium spp. (many species)</i>	3
Feather Boa Kelp	<i>Egregia menziesii</i>	2
Southern Sea Palm	<i>Eisenia arborea</i>	2
Intertidal Rockweeds	<i>Fucus spp.</i>	2
	<i>Gracilaria spp. (many species)</i>	2
Kelp, Giant	<i>Macrocystis pyrifera</i>	2
	<i>Porphyra spp. (many species)</i>	2
	<i>Silvetia compressa</i>	2
Eel Grass	<i>Zostera marina</i>	2
Eel Grass	<i>Zostera pacifica</i>	2
Marine Birds		
Pigeon Guillemot	<i>Cephus columba</i>	4
Black Oystercatcher	<i>Haematopus bachmani</i>	4
Bald Eagle	<i>Haliaeetus leucocephalus</i>	4
Brown Pelican	<i>Pelecanus occidentalis</i>	4
Pelagic Cormorant	<i>Phalacrocorax pelagicus</i>	4
Brandt's Cormorant	<i>Phalacrocorax penicillatus</i>	4
Least Tern	<i>Sternula antillarum</i>	4
Xantus's Murrelet	<i>Synthliboramphus hypoleucus</i>	4
Clark's Grebe	<i>Aechmophorus clarkii</i>	3
Western Grebe	<i>Aechmophorus occidentalis</i>	3
Northern Pintail	<i>Anas acuta</i>	3
American Wigeon	<i>Anas americana</i>	3
Northern Shoveler	<i>Anas clypeata</i>	3
Mallard	<i>Anas platyrhynchos</i>	3
Gadwall	<i>Anas strepera</i>	3
Lesser Scaup	<i>Aythya affinis</i>	3
Greater Scaup	<i>Aythya marila</i>	3
Canvasback	<i>Aythya valisineria</i>	3
Brant	<i>Branta bernicla</i>	3
Canada Goose	<i>Branta canadensis</i>	3
Bufflehead	<i>Bucephala albeola</i>	3
Common Goldeneye	<i>Bucephala clangula</i>	3
Red Knot	<i>Calidris canutus</i>	3
Snowy Plover	<i>Charadrius alexandrinus</i>	3
American Peregrine Falcon	<i>Falco peregrinus anatum</i>	3
Northern Fulmar	<i>Fulmarus glacialis</i>	3
Common Loon	<i>Gavia immer</i>	3
Pacific Loon	<i>Gavia pacifica</i>	3
Red-throated Loon	<i>Gavia stellata</i>	3
Gull-billed Tern	<i>Gelochelidon nilotica</i>	3
Herring Gull	<i>Larus argentatus</i>	3
California Gull	<i>Larus californicus</i>	3
Mew Gull	<i>Larus canus</i>	3
Ring-billed Gull	<i>Larus delawarensis</i>	3
Glaucous-winged Gull	<i>Larus glaucescens</i>	3
Heermann's Gull	<i>Larus heermanni</i>	3
Western Gull	<i>Larus occidentalis</i>	3
Bonaparte's Gull	<i>Larus philadelphia</i>	3

Species Likely to Benefit

Common Name	Scientific Name	Total Score
Thayer's Gull	<i>Larus thayeri</i>	3
Red-breasted Merganser	<i>Mergus serrator</i>	3
Ashy Storm-Petrel	<i>Oceanodroma homochroa</i>	3
Ruddy Duck	<i>Oxyura jamaicensis</i>	3
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	3
Horned Grebe	<i>Podiceps auritus</i>	3
Red-necked Grebe	<i>Podiceps grisegena</i>	3
Eared Grebe	<i>Podiceps nigricollis</i>	3
Pied-billed Grebe	<i>Podilymbus podiceps</i>	3
Pink-footed Shearwater	<i>Puffinus creatopus</i>	3
Sooty Shearwater	<i>Puffinus griseus</i>	3
Black-vented Shearwater	<i>Puffinus opisthomelas</i>	3
Clapper Rail	<i>Rallus longirostris</i>	3
Black Skimmer	<i>Rynchops niger</i>	3
Caspian Tern	<i>Sterna caspia</i>	3
Forster's Tern	<i>Sterna forsteri</i>	3
Surfbird	<i>Aphriza virgata</i>	2
Great Egret	<i>Ardea alba</i>	2
Great Blue Heron	<i>Ardea herodias</i>	2
Ruddy Turnstone	<i>Arenaria interpres</i>	2
Black Turnstone	<i>Arenaria melanocephala</i>	2
American Bittern	<i>Botarus lentiginosus</i>	2
Sanderling	<i>Calidris alba</i>	2
Dunlin	<i>Calidris alpina</i>	2
Western Sandpiper	<i>Calidris mauri</i>	2
Least Sandpiper	<i>Calidris minutilla</i>	2
Semipalmated Plover	<i>Charadrius semiplamatus</i>	2
Killdeer	<i>Charadrius vociferus</i>	2
Snowy Egret	<i>Egretta thula</i>	2
American Coot	<i>Fulica americana</i>	2
Common Moorhen	<i>Gallinula chloropus</i>	2
Wandering Tattler	<i>Heteroscelus incanus</i>	2
Black-necked Stilt	<i>Himantopus mexicana</i>	2
Short-billed Dowitcher	<i>Limnodromus griseus</i>	2
Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>	2
Marbled Godwit	<i>Limosa fedoa</i>	2
Surf Scoter	<i>Melanitta perspicillata</i>	2
Long-billed Curlew	<i>Numenius americanus</i>	2
Whimbrel	<i>Numenius phaeopus</i>	2
Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	2
Red Phalarope	<i>Phalaropus fulicarius</i>	2
Red-necked Phalarope	<i>Phalaropus lobatus</i>	2
Wilson's Phalarope	<i>Phalaropus tricolor</i>	2
Black-bellied Plover	<i>Pluvialis squatarola</i>	2
Cassin's Auklet	<i>Ptychoramphus aleuticus</i>	2
American Avocet	<i>Recurvirostra americana</i>	2
Common Tern	<i>Sterna hirundo</i>	2
Royal Tern	<i>Thalasseus maxima</i>	2
Elegant Tern	<i>Thalasseus elegans</i>	2
Lesser Yellowlegs	<i>Tringa flavipes</i>	2
Greater Yellowlegs	<i>Tringa melanoleuca</i>	2

Common Name	Scientific Name	Total Score
Willet	<i>Tringa semipalmata</i>	2
Marine Mammals		
Guadalupe fur seal	<i>Arctocephalus townsendi</i>	3
Northern fur seal	<i>Callorhinus ursinus</i>	3
Northern elephant seal	<i>Mirounga angustirostris</i>	3
Harbor seal	<i>Phoca vitulina richardsi</i>	3
California sea lion	<i>Zalophus californianus californianus</i>	3
Marine Reptiles		
Green turtle	<i>Chelonia mydas</i>	3

Note: This list may be revised and appended with Science Advisory Team input. Information was compiled by Santa Monica Bay Restoration Commission. Blank cells have not yet been evaluated.

C.2 Special-Status Species Likely to Occur in the Study Region

Listed below are species that are protected under state or federal law and occur within the MLPA South Coast Study Region for consideration in marine protected area planning. Some of these species are described in further detail in section 3.2.4 of this regional profile.

Table C-2. Special-status species likely to occur in southern California

Common Name	Scientific Name	Federal Status	State Status	Other Status
Mammals				
Blue whale	<i>Balaenoptera musculus musculus</i>	E		MMPA
Fin whale	<i>Balaenoptera physalus</i>	E		MMPA
Humpback whale	<i>Megaptera novaeangliae</i>	E		MMPA
North Pacific right whale	<i>Eubalaena japonica</i>	E		MMPA
Gray whale	<i>Eschrichtius robustus</i>	D		MMPA
Sei whale	<i>Balaenoptera borealis</i>	E		MMPA
Sperm whale	<i>Physeter macrocephalus</i>	E		MMPA
Killer whale	<i>Orcinus orca</i>	PT, SC (NMFS)		MMPA
Dall's porpoise	<i>Phocoenoides dalli</i>			MMPA
Pacific white-sided dolphin	<i>Lagenorhynchus obliquidens</i>			MMPA
Risso's dolphin	<i>Grampus griseus</i>			MMPA
Northern right whale dolphin	<i>Lissodelphis borealis</i>		FP	MMPA
California sea lion	<i>Zalophus californianus</i>			MMPA
Guadalupe fur seal	<i>Arctocephalus townsendi</i>	T	T, FP	MMPA
Northern fur seal	<i>Callorhinus ursinus</i>			MMPA
Harbor seal	<i>Phoca vitulina</i>			MMPA
Northern elephant seal	<i>Mirounga angustirostris</i>		FP	MMPA
Southern sea otter	<i>Enhydra lutris nereis</i>	T	FP	MMPA
Southern California Salt Marsh Shrew	<i>Sorex ornatus salicornicus</i>		SSC(SP)	IUCN
Birds				
Common Loon	<i>Gavia immer</i>		SSC(FP)	IUCN
Short-tailed Albatross	<i>Phoebastria albatrus</i>	E	SSC(FP)	IUCN
Black-footed Albatross	<i>Phoebastria nigripes</i>	SC (FWS)		
Dark-rumped Petrel	<i>Pterodroma phaeopygia</i>	E		
Ashy Storm-Petrel	<i>Oceanodroma homochroa</i>		SSC(SP)	IUCN
		BCC (FWS)		
Fork-tailed Storm-Petrel	<i>Oceanodroma furcata</i>		SSC(FP)	IUCN
Black Storm-Petrel	<i>Oceanodroma melania</i>		SSC(TP)	IUCN

Species Likely to Benefit

Common Name	Scientific Name	Federal Status	State Status	Other Status
California Brown Pelican	<i>Pelecanus occidentalis californicus</i>	E, PD	E, FP	IUCN
American White Pelican	<i>Pelecanus erythrorhynchos</i>		SSC(FP)	IUCN
American Bittern	<i>Botaurus lentiginosus</i>			IUCN
Least Bittern	<i>Ixobrychus exilis</i>	BCC (FWS)	SSC(SP)	
White-faced Ibis	<i>Plegadis chihi</i>	SC (FWS)		
Harlequin Duck	<i>Histrionicus histrionicus</i>	SC (FWS)	SSC(SP)	
California Clapper Rail	<i>Rallus longirostris obsoletus</i>	E	E, FP	
Light-footed Clapper Rail	<i>Rallus longirostris levipes</i>	E	E, FP	
California Black Rail	<i>Laterallus jamaicensis coturniculus</i>		T, FP,	IUCN
Western Snowy Plover	<i>Charadrius alexandrinus nivosus</i>	BCC (FWS)	SSC(FP)	
Black Oystercatcher	<i>Haematopus bachmani</i>	T, BCC (FWS)	SSC(FP)	
Whimbrel	<i>Numenius phaeopus</i>	BCC (FWS)		
Long-billed Curlew	<i>Numenius americanus</i>	BCC (FWS)		
Marbled Godwit	<i>Limosa fedoa</i>	BCC (FWS)		
Black Turnstone	<i>Arenaria melanocephala</i>	BCC (FWS)		
Red Knot	<i>Calidris canutus</i>	BCC (FWS)		
Elegant Tern	<i>Sterna elegans</i>	BCC (FWS)	SSC(TP)	IUCN
California Least Tern	<i>Sterna antillarum browni</i>	E	E, FP,	IUCN
			SCC(FP)	
Caspian Tern	<i>Sterna caspia</i>	BCC (FWS)		
Gull-billed Tern	<i>(Sterna nilotica)</i>	BCC (FWS)	SSC(TP)	
Royal Tern	<i>(Sterna maxima)</i>	BCC (FWS)		
Marbled Murrelet	<i>Brachyramphus marmoratus marmoratus</i>	T	E	
Xantus's Murrelet	<i>Synthliboramphus hypoleucus</i>	BCC (FWS) - Candidate	T	IUCN
Cassin's Auklet	<i>Ptychoramphus aleuticus</i>	BCC (FWS)	SSC(TP)	IUCN
Rhinoceros Auklet	<i>Cerorhinca monocerata</i>		SSC(TP)	IUCN
Double-crested Cormorant	<i>Phalacrocorax auritus</i>		SSC(WL)	IUCN
Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	SC		IUCN
"Tule" Greater White-fronted Goose	<i>Anser albifrons elgasi</i>		SSC(SP)	
Canadian Goose	<i>Branta canadensis leucopareia</i>	T		
"Aleutian"and"clackling" Canada Goose	<i>Branta canadensis minima</i>	D	SSC(SP)	
Saltmarsh Common Yellowthroat	<i>Geothlypis trichas sinuosa</i>	SC		
		BCC (FWS)		
Black Brant	<i>Branta bernicla nigricans</i>		SSC(TP)	
Redhead	<i>Aythya americana</i>		SSC(SP)	
Bufflehead	<i>Bucephala albeola</i>		SSC(TP)	
Osprey	<i>Pandion haliaetus</i>		SSC(WL)	
Northern Harrier	<i>Circus cyaneus</i>		SSC(TP)	
Sharp-shinned Hawk	<i>Accipiter striatus</i>		SSC(WL)	
Cooper's Hawk	<i>Accipiter cooperi</i>		SSC(WL)	
Ferruginous Hawk	<i>Buteo regalis</i>	SC	SSC(WL)	
Golden Eagle	<i>Aquila chrysaetos</i>		SSC(FP), FP	
Bald Eagle	<i>Haliaeetus leucocephalus</i>	T	E	
Merlin	<i>Falco columbarius</i>		SSC(WL)	
American Peregrine Falcon	<i>Falco peregrinus anatum</i>	D, SC	E, FP, CD	
Yellow Rail	<i>Coturnicops noveboracensis</i>	BCC (FWS)	SSC(SP)	
Greater Sandhill Crane	<i>Grus canadensis tabida</i>		T, FP	
Long-billed Curlew	<i>Numenius americanus</i>	SC		
California Gull	<i>Larus californicus</i>		SSC(WL)	
Coastal California Gnatcatcher	<i>Polioptila californica californica</i>	T	SSC	
Willow Flycatcher	<i>Empidonax traillii</i>		E	
Black Skimmer	<i>Rynchops niger</i>	SC	SSC(TP)	
		BCC (FWS)		
Tufted Puffin	<i>Fratercula cirrhata</i>		SSC(FP)	IUCN
Belding's Savannah Sparrow	<i>Passerculus sandwichensis beldingi</i>	BCC (FWS)	E	IUCN

Appendix C

Common Name	Scientific Name	Federal Status	State Status	Other Status
Reptiles				
Leatherback sea turtle	<i>Dermochelys coriacea</i>	E		
Loggerhead sea turtle	<i>Caretta caretta</i>	T		
Pacific ridley sea turtle	<i>Lepidochelys olivacea</i>	T		
Green sea turtle	<i>Chelonia mydas</i>	T		IUCN
Fish				
Fish Common Name	Scientific Name	Federal Status	State Status	Other Status
Steelhead (CA southern Santa Maria river to U.S.-Mexico boarder)	<i>Oncorhynchus mykiss</i>	E	SSC(QE)	
Tidewater goby	<i>Eucyclogobius newberryi</i>	E	SSC(QE)	IUCN
Green sturgeon	<i>Acipenser medirostris</i>	SC (NMFS) - Candidate	SSC(QT)	
Cowcod	<i>Sebastes levis</i>	Overfished, SC (NMFS)		
Bocaccio	<i>Sebastes paucispinis</i>	Overfished, SC (NMFS)		
Canary rockfish	<i>Sebastes pinniger</i>	Overfished(NMFS)		
Darkblotched Rockfish	<i>Sebastes crameri</i>	Overfished(NMFS)		
Pacific Ocean Perch	<i>Sebastes alutus</i>	Overfished(NMFS)		
Widow rockfish	<i>Sebastes entomelas</i>	Overfished (NMFS)		
Yelloweye rockfish	<i>Sebastes ruberrimus</i>	Overfished (NMFS)		
Eulachon	<i>Thaleichthys pacificus</i>		SSC(WL)	
Bluefin tuna	<i>Thunnus thynnus</i>	SC		
Swordfish	<i>Xiphias gladius</i>	SC		
Gulf grouper	<i>Mycteroperca jordani</i>		P	
Broomtail grouper	<i>Mycteroperca xenarcha</i>		P	
Garibaldi	<i>Hypsypops rubicundus</i>		P	
Giant sea bass	<i>Stereolepis gigas</i>		P	IUCN
White shark	<i>Carcharodon carcharias</i>		P	IUCN, CITES, CMS
Invertebrates				
Black abalone	<i>Haliotis cracherodii</i>	PE, SC (NMFS)	P	IUCN
Green abalone	<i>Haliotis Fulgens</i>	SC (NMFS)	P	
Pink abalone	<i>Haliotis corrugata</i>	SC (NMFS)	P	
White abalone	<i>Haliotis sorenseni</i>	E	P	
Purple hydrocoral	<i>Stylaster californicus</i>		P	
Sandy beach tiger beetle	<i>Cicindela hirticollis gravida</i>	SC		
Plant Common Name	Scientific Name	Federal Status	State Status	Other Status
Northcoast sand verbena	<i>Abronia umbellata ssp. breviflora</i>	SC		

Index of the listing codes used in Appendix C(ii)

Federal Listing Codes

ESA: Endangered Species Act of 1973 listing codes

- E Federally listed as endangered
- T Federally listed as threatened
- D Federally delisted

PE	Proposed for federal listing as endangered
PT	Proposed for federal listing as threatened
PD	Proposed for federal de-listing
Candidate	Candidate for federal listing as endangered or threatened
SC	Species of concern
SC (NMFS)	Species of concern by the National Marine Fisheries Service
SC (FWS)	Species of concern by the US Fish and Wildlife Service
BCC (FWS)	Birds of Conservation Concern by US Fish and Wildlife Service

State Listing Codes

CESA: California Endangered Species Act listing codes

E	State-listed as endangered
T	State-listed as threatened
CE	Candidate for state listing as endangered
CT	Candidate for state listing as threatened
CD	Considered for state delisting as endangered

SSC: Species of special concern listing codes

(QE)	Qualify as endangered (fish list)
(QT)	Qualify as threatened (fish list)
(WL)	Watch list
(FP)	First priority (bird list)
(SP)	Second priority (bird list)
(TP)	Third priority (bird list)

Other State listings

FP	State fully protected animal list
P	Protected species

Other Status Codes

MMPA	Protected under the Marine Mammal Protection Act
IUCN	Included in the World Conservation Union's Red List of Vulnerable Species
CITES	Protected under the Convention of International Trade in Endangered Species of Fauna and Flora
CMS	Protected by the Convention on Migratory Species

Sources for special status species list

Original list from MBNMS

California ESA status: <http://www.dfg.ca.gov/whdab/pdfs/TEAnimals.pdf>

California Species of Special Concern <http://www.dfg.ca.gov/wildlife/species/ssc/index.html>

Federal ESA status: <http://www.nmfs.noaa.gov/pr/species/esa.htm>

Birds of Conservation Concern: <http://migratorybirds.fws.gov/reports/bcc2002.pdf>

California Natural Diversity Database

<http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/SPAnimals.pdf>

Appendix D. Profile of Commercial Fisheries

This appendix contains the following sections:

- D.1 Summary of Santa Barbara County fisheries, 1998-2007
- D.2 Summary of Ventura County fisheries, 1998-2007
- D.3 Summary of Los Angeles County fisheries, 1998-2007
- D.4 Summary of Orange County fisheries, 1998-2007
- D.5 Summary of San Diego County fisheries, 1998-2007
- D.6 Summary of the Santa Barbara County landings (pounds), 1998-2007
- D.7 Summary of the Ventura County landings (pounds), 1998-2007
- D.8 Summary of the Los Angeles County landings (pounds), 1998-2007
- D.9 Summary of the Orange County landings (pounds), 1998-2007
- D.10 Summary of the San Diego County landings (pounds), 1998-2007
- D.11 Profiles of major commercial fisheries in the MLPA South Coast Study Region
- D.12 Market categories included in market category groupings

D.1 Summary of Santa Barbara County Fisheries, 1998-2007

Table D-1. Santa Barbara County finfish fisheries by average annual landings, 1998-2007

Market Category Groupings ¹	Primary Species Targeted	Primary Gear	Fishermen ⁴ 2007 ³	Vessels ⁴ 2007 ³	Average. Annual Landings (lbs)	Average Annual Ex-vessel (\$) ²
California halibut	California halibut	Trawl, hook-and-line, entangling nets	48	49	74,669	\$322,976
Sharks and skates	Shortfin mako, Thresher, Soupfin, Spiny dogfish, Leopard, Shovelnose guitarfish, Skates	Hook-and-line, trawl, entangling nets	30	32	58,335	\$83,322
White seabass	White seabass	Entangling nets, hook-and-line	14	16	55,479	\$122,901

Appendix D: Commercial Fisheries

Nearshore fishes	Nearshore rockfish, Cabezon	Hook-and-line, trap	22	28	35,099	\$243,871
California sheephead	California sheephead	Hook-and-line, traps	12	15	16,545	\$57,520
Swordfish	Swordfish	Harpoon, entangling nets	7	7	11,332	\$42,500
Salmon	Chinook salmon	Hook-and-line	2	2	10,980	\$28,595
Tuna	Albacore tuna	Hook-and-line	8	8	7,496	\$10,066
Angel shark	Pacific angel shark	Trawl nets	10	10	6,345	\$7,400
Sole	English, Petrale, Rex	Trawl nets	13	13	5,183	\$4,960
Shelf rockfish	Shelf rockfish	Trawl, hook-and-line, entangling nets	14	15	5,019	\$13,784
Unidentified rockfish	Unidentified rockfish	Trawl, hook-and-line, entangling nets	3	3	4,488	\$15,413
Ocean whitefish	Ocean whitefish	Hook-and-line, entangling nets	7	7	2,944	\$8,383
Lingcod	Lingcod	Hook-and-line, trap, entangling net, trawl	12	13	2,181	\$5,270
California yellowtail	California yellowtail	Hook-and-line, round haul nets	3	3	1,664	\$2,360
Mackerel-anchovy	Jack mackerel, Pacific mackerel, and Northern Anchovy	Round haul nets	2	2	1,105	\$323
Pacific bonito	Pacific bonito	Round haul nets, hook-and-line	1	1	943	\$452
Dover sole/ Thornyhead/Sablefish	Dover sole, Longspine thornyhead, Shortspine thornyhead, Sablefish	Trawl nets, hook-and-line	6	5	660	\$1,174
Slope rockfish	Slope rockfish	Trawl nets	4	4	306	\$395
Croaker	White	Entangling nets, hook-and-line, round haul nets	3	3	242	\$327
Sanddabs	Pacific sanddabs, Speckled sanddabs, Longfin, sanddabs	Trawl, hook-and-line	2	2	159	\$186
Surf perch	Barred, Black	Hook-and-line, trawl	0	0	64	\$48
All other fish	All finfish with small landings		22	22	981	\$757

Source: Data compiled from the Commercial Fishery Information System data base (extract date: May 2, 2008).

¹ Market Category Groupings are listed in descending order by average annual landings within the county.

² Average ex-vessel revenue were calculated by applying an inflationary figure to each of the ten years (1998-2007)

³ Commercial license year from April 1 through March 31 the following calendar year.

⁴ Fishermen and vessels may fish more than one market category grouping.

Table D-2. Santa Barbara County invertebrate fisheries by average annual landings, 1998-2007

Market Category Groupings ¹	Primary Species Targeted	Primary Gear	Fishermen ⁴ 2007 ³	Number of Vessels ⁴ 2007 ³	Average Annual Landings (lbs)	Average Annual Ex-vessel (\$) ²
Sea Urchin	Red, purple, and white sea urchins	Hand harvest	110	60	4,299,401	\$3,451,281
Market Squid	Market squid	Round haul nets, and brail	3	3	807,180	\$126,695
Rock crab	Brown, red, and yellow rock crab	Traps	36	38	597,271	\$856,893
Ridgeback prawns	Ridgeback prawn	Traps	3	3	361,313	\$571,896
Sea cucumbers	Warty and giant red sea cucumbers	Hand harvest, and trawl	22	18	192,232	\$167,495
Spiny lobster	Spiny lobster	Traps	38	40	172,837	\$1,533,485
Kellet's whelk	Kellet's whelk	Hand harvest	15	16	32,959	\$21,678
Spider crab	Spider crab	Traps	24	26	19,339	\$23,243
Spot prawn	Spot prawn	Traps	7	7	19,101	\$175,225
All Other Invertebrates	All invertebrates with small amount of landings		21	21	5,039	\$2,729

Source: Data compiled from the Commercial Fishery Information System data base (extract date: May 2, 2008).

¹ Market Category Groupings are listed in descending order by average annual landings within the county.

² Average values were calculated by applying an inflationary figure to each of the ten years (1998-2007)

³ Commercial license year from April 1 through March 31 the following calendar year.

⁴ Fishermen and vessels may fish more than one market category grouping.

D.2 Summary of Ventura County Fisheries, 1998-2007

Table D-3. Ventura County finfish fisheries by average annual landings, 1998-2007

Market Category Groupings ¹	Primary Species Targeted	Primary Gear	Fishermen ⁴ 2007 ³	Vessels ⁴ 2007 ³	Average Annual Landings (lbs)	Average Annual Ex-vessel (\$) ²
Pacific sardine	Pacific sardine	Round haul nets	38	31	6,562,252	\$341,222
Mackerel-anchovy	Jack mackerel, Pacific mackerel, and Northern Anchovy	Round haul nets	36	32	5,532,368	\$402,221
California halibut	California halibut	Trawl, hook-and-line,	37	38	147,759	\$614,043

Market Category Groupings ¹	Primary Species Targeted	Primary Gear	Fishermen ⁴ 2007 ³	Vessels ⁴ 2007 ³	Average Annual Landings (lbs)	Average Annual Ex-vessel (\$) ²
Pacific bonito	Pacific bonito	entangling nets Round haul nets, hook-and-line	9	8	134,385	\$37,455
Tuna	Albacore tuna	Hook-and-line	6	5	131,059	\$212,250
Dover sole/ Thornyhead /Sablefish	Dover sole, Longspine thornyhead, Shortspine thornyhead, Sablefish	Trawl nets, hook-and-line	7	12	97,234	\$223,470
White seabass	White seabass	Entangling nets, hook-and-line	26	27	79,816	\$196,729
Swordfish	Swordfish	Harpoon, entangling nets	8	7	55,381	\$217,215
Sharks and skates	Shortfin mako, Thresher, Soupfin, Spiny dogfish, Leopard, Shovelnose guitarfish, Skates	Hook-and-line, trawl, entangling nets	31	31	52,368	\$61,545
Slope rockfish	Slope rockfish	Trawl nets	9	13	45,695	\$53,222
Shelf rockfish	Shelf rockfish	Trawl, hook-and-line, entangling nets	12	12	35,552	\$49,638
Croakers	White	Entangling nets, hook-and- line, round haul nets	4	4	27,038	\$11,035
Nearshore fishes	Nearshore rockfish, Cabezon	Hook-and-line, trap	16	17	18,020	\$72,654
Angel shark	Pacific angel shark	Trawl nets	10	11	17,667	\$22,566
Sole	English, Petrale, Rex	Trawl nets	13	13	17,456	\$12,711
Unidentified rockfish	Unidentified rockfish	Trawl, hook-and-line, entangling nets	3	3	15,352	\$14,889
California yellowtail	California yellowtail	Hook-and-line, round haul nets	15	15	9,381	\$6,308
Ocean whitefish	Ocean whitefish	Hook-and-line, entangling nets	14	13	4,005	\$6,128
Salmon	Chinook salmon	Hook-and-line	3	3	2,666	\$4,795
Lingcod	Lingcod	Hook-and-line, trap, entangling net, trawl	7	7	1,803	\$2,998
Sandabs	Pacific sanddabs, Speckled sanddabs, Longfin, sanddabs	Trawl, hook-and-line	5	5	1,489	\$2,342
Surf perch	Barred, and black	Hook-and-line, trawl	5	5	1,487	\$342
All other fish	All finfish with small landings		31	33	212	\$1,621

Source: Data compiled from the Commercial Fishery Information System data base (extract date: May 2, 2008).

¹ Market Category Groupings are listed in descending order by average annual landings within the county.

² Average ex-vessel revenue were calculated by applying an inflationary figure to each of the ten years (1998-2007).

³ Commercial license year from April 1 through March 31 the following calendar year.

⁴ Fishermen and vessels may fish more than one market category grouping.

Table D-4. Ventura County invertebrate fisheries by average annual landings, 1998-2007

Market Category Groupings ¹	Primary Species Targeted	Primary Gear	Fishermen ⁴ 2007 ³	Vessels ⁴ 2007 ³	Average Annual Landings (lbs)	Average Annual Ex-vessel (\$) ²
Market Squid	Market squid	Round haul nets, and brail	81	63	66,144,244	\$12,824,706
Sea urchin	Red, purple, and white sea urchins	Hand harvest	49	23	2,217,951	\$1,958,725
Sea cucumber	Warty and giant red sea cucumbers	Hand harvest, and trawl	23	15	310,523	\$339,952
Rock crab	Brown, red, and yellow rock crab	Traps	33	31	173,491	\$251,542
Ridgeback prawn	Ridgeback prawns	Traps	6	5	139,297	\$250,689
Spiny lobster	Spiny lobster	Traps	20	20	85,299	\$764,048
Spot prawn	Spot prawn	Traps	7	6	82,712	\$852,241
Spider crab	Spider crab	Traps	20	21	16,984	\$23,645
Kellet's whelk	Kellet's whelk	Hand harvest	10	10	1,675	\$1,291
Other invert	All invertebrates with small amount of landings		19	22	5,448	\$3,353

Source: Data compiled from the Commercial Fishery Information System data base (extract date: May 2, 2008).

¹ Market Category Groupings are listed in descending order by average annual landings within the county.

² Average ex-vessel revenue were calculated by applying an inflationary figure to each of the ten years (1998-2007).

³ Commercial license year from April 1 through March 31 the following calendar year.

⁴ Fishermen and vessels may fish more than one market category grouping.

D.3 Summary of Los Angeles County Fisheries, 1998-2007

Table D-5. Los Angeles County finfish fisheries by average annual landings, 1998-2007

Market Category Groupings ¹	Primary Species Targeted	Primary Gear	Fishermen ⁴ 2007 ³	Vessels ⁴ 2007 ³	Average Annual Landings (lbs)	Average Annual Ex-vessel(\$) ²
Pacific sardine	Pacific sardine	Round haul nets	43	36	73,087,472	\$3,875,649
Mackeral-anchovy	Jack mackerel, Pacific mackerel, and Northern Anchovy	Round haul nets	49	44	22,272,583	\$1,684,010
Tuna	Albacore, bluefin, yellowfin, bigeye, and skipjack tuna	Hook-and-line, and round haul nets	21	20	7,018,606	\$4,660,835
Swordfish	Swordfish	Harpoon, entangling nets	26	25	1,421,308	\$4,238,893

Market Category Groupings ¹	Primary Species Targeted	Primary Gear	Fishermen ⁴ 2007 ³	Vessels ⁴ 2007 ³	Average Annual Landings (lbs)	Average Annual Ex-vessel(\$) ²
Pacific bonito	Pacific bonito	Round haul nets, hook-and-line	13	13	822,058	\$250,639
Sharks and skates	Shortfin mako, Thresher, Soupfin, Spiny dogfish, Leopard, Shovelnose guitarfish, Skates	Hook-and-line, trawl, entangling nets	49	51	180,294	\$204,156
White seabass	White seabass	Entangling nets, hook-and-line	18	21	131,454	\$280,857
California halibut	California halibut	Trawl, hook-and-line, entangling nets	67	61	119,248	\$521,628
Dover sole Thornyhead Sablefish	Dover sole, Longspine thornyhead, Shortspine thornyhead, Sablefish	Trawl nets, hook-and-line	13	23	108,635	\$333,116
California yellowtail	California yellowtail	Hook-and-line, round haul nets	24	23	51,113	\$63,370
croaker	White	Entangling nets, hook-and-line, round haul nets	10	9	42,291	\$32,709
sheephead	California sheephead	Traps, and hook-and-line	10	12	23,883	\$101,247
Shelf rockfish	Shelf rockfish	Hook-and-line, entangling nets	8	10	23,606	\$47,923
Nearshore fishes	Nearshore rockfish, Cabezon	Hook-and-line, trap	19	22	22,421	\$62,128
Sole	English, Petrale, Rex	Trawl nets	15	15	16,799	\$16,933
Slope rockfish	Slope rockfish	Hook-and-line	6	16	13,487	\$25,147
Unidentified rockfish	Miscellaneous rockfish	Hook-and-line	3	4	10,189	\$16,213
Smelt	Silversides, jack, and top smelt	Round haul nets	8	7	6,837	\$5,558
Sanddabs	Pacific sanddabs, Speckled sanddabs, Longfin, sanddabs	Hook-and-line	6	7	6,188	\$23,504
Other fish	Miscellaneous fish	Miscellaneous gear	59	58	3,903	\$2,304
Lingcod	Lingcod	Hook-and-line, trap, and entangling net	10	10	1,348	\$2,859
Surf Perch	Barred, and black	Hook-and-line, trawl	4	5	945	\$2,075
Ocean whitefish	Ocean whitefish	Hook-and-line, entangling nets	4	4	852	\$1,356
Angel shark	Pacific angel shark	Miscellaneous gears	7	6	763	\$545
Salmon	Chinook salmon	Hook-and-line	0	0	487	\$1,243
Other flatfish	Other flatfishes	Miscellaneous gear	1	1	110	\$80
White shark	White shark	Miscellaneous nets	0	0	100	\$613

Source: Data compiled from the Commercial Fishery Information System data base (extract date: May 2, 2008).

¹ Market Category Groupings are listed in descending order by average annual landings within the county.

² Average ex-vessel revenue were calculated by applying an inflationary figure to each of the ten years (1998-2007).

³ Commercial license year from April 1 through March 31 the following calendar year.

⁴ Fishermen and vessels may fish more than one market category grouping.

Table D-6. Los Angeles County invertebrate fisheries by average annual landings, 1998-2007

Market Category Groupings ¹	Primary Species Targeted	Primary Gear	Number of Fishermen ⁴ 2007 ³	Number of Vessels ⁴ 2007 ³	Average Annual Landings (lbs)	Average Annual Ex-vessel (\$) ²
INVERTEBRATES						
Market squid	Market squid	Round haul nets, and brail	77	61	53,017,529	\$10,344,472
Sea urchin	Red, purple, and white sea urchins	Hand harvest	25	19	2,189,611	\$2,253,215
Sea cucumber	Warty and giant red sea cucumbers	Hand harvest, and trawl	18	12	137,818	\$171,016
Spiny lobster	Spiny lobster	Traps	41	42	113,511	\$984,101
Rock crab	Brown, red, and yellow rock crab	Traps	26	28	80,907	\$131,887
Spot prawn	Spot prawn	Traps	7	7	38,158	\$408,163
Spider crab	Spider crab	Traps	23	25	30,975	\$38,071
Kellet's whelk	Kellet's whelk	Hand harvest	25	27	27,173	\$19,212
Ridgeback prawn	Ridgeback prawns	Traps	2	2	23,234	\$36,302
Other inverts	All invertebrates with small amount of landings		24	24	2,315	\$2,636

Source: Data compiled from the Commercial Fishery Information System data base (extract date: May 2, 2008).

¹ Market Category Groupings are listed in descending order by average annual landings within the county.

² Average ex-vessel revenue were calculated by applying an inflationary figure to each of the ten years (1998-2007).

³ Commercial license year from April 1 through March 31 the following calendar year.

⁴ Fishermen and vessels may fish more than one market category grouping.

D.4 Summary of Orange County Fisheries, 1998-2007

Table D-7. Orange County finfish fisheries by average annual landings, 1998-2007

Market Category Groupings ¹	Primary Species Targeted	Primary Gear	Fishermen ⁴ 2007 ³	Vessels ⁴ 2007 ³	Average Annual Landings (lbs)	Average Annual Ex-vessel (\$) ²
Doversole,Thornyhead,Sablefish	Dover sole, Longspine thornyhead, Shortspine thornyhead, Sablefish	Hook-and-line, and traps	11	21	112,307	\$290,235
Swordfish	Swordfish	Harpoon, entangling nets	8	8	32,536	\$204,902
Mackerel anchovy	Jack mackerel, Pacific mackerel, and Northern Anchovy	Round haul nets	3	3	32,514	\$25,595
Croaker	White	Hook-and-line, and round haul nets	2	2	29,774	\$42,812
California sheephead	California sheephead	Traps, and hook-and-line	4	4	13,292	\$56,894
Slope rockfish	Slope rockfish	Hook-and-line	11	20	8,827	\$18,936
Pacific sardine	Pacific sardine	Round haul nets	2	2	7,851	\$2,818
Sharks and skates	Shortfin mako, Thresher, Soupfin, Spiny dogfish, Leopard, Shovelnose guitarfish, Skates	Hook-and-line, and round haul nets	10	10	4,953	\$5,259
Nearshore fishes	Nearshore rockfish, Cabezon	Hook-and-line, trap	2	2	4,029	\$11,066
Shelf rockfish	Shelf rockfish	Hook-and-line, and traps	2	2	3,380	\$7,402
Tuna	Albacore tuna	Hook-and-line	0	0	2,778	\$6,938
California halibut	California halibut	Hook-and-line	7	7	2,181	\$12,883
Unidentified rockfish	Miscellaneous rockfish	Hook-and-line	0	0	1,480	\$3,431
California yellowtail	California yellowtail	Hook-and-line, round haul nets	0	0	1,046	\$2,231
Other fish	Miscellaneous fish	Miscellaneous gear	5	7	733	\$500
Sanddabs	Pacific sanddabs, Speckled sanddabs, Longfin, sanddabs	Hook-and-line	2	2	472	\$1,093
White seabass	White seabass	Hook-and-line	0	0	402	\$1,149
Ocean whitefish	Ocean whitefish	Hook-and-line	1	1	281	\$566
Smelt	Silversides, jack, and top smelt	Round haul nets	0	0	109	\$535
Sole	English, Petrale, Rex	Miscellaneous gear	8	9	102	\$229
Lingcod	Lingcod	Hook-and-line	1	1	54	\$221
Pacific bonito	Pacific bonito	Round haul nets, hook-	0	0	43	\$37

Market Category Groupings ¹	Primary Species Targeted	Primary Gear	Fishermen ⁴ 2007 ³	Vessels ⁴ 2007 ³	Average Annual Landings (lbs)	Average Annual Ex-vessel (\$) ²
		and-line				
Other flatfish	Other flatfishes	Miscellaneous gear	0	0	19	\$39
Surf perch	Barred, shiner, white, walleye	Hook-and-line, round haul nets	0	0	10	\$11
Angel shark	Pacific angel shark	Miscellaneous gears	1	1	2	\$2
White shark	White shark	N/A	0	0	0	\$0
Salmon	Chinook salmon	N/A	0	0	0	\$0

Source: Data compiled from the Commercial Fishery Information System data base (extract date: May 2, 2008).

¹ Market Category Groupings are listed in descending order by average annual landings within the county.

² Average ex-vessel revenue were calculated by applying an inflationary figure to each of the ten years (1998-2007).

³ Commercial license year from April 1 through March 31 the following calendar year.

⁴ Fishermen and vessels may fish more than one market category grouping.

Table D-8. Orange County invertebrate fisheries by average annual landings, 1998-2007

<u>Market Category Groupings¹</u>	<u>Primary Species Targeted</u>	<u>Primary Gear</u>	<u>Fishermen⁴ 2007³</u>	<u>Vessels⁴ 2007³</u>	<u>Average Annual Landings (lbs)</u>	<u>Average Annual Ex-vessel (\$)²</u>
Spiny lobster	Spiny lobster	Traps	34	30	105,233	\$928,583
Sea urchin	Red, purple, and white sea urchins	Hand harvest	7	6	79,275	\$77,855
Spot prawns	Spot prawn	Traps	5	5	33,645	\$351,540
Rock crabs	Brown, red, and yellow rock crab	Traps	11	13	30,154	\$39,506
Market squid	Market squid	Round haul nets, and brail	0	0	22,841	\$6,218
Kellet's whelk	Kellet's whelk	Hand harvest, and traps	6	7	7,745	\$4,562
Spider crab	Spider crab	Traps	9	9	4,241	\$4,667
Sea cucumbers	Warty and giant red sea cucumbers	Hand harvest	0	0	752	\$687
Ridgeback prawns	Ridgeback prawns	Traps	0	0	23	\$239
Other invertebrates	All invertebrates with small amount of landings	Miscellaneous gear	7	7	613	\$2,101

Source: Data compiled from the Commercial Fishery Information System data base (extract date: May 2, 2008).

¹ Market Category Groupings are listed in descending order by average annual landings within the county.

² Average ex-vessel revenue were calculated by applying an inflationary figure to each of the ten years (1998-2007).

³ Commercial license year from April 1 through March 31 the following calendar year.

⁴ Fishermen and vessels may fish more than one market category grouping.

D.5 Summary of San Diego County Fisheries, 1998-2007

Table D-9. San Diego County finfish fisheries by average annual landings, 1998-2007

Market Category Groupings ¹	Primary Species Targeted	Primary Gear	Fishermen ⁴ 2007 ³	Vessels ⁴ 2007 ³	Average Annual Landings (lbs)	Average Annual Ex-vessel (\$) ²
Tuna	Albacore, bluefin, yellowfin, bigeye, and skipjack tuna	Hook-and-line, and round haul nets	25	24	785,125	\$724,567
Swordfish	Swordfish	Harpoon, entangling nets	42	38	391,923	\$1,571,142
Pacific sardine	Pacific sardine	Round haul nets	1	1	214,852	\$26,166
Sharks and Skate	Shortfin mako, Thresher, Soupfin, Spiny dogfish, Leopard, Shovelnose guitarfish, Skates	Hook-and-line, trawl, round haul nets	51	45	198,006	\$298,233
Dover sole, Thronyhead, Sablefish	Dover sole, Longspine thornyhead, Shortspine thornyhead, Sablefish	Hook-and-line, and traps	9	22	131,686	\$393,791
California sheephead	California sheephead	Traps, and hook-and-line	13	12	36,671	\$162,206
Mackerel-anchovy	Jack mackerel, Pacific mackerel, and Northern Anchovy	Round haul nets	5	6	32,283	\$7,591
California halibut	California halibut	Hook-and-line	22	22	31,113	\$120,307
White seabass	White seabass	Hook-and-line	10	10	21,909	\$57,569
Slope rockfish	Slope rockfish	Hook-and-line	10	20	17,719	\$26,880
California yellowtail	California yellowtail	Hook-and-line, round haul nets	27	25	16,274	\$24,162
Shelf rockfish	Slope rockfish	Hook-and-line	20	19	9,401	\$17,279
Unidentified rockfish	Miscellaneous rockfish	Hook-and-line	8	7	6,426	\$9,716
Nearshore fishes	Nearshore rockfish, Cabezon	Hook-and-line, trap	15	15	4,299	\$15,393
Pacific bonito	Pacific bonito	Round haul nets, hook-and-line	5	5	2,421	\$2,005
Ocean whitefish	Ocean whitefish	Hook-and-line	7	7	1,289	\$1,372
Other fish	Miscellaneous fish	Miscellaneous gear	47	44	1,148	\$939
Lingcod	Lingcod	Hook-and-line	12	13	773	\$2,177
Croaker	White, queenfish	Hook-and-line, and round haul nets	0	0	477	\$484

Market Category Groupings ¹	Primary Species Targeted	Primary Gear	Fishermen ⁴ 2007 ³	Vessels ⁴ 2007 ³	Average Annual Landings (lbs)	Average Annual Ex-vessel (\$) ²
Sanddabs	Pacific sanddabs, Speckled sanddabs, Longfin, sanddabs	Hook-and-line	2	2	359	\$771
Surf perch	Barred, shiner, white, walleye	Hook-and-line, round haul nets	1	1	241	\$261
Sole	English, Petrale, Rex	Miscellaneous gear	1	1	127	\$158
Angel shark	Pacific angel shark	Miscellaneous gears	2	2	112	\$141
Smelt	Silversides, jack, and top smelt	Round haul nets	1	1	21	\$18
Other flatfish	Other flatfishes	Miscellaneous gear	1	1	4	\$8
White shark	White shark	N/A	0	0	0	\$0
Salmon	Chinook salmon	N/A	0	0	0	\$0

Source: Data compiled from the Commercial Fishery Information System data base (extract date: May 2, 2008).

¹ Market Category Groupings are listed in descending order by average annual landings within the county.

² Average ex-vessel revenue were calculated by applying an inflationary figure to each of the ten years (1998-2007).

³ Commercial license year from April 1 through March 31 the following calendar year.

⁴ Fishermen and vessels may fish more than one market category grouping.

Table D-10. San Diego County invertebrate fisheries by average annual landings, 1998-2007

Market Category Groupings ¹	Primary Species Targeted	Primary Gear	Fishermen ⁴ 2007 ³	Vessels ⁴ 2007 ³	Average Annual Landings (lbs)	Average Annual Ex-vessel (\$) ²
Sea urchin	Red, purple, and white sea urchins	Hand harvest	19	14	745,921	\$681,276
Spiny lobster	Spiny lobster	Traps	55	57	237,866	\$1,993,702
rock crab	Brown, red, and yellow rock crab	Traps	15	15	140,069	\$181,832
Spot prawn	Spot prawn	Traps	6	6	47,112	\$443,302
Market squid	Market squid	Round haul nets	2	2	14,937	\$3,439
Kellet's whelk	Kellet's whelk	Hand harvest, and traps	10	11	12,720	\$10,597
Sea cucumber	Warty and giant red sea cucumbers	Hand harvest	5	5	9,625	\$9,091
Spider crab	Spider crab	Traps	12	13	9,164	\$8,478
Ridgeback prawns	Ridgeback prawns	Traps	0	0	18	\$97
Other invertebrates	All invertebrates with small amount of landings	Miscellaneous gear	13	14	1,703	\$2,433

Source: Data compiled from the Commercial Fishery Information System data base (extract date: May 2, 2008).

¹ Market Category Groupings are listed in descending order by average annual landings within the county.

² Average ex-vessel revenue were calculated by applying an inflationary figure to each of the ten years (1998-2007).

³ Commercial license year from April 1 through March 31 the following calendar year.

⁴ Fishermen and vessels may fish more than one market category grouping.

D.6 Summary of the Santa Barbara County Landings, 1998-2007

Table D-11. Santa Barbara County finfish landings (lbs) by 10-year average, 1998-2007

Market Category Grouping	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-Year Average
California halibut	66,782	99,067	66,742	102,546	105,170	69,386	59,425	49,419	61,455	66,698	74,669
Sharks and skates	101,340	64,906	58,445	56,465	69,785	62,202	50,403	37,888	25,871	56,041	58,335
White seabass	32,465	50,169	41,116	36,364	57,067	84,768	65,642	59,371	79,817	48,008	55,479
Nearshore fishes	58,815	58,192	68,090	51,836	34,383	18,269	14,263	11,936	17,918	17,285	35,099
California sheephead	51,116	13,609	19,695	22,341	23,590	18,031	4,419	7,757	3,068	1,819	16,545
Swordfish	18,200	12,673	1,724	6,253	5,074	6,219	4,694	7,659	4,024	46,795	11,332
Salmon	27,260	2,155	980	1,446	61,547	900	11,279	3,868	274	89	10,980
Tuna	13,972	11,887	5,662	13,873	6,133	3,026	11,966	4,925	96	3,416	7,496
Angel shark	14,543	7,815	8,139	5,922	4,781	6,045	5,436	3,413	4,348	3,005	6,345
Sole	2,211	3,162	13,005	7,868	13,770	2,595	7,986	154	387	692	5,183
Shelf rockfish	14,976	8,208	3,592	1,251	2,286	642	5,571	3,918	5,140	4,607	5,019
Unidentified rockfish	18,965	13,140	4,312	2,766	2,687	2,074	579	209	47	105	4,488
Ocean whitefish	8,388	5,073	2,251	4,096	2,317	2,364	1,160	2,283	1,083	421	2,944
Lingcod	4,916	2,779	769	1,636	2,228	3,440	2,389	1,536	1,279	840	2,181
California yellowtail	3,873	3,882	1,275	177	815	1,078	2,325	1,354	1,424	434	1,664
Mackerel-anchovy	4,138	21	6,696	11	21	8	7	3	15	127	1,105
Pacific bonito	473	216	327	48	395	1,235	2,954	302	3,433	51	943
Dover sole, Thornyhead, Sablefish	56	887	54	148	82	105	1,241		513	3,515	660
Slope rockfish	1	151	98		71	1,108	1,522	40		64	306
Croaker	699	506	382	393	177	79	60	83		39	242

Market Category Grouping	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-Year Average
Sanddabs	193	12	418	359	235	89	158	25		97	159
Surf perch	86	17	16		153	330	2	5	30		64
All other fish	1,464	1,209	1,024	1,459	1,126	940	706	709	573	604	981

Source: Data was compiled from the DFG Commercial Fishery Information System database (extract date: May 2, 2008)

Note: 2007 data is preliminary

Table D-12. Santa Barbara County invertebrate landings (lbs) by 10-year average, 1998-2007

Market Category Grouping	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-Year Average
Sea Urchin	3,259,767	4,547,920	2,360,326	2,184,572	3,249,303	4,333,122	5,872,821	5,877,381	5,486,331	5,822,469	4,299,401
Market Squid	43,542	43,392	2,483,758	1,572,467	1,092,773	1,163,832	884,706	784,960	84	2,284	807,180
Rock crab	612,899	445,750	477,153	512,128	637,329	679,142	556,216	641,490	710,203	700,395	597,271
Ridgeback prawns	374,926	1,215,581	1,132,439	180,708	272,262	301,196	43,232	17,288	24,031	51,466	361,313
Sea cucumbers	111,793	157,104	67,474	277,218	337,206	265,411	238,620	197,458	140,699	129,334	192,232
Spiny lobster	145,851	124,356	132,804	174,177	211,553	214,129	221,542	190,861	179,269	133,830	172,837
Kellet's whelk	13,669	26,538	24,843	21,967	13,626	23,606	23,295	8,186	107,032	66,832	32,959
Spider crab	38,801	20,339	9,866	11,285	17,493	20,117	20,593	9,949	27,135	17,813	19,339
Spot prawn	34,228	44,082	30,133	15,973	25,847	5,630	3,617	5,130	11,072	15,294	19,101
All Other Invertebrates	3,405	8,853	7,491	681	4,086	6,129	2,724	12,258	2,724	2,043	5,039

Source: Data was compiled from the DFG Commercial Fishery Information System database (extract date: May 2, 2008)

Note: 2007 data is preliminary

D.7 Summary of the Ventura County Landings, 1998-2007

Table D-13. Ventura County finfish landings (lbs) by 10-year average, 1998-2007

Market Category Grouping	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-Year Average
Pacific sardine	1,956,655	5,473,012	6,825,757	8,877,920	11,185,078	5,221,399	10,436,747	4,308,024	4,266,404	7,071,519	6,562,252
Mackerel-anchovy	3,349,309	5,240,639	8,344,143	8,778,302	1,600,159	1,466,545	6,226,916	6,852,354	9,539,976	3,925,339	5,532,368
California halibut	144,880	210,941	148,588	227,405	210,654	148,428	140,634	75,749	81,233	89,081	147,759

Appendix D: Commercial Fisheries

Market Category Grouping	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-Year Average
Pacific bonito	335,518	117,204	80,252	9	34,650	0	136,141	16,103	581,795	42,174	134,385
Tuna	144,087	34,972	41,762	41,391	388,972	390,782	45,303	32,318	143,114	47,888	131,059
Dover sole, Thornyhead, Sablefish	84,611	48,670	127,076	168,632	72,846	84,586	90,902	105,091	105,909	84,016	97,234
White seabass	5,657	26,079	28,430	35,872	95,224	86,668	109,291	78,904	104,833	227,204	79,816
Swordfish	164,746	53,437	81,195	47,095	59,001	47,238	36,835	1,034	22,228	41,005	55,381
Sharks and skates	63,781	59,066	73,341	53,040	44,426	52,157	49,791	33,736	41,415	52,927	52,368
Slope rockfish	180,590	21,082	19,589	32,347	34,553	54,810	33,697	31,837	36,772	11,675	45,695
California sheephead	86,424	36,691	38,952	54,091	32,108	31,235	31,276	15,935	18,703	10,109	35,552
Shelf Rockfish	180,050	29,322	11,099	7,156	4,443	1,427	10,187	7,801	11,030	7,863	27,038
Croakers	4,709	3,181	25,541	35,252	14,269	22,651	5,154	10,415	33,613	25,417	18,020
Nearshore fishes	28,525	35,206	37,670	28,451	18,943	5,299	11,727	3,407	3,135	4,307	17,667
Angel shark	32,686	38,492	25,003	16,837	17,492	12,275	8,432	8,290	9,778	5,272	17,456
Sole	12,598	9,011	12,470	31,790	9,775	6,623	6,991	4,656	21,305	38,298	15,352
Unidentified rockfish	57,070	18,179	9,233	3,766	1,671	260	1,099	816	1,332	382	9,381
California yellowtail	6,901	7,478	5,361	1,699	9,976	2,051	907	1,668	866	3,138	4,005
Ocean whitefish	5,525	4,267	4,730	3,874	1,680	1,085	824	729	1,306	2,641	2,666
Salmon	11,834	573	220	299	3,971		746	176		215	1,803
Lingcod	5,720	1,692	448	1,674	831	1,010	2,034	391	438	655	1,489
Sandabs	2,738	1,363	1,207	1,677	776	467	5,470	12	104	1,057	1,487
Surf perch	14	788	270	34	19	12	241	144	487	108	212
All other fish	2,356	2,982	3,384	3,378	1,950	2,706	2,444	1,571	2,432	2,066	2,527

Source: Data was compiled from the DFG Commercial Fishery Information System database (extract date: May 2, 2008)

Note: 2007 data is preliminary

Table D-14. Ventura County invertebrate landings (lbs) by 10-year average, 1998-2007

Market Category Grouping	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-Year Average
Market Squid	5,799,950	140,901,486	145,002,569	84,619,803	39,527,026	42,744,307	49,682,338	47,577,595	25,426,752	80,160,618	66,144,244
Sea urchin	2,390,414	3,116,984	2,365,666	1,353,495	1,628,148	2,137,200	2,258,663	2,274,265	2,349,840	2,304,835	2,217,951
Sea cucumber	441,472	270,853	478,172	260,438	438,181	346,373	208,302	277,754	179,497	204,183	310,523
Rock crab	159,802	66,423	121,958	159,039	159,065	203,946	254,560	203,617	177,338	229,162	173,491
Ridgeback prawn	52,638	170,598	294,025	129,210	163,678	186,927	15,652	30,897	134,485	214,862	139,297
Spiny lobster	70,866	57,288	71,301	79,774	82,909	89,284	104,450	101,454	108,117	87,546	85,299
Spot prawn	210,062	159,940	90,745	89,802	54,017	24,291	32,663	43,931	61,534	60,135	82,712
Spider crab	14,013	10,424	14,821	15,921	16,735	26,253	29,009	16,666	11,195	14,799	16,984
Kellet's whelk	348	3,238	2,410	1,632	1,159	1,019	2,216	1,854	1,144	1,731	1,675
Other invert	2,724	6,810	8,853	4,767	5,448	7,491	2,724	7,491	1,362	6,810	5,448

Source: Data was compiled from the DFG Commercial Fishery Information System database (extract date: May 2, 2008)

Note: 2007 data is preliminary

D.8 Summary of the Los Angeles County Landings, 1998-2007

Table D-15. Los Angeles County finfish landings (lbs) by 10-year average, 1998-2007

Market Category Grouping	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-Year Average
Pacific sardine	69,152,351	85,947,696	86,263,897	89,866,542	86,655,046	53,822,780	52,224,069	53,236,434	59,002,589	94,703,314	73,087,472
Mackeral-anchovy	41,270,125	24,038,077	53,263,123	30,745,967	12,277,192	9,724,737	9,209,361	11,651,142	16,758,434	13,787,672	22,272,583
Tuna	31,433,930	19,291,159	6,131,935	2,682,242	2,402,161	2,386,091	2,208,475	2,526,112	299,874	824,084	7,018,606
Swordfish	477,104	1,815,169	3,033,697	2,740,986	2,122,967	2,327,068	1,344,829	69,562	174,236	107,462	1,421,308
Pacific bonito	2,147,710	72,852	13,041	902	8,084	2,663	639,209	5,784	4,885,635	444,697	822,058
Sharks and skates	204,148	267,864	206,928	207,053	229,813	207,383	78,899	105,443	113,587	181,820	180,294
White seabass	89,961	140,552	99,909	87,684	182,239	206,482	100,116	96,382	155,762	155,457	131,454

Market Category Grouping	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-Year Average
California halibut	143,013	218,701	190,829	125,131	144,938	92,216	112,318	62,837	55,932	46,563	119,248
Dover sole Thornyhead Sablefish	52,326	106,643	78,673	51,828	78,453	129,315	176,762	175,577	100,921	135,856	108,635
California yellowtail	197,741	41,783	77,031	61,279	54,049	18,752	25,092	4,991	23,319	7,093	51,113
croaker	27,689	79,104	88,240	51,560	57,056	48,000	19,624	24,652	15,011	11,974	42,291
sheephead	62,971	28,113	28,991	28,689	22,556	18,421	15,786	11,357	15,133	6,811	23,883
Shelf rockfish	104,968	39,457	11,520	10,449	7,438	1,268	13,176	18,010	12,137	17,637	23,606
Nearshore fishes	79,475	36,679	23,131	22,969	14,896	11,048	10,073	12,340	5,744	7,853	22,421
Sole	38,419	22,969	14,018	15,730	8,926	12,818	17,134	20,357	8,438	9,181	16,799
Slope rockfish	16,728	4,013	8,261	21,421	21,230	25,234	21,780	6,589	5,185	4,432	13,487
Unidentified rockfish	80,761	13,054	2,919	2,776	991	162	237	596	34	355	10,189
Smelt	766	1,289	7,299	19,284	12,981	9,214	11,324	3,399	182	2,633	6,837
Sanddabs	3,628	8,056	10,957	13,295	12,938	3,165	1,978	884	3,341	3,640	6,188
Other fish	4,318	5,423	4,930	3,723	4,420	3,298	4,080	3,451	2,754	2,635	3,903
Lingcod	2,570	776	1,047	1,280	358	613	1,735	1,788	1,210	2,098	1,348
Surf Perch	636	459	2,817	526	2,143	912	362	354	1,095	145	945
Ocean whitefish	3,808	348	414	1,826	537	207	315	232	359	477	852
Angel shark	1,783	581	788	1,117	749	277	437	66	1,590	237	763
Salmon	469	87	267	703	366	275	2,705	0	0	0	487
Other flatfish	13	103	56	123	95	3	0	707	2	0	110
White shark	60	0	0	0	50	61	422	350	56	0	100

Source: Data was compiled from the DFG Commercial Fishery Information System database (extract date: May 2, 2008) Note: 2007 data is preliminary

Table D-16. Los Angeles County invertebrate landings (lbs) by 10-year average, 1998-2007

Market Category Grouping	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-Year Average
Market squid	501,600	61,045,584	98,662,148	86,355,527	62,082,214	16,985,383	23,156,830	70,207,733	81,702,131	29,476,139	53,017,529
Sea urchin	1,067,681	2,747,457	4,916,417	4,519,167	2,689,246	1,432,081	1,742,620	1,093,645	934,451	753,345	2,189,611
Sea cucumber	203,195	133,782	89,511	169,413	155,449	137,488	103,146	88,085	149,532	148,576	137,818

Market Category Grouping	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-Year Average
Spiny lobster	134,728	80,835	105,555	108,572	95,734	120,384	137,611	123,334	116,901	111,457	113,511
Rock crab	80,558	38,015	54,294	76,393	75,328	72,596	76,872	71,700	75,666	187,645	80,907
Spot prawn	58,030	48,042	30,561	26,730	13,471	14,721	42,149	49,820	48,001	50,054	38,158
Spider crab	35,827	21,013	20,398	25,306	34,034	56,565	35,806	28,236	26,706	25,861	30,975
Kellet's whelk	10,415	7,928	8,908	10,513	27,659	43,361	33,221	58,657	21,505	49,565	27,173
Ridgeback prawn	6,344	3,151	135,996	52,830	3,705	8,690	282	10,004	1,844	9,496	23,234
Other inverts	681	4,767	3,405	2,043	2,043	6,129	681	681	1,362	1,362	2,315

Source: Data was compiled from the DFG Commercial Fishery Information System database (extract date: May 2, 2008) Note: 2007 data is preliminary

D.9 Summary of the Orange County Landings, 1998-2007

Table D-17. Summary of Orange County finfish landings (lbs) sorted by 10-year average, 1998-2007

Market Category Grouping	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-Year Average
Dover sole, Thornyhead, Sablefish	91,986	131,163	107,095	96,652	84,783	174,843	186,713	67,894	54,461	127,480	112,307
Swordfish	13,526	47,146	37,967	29,977	49,545	42,480	25,817	27,432	29,561	21,907	32,536
Mackerel anchovy	101,964	16,745	33,859	32,051	17,729	18,369	14,072	43,295	34,046	13,007	32,514
Croaker	16,643	34,238	33,736	35,308	67,438	45,721	14,221	13,786	16,867	19,786	29,774
California sheephead	18,800	18,321	26,798	7,325	15,326	11,889	8,502	6,078	10,884	8,994	13,292
Slope rockfish	3,617	846	2,312	2,749	23,893	13,881	13,264	4,908	12,415	10,382	8,827
Pacific sardine	6,962	2,287	345	795	3,440	1,349	754	240	41,381	20,953	7,851
Sharks and skates	5,858	2,643	2,524	2,166	1,937	6,820	5,457	7,321	6,388	8,413	4,953
Nearshore fishes	20,328	9,688	2,072	1,993	3,503	465	1,001	75	974	188	4,029
Shelf rockfish	10,389	6,542	3,376	4,444	1,128	787	5,426	831	79	802	3,380
Tuna	2,076	838	732	7,615	11,979	2,780	495	640	621	0	2,778
California halibut	934	336	606	110	3,720	2,831	3,459	3,109	3,227	3,475	2,181
Unidentified rockfish	8,261	2,550	1,477	310	1,569	17	36	561	20	0	1,480
California yellowtail	6,537	732	1,245	1,092	0	0	58	103	695	0	1,046

Market Category Grouping	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-Year Average
Other fish	816	833	714	510	816	833	1,224	612	408	561	733
Sanddabs	113	806	232	638	1,095	590	338	173	575	162	472
White seabass	401	1,323	510	208	472	1,109	0	0	0	0	402
Ocean whitefish	107	1,023	320	676	22	217	127	312	0	7	281
Smelt	3	36	0	0	0	201	854	0	0	0	109
Sole	37	0	7	42	239	229	13	1	190	257	102
Lingcod	45	262	91	0	134	0	0	0	7	5	54
Pacific bonito	133	0	11	0	0	0	0	0	285	0	43
Other flatfish	30	26	45	0	82	2	0	0	0	0	19
Surf perch	0	0	1	0	0	93	2	0	0	0	10
Angel shark	0	0	0	0	0	0	0	0	0	23	2
White shark	0	0	0	0	0	0	0	0	0	0	0
Salmon	0	0	0	0	0	0	0	0	0	0	0

Source: Data was compiled from the DFG Commercial Fishery Information System database (extract date: May 2, 2008) Note: 2007 data is preliminary

Table D-18. Orange County invertebrate landings (lbs) by 10-year average, 1998-2007

Market Category Grouping	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-Year Average
Spiny lobster	107,872	84,671	125,233	98,070	98,010	81,222	90,919	100,085	149,241	117,006	105,233
Sea urchin	16,589	19,271	115,053	137,228	124,403	98,658	118,108	70,598	19,644	73,195	79,275
Spot prawns	43,995	44,978	21,431	40,697	28,967	26,134	28,506	36,511	35,034	30,194	33,645
Rock crabs	25,542	11,632	31,927	56,206	22,025	35,195	29,881	29,270	40,609	19,254	30,154
Market squid	150	386	200	0	650	121,888	933	0	104,199	0	22,841
Kellet's whelk	3,321	2,218	4,375	5,398	9,646	10,569	11,726	11,327	11,259	7,609	7,745
Spider crab	2,777	2,918	4,163	5,588	4,946	5,728	4,544	6,516	3,145	2,081	4,241
Sea cucumbers	0	5,494	347	0	761	623	288	5	0	0	752
Ridgeback prawns	2	0	0	230	0	0	0	0	0	0	23
Other inverts	681	0	1,362	1,362	0	2,043	681	0	0	0	613

Source: Data was compiled from the DFG Commercial Fishery Information System database (extract date: May 2, 2008)

Note: 2007 data is preliminary

D.10 Summary of the San Diego County Landings, 1998-2007**Table D-19. San Diego County finfish landings (lbs) by 10-year average, 1998-2007**

Market Category Grouping	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-Year Average
Tuna	2,698,361	2,388,053	449,172	554,031	599,675	895,975	215,516	21,144	19,225	10,100	785,125
Swordfish	491,511	614,661	500,289	361,966	330,399	276,272	236,723	253,898	455,161	398,347	391,923
Pacific Sardine	450,702	1,209,193	42,258	450	199,448	61,930	97,990	47,420	39,032	94	214,852
Sharks and Skate	243,097	199,720	211,587	232,417	216,277	228,843	123,682	190,895	165,596	167,947	198,006
Dover sole, Thronyhead, Sablefish	137,266	47,786	30,023	120,166	256,420	189,554	62,417	141,686	196,345	135,194	131,686
California sheephead	38,890	29,631	57,657	35,463	26,536	28,305	26,539	47,279	36,626	39,784	36,671
Mackerel-anchovy	111,130	35,958	13,536	9,824	12,750	37,388	450	42,156	58,774	864	32,283
California halibut	33,122	41,046	55,572	50,183	18,356	19,046	24,054	30,748	20,612	18,390	31,113
White seabass	4,101	7,327	16,421	6,336	17,158	46,438	18,601	52,565	33,112	17,027	21,909
Slope rockfish	7,408	2,399	2,802	1,552	30,676	44,085	41,716	14,476	23,069	9,006	17,719
California yellowtail	29,500	12,639	25,122	17,163	10,625	8,618	18,444	13,259	13,834	13,537	16,274
Shelf rockfish	15,096	21,281	6,778	4,883	8,811	1,562	9,232	8,262	9,637	8,466	9,401
Unidentified rockfish	39,211	19,547	1,862	822	317	272	466	321	375	1,071	6,426
Nearshore fishes	4,583	3,997	6,595	13,523	5,339	817	2,533	1,509	2,202	1,893	4,299
Pacific bonito	8,089	555	1,879	185	739	1,403	1,842	831	7,151	1,531	2,421
Ocean whitefish	5,996	475	1,265	961	807	237	1,278	973	423	472	1,289
Other fish	1,003	884	1,071	850	1,258	1,309	1,207	1,020	1,530	1,343	1,148
Lingcod	368	684	42	96	701	1,581	1,520	681	847	1,212	773
Croaker	394	1,262	114	1,710	718	574	0	0	0	0	477
Sanddabs	715	905	1,428	68	0	160	0	0	49	263	359
Surf perch	0	262	568	1,175	140	30	0	229	0	1	241
Sole	2	326	365	213	249	16	0	0	97	5	127
Angel shark	515	67	346	0	22	45	0	13	27	83	112
Smelt	0	0	0	0	0	0	0	0	137	68	21
Other flatfish	0	25	0	1	0	0	0	0	12	3	4

Market Category Grouping	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-Year Average
White shark	0	0	0	0	0	0	0	0	0	0	0
Salmon	0	0	0	0	0	0	0	0	0	0	0

Source: Data was compiled from the DFG Commercial Fishery Information System database (extract date: May 2, 2008)

Note: 2007 data is preliminary

Table D-20 San Diego County invertebrate landings (lbs) by 10-year average, 1998-2007

Market Category Grouping	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-Year Average
Sea urchin	448,412	582,278	644,464	788,973	1,018,903	891,704	881,415	743,482	822,143	637,440	745,921
Spiny lobster	195,168	138,868	270,810	234,240	212,368	229,475	303,707	246,355	335,733	211,935	237,866
Rock crab	81,914	62,880	272,074	228,893	166,602	187,964	131,929	104,319	89,693	74,425	140,069
Spot prawn	28,722	36,640	36,684	47,463	31,888	33,337	57,340	71,108	73,708	54,229	47,112
Market squid	4,974	9,000	76,794	24,174	0	0	31,402	0	2,997	29	14,937
Kellet's whelk	534	2,234	1,857	1,413	779	217	232	25,659	49,486	44,793	12,720
Sea cucumber	13,198	29,117	6,408	1,365	12,892	6,706	9,257	10,505	0	6,799	9,625
Spider crab	7,369	13,354	6,487	4,349	4,275	6,841	7,117	6,761	16,747	18,343	9,164
Ridgeback prawns	0	184	0	0	0	0	0	0	0	0	18
Other inverts	2,043	1,362	0	2,043	681	2,043	2,724	3,405	1,362	1,362	1,703

Source: Data was compiled from the DFG Commercial Fishery Information System database (extract date: May 2, 2008)

Note: 2007 data is preliminary

D.11 Profile of Major Commercial Fisheries in the South Coast Study Region

Fishery: California Halibut—Bottom Trawl

Species Targeted: California halibut (*Paralichthys californicus*)

Primary depth range: 10 to 300 feet (2 to 50 fathoms)

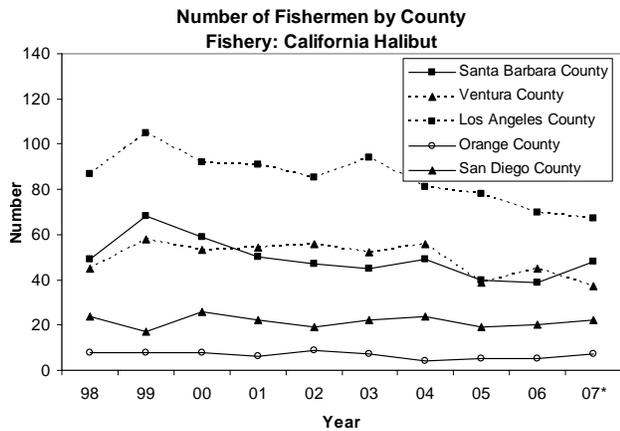
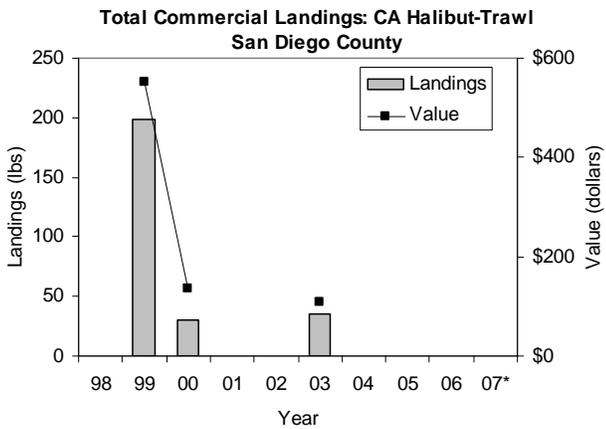
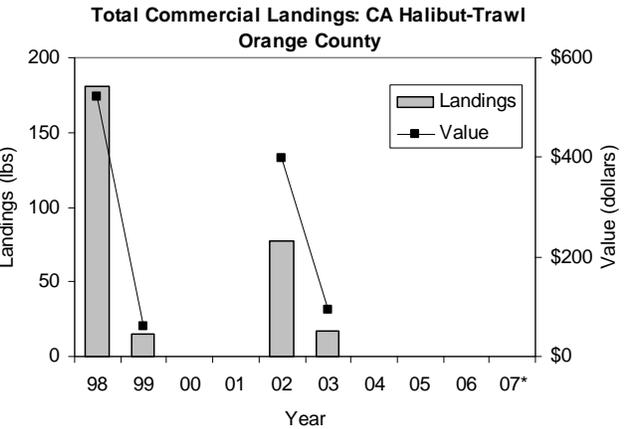
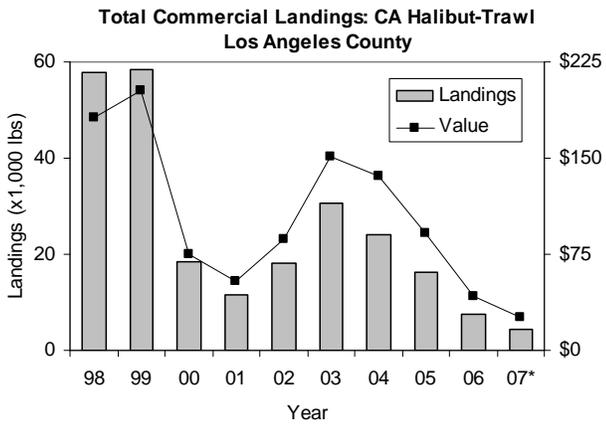
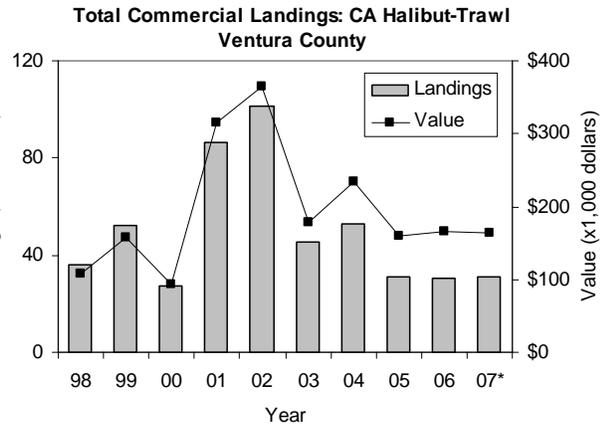
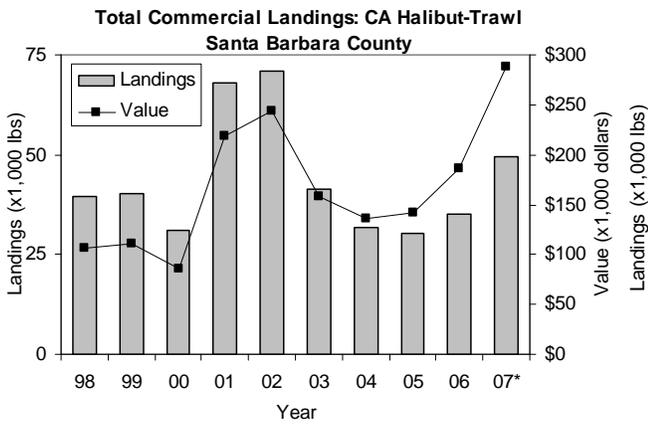
Primary habitat type(s): Soft Bottom

Primary gear: Bottom Trawl

Primary area of fishery: State waters (x) Federal waters (x)

Synopsis of commercial regulations applicable to the south coast study region: Bottom trawling for California halibut is permitted in federal waters (3–200 nautical miles (nm) offshore) year round using trawl nets with a minimum mesh size of 4.5 in, except within the federal non-groundfish trawl Rockfish Conservation Area and Cowcod conservation Areas. For information about the federal trawl RCA and CCAs including federal groundfish seasons, trip limits and other regulations visit this web site: www.nwr.noaa.gov. Trawling is prohibited within all state waters (0–3 nautical miles offshore), except within the designated "California halibut trawl grounds" which encompass the area between Point Arguello (Santa Barbara County) and Point Mugu (Ventura County) in waters beyond one nm from mainland shore. Bottom trawl gear used in this area must have a minimum mesh size of 7.5 in., and trawling is closed from March 15 to June 15 to protect spawning adults.

Landings and ex-vessel values by county: Data were compiled from the Commercial Fisheries Information System database (extraction date: 23 July 2008). Market receipt data were the primary source of catch location information for the commercial fisheries covered in the regional profile. These data are reported by DFG block areas which are 100 square nautical miles in size. Reported ex-vessel values are adjusted to 2007 dollars to account for inflation. The number of fishermen reflects the number of fishermen who have made at least one landing for that fishery, port area and year. In all the following charts, * indicates that 2007 data are preliminary.



Fishery: California Halibut—Set Net

Species Targeted: California halibut (*Paralichthys californicus*)

Primary depth range: 10 to 300 feet (2 to 50 fathoms)

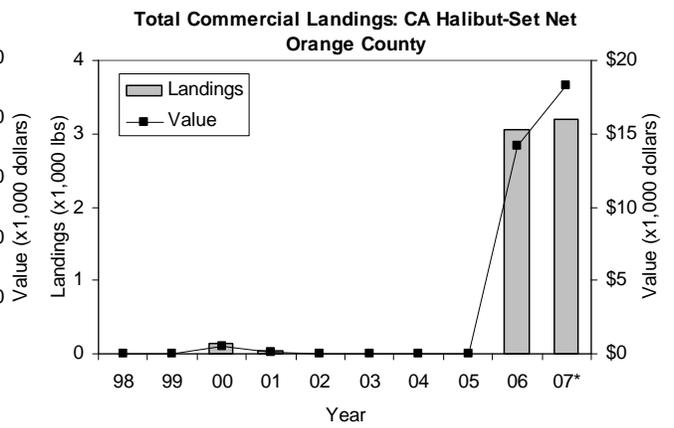
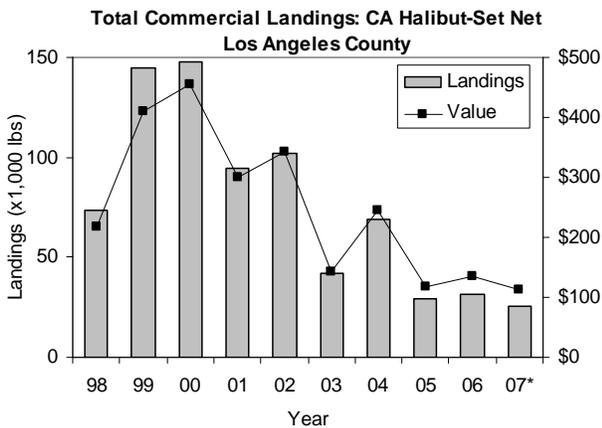
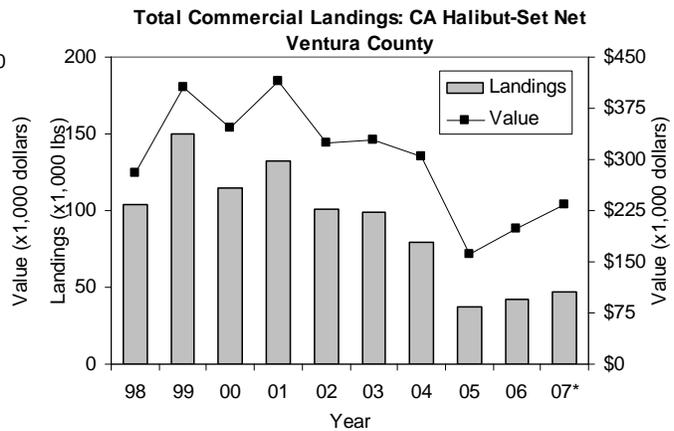
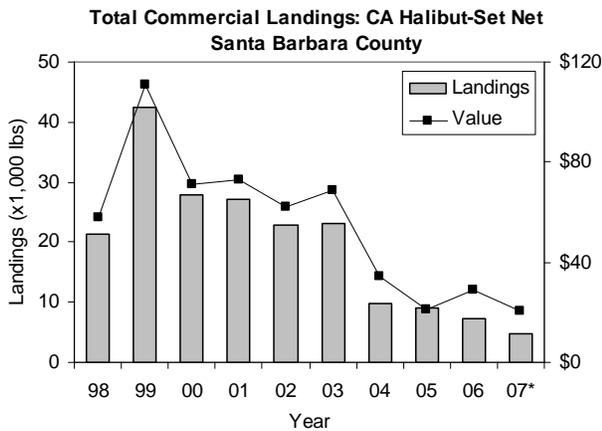
Primary habitat type(s): Soft bottom

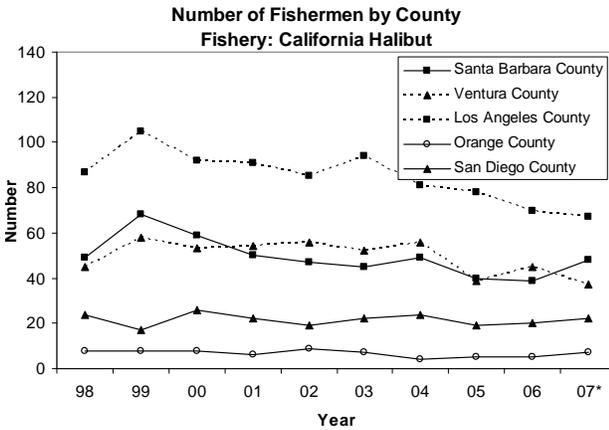
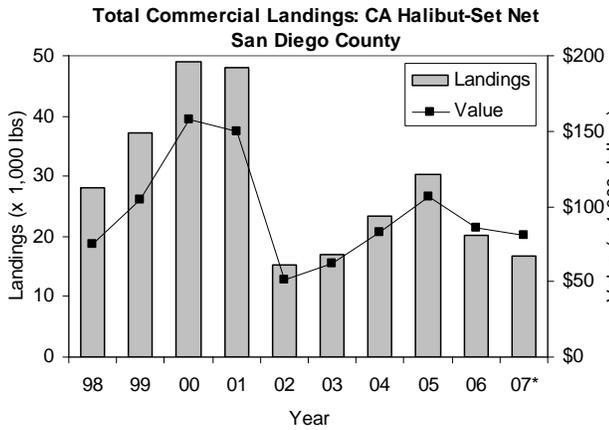
Primary Gear: Gill and trammel net

Primary area of fishery: State waters () Federal waters (x)

Synopsis of commercial regulations applicable to the south coast study region: Gill and trammel nets are prohibited in state waters along the mainland within the study region and in waters less than 70 fathoms (fm) or within 1 nm, whichever is less, around the Channel Islands. Currently, the mesh size must be at least 8.5 in. to harvest California halibut.

Landings and ex-vessel values by county: Data were compiled from the Commercial Fishery Information System database (extraction date: 23 July 2008). Market receipt data were the primary source of catch location information for the commercial fisheries covered in the regional profile. These data are reported by DFG block areas which are 100 square nautical miles in size. Values are adjusted to account for inflation. The number of fishermen reflects the number of fishermen who have made at least one landing for that fishery, port area and year. In all the following charts, * indicates that 2007 data are preliminary.





Fishery: California Halibut—Hook-and-Line

Species Targeted: California halibut (*Paralichthys californicus*)

Primary depth range: 10 to 300 feet (2 to 50 fathoms)

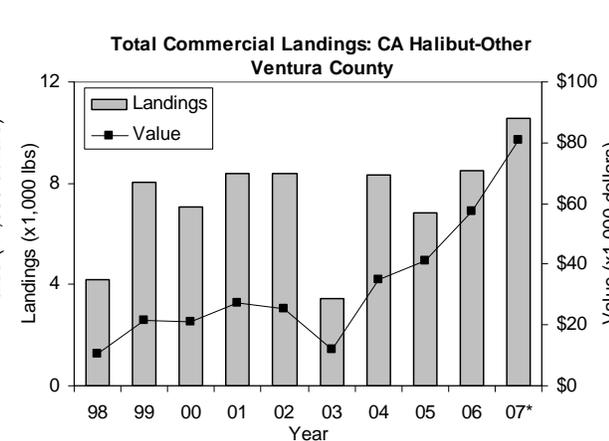
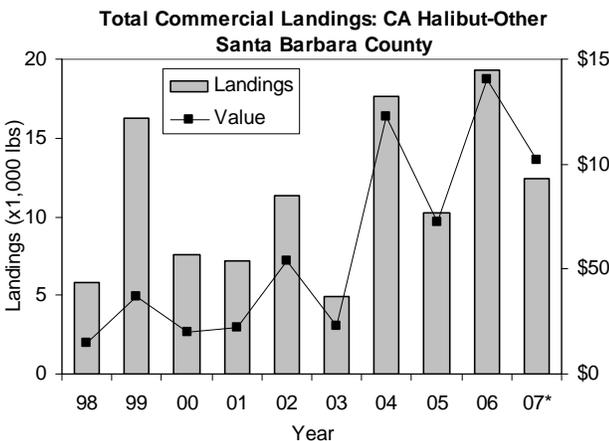
Primary habitat type(s): Soft bottom

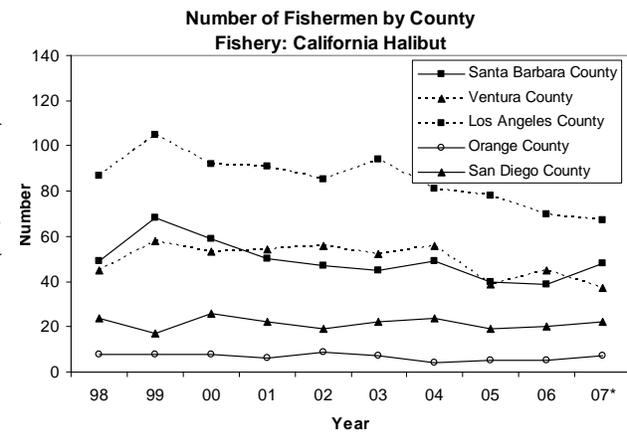
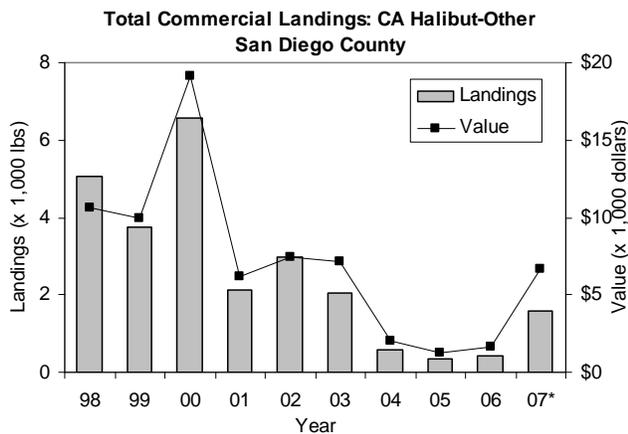
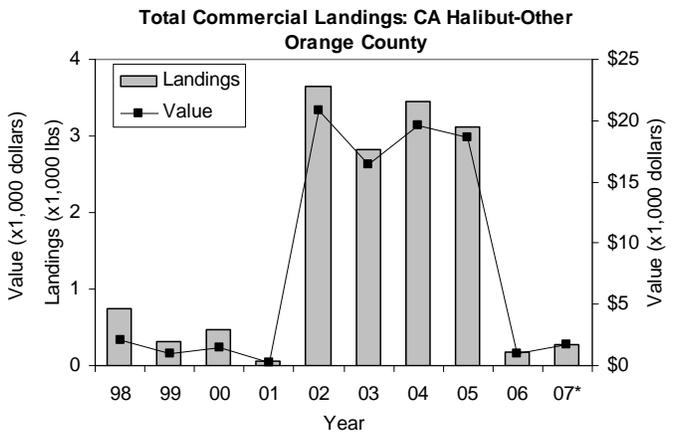
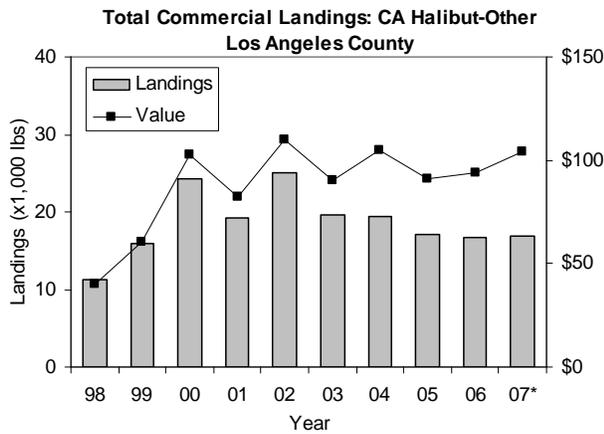
Primary Gear: Hook-and-line

Primary area of fishery: State waters (x) Federal waters ()

Synopsis of commercial regulations applicable to the south coast study region: Historically, commercial catches of California halibut by hook-and-line gear have been insignificant when compared to the total pounds landed annually by trawl and set net fisheries. However, over the last decade, hook-and-line catches of halibut have ranged from 11% to 23% of annual commercial landings, with the majority of those landings made in the San Francisco area. Commercial fishing laws prohibit the take of California halibut, unless the fish is 22 inches or greater in total length.

Landings and ex-vessel values by county: Data were compiled from the Commercial Fishery Information System database (extraction date: 23 July 2008). Market receipt data were the primary source of catch location information for the commercial fisheries covered in the regional profile. These data are reported by DFG block areas which are 100 square nautical miles in size. Values are adjusted to account for inflation. The number of fishermen reflects the number of fishermen who have made at least one landing for that fishery, port area and year. In all the following charts, * indicates that 2007 data are preliminary.





Fishery: California sheephead

Species Targeted: California sheephead (*Semicossyphus pulcher*)

Primary depth range: 10 to 280 feet (2 to 47 fathoms)

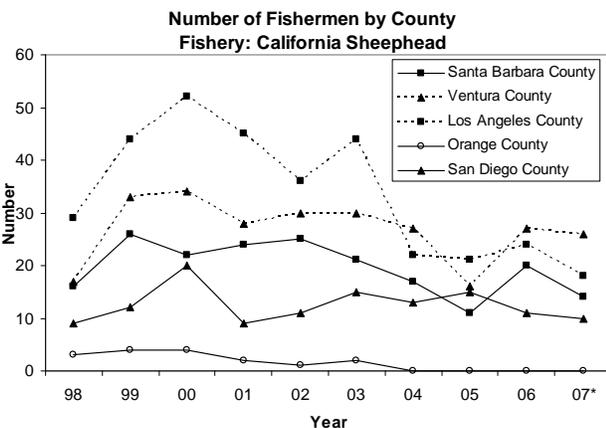
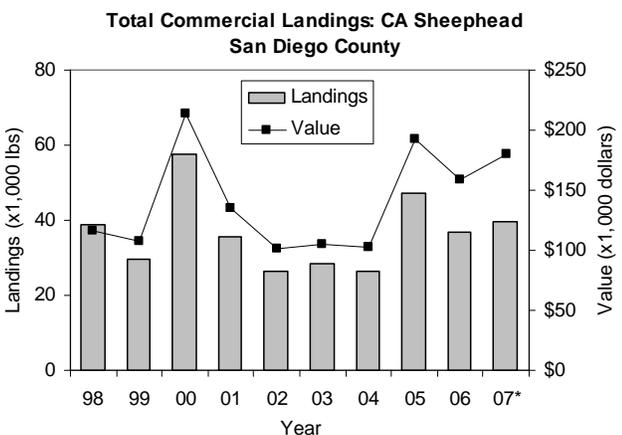
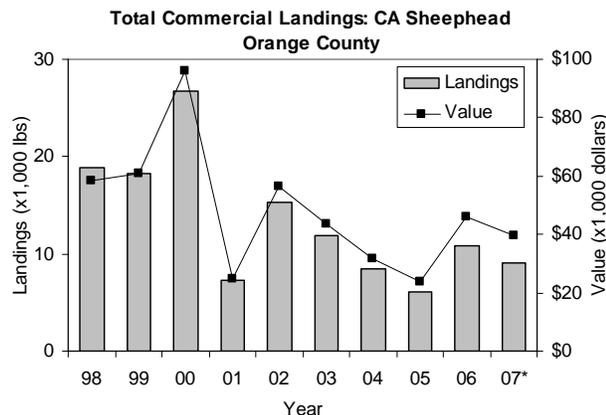
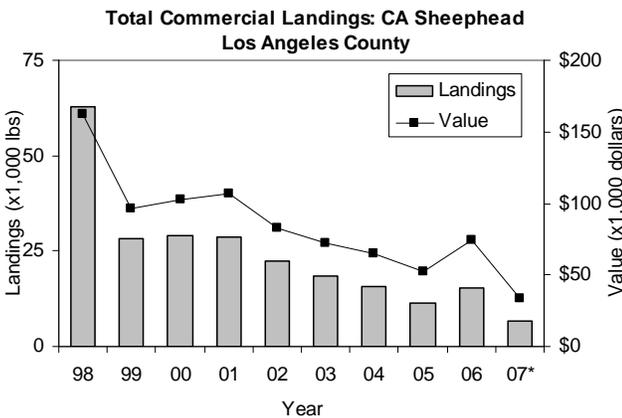
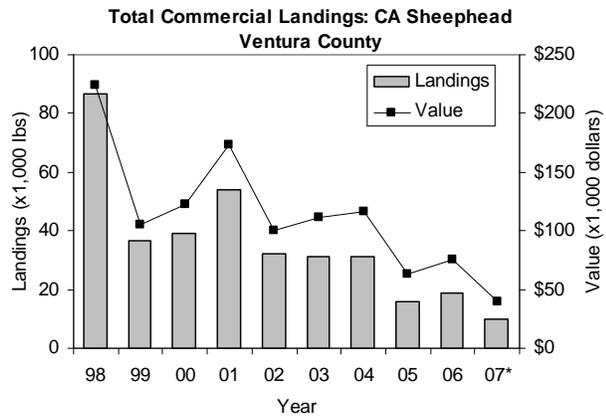
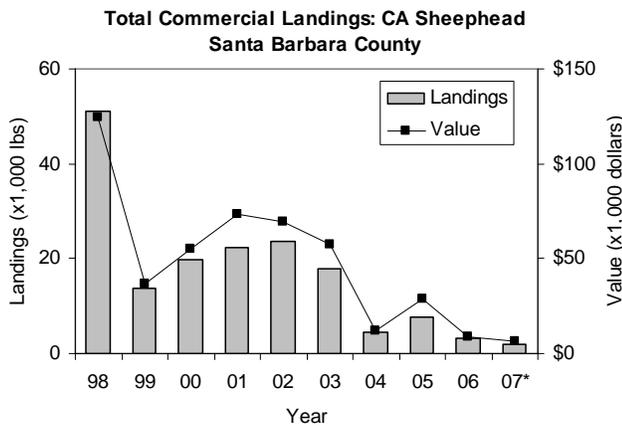
Primary habitat type(s): Reef/kelp areas

Primary gear: Trap

Primary area of fishery: State waters (x) Federal waters (x)

Synopsis of commercial regulations applicable to the south coast study region: Commercial fishermen must possess a nearshore fishery permit to take California sheephead. Beginning in 2004, two month cumulative trip limits set by the state went into effect for the commercial California sheephead fishery in an effort to sustain it throughout the year. The California sheephead fishery has a two month cumulative trip limit set at 2,000 pounds for the January/February period, closed March/April, and thereafter 2,400 pounds for each of the remaining two-month periods per nearshore fishery permit holder.

Landings and ex-vessel values by county: Data were compiled from the Commercial Fisheries Information System database (extraction date: 23 July 2008). Market receipt data were the primary source of catch location information for the commercial fisheries covered in the regional profile. These data are reported by DFG block areas which are 100 square nautical miles in size. Reported ex-vessel values are adjusted to 2007 dollars to account for inflation. The number of fishermen reflects the number of fishermen who have made at least one landing for that fishery, port area and year. In all the following charts, * indicates that 2007 data are preliminary.



Fishery: California Spiny Lobster

Species Targeted: California Spiny Lobster (*Panulirus interruptus*)

Primary depth range: 12 to 300 feet (2 to 50 fathoms)

Primary habitat type(s): Rocky reefs

Primary gear: Trap

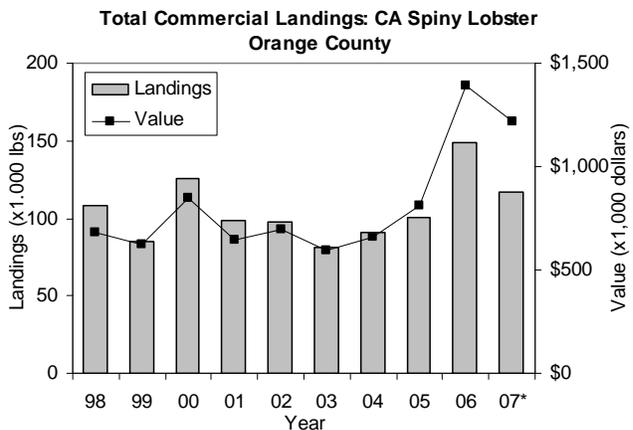
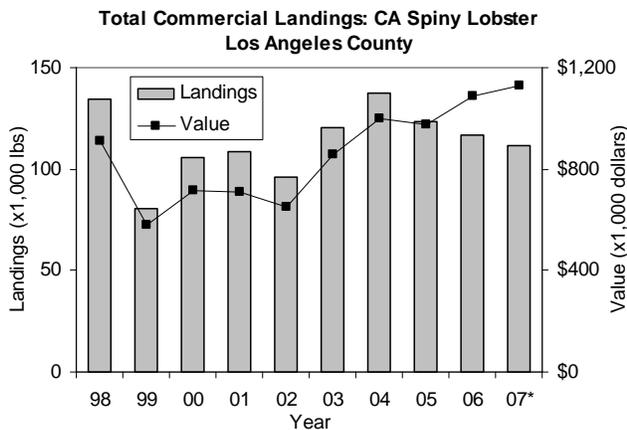
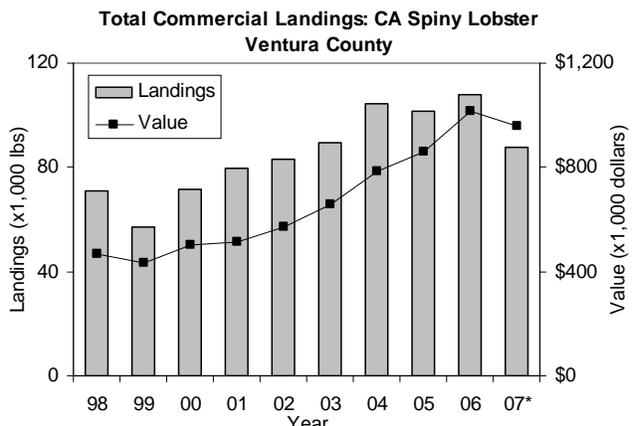
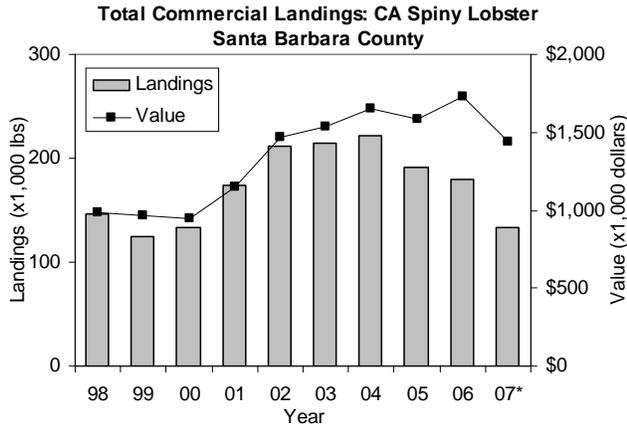
Primary area of fishery: State waters (x) Federal waters ()

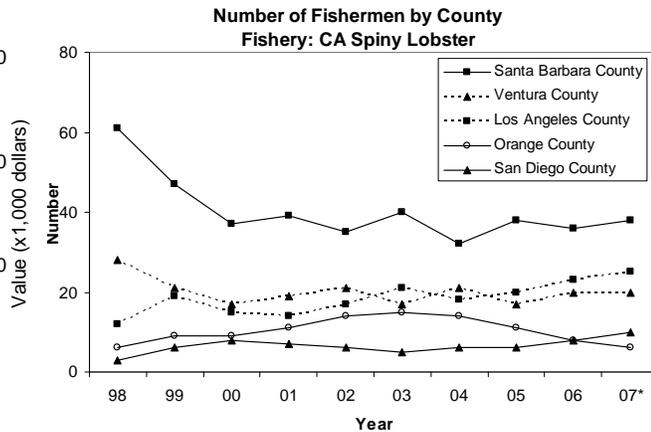
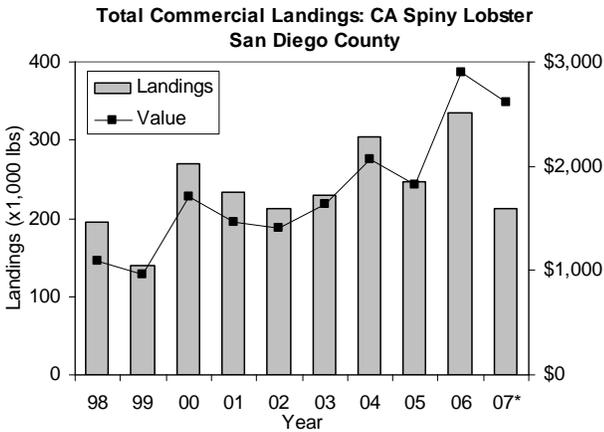
Synopsis of commercial regulations applicable to the south coast study region: A restricted access program for spiny lobster was initiated in 1996. The program currently provides for two types of permits: a restricted access lobster operator permit and an unrestricted lobster crewmember permit. A lobster operator permit, which is non-transferable, is required for the

commercial take of spiny lobster. A lobster crewmember permit is required to assist an operator. Any licensed fisherman may buy a lobster crewmember permit; however, an operator permit is only issued to fishermen who held a permit in the previous season.

The commercial lobster fishery runs from early October through mid-March. A size limit of 3.25 in. carapace length (CL), measured from the rear edge of the eye socket to the rear edge of the body shell, measured along the midline. Lobster traps must have at least one escape port (measuring 2.38 in. x 11.5 in.). Escape ports effectively minimize the retention of undersized lobsters, and have been required since the 1976-1977 season. Lobster traps must have a destruct device that is approved by the Department of Fish and Game (DFG) to ensure that lost or abandoned traps do not continue to capture marine life indefinitely.

Landings and ex-vessel values by county: Data were compiled from the Commercial Fisheries Information System database (extraction date: 02 May 2008). Market receipt data were the primary source of catch location information for the commercial fisheries covered in the regional profile. These data are reported by DFG block areas which are 100 square nautical miles in size. Reported ex-vessel values are adjusted to 2007 dollars to account for inflation. The number of fishermen reflects the number of fishermen who have made at least one landing for that fishery, port area and year. In all the following charts, * indicates that 2007 data are preliminary.





Fishery: Coastal Pelagic Finfish Species (CPFS)

Species Targeted:

- Pacific sardine (*Sardinops sagax*),
- Northern anchovy (*Engraulis mordax*),
- Pacific mackerel (*Scomber japonicus*),
- Jack mackerel (*Trachurus symmetricus*)

Pacific bonito (*Sarda chiliensis*)

Primary depth range: 60 to 300 feet (10 to 50 fathoms)

Primary habitat type(s): Coastal pelagic,

Primary gear: Roundhaul (purse and drum seines)

Primary area of fishery: State waters (x) Federal waters (x)

Synopsis of commercial regulations applicable to the south coast study region: This fishery is federally managed with guidance from the Pacific Fishery Management Council (PFMC) Coastal Pelagic Species (CPS) Fishery Management Plan (FMP). The plan dictates methods for stock assessment, quota limits, restricted access and harvest allocation.

Pacific Sardine: The season is open from January 1 through December 31. Harvest guidelines for 2007 were set at 167,123 short tons. Harvest follows an allocation scheme where 35% of the total allowable harvest is allocated coast wide on January 1, 40% of the harvest guideline, plus any portion not harvested from the initial allocation is reallocated coastwide on July 1, and on September 15 the remaining 25%, plus any portion not harvested from earlier allocations, is reallocated.

Pacific Mackerel: The season is open from July 1 through June 30. The harvest guideline for 2006-2007 fishing season was 21,869 short tons.

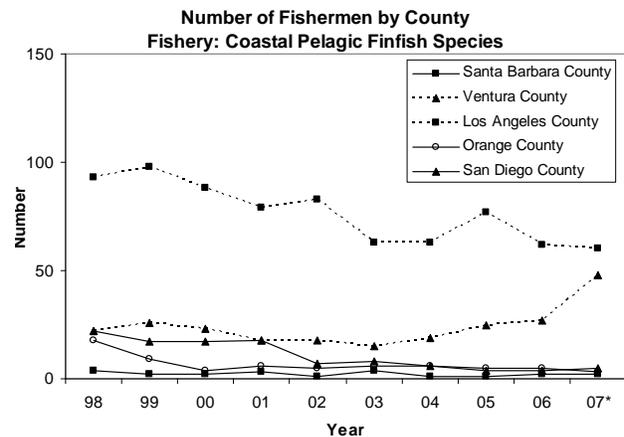
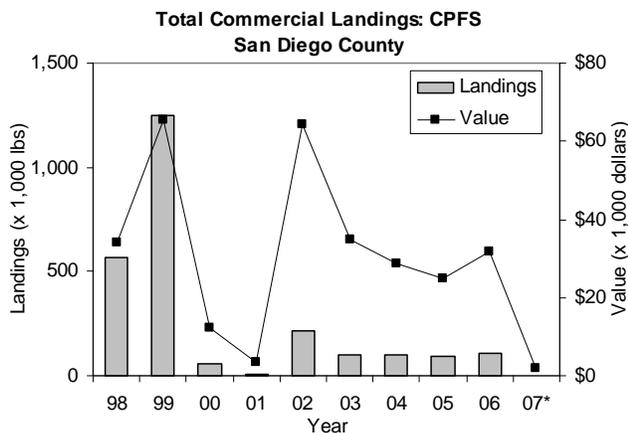
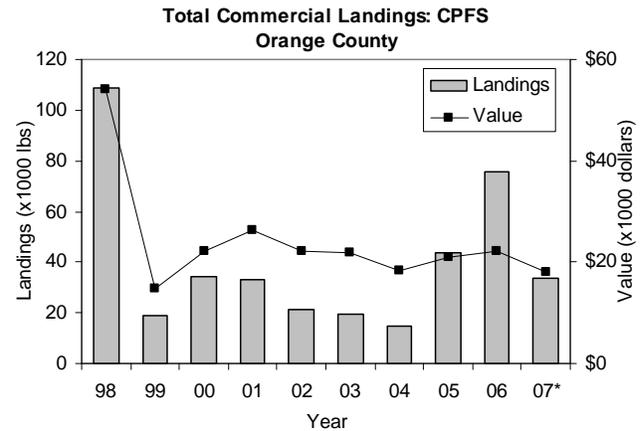
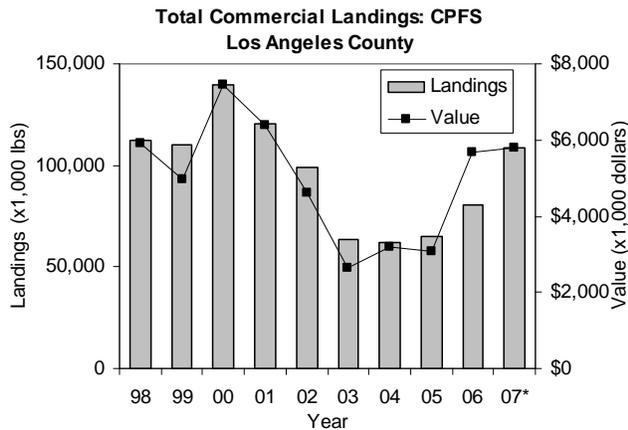
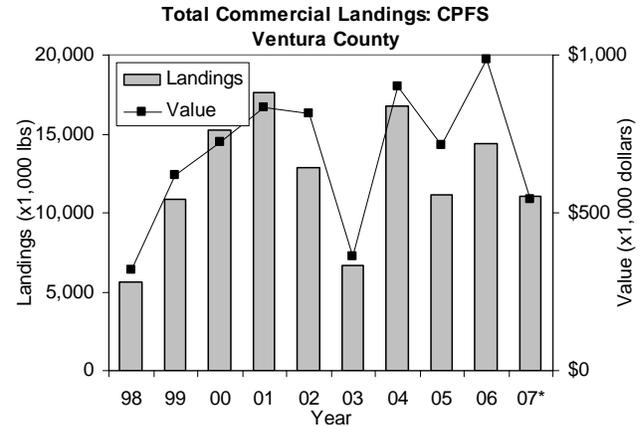
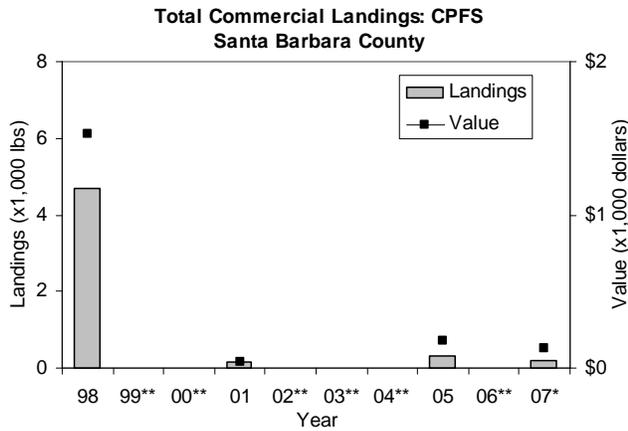
Northern Anchovy: This species is considered a monitored species meaning that it has been determined not to need management by harvest guidelines or quotas according to provisions of the CPS FMP.

Jack Mackerel: This species is considered a monitored species under the CPS FMP. No harvest guidelines or quotas are in place for this fishery.

Pacific Bonito: This species is considered a monitored species meaning that it has been determined not to need management by harvest guidelines or quotas.

Landings and ex-vessel values by county: Data were compiled from the Commercial Fisheries Information System database (extraction date: 02 May 2008). Market receipt data were the

primary source of catch location information for the commercial fisheries covered in the regional profile. These data are reported by DFG block areas which are 100 square nautical miles in size. Reported ex-vessel values are adjusted to 2007 dollars to account for inflation. The number of fishermen reflects the number of fishermen who have made at least one landing for that fishery, port area and year. In all the following charts, * indicates that 2007 data are preliminary.



Fishery: Crab

Species Targeted:

- Brown rock crab (*Cancer antennarius*)
- Red rock crab (*Cancer. productus*)
- Yellow rock crab (*Cancer. anthonyi*)

Primary depth range: 90 to 240 feet (15 to 40 fathoms)

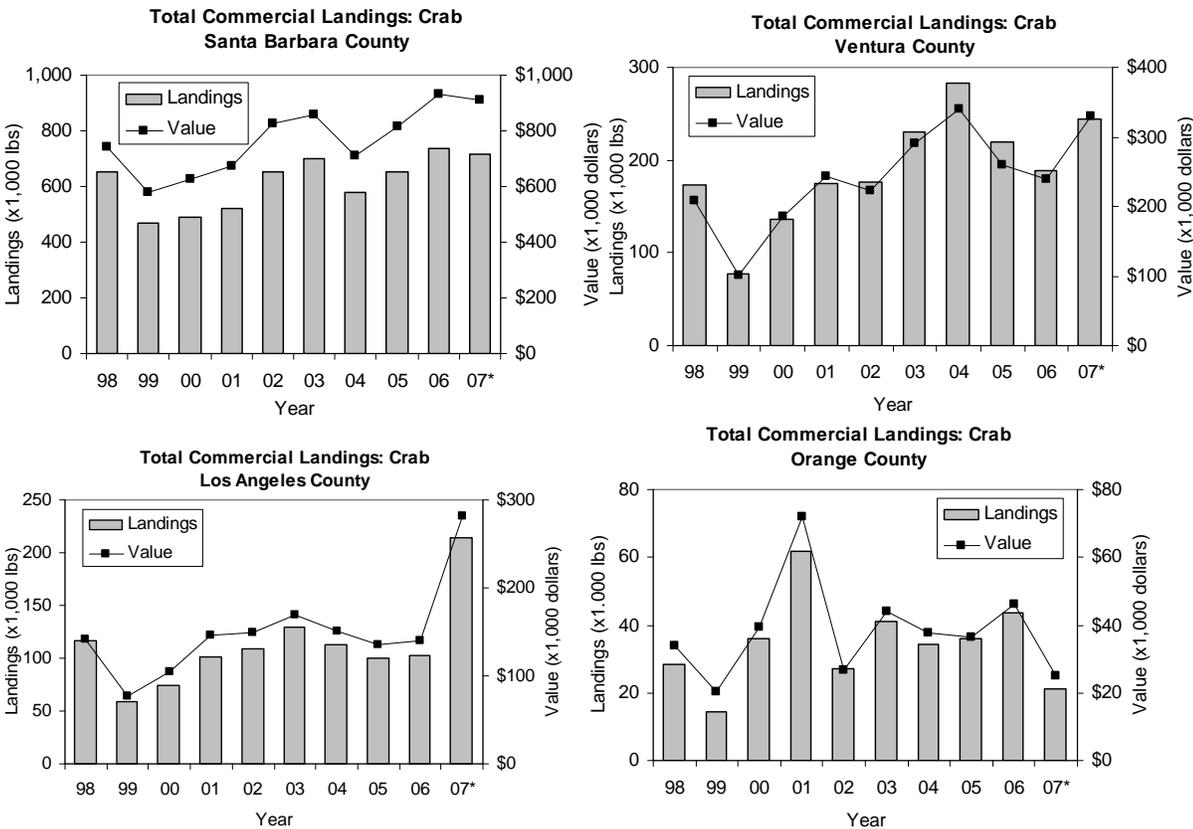
Primary habitat type(s): Sandy bottom, near rocky substrate

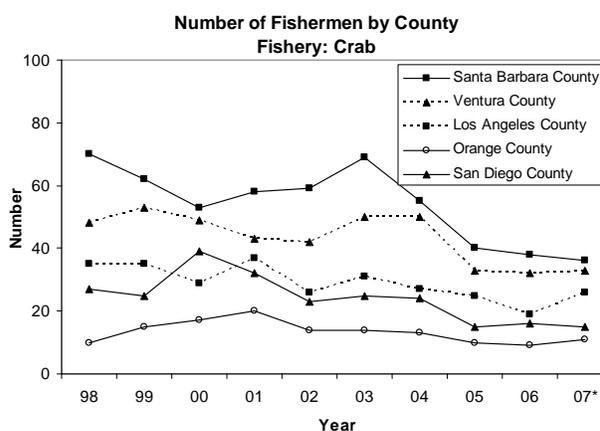
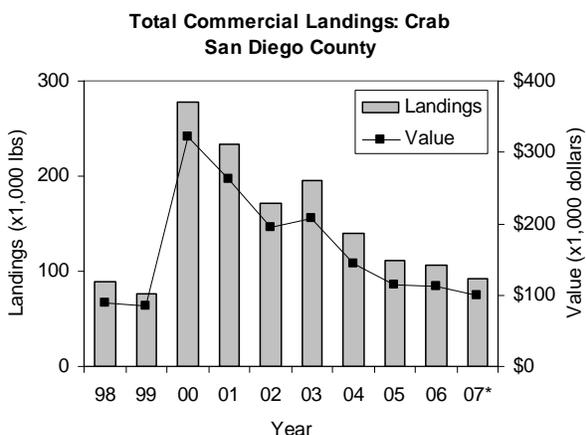
Primary gear: Trap

Primary area of fishery: State waters (x) Federal waters ()

Synopsis of commercial regulations applicable to the south coast study region: A permit system was initiated in the 2005-2006 season. Beginning with the 2006-2007 season, permits will only be issued to those holding a rock crab permit in the previous season. Only rock crab with a carapace width of at least 4.5 inches may be retained.

Landings and ex-vessel values by county: Data were compiled from the Commercial Fisheries Information System database (extraction date: 02 May 2008). Market receipt data were the primary source of catch location information for the commercial fisheries covered in the regional profile. These data are reported by DFG block areas which are 100 square nautical miles in size. Reported ex-vessel values are adjusted to 2007 dollars to account for inflation. The number of fishermen reflects the number of fishermen who have made at least one landing for that fishery, port area and year. The data includes incidental landings of sheep crab (*Loxorhynchus grandis*). In all the following charts, * indicates that 2007 data are preliminary.





Fishery: Flatfish, Other (does not include California halibut)

Species targeted:

- Pacific sanddab (*Citharichthys sordidus*)
- Longfin sanddab (*Citharichthys xanthostigma*)
- Arrowtooth flounder (*Atheresthes stomias*),
- Starry flounder (*Platichthys stellatus*),
- Bigmouth sole (*Hippoglossina stomata*)
- Butter sole (*Pleuronectes isolepis*),
- C-O sole (*Pleuronichthys coenosus*)
- English sole (*Pleuronectes vetulus*),
- Fantail sole (*Xystreureys liolepis*)
- Petrale sole (*Eopsetta jordani*),
- Rex sole (*Errex zachirus*),
- Rock sole (*Pleuronectes bilineata*),
- Sand sole (*Psettichthys melanostictus*),
- Slender sole (*Eopsetta exilis*),
- Curlfin turbot (*Pleuronichthys decurrens*),
- Diamond turbot (*Hypsopsetts guttulata*)
- Hornyhead turbot (*Pleuronichthys verticalis*),
- Spotted turbot (*Pleuronichthys ritteri*)

Primary depth range: 180 to 4,000 feet (30 to 700 fathoms)

Primary habitat type(s): Soft bottom

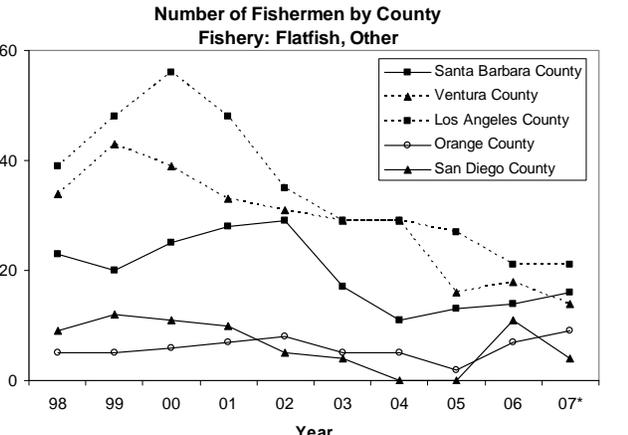
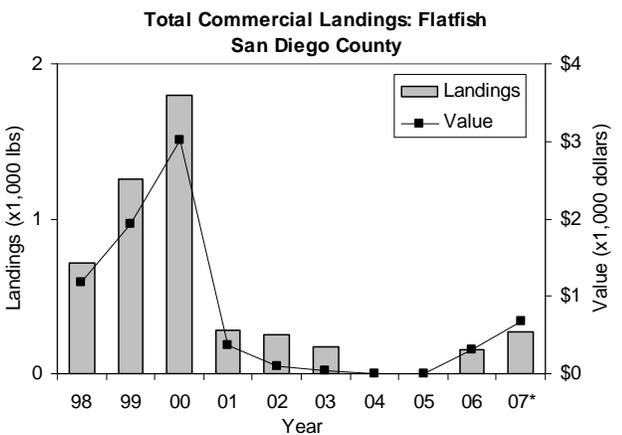
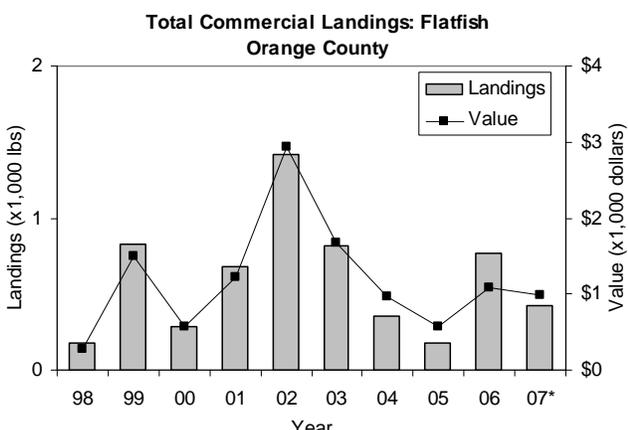
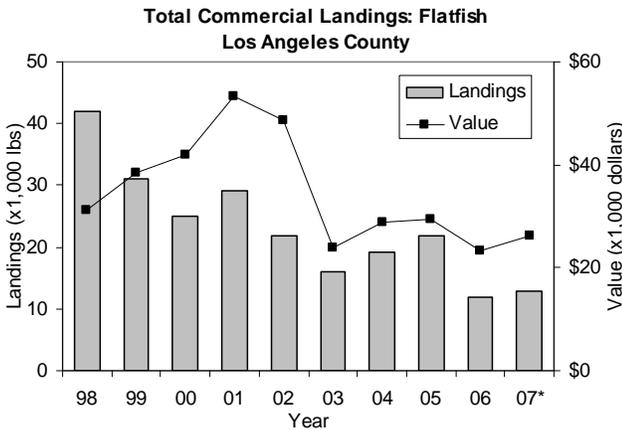
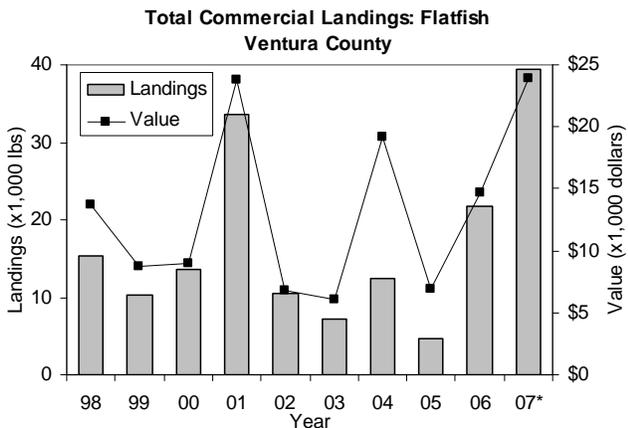
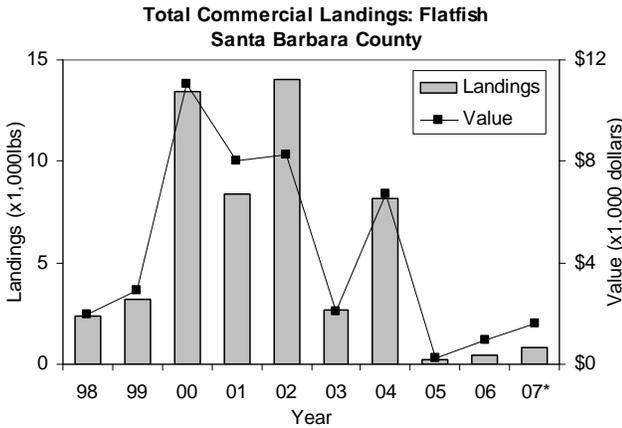
Primary gear: Bottom trawl

Primary area of fishery: State waters (x) Federal waters (x)

Synopsis of commercial regulations applicable to the south coast study region: Bottom trawling for federally managed groundfish is prohibited within the federal trawl Rockfish Conservation Area (RCA) and Cowcod Conservation Areas (CCA). For more information about the federal trawl RCA and CCAs including federal groundfish seasons, trip limits and other regulations visit this web site: www.nwr.noaa.gov.

Landings and ex-vessel values by county: Data were compiled from the Commercial Fisheries Information System database (extraction date: 02 May 2008). Market receipt data were the primary source of catch location information for the commercial fisheries covered in the regional profile. These data are reported by DFG block areas which are 100 square nautical miles in size.

Reported ex-vessel values are adjusted to 2007 dollars to account for inflation. The number of fishermen reflects the number of fishermen who have made at least one landing for that fishery, port area and year. In all the following charts, * indicates that 2007 data are preliminary.



Fishery: Kellet's Whelk

Species targeted: Kellet's whelk (*Kelletia kelletii*)

Primary depth range: 3 to 225 feet (0 to 38 fathoms)

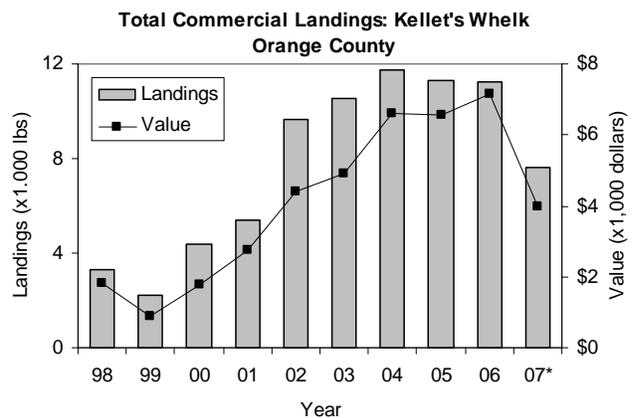
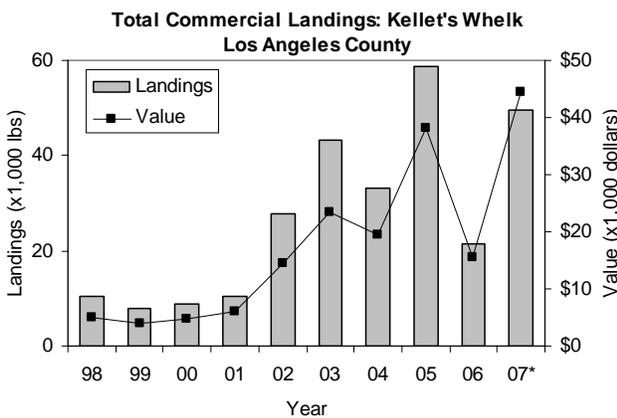
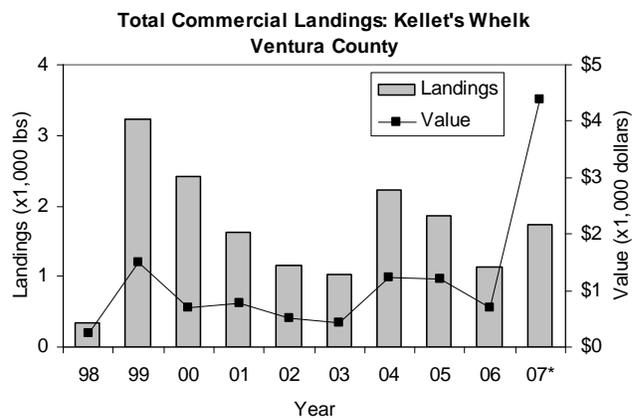
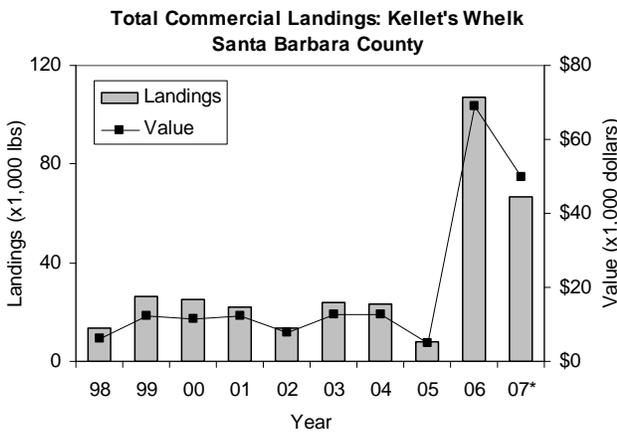
Primary habitat type(s): Rock and sand bottoms in kelp beds

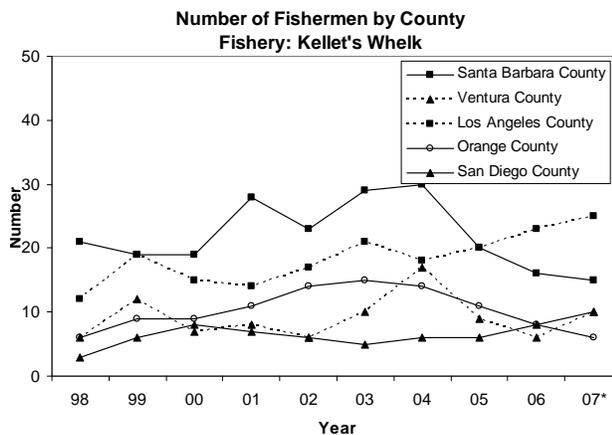
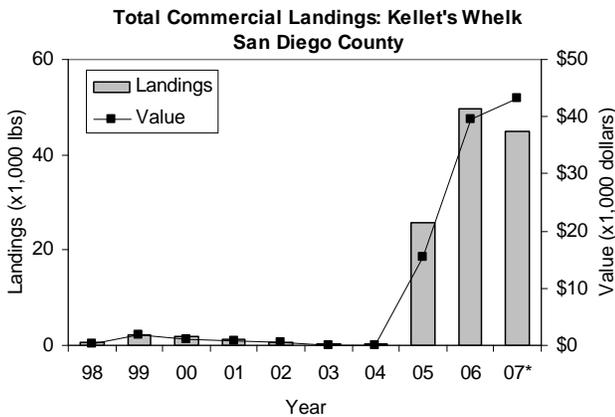
Primary gear: Trap incidental to commercial lobster or rock crab fishing

Primary area of fishery: State waters (x) Federal waters ()

Synopsis of commercial regulations applicable to the south coast study region: Commercial landings are predominantly allowed under incidental take regulations for rock crab and lobster trap fishing. Thus take by this form of fishing is restricted to those persons holding either a commercial rock crab or lobster permit. There is also a very small directed commercial dive fishery.

Landings and ex-vessel values by county: Data were compiled from the Commercial Fisheries Information System database (extraction date: 02 May 2008). Market receipt data were the primary source of catch location information for the commercial fisheries covered in the regional profile. These data are reported by DFG block areas which are 100 square nautical miles in size. Reported ex-vessel values are adjusted to 2007 dollars to account for inflation. The number of fishermen reflects the number of fishermen who have made at least one landing for that fishery, port area and year. In all the following charts, * indicates that 2007 data are preliminary.





Fishery: Market Squid

Species Targeted: Market squid (*Loligo opalescens*)

Primary depth range: 50 to 150 feet (8 to 25 fathoms)

Primary habitat type(s): Pelagic waters, inshore sandy bottoms (spawning)

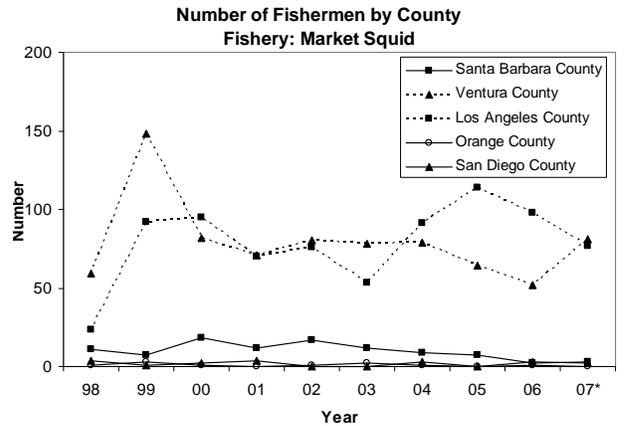
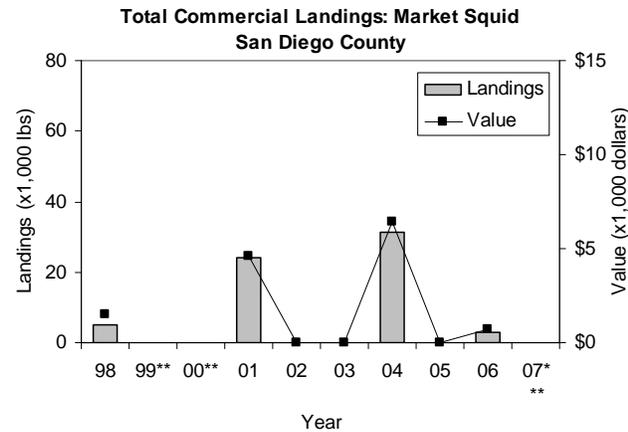
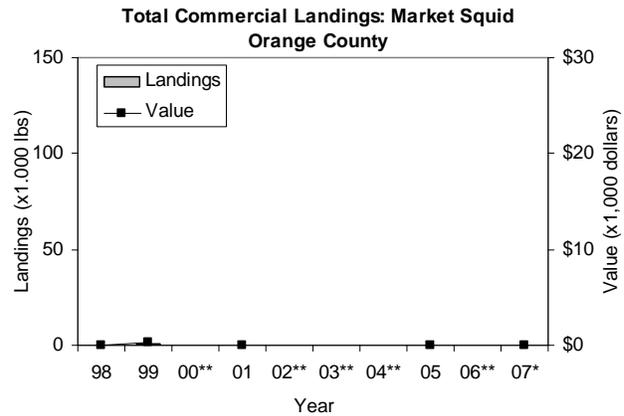
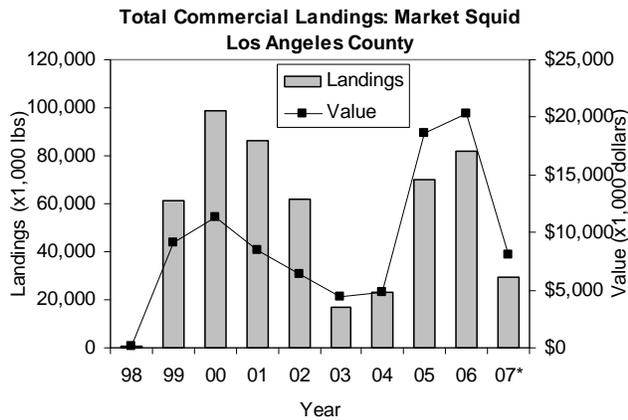
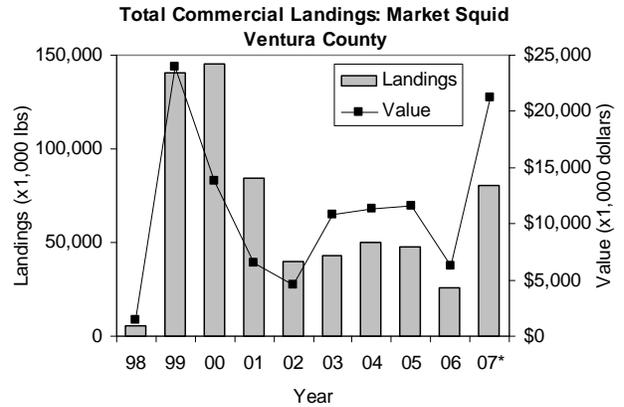
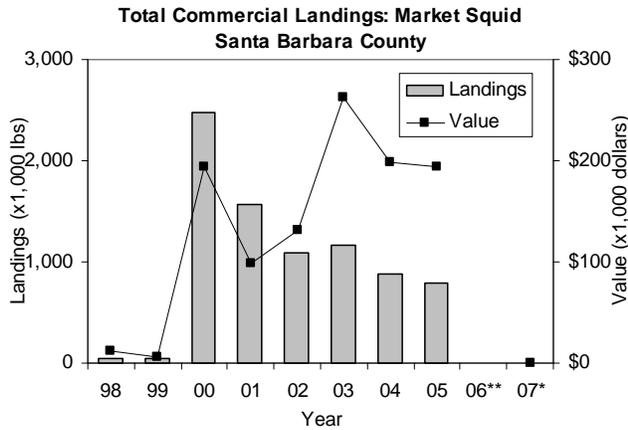
Primary gear: Roundhaul nets (Purse and Drum seines)

Primary area of fishery: State waters (x) Federal waters ()

Synopsis of commercial regulations applicable to the south coast study region: In 2004, the California Fish and Game Commission adopted a comprehensive Market Squid Fishery Management Plan (MSFMP). The season for market squid is April 1 through March 31, which reflects the term of the permit. This fishery is managed with fishery control rules. These rules include:

- Restricted access program limiting participation in the fishery.
- Statewide catch limit of 118,000 tons per season.
- Weekend closures from noon Friday to noon Sunday.
- Fishery monitoring through the use of port sampling and mandatory logbooks.
- Gear restrictions including a 30,000 wattage limit with required light shields, and various spatial closures to round haul gear for general habitat protection (Santa Monica Bay, leeward side of Catalina Island), marine protected areas with act as forage reserves and harvest replenishment areas (e.g., Channel Islands MPAs).

Landings and ex-vessel values by county: Data were compiled from the Commercial Fisheries Information System database (extraction date: 02 May 2008). Market receipt data were the primary source of catch location information for the commercial fisheries covered in the regional profile. These data are reported by DFG block areas which are 100 square nautical miles in size. Reported ex-vessel values are adjusted to 2007 dollars to account for inflation. The number of fishermen represents the number of fishermen who have made at least one landing for that fishery, port area and year. In all the following charts, * indicates that 2007 data are preliminary, and ** indicates that data cannot be disclosed due to confidentiality considerations.



Fishery: Nearshore Finfish (Permitted Fishery)

Species Targeted by Permit Type:

- Deeper nearshore permit species
 - Black rockfish (*Sebastes melanops*)
 - Blue rockfish (*Sebastes mystinus*)
 - Brown rockfish (*Sebastes auriculatus*)
 - Calico rockfish (*Sebastes dalli*)
 - Copper rockfish (*Sebastes caurinus*)
 - Olive rockfish (*Sebastes serranoides*)

- Quillback rockfish (*Sebastes maliger*)
- Treefish (*Sebastes serriceps*)
- Shallow nearshore permit species
 - Black-and-yellow rockfish (*Sebastes chrysomelas*),
 - China rockfish (*Sebastes nebulosus*)
 - Gopher rockfish (*Sebastes carnatus*),
 - Grass rockfish (*Sebastes rastrelliger*)
 - Kelp rockfish (*Sebastes atrovirens*)
 - California scorpionfish (*Scorpaena guttata*)
 - Cabezon (*Scorpaenichthys marmoratus*)
 - Kelp greenling (*Hexagrammos decagrammus*)
 - Rock greenling (*Hexagrammos lagocephalus*)
 - Monkeyface prickleback (*Cebidichthys violaceus*)

Primary depth range: 0 to 400 feet (0–67 fathoms)

Primary habitat type(s): Nearshore rocky reefs, kelp beds

Primary gear: Hook-and-line, trap

Primary area of fishery: State waters (x) Federal waters ()

Synopsis of commercial regulations applicable to the south coast study region: A

comprehensive Nearshore Fishery Management Plan (NFMP) was adopted by the California Fish and Game Commission (Commission) in May 2002. The NFMP established four management areas for the nearshore fishery; the MLPA South Coast Study Region (Point Conception to the California/Mexico border) is entirely contained within the Nearshore FMP South Coast management area. Nearshore Fishery Permits for the take of the shallow nearshore species listed above were established in 1999, and a restricted access program was implemented in 2003. Under the restricted access program, nearshore fishery permits may only be used within the management area for which they were issued. Nearshore fishery permits are both non-transferable and transferable, and allow the use of hook-and-line gear only. There is a gear endorsement for trap gear. A non-transferable permit for the deeper nearshore species listed above was established in 2003. There are no gear restrictions for the deeper nearshore species. Additionally, a non-transferable bycatch permit, established in 2003, is issued to qualified fishermen using trawl and gill net gears. This allows them to take small amounts of shallow nearshore species and is valid only for the south-central and south management areas.

Cumulative two-month trip limits are in effect for all nearshore species except monkeyface prickleback, and there is a March/April closure for that portion of the state south of 40°10' north latitude. The season may be closed early if the harvest guidelines are met or exceeded. There are year-long closures for limited-entry trawl permit holders using large footrope or midwater trawls.

The statewide harvest guideline and trip limits for minor nearshore rockfish (shallow and deeper) are set by the Pacific Fishery Management Council. The Commission sets the total allowable catch (TAC) and trip limits for cabezon, greenlings, and California sheephead. The statewide annual TAC for cabezon is 152,100 lbs with 59,300 lbs allocated for commercial harvest. The TAC for sheephead is 205,500 pounds and the commercial allocation is 75,200 pounds. The TAC for greenlings is 37,600 pounds and the commercial allocation is 3,400 pounds.

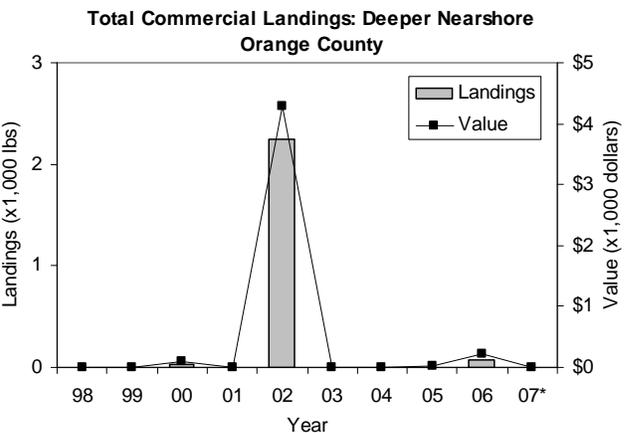
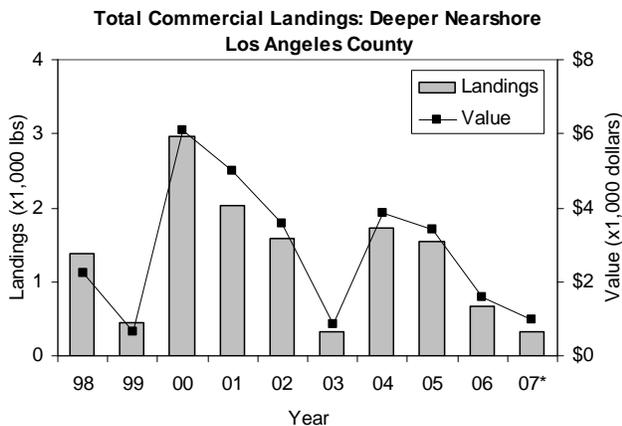
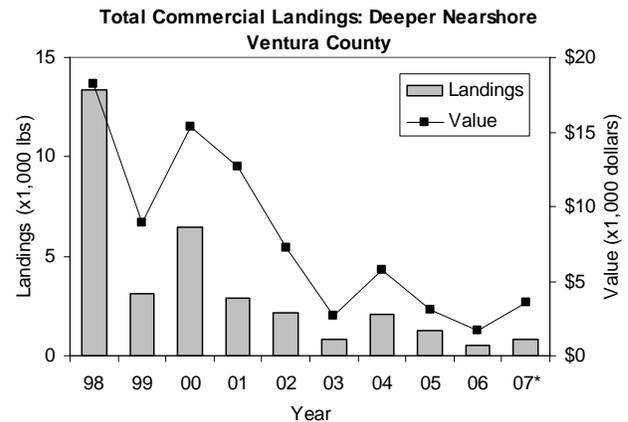
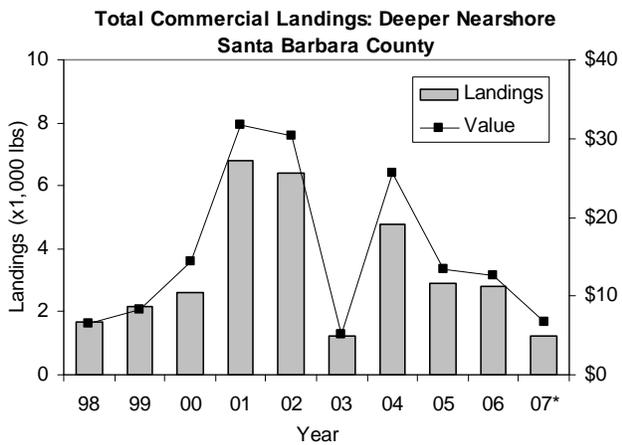
Minimum size limits:

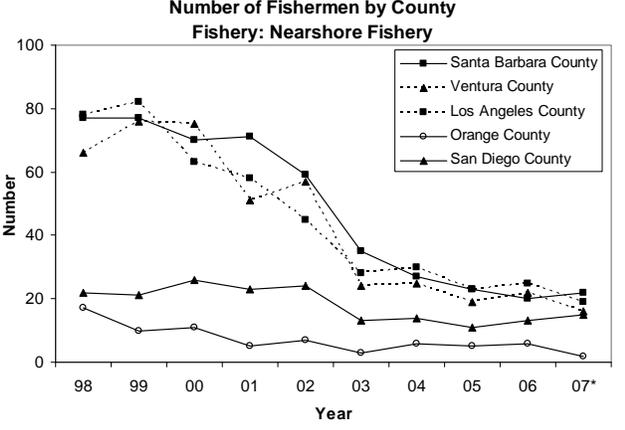
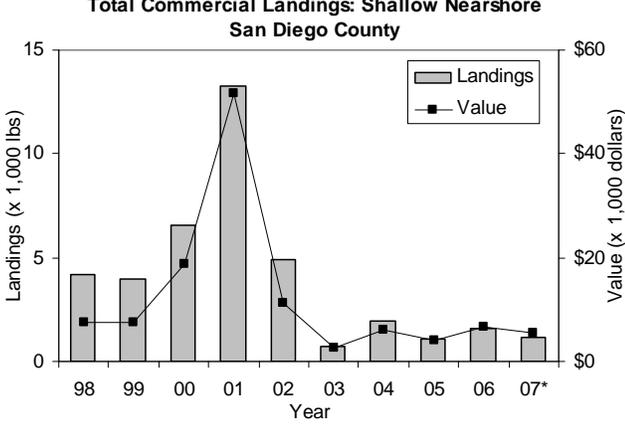
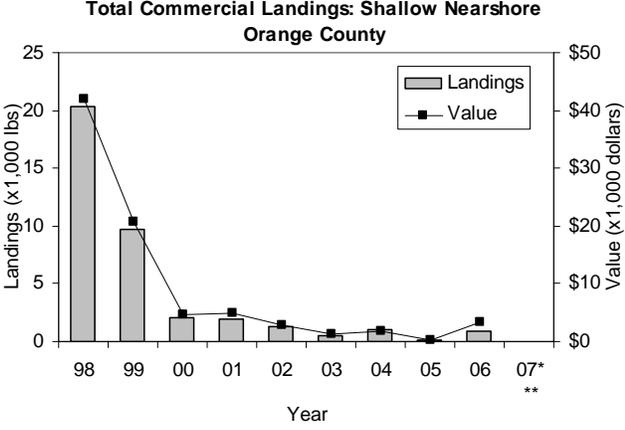
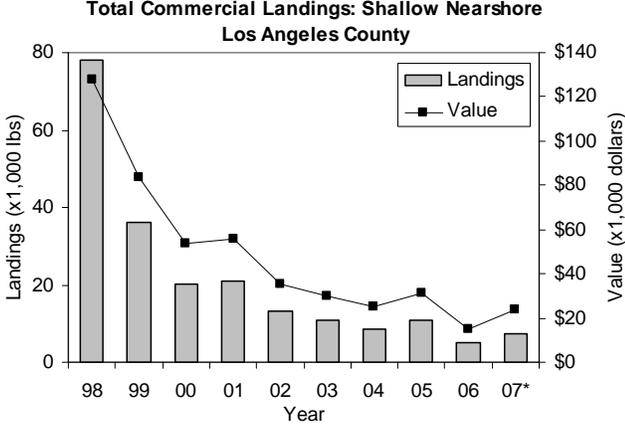
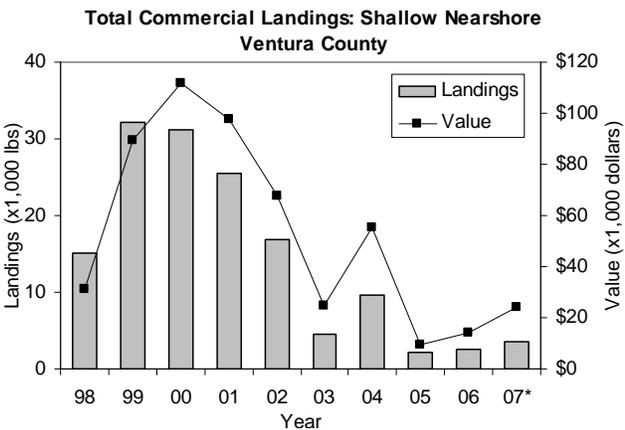
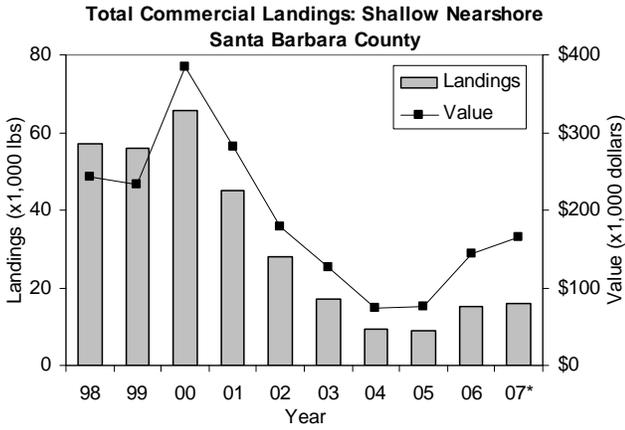
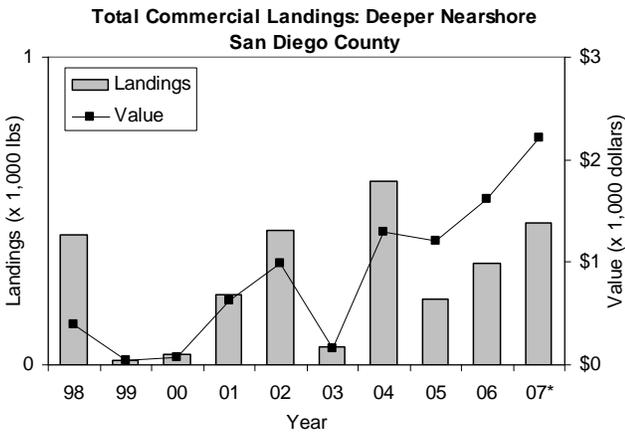
- 10 inches:
 - Black-and-yellow rockfish (*Sebastes chrysomelas*)
 - Gopher rockfish (*Sebastes carnatus*)

- Kelp rockfish (*Sebastes atrovirens*)
- California scorpionfish (*Scorpaena guttata*)
- 12 inches:
 - Kelp greenling (*Hexagrammos decagrammus*)
 - Rock greenling (*Hexagrammos lagocephalus*)
 - China rockfish (*Sebastes nebulosus*)
 - Grass rockfish (*Sebastes rastrelliger*)
- 15 inches:
 - Cabezon (*Scorpaenichthys marmoratus*)

The deeper nearshore species do not have size limits.

Landings and ex-vessel values by county: Data were compiled from the Commercial Fisheries Information System database (extraction date: 23 July 2008). Market receipt data were the primary source of catch location information for the commercial fisheries covered in the regional profile. These data are reported by DFG block areas which are 100 square nautical miles in size. Reported ex-vessel values are adjusted to 2007 dollars to account for inflation. The number of fishermen reflects the number of fishermen who have made at least one landing for that fishery, port area and year. In all the following charts, * indicates that 2007 data are preliminary, and ** indicates that data cannot be disclosed due to confidentiality considerations.





Fishery: Ridgeback Prawn

Species Targeted: Ridgeback prawn (*Sicyonia ingentis*)

Primary depth range: 130 to 525 feet (22 to 88 fathoms)

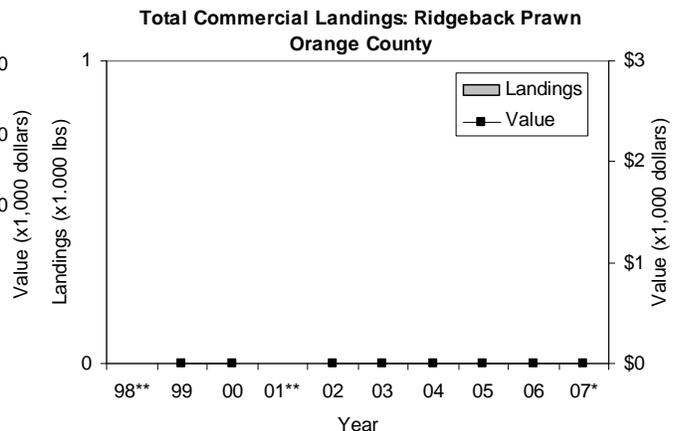
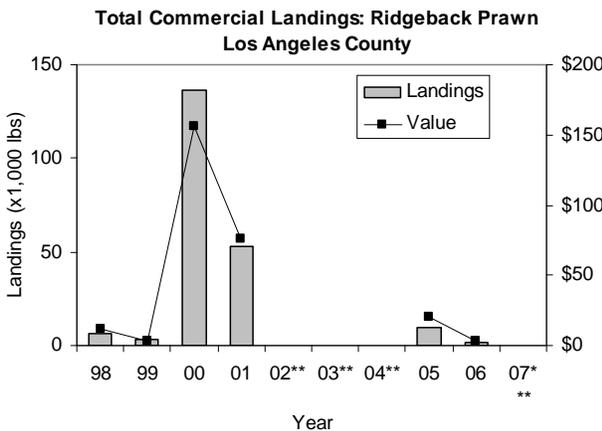
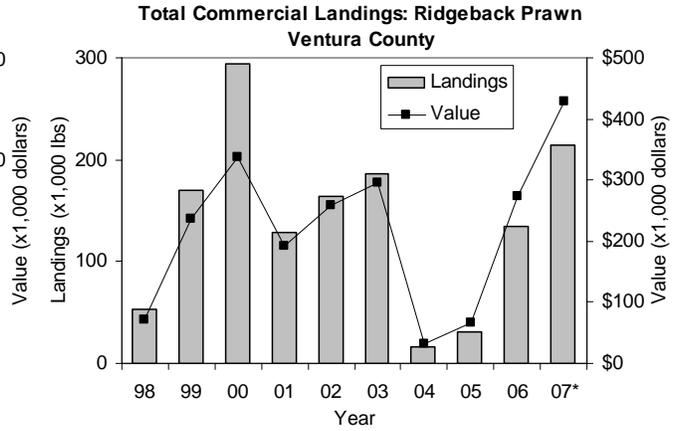
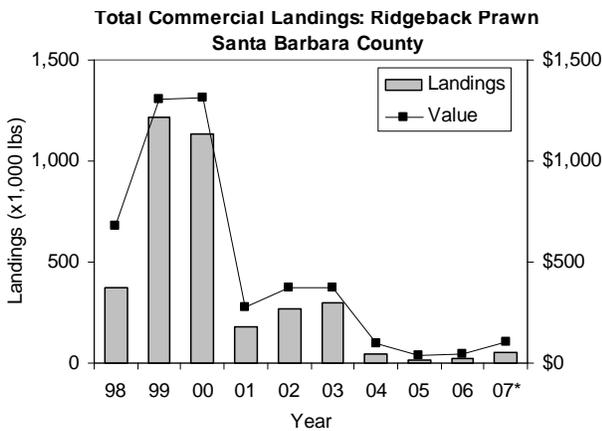
Primary habitat type(s): Soft bottom habitat composed of green mud, shell and sand.

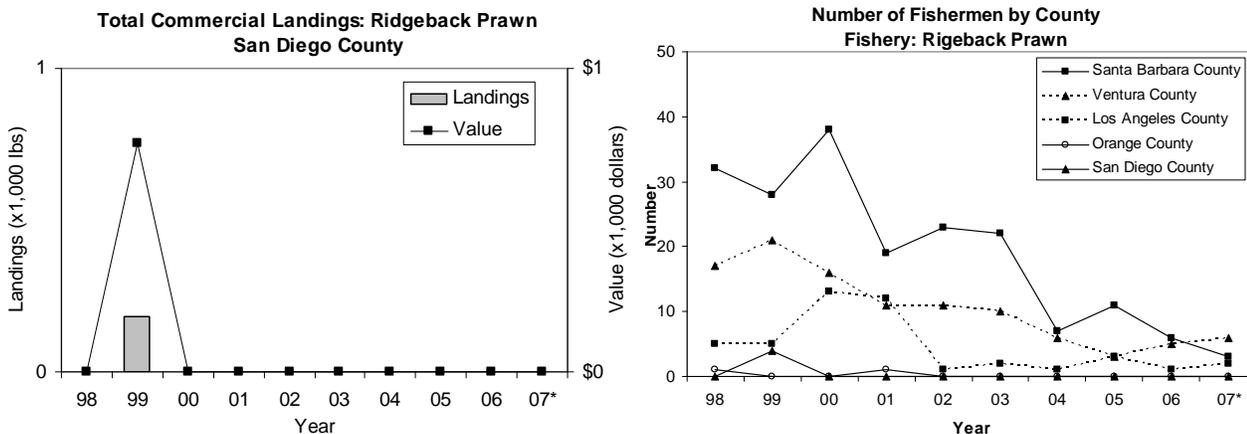
Primary gear: Trawl

Primary area of fishery: State waters () Federal waters (x)

Synopsis of commercial regulations applicable to the south coast study region: Trawling for ridgeback prawn is prohibited in state waters and within the federal non-groundfish trawl RCA and CCA. For information about the federal non-groundfish trawl RCA and CCAs including federal groundfish seasons, trip limits and other regulations visit this web site: www.nwr.noaa.gov. Trawl nets with single-walled bag or cod-end, mesh of any webbing shall not be less than 1½ inches in length; trawl nets with double-walled bag or cod-end may be used with a mesh of not less than three inches in length (FGC, Title 14 §120). Bottom trawlers targeting ridgeback prawn are required to use a bycatch reduction device to minimize the catch of non-target species (FGC, Title 14 §120). A seasonal closure from June 1 through September 30 exists to protect the ridgeback during their peak spawning months.

Landings and ex-vessel values by county: Data were compiled from the Commercial Fisheries Information System database (extraction date: 02 May 2008). Market receipt data were the primary source of catch location information for the commercial fisheries covered in the regional profile. These data are reported by DFG block areas which are 100 square nautical miles in size. Reported ex-vessel values are adjusted to 2007 dollars to account for inflation. The number of fishermen reflects the number of fishermen who have made at least one landing for that fishery, port area and year. In all the following charts, * indicates that 2007 data are preliminary, and ** indicates that data cannot be disclosed due to confidentiality considerations.





Fishery: Sea Cucumber—Non-Trawl (Dive)

Species Targeted: Warty sea cucumber (*Parastichopus parvimensis*)

Primary depth range: 20 to 80 ft (3 to 13 fathoms)

Primary habitat type(s): Rocky reefs, sand and gravel sediment

Primary gear: Dive

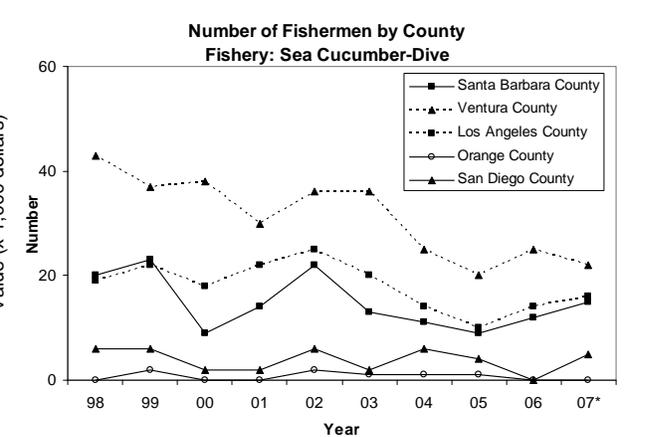
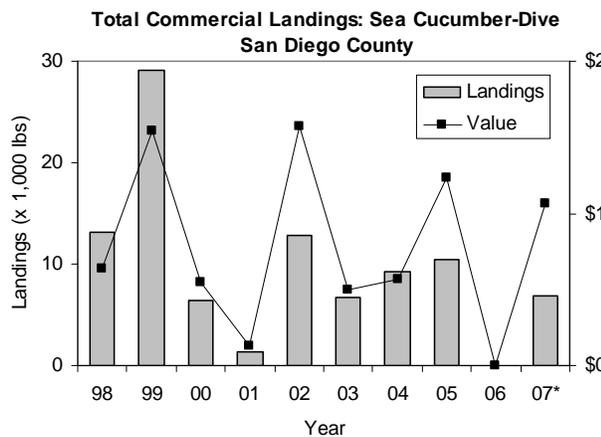
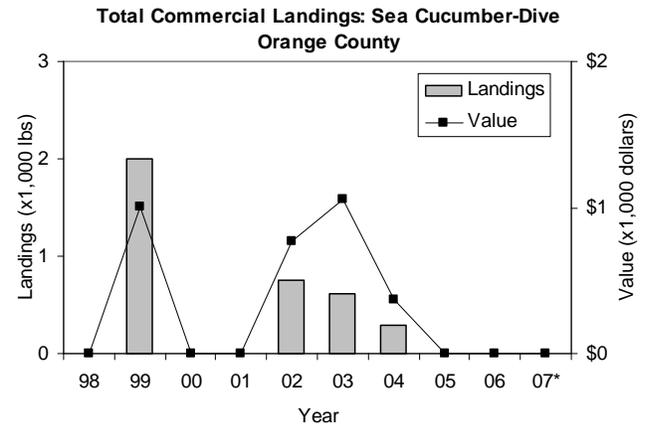
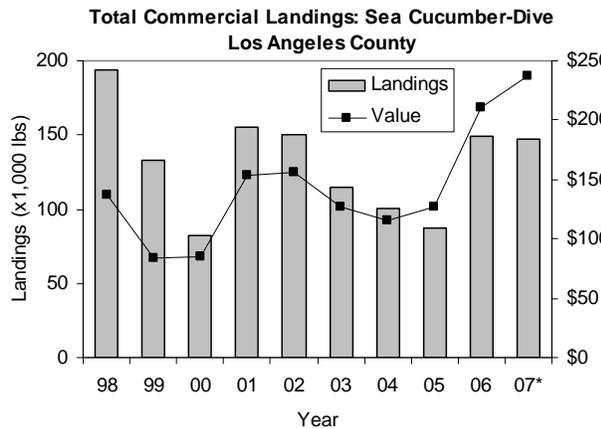
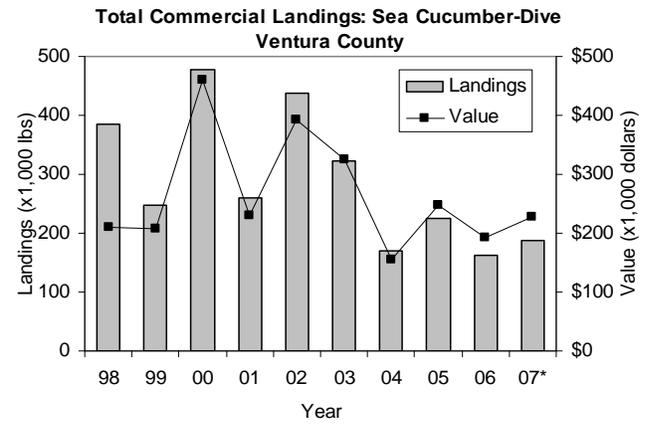
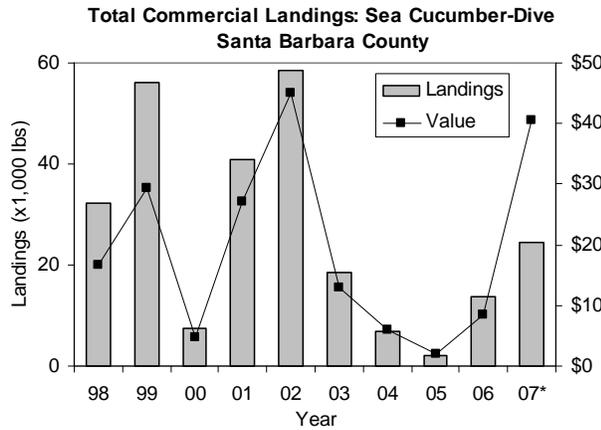
Primary area of fishery: State waters (x) Federal waters ()

Synopsis of commercial regulations applicable to the south coast study region:

In 1992 the Legislature established a sea cucumber harvest permit, required for trawlers and divers targeting sea cucumbers. Qualifying criteria for the permit included having a 50-pound documented landing of sea cucumbers during at least one calendar year between January 01, 1988 and June 30, 1991. In 1994 the Legislature specified that sea cucumber permits were non-transferable, and established a \$250 annual permit fee.

In 1997 the Legislature repealed existing sea cucumber regulations and created separate dive and trawl sea cucumber permits. A ceiling on the number of dive permittees was set, based on the number of dive permits issued during the 1997-98 license year. In 2006 there were 92 sea cucumber diver permits. A dive permit transfer procedure was also introduced by the 1997 legislation.

Landings and ex-vessel values by county: Data were compiled from the Commercial Fisheries Information System database (extraction date: 23 July 2008). Market receipt data were the primary source of catch location information for the commercial fisheries covered in the regional profile. These data are reported by DFG block areas which are 100 square nautical miles in size. Reported ex-vessel values are adjusted to 2007 dollars to account for inflation. The number of fishermen reflects the number of fishermen who have made at least one landing for that fishery, port area and year. In all the following charts, * indicates that 2007 data are preliminary, and ** Indicates that data cannot be disclosed due to confidentiality considerations.



Fishery: Sea Cucumber—Bottom Trawl

Species Targeted: California sea cucumber (*Parastichopus californicus*)

Primary depth range: 120 to 360 feet (20 to 60 fathoms)

Primary habitat type(s): sand, mud bottom

Primary gear: Bottom trawl

Primary area of fishery: State waters () Federal waters (x)

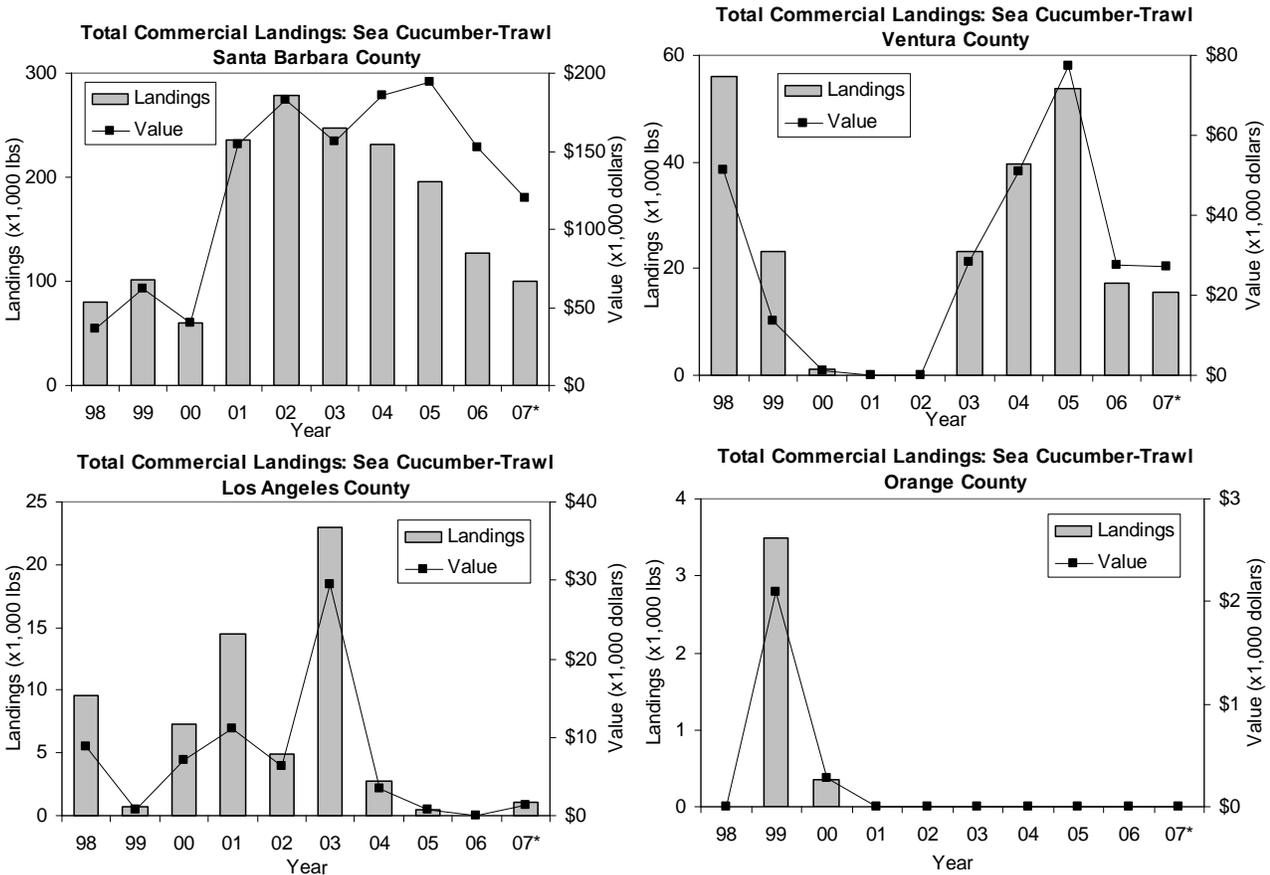
Synopsis of commercial regulations applicable to the south coast study region: In 1992 the Legislature established a sea cucumber harvest permit, required for trawlers and divers targeting sea cucumbers. Qualifying criteria for the permit included having a 50-pound documented landing of sea cucumbers during a calendar year between Jan 01, 1988, and June 30, 1991.

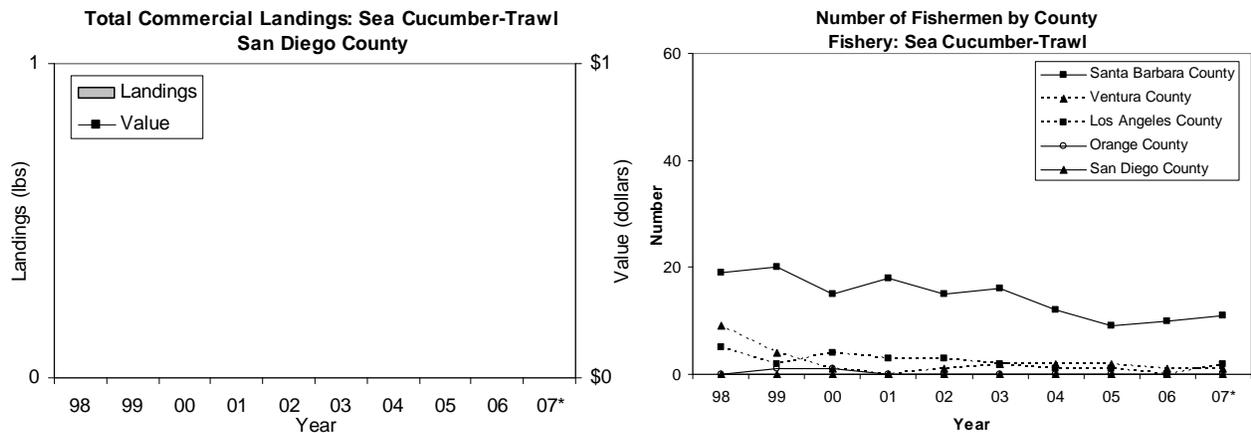
In 1994 the Legislature specified that sea cucumber permits were non-transferable, and established a \$250 annual permit fee. The minimum landing requirement was waived for some trawl sea cucumber fishermen.

In 1997 the Legislature repealed existing sea cucumber regulations and created separate dive and trawl sea cucumber permits. A ceiling on the number of trawl permittees was set, based on the number of trawl permits issued during the 1997-98 license year. A trawl permit transfer procedure was also introduced by the 1997 legislation.

Bottom trawling for sea cucumber is permitted in federal waters (3 to 200 nautical miles offshore) year-round using trawl nets with a minimum mesh size of 4.5 in, except within the non-groundfish trawl RCA and CCA. Trawling is prohibited within all state waters (zero to three nautical miles offshore), except within the designated "California halibut trawl grounds" which encompass the area between Point Arguello (Santa Barbara County) and Point Mugu (Ventura County) in waters beyond one nm from mainland shore. Bottom trawls used in this area must have a minimum mesh size of 7.5 in., and trawling is closed from March 15 to June 15 to protect spawning adults. Retention of sea cucumbers by trawlers fishing in the California halibut Trawl Grounds is permitted, if the vessel operator has the proper permits and gear.

Landings and ex-vessel values by county: Data were compiled from the Commercial Fisheries Information System database (extraction date: 23 July 2008). Market receipt data were the primary source of catch location information for the commercial fisheries covered in the regional profile. These data are reported by DFG block areas which are 100 square nautical miles in size. Reported ex-vessel values are adjusted to 2007 dollars to account for inflation. The number of fishermen reflects the number of fishermen who have made at least one landing for that fishery, port area and year. In all the following charts, * indicates that 2007 data are preliminary, and ** indicates that data cannot be disclosed due to confidentiality considerations.





Fishery: Sea Urchin

Species Targeted: Red sea urchin (*Strongylocentrotus franciscanus*)

Primary depth range: 10 to 90 feet (2 to 15 fathoms)

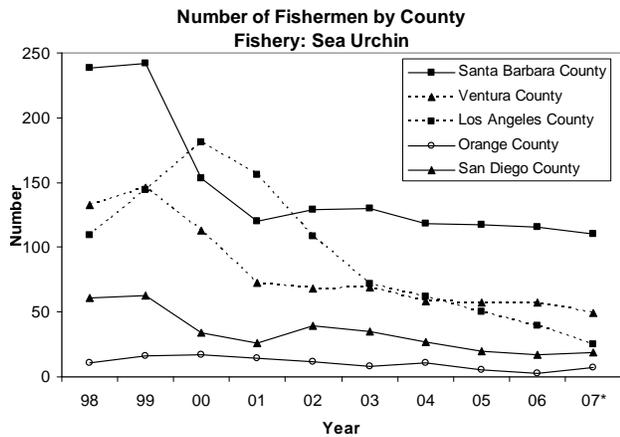
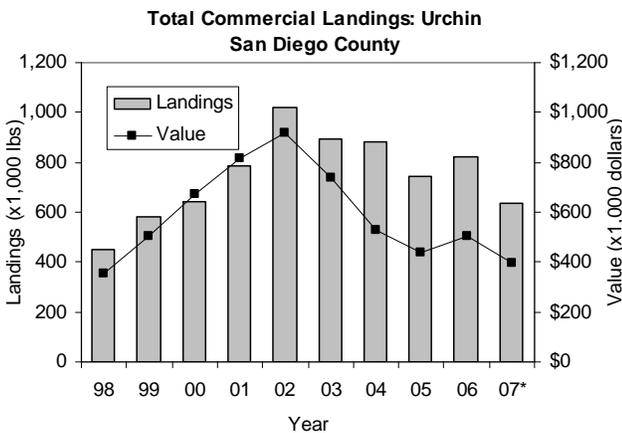
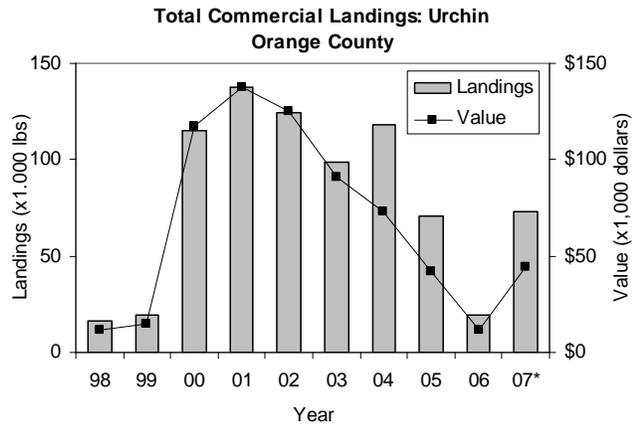
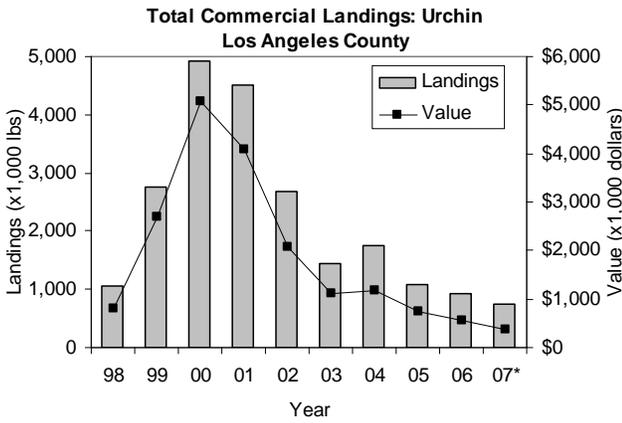
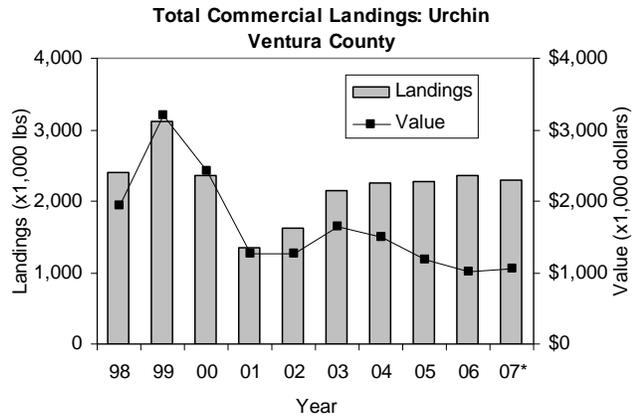
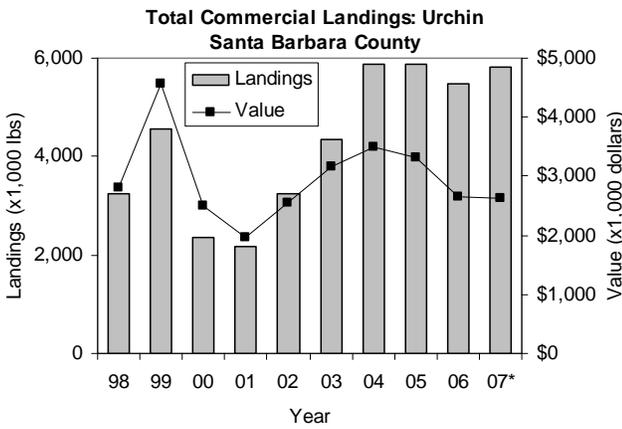
Primary habitat type(s): Rocky reefs, kelp and hard bottoms

Primary gear: Dive

Primary area of fishery: State waters (x) Federal waters ()

Synopsis of commercial regulations applicable to the south coast study region: This is a restricted access dive fishery requiring a non-transferable urchin diving permit. Divers usually collect sea urchins by hand using hookah (a compressor system with a long hose to deliver air to the diver). Scuba (air tank on back) is also used, but usually for scouting areas. New fishermen enter the fishery by lottery based on the number of permits from the previous season that are not renewed. There are no landing requirements to renew the permit. The season is open seven days per week from November through May, and four days a week from June through October (new regulations effective July 1, 2008). Sea urchins harvested in southern California (south of the Monterey-San Luis Obispo County line) may not have a test diameter between 1.5 and 3.25 inches except that not more than 30 may be landed incidentally within this size range. Sea urchins less than 1.5 inches in diameter are not targeted, but may be landed incidentally. Effective July 2008, a logbook is required to be filled out by every diver after each dive day. Prior to this date, only the operator of the vessel where sea urchin harvesting was taking place was required to fill out a daily log. As of August 1, 2008, 291 sea urchin permittees had renewed their permits. Nineteen new applicants were drawn for sea urchin permits on August 20, 2008.

Landings and ex-vessel values by county: Data were compiled from the Commercial Fisheries Information System database (extraction date: 02 May 2008). Market receipt data were the primary source of catch location information for the commercial fisheries covered in the regional profile. These data are reported by DFG block areas which are 100 square nautical miles in size. Reported ex-vessel values are adjusted to 2007 dollars to account for inflation. However, the value reported is based on the price recorded on the landing receipt at the time of landing which may have been significantly lower than the final price paid to the permittee due to uncertainties in roe recovery and quality, and market price. The number of fishermen reflects permittees who have made at least one landing for that fishery, port area and year. In 2007, there were 199 active sea urchin divers in southern California and 32 active in northern California. In all the following charts, * indicates that 2007 data are preliminary.



Fishery: Sharks, Skates and Rays

This represents multiple fisheries which either target shark or harvest them incidentally.

Species Targeted:

- Brown smoothhound (*Mustelus henlei*)
- Gray smoothhound (*Mustelus californicus*)
- Basking shark (*Cetorhinus maximus*)
- Blue shark (*Prionace glauca*)
- Horn shark (*Heterodontus francisci*)
- Leopard shark (*Triakis semifasciata*)

- Pacific angel shark (*Squatina californica*)
- Salmon shark (*Lamna ditropis*)
- Sevengill (*Notorynchus cepedianus*)
- Soupfin shark (*Galeorhinus zyopterus*)
- Sixgill (*Hexanchus griseus*)
- Shortfin mako shark (bonito shark) (*Isurus oxyrinchus*)
- Swell shark (*Cephaloscyllium ventriosum*)
- Thresher shark (*Alopias vulpinus*)
- White shark (*Carcharodon carcharias*)
- Spiny dogfish (*Squalus acanthias*)
- Pacific electric ray (*Torpedo californica*)
- Round stingray (*Urolophus halleri*)
- Bat ray (*Myliobatis californica*)
- Big skate (*Raja binoculata*)
- California skate (*Raja inornata*)
- Shovelnose guitarfish (*Rhinobatos productus*)
- Spotted ratfish (*Hydrolagus collieri*)

Primary depth range: 0 to 2,400 feet (0 to 400 fathoms)

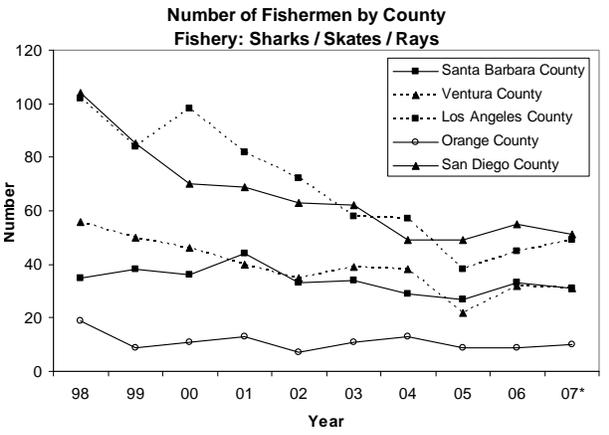
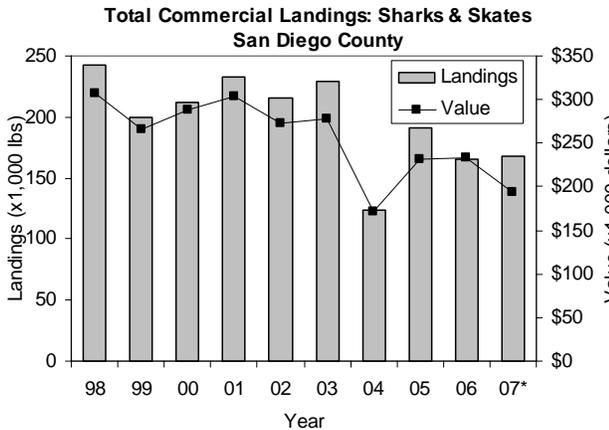
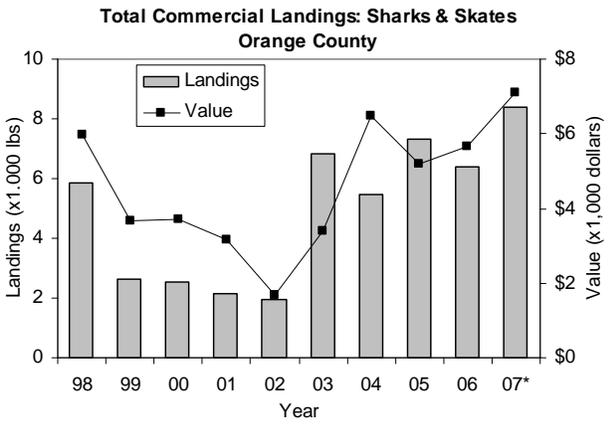
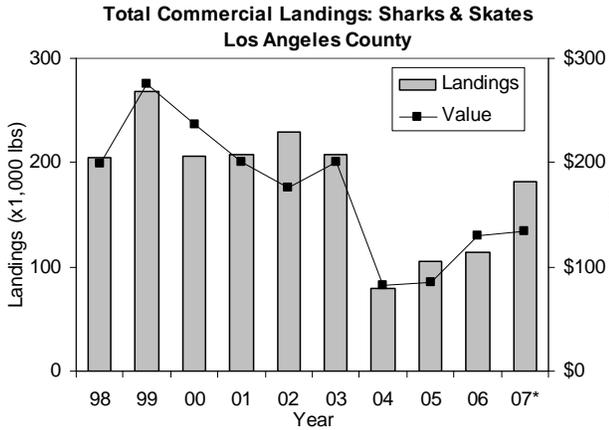
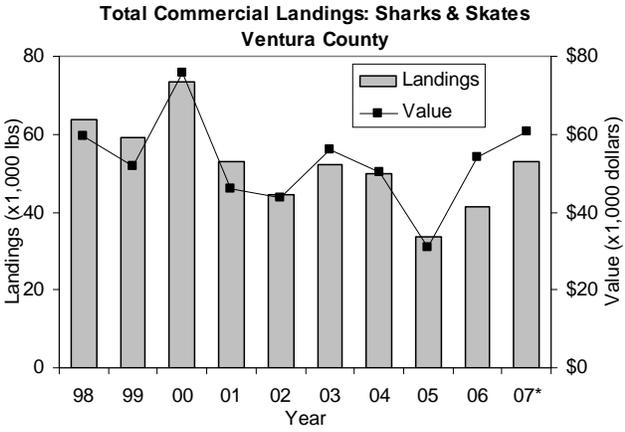
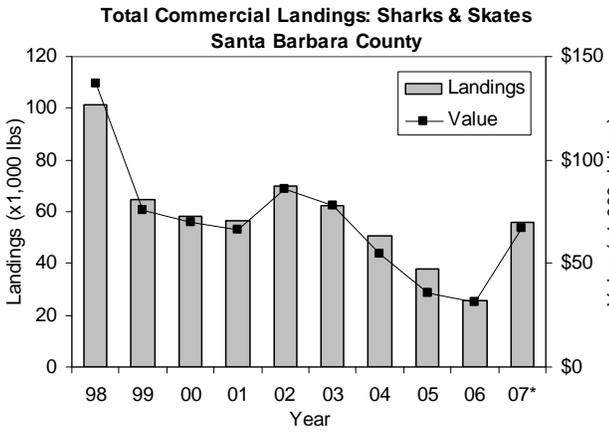
Primary habitat type(s): Open ocean, pelagic, nearshore, soft and hard bottoms, rocky reefs, and kelp forests

Primary gear: Hook-and-line, trawl, gill nets.

Primary area of fishery: State waters (x) Federal waters (x)

Synopsis of commercial regulations applicable to the south coast study region: A highly migratory species (HMS) permit is required to take thresher and mako sharks. No quotas are currently in place for harvesting sharks covered in the HMS Fishery Management Plan. However, harvest guidelines for common thresher sharks are set at 340 metric tons and at 150 metric tons for shortfin mako sharks. White sharks may not be taken for commercial purposes. Leopard sharks have a minimum legal size of 36 inches. Pacific angel sharks have a minimum legal size of 42 inches for females and 40 inches for males. Sharks may be taken with drift gill nets with a mesh size of 8 inches. Spears, harpoons, and bow-and-arrow may not be used to take soupfin shark.

Landings and ex-vessel values by county: Data were compiled from the Commercial Fisheries Information System database (extraction date: 02 May 2008). Market receipt data were the primary source of catch location information for the commercial fisheries covered in the regional profile. These data are reported by DFG block areas which are 100 square nautical miles in size. Reported ex-vessel values are adjusted to 2007 dollars to account for inflation. The number of fishermen reflects the number of fishermen who have made at least one landing for that fishery, port area and year. In all the following charts, * indicates that 2007 data are preliminary.



Fishery: Shelf Rockfish

Species Targeted:

- Shelf rockfishes:
 - Chilipepper (*Sebastes goodei*),
 - Shortbelly (*Sebastes jordani*),
 - Chameleon (*Sebastes phillipsi*)
 - Flag (*Sebastes rubrivinctus*),
 - Greenblotched (*Sebastes rosenblatti*),
 - Greenspotted (*Sebastes. chlorostictus*),
 - Greenstriped (*Sebastes elongatus*),
 - Halfbanded (*Sebastes semicinctus*),
 - Honeycomb (*Sebastes umbrosus*)
 - Pink (*Sebastes eos*),
 - Pinkrose (*Sebastes simulator*),
 - Redstripe (*Sebastes proriger*),
 - Rosethorn (*Sebastes helvomaculatus*),
 - Rosy (*Sebastes rosaceus*),
 - Speckled (*Sebastes ovalis*),
 - Squarespot (*Sebastes hopkinsi*),
 - Starry (*Sebastes constellatus*),
 - Swordspine (*Sebastes ensifer*),
 - Vermillion (*Sebastes miniatus*),
 - Yellowtail (*Sebastes flavidus*)

Primary depth range: 180 to 1,200 feet (30 to 200 fathoms).

Primary habitat type(s): Deep rocky reefs, cobble, sand, and edges of canyons.

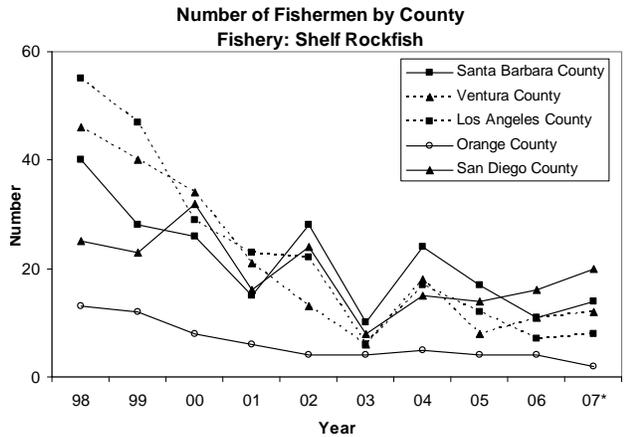
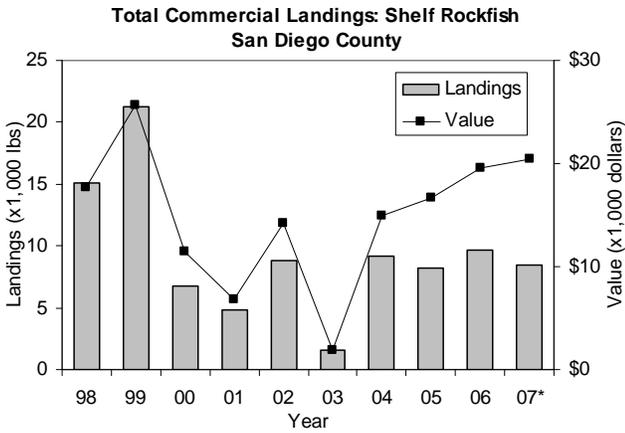
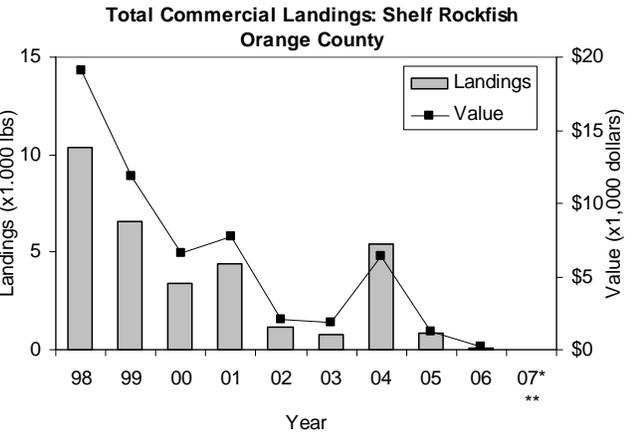
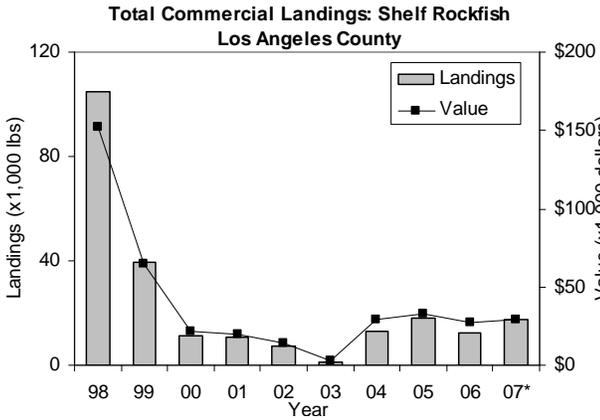
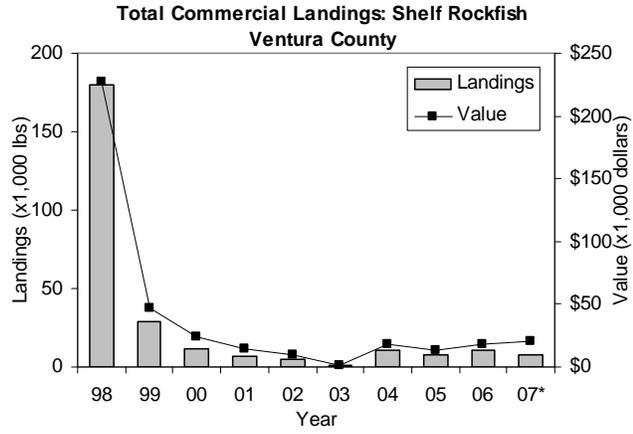
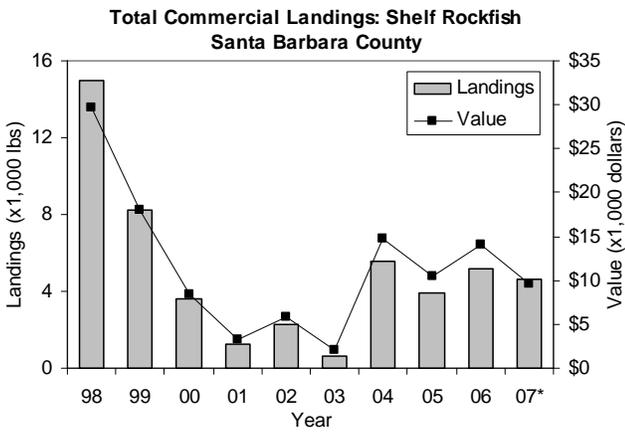
Primary gear: Hook-and-line (horizontal longline and rod-and-reel).

Primary area of fishery: State waters (x) Federal waters (x)

Synopsis of commercial regulations applicable to the south coast study region:

Fishing for federally managed groundfish with hook-and-line gear is prohibited within the non-trawl RCAs and CCAs. For information about the federal non-trawl RCAs and CCAs including federal groundfish seasons, trip limits and other regulations visit this web site: www.nwr.noaa.gov.

Landings and ex-vessel values by county: Data were compiled from the Commercial Fisheries Information System database (extraction date: 02 May 2008). Market receipt data were the primary source of catch location information for the commercial fisheries covered in the regional profile. These data are reported by DFG block areas which are 100 square nautical miles in size. Reported ex-vessel values are adjusted to 2007 dollars to account for inflation. The number of fishermen reflects the number of fishermen who have made at least one landing for that fishery, port area and year. In all the following charts, * indicates that 2007 data are preliminary, and ** indicates that data cannot be disclosed due to confidentiality considerations.



Fishery: Slope Rockfish

Species Targeted:

- Slope rockfishes:
 - Splitnose (*Sebastes diploproa*)
 - Grenadiers (Pacific rattail- *Coryphaenoides acrolepis*)
 - Aurora (*Sebastes aurora*)
 - Bank (*Sebastes rufus*)
 - Blackgill (*Sebastes melanostomus*)
 - Redbanded (*Sebastes babcocki*)
 - Shortspine Thornyhead (*Sebastolobus alascanus*)
 - Longspine thornyhead (*Sebastolobus altivelis*)

Primary depth range: 1,200 to 4,200 feet (200 to 700 fathoms)

Primary habitat type(s): Soft bottom on continental slope, submarine canyons

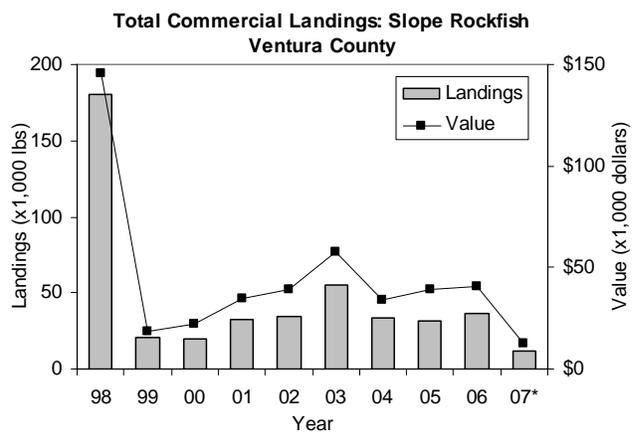
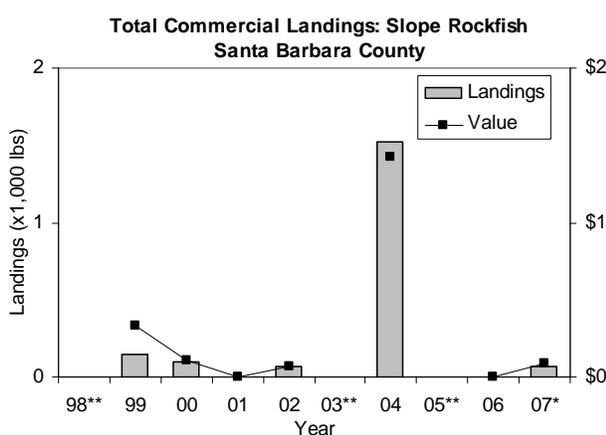
Primary gear: Trawl, horizontal longline and hook-and-line.

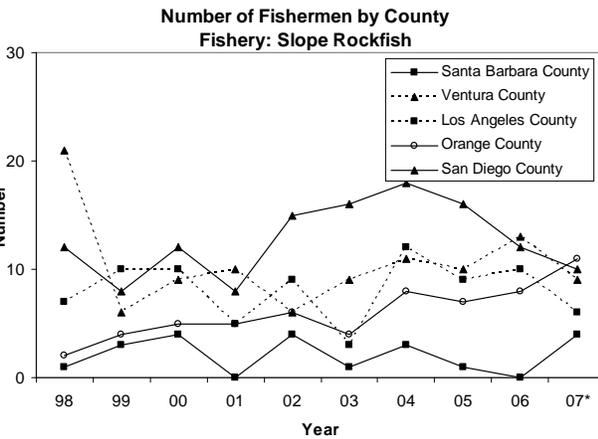
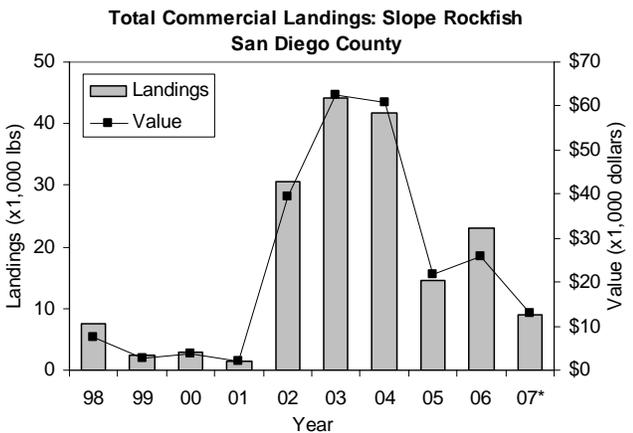
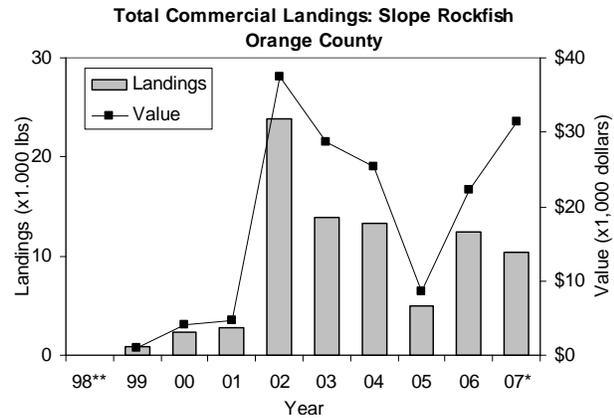
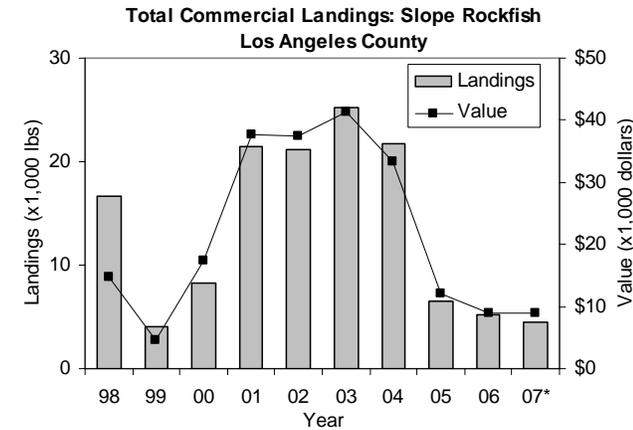
Primary area of fishery: State waters () Federal waters (x)

Synopsis of commercial regulations applicable to the south coast study region:

Fishing for federally managed groundfish with hook-and-line gear is prohibited within the non-trawl RCAs and CCAs. For more information about federal groundfish regulations, go to the NMFS website: <http://www.nwr.noaa.gov/> .

Landings and ex-vessel values by county: Data were compiled from the Commercial Fisheries Information System database (extraction date: 02 May 2008). Market receipt data were the primary source of catch location information for the commercial fisheries covered in the regional profile. These data are reported by DFG block areas which are 100 square nautical miles in size. Reported ex-vessel values are adjusted to 2007 dollars to account for inflation. The number of fishermen reflects the number of fishermen who have made at least one landing for that fishery, port area and year. In all the following charts, * indicates that 2007 data are preliminary, and ** indicates that data cannot be disclosed due to confidentiality considerations.





Fishery: Spot Prawn

Species Targeted: Spot prawn (*Pandalus platyceros*)

Primary depth range: 600 to 750 feet (100 to 125 fathoms)

Primary habitat type(s): Canyons; hard, soft and mixed bottoms

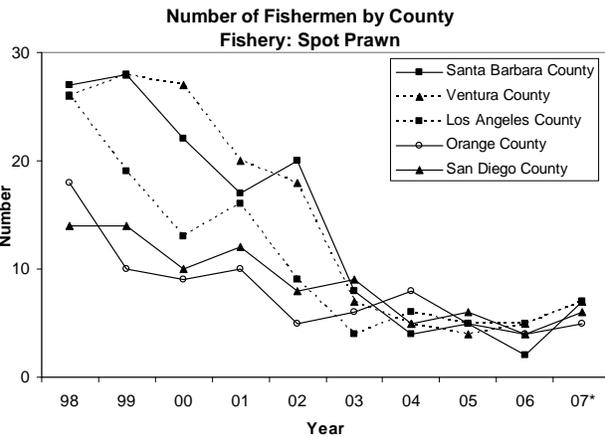
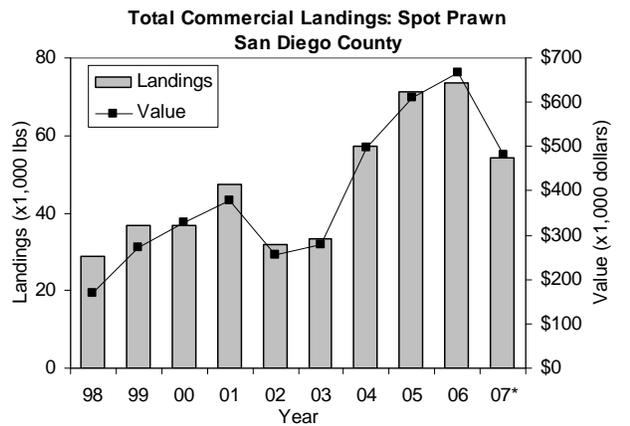
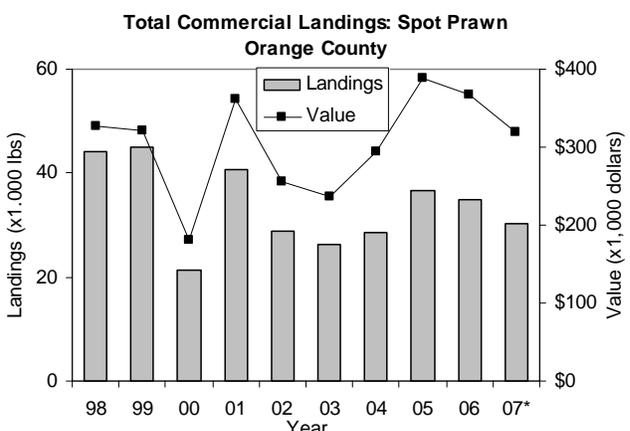
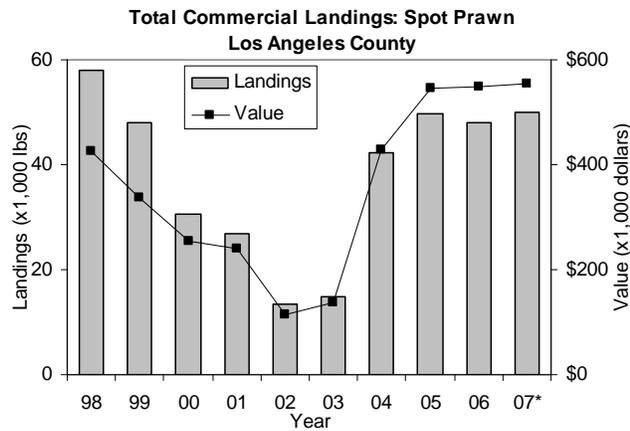
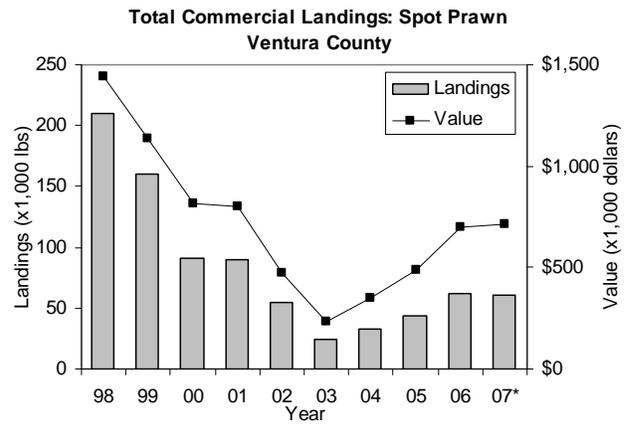
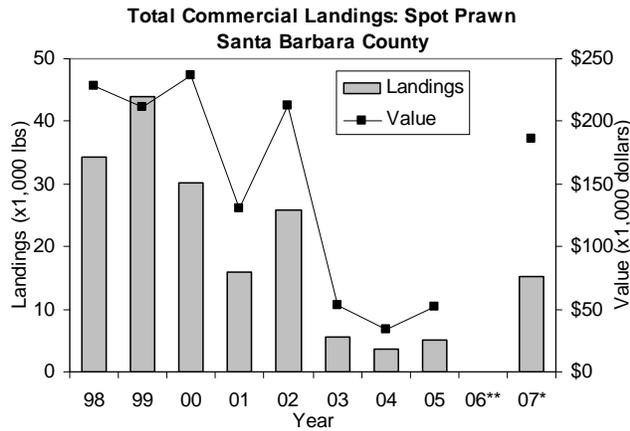
Primary gear: Trap

Primary area of fishery: State waters (x) Federal waters (x)

Synopsis of commercial regulations applicable to the south coast study region: This is a restricted access fishery with a 3-tier structure with no restrictions on geographical region of fishing. Tier 1 permits are fully transferable. A permittee may use no more than 500 traps (only 300 in state waters north of Point Arguello), and has no restrictions on landings. Tier 2 permits are not transferable. A permittee may use no more than 150 traps, and may land no more than 5,000 lbs of spot prawns in a calendar year. Tier 3 (trawl-to-trap conversion) permits are not transferable. A permittee may use no more than 500 traps (only 300 in state waters north of Point Arguello), and has no restrictions on landings. North of Point Arguello the season for spot prawn is open from 1 August through 30 April. South of Point Arguello the season is open from 1 February through 31 October. All species caught incidentally in spot prawn traps must be returned to the water immediately.

Landings and ex-vessel values by county: Data were compiled from the Commercial Fisheries Information System database (extraction date: 02 May 2008). Market receipt data were the primary source of catch location information for the commercial fisheries covered in the regional profile. These data are reported by DFG block areas which are 100 square nautical miles in size. Reported ex-vessel values are adjusted to 2007 dollars to account for inflation. The number of fishermen reflects the number of fishermen who have made at least one landing for that fishery,

port area and year. In all the following charts, * indicates that 2007 data are preliminary, and ** indicates that data cannot be disclosed due to confidentiality considerations.



Fishery: White Seabass

Species Targeted: White seabass (*Atractoscion nobilis*)

Primary depth range: 0 to 400 feet (0 to 67 fathoms)

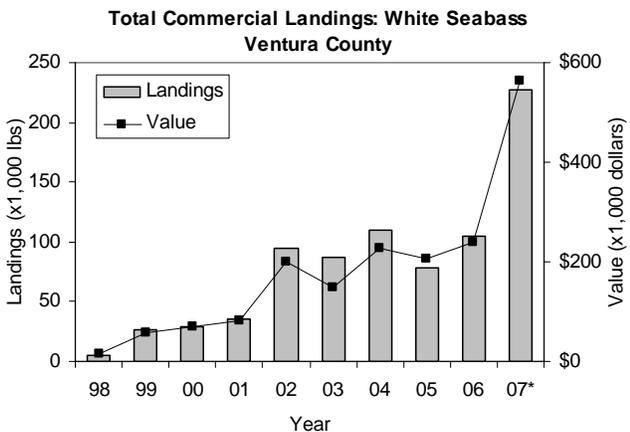
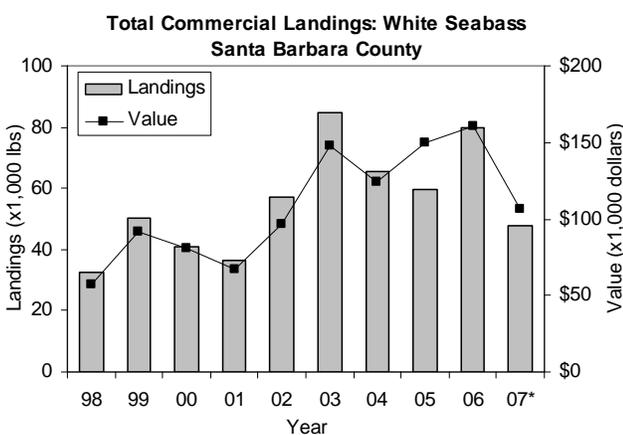
Primary habitat type(s): Kelp beds and rocky bottom

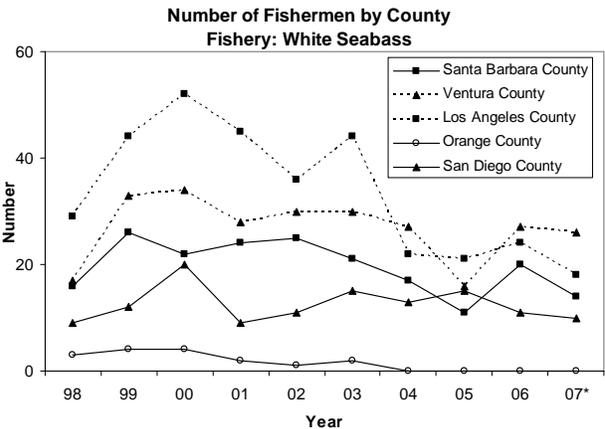
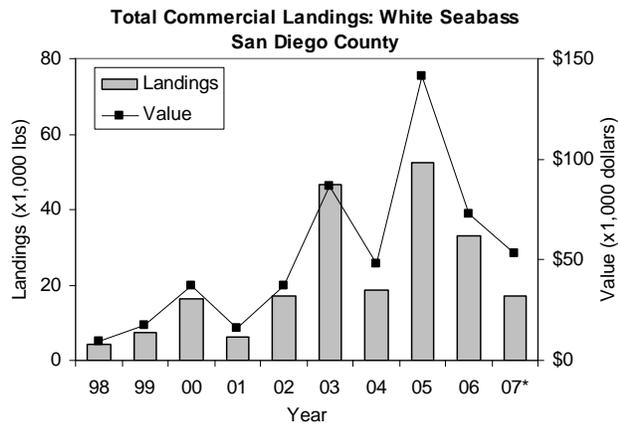
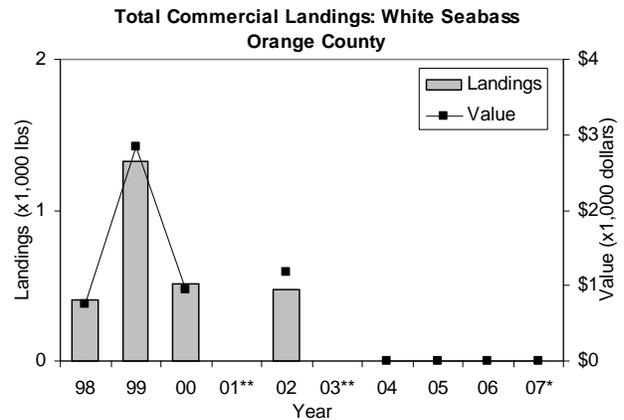
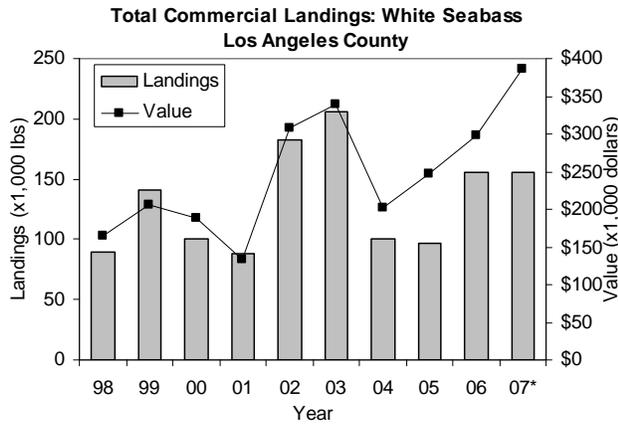
Primary gear: Set gill net

Primary area of fishery: State waters (x) Federal waters ()

Synopsis of commercial regulations applicable to the south coast study region: The white seabass season is open from June 16 through March 14 between Point Conception and the California/Mexico border (FGC §8383). The minimum size is 28 inches total length. Gill nets with meshes of a minimum length of six inches may be used to take white seabass (FGC §8384); however, from June 16 to March 14 not more than 20 percent by number of white seabass (greater than 28 inches), up to 10 fish per load, can be taken in gill or trammel nets with meshes 3.5 to 6 inches. White seabass, in addition to all other species, cannot be taken by gill and trammel nets in ocean waters under the following conditions: (1) less than 70 fathoms deep or within one mile, whichever is less, of the Channel Islands, (2) 0-3 miles from the mainland shore between Point Arguello and the Mexican border, (3) less than 35 fathoms between Point Fermin and the south jetty at Newport Harbor (FGC §8610.2, 8610.3, 8610.4). It is unlawful to take white seabass using purse seine or round haul nets. It is unlawful to possess white seabass on a boat carrying or using any purse seine or round haul net unless taken off Mexico. A gill and trammel net permit and logbook are required to fish for white seabass (FGC §8681)

Landings and ex-vessel values by county: Data were compiled from the Commercial Fisheries Information System database (extraction date: 02 May 2008). Market receipt data were the primary source of catch location information for the commercial fisheries covered in the regional profile. These data are reported by DFG block areas which are 100 square nautical miles in size. Reported ex-vessel values are adjusted to 2007 dollars to account for inflation. The number of fishermen reflects the number of fishermen who have made at least one landing for that fishery, port area and year. In all the following charts, * indicates that 2007 data are preliminary, and ** indicates that data cannot be disclosed due to confidentiality considerations.





Fishery: Yellowtail

Species Targeted: California Yellowtail (*Seriola lalandi*, also known as *Seriola dorsalis*)

Primary depth range: 0 to 228 feet (0 to 38 fathoms)

Primary habitat type(s): Pelagic

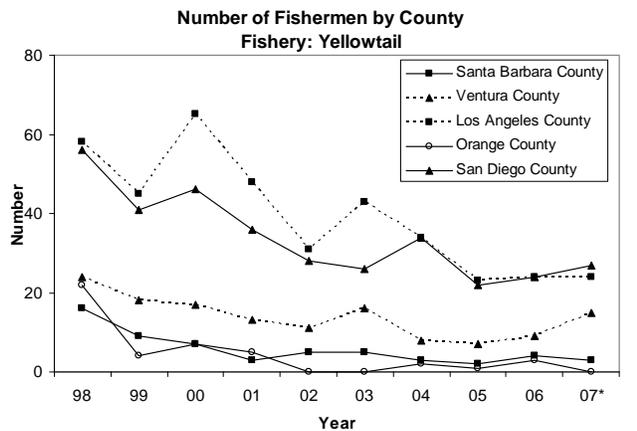
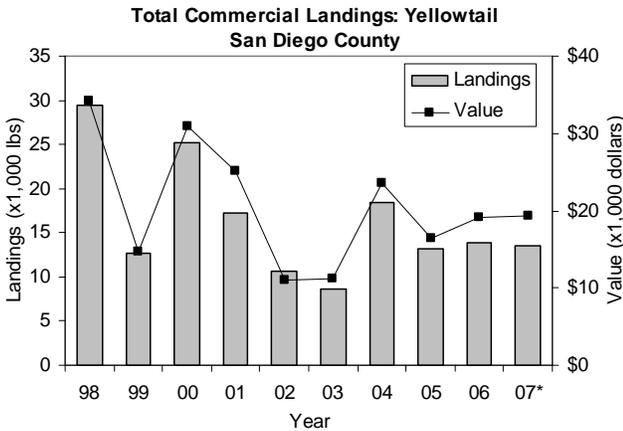
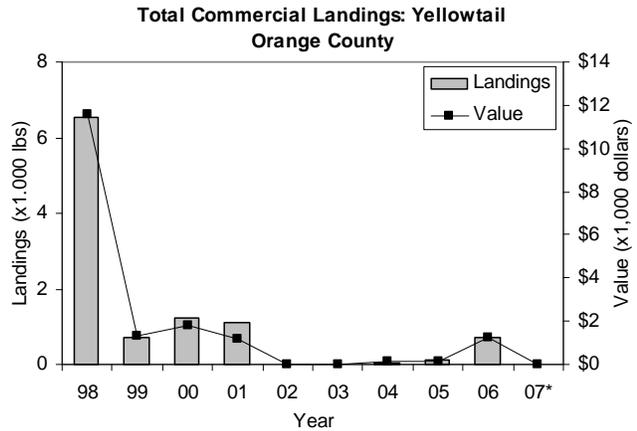
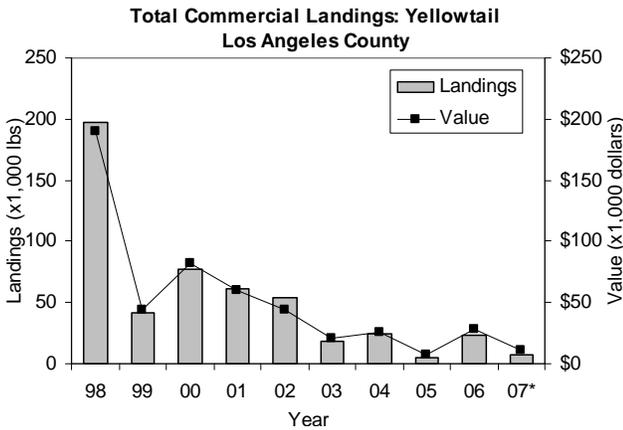
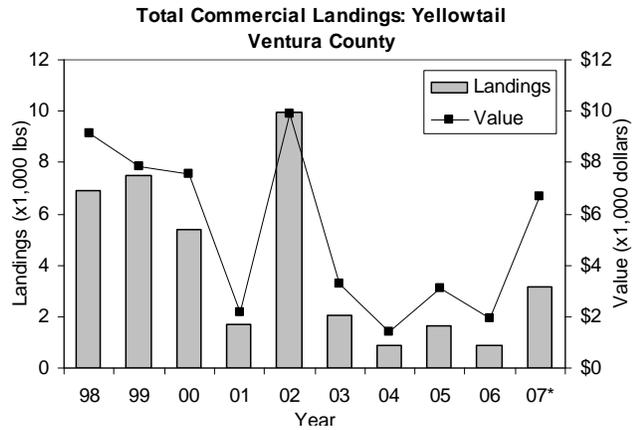
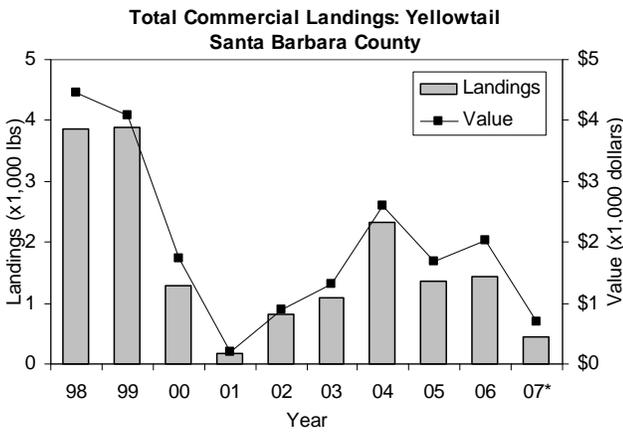
Primary gear: Set gill-net, hook-and-line

Primary area of fishery: State waters (x) Federal waters ()

Synopsis of commercial regulations applicable to the south coast study region:

Minimum size limit is 28 inches. Between May 1 and August 31 it is unlawful for (a) any one person to have more than 500 pounds of yellowtail in their possession on any boat, barge or vessel; (b) two or more persons to have in their possession on any boat, barge or vessel, a combined weight of 500 pounds of yellowtail per person; or (c) five or more persons to have more than a combined weight of 2,500 pounds of yellowtail in their possession on any boat, barge or vessel (FGC §8382, 8384, 8386, 8387, 8623. CCR Title 14, §109).

Landings and ex-vessel values by county: Data were compiled from the Commercial Fisheries Information System database (extraction date: 02 May 2008). Market receipt data were the primary source of catch location information for the commercial fisheries covered in the regional profile. These data are reported by DFG block areas which are 100 square nautical miles in size. Reported ex-vessel values are adjusted to 2007 dollars to account for inflation. The number of fishermen reflects the number of fishermen who have made at least one landing for that fishery, port area and year. In all the following charts, * indicates that 2007 data are preliminary.



D.12 Market Categories Included in Market Category Groupings

California Halibut: Market categories: California Halibut, Halibut

California Sheephead: Market categories: California Sheephead

California Spiny Lobster: Market categories: California Spiny Lobster

Coastal Pelagics Finfish Species: Market categories: Bullet Mackerel, Deep Body Anchovy, Jack Mackerel, Juvenile Sardine, Northern Anchovy, Pacific Mackerel, Pacific Sardine, Slough Anchovy, Unspecified Mackerel

Crab: Market categories: Brown Rock Crab, Red Rock Crab, Rock Unspecified Crab, Yellow Rock Crab, Sheep Crab

- Croaker:** Market categories: Black Croaker, Spotfin Croaker, Unspecified Croaker, White Croaker, Yellowfin Croaker
- Dover sole, Thornyheads & Sablefish (DTS):** Market categories: Dover Sole, Sablefish, Longspine Thornyhead, Shortspine Thornyhead, and Thornyheads
- Flatfish, Other:** Market categories: Arrowtooth Flounder, Starry Flounder, Unspecified Flounder, Butter Sole, English Sole, Petrale Sole, Rex Sole, Rock Sole, Sand Sole, Slender Sole, Unspecified Sole, Bigmouth Sole, Faintail Sole, C-O Sole, Hornyhead Turbot, Spotted Turbot, Turbot, Curlfin Turbot, Diamond Turbot, Longfin Sanddab, Pacific Sanddab, Sanddab, and Speckled Sanddab
- Kellet's Whelk:** Market categories: Kellet's Whelk
- Lingcod:** Market category: Lingcod
- Market Squid:** Market category: Market Squid
- Nearshore Finfish:** Market categories: California Scorpionfish, Rockfish (Black-and-Yellow, Black, Blue, Brown, Calico, China, Copper, Grass, Gopher, Kelp, Olive, Quillback, Treefish, and Group Black/Blue, Group Bolina, Group Deep Nearshore, Group Gopher, and Group Nearshore), Cabezon, Rock greenling, Kelp Greenling, and Monkeyface Eel
- Ridgeback Prawn:** Market categories: Ridgeback Prawn
- Sea Cucumber:** Market categories: Giant Red Sea Cucumber, Warty Sea Cucumber, and Unspecified Cucumber
- Sea Urchin:** Market category: Red Urchin
- Sharks, Skates & Rays:** Market categories: Bat Ray, Pacific Electric Ray, Stingray, Unspecified Ray, Basking Shark, Bigeye Thresher Shark, Blacktip Shark, Blue Shark, Brown Smoothhound Shark, Cow Shark, Dusky Shark, Gray Smoothhound Shark, Horn Shark, Leopard Shark, Pacific Angel Shark, Pelagic Thresher Shark, Salmon Shark, Sevengill Shark, Shortfin Mako Shark, Sixgill Shark, Smooth Hammerhead Shark, Soupfin Shark, Spiny Dogfish Shark, Swell Shark, Thresher Shark, White Shark, Unspecified Shark Big Skate, California Skate, Round Stingray, Shovelnose Guitarfish, Spotted Ratfish, Thornback Skate, and Unspecified Skate
- Shelf Rockfish:** Market categories: Bronzespotted Rockfish, Bocaccio Rockfish, Boccacio/Chili Group Rockfish, Canary/Vermillion Group Rockfish, Canary Rockfish, Chilipepper Rockfish, Chameleon Rockfish, Cowcod Rockfish, Flag Rockfish, Greenblotched Rockfish Greenspotted Rockfish, Greenstriped Rockfish, Group Red Rockfish, Group Shelf Rockfish, Halfbanded Rockfish, Honeycomb Rockfish, Mexican Rockfish, Pink Rockfish, Pinkrose Rockfish, Redstripe Rockfish, Rosethorn Rockfish, Rosy Rockfish, Shortbelly Rockfish, Speckled Rockfish, Squarespot Rockfish, Starry Rockfish, Stripetail Rockfish, Swordspine Rockfish, Tiger Rockfish, Widow Rockfish Yelloweye Rockfish, Yellowtail Rockfish, and Vermilion Rockfish
- Slope Rockfish:** Market categories: Aurora Rockfish, Bank Rockfish, Blackgill Rockfish, Darkblotched Rockfish, Grenadier, Pacific Ocean Perch Rockfish, Redbanded Rockfish, Shortraker Rockfish, and Splitnose Rockfish
- Smelt:** Market categories: Jacksmelt, Night Smelt, Surf Smelt, True Smelt, Topsmelt, and Whitebait Smelt
- Spot Prawn:** Market category: Spot Prawn

Appendix E: Profile of the Recreational Fishery

This appendix contains the following sections:

- E.1 Data used to characterize the recreational fishery
- E.2 CRFS fishery statistics, 2005-2007
- E.3 Historic MRFSS fishery statistics, 1998-2003
- E.4 CPFV logbook data, 1998 to 2007: Invertebrate catch statistics
- E.5 Synopsis of applicable regulations

This appendix provides more in-depth information regarding marine recreational fisheries occurring within the study region, and is supplementary to information provided in section 5.6 (Recreational Fisheries) of this profile.

E.1 Data used to characterize the recreational fishery

CRFS is the primary source of data used in characterizing the recreational fishery for this profile. California implemented the survey in 2004 and it is a collaborative effort between DFG and the Pacific States Marine Fisheries Commission (PSMFC). The data are maintained by the PSMFC on the Recreational Fisheries Information Network (RecFIN). Catch and effort data are collected at more than 400 publicly-accessible sites during day-light hours and aboard CPFVs. The survey generally does not sample catch for night-time fishing, CPFV dive charters, and invertebrate fisheries, although a limited sampling effort for California spiny lobster was conducted in 2007. A telephone survey of licensed anglers is used to estimate effort information for night-time fishing and for boats that return to non-accessible marinas. A separate telephone survey of vessel operators is also used to estimate CPFV effort.

Estimates of catch and effort are reported monthly by six geographical districts along California's coastline and by mode of fishing. Two of these districts occur in the study region: the Channel District, consisting of Santa Barbara and Ventura counties, and the Southern District, consisting of Los Angeles, Orange, and San Diego counties. It should be noted that the CRFS catch estimates for southern California represent trips occurring from the northern Santa Barbara County line to the US/Mexico border, while the study region extends from Point Conception, just south of the northern Santa Barbara County line, to the US/Mexico border in San Diego County. Additional details about CRFS may be found at <http://www.dfg.ca.gov/marine/crfs.asp>, and CRFS data are available at <http://www.recfin.org>.

Prior to the CRFS, the California recreational fishery was sampled by the Marine Recreational Fisheries Statistics Survey (MRFSS) from 1981 through 2003. MRFSS estimates are not directly comparable to CRFS estimates. Further details regarding the MRFSS may be found at <http://www.st.nmfs.noaa.gov/st1/recreational/index.html>, and MRFSS data and estimates are available at <http://www.recfin.org>.

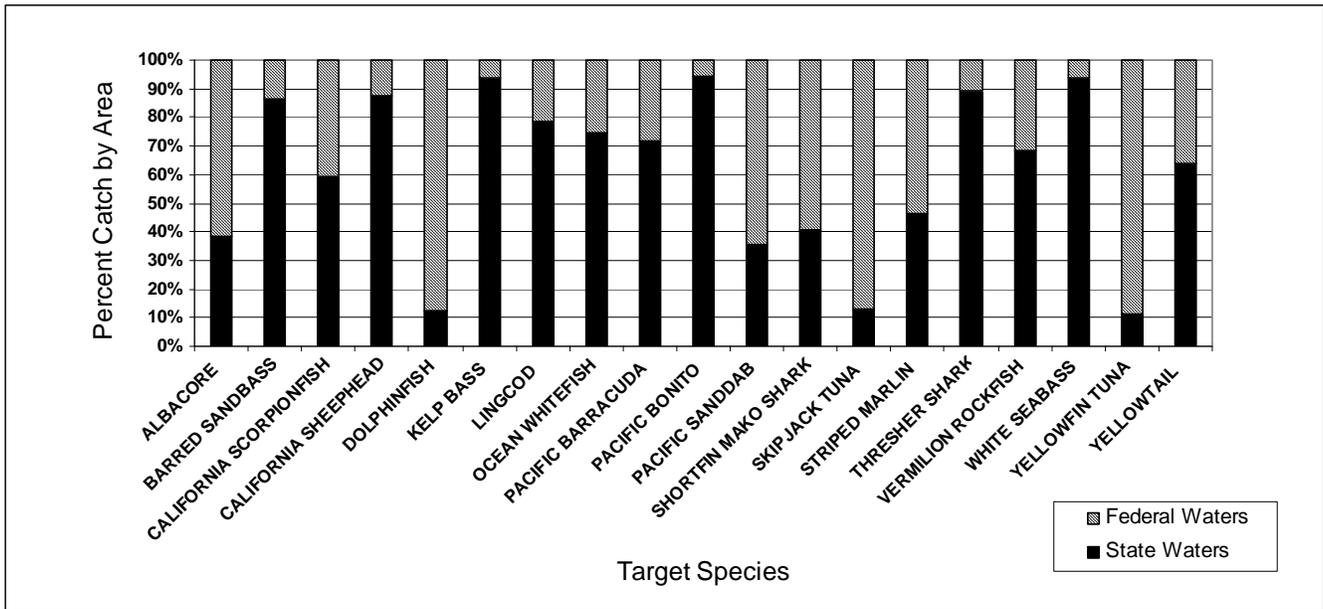
An additional source for CPFV catch and effort data are logbooks. The CPFV logbook is completed by the vessel operator and must be submitted monthly to DFG. Logbook data are maintained by DFG in the Commercial Fishery Information System database (CFIS).

E.2 CRFS Fishery Statistics, 2005 to 2007

Catch Estimates by Fishing Area for Southern California

CRFS catch estimates for United States waters can be summarized for trips that occurred within state waters (within three miles of shore) versus trips that occurred in federal waters (outside of three miles). Some important species targeted by CPFV's and private boat anglers in southern California are primarily caught outside of the study region, particularly highly migratory species. Catches of highly migratory species such as tunas, billfish, and dolphinfish primarily occur in federal waters (Figure E-1) and Mexico (not shown), although catches in state waters can be significant in some years.

Figure E-1. Estimated percentage of catch (number of fish) occurring within state vs federal waters for some southern California target species, 2005 to 2007.

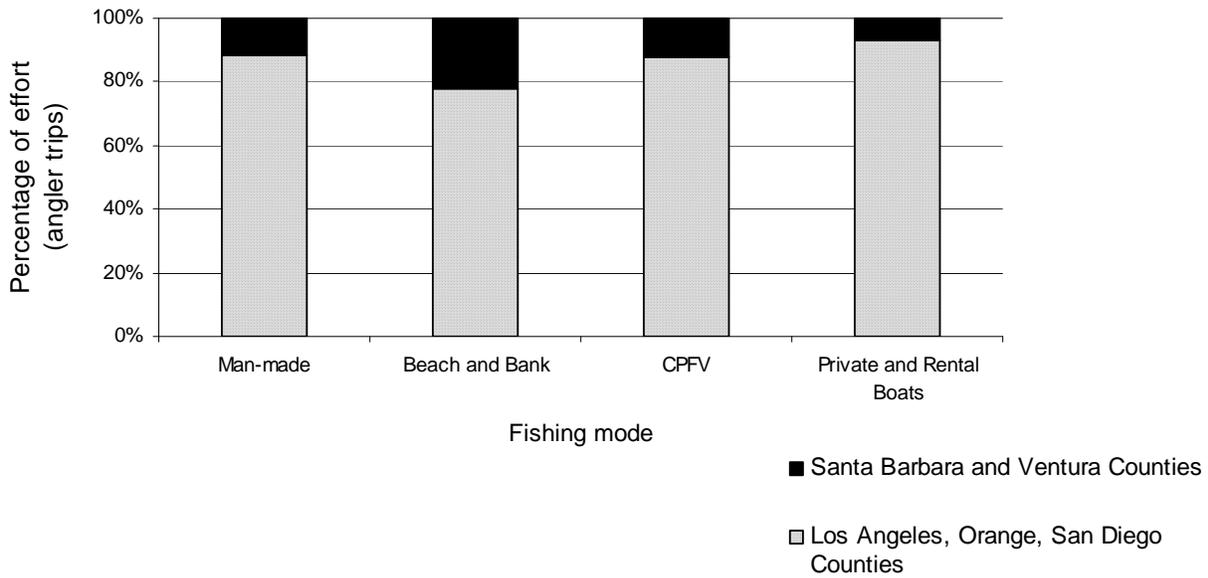


Source: CRFS data extracted from the RecFIN database at <http://www.recfin.org/forms/est2004.html>
 Query represents A+B1 catch by species for trips occurring in United States waters for southern California.
 Extraction date: December 17, 2008.

Catch and Effort by CRFS Sampling District for Southern California

CRFS provides separate catch and effort estimates for Santa Barbara and Ventura counties (Channel District) and for Los Angeles, Orange, and San Diego counties (Southern District). Effort and catch estimates in the study region for most species are much higher for all modes of fishing in the Southern District (Figure E-2). However, more than half of the rockfish and sculpins (cabezon and staghorn sculpin) are caught in the Channel District (Figure E-3).

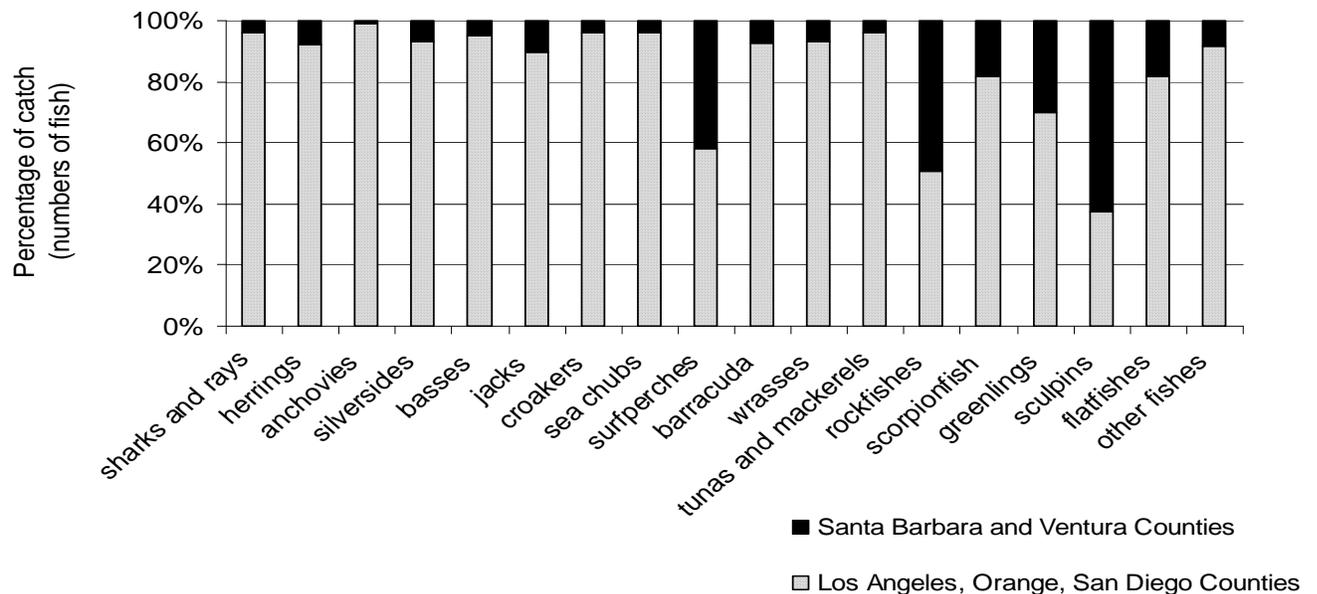
Figure E-2. Estimated Proportion of Fishing Effort, 2005 to 2007



Source: CRFS data extracted from the RecFIN database at <http://www.recfin.org/forms/est2004.html>

Query represents all angler trips for all modes of fishing for inland and marine waters less than 3 miles from shore for southern California. Extraction date: December 17, 2008

Figure E-3. Estimated proportion of catch by fish type, 2005 to 2007



Source: CRFS data extracted from the RecFIN database at <http://www.recfin.org/forms/est2004.html>. Query represents catch in numbers of fish by supergroup for all modes for inland and marine waters within three miles of shore for southern California. Extraction date: August 28, 2008

Note: A large proportion of surfperch catch for Santa Barbara and Ventura Counties originates from sites north of Point Conception.

CRFS Catch Estimates by Species and Fishing Mode

Finfish catch by species and catch proportions vary by fishing mode. Table V-1 shows the average annual top ten species of fish caught for each fishing mode in the study region from 2005 to 2007.

Table E-1. Top ten species by fishing mode, 2005 to 2007

		Estimated number of fish taken, in 1000s.					
Man-made		Beach and bank ¹		CPFV		Private and rental boats	
Pacific mackerel	1,678	Barred surfperch	121	barred sandbass	114	Pacific mackerel	105
northern anchovy	580	Silversides	98	kelp bass	82	white croaker	89
Pacific sardine	446	yellowfin Croaker	34	Pacific bonito	40	barred sandbass	78
queenfish	216	white Croaker	23	Pacific barracuda	38	kelp bass	75
silversides	471	spotfin Croaker	19	vermillion rockfish	33	vermillion rockfish	24
yellowfin croaker	75	opaleye	15	Calif. scorpionfish	33	Sanddabs	22
Pacific bonito	74	California corbina	14	Pacific mackerel	28	Pacific bonito	21
walleye surfperch	59	walleye surfperch	12	blue rockfish	20	Pacific barracuda	15
white Croaker	55	black perch	11	halfmoon	17	California halibut	14
barred surfperch	44	Pacific mackerel	4	bocaccio	16	spotted sandbass	13

Source: CRFS data extracted from the RecFIN database at <http://www.recfin.org/forms/est2004.html> Query represents catch in numbers of fish by species for all modes in inland and marine waters within three miles of shore for southern California. Extraction date: July 7, 2008.

¹Note that a large proportion of surfperch catch for Santa Barbara and Ventura Counties originates from sites north of Point Conception.

CRFS Angler Reported Target Species

Tables E-2 through E-4 display the primary target species as reported by anglers during interviews with CRFS samplers. The target term “anything” is recorded when anglers are not targeting a particular species or type of fish, such as bottom or pelagic fish. The data shown in these tables are based on raw (un-extrapolated) interview data collected at fishing sites.

Table E-2. Top ten targeted finfish species by fishing mode, 2005 to 2007

	Man-made	Beach and bank	CPFVs	Private and rental boats
1	anything	anything	rockfish genus	anything
2	Pacific mackerel	surfperch family	sandbass genus	California halibut
3	California halibut	California halibut	kelp bass	yellowtail
4	surfperch family	California corbina	barred sandbass	sandbass genus
5	Pacific bonito	sandbass genus	yellowtail	kelp bass
6	bottomfish	barred surfperch	California scorpionfish	rockfish genus
7	sharks	croaker family	Pacific barracuda	barred sandbass
8	sandbass genus	bottomfish	anything	white seabass
9	croaker family	opaleye	bottom fish	Pacific barracuda
10	surface fish	Pacific bonito	surface fish	spotted sandbass

Data source: CRFS data extracted from the RecFIN database at <http://www.recfin.org/forms/dsamp.htm>.

Query represents type 1 records (angler information) for reported primary target in all modes in inland and marine waters within three miles of shore for southern California. Extraction date: July 7, 2008

Table E-3. Top ten finfish species targeted by kayakers, 2005 to 2007

Kayak	
1	yellowtail
2	anything
3	California halibut
4	white seabass
5	sandbass genus
6	spotted sandbass
7	kelp bass
8	barred sandbass
9	bottomfish
10	Pacific barracuda

Source: CRFS data extracted from the RecFIN database at <http://www.recfin.org/forms/dsamp.htm>.

Query represents type 1 records (angler information) for reported primary target species in private and rental boat mode where the boat type was a kayak for inland and marine waters within 3 miles from shore for southern California. Extraction date: July 7, 2008

Table E-4. Top ten finfish species targeted by spearfishermen, 2005 to 2007

Shore modes		Private and rental boats
1	anything	kelp bass
2	California halibut	white seabass
3	white seabass	California halibut
4	black perch	yellowtail
5	California sheephead	sandbass genus
6	kelp bass	anything
7	opaleye	California sheephead
8	bottomfish	barred sandbass
9	California corbina	California scorpionfish
10	sandbass genus	black perch

Source: CRFS data extracted from the RecFIN database at <http://www.recfin.org/forms/dsamp.htm>.

Notes: Query represents type 1 records (angler information) for reported primary target species in all modes where the gear type was a spear for inland and marine waters within 3 miles of shore for southern California. Extraction date: July 7, 2008

No CRFS interview data are available for CPFV spearfishing trips.

E.3 Historic MRFSS Fishery Statistics, 1998 to 2003

Catch statistics from the MRFSS, although not directly comparable to the CRFS, are provided here to show historic catch proportions. Table V-5 shows the average annual estimated top ten species caught (number of fish) for each fishing mode in the study area from 1998 to 2003.

Table E-5. Top ten species by fishing mode, average annual catch, 1998 to 2003

	Estimated number of fish taken, in 1000s.						
	Man-made	Beach and bank ^a		CPFV	Private and rental boats		
Pacific mackerel	455	Pacific mackerel	131	barred sandbass	189	barred sandbass	337
Pacific sardine	357	barred surfperch	103	kelp bass	152	Pacific mackerel	246
silversides	298	silversides	84	Pacific barracuda	117	kelp bass	224
queenfish	258	white croaker	28	Pacific mackerel	66	white croaker	103
white croaker	77	opaleye	15	ocean whitefish	62	California halibut	78
walleye surfperch	47	yellowfin croaker	12	Calif. scorpionfish	60	Calif. scorpionfish	67
yellowfin croaker	39	walleye surfperch	8	vermillion rockfish	34	Pacific barracuda	58
barred surfperch	21	black surfperch	8	yellowtail	33	ocean whitefish	53
black surfperch	15	Pacific sardine	7	halfmoon	27	spotted sandbass	46
northern anchovy	15	California corbina	7	rosy rockfish	19	vermillion rockfish	38

Source: MRFSS data extracted from the RecFIN database at <http://www.recfin.org/forms/dsamp.htm>. Query represents catch in numbers of fish by species for all modes in inland and marine waters within three miles of shore for southern California. Extraction date: July 7, 2008.

Notes: MRFSS catch estimates are not comparable to CRFS estimates.

^a Beach bank catch estimates are based on samples from the Santa Barbara/ San Luis Obispo County line to the Mexico/US border.

E.4 CPFV Logbook Data, 1998 to 2007: Invertebrate Catch Statistics

The CRFS and MRFSS programs have not historically collected catch and effort data on invertebrate species harvested in the recreational fisheries; thus CPFV logbook data are the best available source of information for some invertebrate species. Table V-6 displays the reported catch in thousands of fish for invertebrates taken by both divers and hook-and-line anglers on CPFVs. Humboldt squid is targeted by hook-and-line anglers, while rock scallop and California spiny lobster are primarily targeted by divers on CPFV trips. Unlike CRFS and MRFSS estimates, CPFV logbook data are not reported at the level of resolution needed to isolate trips that occurred within state waters.

Table E-6. CPFV catch of Humboldt squid, rock scallop, and California spiny lobster

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Humboldt squid		119	8		198	1		28		76
rock scallop	13	12	15	14	12	10	7	9	9	8
California spiny lobster	6	8	12	10	12	11	8	8	9	10

Source: CPFV logbook data extracted from CFIS for all ports within the south coast study region. Extraction date: August 4, 2008

Notes: Catch statistics for invertebrates represented in this table are for CPFV mode only, and are not representative of all recreational harvest.

Represents catch from all waters in southern California.

E.5 Synopsis of Applicable Regulations

California ocean sportfishing regulations applicable to the study region are described in the Ocean Sportfishing Regulation Booklet, which is available on DFG's website at: http://www.dfg.ca.gov/marine/sportfishing_regs2008.asp .

A summary of size and bag limits for common southern California species is provided in Tables E-7 and E-9, and a summary of groundfish regulations applicable to the southern California is provided in Table E-8.

Table E-7. 2007-2008 Size and bag limits for some common fishes

Common name	Size limit (TL)	Daily bag limit
		General finfish bag limit: no more than 20 in combination of all species with no more than 10 of a single species except as provided.
albacore		10 fish in addition to overall daily limit of 20 fish in combination
bluefin tuna		10 fish in addition to overall daily limit of 20 fish in combination
kelp bass	12 inches	10 fish in combination
barred sandbass		
spotted sandbass		
California halibut	22 inches	5 fish
thresher shark		2 fish
blue shark		
shortfin mako		
shiner surfperch		20 fish in addition to overall daily limit of 20 fish in combination
Pacific barracuda	28 inches	10 fish
Pacific bonito	maximum of 5 fish can be under 24 inches(FL) or 5 lbs	10 fish
white seabass	28 inches	3 fish, except 1 fish between March 15th and June 15th
yellowtail	maximum of 5 fish can be under 24 inches (FL)	10 fish
anchovy		no limit
grunion		no limit
jacksmelt		no limit
topsmelt		no limit
Pacific butterfish		no limit
queenfish		no limit
sanddabs		no limit
skipjack		no limit
jack mackerel		no limit
Pacific mackerel		no limit
Pacific staghorn sculpin		no limit
round herring		no limit
Pacific sardine		no limit
petrale sole		no limit

Appendix E

Common name	Size limit (TL)	Daily bag limit
starry flounder		no limit
garibaldi		no take allowed
white shark		no take allowed
giant seabass		no take allowed
broomtail grouper		no take allowed

Notes: Boat limits also apply for CPFV trips. See section §27.60, Title 14, CCR.
See regulations for gear restrictions and fillet lengths.

Table E-8 2008 Groundfish regulations excluding cowcod conservation areas

Species	Time period ^{2,3,4,6,7}	Depth limit ^{2,3,4,6,7}	Daily bag limit ³	Min. size limit ^{1,3,5}
RCG Complex (including all species of rockfish, cabezon and greenlings)	<u>Boat-based Anglers</u> ⁴ : Open: Mar 1-Dec 31 Closed: Jan, Feb <u>Divers, Shore-based Anglers</u> ⁴ : Open year-round	May only be taken or possessed in waters <i>less than</i> 360 ft (60 fm) deep ² SEE EXCEPTION AT END OF TABLE	10 fish in combination per person; see sublimits for cabezon, greenlings and bocaccio	See individual species and groups below
canary and yelloweye rockfishes, cowcod	CLOSED all year; NO RETENTION		NO RETENTION (zero)	
bocaccio	Same as RCG Complex, above	Same as RCG Complex, above	1 fish per person; also included in the 10-fish aggregate RCG Complex bag limit	10" total length
cabezon	Same as RCG Complex, above	Same as RCG Complex, above	1 fish per person; also included in the 10-fish aggregate RCG Complex bag limit	15" total length
kelp or rock greenling	Same as RCG Complex, above	Same as RCG Complex, above	2 fish per person; also included in the 10-fish aggregate RCG Complex bag limit	12" total length
ocean whitefish	Same as RCG Complex, above	Same as RCG Complex, above	10 fish per person	none
California sheephead	Same as RCG Complex, above	Same as RCG Complex, above	5 fish per person	12" total length
California scorpionfish	OPEN all year	Jan, Feb: May only be taken or possessed in waters <i>less than</i> 240 ft. (40 fm) deep ² Mar 1-Dec 31: May only be taken or possessed in waters <i>less than</i> 360 ft. (60 fm) deep ²	5 fish per person	10" total length
lingcod	<u>All Anglers and Divers</u> ⁴ : Open: Apr 1-Nov 30 Closed: Jan 1-Mar 31, Dec	Same as RCG Complex, above	2 fish per person	24" total length

Species	Time period ^{2,3,4,6,7}	Depth limit ^{2,3,4,6,7}	Daily bag limit ³	Min. size limit ^{1,3,5}
leopard shark	<u>Boat-based Anglers⁴ within Newport Bay, Alamitos Bay, San Diego Bay, and Mission Bay.</u> Open all year <u>Outside of the above-mentioned bays.</u> Same as RCG Complex, above <u>Divers, Shore-Based Anglers⁴:</u> Open all year	<u>Boat-based Anglers⁴ within Newport Bay, Alamitos Bay, San Diego Bay, and Mission Bay.</u> No depth restrictions <u>Outside of the above-mentioned bays.</u> Same as RCG Complex, above <u>Divers, Shore-Based Anglers⁴:</u> Open all year	3 fish per person	36" total length
Pacific sanddabs and "Other Flatfish" ⁷ (see Section 28.48)	OPEN all year <i>with certain gear restrictions during Jan and Feb</i> (see Footnote 7, below)	None, <i>although certain gear restrictions apply in depths greater than 360 ft (60 fm)</i> (see Footnote 7, below)	See Section 28.48	See Section 28.48
other federal groundfish (see Sections 28.49, 28.51, 28.52, 28.53, 28.57)	Same as RCG Complex, above	Same as RCG Complex, above	See Sections 28.49, 28.51, 28.52, 28.53, 28.57	See Sections 28.49, 28.51, 28.52, 28.53, 28.57

Notes: 1 See regulations for information on gear restrictions and fillet lengths.

2-In the Cowcod Conservation Areas fishing is prohibited in waters greater than 120 feet (20 fathoms) in depth. Fishing is also subject to the Time Period closures for the Southern Management Area. See Section 27.50 for further information on species restrictions.

3-Subject to in-season change.

4-Divers and shore-based anglers are exempt from season and depth restrictions affecting the RCG complex, ocean whitefish, California sheephead, and other federally managed groundfish (except for lingcod). However, when spear fishing during a boat-based closure, only spear fishing gear is allowed aboard any vessel or watercraft. Also, when angling from shore during a boat-based closure, no vessel or watercraft may be used to assist in taking or possessing species included in this table. The following definitions describe boat-based and shore-based anglers, and divers:

Boat-based anglers are fishermen that fish from boats or vessels of any size or any other type of floating object, including kayaks and float tubes.

Shore-based anglers are fishermen that fish from beaches, banks, piers, jetties, breakwaters, docks and other manmade structures connected to the shore.

Divers are spear fishermen entering the water either from the shore or from a boat or other floating object.

5-Total length is the longest straight-line measurement from the tip of the head with the mouth closed to the end of the longest lobe of the tail. The 2007 Ocean Sport Fishing regulations booklet has a measurement illustration.

6-The sport fishery for leopard shark inside Newport Bay, Alamitos Bay, Mission Bay, and San Diego Bay is exempt from season and depth restrictions that affect other federally managed groundfish.

7-In closed areas or during closed periods, Pacific sanddab, butter sole, curfin sole, flathead sole, rex sole, rock sole, and sand sole (defined as "Other Flatfish" in Section 1.91(a)(10)) may ONLY be taken using the following gear: up to 12 No. 2 (or smaller) hooks and up to 2 lb. of weight.

EXCEPTION: During the open season, groundfish may be possessed in closed areas and in water depths closed to fishing only aboard vessels in transit with no fishing gear in the water. See sub-section 27.20(b).

Table E-9 2007-2008 size and bag limits for common invertebrates

Common name	Size limit	Daily bag limit
		General bag limit: 35 individuals
California spiny lobster ^a	3 1/4 inch carapace length	7 lobsters
ghost shrimp		50 shrimp in combination
blue mud shrimp		
sand crabs		50 crabs
mussels		10 lbs
Pismo clam	4 1/2 inch greatest diameter	10 clams
littleneck clams	1 1/2 inch greatest diameter	50 clams in combination
soft-shell clams	No limit	

Appendix E

<u>Common name</u>	<u>Size limit</u>	<u>Daily bag limit</u>
chiones	1 1/2 inch greatest diameter	
northern quahogs	1 1/2 inch greatest diameter	
cockles	1 1/2 inch greatest diameter	

Notes: See regulations for additional restrictions. Recreational take of abalone is prohibited in southern California

^a California spiny lobster may be taken by hand or by baited hoop net. South of Point Arguello, not more than five baited hoop nets may be fished by any one person, not to exceed a total of 10 baited hoop nets fished from any vessel.

Appendix F: List of Species Referenced in this Profile

This appendix contains a list of all species referenced in the Draft Regional Profile of the MLPA South Coast Study Region (Point Conception to the California/Mexico border), with both common and scientific names given. This appendix does not represent an exhaustive list of all species found in the MLPA South Coast Study Region.

Common Name (Colloquial Names)	Scientific Name
<i>Finfish</i>	
Arrow goby	<i>Clevelandia ios</i>
Bay pipefish	<i>Syngnathus leptorhynchus</i>
Cabezon	<i>Scorpaenichthys marmoratus</i>
California grunion	<i>Leuresthes tenuis</i>
California halibut (flatty)	<i>Paralichthys californicus</i>
California killifish	<i>Fundulus parvipinnis</i>
California scorpionfish (sculpin)	<i>Scorpaena guttata</i>
California yellowtail	<i>Seriola lalandi</i>
Croakers	<i>Sciaenidae</i>
California corbina	<i>Menticirrhus undulatus</i>
Queenfish (Herring)	<i>Seriphus politus</i>
Spotfin croaker	<i>Roncador stearnsii</i>
White croaker (tomcod or kingfish)	<i>Genyonemus lineatus</i>
White seabass	<i>Atractoscion nobilis</i>
Yellowfin croaker	<i>Umbrina roncadore</i>
Diamond turbot	<i>Pleuronichthys guttulatus</i>
Dolphinfish (dorado or mahi mahi)	<i>Coryphaena hippurus</i>
Garibaldi	<i>Hypsypops rubicundus</i>
Giant sea bass (black sea bass)	<i>Stereolepis gigas</i>
Greenlings	<i>Hexagrammos</i>
Kelp	<i>H. decagrammus</i>
Rock	<i>H. lagocephalus</i>
Lingcod	<i>Ophiodon elongatus</i>
Jack mackerel (Spanish mackerel)	<i>Trachurus symmetricus</i>
Monkeyface prickleback (monkeyface eel)	<i>Cebidichthys violaceus</i>
Northern anchovy	<i>Engraulis mordax</i>
Pacific barracuda	<i>Sphyræna argentea</i>
Pacific bonefish (bonefish)	<i>Albula</i> spp. A
Pacific bonito (bonita')	<i>Sarda chiliensis</i>
Pacific herring	<i>Clupea pallasii</i>
Pacific lamprey	<i>Lampetra tridentata</i>
Pacific chub mackerel (greenback mackerel)	<i>Scomber japonicus</i>
Pacific sardine	<i>Sardinops sagax</i>
Pacific staghorn sculpin	<i>Leptocottus armatus</i>
Rockfishes	<i>Sebastes</i>
Black (black bass or black snapper)	<i>S. melanops</i>
Black-and-yellow	<i>S. chrysomelas</i>
Blue (blue bass or blue perch)	<i>S. mystinus</i>
Bocaccio (salmon grouper)	<i>S. paucispinis</i>
Brown (bolina)	<i>S. auriculatus</i>
Calico	<i>S. dallii</i>
China	<i>S. nebulosus</i>

Copper (chucklehead)	<i>S. caurinus</i>
Cowcod (cowfish or roosterfish)	<i>S. levis</i>
Gopher	<i>S. carnatus</i>
Grass (grass bass)	<i>S. rastrelliger</i>
Kelp (sugar bass)	<i>S. atrovirens</i>
Olive (johnny bass)	<i>S. serranoides</i>
Quillback	<i>S. maliger</i>
Treefish (lipstick bass or convictfish)	<i>S. serriceps</i>
Vermillion (red snapper or red rockcod)	<i>S. miniatus</i>
Sablefish (blackcod)	<i>Anoplopoma fimbria</i>
Sargo	<i>Anisotremus davidsonii</i>
Sea basses	<i>Paralabrax</i> spp.
Kelp bass (calico bass)	<i>P. clathratus</i>
Barred sand bass (sand bass)	<i>P. nebulifer</i>
Spotted sand bass (spotted bay bass)	<i>P. maculatofasciatus</i>
Sea chubs	<i>Kyphosidae</i>
Halfmoon (catalina blue perch)	<i>Medialuna californiensis</i>
Opaleye	<i>Girella nigricans</i>
Sharks and rays	
Bat ray	<i>Myliobatis californica</i>
Blue shark	<i>Prionace glauca</i>
Brown smoothhound (sandshark)	<i>Mustelus henlei</i>
Grey smoothhound (sandshark)	<i>Mustelus californicus</i>
Leopard shark	<i>Triakis semifasciata</i>
Pacific angel shark	<i>Squatina californica</i>
Salmon shark	<i>Lamna ditropis</i>
Shortfin mako shark (mako or bonito shark)	<i>Isurus oxyrinchus</i>
Shovelnose guitarfish (shovelnose, sandshark)	<i>Rhinobatos productus</i>
Soupfin shark	<i>Galeorhinus zyopterus</i>
Spiny dogfish (pinback shark)	<i>Squalus acanthias</i>
Thresher shark	<i>Alopias vulpinus</i>
Silversides (smelt)	<i>Atherinopsidae</i>
California grunion	<i>Leuresthes tenuis</i>
Jacksmelt	<i>Atherinopsis californiensis</i>
Topsmelt	<i>Atherinops affinis</i>
Sole	
Dover	<i>Microstomus pacificus</i>
English	<i>Parophrys vetulus</i>
Petrale	<i>Eopsetta jordani</i>
Striped mullet	<i>Mugil cephalus</i>
Steelhead trout	<i>Oncorhynchus mykiss</i>
Surfperch	<i>Embiotocidae</i>
Barred	<i>Amphistichus argenteus</i>
Black perch (butter mouth)	<i>Embiotoca jacksoni</i>
Kelp	<i>Brachyistius frenatus</i>
Pile	<i>Rhacochilus vacca</i>
Walleye	<i>Hyperprosopon argenteum</i>
Swordfish	<i>Xiphias gladius</i>
Thornyhead	<i>Sebastolobus</i> spp.
Longspine	<i>S. altivelis</i>
Shortspine	<i>S. alascanus</i>
Tidewater Goby	<i>Eucyclogobius newberryi</i>
Tuna	<i>Thunnus</i>
Albacore (longfin)	<i>T. alalunga</i>

Bluefin
 Yellowfin
 Wrasses
 California sheephead
 Rock wrasse

T. thynnus
T. albacares
 Labridae
Semicossyphus pulcher
Halichoeres semicinctus

Invertebrates

Abalones
 Red
 White
 Black
 Pink
 Green
 Pinto
 Flat
 Amphipods
 Amur River clam
 Anemones
 Barnacles
 California spiny lobster
 Chinese mitten crab
 Chiones
 Cockles
 Ghost shrimp
 Isopods
 Jackknife clam
 Japanese shore crab
 Kellet's whelk
 Humboldt squid (giant squid)
 Market squid
 Mussels
 Oysters
 Prawns
 Ridgeback
 Spot
 Purple coral
 Rock crabs
 Yellow
 Brown
 Red
 Rock scallop
 Sabellid worm, South African
 Sand crabs (mole crabs)
 Sea cucumbers
 California
 Giant red
 Sea stars
 Sea urchins
 Red
 Snails
 Worms

Haliotis spp
H. rufescens
H. sorenseni
H. cracherodii
H. corrugata
H. fulgens
H. kamtschatkana
H. walallensis
 Amphipoda
Corbula amurensis
 Zoantharia
 Cirripedia
Panulirus interruptus
Eriocheir sinensis
 Veneridae
 Cardiidae
 Callianessidae
 Isopoda
Tagelus californianus
Hemigrapsus sanguineus
Kelletia kelletii
Dosidicus gigas
Loligo opalescens
Mytilus spp.
 Ostreidae

Sicyonia ingentis
Pandalus platyceros
Stylaster californicus
 Cancer
C. anthonyi
C. antennarius
C. productus
Crassadoma gigantea
Terebrasabella heterouncinata
 Hippidae
 Parastichopus
P. californicus
P. parvimensis
 Asteroidea
Strongylocentrotus spp.
Strongylocentrotus franciscanus
 Gastropoda
 Polychaeta

Birds

American White Pelican
Ashy Storm-Petrel
Barrow's Goldeneye
Black Tern
Black Skimmer
Black Storm-Petrel
California Brown Pelican
California Gull
California Least Tern
Common Loon
Double Crested Cormorant
Elegant Tern
Fulvous Whistling Duck
Harlequin Duck
Laughing Gull
Least Bell's Vireo
Least Bittern
Light-footed Clapper Rail
Long-billed Curlew
Large-billed Savannah Sparrow
Northern Harrier
Osprey
Pacific Loon
Peregrine Falcon
Reddish Egret
Rhinoceros Auklet
Sandhill Crane
Snowy Plover
Swainson's Hawk
Tricolored Blackbird
Tufted Puffin
White-faced Ibis
Xantus's Murrelet

Pelecanus erythrorhynchos
Oceanodroma homochroa
Bucephala islandica
Chlidonias niger
Rvnchops niger
Oceanodroma melania
Pelecanus occidentalis californicus
Larus californicus
Sternula antillarum browni
Gavia immer
Phalacrocorax auritus
Sterna elegans
Dendrocygna bicolor
Histrionicus histrionicus
Larus atricilla
Vireo bellii pusillus
Ixobrychus exilis
Rallus longirostris levipes
Numenius americanus
Passerculus rostratus
Circus cyaneus
Pandion haliaetus
Gavia pacifica
Falco peregrinus
Egretta rufescens
Cerorhinca monocerata
Grus canadensis
Charadrius alexandrinus
Buteo swainsoni
Agelaius tricolor
Lunda cirrhata
Plegadis chihi
Synthliboramphus hypoleucus

Mammals

Anacapa Island deer mouse
cetaceans
Baird's beaked whale
blue whale
bottlenose dolphin
Bryde's whale
common dolphin
Dall's porpoise
fin whale
gray whale
humpback whale
killer whale
minke whale
northern right-whale dolphin
Pacific white-sided dolphin

Peromyscus maniculatus anacapae

Berardius bairdii
Balaenoptera musculus
Tursiops truncatus
Balaenoptera edeni
Delphinus delphis
Phocanoides dalli
Balaenoptera physalus
Eschrichtus robustus
Megaptera novaeangliae
Orcinus orca
Balaenoptera acutorostrata
Lissodelphis borealis
Lagenorhynchus obliquidens

pilot whale
 right whale
 Risso's dolphin
 sei whale
 sperm whale
 pinnipeds
 California sea lion
 Guadalupe fur seal
 harbor seal
 northern elephant seal
 northern fur seal
 ribbon seal
 Steller sea lion
 southern sea otter
 Santa Catalina ground squirrel
 south coast marsh vole
 southern California salt marsh shrew
 southern marsh harvest mouse

Globicephala macrohynchus
Eubalaena glacialis
Grampus griseus
Balaenoptera borealis
Physeter macrocephalus

Zalophus californianus
Arctocephalus townsendi
Phoca vitulina
Mirounga angustirostris
Callorhinus ursinus
Histriophoca fasciata
Eumetopias jubatus
Enhydra lutris nereis
Spermophilus beecheyi nesioticus
Microtus californicus stephensi
Sorex ornatus salicornicus
Reithrodontomys megalotis limicola

Amphibians and Reptiles

sea turtles
 green sea turtle
 leatherback
 loggerhead
 olive ridley

Chelonia mydas
Dermochelys coriacea
Caretta caretta
Lepidochelys olivacea

Plants

bull kelp
 eelgrass
 Pacific eel grass
 common eel grass
 giant kelp
 rock weeds
 salt marsh bird's beak
 sea palm
 surfgrass
 turfweed
 Ventura marsh milk-vetch

Nereocystis lutkeana
Zostera spp.
Zostera pacifica
Zostera marina
Macrocystis pyrifora
Hesperophycus californicus & *Silvetia deliquenscens*
Cordylanthus maritimus ssp. *Maritimus*
Postelsia spp
Phyllospadix spp
Endocladia muricata
Astragalus pycnostachys var. *lanosissimus*

Appendix G: Impaired Water Bodies and Rivers in the Study Region

In this appendix, impaired water bodies and impaired streams and rivers are listed by Water Quality Control Board region.

Table G-1. Impaired water bodies in RWQCB Region 3 (central coast)

Name	Pollutant/Stressor	Source	TMDL Status	Map Category
Arroyo Burro Creek	Pathogens	NPS, Natural	2015	Impaired Water Bodies/Rivers ¹ /Rivers ¹
Arroyo Paredon	B, NO ₃ , Toxicity	Unknown	2019	Impaired Water Bodies/Rivers ¹ /Rivers ¹
Carpinteria Creek	Pathogens	Agri., Land Disposal, Septage Disposal	2015	Impaired Water Bodies/Rivers ¹ /Rivers ¹
Cholame Creek	B, F. Coliform	Unknown, Agri., Natural, NPS, Grazing-Riparian and/or Upland	2019	Impaired Water Bodies/Rivers ¹
Franklin Creek	NO ₃	Unknown	2019	Impaired Water Bodies/Rivers ¹
Mission Creek	Pathogens, U. Tox.	Transient encampments, Natural	2015	Impaired Water Bodies/Rivers ¹
Pacific Ocean at Arroyo Burro Beach (Santa Barbara County)	T. Coliform	Unknown	2015	Impaired Beaches ¹
Pacific Ocean at Carpinteria State Beach (Carpinteria Creek mouth, Santa Barbara County)	F. Coliform, T. Coliform	Unknown	2015	Impaired Beaches ¹
Pacific Ocean at East Beach (mouth of Mission Creek, Santa Barbara County)	F. Coliform, T. Coliform	Agri., Natural, NPS, UNPS	2015	Impaired Beaches ¹
Pacific Ocean at East Beach (mouth of Sycamore Creek, Santa Barbara County)	T. Coliform	Unknown	2015	Impaired Beaches ¹
Pacific Ocean at Gaviota Beach (mouth of Canada de la Gaviota Creek, Santa Barbara County)	T. Coliform	Unknown	2015	Impaired Beaches ¹
Pacific Ocean at Goleta Beach (Santa Barbara County)	F. Coliform	Unknown	2019	Impaired Beaches ¹
Pacific Ocean at Hammonds Beach (Santa Barbara County)	F. Coliform	Unknown	2015	Impaired Beaches ¹
Pacific Ocean at Hope Ranch Beach (Santa Barbara County)	F. Coliform	Unknown	2015	Impaired Beaches ¹
Pacific Ocean at Jalama Beach (Santa Barbara County)	F. Coliform, T. Coliform	Agri., Natural, NPS, Grazing-Riparian	2015	Impaired Beaches ¹

Name	Pollutant/Stressor	Source	TMDL Status	Map Category
Pacific Ocean at Pbbetter Beach (Santa Barbara County)	F. Coliform	Unknown	2019	Impaired Beaches, human impact only ²
Pacific Ocean at Ocean Beach (Santa Barbara County)	F. Coliform, T. Coliform	Unknown	2015	Impaired Beaches ¹
Pacific Ocean at Point Rincon (mouth of Rincon Cr, Santa Barbara County)	F. Coliform, T. Coliform	Unknown	2015	Impaired Coastlines, human impact only ²
Pacific Ocean at Refugio Beach (Santa Barbara County)	T. Coliform	Unknown	2015	Impaired Beaches
Pacific Ocean at Rio Del Mar (Santa Cruz County)	F. Coliform	Unknown	2019	Impaired Coastlines, human impact only ²
Rincon Creek	B, Toxicity	Unknown	2019	Impaired Water Bodies/Rivers ¹

Source: State Water Resources Control Board, 2006.

Note: Ag= Silver, Agri.= Agriculture, B= Boron, Benthic= Benthic Community Effects, Cd= Cadmium, Cl-= Chloride, Coliform= Coliform bacteria, Cu= Copper, DO= Dissolved Oxygen, DDT= Dichloro-Diphenyl-Trichloroethane, F. Coliform= Fecal Coliform, Fe= Iron, Hg= Mercury, Mn= Manganese, N= Nitrogen, Natural= Natural Source, NH₃= Ammonia, Ni= Nickel, NPS= Nonpoint Source, PAHs= Polycyclic Aromatic Hydrocarbons, Pb= Lead, PCB= Polychlorinated biphenyls, Ph= Phosphorus, PS= Point Source, sed.= sed., Sed/Silt= Sedimentation/Siltation, T. Coliform= Total Coliform, TDS= Total dissolved solids, tis.= tissue, Unknown= Unknown Source, UNPS= Unknown Nonpoint Source, UPS= Unknown Point Source, Zn= Zinc

1 Contains any 303(d) listed pollutant, but must not be limited to those associated with human health concerns.

2 Contains only 303(d) listed pollutants known to affect humans through recreational contact. These impairments include pathogens and other bacterial strains.

Table G-2. Impaired water bodies in RWQCB Region 4 (Los Angeles)

Name	Pollutant/Stressor	Source	TMDL Status	Map Category
Abalone Cove Beach	DDT (sed.), PCBs	NPS	2019	Impaired Beaches, human impact only ²
Alamitos Bay	F. Coliform	Unknown	2019	Impaired Water Bodies/Rivers ¹
Aliso Canyon Wash	Cu, F. Coliform	Unknown	2019	Impaired Water Bodies/Rivers ¹
Amarillo Beach	DDT, PCBs	NPS	2019	Impaired Beaches, human impact only ²
Arroyo Seco Reach 1 (LA River to West Holly Ave.)	Coliform, Trash	NPS	2009	Impaired Water Bodies/Rivers ¹
Arroyo Seco Reach 2 (Figueroa St. to Riverside Dr.)	Coliform, Trash	NPS	2009	Impaired Water Bodies/Rivers ¹
Avalon Beach	F. Coliform	NPS/PS	2019	Impaired Beaches, human impact only ²
Ballona Creek	Cd (sed.), Cyanide, Ag (sed.)	NPS/PS, Unknown	2005	Impaired Water Bodies/Rivers ¹

Name	Pollutant/Stressor	Source	TMDL Status	Map Category
Ballona Creek Estuary	Shellfish Harvesting Advisory	NPS/PS	2006	Impaired Water Bodies/Rivers ¹
Ballona Creek Wetlands	Exotic Vegetation, Habitat alterations, Hydromodification, Tidal Flushing	NPS	2019	Impaired Water Bodies/Rivers ¹
Bell Creek	Coliform	NPS/PS	2009	Impaired Water Bodies/Rivers ¹
Big Rock Beach	DDT, PCBs	NPS	2019	Impaired Beaches, human impact only ²
Bluff Cove Beach	DDT, PCBs	NPS	2019	Impaired Beaches
Brown Barranca/Long Canyon	Nitrate and Nitrite	NPS	2003	Impaired Water Bodies/Rivers ¹
Burbank Western Channel	Cyanide, Trash	Unknown, NPS/PS	2019	Impaired Water Bodies/Rivers ¹
Cabrillo Beach (Outer)	DDT, PCBs	NPS	2019	Impaired Beaches, human impact only ²
Calleguas Creek Reach 1 (was Mugu Lagoon on 1998 303(d) list)	Endosulfan (tis.)	NPS	2005	Impaired Water Bodies/Rivers ¹
Calleguas Creek Reach 2 (estuary to Potrero Rd- was Calleguas Creek Reaches 1 and 2 on 1998 303d list)	ChemA (tis.), Endosulfan (tis.), F. Coliform, Sed/Silt	NPS/PS, Agri., Natural	2005	Impaired Water Bodies/Rivers ¹
Calleguas Creek Reach 3 (Potrero Road upstream to confluence with Conejo Creek on 1998 303d list)	Cl-, Sed/Silt, TDS	NPS/PS, Agri., Natural	2002	Impaired Water Bodies/Rivers ¹
Calleguas Creek Reach 4 (was Revolon Slough Main Branch: Mugu Lagoon to Central Avenue on 1998 303d list)	B, ChemA (tis.), Endosulfan (tis. & sed.), F. Coliform, Sed/Silt, Sulfates, TDS, Trash	NPS/PS, Agri., Natural	2019	Impaired Water Bodies/Rivers ¹
Calleguas Creek Reach 5 (was Beardsley Channel on 1998 303d list)	ChemA (tis.), Dacthal (sed.), Endosulfan (tis. & sed.), Sed/Silt, Trash	NPS, Agri., Natural	2005	Impaired Water Bodies/Rivers ¹
Calleguas Creek Reach 6 (was Arroyo Las Posas Reaches 1 and 2 on 1998 303d list)	Cl-, F. Coliform, Sed/Silt, Sulfates, TDS	NPS/PS, Agri., Natural	2002	Impaired Water Bodies/Rivers ¹
Calleguas Creek Reach 7 (was Arroyo Simi Reaches 1 and 2 on 1998 303d list)	B, Cl-, F. Coliform, Sed/Silt, Sulfates, TDS	NPS, Agri., Natural	2019	Impaired Water Bodies/Rivers ¹
Calleguas Creek Reach 8 (was Tapo Canyon Reach 1)	B, Cl-, Sed/Silt, Sulfates, TDS	NPS/PS	2019	Impaired Water Bodies/Rivers ¹
Calleguas Creek Reach 9A (was lower part of Conejo Creek Reach 1 on 1998 303d list)	ChemA (tis.), Endosulfan (tis.), F. Coliform, HCH (tis.), Sulfates, TDS	NPS/PS	2005	Impaired Water Bodies/Rivers ¹
Calleguas Creek Reach 9B (was part of Conejo Creek Reaches 1 and 2 on 1998 303d list)	ChemA (tis.), Cl-, Endosulfan (tis.), F. Coliform, Sulfates, TDS	NPS/PS	2005	Impaired Water Bodies/Rivers ¹

Name	Pollutant/Stressor	Source	TMDL Status	Map Category
Calleguas Creek Reach 10 (Conejo Creek (Hill Canyon)-was part of Conejo Crk Reaches 2 & 3, and lower Conejo Crk/Arroyo Conejo N Fk on 1998 303d list)	ChemA (tis.), Cl-, Endosulfan (tis.), F. Coliform, Sulfates, TDS	NPS/PS	2005	Impaired Water Bodies/Rivers ¹
Calleguas Creek Reach 11 (Arroyo Santa Rosa, was part of Conejo Creek Reach 3 on 1998 303d list)	ChemA (tis.), Endosulfan (tis.), F. Coliform, Sed/Silt, Sulfates, TDS	NPS/PS, Agri., Natural	2005	Impaired Water Bodies/Rivers ¹
Calleguas Creek Reach 12 (was Conejo Creek/Arroyo Conejo North Fork on 1998 303d list)	Sulfates, TDS	NPS/PS	2019	Impaired Water Bodies/Rivers ¹
Calleguas Creek Reach 13 (Conejo Creek South Fork, was Conejo Cr Reach 4 and part of Reach 3 on 1998 303d list)	ChemA (tis.), Cl-, Endosulfan (tis.), Sulfates, TDS	NPS/PS	2005	Impaired Water Bodies/Rivers ¹
Canada Larga (Ventura River Watershed)	F. Coliform, Low DO	NPS	2019	Impaired Water Bodies/Rivers ¹
Carbon Beach	DDT, PCBs	NPS	2019	Impaired Beaches
Castlerock Beach	DDT, PCBs	NPS	2019	Impaired Beaches ¹
Channel Islands Harbor	Pb (sed.), Zn (sed.)	NPS	2019	Impaired Water Bodies/Rivers ¹
Channel Islands Harbor Beach	F. Coliform	NPS/PS	2019	Impaired Coastlines, human impact only ²
Colorado Lagoon	Chlordane (tis. & sed.), DDT (tis.), Dieldrin (tis.), F. Coliform, Pb (sed.), PAHs(sed.), PCBs (tis.), Sed. Toxicity, Zn (sed.)	NPS, Unknown	2019	Impaired Water Bodies/Rivers ¹
Compton Creek	Coliform, Trash	NPS/PS, Unknown	2009	Impaired Water Bodies/Rivers ¹
Coyote Creek	Coliform, Cu, Dissolved, Diazinon, Pb, pH, Toxicity, Zn	NPS/PS, Unknown, PS	2019	Impaired Water Bodies/Rivers ¹
Crystal Lake	Organic Enrichment/Low DO	NPS	2019	Impaired Water Bodies/Rivers ¹
Dominguez Channel (lined portion above Vermont Ave)	NH ₃ , Cu, Dieldrin (tis.), F. Coliform, Pb (tis.), Sed. Toxicity, Zn (sed.)	NPS/PS, Unknown	2019	Impaired Water Bodies/Rivers ¹
Dominguez Channel Estuary (unlined portion below Vermont Ave)	NH ₃ , Benthic, Benzo(a)pyrene (PAHs), Benzo[a]anthracene, Chlordane (tis.), Chrysene (C1-C4), Coliform, DDT (tis. & sed.), Dieldrin (tis.), Pb (tis.), PCBs, Phenanthrene, Pyrene, Zn (sed.)	NPS/PS, Unknown	2019	Impaired Water Bodies/Rivers ¹
Dry Canyon Creek	F. Coliform, F. Coliform	Natural	2009	Impaired Water Bodies/Rivers ¹

Name	Pollutant/Stressor	Source	TMDL Status	Map Category
Echo Park Lake	Algae, NH ₃ , Cu, Eutrophic, Pb, Odor, PCBs (tis.), pH, Trash	NPS, Unknown	2019	Impaired Water Bodies/Rivers ¹
El Dorado Lakes	Algae, NH ₃ , Cu, Eutrophic, Pb, Hg (tis.), pH	NPS	2019	Impaired Water Bodies/Rivers ¹
Elizabeth Lake	Eutrophic, Organic Enrichment/Low DO, pH, Trash	NPS	2019	Impaired Water Bodies/Rivers ¹
Escondido Beach	DDT, PCBs	NPS	2019	Impaired Beaches ¹
Flat Rock Point Beach Area	DDT, PCBs	NPS	2019	Impaired Beaches ¹
Fox Barranca (tributary to Calleguas Creek Reach 6)	B, Sulfates, TDS	NPS	2019	Impaired Water Bodies/Rivers ¹
Hobie Beach (Channel Islands Harbor)	F. Coliform	NPS/PS	2019	Impaired Beaches ¹
Hopper Creek	Sulfates, TDS	NPS/PS	2019	Impaired Water Bodies/Rivers ¹
Inspiration Point Beach	DDT, PCBs	NPS	2019	Impaired Beaches ¹
La Costa Beach	DDT, PCBs	NPS	2019	Impaired Beaches ¹
Lake Calabasas	NH ₃ , DDT (tis.), Eutrophic, Odor, Organic Enrichment/Low DO, pH	NPS	2006	Impaired Water Bodies/Rivers ¹
Lake Hughes	Algae, Eutrophic, Fish Kills, Odor, Trash	NPS	2019	Impaired Water Bodies/Rivers ¹
Lake Lindero	Algae, Cl-, Eutrophic, Odor, Selenium, Specific Conductivity, Trash	NPS, Unknown	2006	Impaired Water Bodies/Rivers ¹
Lake Sherwood	Algae, NH ₃ , Eutrophic, Hg (tis.), Organic Enrichment/Low DO	NPS	2006	Impaired Water Bodies/Rivers ¹
Las Flores Beach	DDT, PCBs	NPS	2019	Impaired Beaches ¹
Las Tunas Beach	DDT, PCBs	NPS	2019	Impaired Beaches ¹
Las Virgenes Creek	Algae, Organic Enrichment/Low DO, Scum/Foam-unnatural, Sed/Silt, Selenium, Trash	NPS, Unknown	2006	Impaired Water Bodies/Rivers ¹
Legg Lake	NH ₃ , Cu, Pb, Odor, pH, Trash	NPS	2019	Impaired Water Bodies/Rivers ¹
Lincoln Park Lake	NH ₃ , Eutrophic, Pb, Odor, Organic Enrichment/Low DO, Trash	NPS, Unknown	2019	Impaired Water Bodies/Rivers ¹
Lindero Creek Reach 1	Algae, Scum/Foam-unnatural, Selenium, Trash	NPS	2006	Impaired Water Bodies/Rivers ¹

Name	Pollutant/Stressor	Source	TMDL Status	Map Category
Lindero Creek Reach 2 (Above Lake)	Algae, Scum/Foam-unnatural, Selenium, Trash	NPS	2006	Impaired Water Bodies/Rivers ¹
Long Beach City Beach	F. Coliform	Unknown	2019	Impaired Beaches ¹
Long Point Beach	DDT, PCBs	NPS	2019	Impaired Beaches ¹
Los Angeles Harbor - Cabrillo Marina	DDT, PCBs	Unknown	2019	Impaired Water Bodies/Rivers ¹
Los Angeles Harbor - Consolidated Slip	2-Methylnaphthalene, Benthic, Benzo(a)pyrene (PAHs), Benzo[a]anthracene, Cd (sed.), Chlordane (tis. & sed.), Chromium (sed.), Chrysene (C1-C4), Cu (sed.), DDT (tis. & sed.), Dieldrin, Pb (sed.), Hg (sed.), PCBs (tis. & sed.), Phenanthrene, Pyrene, Sed. Toxicity, Toxaphene (tis.), Zn (sed.)	Unknown, NPS	2008	Impaired Water Bodies/Rivers ¹
Los Angeles Harbor - Fish Harbor	Benzo(a)pyrene (PAHs), Benzo[a]anthracene, Chlordane, Chrysene (C1-C4), Cu, DDT, Dibenz[a,h]anthracene, Pb, Hg, PAHs, PCBs, Phenanthrene, Pyrene, Sed. Toxicity, Zn	Unknown, NPS	2008	Impaired Water Bodies/Rivers ¹
Los Angeles Harbor - Inner Cabrillo Beach Area	Cu, DDT, PCBs	Unknown, NPS	2019	Impaired Water Bodies/Rivers ¹
LA River Estuary (Queensway Bay)	Chlordane (sed.), DDT (sed.), Pb (sed.), PCBs (sed.), Sed. Toxicity, Trash, Zn (sed.)	NPS, Unknown	2019	Impaired Water Bodies/Rivers ¹
LA River Reach 1 (Estuary to Carson Street)	Coliform, Cyanide, Diazinon, Trash	NPS/PS, Unknown	2009	Impaired Water Bodies/Rivers ¹
LA Reach 2 (Carson- Figueroa)	Coliform, Oil, Trash	NPS/PS	2009	Impaired Water Bodies/Rivers ¹
LA River Reach 3 (Figueroa St. - Riverside Dr.)	Trash	Unknown	2007	Impaired Water Bodies/Rivers ¹
LA River Reach 4 (Sepulveda Dr. to Sepulveda Dam)	Coliform, Trash	NPS/PS, Unknown	2009	Impaired Water Bodies/Rivers ¹
LA River Reach 5 (within Sepulveda Basin)	Oil, Trash	NPS/PS	2019	Impaired Water Bodies/Rivers ¹
LA River Reach 6 (above Sepulveda Flood Control Basin)	1,1-Dichloroethane (1,1-DCE)/Vinylidene Cl-, Coliform, Tetrachloroethylene/PCE, Trichloroethylene/TCE	NPS	2019	Impaired Water Bodies/Rivers ¹

Name	Pollutant/Stressor	Source	TMDL Status	Map Category
Los Angeles/Long Beach Inner Harbor	Beach Closures, Benthic, Cu, DDT, PCBs, Sed. Toxicity, Zn	NPS/PS, Unknown	2004	Impaired Water Bodies/Rivers ¹
Los Angeles/Long Beach Outer Harbor (inside breakwater)	DDT, PCBs, Sed. Toxicity	NPS, Unknown	2019	Impaired Water Bodies/Rivers ¹
Los Cerritos Channel	NH ₃ , Bis(2ethylhexyl)phthalate/ DEHP, Chlordane (sed.), Coliform, Cu, Pb, Trash, Zn	NPS, Unknown	2019	Impaired Water Bodies/Rivers ¹
Machado Lake (Harbor Park Lake)	Algae, NH ₃ , ChemA (tis.), Chlordane (tis.), DDT (tis.), Dieldrin (tis.), Eutrophic, Odor, PCBs (tis.), Trash	NPS	2019	Impaired Water Bodies/Rivers ¹
Malaga Cove Beach	DDT, PCBs	NPS	2019	Impaired Beaches ¹
Malibu Lake	Algae, Eutrophic, Organic Enrichment/Low DO	NPS	2006	Impaired Water Bodies/Rivers ¹
Malibu Beach	DDT	NPS	2019	Impaired Beaches ¹
Malibu Creek	Fish Barriers (Fish Passage), Algae, Scum/Foam, Sed/Silt, Selenium, Sulfates, Trash	Dam Const., NPS/PS, Unknown	2019	Impaired Water Bodies/Rivers ¹
Malibu Lagoon	Benthic, Eutrophic, pH, Shellfish Harvesting Advisory, Swimming Restrictions, Viruses (enteric)	NPS/PS, NPS/PS, Unknown	2019	Impaired Water Bodies/Rivers ¹
Malibu Lagoon Beach (Surfrider)	DDT, PCBs	NPS	2019	Impaired Beaches ¹
Marina del Rey Harbor - Back Basins	DDT (tis.), Dieldrin (tis.)	NPS	2005	Impaired Water Bodies/Rivers ¹
Matilija Creek Reach 1 (Jct. With N. Fork to Reservoir)	Fish Barriers (Fish Passage)	Dam Construction	2019	Impaired Water Bodies/Rivers ¹
Matilija Creek Reach 2 (Above Reservoir)	Fish Barriers (Fish Passage)	Dam Construction	2019	Impaired Water Bodies/Rivers ¹
Matilija Reservoir	Fish Barriers (Fish Passage)	Dam Construction	2019	Impaired Water Bodies/Rivers ¹
McCoy Canyon Creek	F. Coliform, Nitrate, N, Nitrate, N, Nitrate	NPS, Natural, Natural	2009	Impaired Water Bodies/Rivers ¹
McGrath Lake	Chlordane (sed.), DDT (sed.), Dieldrin (sed.), F. Coliform, F. Coliform, F. Coliform, PCBs (sed.), Sed. Toxicity	NPS, Agri., Landfills, Natural	2019	Impaired Water Bodies/Rivers ¹
Medea Creek Reach 1 (Lake to Confl. with Lindero)	Algae, Sed/Silt, Selenium, Trash	NPS, Unknown	2006	Impaired Water Bodies/Rivers ¹

Name	Pollutant/Stressor	Source	TMDL Status	Map Category
Medea Creek Reach 2 (Abv Confl. with Lindero)	Algae, Sed/Silt, Selenium, Trash	NPS, Unknown	2006	Impaired Water Bodies/Rivers ¹
Mint Canyon Creek Reach 1 (Confl to Rowler Cyn)	Nitrate and Nitrite	NPS	2004	Impaired Water Bodies/Rivers ¹
Munz Lake	Eutrophic, Trash	NPS	2019	Impaired Water Bodies/Rivers ¹
Nicholas Canyon Beach	DDT, PCBs	NPS	2019	Impaired Beaches ¹
Ormond Beach	F. Coliform	Unknown	2008	Impaired Beaches ¹
Palo Verde Shoreline Park Beach	Pesticides	Unknown	2019	Impaired Beaches ¹
Paradise Cove Beach	DDT, PCBs	NPS	2019	Impaired Beaches ¹
Peck Road Park Lake	Chlordane (tis.), DDT (tis.), Pb, Odor, Organic Enrichment/Low DO, Trash	NPS	2019	Impaired Water Bodies/Rivers ¹
Peninsula Beach	F. Coliform	NPS/PS	2003	Impaired Beaches ¹
Piru Creek (from gaging station below Santa Felicia Dam to headwaters)	Cl-, pH, pH	Unknown, NPS, Conservation Dishcharge Releases	2019	Impaired Water Bodies/Rivers ¹
Point Dume Beach	DDT, PCBs	NPS	2019	Impaired Beaches ¹
Point Fermin Park Beach	DDT, PCBs	NPS	2019	Impaired Beaches ¹
Pole Creek (trib to Santa Clara River Reach 3)	Sulfates, TDS	NPS	2019	Impaired Water Bodies/Rivers ¹
Port Hueneme Harbor (Back Basins)	DDT (tis.), PCBs (tis.)	NPS	2019	Impaired Water Bodies/Rivers ¹
Port Hueneme Pier	PCBs	Unknown	2019	Impaired Coastlines ¹
Portuguese Bend Beach	DDT, PCBs	NPS	2019	Impaired Beaches ¹
Puddingstone Reservoir	Chlordane (tis.), DDT (tis.), Hg (tis.), Organic Enrichment/Low DO, PCBs (tis.)	NPS	2019	Impaired Water Bodies/Rivers ¹
Puerco Beach	DDT, PCBs	NPS	2019	Impaired Beaches ¹
Redondo Beach	DDT, PCBs	NPS	2019	Impaired Beaches ¹
Rincon Beach	F. Coliform	NPS/PS	2003	Impaired Beaches ¹
Rio De Santa Clara/Oxnard Drain No. 3	ChemA (tis.), Chlordane (tis.), DDT (tis.), N, PCBs (tis.), Sed. Toxicity, Toxaphene (tis.)	NPS	2019	Impaired Water Bodies/Rivers ¹

Name	Pollutant/Stressor	Source	TMDL Status	Map Category
Rio Hondo Reach 1 (Confl. LA River to Snt Ana Fwy)	Coliform, Trash	NPS/PS	2009	Impaired Water Bodies/Rivers ¹
Rio Hondo Reach 2 (At Spreading Grounds)	Coliform	NPS/PS	2009	Impaired Water Bodies/Rivers ¹
Robert H. Meyer Memorial Beach	Beach Closures, DDT, PCBs	NPS	2019	Impaired Beaches ¹
Royal Palms Beach	DDT, PCBs	NPS	2019	Impaired Beaches ¹
San Antonio Creek (Tributary to Ventura River Reach 4)	N	NPS	2019	Impaired Water Bodies/Rivers ¹
San Buenaventura Beach	F. Coliform	Unknown	2008	Impaired Beaches ¹
San Gabriel River Estuary	Cu	Unknown	2007	Impaired Water Bodies/Rivers ¹
San Gabriel River Reach 1 (Estuary to Firestone)	Coliform, pH	NPS/PS, Unknown	2019	Impaired Water Bodies/Rivers ¹
San Gabriel River Reach 2 (Firestone to Whittier Narrows Dam)	Coliform, Pb	NPS/PS	2019	Impaired Water Bodies/Rivers ¹
San Jose Creek Reach 1 (SG Confluence to Temple St.)	Coliform, Selenium, Toxicity	NPS/PS, Unknown	2019	Impaired Water Bodies/Rivers ¹
San Jose Creek Reach 2 (Temple to I-10 at White Ave.)	Coliform	NPS/PS	2019	Impaired Water Bodies/Rivers ¹
San Pedro Bay Near/Off Shore Zones	Chlordane, Chromium (sed.), Cu (sed.), DDT (tis. & sed.), PAHs(sed.), PCBs, Sed. Toxicity, Zn (sed.)	Unknown, NPS/PS	2019	Impaired Water Bodies/Rivers ¹
Santa Clara River Estuary	ChemA, Coliform, Toxaphene	Unknown, NPS	2019	Impaired Water Bodies/Rivers ¹
Santa Clara River Reach 1 (Estuary to Hwy 101 Bridge)	Toxicity	Unknown	2019	Impaired Water Bodies/Rivers ¹
Santa Clara River Reach 3 (Freeman Diversion to A Street)	TDS	NPS/PS	2019	Impaired Water Bodies/Rivers ¹
Santa Clara River Reach 5 (Blue Cut gaging station to West Pier Hwy 99 Bridge) (was named Santa Clara River Reach 7 on 2002 303(d) list)	Coliform	NPS/PS	2019	Impaired Water Bodies/Rivers ¹
Santa Clara River Reach 6 (W Pier Hwy 99 to Bouquet Cyn Rd) (was named Santa Clara River Reach 8 on 2002 303(d) list)	Chlorpyrifos, Coliform, Diazinon, Toxicity	Unknown, NPS/PS	2019	Impaired Water Bodies/Rivers ¹

Name	Pollutant/Stressor	Source	TMDL Status	Map Category
Santa Clara River Reach 7 (Bouquet Canyon Rd to above Lang Gaging Station) (was named Santa Clara River Reach 9 on 2002 303(d) list)	Coliform	NPS/PS	2019	Impaired Water Bodies/Rivers ¹
Santa Clara River Reach 11 (Piru Creek, from confluence with Santa Clara River Reach 4 to gaging station below Santa Felicia Dam)	B, Sulfates	Unknown	2019	Impaired Water Bodies/Rivers ¹
Santa Fe Dam Park Lake	Cu, Pb, pH	NPS	2019	Impaired Water Bodies/Rivers ¹
Santa Monica Bay Offshore/Nearshore	DDT (tis. & sed.), Debris, Fish Consumption Advisory, PCBs (tis. & sed.), Sed. Toxicity	NPS/PS	2019	Impaired Water Bodies/Rivers ¹
Santa Monica Canyon	Pb	NPS	2019	Impaired Water Bodies/Rivers ¹
Sawpit Creek	Bis(2ethylhexyl)phthalate/DEHP, F. Coliform	Unknown	2019	Impaired Water Bodies/Rivers ¹
Sea Level Beach	DDT, PCBs	NPS	2019	Impaired Beaches ¹
Sepulveda Canyon	NH3	NPS	2019	Impaired Water Bodies/Rivers ¹
Sespe Creek (from 500 ft below confluence with Little Sespe Cr to headwaters)	Cl-, pH	NPS	2019	Impaired Water Bodies/Rivers ¹
Topanga Beach	DDT, PCBs	NPS	2019	Impaired Beaches ¹
Topanga Canyon Creek	Pb	NPS	2019	Impaired Water Bodies/Rivers ¹
Torrance Carson Channel	Coliform, Cu, Pb	NPS	2007	Impaired Water Bodies/Rivers ¹
Trancas Beach (Broad Beach)	DDT, PCBs	NPS	2019	Impaired Beaches ¹
Triunfo Canyon Creek Reach 1	Pb, Hg, Sed/Silt	NPS, Unknown	2019	Impaired Water Bodies/Rivers ¹
Triunfo Canyon Creek Reach 2	Pb, Hg, Sed/Silt	NPS, Unknown	2019	Impaired Water Bodies/Rivers ¹
Tujunga Wash (LA River to Hansen Dam)	Coliform, Trash	NPS	2009	Impaired Water Bodies/Rivers ¹
Ventura Harbor: Ventura Keys	Coliform	NPS	2019	Impaired Water Bodies/Rivers ¹
Ventura Marina Jetties	DDT, PCBs	Unknown	2019	Impaired Coastlines ¹
Ventura River Estuary	Algae, Eutrophic, T. Coliform, Trash	NPS/PS	2019	Impaired Water Bodies/Rivers ¹

Name	Pollutant/Stressor	Source	TMDL Status	Map Category
Ventura River Reach 1 and 2 (Estuary to Weldon Canyon)	Algae	NPS/PS	2019	Impaired Water Bodies/Rivers ¹
Ventura River Reach 3 (Weldon Canyon to Confl. w/ Coyote Cr)	Pumping, Water Diversion	NPS	2019	Impaired Water Bodies/Rivers ¹
Ventura River Reach 4 (Coyote Creek to Camino Cielo Rd)	Pumping, Water Diversion	NPS	2019	Impaired Water Bodies/Rivers ¹
Verdugo Wash Reach 1 (LA River to Verdugo Rd.)	Coliform, Trash	NPS	2009	Impaired Water Bodies/Rivers ¹
Verdugo Wash Reach 2 (Above Verdugo Road)	Coliform, Trash	NPS	2009	Impaired Water Bodies/Rivers ¹
Walnut Creek Wash (Drains from Puddingstone Res)	pH, Toxicity	NPS/PS	2007	Impaired Water Bodies/Rivers ¹
Westlake Lake	Algae, NH ₃ , Eutrophic, Pb, Organic Enrichment/Low DO	NPS	2006	Impaired Water Bodies/Rivers ¹
Wheeler Canyon/Todd Barranca	Sulfates, TDS	NPS	2019	Impaired Water Bodies/Rivers ¹
Whites Point Beach	DDT, PCBs	NPS	2019	Impaired Beaches ¹
Wilmington Drain	NH ₃ , Coliform, Cu, Pb	NPS	2019	Impaired Water Bodies/Rivers ¹
Zuma Beach (Westward Beach)	DDT, PCBs	NPS	2019	Impaired Beaches ¹

Source: State Water Resources Control Board, 2006.

Note: Ag= Silver, Agri.= Agriculture, B= Boron, Benthic= Benthic Community Effects, Cd= Cadmium, Cl= Chloride, Coliform= Coliform bacteria, Cu= Copper, DO= Dissolved Oxygen, DDT= Dichloro-Diphenyl-Trichloroethane, F. Coliform= Fecal Coliform, Fe= Iron, Hg= Mercury, Mn= Manganese, N= Nitrogen, Natural= Natural Source, NH₃= Ammonia, Ni= Nickel, NPS= Nonpoint Source, PAHs= Polycyclic Aromatic Hydrocarbons, Pb= Lead, PCB= Polychlorinated biphenyls, Ph= Phosphorus, PS= Point Source, sed.= sedimentation, Sed/Silt= Sedimentation/Siltation, T. Coliform= Total Coliform, TDS= Total dissolved solids, tis.= tissue, Unknown= Unknown Source, UNPS= Unknown Nonpoint Source, UPS= Unknown Point Source, Zn= Zinc

1 Contains any 303(d) listed pollutant, but must not be limited to those associated with human health concerns.

2 Contains only 303(d) listed pollutants known to affect humans through recreational contact. These impairments include pathogens and other bacterial strains.

Table G-3. Impaired water bodies in RWQCB Region 8 (Santa Ana)

Name	Pollutant/Stressor	Source	TMDL Status	Map Category
Anaheim Bay	Dieldrin (tis.), Ni, PCBs (tis.), Sed. Toxicity	Unknown	2019	Impaired Water Bodies/Rivers ¹
Balboa Beach	DDT, Dieldrin, PCBs	Unknown	2019	Impaired Beaches, human impact only ²

Name	Pollutant/Stressor	Source	TMDL Status	Map Category
Big Bear Lake	Cu, Hg, Metals, Noxious aquatic plants, Nutrients, PCBs, Sed/Silt	Construction/Land Development, Resource Extraction, Snow skiing, Unknown, UNPS, UPS	2007	Impaired Water Bodies/Rivers ¹
Bolsa Chica State Beach	Cu, Ni	Unknown	2019	Impaired Beaches, human impact only ²
Buck Gully Creek	F. Coliform, T. Coliform	Unknown	2019	Impaired Water Bodies/Rivers ¹
Canyon Lake (Railroad Canyon Reservoir)	Pathogens	NPS	2006	Impaired Water Bodies/Rivers ¹
Chino Creek Reach 1	Nutrients, Nutrients	Agri., Dairies	2019	Impaired Water Bodies/Rivers ¹
Elsinore, Lake	PCBs, U. Tox.	Unknown, UNPS	2007	Impaired Water Bodies/Rivers ¹
Fulmor, Lake	Pathogens	UNPS	2019	Impaired Water Bodies/Rivers ¹
Grout Creek	Metals, Nutrients	UNPS	2007	Impaired Water Bodies/Rivers ¹
Huntington Beach State Park	Enterococcus, F. Coliform, PCBs	Unknown	2019	Impaired Beaches ¹
Huntington Harbour	Chlordane, Cu, Pb, Ni, Pathogens, PCBs (tis.), Sed. Toxicity	Unknown	2019	Impaired Water Bodies/Rivers ¹
Knickerbocker Creek	Metals, Pathogens	UNPS	2007	Impaired Water Bodies/Rivers ¹
Los Trancos Creek (Crystal Cove Creek)	F. Coliform, T. Coliform	Unknown	2019	Impaired Water Bodies/Rivers ¹
Lytle Creek	Pathogens	UNPS	2019	Impaired Water Bodies/Rivers ¹
Mill Creek (Prado Area)	Nutrients, Nutrients, Total Suspended Solids (TSS)	Agri., Dairies	2019	Impaired Water Bodies/Rivers ¹
Mill Creek Reach 1	Pathogens	UNPS	2019	Impaired Water Bodies/Rivers ¹
Mill Creek Reach 2	Pathogens	UNPS	2019	Impaired Water Bodies/Rivers ¹
Mountain Home Creek	Pathogens	UNPS	2019	Impaired Water Bodies/Rivers ¹
Mountain Home Creek, East Fk	Pathogens	UNPS	2019	Impaired Water Bodies/Rivers ¹
Newport Bay, Lower	Chlordane, Cu, DDT, PCBs, Sed. Toxicity	Unknown	2007	Impaired Water Bodies/Rivers ¹
Newport Bay, Upper (Ecological Reserve)	Chlordane, Cu, DDT, Metals, PCBs, Sed. Toxicity	Unknown, Natural	2019	Impaired Water Bodies/Rivers ¹
Peters Canyon Channel	DDT, Toxaphene	Unknown	2019	Impaired Water Bodies/Rivers ¹
Prado Park Lake	Nutrients	NPS	2019	Impaired Water Bodies/Rivers ¹

Name	Pollutant/Stressor	Source	TMDL Status	Map Category
Rathbone (Rathbun) Creek	Nutrients, Sed/Silt	Snow skiing, UNPS	2008	Impaired Water Bodies/Rivers ¹
Rhine Channel	Cu, Pb, Hg, PCBs, Sed. Toxicity, Zn	Unknown	2019	Impaired Water Bodies/Rivers ¹
San Diego Creek, Reach 1	F. Coliform, Selenium, Toxaphene	Other Urban Runoff, Unknown, Natural	2007	Impaired Water Bodies/Rivers ¹
San Diego Creek, Reach 2	Metals	Natural	2007	Impaired Water Bodies/Rivers ¹
Santa Ana River, Reach 4	Pathogens	NPS	2019	Impaired Water Bodies/Rivers ¹
Santiago Creek, Reach 4	Salinity/TDS/Cl-s	Unknown	2019	Impaired Water Bodies/Rivers ¹
Seal Beach	Enterococcus, PCBs	Unknown	2019	Impaired Beaches ¹
Agado Creek	Pathogens, Salinity/TDS/Cl-s	UNPS	2019	Impaired Water Bodies/Rivers ¹
Summit Creek	Nutrients	Construction/Land Development	2008	Impaired Water Bodies/Rivers ¹

Source: State Water Resources Control Board, 2006.

Note: Ag= Silver, Agri.= Agriculture, B= Boron, Benthic= Benthic Community Effects, Cd= Cadmium, Cl= Chloride, Coliform= Coliform bacteria, Cu= Copper, DO= Dissolved Oxygen, DDT= Dichloro-Diphenyl-Trichloroethane, F. Coliform= Fecal Coliform, Fe= Iron, Hg= Mercury, Mn= Manganese, N= Nitrogen, Natural= Natural Source, NH₃= Ammonia, Ni= Nickel, NPS= Nonpoint Source, PAHs= Polycyclic Aromatic Hydrocarbons, Pb= Lead, PCB= Polychlorinated biphenyls, Ph= Phosphorus, PS= Point Source, sed.= sedimentation, Sed/Silt= Sedimentation/Siltation, T. Coliform= Total Coliform, TDS= Total dissolved solids, tis.= tissue, Unknown= Unknown Source, UNPS= Unknown Nonpoint Source, UPS= Unknown Point Source, Zn= Zinc

1 Contains any 303(d) listed pollutant, but must not be limited to those associated with human health concerns.

2 Contains only 303(d) listed pollutants known to affect humans through recreational contact. These impairments include pathogens and other bacterial strains.

Table G-4. Impaired water bodies in RWQCB Region 9 (San Diego)

Name	Pollutant/Stressor	Source	TMDL Status	Map Category
Agua Hedionda Creek	Mn, Selenium, Sulfates, TDS	Unknown, UNPS, UPS, Natural	2019	Impaired Water Bodies/Rivers ¹
Agua Hedionda Lagoon	F. Coliform, Sed/Silt	NPS/PS	2006	Impaired Water Bodies/Rivers ¹
Aliso Creek	F. Coliform, Ph, Toxicity	NPS/PS, UPS, Natural, UNPS	2005	Impaired Water Bodies/Rivers ¹
Aliso Creek (mouth)	F. Coliform	NPS/PS	2005	Impaired Water Bodies/Rivers ¹
Barrett Lake	Color, Mn, pH	Unknown	2019	Impaired Water Bodies/Rivers ¹
Buena Creek	DDT, Nitrate and Nitrite, Phosphate	Unknown	2019	Impaired Water Bodies/Rivers ¹

Name	Pollutant/Stressor	Source	TMDL Status	Map Category
Buena Vista Creek	Sed. Toxicity	Unknown	2019	Impaired Water Bodies/Rivers ¹
Buena Vista Lagoon	F. Coliform, Nutrients, Sed/Silt	NPS/PS	2008	Impaired Water Bodies/Rivers ¹
Chollas Creek	Cu, F. Coliform, Pb, Zn	NPS/PS	2004	Impaired Water Bodies/Rivers ¹
Cloverdale Creek	Ph, TDS	UNPS, UPS, Natural	2019	Impaired Water Bodies/Rivers ¹
Cottonwood Creek (San Marcos Creek watershed)	DDT, Ph, Sed. Toxicity	Unknown	2019	Impaired Water Bodies/Rivers ¹
Dana Point Harbor	F. Coliform	Marinas and Recreational Boating, UNPS, UPS, Natural	2006	Impaired Water Bodies/Rivers ¹
De Luz Creek	Fe, Mn	Unknown	2019	Impaired Water Bodies/Rivers ¹
El Capitan Lake	Color, Mn, pH	Unknown	2019	Impaired Water Bodies/Rivers ¹
Encinitas Creek	Ph	Unknown	2019	Impaired Water Bodies/Rivers ¹
English Canyon	Benzo[b]fluoranthene, Dieldrin, Sed. Toxicity	Unknown	2019	Impaired Water Bodies/Rivers ¹
Escondido Creek	DDT, Mn, Phosphate, Selenium, Sulfates, TDS	Unknown	2019	Impaired Water Bodies/Rivers ¹
Famosa Slough and Channel	Eutrophic	NPS	2019	Impaired Water Bodies/Rivers ¹
Felicita Creek	Aluminum, TDS	Unknown, Agricultural Return Flows, Flow Regulation/Modification, UNPS, UPS, Natural	2019	Impaired Water Bodies/Rivers ¹
Forester Creek	F. Coliform, DO, pH, Ph, TDS	Spills, UNPS, UPS, Natural, Unknown, Habitat Modification, Industrial PSs, Agricultural Return Flows, Flow Regulation/Modification	2005	Impaired Water Bodies/Rivers ¹
Green Valley Creek	Cl-, Mn, Pentachlorophenol (PCP), Sulfates	Unknown, Natural, UNPS, UPS, Natural	2019	Impaired Water Bodies/Rivers ¹
Guajome Lake	Eutrophic	NPS/PS	2019	Impaired Water Bodies/Rivers ¹
Hodges, Lake	Color, Mn, N, pH, Ph, Turbidity	UNPS, UPS, Natural, Unknown, Agri., Dairies	2019	Impaired Water Bodies/Rivers ¹
Kit Carson Creek	Pentachlorophenol (PCP), TDS	Unknown, Agricultural Return Flows, Flow Regulation/Modification, UNPS, UPS, Natural	2019	Impaired Water Bodies/Rivers ¹
Laguna Canyon Channel	Sed. Toxicity	Unknown	2019	Impaired Water Bodies/Rivers ¹
Loma Alta Slough	Eutrophic, F. Coliform	NPS	2019	Impaired Water Bodies/Rivers ¹

Name	Pollutant/Stressor	Source	TMDL Status	Map Category
Long Canyon Creek	TDS	Unknown	2019	Impaired Water Bodies/Rivers ¹
Los Penasquitos Creek	Phosphate, TDS	Unknown	2019	Impaired Water Bodies/Rivers ¹
Los Penasquitos Lagoon	Sed/Silt	NPS/PS	2019	Impaired Water Bodies/Rivers ¹
Loveland Reservoir	Al, Mn, Oxygen, Dissolved, pH	Unknown	2019	Impaired Water Bodies/Rivers ¹
Mission Bay (area at mouth of Rose Ck only)	Eutrophic, Pb	NPS/PS	2019	Impaired Water Bodies/Rivers ¹
Mission Bay (area at mouth Tecolote Ck only)	Eutrophic, Pb	NPS/PS	2019	Impaired Water Bodies/Rivers ¹
Mission Bay Shoreline	F. Coliform	Unknown	2019	Impaired Coastlines ¹
Morena Reservoir	Color, Mn, pH	Unknown	2019	Impaired Water Bodies/Rivers ¹
Murray Reservoir	pH	Unknown	2019	Impaired Water Bodies/Rivers ¹
Murrieta Creek	Fe, Mn, N, Ph	Unknown, UNPS, UPS, Natural	2019	Impaired Water Bodies/Rivers ¹
Oso Creek (at Mission Viejo Golf Course)	Cl-, Sulfates, TDS	Unknown	2019	Impaired Water Bodies/Rivers ¹
Otay Reservoir, Lower	Color, Fe, Mn, N, NH3 (Total NH3), pH (high)	Unknown	2019	Impaired Water Bodies/Rivers ¹
Pacific Ocean Shoreline, Aliso HSA	F. Coliform	NPS/PS	2005	Impaired Coastlines ¹
Pacific Ocean Shoreline, Buena Vista Creek HA	F. Coliform	NPS/PS	2008	Impaired Coastlines ¹
Pacific Ocean Shoreline, Dana Point HSA	F. Coliform	NPS/PS	2005	Impaired Coastlines ¹
Pacific Ocean Shoreline, Escondido Creek HA	F. Coliform	NPS/PS	2008	Impaired Coastlines ¹
Pacific Ocean Shoreline, Imperial Beach Pier	PCBs	Unknown	2019	Impaired Coastlines ¹
Pacific Ocean Shoreline, Laguna Beach HSA	F. Coliform	NPS/PS	2005	Impaired Coastlines ¹
Pacific Ocean Shoreline, Loma Alta HA	F. Coliform	NPS/PS	2008	Impaired Coastlines ¹
Pacific Ocean Shoreline, Lower San Juan HSA	F. Coliform	NPS/PS	2008	Impaired Coastlines ¹
Pacific Ocean Shoreline, San Clemente HA	F. Coliform	NPS/PS	2005	Impaired Coastlines ¹
Pacific Ocean Shoreline, San Diego HU	F. Coliform	NPS/PS	2005	Impaired Coastlines ¹
Pacific Ocean Shoreline, San Diequito HU	F. Coliform	NPS/PS	2005	Impaired Coastlines, human impact only ²

Name	Pollutant/Stressor	Source	TMDL Status	Map Category
Pacific Ocean Shoreline, San Joaquin Hills HSA	F. Coliform	UNPS, UPS, Natural	2005	Impaired Coastlines ¹
Pacific Ocean Shoreline, San Luis Rey HU	F. Coliform	NPS/PS	2005	Impaired Coastlines ¹
Pacific Ocean Shoreline, San Marcos HA	F. Coliform	NPS/PS	2005	Impaired Coastlines ¹
Pacific Ocean Shoreline, Scripps HA	F. Coliform	NPS/PS	2019	Impaired Coastlines ¹
Pacific Ocean Shoreline, Tijuana HU	F. Coliform	NPS/PS	2010	Impaired Coastlines ¹
Pine Valley Creek (Upper)	Enterococcus, Ph, Turbidity	Concentrated Animal Feeding Operations (permitted, PS), Grazing-Related Sources, Transient encampments, Unknown	2010	Impaired Water Bodies/Rivers ¹
Pogi Canyon Creek	DDT	Unknown	2019	Impaired Water Bodies/Rivers ¹
Prima Deshecha Creek	Ph, Turbidity	UNPS, UPS, Natural	2019	Impaired Water Bodies/Rivers ¹
Rainbow Creek	Fe, Sulfates, TDS	Unknown	2019	Impaired Water Bodies/Rivers ¹
Reidy Canyon Creek	Ph	Unknown	2019	Impaired Water Bodies/Rivers ¹
San Diego Bay	PCBs	Unknown	2019	Impaired Water Bodies/Rivers ¹
San Diego Bay Shoreline, 32nd St San Diego Naval Station	Benthic, Sed. Toxicity	NPS/PS	2019	Impaired Water Bodies/Rivers ¹
San Diego Bay Shoreline, at Americas Cup Harbor	Cu	Unknown	2019	Impaired Water Bodies/Rivers ¹
San Diego Bay Shoreline, at Bayside Park (J Street)	F. Coliform	Unknown	2019	Impaired Water Bodies/Rivers ¹
San Diego Bay Shoreline, at Coronado Cays	Cu	Unknown	2019	Impaired Water Bodies/Rivers ¹
San Diego Bay Shoreline, at Glorietta Bay	Cu	Unknown	2019	Impaired Water Bodies/Rivers ¹
San Diego Bay Shoreline, at Harbor Island (East Basin)	Cu	Unknown	2019	Impaired Water Bodies/Rivers ¹
San Diego Bay Shoreline, at Harbor Island (West Basin)	Cu	Unknown	2019	Impaired Water Bodies/Rivers ¹
San Diego Bay Shoreline, at Marriott Marina	Cu	Unknown	2019	Impaired Water Bodies/Rivers ¹
San Diego Bay Shoreline, between Sampson and 28th Streets	Cu, Hg, PAHs, PCBs, Zn	NPS/PS	2005	Impaired Water Bodies/Rivers ¹

Name	Pollutant/Stressor	Source	TMDL Status	Map Category
San Diego Bay Shoreline, Chula Vista Marina	Cu	Unknown	2019	Impaired Coastlines ¹
San Diego Bay Shoreline, Downtown Anchorage	Benthic, Sed. Toxicity	NPS/PS	2019	Impaired Water Bodies/Rivers ¹
San Diego Bay Shoreline, G Street Pier	F. Coliform	UNPS, UPS, Natural	2006	Impaired Coastlines ¹
San Diego Bay Shoreline, near Chollas Creek	Benthic, Sed. Toxicity	NPS/PS	2006	Impaired Water Bodies/Rivers ¹
San Diego Bay Shoreline, near Coronado Bridge	Benthic, Sed. Toxicity	NPS/PS	2019	Impaired Water Bodies/Rivers ¹
San Diego Bay Shoreline, near sub base	Benthic, Sed. Toxicity	NPS/PS	2019	Impaired Water Bodies/Rivers ¹
San Diego Bay Shoreline, near Switzer Creek	Chlordane, Lindane/Hexachlorocyclohexane (HCH), PAHs	Boatyards, NPS/PS, Other, Natural	2019	Impaired Water Bodies/Rivers ¹
San Diego Bay Shoreline, North of 24th Street Marine Terminal	Benthic, Sed. Toxicity	NPS/PS	2019	Impaired Water Bodies/Rivers ¹
San Diego Bay Shoreline, Seventh Street Channel	Benthic, Sed. Toxicity	NPS/PS	2008	Impaired Water Bodies/Rivers ¹
San Diego Bay Shoreline, Shelter Island Shoreline Park	F. Coliform	UNPS, UPS	2006	Impaired Beaches ¹
San Diego Bay Shoreline, Vicinity of B St and Broadway Piers	Benthic, F. Coliform, Sed. Toxicity	NPS/PS, UNPS, UPS, Natural	2019	Impaired Water Bodies/Rivers ¹
San Diego River (Lower)	F. Coliform, Low DO, Ph, TDS	NPS/PS, Natural, Wastewater, UNPS, UPS, Flow Regulation/Modification, Natural	2005	Impaired Water Bodies/Rivers ¹
San Elijo Lagoon	Eutrophic, F. Coliform, Sed/Silt	NPS/PS	2019	Impaired Water Bodies/Rivers ¹
San Juan Creek	DDE, F. Coliform	Unknown, NPS/PS	2019	Impaired Water Bodies/Rivers ¹
San Juan Creek (mouth)	F. Coliform	NPS/PS	2008	Impaired Water Bodies/Rivers ¹
San Luis Rey River	Cl-, TDS	UNPS, UPS, Natural, Agri.-storm runoff, Flow Regulation/Modification, Golf course activities, Industrial PSSs, Natural, Surface Mining	2019	Impaired Water Bodies/Rivers ¹
San Marcos Creek	DDE, Ph, Sed. Toxicity	Unknown	2019	Impaired Water Bodies/Rivers ¹
San Marcos Lake	NH3, Nutrients, Ph	Unknown	2019	Impaired Water Bodies/Rivers ¹
San Vicente Reservoir	Cl-, Color, Mn, pH (high), Sulfates	Unknown	2019	Impaired Water Bodies/Rivers ¹

Name	Pollutant/Stressor	Source	TMDL Status	Map Category
Sandia Creek	Fe, Mn, N, Sulfates, TDS	Unknown, Flow Regulation/Modification, Natural, UNPS, UPS, Natural	2019	Impaired Water Bodies/Rivers ¹
Santa Margarita Lagoon	Eutrophic	NPS/PS	2019	Impaired Water Bodies/Rivers ¹
Santa Margarita River (Upper)	Ph	UNPS, UPS, Natural	2019	Impaired Water Bodies/Rivers ¹
Segunda Deshecha Creek	Ph, Turbidity	UNPS, UPS, Natural, Channelization, Construction/Land Development, Flow Regulation/Modification	2019	Impaired Water Bodies/Rivers ¹
Soledad Canyon	Sed. Toxicity	Unknown	2019	Impaired Water Bodies/Rivers ¹
Sutherland Reservoir	Color, Mn, pH	UNPS, UPS, Natural, Unknown	2019	Impaired Water Bodies/Rivers ¹
Sweetwater Reservoir	Oxygen, Dissolved	Unknown	2019	Impaired Water Bodies/Rivers ¹
Tecolote Creek	Cd, Cu, F. Coliform, Pb, Ph, Toxicity, Turbidity, Zn	NPS/PS, Unknown	2019	Impaired Water Bodies/Rivers ¹
Temecula Creek	N, Ph, TDS	Unknown	2019	Impaired Water Bodies/Rivers ¹
Tijuana River	Eutrophic, F. Coliform, Low DO, Pesticides, Solids, Synthetic Organics, Trace Elements, Trash	NPS/PS	2019	Impaired Water Bodies/Rivers ¹
Tijuana River Estuary	Eutrophic, F. Coliform, Pb, Low DO, Low DO, Ni, Pesticides, Thallium, Trash, Turbidity	NPS/PS, UNPS, UPS, Natural, Wastewater, Unknown	2019	Impaired Water Bodies/Rivers ¹

Source: State Water Resources Control Board, 2006.

Note: Ag= Silver, Agri.= Agriculture, B= Boron, Benthic= Benthic Community Effects, Cd= Cadmium, Cl= Chloride, Coliform= Coliform bacteria, Cu= Copper, DO= Dissolved Oxygen, DDT= Dichloro-Diphenyl-Trichloroethane, F. Coliform= Fecal Coliform, Fe= Iron, Hg= Mercury, Mn= Manganese, N= Nitrogen, Natural= Natural Source, NH₃= Ammonia, Ni= Nickel, NPS= Nonpoint Source, PAHs= Polycyclic Aromatic Hydrocarbons, Pb= Lead, PCB= Polychlorinated biphenyls, Ph= Phosphorus, PS= Point Source, sed.= sedimentation, Sed/Silt= Sedimentation/Siltation, T. Coliform= Total Coliform, TDS= Total dissolved solids, tis.= tissue, Unknown= Unknown Source, UNPS= Unknown Nonpoint Source, UPS= Unknown Point Source, Zn= Zinc

¹ Contains any 303(d) listed pollutant, but must not be limited to those associated with human health concerns.

² Contains only 303(d) listed pollutants known to affect humans through recreational contact. These impairments include pathogens and other bacterial strains.

Appendix H: Academic, Research, and Education Institutions

This appendix lists academic, research, and education institutions with a focus on coastal and marine ecosystems in the MLPA South Coast Study Region.

Table H-1. Academic, research, and education institutions

Name	Address and Telephone	Web Site
Aquarium of the Pacific	100 Aquarium Way Long Beach, CA 90802 (562) 590-3100	http://www.aquariumofpacific.org/
Cabrillo Marine Aquarium	3720 Stephen M. White Drive San Pedro, CA 90731 (310) 548-7562	http://www.cabrilloaq.org/
California Center for Ocean Sciences Education Excellence (COSEE) West	USC; University Park Los Angeles, CA 90089 (213) 740-1961 University of California, Los Angeles Ecology and Evolutionary Biology Los Angeles, CA	http://www.usc.edu/org/cosee-west/
California Coastal Commission	89 South California Street, Suite 200 Ventura, CA 93001-2801 (805) 585-1800 200 Oceangate, 10th Floor Long Beach, CA 90802-4416 (562) 590-5071 7575 Metropolitan Drive, Suite 103 San Diego, CA 92108-4402 (619) 767-2370	http://www.coastal.ca.gov/index.html
California Department of Fish and Game	Marine Region 7329 Silverado Trail Napa, CA 94558 (707) 944-5500	www.dfg.ca.gov/regions/region3.html/
California Maritime Academy	200 Maritime Academy Drive Vallejo, CA 94590 (707) 654-1000	www.csum.edu
California State Polytechnic University, Pomona	3801 W Temple Avenue Pomona, CA 91768 (909) 869-2284	www.csupomona.edu
California State University, Channel Islands	One University Drive Camarillo, CA 93012 (805) 437-8400	http://www.csuci.edu/index.htm

Appendix H

Name	Address and Telephone	Web Site
California State University, Dominguez Hills	1000 E. Victoria Street Carson, CA 90747 (310) 243-3696	http://www.nbs.csudh.edu/biology/index.html
California State University, Fullerton	Department of Biological Science (MH-282) California State University, Fullerton 800 North State College Boulevard Fullerton, CA 92831-3599 (714) 278-3614	http://biology.fullerton.edu/
California State University, Long Beach	1250 N Bellflower Boulevard Long Beach, CA 90840 (562) 985-4111	http://www.csulb.edu
California State University, Los Angeles	College of Natural and Social Sciences; King Hall 5151 State University Drive Los Angeles, CA (323) 343-2000	http://www.calstatela.edu/academic/nssd/
California State University, Northridge	18111 Nordhoff Street Northridge, CA 91330 (818) 677-1200	http://www.csun.edu/
California State University, San Bernardino	5500 University Parkway San Bernardino, CA 92407 (909) 880-5000	http://www.csusb.edu/
Catalina Island Conservancy	P.O. Box 2739 Avalon, CA 90704	http://www.catalinaconservancy.org/
Channel Islands National Marine Sanctuary	113 Harbor Way, Suite 150 Santa Barbara, CA 93109 (805) 966-7107 3600 S. Harbor Blvd., Suite 111 Oxnard, CA. 93035 (805) 382-6149	http://channelislands.noaa.gov/
Channel Islands National Park	1901 Spinnaker Drive Ventura, CA 93001-4354 (805) 658-5700	http://www.channel.islands.national-park.com/
Communication Partnership for Science and the Sea (COMPASS)	c/o National Center for Ecological Analysis and Synthesis (NCEAS) 735 State Street, Suite 300 Santa Barbara, CA 93101 (805) 892-2515	http://www.compassonline.org/
Conservation Corps S.E.A. Lab	1021 North Harbor Drive Redondo Beach, CA 90277 (310) 318-7438	http://mysite.verizon.net/john.healy5/sealab/

Name	Address and Telephone	Web Site
Grunion.org Pepperdine University	24255 Pacific Coast Highway Malibu, CA 90263 (310) 506-4000	http://arachnid.pepperdine.edu/grunion/default.htm http://www.grunion.org
Heal the Bay	1444 Ninth Street Santa Monica, CA 90401 (310) 451-1500	http://www.healthebay.org/
Hubbs Sea World Research Institute	2595 Ingraham Street San Diego, CA 92109 (619) 226-3870	http://www.hswri.org/index.cfm
Jet Propulsion Laboratory	4800 Oak Grove Drive Pasadena, CA 91109 (818) 354-4321	http://www.jpl.nasa.gov/
Long Beach Marine Institute	5875 E Appian Way Long Beach, CA 90803 (562) 431-7156	http://www.longbeachmarine.org/
Los Angeles County Natural History Museum	900 Exposition Boulevard Los Angeles, CA 90007 (213) 763-DINO	http://www.nhm.org/
Marine Mammal Center at Fort MacArthur	3601 S Gaffey Street San Pedro, CA 90731 (310) 548-5677	http://www.marinemammalcare.org/
MARINe (Multi-Agency Rocky Intertidal Network)	Attn: Mary Elaine Helix 1111 Jackson St., Suite 520 Oakland, CA 94607 (510) 817-1479	http://www.marine.gov
Ocean Institute	24200 Dana Point Harbor Drive Dana Point, CA 92629 (949) 496-2274	http://www.ocean-institute.org/index2.html
Orange County Coastkeeper	3151 Airway Ave., Suite F-110 Costa Mesa, Ca 92626 (714) 850-1965	http://www.coastkeeper.org/
Oxnard College	4000 South Rose Avenue Oxnard, CA 93033 (805) 986-5800	http://www.oxnardcollege.edu/
Pepperdine University	Department of Biology 24255 Pacific Coast Highway Malibu, CA 90263 (310) 506-4321	http://www.pepperdine.edu
Port of Long Beach	925 Harbor Plaza Long Beach, CA 90802 (562) 437-0041	http://www.polb.com
Port of Los Angeles	425 South Palos Verdes Street San Pedro, CA 90731 (310) SEA-PORT	http://www.portoflosangeles.org/

Appendix H

Name	Address and Telephone	Web Site
PISCO	Marine Science Institute University of California Santa Barbara, CA 93106-6150 (805) 893-3387	http://www.piscoweb.org
Reef Check California	17575 Pacific Coast Highway Pacific Palisades, CA 90272 (310) 230-2371	http://www.ReefCheck.org
San Diego Coastkeeper	2825 Dewey Road, Suite 200 San Diego, CA 92106	http://www.sdcoastkeeper.org
San Diego State University	5500 Campanile Drive San Diego, CA 92182 (619) 594-6561	http://www.sdsu.edu
Santa Barbara City College	721 Cliff Drive Santa Barbara, CA 93109-2394 (805) 965-0581	http://www.sbccc.edu/
Santa Monica Baykeeper	P.O. Box 10096 Marina del Rey, CA 90295 (310) 305-9645	http://www.smbaykeeper.org/
Santa Monica Bay Restoration Commission	320 West 4th Street, Suite 200 Los Angeles, CA 90013 (213) 576-6615	http://www.santamonicabay.org/smbay/
Santa Monica Pier Aquarium	1600 Ocean Front Walk Santa Monica, CA 90401 (310) 393-6149	http://www.healthebay.org/smpa/
Scripps Institution of Oceanography	8602 La Jolla Shores Drive La Jolla, CA 92037	http://sio.ucsd.edu/
Sea World	500 Sea World Dr. San Diego, CA 92109 (800) 257-4268	http://www.seaworld.com/sandiego/default.asp
Southern California Academy of Sciences	900 Exposition Blvd. Los Angeles, CA 90007 (909) 607 2836	http://scas.jsd.claremont.edu/
Southern California Coastal Ocean Observing System	info@sccoos.org	http://www.sccoos.org/index.html
Southern California Marine Institute	820 South Seaside Avenue Terminal Island, CA 90731 (310) 519-3172	http://scmi.us/
Southwest Fisheries Science Center	8604 La Jolla Shores Drive La Jolla, CA 92037-1508 (858) 546-7000	http://swfsc.noaa.gov/
Stephen Birch Aquarium	2300 Expedition Way La Jolla, CA 92037 (858) 534-FISH	http://aquarium.ucsd.edu/

Name	Address and Telephone	Web Site
Surfrider Foundation	P.O. Box 6010 San Clemente, CA 92674-6010	www.surfrider.org
Tijuana River Reserve	301 Caspian Way Imperial Beach, CA 91932 (619)-575-3613	http://trnerr.org/
Ty Warner Sea Center	211 Stearns Wharf Santa Barbara, CA 93101 (805) 962-2526	http://www.sbnature.org/seacenter/
University of California, Los Angeles; Marine Science Center	621 Charles E. Young South Box 951606 Los Angeles, CA 90095 (310) 206-8247	http://www.msc.ucla.edu/
University of California, Santa Barbara	Visitors Center 552 University Road Santa Barbara, CA 93106 (805) 893-8000	http://www.ucsb.edu/
University of California, Irvine	University of California, Irvine Irvine, CA 92623 – 9557 (949) 824-6836	http://www.uci.edu/
University of California, San Diego	9500 Gilman Drive La Jolla, CA 92093 (858) 534-2230	http://www.ucsd.edu/portal/site/ucsd
University of Southern California Sea Grant	University of Southern California Los Angeles, CA 90089-0373 (213) 740-1961	http://www.usc.edu/org/seagrant/index.html
USC Philip K. Wrigley Marine Science Center on Catalina Island	P.O. Box 5069 1 Big Fisherman Cove Avalon, CA 90704 (310) 510-0811	http://wrigley.usc.edu/
U.S. Geological Survey	345 Middlefield Road Menlo Park, CA 94025 (650) 853-8300	www.usgs.gov
Vantuna Research Group Occidental College	Moore Laboratory of Zoology Occidental College 1600 Campus Road Los Angeles, CA 90041	http://departments.oxy.edu/vrg/
Ventura Coastkeeper	3600 South Harbor Blvd., Suite 218 Oxnard, CA 93035 (805) 382-4540	http://www.wishtooyo.org/venturacoastkeeper/
WILDCOAST	925 Seacoast Drive Imperial Beach, CA 91932 (619) 423-8665	www.wildcoast.net

References Cited

- Aalbers, S.A. 2008. Seasonal, diel, and lunar spawning periodicities and associated sound production of white seabass (*Atractoscion nobilis*). *Fishery Bulletin* 106(2) 143-151.
- Aalbers, S.A. and C.A. Sepulveda. In preparation. Passive acoustic detection of white seabass spawning aggregations within Southern California.
- Abbott, I.A. and G.J. Hollenberg. 1976. *Marine Algae of California*. Stanford University Press. Stanford, CA. 827pp.
- Airamé, S., S. Gaines, and C. Caldow. 2003a. *Ecological Linkages: Marine and Estuarine Ecosystems of Central and Northern California*. NOAA, National Ocean Service. Silver Spring, MD. 164pp.
- Allen, L.G. 1988. Recruitment, distribution, and feeding habits of young-of-the-year California halibut, *Paralichthys californicus*, in the vicinity of Alamitos Bay-Long Beach Harbor, California, 1983-1995. *Bulletin Southern California Academy of Science* 87:19-30.
- Allen, L.G., A.M. Findlay, and C.M. Phalen. 2002. The Fish Assemblages of San Diego Bay in the Five-year Period of July 1994 to April 1999. *Bull. So. Cal Acad. Sci.*, 101(2): 49-85.
- Allen, L.G., T.E. Hovey, M.S. Love, and J.T.W. Smith. 1995. The Life History of the Spotted Sand Bass (*Paralabrax Maculatofasciatus*) within the Southern California Bight. *CalCOFI Report*, Vol 36, 193-203.
- Allen, L.G., D.J. Pondella, and M.A. Shane. 2007. Fisheries independent assessment of a returning fishery: abundance of juvenile white seabass (*Atractoscion nobilis*) in the shallow nearshore waters of the Southern California Bight, 1995-2005. *Fisheries Research* 88: 24-32.
- Allen, L.G., D.J. Pondella, and M.H. Horn. 2006a. *The Ecology of Marine Fishes: California and Adjacent Waters*. University of California Press, 2006, 670pp.
- Allen, L.G., M.M. Yoklavich, G.M. Cailliet, and M.H. Horn. 2006b. Bays and estuaries. In *The Ecology of Marine Fishes: California and Adjacent Waters*, eds. L. G. Allen, M. H. Horn, and D. J. Pondella, 119-148. University of California Press, Berkeley, California.
- Allen, M.J. 2006. Continental shelf and upper slope. In *The Ecology of Marine Fishes: California and Adjacent Areas*, eds. L. G. Allen, M. H. Horn, and D. J. Pondella, 167-202. University of California Press, Berkeley, California.
- Allen, M.J., and K. Herbinson. 1990. Settlement of juvenile California halibut, *Paralichthys californicus*, along the coasts of Los Angeles, Orange, and San Diego Counties in 1989. *California Cooperative Oceanic Fisheries Investigations Reports* 31:84-96.
- Allen, M.J., S.L. Moore, K.C. Schiff, S.B. Weisberg, D. Diener, J.K. Stull, A. Groce, J. Mubarak, C.L. Tang, and R. Gartman. 1998. Southern California Bight 1994 Pilot Project: V. Demersal Fishes and Megabenthic Invertebrates. Southern California Coastal Water Research Project, Westminster, CA. 324pp.
- Alonzo, S., M. Key, T. Ish, and A. MacCall. 2004. Status of the California Sheephead (*Semicossyphus Pulcher*) Stock (2004). California Department of Fish and Game, Marine Region, 30pp. + appendices.
- Ambrose, R.F. and J.R. Smith. 2004. Restoring Rocky Intertidal Habitats in Santa Monica Bay. Santa Monica Bay Restoration Commission Report.
- American Trader Trustee Council. 2001. Final Restoration Plan and Environmental Assessment for Seabirds Injured by the American Trader Oil Spill. Report of the American Trader Natural Resource Trustee Council, U.S. Fish and Wildlife Service, California Department of Fish and Game, and National Oceanic and Atmospheric Administration.
- Anderson, M.K. 2006. *Tending the Wild: Native American Knowledge and Management of California's Natural Resources*. University of California Press, 555 pp.
- (ANEP 2001) Association of National Estuary Programs. 2001. Santa Monica Bay Restoration Project. NEP Fact Cards.
- Antonelis, G.A. and C.H. Fiscus. 1980. Pinnipeds of the California Current. *CalCOFI Report*. Volume XXI. CalCOFI.

References Cited

- (ARB 2004) State of California, Environmental Protection Agency, Air Resources Board. 2004. Statewide Commercial Harbor Craft Survey: Final Report. Stationary Source Division, Emissions Assessment Branch, Sacramento, CA. March 2004.
- Atkinson, L.P., K.H. Brink, R.E. Davis, B.H. Jones, T. Paluszkiwicz, and D.W. Stuart. 1986. Mesoscale Hydrographic Variability in the Vicinity of Point Conception and Arguello During April-May 1983: The OPUS 1983 Experiment. *Journal of Geophysical Research* 91:12899-12918.
- Bae, C-H. C. 2005. "Tijuana-San Diego: Globalization and the transborder metropolis." In *Globalization and Urban Development*, ed. H.W. Richardson and C-H. C. Bae, 181-195. Springer Berlin Heidelberg.
- Bariolotti, D.C., R.H. McPeak, and P.K. Dayton. 1985. Experimental studies on the effects of commercial kelp harvesting in central and southern California *Macrocystis pyrifera* kelp beds. *California Fish and Game* 71(1):4-20.
- Barnett, A.M., A.E. Jahn, P.D. Sertic, and W. Watson. 1984. Distribution of ichthyoplankton off San Onofre, California, and methods for sampling very shallow coastal waters. *Fishery Bulletin, U.S.* 82:97-111.
- Beach Crabs. 2008. <http://www.beachcrabs.net/divesites.htm> (accessed 08/15/08).
- (Beach Watch 2008) SWRCB 2008. Beach Watch. Annual Summary of County Beach Posting and Closure Reports. http://beachwatch.waterboards.ca.gov/BeachWatch/cla_common/BmdComparedCriteria.jsp (accessed and generated a report on 07/12/08).
- Bearzi, M. 2004. Aspects of the ecology and behaviour of bottlenose dolphins (*Tursiops truncatus*) in Santa Monica Bay, California, UC Marine Council Coastal Environmental Quality Initiative.
- Bearzi, M. 2005. Habitat Partitioning by Three Species of Dolphins in Santa Monica Bay, California. *Bulletin Southern California Academy of Science* 104(3): 113-124.
- (BLF 2008) Batiquitos Lagoon Foundation. 2008. About Batiquitos Lagoon. http://www.batiquitosfoundation.org/newsite/about_main.php (accessed 08/08/08).
- Blue Green Algae Work Group of the State Water Resources Control Board, Department of Public Health, and Office of Environmental Health and Hazard Assessment. 2007. Cyanobacteria in California Recreational Water Bodies: Providing Voluntary Guidance about Harmful Algal Blooms, Their Monitoring, and Public Notification. Draft released June 2007. http://www.waterboards.ca.gov/water_issues/programs/bluegreen_algae/docs/bga_volguidance.pdf.
- Boat Ramps Locator. 2008. Available from <http://www.boatrampslocator.com> (accessed 08/20/08).
- Boehm, A.B., B.F. Sanders and C.D. Winant. 2002. Cross-shelf transport at Huntington Beach: implications for the fate of sewage discharged through an offshore ocean outfall. *Environmental Science and Technology*, 36, 1899-1906.
- Bolsa Chica Report. 2008. First-year report update on the biological, physical, and beach monitoring for the Bolsa Chica Lowlands Restoration Project near Huntington Beach, Year 1, October 2006 through September 2007. Presented to the State Lands Commission, October 16, 2008.
- Booth, D.B. and C.R. Jackson. 1997. Urbanization of Aquatic Systems- Degradation Thresholds, Stormwater Detention, and the Limits of Mitigation. *Journal of the American Water Resources Association*, Volume 22, Number 5, October 1997.
- Brookhart, M. 2006. Personal communication between Matt Brookhart, Policy Coordinator, West Coast Region, National Marine Sanctuary Program and Amy Boone, Policy Analyst, California Marine Life Protection Act Initiative.
- Brown, J.A. 2006. Using the Chemical Composition of Otoliths to Evaluate the Nursery Role of Estuaries for English Sole (*Pleuronectes vetulus*) populations. *Marine Ecology Progress Series*, 306: 269-281.
- Buena Vista Lagoon Foundation. 2008. <http://buenavistalagoon.org/> (accessed 11/24/08).
- Burkett, E.E., R.J. Logsdon, and K.M. Fien. 2007. Report to the California Fish and Game Commission: Status Review of California Brown Pelican (*Pelicanus occidentalis californicus*) in California. Calif. Dept. of Fish and Game, Wildlife Branch, Nongame Wildlife Program Report 2007-04. 26pp.+ appendices.
- Butler, J., D. Fuller, M. Yaremko. 1999 Age and Growth of Market Squid (*Loligo Opalescens*) Off California During 1998. *CalCOFI Report Vol.* 40.

- Button, C. 2008. The influence of density-dependent aggregation characteristics on the population biology of benthic broadcast-spawning gastropods: Pink abalone (*Haliotis corrugata*), red abalone (*Haliotis rufescens*), and wavy turban snails (*Megastrea undosa*). Doctoral Dissertation. University of California San Diego, La Jolla, CA
- (CABRILLO 2008) Southern California Bight Regional Investigations Life, Land, and Ocean. 2008. United States Geological Survey, Coastal and Marine Geology Program, CABRILLO. <http://walrus.wr.usgs.gov/cabrillo/playa/index.html> (accessed 07/29/08).
- (CADMV 2008) California Department of Motor Vehicles. 2008. Total Vessel Registrations by County. Sacramento, CA. <http://www.dbw.ca.gov/PDF/VesselReg/Vessel90.pdf> and <http://www.dbw.ca.gov/PDF/VesselReg/Vessel07.pdf> (accessed 12/04/08).
- Caldeira, R., P. Marchesiello, N.P. Nezlin, P.M. DiGiacomo, and J.C. McWilliams. 2005. Island wakes in the Southern California Bight. *Journal of Geophysical Research*, 10, C11012, doi:10.1029/2004JC0022675.
- California Coastkeeper Alliance. 2008. Regional Coastkeeper Organizations. (<http://www.cacoastkeeper.org/water-quality-maps.php> (accessed 07/19/08)).
- California Cooperative Oceanic Fisheries Investigations (CalCOFI). 2002. Reports, volume 43, January 1 – December 31, 2001. Distributed May 2003, La Jolla, California.
- California Marine Life Protection Act Initiative. 2005. Marine Life Protection Act Master Plan Framework, Sacramento, CA.
- CaliforniaHerps. 2008. Chelonia mydas – green sea turtle. <http://www.californiaherps.com/turtles/pages/c.mydas.html#top> (accessed 12/22/08).
- Carr, M.H. 1991. Habitat Selection and Recruitment of an Assemblage of Temperate Zone Reef Fishes. *Journal of Experimental Marine Biology and Ecology* 146: 113-137.
- Carretta, J.V., K.A. Forney, M.M. Muto, J. Barlow, J. Baker, B. Hanson, and M. Lowry. 2004. U.S. Pacific Marine Mammal Stock Assessments: 2004. U.S. Department of Commerce, NOAA Technical Memorandum NMFS SWFSC-375. 316pp.
- Carson, R., M. Damon, L. Johnson, and J. Miller. 2002. Transitioning to Non-Metal Antifouling Paints on Marine Recreational Boats in San Diego Bay. Submitted by University of California to California Department of Boating and Waterways, November 15, 2002.
- Castillo, E.D. 1998. The Short Overview of California Indian History. Available at: <http://nahc.ca.gov/califindian.html> (accessed 12/27/08).
- Catalina Divers Supply, LLC. 2008. http://catalinadiverssupply.com/Contact_Details__Shop_History/contact_details__shop_history.htm (accessed 09/12/08).
- Catalina Island Conservancy. 2008. <http://www.catalinaconservancy.org> (accessed 08/17/08).
- (CBI 2005) Clean Beaches Initiative Program: 2005 Progress Report on Using Environmental Indicators to Administer Bond Funds.
- (CBI 2008) Clean Beaches Initiative (CBI). 2008. Clean Beaches Initiative Grant Projects. http://www.waterboards.ca.gov/water_issues/programs/beaches/cbi_projects/index.shtml (accessed 12/15/08).
- (CCBN 2007) California Clean Boating Network. 2007. The Boating Clean and Green Campaign. http://coastal.ca.gov/ccbn/2007_BCGCGralddescription.pdf (accessed 12/14/08).
- (CCC 1993) California Coastal Commission. 1993. Seawater Desalination in California. San Francisco, CA. October 1993.
- (CCC 2002) Critical Coastal Areas Draft Strategic Plan: Protecting Coastal Waters. http://www.coastal.ca.gov/nps/Web/misc_resources/cca-strategy.pdf (accessed 07/07/08).
- (CCC 2003) California Coastal Access Guide, Sixth ed. The University of California Press.
- (CCC 2004) Seawater Desalination and the California Coastal Act. San Francisco, CA. March 2004.
- (CCC 2005a) Marina del Rey Periodic LCP Review. San Francisco, California, May 25, 2005.

References Cited

- (CCC 2005b) Summary of LCP Program Activity. San Francisco, California.
- (CCC 2006) State of the Critical Coastal Areas Report. June 2, 2006.
http://www.coastal.ca.gov/nps/Web/cca_socoast1.htm (accessed 07/07/08).
- (CCC 2007) Status Report on SONGS Mitigation Program. San Francisco, CA. May 24, 2007.
- (CCC 2008a) Upper Newport Bay Project: Community-Based Restoration and Education Program.
<http://www.coastal.ca.gov/publiced/UNBweb/restore.html> (accessed 08/08/08).
- (CCC 2008b) <http://www.coastal.ca.gov/> (accessed 08/02/08).
- (CCMA 2004) Center for Coastal Monitoring and Assessment. 2004. A Biogeographic Assessment off North/Central California. http://ccma.nos.noaa.gov/products/biogeography/canms_cd/html/products.htm
- (CCY 2008) California Coastal Conservancy. 2008. San Mateo Creek Watershed Profile.
http://wrpinfo.scc.ca.gov/watersheds/sm/sm_profile.html (accessed 11/24/08).
- (CDBW 2002) California Department of Boating and Waterways. 2002. California Boating Facilities Needs Assessment. October 15, 2002. Sacramento, California.
- (CDBW and SCC 2002) CDBW and State Coastal Conservancy. 2002. California Beach Restoration Study. Sacramento, California. January 2002.
- (CDOF 2007) State of California, Department of Finance. 2007. Population Projections for California and Its Counties 2000-2050, by Age, Gender and Race/Ethnicity. Sacramento, California, July 2007.
- (CDOF 2008) State of California, Department of Finance. 2008. E-1 Population Estimates for Cities, Counties and the State with Annual Percent Change—January 1, 2007 and 2008. Sacramento, California, May 2008.
- (CDPH 2007) California Department of Public Health. 2007. Marine Biotxin Monitoring Program: Annual Report: 2007. Submitted to California Department of Fish and Game by Department of Public Health, Division of Drinking Water and Environmental Management. Available at:
http://www.cdph.ca.gov/HealthInfo/environhealth/water/Documents/Shellfish/AnnualReports/Annual_Report_PSP_2007.pdf.
- (CDPH 2008) Blue-Green Algae (Cyanobacteria) Blooms. Last updated July 1, 2008.
<http://www.cdph.ca.gov/healthinfo/environhealth/water/Pages/Bluegreenalgae.aspx> (accessed 07/26/08).
- (CDPR 2006) California Department of Parks and Recreation. 2006. California State Park System Statistical Report 2005/2006 Fiscal Year. Sacramento, CA.
- (CDPR, DFG, and USFWS) California Department of Parks and Recreation, California Department of Fish and Game, and United States Fish and Wildlife Service. 2005. McGrath State Beach Area, Berry Petroleum Oil Spill, December 1993: Final Restoration Plan and Environmental Assessment. January 2005.
http://www.dfg.ca.gov/ospr/spill/nrda/mcgrath_restoration_plan_appendix_a-d.pdf.
- (CDPR-SDCD) California Department of Parks and Recreation, San Diego Coast District. 2008. Los Peñasquitos Marsh. <http://www.torreypine.org/parks/penasquitos-lagoon.html> (accessed 08/08/08).
- Center for Watershed Protection. 2003. Impacts of Impervious Cover on Aquatic Systems, Ellicott City, MD.
- (CERES 1997a) California Resources Agency, California Environmental Resources Evaluation System, Wetland Information System. 1997a. Goleta Slough Profile.
http://ceres.ca.gov/wetlands/geo_info/so_cal/goleta_slough.html (accessed 09/18/08).
- (CERES 1997b) Mugu Lagoon Profile. http://ceres.ca.gov/wetlands/geo_info/so_cal/mugu_lagoon.html (accessed 09/18/08).
- (CERES 1997c) Aqua Hedionda Lagoon Profile.
http://ceres.ca.gov/wetlands/geo_info/so_cal/agua_hedionda.html (accessed on 08/08/08).
- (CERES 1998) Bolsa Chica Profile. http://ceres.ca.gov/wetlands/geo_info/so_cal/bolsa_chica.html (accessed 09/18/08).
- (CERES 2000) Devereux Slough Profile. http://ceres.ca.gov/wetlands/geo_info/so_cal/devereux.html (accessed 09/18/08).

- (CERES 2006a) Oil, Gas, and Mineral Resources. www.ceres.ca.gov/ocean/theme/mineral_background.html (accessed 09/18/08).
- (CERES 2006b) Vessel Traffic Safety. http://www.ceres.ca.gov/ocean/theme/vessel_background.html (accessed 09/18/08).
- (CERES 2007) Los Peñasquitos Lagoon Profile. http://ceres.ca.gov/wetlands/geo_info/so_cal/los_penasquitos.html (accessed 08/08/08).
- (CFIS 2008) Commercial Fishery Information System database. CPFV logbook data accessed 08/04/08.
- Chadwick, D.B. and J.L. Largier. 1999. Tidal exchange at the bay-ocean boundary. *Journal of Geophysical Research*, 104 (C12), 29901-29919.
- CIC Research, Inc. 2008. Overseas & Mexican Visitors to California 2007. San Diego, CA.
- (CINMS 2003) Channel Islands National Marine Sanctuary, National Ocean Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce. 2003. Common Sanctuary Cetaceans. <http://channelislands.noaa.gov/animals/cmncetns.html> (accessed 08/29/08).
- (CINMS 2007) Final Environmental Impact Statement for the Establishment of Marine Reserves and Marine Conservation Areas.
- City of Carlsbad. 2008. Aqua Hedionda Lagoon. <http://www.carlsbadca.gov/parks/lagoonoverview.html> (accessed 08/08/08).
- City of Dana Point. 2008. Dana Point Salt Creek Ozone Treatment: Fact Sheet. <http://www.danapoint.org/Modules/ShowDocument.aspx?documentid=2638> (accessed 12/18/08).
- City of Long Beach, Heath and Human Services. 2008. Water Quality Program. http://www.longbeach.gov/health/organization/eh/water/water_samples.asp (accessed 07/28/08).
- City of Los Angeles, Ad Hoc Committee on the Los Angeles River. 2007. Los Angeles River Revitalization Master Plan. http://www.lariverrmp.org/CommunityOutreach/masterplan_download.htm.
- City of Los Angeles. 2008. About the Los Angeles Storm Drain System. <http://www.lacity.org/SAN/wpd/Siteorg/general/lastrmdrn.htm> (accessed 08/1/08).
- Clark, J.R. 1996. Coastal Zone Management Handbook. Lewis Publishers: New York, 8-16 pp.
- Clendenning, K.A. 1960. Organic Productivity of Giant Kelp Areas. Kelp Investigations Program (KIP) quarterly Report, 1 July-30 Sep. 1959. University of California, Institute of Marine Resources (IMR), San Diego, California. 34 pp.
- (CLIA 2008) California Lodging Industry Association. 2008. California Tourism's Contributions to the California Economy: 1998-2002. <http://www.clia.org/tourism.cfm> (accessed 08/20/08).
- (CNPS 2006) California Native Plant Society 2006. *Inventory of Rare and Endangered Plants*. Available at: <http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi>
- Coastal Reserves Working Group, 2005, Integrated Conservation Planning in the Coastal Environments with Special Reference to California's Central Coast. National Center for Ecological Analysis and Synthesis, Santa Barbara, CA.
- Collins, C. 2006. Elegant tern. <http://www.fws.gov/bolsachica/ElegantTernprofile.htm> (accessed 08/29/08).
- Cordero, R. 2008. Personal communication. Co-Founder and President, Chumash Maritime Association, 805-681-9133, roberta.cordero@gmail.com.
- (CoRIS 2008) NOAA's Coral Reef Information System. 2008. National Coral Reef Data Discovery Glossary. http://coris.noaa.gov/glossary/glossary_a_k.html (accessed 08/03/08).
- County of Los Angeles, Department of Public Health. 2008. Ocean Water Monitoring Program. <http://www.lapublichealth.org/eh/progs/envirp/rechlth/ehrecoc.htm> (accessed 07/28/08).
- County of Orange, Health Care Agency, Environmental Health Division. 2008. Ocean Water Protection Program. <http://www.ocbeachinfo.com/> (accessed 07/28/08).
- County of San Diego, Department of Environmental Health. 2008. Beach and Bay Program. http://www.sdcounty.ca.gov/deh/water/beach_bay.html (accessed 07/28/08).

References Cited

- County of Santa Barbara, Environmental Health Services. 2008. Ocean Monitoring Program. <http://sbcphd.org/ehs/ocean.htm> (accessed 07/28/08).
- County of Santa Barbara, Planning and Development, Energy Division. 2002. Natural Oil Seeps and Oil Spills. Published March 8, 2002. <http://www.countyofsb.org/energy/information/seepsaper.asp> (accessed 07/27/08).
- Cowen, R. 1983. The effect of sheephead (*Semicossyphus pulcher*) predation on red sea urchin (*Strongylocentrotus franciscanus*) populations: an experimental analysis. *Oecologia* (Berlin) 58:249-255.
- Cox K.W. 1960. Review of the abalone in California. *Calif. Fish and Game* 46:381-406.
- Coyer, J. A., K. A. Miller, J. M. Engle, J. Veldsink, A. Cabello-Pasini, W. T. Stam, and J. L. Olsen. 2008. Eelgrass meadows in the California Channel Islands and adjacent coast reveal a mosaic of two species, evidence for introgression and variable clonality. *Annals of Botany* 101:73-87
- Coyne, M. 2000. Identifying Potential Beach Nourishment Sites in California: A Decision Support Tool. California Coastal Commission and California Department of Boating and Waterways.
- (CRA and CEPA 2004) California Resources Agency and California Environmental Protection Agency. 2004. Protecting Our Ocean, California's Action Strategy, Final Report to Governor Schwarzenegger.
- Cross, J.N. and L.G. Allen. 1993. In *Ecology of the Southern California Bight: A Synthesis and Interpretation*. M.D. Dailey, D.J. Reish, and J.W. Anderson, eds. University of California Press, Berkeley, pp. 495-540.
- (CSDLA 2008) County Sanitation Districts of Los Angeles. 2008. Joint Water Pollution Control Plant (JWPCP). http://www.lacsd.org/about/wastewater_facilities/jwpcp/default.asp (accessed 08/02/08).
- (CSMW) Coastal Sediment Management Workgroup. 2008. <http://www.dbw.ca.gov/CSMW/default.aspx> (accessed 12/20/08).
- (CTTC 2006) California Travel and Tourism Commission. 2006. California Fast Facts 2006: Statewide and Regional Tourism Facts and Figures. Sacramento. Available from <http://visitcalifornia.com/tourism/pdfs/fastfacts2006.pdf> (accessed 08/4/08, 12/4/08).
- D.K Shifflet & Associates, Ltd. 2007. California Domestic Travel Report 2006, from the Destination Performance/Monitor. Sacramento, CA.
- Dailey, M.D., D.J. Reish, and J.W. Anderson (eds.). 1993. *Ecology of the Southern California Bight: A Synthesis and Interpretation*. University of California Press, Berkeley, California.
- Dana Point Partners. 2006. Press Release: Is Doheny State beach safe for swimmers? Prepared by City of Dana Point, Southern California Coastal Water Research Project (SCCWRP), and the University of California, Berkeley. Released on September 26, 2006.
- Dayton, P.K., V. Currie, T. Gerrodette, B.D. Keller, R. Rosenthal, and D. Ven Tresca. 1984. Patch Dynamics and Stability of Some California Kelp Communities. *Ecological Monographs* 54(3):253-289.
- Dean Runyan Associates, Inc. 2008. California Travel Impacts by County, 1992-2006, 2007 Preliminary State Estimates. Submitted to California Travel & Tourism Commission, March 2008.
- Dean, R.G., R.A. Davis, and K.M. Erickson. 2008. Beach Nourishment: A Guide for Local Government Officials: Beach Nourishment with Emphasis on Geological Characteristics Affecting Project Performance. National Oceanic and Atmospheric Administration (NOAA), Coastal Services Center. June 11, 2008.
- Dever, E.P., M.C. Hendershott and C.D. Winant. 1998. Statistical aspects of surface drifter observations in the Santa Barbara Channel. *Journal of Geophysical Research*, 103, 24781-24797.
- (DFG 2000) California Department of Fish and Game. Mammals Species Account. http://www.dfg.ca.gov/wildlife/species/t_e_spp/docs/2000/t_e09mammals.pdf (accessed 08/29/08).
- (DFG 2001a) California's Living Marine Resources: A Status Report (ANR Publication #SG01-11) California Department of Fish and Game, available at <http://anrcatalog.ucdavis.edu> or <http://www.dfg.ca.gov/marine/status/status2001.asp>.
- (DFG 2001b) The Master Plan: A Guide for the Development of Fishery Management Plans. California Department of Fish and Game, Marine Region, 121pp.

- (DFG 2001c). A Guide to the Artificial Reefs in Southern California. <http://www.dfg.ca.gov/marine/artificialreefs/index.asp> (accessed 08/03/08).
- (DFG 2002a) Final 2002 Environmental Document. Marine Protected Areas in the National Oceanographic and Atmospheric Administration's Channel Islands National Marine Sanctuary. State Clearing House Number 2001121116. Sections 27.82,630 and 632 Title 14, California Code of Regulations
- (DFG 2002b) Final White Seabass Fishery Management Plan. California Department of Fish and Game, Marine Region, Ch. 6, 26pp.
- (DFG 2004a) Annual Status of the Fisheries Report Through 2003. California Department of Fish and Game. C. Ryan and M. Patyten, eds. 182pp. <http://www.dfg.ca.gov/mrd/status/status2003.html>
- (DFG 2004b) Descriptions and Preliminary Evaluations of Existing California Marine Protected Areas in the Central Coast.
- (DFG 2005a) Abalone Recovery and Management Plan. California Department of Fish and Game, Marine Region, 363pp.
- (DFG 2005b) Market Squid Fishery Management Plan. California Department of Fish and Game, Marine Region, 124pp.
- (DFG 2007a) California Steelhead Fishing Report-Restoration Card: A Report to the Legislature. T. A. Jackson. Sacramento, CA.
- (DFG 2007b) Garibaldi (*Hypsypops rubicundus*). <http://www.dfg.ca.gov/mlpa/response/garibaldi.pdf> (accessed 09/12/08).
- (DFG 2008a) 2008a. Annual Fisheries Forum, April 2008, Fisheries Report, Department of Fish and Game, Marine Region, 23pp.
- (DFG 2008b) Biogeographic Data Branch California Natural Diversity Database State and Federally Listed Endangered and Threatened Animals of California. May 2008. <http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/TEAnimals.pdf>
- (DFG 2008c) Threatened and Endangered Plants. California Department of Fish and Game, Nongame Wildlife Program. http://www.dfg.ca.gov/wildlife/species/t_e_spp/plants.html (accessed 08/28/08).
- (DFG 2008d) California Marine Life Protection Act Master Plan for Marine Protected Areas. California Department of Fish and Game, January 2008. Approved February 2008.
- (DFG 2008e) Review of California halibut trawl fishery in the California Halibut Trawl Grounds. California Department of Fish and Game, Marine Region, State Fisheries Evaluation Project. 43 pp. Available at: <http://www.dfg.ca.gov/marine/pdfs/chtg-report.pdf>
- Di Lorenzo, E. 2003. Seasonal dynamics of the surface circulation in the Southern California Current System. *Deep-Sea Research II* 50, 2371-2388.
- Divemaster. 2008. <http://www.divemaster.com/scuba-diving-sites-in-north-america/united-states/california/casino-point-under-water-marine-park-catalina-island.html> (accessed 09/12/08).
- Dojiri, M. 2008. Personal communication. Division Manager, City of Los Angeles, Environmental Monitoring Division, 310-648-5610, mas.dojiri@lacity.org.
- Domeier, M.L., and C.S.Y. Chun. 1995. A tagging study of the California halibut, *Paralichthys californicus*. *California Cooperative Oceanic Fisheries Investigations Reports* 36:204-207.
- Dong, C. and J.C. McWilliams. 2007. A numerical model study of island wakes in the Southern California Bight. *Continental Shelf Research*, 27:1233-1248.
- Dugan, J. 2008. Personal communication. Lecturer, Environmental Studies Program and Assistant Research Biology, Marine Science Institute, University of California, Santa Barbara, (805) 893-2968, j_dugan@lifesci.ucsb.edu
- Dugan, J.E. and D.M. Hubbard. 2006. Ecological Responses to Coastal Armoring on Exposed Sandy Beaches. *Shore and Beach*, Volume 74, No. 1, Winter 2006, pp. 10-16.
- Dugan, J.E., D.M. Hubbard, D.L. Martin, J.M. Engle, D.M. Richards, G.E. Davis, K.D. Lafferty, R.F. Ambrose 2000. Macrofauna communities of exposed sandy beaches on the Southern California mainland and

References Cited

- Channel Islands. pp 339-346 in, D.R. Brown, K.L. Mitchell and H.W. Chang eds., Proceedings of the Fifth California Islands Symposium. Minerals Management Service Publication # 99-0038.
- Dugan, J.E., D.M. Hubbard, M.D. McCrary, and M.O. Pierson. 2003. The response of macrofauna communities and shorebirds to macrophyte wrack subsidies on exposed sandy beaches of southern California. *Estuarine, Coastal, and Shelf Science*, 58S, pp. 25-40.
- Dugan, J.E., D.M. Hubbard, I.F. Rodil, D.L. Revell and S. Schroeter. 2008. Ecological effects of coastal armoring on sandy beaches. *Marine Ecology*, Volume 29, Supplement 1: 160-170.
- Dwight, R.H., M.V. Brinks, G. Sharavanakumar and J.C. Semenza. 2007. Beach attendance and bathing rates for Southern California beaches. *Ocean and Coastal Management* 50 (10): 847-858.
- Ebeling, A.W., D.R. Laur, and R.J. Rowley. 1985. Severe storm disturbances and reversal of community structure in a southern California kelp forest. *Mar. Bio.* 84(3): 287-294.
- EDAW, Inc. 2008. Final Mitigated Negative Declaration for the Opportunistic Beach Fill Program in the Cities of Encinitas, Solana Beach, Coronado, and Imperial Beach. Prepared for Moffat and Nichol, Long Beach, CA, May 2008. http://www.sandag.org/uploads/publicationid/publicationid_1370_8211.pdf
- Eglash, Ron. 2002. Computation, Complexity and Coding in Native American Knowledge Systems. in J. Hankes and G. Fast (ed) *Changing the Faces of Mathematics: Perspectives on Indigenous People of North America*. Reston, VA: NCTM.
- Elwany, M. H. S., A-L. Lindquist, R. Flick, W. O'Reilly, J. Reitzel, and W. Boyd. 1999. Study of Sediment Transport Conditions in the Vicinity of Agua Hedionda Lagoon, Volume 1: Technical Report. SIO Reference No. 00-07, Scripps Institution of Oceanography, Center for Coastal Studies, La Jolla, CA, 8 January 1999. 10 chapters + 3 appendices.
- Emery, K.O. 1960. *The Sea Off Southern California, A Modern Habitat of Petroleum*. Wiley, New York. 336pp.
- Engle, J.M. 1979. Ecology and growth of juvenile California spiny lobster, *Panulirus interruptus* (Randall). Ph.D. Dissertation, University of Southern California.
- Engle, J. M., and K. A. Miller. 2005. Distribution and morphology of eelgrass (*Zostera marina* L.) at the California Channel Islands. pp. 405-414 in D. K. Garcelon and C. A. Schwemm eds., Proceedings of the Sixth California Islands Symposium. National Park Service Technical Publication CHIS-05-01.
- Engle, J.M., and J.A. Coyer. 1981. California Marine Waters, Areas of Special Biological Significance Survey Report: Santa Catalina Island – Subarea III. State Water Resources Control Board, Surveillance and Monitoring Section, Sacramento, CA. Report No. 81-4.
- Erlandson, J.M., T.C. Rick, P.W. Collins, and D.A. Guthrie. 2007a. Archaeological implications of a bald eagle nesting site at Ferrelo Point, San Miguel Island, California. *Journal of Archaeological Science* 34: 255-271.
- Erlandson, J.M., T.C. Rick, T.L. Jones, and J.F. Porcasi. 2007b. "One if by Land, Two if by Sea: Who Were the First Californians?" in *California Prehistory: Colonization, Culture and Complexity*, ed. T.L. Jones and K. Klar, 53-62, AltaMira Press.
- Falkner, M., L. Takata, and S. Gilmore. 2006. Report on Performance Standards for Ballast Water Discharges in California Waters. California State Lands Commission, Marine Facilities Division. Prepared for California State Legislature, January 2006.
- Falkner, M., L. Takata, S. Gilmore, and N. Dobroski. 2007. Biennial Report on the California Marine Invasive Species Program. Produced for the California State Legislature, by California State Lands Commission, Marine Facilities Division, February 2007.
- Fancher, J., L. Hays, and P. Knapp. 2002. Western Snowy Plover Nesting at Bolsa Chica, Orange County, California 2002. U.S. Fish & Wildlife Service. 23pp.
- Ferry-Graham, L., M. Dorin, and P. Lin. 2008. Understanding Entrainment at Coastal Power Plants: Informing a Program to Study Impacts and Their Reduction. California Energy Commission, PIER Energy-Related Environmental Research Program. CEC-500-2007-120.
- Fish Contamination Education Collaborative (FCEC). 2008. www.pvfish.org (accessed 12/14/08).
- Flick, R.E. 1993. The myth and reality of southern California beaches. *Shore and Beach* 61(3):3-13.

- Fodrie, F.J., and G. Mendoza. 2006. Availability, usage and expected contribution of potential nursery habitats for the California halibut. UC Marine Council, Coastal Environmental Quality Initiative, University of California, Paper 42.
- Forney, K.A., J. Barlow. 1998. Seasonal patterns in the abundance and distribution of California Cetaceans, 1991-1992. *Marine Mammal Science* 14 (3): 460-489.
- Foster, M.S. and D.R. Schiel. 1985. The ecology of giant kelp forests in California: A community profile. U.S. Fish and Wildlife Service Biological Report 85 (7.2). 152pp.
- Foster, M.S., A.P. DeVogelaere, C. Harrold, J.S. Pearse, and A.B. Thrum. 1988. Causes of spatial and temporal patterns in rocky intertidal communities of central and northern California. *Memoirs of the California Academy of Sciences* 9:1-45.
- Franklin, M.P. 1997. An investigation into the population structure of white seabass (*Atractoscion nobilis*), in California and Mexican waters using microsatellite DNA analysis. Phd Dissertation. University of California Santa Barbara. 109 pp.
- Franko's Maps. 2008. Fabulous Maps of Favorite Places. http://www.frankosmaps.com/San_Diego_Coast.htm (accessed 08/18/08).
- Gadomski, D.M., S.M. Caddell, and L.R. Abbott, T.C. Caro. 1990. Growth and development of larval and juvenile California halibut, *Paralichthys californicus*, reared in the laboratory. Pages 85-98 in: C.W. Haugen, ed. *The California halibut, Paralichthys californicus*, resource and fisheries. California Department of Fish and Game, Fish Bulletin 174.
- Garrison, T. 2004. *Oceanography: An Invitation to Marine Science*. Thomas Brooks/Cole, 522pp.
- Gentner B. and Steinback S. 2008. The Economic Contribution of Marine Angler Expenditures in the United States, 2006. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-F/SPO -94.
- Gentner, B., S. Steinback and M. Price. 2001. Marine angler expenditures in the Pacific Coast Region, 2000. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-F/SPO-49.
- Goldfarb, G. 2005. The Planning and Operations Costs of MPAs and MPA Networks: A Limited Body of Knowledge. California Marine Life Protection Act Initiative, Sacramento, CA.
- Greene, H.G., R. Kvitek, J.J. Bizzarro, C. Bretz, and P. Iampietro. 2004. Fisheries Habitat Characterization of the California Continental Margin. California Sea Grant.
- Gress, P., R.W. Risebrough, D.W. Anderson, L.F. Kiff, and J.R. Jehl Jr. 1973. Reproductive failures of Double-crested Cormorants in southern California and Baja California. *Wilson Bull.* 85:183_196.
- Griggs, G. California Needs a Coastal Hazard Policy. *Coast and Ocean Magazine*. Volume 13, No. 3. 1998.
- Grossman, G.D., G.P. Jones, and W.J. Searman Jr. 1997. Do Artificial Reefs Increase Regional Fish Production? A Review of Existing Data. *Fisheries*, Volume 22, Number 4, 17-23.
- Guassac, M. 2008. Personal communication. Executive Director, Kumeyaay Diegueño Land Conservancy, 619-952-8430, iguassac@sycuan-nsn.gov.
- Gully, J. 2008. Personal communication. Supervising Environmental Scientist, Ocean Monitoring and Research Group, County Sanitation Districts of Los Angeles County, 562-699-7411 ext 2818, jgully@lacsds.org.
- Habel, J.S. and G.A. Armstrong. 1978. Assessment and atlas of shoreline erosion along the California coast. State of California, Department of Navigation and Ocean Development, Sacramento, CA 95814. 277 pp
- Hamilton, P., M.A. Noble, J. Largier, L.K. Rosenfeld, G. Robertson, 2006. Cross-shelf subtidal variability in San Pedro Bay during summer 2001. *Continental Shelf Research*, 26(6):681-702.
- Hanks, H. 2006. Personal communication between Rick Hanks, National Monument Manager, California Coastal National Monument, Bureau of Land Management, U.S. Department of Interior and Amy Boone, Policy Analyst, California Marine Life Protection Act Initiative.
- Harms, S. and C.D. Winant. 1998. Characteristic patterns of circulation in the Santa Barbara Channel. *Journal of Geophysical Research*, 103, C2, 3041-3065.

References Cited

- Harrold, C., J. Watanabe, and S. Lisin. 1988. Spatial variation in the structure of kelp forest communities along a wave exposure gradient. *Marine Ecology* 9(2): 131-156.
- Hart, J. L. 1973. Pacific fishes of Canada. Fisheries Research Board of Canada Bulletin 180. Ottawa, Canada.
- (HBWC 2008) The Huntington Beach Wetlands Conservancy. <http://www.hbwc.org/what.htm> (accessed 12/09/2008).
- Heal the Bay. 2008. The Beach Report: 18th Annual. Prepared by Heal the Bay, May 21, 2008. http://www.healthebay.org/assets/pdfdocs/brc/annual/2008/report_web.pdf.
- Heizer, R.F. and A.B. Elsasser. 1980. The Natural World of the California Indians. University of California Press, 271 pp.
- Hemphill, J. 2008. Manager of Engineering, the Mineral Resources Management, California State Lands Commission, July 25, 2008.
- Hickey, B.M. 1992. Circulation over the Santa Monica-San Pedro Basin and shelf. *Progress in Oceanography*, 30, 37-115.
- Hickey, B.M. 1993. Physical Oceanography. pp. 19-70. In: M.D. Dailey, D.J. Reish, and J.W. Anderson (Eds.), *Ecology of the Southern California Bight: A Synthesis and Interpretation*. Berkeley, CA: University of California Press.
- Hickey, B.M. 2000. Basin to Basin Water Exchange in the Southern Bight. In: *Proceedings of the 5th Channel Islands Symposium*. Sponsored by the U.S. Department of Interior Minerals Management Service at the Santa Barbara Museum of Natural History. MMS Pacific OCS Region Document No. 99-0038.
- Hickey, B.M., E.L. Dobbins and S.E. Allen. 2003. Local and remote forcing of currents and temperature in the central Southern California Bight. *Journal of Geophysical Research*, 108, C3, 3081, doi:10.1029/2000JC000313.
- Hoffman, R.F. 1986. Fishery utilization of eelgrass (*Zostera marina*) beds and non-vegetated shallow water areas in San Diego Bay. National Marine Fishery Service, Southwest Region. Administrative Report SWR-86-4.
- Hornsby, A. 2005. Personal communication between Al Hornsby, PADI, and Tegan Churcher Hoffman, Consultant to the California Marine Life Protection Act Initiative.
- Hubbard, D.M., and J. Dugan. 2003. Shorebird use of an exposed sandy beach in southern California. *Estuarine, Coastal and Shelf Science* 58S: 41-54.
- IWS (Institute for Wildlife Studies). 2008. <http://www.iws.org/> (accessed 12/16/08).
- Jauregui, R. 2008. Personal communication. California State Water Resources Control Board, Division of Water Quality, NPDES, 916-341-5505, rjauregui@waterboards.ca.gov.
- Jensen, N.J. 2007. The Habitat of *Astragalus pycnostachyus* var. *lanosissimus* (Ventura marsh milk-vetch) and an Assessment of Potential Future Planting Sites. Submitted to Channel Islands Chapter, California Native Plant Society, April 26, 2007.
- Johnson, L.T. 1998. Environmental Impacts on Pleasure Craft Oil Spills. University of California Cooperative Extension and Sea Grant Extension Program, San Diego County, November 1998.
- Johnson, P. B., K. L. Martin, T. L. Vandergon, R. L. Honeycutt, R. S. Burton, and A. Fry. 2009. Microsatellite and mitochondrial genetic comparisons between northern and southern populations of California Grunion *Leuresthes tenuis*. *Copeia* (in press).
- Jones, A. T., Dutton, P., Snodgrass, R. E., and T. Wayland. 1988. Reoccurrence of the Pacific seahorse, *Hippocampus ingens*, in San Diego Bay. *California Fish and Game* 74(4):236-248.
- Jones, J.H. 1971. General circulation and water characteristics in the Southern California Bight - Southern California Coastal Water Resources Project
- Jones, J.H. 1971. General circulation and water characteristics in the Southern California Bight - Southern California Coastal Water Resources Project.
- Kane, M. 2005. California Small Hydropower and Ocean Wave Energy Resources. Presented to the California Energy Commission, May 9, 2005.

- Kelco Division of Merck & Co., Inc. 1992. 1991 Santa Barbara kelp restoration project. California Department of Fish & Game contract No. FG-0322. Final report 1992. MBC Applied Environmental Sciences, Costa Mesa, California. 33pp.
- Kildow, J., and C.S. Colgan. 2005. California's Ocean Economy: Report to the Resources Agency, State of California. National Ocean Economics Program, Monterey, California.
- Kim, J.H., S.B. Grant, C.D. McGee, B.F. Sanders J.L. Largier. 2003. Locating sources of surf zone pollution: a mass budget analysis of fecal indicator bacteria at Huntington Beach. *Environmental Science and Technology*, 38:2626-2636.
- King, 1999. The Fiscal Impact of Beaches in California. Public Research Institute, San Francisco State University.
- Kirschbaum, K. and P. Watkins. 2000. "*Pandion haliaetus*" (On-line), Animal Diversity Web. http://animaldiversity.ummz.umich.edu/site/accounts/information/Pandion_haliaetus.html (accessed 08/29/08).
- Kohler, S. 2007. California Non-Fuel Minerals 2007. California Geological Survey, Sacramento, CA.
- Kramer, S.H. 1990. Distribution and abundance of juvenile California halibut, *Paralichthys californicus*, in shallow waters of San Diego County. Pages 99-126 in: C.W. Haugen, editor. The California halibut, *Paralichthys californicus*, resource and fisheries. California Department of Fish and Game, Fish Bulletin 174.
- Kramer, S.H. 1991. The shallow-water flatfishes of San Diego County. California Cooperative Oceanic Fisheries Investigations Reports 32:128-142.
- Kruer, C.R. and L.O. Causey. 2005. The Use of Large Artificial Reefs to Enhance Fish Populations at Different Depths in the Florida Keys. MARFIN Program, NOAA National Marine Fisheries Service, May 2005.
- Lane, E.D. and C.W. Hill. 1975. The marine resources of Anaheim Bay. California Department of Fish and Game, Fish Bulletin 165.
- Langdon-Pollock, J. 2004. West Coast Marine Fishing Community Description. Pacific State Marine Fisheries Commission, Economic Fisheries Information Network, Portland Oregon.
- Largier, J.L., S.V. Smith and J.T. Hollibaugh. 1997. Seasonally hypersaline estuaries in mediterranean-climate regions. *Estuarine Coastal and Shelf Science*, 45, 789-797.
- Larinto, T. 2008. Senior Marine Biologist Specialist Groundfish Project, Department of Fish and Game. Personal communication.
- Larson, S. 2002. Energy Supply Panel, The Big Picture-by the Numbers-And Issues for the Coast. California and the World Ocean '02 Conference. California Energy Commission Paper 410, October 2002.
- (LARWQCB 1994) California Regional Water Quality Control Board, Los Angeles Region. 1994. Water Quality Control Plan (Basin Plan), Chapter 4: Strategic Planning and Implementation. http://www.waterboards.ca.gov/losangeles/water_issues/programs/basin_plan/electronics_documents/bp4_strategic_planning_and_implementation.pdf.
- (LARWQCB 2002) California Regional Water Quality Control Board. 2002. Draft Strategy for Developing TMDLs and Attaining Water Quality Standards in the Los Angeles Region. http://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/02_1210_strategy%20121002.pdf.
- (LARWQCB 2004) California Regional Water Quality Control Board, Los Angeles Region. 1994. Water Quality Control Plan (Basin Plan). http://www.waterboards.ca.gov/losangeles/water_issues/programs/basin_plan/electronics_documents/bp1_introduction.pdf.
- Lavenberg, R.J., G.E. McGown, A.E. Jahn, J.H. Petersen, and T.C. Sciarrotta. 1986. Abundance of southern California nearshore ichthyoplankton: 1978-1984. California Cooperative Oceanic Fisheries Investigations Reports 27: 53-64.
- Leatherwood, S., B. Stewart and P. Folkens. 1987. Cetaceans of the Channel Islands National Marine Sanctuary. Channel Islands National Marine Sanctuary, NOAA and the National Marine Fisheries Service.

References Cited

- Leatherwood, S., R. Reeves, W. Perrin, and W. Evans. 1982. Whales, Dolphins and Porpoises of the Eastern North Pacific and Adjacent Arctic Waters. NOAA Technical Report, National Marine Fisheries Service Circular 444.
- Leeworthy, V.R. 2001. National Survey on Recreation and the Environment (NSRE): Preliminary Estimates from Versions 1-6, Coastal Recreation Participation. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service, Special Projects Office. Silver Spring, Maryland (available at: http://www.srs.fs.usda.gov/trends/Nsre/NSRE_V1-6_May.pdf).
- Leeworthy, V. R., J.M. Bowker, J.H. Hospital, E.A. Stone. 2005. Projected participation in marine recreation: 2005 & 2010. Final report; U.S. Department of Commerce, National Oceanic and Atmospheric Administration. Silver Spring, MD: U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service. 152pp. (available at: <http://www.treesearch.fs.fed.us/pubs/21306>).
- Leeworthy, V.R. and P.C. Wiley. 2001. Current Participation Patterns in Marine Recreation. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service, Special Projects Office. Silver Spring, Maryland (available at: http://marineeconomics.noaa.gov/NSRE/NSRE_2.pdf),
- Littler, M. M., and D. S. Littler. 1979. Rocky intertidal island survey. Technical Report II-5.0. Bureau of Land Management, United States Department of the Interior, Washington, D.C., USA.
- Los Angeles Water Quality Control Board (LAWQCB). 2008. Killer Algae found in Southern California. http://www.waterboards.ca.gov/losangeles/water_issues/programs/water_quality_issues/killer_algae_article.shtml (accessed 12/15/08).
- Love, M. M. Yoklavich, L. Thorsteinson. 2002. The rockfishes of the northeast Pacific. University of California Press, 404 pp.
- Love, M.S., M. Nishimoto, D. Schroeder and J. Caselle. 1999. The ecological role of oil and gas production platforms on rocky reef fishes in Southern California. U. S. Geological Survey, OCS Study MMS 1999-0015.
- Lowe, C.G., D.T. Topping, D.P. Cartamil, Y.P. Papastamatiou. 2003. Movement patterns, home range and habitat utilization of adult kelp bass (*Paralabrax clathratus*) in a temperate no-take marine reserve. Marine Ecology Progress Series 256:205–216.
- Lynn, R.J. and J.J. Simpson. 1987. The California current system: The seasonal variability of its physical characteristics. Journal of Geophysical Research 92:12947-12966.
- Maloney, E., R. Fairey, A. Lyman, K. Reynolds, and M. Sigala. 2006. Introduced Aquatic Species in California Open Coastal Waters. Final Report. California Department of Fish and Game. Office of Spill Prevention and Response. Sacramento, CA.,
- Marine Mammal Center. 2008. <http://www.marinemammalcenter.org/learning/education/pinnipeds/noelephseal.asp> (accessed 08/28/08).
- MarineBio 2008. *Strongylocentrotus franciscanus*, Red Sea Urchin - MarineBio.org. <http://marinebio.org/species.asp?id=45> (accessed 08/29/08).
- Marschalek, D.A., February 2008, California Least Tern Breeding Survey 2007 Season, Final Report to State of California, Department of Fish and Game, 61pp.
- Martin, K. 2008. Personal communication. Pepperdine University, Chair in Natural Science and Professor of Biology, 310-506-4808, karen.martin@pepperdine.edu.
- Martin, K., A. Staines, M. Studer, C. Stivers, C. Moravek, P. Johnson, and J. Flannery. 2007. Grunion Greeters in California: Beach Spawning Fish, Coastal Stewardship, Beach Management and Ecotourism. Pp. 73-86 in Lück, M.; Gräupl, A.; Auyong, J.; Miller, M.L. & M.B. Orams (eds.): Proceedings of the 5th International Coastal & Marine Tourism Congress: Balancing Marine Tourism, Development and Sustainability. Auckland, New Zealand: New Zealand Tourism Research Institute.
- Martin, K., T. Speer-Blank, R. Pommerening, J. Flannery, and K. Carpenter. 2006. Does beach grooming harm grunion eggs? Shore & Beach 74: 17-22.

- Mason, T. 2008. Home range size, habitat use, and the effects of habitat breaks on the movements of temperate reef gamefishes in a southern California marine protected area. California State University Long Beach Masters Thesis pp 52.
- (MBNMS 2003) Monterey Bay National Marine Sanctuary. 2003. Ecosystem Observations for the Monterey Bay National Marine Sanctuary. Monterey, CA.
- (MBNMS 2006) Monterey Bay National Marine Sanctuary (MBNMS). 2006. Resource Management Issues: Cruise Ships. <http://montereybay.noaa.gov/resourcepro/resmanissues/printable.html> (accessed 08/02/08).
- McDonald, D. and P. Dutton. 1990. Fibropapillomas on Sea Turtles in San Diego Bay, California. Marine Turtle Newsletter 51:9-10, available at: <http://www.seaturtle.org/mtn/archives/mtn51/mtn51p9.shtml>.
- McKnight v. U.S., C.C.A.Cal., 78 F.2d 931, 933. McKnight v. United States, 78 F.2d 931; 1935 U.S. App. LEXIS 3902 (9th Cir. Cal. 1935).
- McPeak, R.H., and D.C. Barilotti. 1993. Techniques for managing and restoring *Macrocystis pyrifera* kelp forests in California, USA. Universidad Católica del Norte, Coquimbo, Chile. Occasional Series 2:271-284.
- Miller, K. A., J.L. Olsen, and W.T. Stam. 2000. Genetic divergence correlates with morphological and ecological subdivision in the deep-water elk kelp, *Pelagophycus porra* (*Phaeophyceae*). Journal of Phycology. 36: 862-870.
- (MMS 1995) Minerals Management Service. 1995. Accidents Associated with Oil and Gas Operations: Outer Continental Shelf, 1991-1994. Submitted to United States Department of the Interior, Minerals Management Service, September 1995.
- (MMS 1998) Minerals Management Service. 1998. Accidents Associated with Oil and Gas Operations: Outer Continental Shelf, 1995-1996. OCS Report: MMS 98-0030. Submitted to United States Department of the Interior, Minerals Management Service.
- (MMS 2006) Threatened pinnipeds and sea otters in the southern California planning area. <http://www.mms.gov/omm/pacific/enviro/pin-and-seaotter.htm> (accessed 12/22/08).
- (MMS 2008a) Minerals Management Service. Offshore Energy & Minerals Management. 2008a. Spills - Statistics and Summaries 1996-2008. <http://www.mms.gov/incidents/spills1996-2008.htm>. (accessed 07/27/08). Updated June 15, 2008.
- (MMS 2008b) Offshore Energy & Minerals Management. 2008b. Spills - Statistics and Summaries 1964-1995. <http://www.mms.gov/incidents/spills1964-1995.htm>. (accessed 07/27/08). Updated June 15, 2008.
- Morris, R., D. Abbott, E. Haderlie. 1980. Intertidal Invertebrates of California. Stanford University Press, 680pp.
- Moser H.G., D.A. Ambrose, M.S. Busby, J.L. Butler, E.M. Sandknop, B.Y. Sumida, and E.G. Stevens. 1983. Description of early stages of white seabass, *Atractoscion nobilis*, with notes on distribution. Calif. Coop. Oceanic Fish. Invest. Rep. 24:182-193.
- Moser, G.H., and W. Watson. 1990. Distribution and abundance of early life history stages of the California halibut, *Paralichthys californicus*, and comparison with the fantail sole, *Xystreureys liolepis*. Pages 31-71 in: C.W. Haugen, editor. The California halibut, *Paralichthys californicus*, resource and fisheries. California Department of Fish and Game, Fish Bulletin 174.
- National Dredging Team. 1998. Local Planning Group and Development of Dredged Materials Management Plans. U.S. Environmental Protection Agency (USEPA) and U.S. Army Corps of Engineers, Washington, D.C. June 1998.
- National Ocean Economics Program. 2005. California's Ocean Economy. Report to the Resources Agency, State of California; Sacramento, California. http://resources.ca.gov/press_documents/CA_Ocean_Econ_Report.pdf.
- National Ocean Economics Program. 2008. Ocean Economy Data (from the Bureau of Labor Statistics. <http://noep.mbari.org/Market/ocean/oceanEcon.asp> (accessed 07/12/08).
- National Research Council (NRC) 1990. Monitoring California's Coastal Waters. Panel on the Southern California Bight of the Committee on a Systems Assessment of Marine Environmental Monitoring. Marine Board. Commission on Engineering and Technical Systems. National Academy Press. Washington D.C.

References Cited

- Natural Resource Trustees. 2006. Executive Summary of the Montrose Settlements Restoration Program Restoration Plan, Programmatic Environmental Impact Statement, and Programmatic Environmental Impact Report. Developed for the Montrose Settlements Restoration Program, Long Beach, CA, July 2006. Available at http://www.darrp.noaa.gov/southwest/montrose/pdf/msrp_rp_execsumm.pdf.
- (NBNF 2008) Newport Bay Naturalists and Friends 2008. Upper Newport Bay (Introduction, History, Habitats). <http://www.newportbay.org/index.html> (accessed 08/08/08).
- (NCCOS 2005) National Centers for Coastal Ocean Science, National Oceanic and Atmospheric Administration, U.S. Department of Commerce. 2005. A Biogeographic Assessment of the Channel Islands National Marine Sanctuary: A Review of Boundary Expansion Concepts for NOAA's National Marine Sanctuary Program (DVD). Silver Spring, MD. NOAA Technical Memorandum NOS NCCOS 21.
- (NCCOS 2008) Land and Resource Use Overview. Available at http://www.cop.noaa.gov/stressors/resourcelanduse/LandRes_overview.pdf (Accessed 12/01/08).
- (NCCOS 2008a) Harmful Algal Bloom Research in California. <http://www.cop.noaa.gov/stressors/extremeevents/hab/features/hab-california.pdf> (accessed 08/27/08).
- (NCCOS 2008b) Harmful Algal Bloom in California: Pseudo-nitzschia Spread Along Coast Causing Massive Mortalities of Marine Life in Spring 2007. http://www.cop.noaa.gov/stressors/extremeevents/hab/features/ca_pn_050807.html (accessed 08/27/08).
- Neilson, D., and T. Buck. DFG. 2008. Sport Lobster Intercept Survey, Fall 2007. Submitted In Fulfillment of OPC -- Work Project A-7, Task 3. 48 pages.
- (NERRS 2008) National Estuarine Research Reserve System, National Ocean Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce. 2008. Tijuana River Reserve, California. <http://nerrs.noaa.gov/TijuanaRiver/welcome.html> (accessed 12/01/08).
- Neubacher, D. 2006. Personal communication between Don Neubacher, Superintendent, Point Reyes National Seashore and Amy Boone, Marine Life Protection Act Initiative.
- Neushul, M. 1971. The species of *Macrocystis*. In: W.J. North (ed.), *The Biology of Giant Kelp Beds (Macrocystis)*. Noca Hedwigia Z. Kryptogamenkd., 32:1-98.
- Newell, R.C., L.J. Seiderer, and D.R. Hitchcock. 1998. The impact of dredging works in coastal waters: a review of the sensitivity to disturbance and subsequent recovery of biological resources on the sea bed. *Oceanography and Marine Biology*, Volume 36, pp. 127-178.
- Nezlin, N.P., P.M. DiGiacomo, E.D. Stein, D. Ackerman. 2005. Stormwater runoff plumes observed by SeaWiFS radiometer in the Southern California Bight. *Remote Sensing of Environment* 98(4).
- Nishimoto, M.M. and L. Washburn. 2002. Patterns of coastal eddy circulation and abundance of pelagic juvenile fish in the Santa Barbara Channel, California, USA *Marine Ecology Progress Series* 241:183-199.
- (NMSF-SW 2008a) National Marine Fisheries Service, Southwest Region; National Oceanic and Atmospheric Administration, U.S. Department of Commerce. 2008. Noxious Seaweed Found in Southern California Coastal Waters. <http://swr.nmfs.noaa.gov/hcd/caulerpa.htm> (accessed 12/12/08).
- (NMSF-SW 2008b) Status Review Report for Black Abalone: Draft – 4 January 2008. NOAA Technical Memorandum NMFS-SWR-##, available at http://swr.nmfs.noaa.gov/media/BASR_Report_Draft_11_January_2008.pdf.
- (NMSP 2006) National Marine Sanctuary Program, National Oceanic and Atmospheric Administration, U.S. Department of Commerce. 2006. *Channel Islands National Marine Sanctuary Draft Management Plan/Draft Environmental Impact Statement*. Silver Spring, MD.
- (NOAA 2000) National Oceanic and Atmospheric Administration. 2000 National Survey of Recreation and the Environment, Preliminary Estimates from Versions 1-6: Coastal Recreation Participation. National Oceanic and Atmospheric Administration, Silver Springs, Maryland.
- Noble, M.A., K.J. Rosenberg, P. Hamilton and J. Xu. 2008. Coastal ocean transport patterns in the central Southern California Bight. In: *GSA Southern California Bight*.
- Norris, R.M. and R.W. Webb. 1990. *Geology of California*. New York, NY: John Wiley and Sons.

- North, W.J. 1967. Kelp Habitat Improvement Project: Annual Report 1966-1967. W.M. Keck Laboratory of Environmental Health Engineering, California Institute of Technology, Pasadena. 105pp.
- North, W.J. 1968. Studies of kelp deterioration at south Point Loma. Kelp Habitat Improvement Project; Ann. Rept. 1967-1968. Calif. Insti. Tech., Pasadena, pp. 75–84.
- North, W.J. 1968b. Effects of canopy cutting on kelp growth: comparison of experimentation with theory. In W.J. North and C.L. Hubbs (eds.). Utilization of kelp-bed resources in southern California. Calif. Dep. Fish and Game, Fish Bull. 139. pp. 223-254.
- North, W.J. 1971a. Introduction and background. In: W.J. North (ed.), *The Biology of Giant Kelp Beds (Macrocystis)*. Nova Hedwigia Z. Kryptogamenkd., 32: 1-98.
- North, W.J. 1971b. Growth of individual fronds of the mature giant kelp *Macrocystis*. In *The biology of giant kelp beds (Macrocystis) in California*. W.J. North (ed.). Beihefte zur Nova Hedwigia. 32. J. Cramer. Lehre. p. 123-168.
- (NOS 2008) NOAA, National Ocean Service. 2008. Harmful Algal Blooms. <http://oceanservice.noaa.gov/topics/coasts/hab/welcome.html> (accessed 08/29/08).
- (NPS 2006a) National Park Service. 2006a. Channel Islands National Park: Park Statistics. <http://www.nps.gov/chis/parkmgmt/statistics.htm> (accessed 08/15/08).
- (NPS 2006b) National Park Service. 2006b. Channel Islands National Park: Tidepooling. <http://www.nps.gov/chis/planyourvisit/tidepooling.htm> (accessed 08/18/08).
- (NPS 2007) National Park Service. <http://www.nps.gov/chis/naturescience/bald-eagles.htm> (accessed 08/28/08).
- Oey, L.Y. 1999. A forcing mechanism for the poleward flow off the southern California coast. *Journal of Geophysical Research* 104:13529-13539.
- Orange County Parks. 2008. <http://www.ocparks.com/coastalparcs/> (accessed 08/19/08).
- (OSPR 2005) California Office of Spill Prevention and Response, Department of Fish and Game. 2005. OSPR News Release: Oil Spills Affect Seabirds Off Ventura Coast. Released January 15, 2005. <http://www.dfg.ca.gov/ospr/news/2005nr/venturaseabirds011505.pdf>.
- (OSPR 2008) California Office of Spill Prevention and Response, Department of Fish and Game. 2008. <http://www.dfg.ca.gov/ospr/index.html> (accessed 07/28/08).
- Otero, M.P. and D.A. Siegel. 2004. Spatial and temporal characteristics of sediment plumes and phytoplankton blooms in the Santa Barbara Channel. *Deep-Sea Research II* 51: 1129-1149.
- Pacific States Marine Fisheries Commission. 2007. CRFS Sampler Manual; California Recreational Fisheries Survey, a cooperative program of: California Department of Fish and Game, Pacific States Marine Fisheries Commission, and National Marine Fisheries Service. Portland, Oregon.
- Page, G.W., L.E. Stenzel, and J.E. Kjelson. 1999. Overview of Shorebird Abundance and Distribution in Wetlands of the Pacific Coast of the Contiguous United States. *The Condor* 101:461-471.
- Parnell, P.E., C.E. Lennert-Cody, L. Geelen, L.D. Stanley, P.K. Dayton. 2005. Effectiveness of a small marine reserve in southern California. *Marine Ecology Progress Series*. Vol 296.
- Parnell, P.E., P.K. Dayton, and F. Margiotta. 2007. Spatial and Temporal Patterns of Lobster Trap Fishing: A Survey of Fishing Effort and Habitat Structure. *Bulletin Southern California Academy of Science*. 106(1).
- Parnell, P.E., P.K. Dayton, C.E. Lennert-Cody, L.L. Rasmussen, and J.J. Leichter. 2006. Marine Reserve Design: Optimal Size, Habitats, Species Affinities, Diversity, and Ocean Microclimate. *Ecological Applications*. 16(3).
- Pearse, J.S. and A.H. Hines. 1979. Expansion of a Central California kelp forest following mass mortality of sea urchins. *Marine Biology* 51: 83-91.
- Pendleton, L. and C. LaFranchi. 2008. Preliminary Findings: The California Coastal Use Internet Survey.
- Perry, B. 2008. Coastal Systems and Impacts. An online text. California State University, Long Beach, Department of Geological Sciences, Long Beach, CA.

References Cited

- <http://www.cnsm.csulb.edu/departments/geology/people/bperry/geology303/geol303text.html> (accessed 07/27/08)
- Peterson, C.H. and M.J. Bishop. 2005. Assessing the Environmental Impacts of Beach Nourishment. *Bioscience*, Volume 55, Number 10, October 2005, 887-895.
- (PFMC 2008) Pacific Fishery Management Council. 2008. <http://www.pcouncil.org/acronyms.html#O> (accessed 08/27/08).
- Philip Williams & Associates, Ltd. 2006. Ballona Wetlands Existing Conditions Restoration Draft Report. Prepared for the California State Coastal Conservancy. August 2006.
- Pineda, J., 1994. Internal tidal bores in the nearshore: warm-water fronts, seaward gravity currents and the onshore transport of nesutonic larvae. *Journal of Marine Research* 52, 427-458.
- Pitman, R.L. and S.M. Speich. 1976. Black Storm-Petrel breeds in the United States. *West. Birds* 7:71.
- Pondella, D.J. and Allen, L.G. 2008. The decline and recovery of four predatory fishes from the Southern California Bight. *Marine Biology* 154: 307-313.
- Pondella, D.J., B.E. Gintert, J.R. Cobb, L.G. Allen. 2005. Biogeography of the nearshore rocky-reef fishes at the southern and Baja California islands. *Journal of Biogeography*, 23:2.
- Port of Los Angeles. 2008. The Restoration of Batiquitos Lagoon. <http://www.batiquitos.org/index.html> (accessed 08/08/08).
- Poseidon Resources. 2008. News Release: California State Lands Commission Approves Carlsbad Desalination Project. August 22, 2008. <http://www.carlsbad-desal.com/news.aspx?id=210>.
- Pringle, J.M. and K. Riser. 2004. Remotely forced nearshore upwelling in southern California. *Journal of Geophysical Research*, 108, C4, 3131, doi:10.1029/2002JC001447.
- Project Clean Water. 2008. Watersheds: San Diego Hydrologic Region http://www.projectcleanwater.org/html/watershed_sdhr.html (accessed 06/23/08).
- Ramer, B.A., G.W. Page, M.M. Yoklavich. 1991. Seasonal abundance, habitat use, and diet of shorebirds in Elkhorn Slough, California. *West. Birds* 22: 157-174.
- Reed, D.C., S.C. Schroeter, D. Huang, T.W. Anderson, and R.F. Ambrose. 2006. Quantitative Assessment of Different Artificial Reef Designs in Mitigating Losses to Kelp Forest Fishes. *Bulletin of Marine Science*, Volume 78, Number 1, 133-150.
- Remsen, J.V. 1978. Bird Species of Special Concern in California. California Department of Fish and Game. http://www.dfg.ca.gov/wildlife/species/publications/bird_ssc.html (accessed 09/02/08).
- Ricketts, E. , J. Calvin, J. Hedgepeth, and W. Phillips. 1985. *Between Pacific Tides*. Stanford University Press. Stanford, California. 609pp.
- Roberts, D., R.N. Lea and K.L.M. Martin. 2007. First record of the occurrence of the California Grunion, *Leuresthes tenuis*, in Tomales Bay, California; a northern extension of the species. *California Fish & Game* 93:107-110.
- Robinette, D. and J. Howar. 2008. Monitoring and management of the California Least Tern colony at Purisima Point, Vandenberg Air Force Base, 2007. Unpublished Report, PRBO Conservation Science, Petaluma, CA.
- Rogers-Bennett, L., P.K. Haaker, T.O. Huff and P.K. Dayton. 2002. Estimating historic abundances of abalone in California for restoration. *CalCOFI* 43:63-74.
- Rosenthal, R.J., W.D. Clarke, and P.K. Dayton. 1974. Ecology and natural history of a stand of giant kelp, *Macrocystis pyrifera*, off Del Mar, California. *Fisheries Bulletin* 72(3):670-684.
- Roughan, M., E.J. Terrill, J.L. Largier, M.P. Otero. 2005. Observations of divergence and upwelling around Pt Loma, California. *Journal of Geophysical Research*, 110, C04011, doi:10.1029/2004JC002662.
- Rust, E. and M. Potepan. 1997. The economic impact of boating in California. Prepared for the California Department of Boating and Waterways (C.F. Raysbrook, Director), by the Public Research Institute, San Francisco State University and Planning and Applied Economics, Berkeley, California.
- Sadrozinski, A. 2008. Personnel communication to Michelle Horeczko.

- Salmon, M., R. Reiners, C. Lavin, and J. Wyneken. 1995. Behavior of Loggerhead Sea Turtles on an Urban Beach. I. Correlates of Nest Placement. *Journal of Herpetology*, Volume 29, Number 4, December 1995, pp. 560-567.
- (San Diego 2006) City of San Diego, Water Department. 2006. Final San Dieguito Watershed Management Plan. La Mesa, California. September 2006.
- San Diego Natural History Museum. 2008. Tidepools in San Diego County.
<http://www.sdnhm.org/fieldguide/places/tidepooling.html> (accessed 08/19/08).
- Sanders, G. 2008. Recovery of sea otter populations in southern California waters. Presentation at the Santa Barbara Maritime Museum as part of the 'From Shore to Sea' lecture series. November, 2008.
- (SARWQCB 2006b) California Regional Water Quality Control Board, Santa Ana Region. 2006. Total Maximum Daily Loads for Organochlorine Compounds: San Diego Creek (Total DDT and Toxaphene) and Upper and Lower Newport Bay (Total DDT, Chlordane, Total PCBs).
http://www.swrcb.ca.gov/rwqcb8/water_issues/programs/tmdl/docs/oc/staffreport_final_12_01_06.pdf.
- (SARWQCB 2008) California Regional Water Quality Control Board, Santa Ana Region. 2008. Water Quality Control Plan (Basin Plan) for the Santa Ana River Basin.
http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/docs/chapter1.pdf.
- (SARWQCB. 2006a) California Regional Water Quality Control Board, Santa Ana Region 2006. Fact Sheet: Santa Ana Regional Water Quality Control Board, California Environmental Protection Agency.
http://www.waterboards.ca.gov/santaana/resources/docs/reg8_factsheet.pdf.
- (SCCWRP 2008a) Southern California Coastal Water Research Project. 2008. Stormwater Monitoring Coalition. (<http://www.sccwrp.org/tools/stormwater.html> (accessed 07/19/08)).
- (SCCWRP 2008b) Emerging Contaminants of Concern in Coastal Waters, Sediment, and Biota.
<http://www.sccwrp.org/view.php?id=275> (accessed 12/15/08).
- (SCE 2008) Southern California Edison. 2008. San Dieguito Lagoon Restoration.
<http://www.sce.com/PowerandEnvironment/PowerGeneration/MarineMitigation/SanDieguitoLagoonRestoration.htm> (accessed 08/08/08).
- Schiff, K., K. Maruya, and K. Christensen. 2006. Southern California Bight 2003 Regional Monitoring Program: II. Sediment Chemistry. Southern California Coastal Water Research Project. Westminster, CA.
- Schiff, K.C., M.J. Allen, E.Y. Zeng, and S.M. Bay. 2000. Southern California. *Marine Pollution Bulletin*, Volume 41, Numbers 1-6, 76-93.
- Schlacher, T.A., J. Dugan, D.S. Shoeman, M. Lastra, A. Jones, F. Scapini, A. McLachlan, and O. Defeo. 2007. Sandy beaches at the brink. *Diversity and Distributions*, 13, 556-560.
- Schroeder, D. and M. Love. 2002. Recreational Fishing and Marine Fish Populations in California. *CalCOFI Report*, Vol. 43 182-190pp.
- Schroeter, S.C., D.C. Reed, D.J. Kushner, J.A. Estes, and D.S. Ono. 2001. The use of marine reserves in evaluating the dive fishery for the warty sea cucumber (*Parastichopus parvimensis*) in California, U.S.A. *Canadian Journal of Fisheries and Aquatic Science*. 58 1773-1781.
- (SDMAC 2008) San Diego Military Advisory Council. 2008. Military Economic Impact Study.
- (SDRP 2008) San Dieguito River Park Joint Powers Authority. 2008. San Dieguito River Park.
<http://www.sdrp.org/> (accessed 08/08/08).
- (SDRWQCB 2005) California Regional Water Quality Control Board, San Diego Region. Regionalization of the State Water Resources Control Board Strategic Plan. Revised July 2005.
http://www.waterboards.ca.gov/sandiego/publications_forms/publications/docs/2005regionlan_rev.pdf.
- (SDRWQCB 2007) California Regional Water Quality Control Board, San Diego Region. 2007. Water Quality Control Plan (Basin Plan).
http://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/docs/update102207/chapter1_042507.pdf.
- Sea World. 2008. San Diego Wetlands, San Diego, CA.
http://www.seaworld.org/swc/wetlands/sd_county_wetlands/buena_vista_lagoon.htm (accessed 11/24/08).

References Cited

- Seapy, R.R and M.M. Littler. 1980. "Biogeography of Rocky Intertidal Macroinvertebrates of the Southern California Islands." In *The California Islands: Proceedings of a Multidisciplinary Symposium*, Denis M. Power (ed.), 307- 323. Santa Barbara: Santa Barbara Museum of Natural History.
- (SELC 2006) 2006 Annual Report 2006. San Elijo Lagoon Conservancy, Cardiff-by-the-Sea, CA.
- (SELC 2008) San Elijo Lagoon Conservancy. 2008. San Elijo Lagoon Ecological Reserve. <http://www.sanelijo.org/index.htm> (accessed 08/08/08).
- Sharpe, P.B. 2002. Restoration and Management of Bald Eagles on Santa Catalina Island, California, 2002. Report prepared for the U.S. Fish and Wildlife Service, Sacramento, Ca. November, 2002.
- Shepard, F.P. and K.O. Emery. 1941. Submarine topography off the California coast, canyons and tectonic interpretations: Geological Society of America Special Paper.
- Shoffler, S., ed. 2006. Review of Some California Fisheries for 2005. CalCOFI Reports, 47, pp. 9–29.
- (SIMA 2007) Surfing Industry Manufacturers Association. 2007. No slowing down for the surf industry. <http://66.235.111.211/Default.aspx?tabid=88&id=25> (accessed on 12/15/08).
- Skogsberg, T. 1925. Preliminary investigations of the purse seine industry of southern California: white seabass. California Division of Fish and Game Fish Bulletin 9:53-63.
- Skogsberg, T. 1939. The fishes of the family Sciaenidae (croakers) of California. California Division of Fish and Game Fish Bulletin 54:1-62.
- (SMBRC 2004) State of the Bay 2004: Progress and Challenges. Los Angeles, CA.
- (SMBRC 2007) Annual Report 2007. <http://www.santamonicabay.org/smbay/Library/DocumentsReports/tabid/97/Default.aspx>
- (SMBRC 2008) Santa Monica Bay Restoration Commission. 2008. <http://www.santamonicabay.org> (accessed 12/13/08)
- State Lands Commission. 2008. Draft environmental impact report for the Venoco Ellwood Oil Development and Pipeline (Full Field Development) Project. State Clearinghouse No. 2006061146, CSLC EIR No. 738.
- State of California, Employment Development Department. 2008. Employment by Industry Data. Sacramento, California, June 2008.
- State of California. 2008. Public Resources Code, Division 20, California Coastal Act. <http://www.coastal.ca.gov/coastact.pdf> (accessed 08/04/08).
- Stebbins, R.C. A Field Guide to Western Reptiles and Amphibians. 3rd Edition. Houghton Mifflin Company, 2003.
- Stewart, B.S. and P.K. Yochem. 1994. Ecology of harbor seals in the Southern California Bight. In W. L. Halvorson and G. J. Meander (editors), Fourth California Islands symposium: Update on the status of resources, pp. 123-134. Santa Barbara Museum of Natural History.
- Stewart, J.G. and B. Myers. 1980. Assemblages of algae and invertebrates in Southern California Phyllospadix-dominated intertidal habitats. Aquatic Botany 9:73-94.
- Stinson, M. L. 1984. Biology of sea turtles in San Diego Bay, California, and in the northeastern Pacific Ocean. Volume 1. Master's Thesis, San Diego State University, San Diego, California.
- StockTeam. 2007. <http://www.stockteam.com/USOPEN/usurf.html> (accessed 08/05/08).
- Stoms, D.M., F.W. Davis, S.J. Andelman, M.H Carr, S.D. Gaines, B.S. Halpern, R. Hoenicke, S.G. Leibowitz, A. Leydecker, E.M.P. Madin, H. Tallis, and R.R. Warner. 2005. Integrated coastal reserve planning: making the land-sea connection. *Frontiers in Ecology and the Environment*. 3(8): 429-436.
- Strathmann, R. 1971. The feeding behavior of plankton echinoderm larvae: Mechanisms, regulation, and rate of suspension feeding. *Journal of Experimental Marine Biology and Ecology* 6(2): 109-160.
- Surflines. 2008. Full Surf Spot List: North America, Southern California; Santa Barbara, Ventura, North Los Angeles, South Los Angeles, North Orange County, South Orange County, North San Diego, South San Diego. <http://www.surflines.com/home/index.cfm> (accessed 08/5/08).

- Swift, C.C., J.L. Nelson, C. Maslow, and T. Stein. 1989. Biology and distribution of the tidewater goby, *Eucyclogobius newberryi* (Pisces: Gobiidae) of California. Los Angeles Co. Museum of Nat. Hist. Contribs. in Science 404:1-19.
- (SWRCB 2000) State Water Resources Control Board. 2000. Nonpoint Source Program Strategy and Implementation Plan, 1998-2013 (PROSIP). State Water Resources Control Board, Division of Water Quality, Sacramento, CA. January 2000.
- (SWRCB 2003) California State Water Resources Control Board. 2003. Water Quality Order No. 2003-0017-DWQ: Statewide General Waste Discharge Requirements for Dredged or Fill Discharges that have Received State Water Quality Certification (General WDRs). Certified on November 19, 2003.
- (SWRCB 2004) Fact Sheet on the Nonpoint Source Implementation and Enforcement Policy. State Water Resources Control Board, Nonpoint Source Pollution Control Program, Sacramento, CA. May 2004.
- (SWRCB 2008a) State Water Resources Control Board. 2008a. Clean Water Team. http://www.swrcb.ca.gov/water_issues/programs/swamp/cwt_volunteer.shtml (accessed 07/29/08).
- (SWRCB 2008b) Nonpoint Source Encyclopedia. http://www.waterboards.ca.gov/water_issues/programs/nps/encyclopedia.shtml (accessed 07/30/08).
- (SWRCB 2008c) Surface Water Ambient Monitoring Program (SWAMP). http://www.swrcb.ca.gov/water_issues/programs/swamp/ (accessed July 29, 2008).
- (SWRCB 2008d) Scoping Document: Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling. March 2008. http://www.swrcb.ca.gov/water_issues/programs/npdes/cwa316.shtml
- (SWRCB 2008d) State Mussel Watch (SMW). http://www.waterboards.ca.gov/water_issues/programs/swamp/mussel_watch.shtml (accessed 07/29/08).
- (SWRCB 2008e) Toxic Substance Monitoring Program (TSMP). http://www.swrcb.ca.gov/water_issues/programs/swamp/programs.shtml (accessed July 29, 2008).
- (SWRCB 2008f) California's 2006 Clean Water Act Section 303(d) List of Water Quality Limited Segments. http://www.swrcb.ca.gov/water_issues/programs/tmdl/303d_lists2006_epa.shtml.
- (SWRCB 2008g). Scoping document: Water quality control policy on the use of coastal and estuarine waters for power plant cooling. March 2008.
- (SWRCB 2008h) 2008a. Draft Staff Report: Water Quality Control Plan for Enclosed Bays and Estuaries, Part 1. Sediment. Quality. Released July 18, 2008.
- (SWRCB 2008i) Bay Protection and Toxic Cleanup Program (BPTCP). 2008. Sediment Quality Objectives. http://www.swrcb.ca.gov/water_issues/programs/bptcp/sediment.shtml (accessed 08/29/08).
- (SWRCB and EPA 2005) State Water Resources Control Board and California Environmental Protection Agency. 2005. The California Ocean Plan: Water Quality Control Plan: Ocean Waters of California. Adopted by the State Water Resources Control Board on April 21, 2005. Approved by the Office of Administrative Law on October 12, 2005. Approved by the U.S. Environmental Protection Agency on February 14, 2006.
- Tarpley, J.A. and D.A. Glantz. 1992. Marine plant resources: giant kelp. In *California's living marine resources and their utilization*. W.S. Leet, C.M. DeWees, and C.W. Haugen (eds.). California Sea Grant Extension Publication UCSGEP-92-12. p. 2-5.
- Tegner, M.J. and P.K. Dayton. 1991. Sea urchins, El Niños, and the Long Term Stability of Southern California Kelp Forest Communities. *Marine Ecology Progress Series*. Vol 77:49-63pp.
- Tegner, M.J. and P.K. Dayton. 2000. Ecosystem effects of fishing in kelp forest communities. *ICES Journal of Marine Science*. Vol 57:579-589.
- Tegner, M.J., P.K. Dayton, P.B. Edwards, and K.L. Riser. 1997. Large-scale, low frequency oceanographic effects on kelp forest succession: a tale of two cohorts. *Marine Ecology Progress Series* Vol 146:117-134.
- Tenera Environmental, Inc. 2007. Clean Water Act Section 316(b) impingement mortality and entrainment characterization study of Encina Power Station: Effects on the biological resources of Agua Hedionda Lagoon and the nearshore ocean environment. Report Submitted to Cabrillo Power I, LLC. 343 p.

References Cited

- Thomas, J.C. 1968. Management of the white seabass *Cynoscion nobilis* in California waters. California Department of Fish and Game Fish Bulletin 142:1-33.
- Thomson, C.J., T. Bishop, J. Morgan. 1994. Status of the California coastal pelagic fisheries in 1993. NMFS, SWFSC Admin. Rep. LJ-94-14.
- Tierra Data Inc. 2008. Naval Auxiliary Landing Field, San Clemente Island Black Abalone (*Haliotis cracherodii*) Survey. Prepared for the Naval Facilities Engineering Command South west, February 2008. N68711-05-D-8004/0041.
- Topping, D, C. Lowe, and J. Caselle. 2006. Site fidelity and seasonal movement patterns of adult California sheephead *Semicossyphus pulcher* (Labridae): an acoustic monitoring study. Inter-Research Marine Ecology Progress Series. 326:257-267.
- Trails.com. 2008. <http://www.trails.com/stateactivity.aspx?area=13260> (accessed 08/05/08).
- (TUCA 2008) Trout Unlimited California. 2008. San Mateo Creek: Orange County. <http://www.tucalifornia.org/sanmateo-proj.htm> (accessed 11/24/08).
- (UC NRS 2008) University of California Natural Reserve System, Carpinteria Salt Marsh Reserve. <http://nrs.ucop.edu/Carpinteria-Salt-Marsh.htm> (accessed 11/07/08).
- Unified Port of San Diego. 2008. Birds of San Diego Bay. <http://www.portofsandiego.org/environment/natural-resources/321-birds-of-san-diego-bay.html> (accessed 11/25/08).
- (USEPA 1993) United State Environmental Protection Agency. 1993. Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters. EPA 840-B-92-002. U.S. Environmental Protection Agency, Office of Water, Washington, D.C.
- (USEPA 2001) 40 CFR Part 131. Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Correction. Federal Register February 13, 2001 (Volume 66, Number 30).
- (USEPA 2002) 2000 National Water Quality Inventory. Report: EPA-841-R-02-001. U.S. EPA, Office of Water, Washington DC, August 2002.
- (USEPA 2007) RiverKeeper, Inc. v. USEPA (2nd Cir. 2007) 475 F.3d 83.
- (USEPA 2008a) Ocean Dumping and Dredged Materials Management. <http://www.epa.gov/owow/oceans/regulatory/dumpdredged/dumpdredged.html> (accessed 08/04/08).
- (USEPA 2008b) Superfund: Basic Information. <http://www.epa.gov/superfund/about.htm> (accessed 08/27/08).
- (USEPA 2008c) National Priority List: Basic Information. http://www.epa.gov/superfund/sites/npl/npl_hrs.htm (accessed 08/27/08).
- (USEPA 2008d) Region 9, Superfund Sites: Sites Overview by State and County. <http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/WSOState!OpenView&Start=1&Count=1000&Expand=2#2> (accessed 08/27/08).
- (USEPA 2008e) Region 9, Superfund Sites: Palos Verdes Shelf. <http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/7508188dd3c99a2a8825742600743735/e61d5255780dd68288257007005e9422!OpenDocument> (accessed 08/27/08).
- (USEPA 2008f) Introduction to TMDLs. <http://www.epa.gov/owow/tmdl/intro.html#definition> (accessed 07/29/08).
- (USFWS 1995) US Fish and Wildlife Service. 1995. Southern sea otter (*Enhydra lutris*): California stock. http://www.nmfs.noaa.gov/pr/pdfs/sars/fws2000_seaotter-ca.pdf (accessed 09/04/08).
- (USFWS 1999) Draft reports released on southern sea otter translocation program. Ventura Ca. <http://www.fws.gov/cno/news/1999/9912.htm> (accessed 12/22/08).
- (USFWS 2000) Memorandum: Reinitiation of formal consultation on the containment program for the southern sea otter (1-8-99-FW-81). http://www.fws.gov/ventura/speciesinfo/so_sea_otter/seis/2005ssodraftseis-appendixB.pdf (accessed 12/22/08).
- (USFWS 2001) Western Snowy Plover (*Charadrius alexandrinus nivosus*) Pacific Coast Population Draft Recovery Plan. Portland, Oregon. xix + 630pp.

- (USFWS 2003) Final Revised Recovery Plan for the Southern Sea Otter (*Enhydra lutris nereis*). Portland, Oregon. xi + 165pp.
- (USFWS 2005) Regional Seabird Conservation Plan, Pacific Region. U.S. Fish and Wildlife Service, Migratory Birds and Habitat Programs, Pacific Region, Portland, Oregon.
- (USFWS 2007) Tidewater Goby (*Eucyclogobius newberryi*) 5-Year Review: Summary and Evaluation. Ventura Fish and Wildlife Office, Ventura, Ca. 50pp.
- Valle, C.F., J.W. O'Brien, K.B. Wiese. 1999. Differential habitat use by California halibut, *Paralichthys californicus*, barred sand bass, *Paralabrax nebulifer*, and other juvenile fishes in Alamitos Bay, California. Fish. Bull. 97:646–660 (1999).
- Van Buskirk, W. 2007. Personal communication, January 18, 2007. Pacific States Marine Fisheries Commission, Portland, Oregon.
- Vetter, E.W. and P.K. Dayton. 1998. Macrofaunal communities within and adjacent to a detritus-rich submarine canyon system. Deep-Sea Research II 45:25-54.
- Warrick, J.A., P.M. DiGiacomo, S.B. Weisberg, N.P. Nezlin, M. Mengel, B.H. Jones, J.C. Ohlmann, L. Washburn, E.J. Terrill, and K.L. Farnsworth. 2007. River Plume patterns and dynamics within the Southern California Bight. Continental Shelf Research 27 (19).
- Watson, J. 2002. Comparative Home Ranges and Food Habits of Bald Eagles Nesting In Four Aquatic Habitats in Western Washington. Northwestern Naturalist. Vol. 83(3), pp. 101-108.
- Weinstein, A. Socioeconomic Uses. Watershed Institute, CSU Monterey Bay. In MBNMS site characterization, human influences website.
- Weise, M.J. and J.T. Harvey. 2001. Monitoring pinniped predation of winter-run steelhead in the San Lorenzo River during 2000. Final Report. NOAA Contract # 40ABNF901343.
- Weise, M.J. and J.T. Harvey. 2005. California sea lion (*Zalophus californianus*) impacts on salmonids near Año Nuevo Island, California. Final Report NOAA Contract #40ABNF101432.
- Wertz, S.P., and M.L. Domeier. 1997. Relative importance of prey items to California halibut. California Fish and Game 83(1):21-29.
- Wilson, K.C. and R.H. McPeak. 1983. Kelp restoration. In *The effects of waste disposal on kelp communities*. W. Bascom, (ed.). Southern California Coastal Water Research Project. Long Beach. pp. 77-92.
- Wolch, J. 2001. Attitudes toward Marine Wildlife Among Residents of Southern California's Urban Coastal Zone. USC Sea Grant, University of Southern California, Los Angeles, CA. USCSG-TR-01-2001.
- Wolch, J. and J. Zhang. 2004. Beach Recreation, Cultural Diversity and Attitudes Towards Nature. Journal of Leisure Research, Volume 36(3): 414-443.
- Woodward-Clyde Consultants. 1982. Central and Northern California Coastal Marine Habitats: Oil Residence and Biological Sensitivity Indices: Final Report. Prepared for the US Minerals Management Service Pacific Outer Continental Shelf Region, POCS Technical Paper #83-5.
- (WWF 2000) World Wildlife Fund. Sept. 2000. The Global 200 Ecoregions: A User's Guide. WWF. Washington D.C.
- Yacht Club Guide. 2008. http://www.yachtclubguide.com/southern_california_yacht_clubs.htm (accessed 08/05/08).
- Yen, P.P.W, W.J. Sydeman, and K.D. Hyrenbach, 2004. Marine bird and cetacean associations with bathymetric habitats and shallow-water topographies: implications for trophic transfer and conservation. J. of Marine Systems 50: 79-9.
- Zedler, J.B., editor. 2001. Handbook for Restoring Tidal Wetlands. Marine Science Series, CRC Press, LLC. Boca Raton, Florida.
- Zimmerman, R.C. and D.L. Robertson. 1985. Effects of El Niño on local hydrography and growth of the giant kelp *Macrocystis pyrifera* at Santa Catalina Island, California. Limnology and Oceanography 30: 1298-1302.