V. MARINE WETLANDS

California, Santa Barbara County: Santa Cruz Island

MARINE SYSTEM

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INTRODUCTION

The coast of California extends along a linear length approximately 1100 miles. Although the study region covers about 400 linear miles of coastline (Fig. V-1), it is longer and richer in wetland types because of its fractal character. This length is studded with a rich abundance and diversity of physical attributes, renown in their scenic beauty, and unique in geologic origin (Figure V-2). It is home to a varied and fascinating assemblage of plants and animals. Native Americans densely populated the California coast and developed cultures based upon these luxurious resources. Today the majority of Californians also live close to the shore and embody a modern coastal culture.

The Marine System (System No. 10.000) includes two subsystems: (1) Subsystem Intertidal (wetlands) (11.000); and, (2) Subsystem Subtidal (deepwater habitats) (12.000). Cowardin et al. (1979:4) define the system as follows:

> *The Marine System...consists of the open ocean overlying the continental shelf and its associated high-energy coastline. Marine habitats are exposed to the waves and currents of the open ocean and the water regimes are determined primarily by the ebb and flow of oceanic tides. Salinities exceed 30 ppt [parts per thousand], with little or no dilution except outside the mouths of estuaries. Shallow coastal indentations or bays without appreciable freshwater inflow, and*

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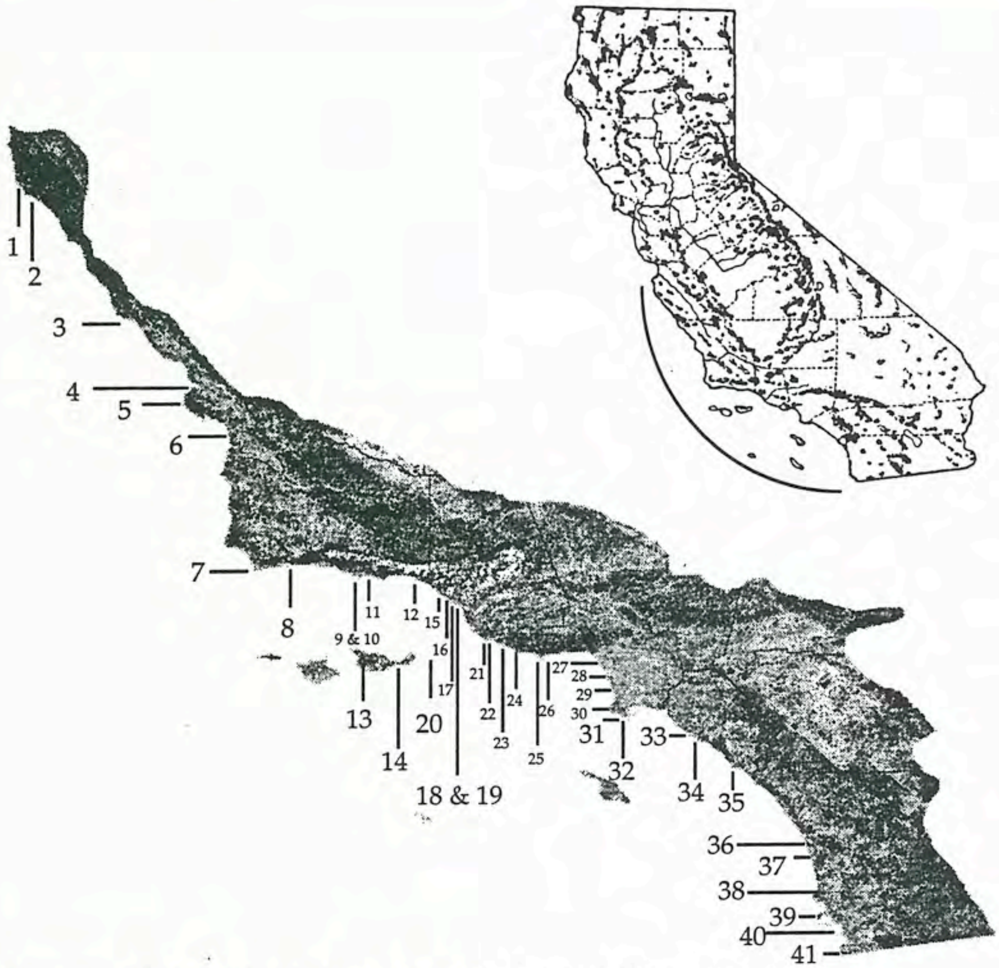

Monterey Co. 1. Andrew Molera State Park, 2. Pfeiffer Beach.
San Luis Obispo Co. 3. William Hearst State Beach, 4. Morro Bay, 5. Montana de Oro State Park, 6. Pismo Beach.
Santa Barbara Co.. 7. Point Conception, 8. Alegria Beach, 9. Platform Holly, 10. Campus Point, Campus Lagoon, 11. Goleta Beach, 12. Carpenteria Beach, 13. Santa Cruz Island, 14. East Valley Anchorage.
Ventura Co. 15. Mussel Shoals, 16. Hobson County Park, 17. Solimar Beach, 18. Emma Wood State Beach, 19. Ventura River Mouth, 20. Anacapa Island, 21. Silver Strand Beach, 22. Port Hueneme, 23. Point Mugu Beach.
Los Angeles Co. 24. Leo Carrillo State Beach, 25. Point Dume, 26. Paradise Cove, 27. Santa Monica Bay, 28. Del Rey Lagoon Park, 29. King Harbor, 30. Resort Point, 31. Abalone Cove, 32. White Point.
Orange Co. 33. Huntington Beach, 34. Newport Beach, 35. Dana Point.
San Diego Co. 36. Oceanside City Beach, 37. South Carlsbad State Beach, 38. La Jolla Shores, 39. Sunset Cliffs Park, 40. San Diego Bay, 41. Tijuana River Mouth.

FIGURE V-1. **EXAMPLE WETLAND SITES IN THE MARINE SYSTEM ALONG THE CENTRAL AND SOUTHERN CALIFORNIA COAST.** The marine study region extends from the mouth of the Carmel River south to the Tijuana River as bounded by the United States-Mexican border.

coasts with exposed rocky islands that provide the mainland with little or no shelter from wind and waves, are also considered part of the Marine System because they generally support typical marine biota.

Cowardin et al. (1979) also have provided a description of the limits of this system. As a general rule, the Marine System extends from the outer edge of the continental shelf (= deepwater habitat) to one of several possible shoreline features. These features include the landward limit of tidal inundation defined as the extreme high water of spring tides (including the splash zone from breaking waves); the seaward limit of wetland emergents, shrubs, or trees; and the seaward limit of the Estuarine System.

Marine wetlands of the study region occur within the Californian Marine and Estuary Province of North America, which extends from Mendocino County southward along the coast of Baja California, Mexico, and has a shoreline strongly influenced by coastal mountains and the coasts are rocky (Cowardin et al. 1979). In this province, freshwater is limited, the climate is Mediterranean and is influenced by the Humboldt Current, and the tidal range is moderate (Cowardin et al. 1979). Point Conception in Santa Barbara Co. is the demarcation between northern and southern California biogeographic areas that are reflected in the marine wetlands as well as the terrestrial flora and fauna.

MARINE WETLANDS

To have a greater appreciation for: (1) the richness of marine wetland types; (2) their numerous ecosystem functions and socio-economic values; and, (3) the extent of the impacts to and losses of marine wetlands, we believe it is necessary to review the various marine classes, subsclasses, and hydrogeomorphic units in the study area, and their characteristic or unique attributes. Conservation and management of the various marine wetlands require an understanding of the ecosystem context in which the wetlands occur. Refer to Section III, Classification, and Section XIV, Glossary, for additional explanations and definition of terms.

Marine Wetland Classes and Subclasses

The Marine System includes the following six classes: (10.00) Rock Bottom, (10.120) Unconsolidated Bottom, (10.140) Rocky Shore, (10.150) Unconsolidated Shore, (10.210) Aquatic Bed, and (10.220) Reef. A key to these classes occurs at the end of this discussion and before the classification of hydrogeomorphic units and annotated examples of marine wetland types. Each of these classes occurs along coastal central and southern California. This chapter is primarily limited to a discussion of intertidal marine wetlands. Due to the intertidal focus of this chapter, we discuss only four of these classes (and several subclasses). These are Rocky Shore (bedrock and rubble), Aquatic Bed (attached algal and rooted vascular), Reef, and Unconsolidated Shore (cobble-gravel, sand, and mud). The characteristic water regimes of these classes include irregularly-exposed, regularly-flooded, and irregularly-flooded.

11.140 Class Rocky Shore Wetland. Marine Class Rocky Shore includes the bedrock and rubble subclasses. This class is a major component of the Marine System and tends to support relatively persistent communities of animals and plants, such as California mussels (*Mytilus californiensis*), barnacles, and brown algae (*Phaeophyta*). Geomorphology and water regime (tidal height) influence the membership of these communities, as is discussed in more detail in the following section. Large areas of Subclass Bedrock are often associated with headlands while sections of Unconsolidated Shore may isolate small areas (Fig. V-2). They often make up wave-cut platforms with much horizontal relief. Subclass Rubble often is associated with eroding cliffs or other consolidated shores. Rubble has a greater proportion of vertical relief and presents a more complex topography than bedrock.

11.150 Class Unconsolidated Shore Wetland. Marine Class Unconsolidated Shore includes the cobble-gravel, sand, and mud subclasses. Waves and other erosional forces frequently disturb Unconsolidated Shores. These disturbances greatly affect their physical character over time as well as the types of organisms that live there. The cobble-gravel subclass, as is found at the mouth of the Ventura River, Ventura County, is able to support sessile species that exist on the rocky shore, particularly ones that are good colonizers following disturbances. The sand subclass is the most highly represented of any subclass in the system (Fig. V-3, V-4). Due to wave-driven longshore transport, sand is in a continual state of movement. Only animals that burrow and move such as Mole Crabs (*Emerita analoga*) are able to exploit this subclass. The mud subclass is rare in the intertidal subsystem because wave action easily suspends fine sediments. This subclass occurs along the protected shores of areas such as harbors and marinas where it supports organisms more commonly found in the Estuarine System.

11.210 Class Aquatic Bed Wetland. This class occurs on areas of the Rocky Shore and on the cobble-gravel subclass of Unconsolidated Shores. Nearly all the organisms that form Aquatic Bed wetlands in our region belong to the attached algal subclass. Surf Grass (*Phyllospadix* spp.) represents Subclass Rooted Vascular. Perhaps due to the high percentage cover of animals on rocky shores, marine ecologists have tended to classify marine habitats first according to substrate type and second according to the organisms that cover the substrate. Our classification typically accounts for both types of information, and thus the numerical code and nomenclature can be formed to emphasize the biotic or abiotic class.

11.220 Class Reef Wetland. This class rarely occurs (if at all) in the marine intertidal of our study area, as defined by cover dominance of invertebrate animals such as bivalves and worms. We include it mainly to extent the generality of the classification. Note that we do use the term "reef" to describe a type of hydrogeomorphic unit. Reefs in this sense are fixed structures made of consolidated substrate that rise out of the bottom, frequently in subtidal deepwater habitats (e.g., Carpinteria Reef and Naples Reef in Santa Barbara County).

MARINE HYDROGEOMORPHIC UNITS

The natural and artificial hydrogeomorphic units in the marine system are various and rich. Figure V-3, for example, shows a view from the coast in Ventura County along Highway 101 with a sandy beach, rubble shore, pier and offshore oil island -- all prominant hydrogeomorphic units along the coast of central and southern California.

Six of the nine categories of hydrogeomorphic units described in this volume occur in this region. Here, we present a brief description of these units in the context of the types of marine wetland in which they occur to demonstrate the importance of the differences in their physical and

FIG. V-2. **SANTA BARBARA CO., SANTA CRUZ ISLAND**. View eastward across Valley Anchorage at Santa Cruz Island includes several components of the marine system: rocky and unconsolidated shores, cliffs, and headlands. Santa Cruz Island is the largest of the eight Channel Islands off the coast of Southern California, all of which lie within the scope of this treatment.

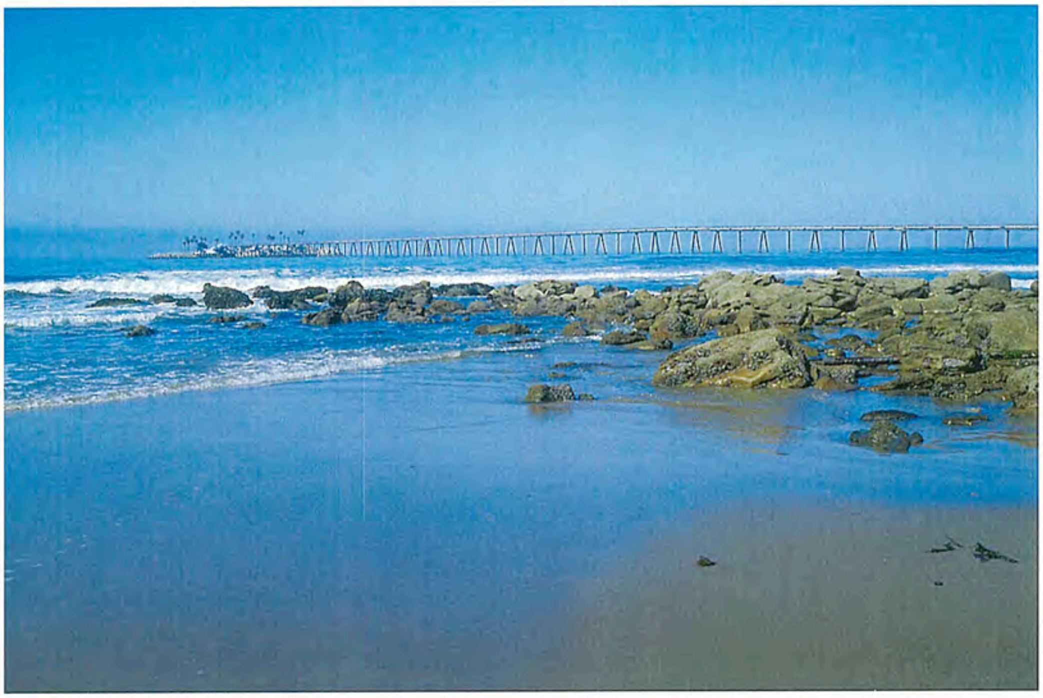

FIG. V-3. **VENTURA CO., MUSSEL SHOALS**. View westward across Mussel Shoals shows several characteristic features of the southern California coast. In the foreground, there is the sandy and rocky intertidal wetland, whereas offshore, a stationary artificial structure (Rincon Island) is connected to the shore by Richfield Pier.

biological attributes.

Water Bodies (HGM Category .100). Most wetlands are associated with a water body. In the marine system, the largest scale water body is the **ocean** (.110). **Exposed bays** (.120), such as Morro Bay, San Luis Obispo Co. or Santa Monica Bay, Los Angeles Co., are large segments of the shore that are bounded on two sides by headlands or peninsulas. Thus exposed bays are more protected from exposure to swells than are the open shore or exposed headlands, resulting in an accumulation of finer sediments. They are also less likely to lose sand in the winter than coves or exposed sandy beaches. Bays may be valued as safe anchorage and swimming areas. If bays are associated with freshwater input, they are categorized as estuaries.

Coves (.140) (e.g., Abalone Cove in Palos Verdes and Paradise Cove in Malibu, Los Angeles Co.) are small "bays" between two rocky headlands. These areas are subject to less wave energy than exposed beaches. These water bodies also may provide sheltered haul out sites for harbor seals (*Phoca vitulina*). If backing cliffs are made of poorly lithified sandstone, weathering may form a sandy beach that may be eroded in the winter, particularly to the southeast (i.e., down-coast of the long-shore current) of a rocky headland. Some cove-beaches are composed of two parts: a flat sandy portion exposed at low tide, and a cobble rampart above. **Lagoons** (.150) are medium-sized, enclosed water bodies protected from surf. Probably the best example of a marine lagoon is the sheltered body of water enclosed by a coral atoll. On California's south coast, lagoons occur primarily within the Estuarine System. Marine lagoons have been created artificially through tidal gates and by pumping seawater into enclosed areas that were formerly more influenced by freshwater (e.g., the Campus Lagoon, Santa Barbara Co. and the Del Rey Lagoon, Los Angeles Co.). Like lagoons, **harbors** (.160) and **ports** (.160) provide sheltered habitat for the marine system. These habitats are associated with several types of artificial structures discussed below. **Tide pools** (.180) are depressions that trap water when the tide recedes.

Channels, Fissures and Caves (HGM Category .200). **Surge channels** (.210) are gaps between rocky benches where wave energy is intensified. Often they are comprised of vertical rock banks and a cobble bottom. Currents in these areas can be strong. Also occurring within the rocky bench marine zone are **fissures** (.260) -- i.e., cracks or crevices in a consolidated substrate. Fissures may be subject to strong surge yet differ from surge channels in that they are relatively narrower. Depending on their morphology, tidal height and orientation to swell, fissures may act as blow-holes. **Sea caves** (.270) are cavities in the base of a sea cliff that has been excavated further by wave action. They are particularly common on Santa Cruz and Anacapa Islands where they extend in from cliff faces. Occasionally found in the marine system, **culverts** (.280) are enclosed constructed channels that usually are made of concrete.

Shores, Beaches and Benches (HGM Category .300). Shoreline features are the most familiar marine intertidal habitats and consist of a wide variety of hydrogeomorphic units. These habitats represent the interface between a water body and a land mass. **Shores** (.310) have the broadest definition and describe shoreline habitats at the largest scale. This term is useful as an inclusive descriptor of the subsystem. **Beaches** (.320) usually refer to a section of shore with a uniform unconsolidated substrate. Sandy beaches (e.g., Huntington Beach, Orange Co.) are often uninterrupted stretches of sand brought to the ocean by rivers or cliff erosion. During the winter, the long-shore current transports sand southward and off shore. Winter storms result in a steeper beach that may expose rocks. Calmer summer conditions result in a gently sloping beach. In southern and central California, most beaches are steep-faced and are composed of coarse light-colored sand made of quartz and feldspar. **Rocky benches** (.340) (e.g., Montaña de Oro, San Luis Obispo Co.) are wave cut platforms with horizontal relief. For this reason, they provide an extensive rocky intertidal zone. Occurring within the rocky bench habitat, **ledges** (.360) are vertical relief or overhangs. **Hogback ridges** (.360) (e.g., Alegria Beach, Hollister Ranch, Santa Barbara Co.), are parallel remnant ridges of rock that project upwards off a rocky bench. Hogback ridges impart vertical relief to a rocky bench and commonly form tide pools.

Bottoms, Beds, Bars, Reefs, Sea Stacks, Islets (HGM Category .400). These hydrogeomorphic units have a strong linkage with the subtidal habitat. **Bottoms** (.410) and **beds** (.410) belong almost exclusively to the subtidal subsystem but may be useful in describing habitats such as tide pool bottoms. The remaining habitats in this group rise into the intertidal system from a subtidal bottom and are not directly connected to the shoreline. **Bars** (.420) generally are composed of unconsolidated substrate. They may be seasonal and their locations may change over relatively short periods of time. Nearshore shallow **reefs** (.430) may protrude offshore at low tide as rocky remnants of eroding headlands. Reefs are composed of consolidated substrate or, in some areas outside of our geographical scope, may be built by animals such as corals or oysters. Both bars and reefs project off the bottom but lack a terrestrial component. Bars and reefs also exist in the subtidal subsystem where they are not necessarily ever exposed. **Islets** (.450) vary with respect to their topography, size, and distance from shore. They are similar to reefs or bars but are high enough above sea-level to have a terrestrial component and sometimes support nesting colonies of seabirds such as gulls and cormorants (Sowls et al. 1980). **Sea stacks** (.440) are islets that are formed when headlands erode from the sides and, therefore, are in close proximity to the mainland. They often have steep sides and may rise relatively far above tides.

Deltas (HGM Category .500). Rivers often form **deltas** (.520) at the ocean-shore. In central and southern California, these areas may not be discharging freshwater for most of the year and are characteristically populated by marine species. Although they may be broken down into more familiar hydrogeomorphic units such as cobble bars and beaches, this category provides a large scale description for a unique marine wetland that has been affected by development in central and southern California.

Headlands and Cliffs (HGM Category .600). These habitats are grouped together because they are aspects of the shore that have a strong vertical component. **Headlands** (.610) (e.g., Pt. Dume, Los Angeles Co.) are rocky points that project out from the coast. Erosion of the headland often creates a rocky intertidal habitat. Long-shore transport creates sandy beaches to the north of headlands while it erodes beaches immediately to the south. Cobble beaches may also form in the vicinity if the headland is associated with a river mouth or alluvial deposit.

Wave action wears down **cliffs** (.620) (e.g., Anacapa Island, Ventura Co.) present in the intertidal zone leaving a slope of rocky rubble, subtidally and intertidally. Cliffs present an exposed vertical rocky surface intertidal zone. Due to their sharp slopes, such areas are occupied by narrow horizontal bands of algae and marine invertebrates.

Seeps (HGM Category .700). **Seeps** (.710) are an important part of other wetlands but are also represented in the marine system. Petroleum seeps are common in Santa Barbara County and sulfur seeps are present in tide pools at White's Point on the Palos Verdes Peninsula, Los Angeles Co. After being saturated at high tide, cobble shores may act as seeps during low tide, potentially altering patterns of exposure and desiccation.

Artificial structures (HGM Category .900). Jetties (.911) extend into the sea in order to influence currents and concentrate tidal flow into a single channel. Wave energy is spent as turbulence amid the irregularly stacked boulders, tetrapods, or other rip-rap used to construct a jetty. Artificial **breakwaters** (.911) (e.g., Newport Breakwater, Orange Co.), **sea walls** (.912) and **revetments** (.912) are composites of quarry rock or cement structures and are constructed to provide shelter from waves or to retain sand -- they do not necessarily extend into the sea. Jetties and breakwaters provide a wider range of intertidal habitat compared with sea walls that are typically only inundated at high tide. In some cases, sea walls may serve predominantly as retaining walls against erosion. Long-shore currents cause sand to accumulate to the northwest and inshore of some artificial structures whereas depletion of sand occurs to the southeast.

Cement, metal or wood **pilings** (.916) are associated with several kinds of man-made structures. These structures provide a hard substrate often surrounded by an unconsolidated one. **Piers** (.916) (e.g., Pismo Pier, San Luis Obispo Co.) in California are constructed primarily to facilitate access for sports fishermen. Oil **platforms** (.917) (e.g., Platform Holly, Santa Barbara Co.) have attributes similar to piers with the exception that they are free from sand scour and provide a deep subtidal habitat. **Boat ramps** (.918) are usually slightly- to moderatley- sloped slabs of concrete that span the entire intertidal in order to provide a safe launch for trailered vessels. **Wreckage** (.919) is a miscellaneous category which covers the areas of consolidated substrate formed by the remnants of large ships and piers. As an example, the rock-filled wreck of the ocean liner, *La Jenelle*, was converted into a fishing jetty at Silver Strand Beach in Oxnard, Ventura Co.

Floating artificial structures (.920) such as **boat hulls** (.921) (e.g., King Harbor, L.A. Co.) are generally associated with harbors and bays. Other floating forms of man-made structures are **docks** (.922) and **buoys** (.923). Because they float and therefore are not truly intertidal, they are more closely tied to the distinctions of intertidal rather than a subtidal habitat. Depending on their source, **logs** (.924) may be a natural or artificial type of floating substrate. Naturally deposited logs are much more prevalent features in northern latitudes.

Ecosystem Functions and Socioeconomic Values

Food Chain Support and Nutrient Cycling. As the shallow waters of the marine intertidal zone are well lit, they are important habitats for plant life. Although phytoplankton can be major producers in near-shore waters, in areas with consolidated substrate, the dominant producers are macrophytes -- i.e., macroalgae and seagrasses. In near-shore waters, most living plant biomass remains uneaten by herbivores (except sea urchins), and the yearly production is either degraded by local decomposers or transported by currents and tidal flow. Such dead plant material is an important export of areas composed of consolidated substrate. This material often enters the detrital food chain in areas of unconsolidated substrate where it may be the primary source of plant material. Dead plant material is eaten by a variety of invertebrates that are able to digest plant material directly or derive nutrition from the film of bacteria that coats the decomposing material (Barnes and Mann 1991). The coastline also plays an important role in recycling nutrients. Wind forces surface water offshore which, in turn, causes nutrient rich deep water to be drawn to the shallow photic zone where it can be utilized by plant life.

Habitat. A striking feature of the marine system is the vertical zonation of marine life that is related to the rise and fall of the tides. In the marine system, our use of the wetland water regimes Irregularly Exposed, Regularly Flooded, and Irregularly Flooded, roughly correspond to tidal levels that are often specified as Low, Middle, or High Intertidal. Here, Irregularly Exposed refers to regions that are exposed only during minus tides; Regularly Flooded refers to the typical diurnal tidal range (in practice, it may be useful to subdivide the Regularly Flooded water regime more finely), and Irregularly Flooded refers to the upper-most zone affected by the highest tides and surf-spray. These definitions are constrained in order to retain consistency with the other wetland systems. When particular tidal zones need to be referenced, it may be more appropriate to use terminology specifically tailored for the intertidal zone (e.g., Ricketts and Calvin 1939).

Vertical zonation is most apparent along rocky shores (Stephenson and Stephenson 1972). Plants and invertebrates have different tolerances for desiccation and the upper limit of a species' distribution is thought to be most often set by physical tolerance. What sets the lower bounds of a species' distribution is more complex but is more likely to be associated with biotic interactions such as competition, predation and herbivory. Since macrophytic algae generally are not anchored in sandy beach ecosystems and the animals there can often move up and down with the tides, vertical zonation is not nearly as apparent. Exposure to wave energy and sunlight are other important physical factors that affect community composition (Carefoot 1983).

Substrate is another key determinant of the habitat. Rock and cobble provide an attachment site for plants and sessile animals while sand beaches are inhabited primarily by burrowing animals. Smaller animals may live in interstitial habitats such as mussel beds and under rocks and cobble.

Because rocky benches provide a spatially contiguous and temporally stable habitat, they are usually rich with algae and invertebrates. Littorine snails, limpets, California Mussels (*Mytilus californianus*), and Gooseneck Barnacles (*Pollicipes polymerus*) are typical animals. Red and brown algae and Surf Grass (*Phyllospadix scouleri*) may reach 100 percent cover in some areas.

Cobble beaches (e.g., Ventura River Mouth) have faunal characteristics that are similar to rocky benches. However, they contain a more speciose community composed of additional taxa, such as such as flatworms, peanut worms, brittle stars and Octopus (*Octopus bimaculoides*) that utilize "under rock" habitats. Because cobbles are not affixed to the substrate, these sites often are subject to disturbance by wave action. Smaller cobbles are turned over during winter storms and large cobble boulders may be disturbed in extremely harsh winters. This creates a more dynamic seasonal component to intertidal algal communities in cobble habitats.

Oil shale provides a unique "soft" hard substrate that is relatively unstable over time (e.g., Campus Point, Santa Barbara Co.). Shale benches may be covered with sand in the summer and may erode too rapidly for perennial communities of algae to persist for more than one season. More opportunistic species such as Sea Lettuce (*Ulva lactuca*) may be seasonally abundant. However, burrowing pholad clams often can keep pace with erosion, often contributing to it, and may form dense beds. Surf Grass, by affixing its roots directly to the shale and resisting burial by sand, also is able survive in this habitat.

Sandy beaches are important for probing shorebirds and support invertebrates such as Mole Crabs (*Emerita analoga*), Spiny Sand Crabs (*Blepharipoda occidentalis*), and Pismo Clams (*Tivela stultorum*). Amphipods (*Megalorchestia spp.*) and insects such as Kelp Flies (*Coelopa vanduzeei*) and Rove Beetles (*Thinopinnus spp.*) may be abundant if wrack from nearby algal beds is deposited by tides and storms in the Uppermost Horizon (or irregularly flooded zone).

Habitats also vary among hydrogeomorphic units. For example, fissures provide a shady, vertical substrate and may provide a refuge from desiccation Depending on their vertical position in the intertidal zone, fissures are often occupied by Black Abalone (*Haliotis cracherodii*), Ochre Stars (*Pisaster giganteus*) and other macro-invertebrates. Tide pools almost always remain wet and are habitat for a variety of invertebrate and fish species such as sea anemones (*Anthopleura* spp.), sea urchins (*Strongylocentrotus* spp.), Opaleye (*Girella nigricans*) and sculpin (*Cottus* spp.). The communities in tidepools may differ from higher energy habitats. The Gooseneck Barnacle (*Pollicipes polymerus*) often is found in the upper areas of surge channels while Ochre Stars may be seen along the vertical walls. Surf Grass, Boa Kelp (*Egresia menziesii*) and Sea Palms (*Eisenia arborea* and *Postelsia palmaeformis*) may grow along the lower regions of the channel wall. The cobble bottoms of surge channels are usually too frequently disturbed to support attached life. By comparison, the intertidal and subtidal areas of caves lack most foliose algae which require high light levels. Instead these hydrogeomorphic units are covered with sponges and calcareous algae, and also serve as haul out sites for Sea Lions (*Zalophus californianus*), and roosting areas for sea birds such as Cormorants (*Phalacrocorax auritus*) and Pigeon Guillomots (*Cepphus columba*).

Offshore habitats, i.e., those not directly connected to a shoreline, are isolated from terrestrial predators and human disturbance. For this reason, they are often valuable refuges for seabirds and pinnipeds, providing haul-outs for seals and sea lions and protected roosts for gulls, pelicans, and cormorants. Because offshore habitats are spared sand scour and turbid coastal runoff, they often support rich algal, invertebrate and fish communities intertidally and subtidally.

Headlands may cause significant breaks in the distribution of otherwise continually distributed animals that use unconsolidated habitats. In some cases, such as for Point Conception, headlands represent end and starting points of species distributions because they act to deflect and initiate currents and separate water masses.

Artificial structures can be rich with marine life. Pilings provide habitat for communities of sessile marine organisms that vary depending on the physical habitat surrounding the structure. Piers are often subject to heavy wave action and serve as habitat for species such as California Mussels and Gooseneck Barnacles. In harbors, docks support unique communities consisting of sessile species associated with reduced wave action such as Blue Mussels (*Mytilus galloprovincialis* [=*M. edulis*]), tunicates and Sea Lettuce. Boring mollusks, worms, and sponges are associated with wooden docks. These structures also attract fishes and may be frequented by anglers.

Several species of special concern exist in this system. Federally endangered birds such as the Western Snowy Plover (*Charadrius alexandrinus)* and California Least Tern (*Sterna antillarum*) use the upper intertidal areas of sandy beaches. The Marine Mammal Protection Act protects California Sea Lions and Harbor Seals (*Phoca vitulina*) from disturbance, the latter of which require haul out sites on mainland beaches (Figure V-4). Elephant seals (*Mirounga angustirostris*), as well as other species of pinnipeds, commonly haul out and pup on San Miguel and San Nicolas Islands (Santa Barbara and Ventura Cos., respectively). Harvested species such as the Pismo Clam and Black Abalone have suffered dramatic declines in abundance, and their exploitation currently is regulated by the California Department of Fish and Game. Surf Grass is one of several species of marine vascular plants that have been monitored for changes in abundance by the Channel Islands National Park.

Hydrology. The hydrology of California's central and southern coast is dominated by three major forces: waves, currents, and the rise and fall of tides. The shoreline can play a role in absorbing energy from storms and waves, impede flooding caused by combinations of storms and tides, and provide source material, due to erosion, for sandy beaches down-coast and subtidal sandy habitats offshore (Mikkelsen and Neuwirth 1987).

Waves produce long-shore currents when they strike the shoreline at an angle. These littoral currents are responsible for transporting sand along the coastline. Sand that flows within the long-shore current derives from river sediment and bedload as well as from the erosion of coastal features (e.g., cliffs or headlands). Loss of cliff material to the forces of erosion results in beach front land turning to sand. Thus the rate of cliff retreat is variable from place to place and depends, in part, on seaward and landward activities surrounding the cliff. Offshore features such as bars, reefs, and islets may act to buffer an adjacent shoreline from wave action, but erosion can be severe when wave and wind attack from the sea is joined by flooding, rainfall run-off, and ground water seepage from land.

Socio-Economic Values. "The economic resources of California's coast are those elements of nature -- the climate, water, soil, topography, flora, and fauna -- that can be transformed into marketable commodities" (California Coastal Commission 1987). Resources in the marine system provide socio-economic value for the public that are utilized in either a consumptive or non-consumptive manner. Commercial fisheries, mineral extraction operations, scientists, beachcombers, and recreational fishermen all consume valuable resources of the system.

Consumptive Values. Sport fishing takes place from shore, piers, jetties, paddleboards, float-tubes, and boats. Surfcasting removes fish from the intertidal and subtidal as far out as the angler can cast. Targeted species include bass (*Paralabrax* spp.), California Halibut (*Paralichthys californicus*), Lingcod (*Ophiodon elongatus*), Cabezon (*Scorpaenichthys marmoratus*), Sheepshead (*Pimelometopon pulchrum*), California Corbina (*Menticirrhus undulatus*), White Seabass (*Atractoscion nobilis*), Yellowtail (*Seriola lalandi*), Barracuda (*Sphyraena argentea*), and surf perches (Embiotocidae). Spearfishermen generally focus on the same species targeted by line fishermen, but with more emphasis on Calico Bass (*Paralabrax clathratus*), White Seabass, Sheepshead, California Halibut, Cabezon, Yellowtail, Spiny Lobster (*Panulirus interruptus*), Rock Scallops (*Hinnites multirugosus*), and Red Abalone (*Haliotus rufescens*) (Howorth 1977). Fishermen may collect live bait such as Mole Crabs and mussels from the areas where they fish. Oil platforms support a rich community of species and are very important sites for sport fishermen. In addition, they serve as substrate for commercially harvested blue mussels.

Foraging by hand, or beachcombing, is an effective method for collecting shells and for taking clams, abalone, crabs, mussels, and algae. Claming consists of over-turning small boulders for Littleneck Clams (*Protothaca staminea*) and digging through the sand in search of Pismo Clams (Howorth 1977). *Porphyra* spp. (nori), *Alaria*, *Postelsia palmaeformis* (unique to Pacific coast), *Palmaria palmata*, *Ulva* spp., *Fucus* spp., and *Nereocystis luetkeara* are the most popular edible algae (Lewallen 1983). Grunion (*Leuresthes tenuis*) are harvested by hand during spring and summer nocturnal high tides. "Grunion hunting" provides a unique experience that is important to the cultural traditions of this state. The ethnic diversification of California has expanded the list of species considered valuable forage items, and has led to increased harvesting of rocky intertidal invertebrate communities.

The Marine System and its variety of habitats and characteristic plants and animals is a favorite spot for snorkeling and scuba diving. Clear water is preferred, as is an interesting substrate of habitat densely populated by marine life. While snorkelers kick about on the surface and occasionally breath-hold dive for a closer look, a scuba diver's stay is mostly spent subtidally.

Usually the purpose of a scuba diving or snorkeling excursion is to observe protists (i.e., macroalgae) and animals within their underwater habitat, but divers often hunt and collect in addition to observing. Seasoned free-divers and scuba divers represent the only group that comes into direct contact with underwater habitats. Scientific research may involve consumption, but that is not its primary purpose. Gathering specimens for the laboratory, however, is a consumptive act, and may have commercial value.

Oil and mineral extraction also utilize the marine system. Subsurface offshore and near-shore oil reservoirs are pumped, and the crude is shipped to onshore refineries for petroleum conversion. Sand and salt extraction occurs in Oceanside and San Diego Bay respectively (California Coastal Commission 1987). Oil and mineral extraction are highly regulated due to their potential environmental impacts (Figure V-4).

<u>Non-consumptive Values</u>. Public recreation is probably the largest non-consumptive use of the Marine System and has great value to Southern California's culture. The most common activities that occur along the shore are sunbathing, beachcombing, strolling, jogging, and watersports. Bodysurfing and bodyboarding are most common in the ocean adjacent to sandy beaches during the summer months in Southern California. Board surfing requires a more substantial skill development. This sport is practiced year round in locations known to fulfill specific requirements: "plunging breakers in which the end of the curl is progressing sideways along the wave front somewhere between one and two times as fast as any point on the wave is approaching the beach." (Bascom 1980). These kinds of waves can be found near several kinds of hydrogeomorphic locations, e.g., wide sandy beaches (e.g., Oxnard Shores in Ventura Co., Huntington Beach in Orange Co.), headlands (e.g., Rincon Point in Ventura Co.), rocky reefs (e.g., Emma Wood State Beach in Ventura Co.), and sand bars (e.g., Santa Clara River Mouth in Ventura Co.). Since headlands concentrate wave action, they may have recreational value to surfers as "point breaks". Board surfing is synonymous with California's popular culture and surfers have recently been more vocal in their concerns about sanitation, marine construction, and public access. Also growing in numbers, windsurfers mostly tack back and forth outside the breakers, but some carve into the impact zone and back out again, jumping off the incoming swell.

The intertidal zone is used as a launching point for small watercraft. Some kayakers ride small waves, but most do not. The kayak, with its small size and efficient maneuverability and

FIG. V-4. **SANTA BARBARA CO., CARPINTERIA**. At Chevron Point, Carpinteria, the marine system is a valuable component of petroleum-based activities. The pier (upper right) is an intermediate between the offshore oil platforms and onshore refineries. Also shown (center) is the function of ocean beaches as haul-out and pupping grounds for harbor seals (*Phoca vitulina*), despite their proximity to the noise and activities associated with the boats and pier. (See also Fig. V-12).

propulsion can access areas of coastline that are otherwise out of reach. Some areas, such as sea caves that cannot be reached by boat, can be reached easily in a kayak. Kayakers can also access offshore islets and kelp beds. Fishermen and spearfishermen sometimes use kayaks to reach otherwise difficult-to-access areas. Another form of recreation and transport that is used in the marine system is the thrill craft (or "Jetski"). Most thrill craft can outrun or avoid large waves and hold enough fuel to motor for hours. Like kayaks, thrill craft can reach remote locations.

The coastal character of central and southern California offers several semi-protected bays, coves, and relatively safe anchorage. Many of these valuable features have been utilized and transformed to serve as port cities, such as the city of San Diego. Shipping, ship-building, commercial fisheries, and other coastal-dependent industry settled and grew, expanding the port cities. The military has also taken advantage of the large safe-water bays as important sites for bases (California Coastal Commission 1987). San Diego, again, serves as an important example.

The marine system is an important research and educational resource used by scientists, teachers, naturalists, and the general public. The variety of hydrogeomorphic units is immense, considering the unique characteristics of different locations that are otherwise the same by definition or classification, and most have been and will continue to be researched and explored.

Aesthetic and Natural Heritage Values. The coastline of central and southern California is unique to its region and has unparalleled value as part of our natural heritage. It is the product of the geological, hydrological, biological, and chemical processes that occur within and around our state. It is also being continuously shaped by these processes and, to a large extent, by the activities of humans. In particular, the southern California coast is a boundary for one of the largest metropolitan areas in the world and is very much utilized and impacted by southern California's burgeoning population. Of the State's total population, approximately 85% live within less than 30 miles of the coast, where the fastest rates of growth historically have occurred. Approximately half of the State's population is concentrated south of Point Conception (Capelli 1991).

Part of understanding the value of an area's natural heritage is knowing the history, site-specific resources and characteristics of the region. Aesthetic concerns need to be considered as well. For instance, offshore habitat features are strongly valued for their contribution to coastal views. Shorebird communities and communities of macroinvertebrates associated with rocky shores also are recognized by the public as important components of the ecosystem and natural heritage. Onuf et. al. (1978) found that the wetlands of central and southern California are valuable in terms of rarity and that certain values characteristic of the wetlands of one region are not necessarily transferable to the wetlands of another region. Although (Onuf et. al. 1978) were working within the estuarine system, a similar viewpoint can be adopted when considering the aesthetic and socio-economic values of the marine system of central and southern California. The physical and biological resources of central and southern California's marine wetlands are immense. Native Americans sustained livelihoods for hundreds of generations by utilizing the foods of the intertidal to supplement their diet (refer to Section II, Environmental Setting). The Chumash occupied the coast from San Luis Obispo to Malibu and are considered to have been one of the most culturally advanced Native American peoples partially because they had such rich marine and terrestrial food sources. Compared to other Native American groups, they spent less time hunting, gathering, cultivating, and raising animals, and more time practicing and enhancing their art, music, religion, and oral traditions (McCall and Perry 1990). Present day Californian's are also immersed in "beach culture" and continue to place a heavy use on the Marine System.

Losses and Impacts to Marine Wetlands

Losses. Any disruption or modification to the natural processes that operate along the coast can directly or indirectly impact the shoreline and its processes. Inland activities such as damming rivers, agricultural grading, flood control, and urban development have an indirect but substantial impact. From Santa Barbara to Mexico, the damming of rivers has reduced the natural supply of sand to the coast by one-half (California Coastal Commission 1987). Waves, chemical reactions (limestone solubility), wind, sapping, burrowing organisms, and human activity, such as building, grading, and climbing, cause shoreline erosion which threatens coastal property (Norris 1990). Currently, the coastline is under unprecedented pressure for real estate development. Coastal bluffs represent desirable real estate and the majority of the few that remain undeveloped are proposed for development. Increased foot traffic, harvesting, erosion, alteration of the existing water table, and disturbance of the animals and habitats that reside in these areas are examples of the impacts associated with development and settlement of the coastal mesas.

Pollution can cause losses of intertidal habitat to humans. Fishing from public piers in Santa Monica Bay is discouraged due to pollution associated health risks. Further south, the

Tijuana River has been used as a waste disposal site for several years because Tijuana lacks an adequate infrastructure. When effluent discharge reaches unacceptable levels, beaches along the south coast of San Diego County are closed for human health reasons. Surfers have complained that sewage outfalls and storm drains expose them to direct health risks.

Impacts. The proximity of the Marine System to public access,and to coastal communities in general, makes shoreline features subject to a variety of disturbances. In particular, they may be impacted by municipal storm sewers, sewage plants, industrial wastes, agricultural runoff, electrical and nuclear power plants, dredging and construction, petroleum production and exploration, and shipping activities. Recreational use by sun-bathers, jet skiers, joggers, beachcombers, surfers, fishermen, etc., may impact these habitats to varying degrees.

The presence of humans, their pets and motorized vehicles disturbs the wildlife that uses the marine intertidal zone. This is most true for shorebirds, such as the endangered Snowy Plover, particularly during the breeding season. Sandy beaches where these endangered species nest and forage have obvious recreational value and are subjected to heavy use. Beaches are often groomed of beach wrack, disrupting the detrital food web upon which many species depend. Thrill craft represent an extreme example of human disturbance. Thrill craft operate with greater speed, noise and pollution than other single user watercraft. For example, the National Oceanographic and Atmospheric Administration (NOAA) affirms that thrill craft are a threat to the Monterey Bay National Marine Sanctuary because of their small size, high speed, shallow draft and maneuverability. NOAA research also has determined that thrill craft threaten marine mammals and seabirds in addition to those people engaged in water-related recreational activities (Nichols 1993).

All consumptive use impacts the system to some degree, the severity of which depends on the status of the targeted resource, the extent to which it is exploited, and the sensitivity of the surrounding habitat (Figure V-5). The shoreline and near-shore waters hold an abundance of resources that are intentionally impacted by man. Often socio-economic factors lead to over-exploitation. As previously mentioned, such was the case with the Black Abalone and the Pismo Clam, which were heavily harvested along the coastline until many populations were threatened with extinction. Even beach sand itself can be extracted. At the city of Santa Barbara, it was alleged that a coastal property owner gave beach sand to a fraternity for a theme party in exchange for political support for his development plans (UCSB, Daily Nexus, date unknown).

Oil tankering through the Santa Barbara Channel and platform and slant drilling also results in detrimental impacts to the shoreline. Mishaps while tankering have lead to environmental catastrophes similar in scale and impact to the Exxon *Valdez* incident, while platform and slant drilling pollute on a large scale, e.g., the 1969 platform blow-out in Santa Barbara, or on a smaller-scale if pressurization of sub-surface oil reservoirs accelerates natural seepage. For generations, the ocean has been used as a dumping ground for a wide variety of human-generated waste. Storm sewers, sewage treatment plants, agricultural run-off, power plants, dredging operations, and vessels are all sources of pollution. Trash, sewage, sediment, oils, pesticides, fertilizers, thermal effluent, radioactive materials, dredge spoils, heavy metals, nutrients, and construction and demolition debris are some of the most common sorts of pollutants (Botkin and Keller 1987). Animals attracted to artificial structures are subject to contamination from petroleum, raw sewage and toxicants placed on artificial structures to prevent "fouling" organisms from colonizing them. Pollution can cause direct losses to wildlife as in the 1969 oil spill in Santa Barbara. Such events are not resigned to history. A long term leak of petroleum solvent at the Santa Maria River Mouth (San Luis Obispo and Santa Barbara Cos.) oiled the sandy beach and nearshore waters with unknown impacts.

Restoration and Creation of Marine Wetlands

Coastal access is linked to human impacts. Coastal private property usually inhibits access, whereas public property usually provides it. Areas of "total exclusion" exist mainly because the area is dangerous or unusual in terms of aesthetics, sensitivity, natural heritage and representation, or intrinsic value. Nesting sites of Snowy Plovers and Least Terns, and Harbor Seal haul-outs are now protected from such disturbances in several cases. Areas of "partial exclusion" also exist primarily because they are private or military property. Mandatory buffer zones around oil platforms and piers keep vessels and unauthorized people at a distance.

The process of erosion along the coast poses a problem for property owners and developers who reside and build on beach-front land, especially on coastal mesas where wind and wave-driven erosion is a ongoing process. A number of "hard" or "soft" solutions exist to reduces this shoreline erosion (Mikkelsen and Neuwirth 1987). Hard solutions include concrete slurries, seawalls, jetties, breakwaters, and groins (Figure V-6). The advantages of hard solutions are site-specificity,

FIG. V-5. **VENTURA CO., VENTURA**. Removing flora and fauna, be it for research or consumption, can be a serious impact to the marine system. Foraging the coast is part of California culture and is regulated to prevent over-exploitation. The Ventura River Delta (shown here) is a popular clamming spot, but the overturned cobbles and dug holes can produce significant impacts if the frequency of activities is too great (photograph by M. Capelli).

FIG. V-6. **SAN DIEGO CO., LA JOLLA**. Although seawalls, breakwaters, and other artificial revetments provide habitat, they also impact the coastline (shown here is *Ulva lactuca* blanketing a concrete walkway down a seawall in La Jolla). Loss of natural shoreline features and habitats, and alteration of the beach-building and excavating functions of the longshore current are significant impacts.

affordability, and durability. Disadvantages include a false sense of security, disruption of natural processes and/or habitat, displaced public beach area, and aesthetic degradation. Breakwaters, jetties, groins, and seawalls associated with development can disrupt the natural erosive processes that build beaches. Hard solutions may also result in an unforeseen increased rate of erosion or scouring (Capelli 1992).

Fortunately, there are a number of soft solutions that reduce shoreline erosion. Restoration or replenishment of the natural supply of sand (which may include dune protection and/or restoration), limitations on public access, relocation or modification of structures in anticipation of erosion, redirecting bluff-top drainage, and modernization of insurance policies so they take natural processes into account have all been successfully implemented. Soft solutions are aesthetically acceptable, long-term, broader reaching (i.e., not strictly a local improvement), minimize the loss of beach and beach access with little impact on habitat, and rely on natural processes. Unfortunately, soft solutions may not provide immediate protection and may be relatively expensive, with the cost being shared by general public. They also require extensive permitting and planning (Capelli 1992).

Rare or Threatened Wetlands

Urbanization of the coast and erosion of coastlines caused by various factors (e.g., excavation of coastal riverbed sediments and sanitary district discharges) has resulted in many impacts to marine wetlands. Sandy beaches have declined in California due to a loss of sediment associated with river damming. For example, the intertidal marine wetlands that form on rocky and cobble shorelines generally are rich in plant and animal life but are sensitive to excessive human access and harvesting of resources and to increased rates of erosion from natural and artificial phenomena.

River delta coastlines are one kind of threatened marine wetland. These wetlands occur where the erosion of watersheds and deposition of sediments exceeds the erosion capacity of the ocean into which a river or stream drains. The Ventura River Delta is perhaps the best example of this wetland (Ferren et al. 1990). It is the most rapidly-emerging watershed (i.e., geologically) along the entire Pacific basin. Erosion of the mountains that rise to form the inland watershed boundary provides the material that forms the delta and sand and cobble bar, which extends across and closes the mouth of the Ventura River Estuary for most of each year. The mixosaline (brackish) water that collects behind this bar drains onto the marine wetlands along the shoreline, particularly at low tide, and provides periods of near-estuarine conditions with salinity as low as 10 ppt for brief periods at some locations (Ferren et al. 1990). At least 108 species of algae have been identified from the high, middle, and low intertidal zones of the delta, the undeveloped portion of which extends for about one mile along the coast of Ventura County. The Ventura River Delta is, however, increasingly impacted by access, commercial development, and increased shoreline erosion.

CLASSIFICATION OF MARINE WETLANDS

The classification of marine wetlands includes: (1) a "Key to the Marine Classes; (2) Table V-1: "Table of the Hydrogeomorphic Units Arranged within Corresponding Water Regimes"; (3) "Catalogue of the Marine Wetlands;" and, (4) "Description and Illustrations of Selected Marine Wetland Types". See Section III, Classification, for an explanation of the classification methodology and use of the key, table, and catalogue.

Key to the Marine Wetland Classes and Subclasses

Use of this classification is explained in more detail elsewhere in this volume (see Section III, Classification). Only the items of classification pertinent to the Marine System are presented here. The remaining portions of Section V, Marine, apply to this classification. This key is adapted mainly from Cowardin et al. (1979). Following this key is a hierarchical description of hydrogeomorphic units (Table V-1) that allow for a more detailed classification.

During the growing season of most years, areal cover by vegetation (algae and marine flowing plants such as *Phyllospadix*) is less than 30%: **AQUATIC BED CLASS**

Vegetation is comprised of algae attached to substrate:...............**Attached Algal Subclass**

Vegetation is comprised of vascular plants attached to substrate: ....**Rooted Vascular Subclass**

During the growing season of most years, areal cover by vegetation is less than 30%:

Substrate is formed by the colonization of sedentary invertebrates (not found in our domain): .... **REEF CLASS**

Substrate composed of rock or sediment; often inhabited by invertebrates but not formed by the colonization of sedentary types:

Substrate of bedrock, boulders, stones, or combinations of these covering 70% or more of the habitat: .... **ROCKY SHORE CLASS**

Substrate is composed of a contiguous expanse of rock: .... **Bedrock Subclass**

Substrate is composed of a discontinuous large units of rock: .... **Rubble Subclass**

Substrate of organic material, mud, sand, gravel, or cobbles with less than 70% areal cover of bedrock, boulders, or stones:... .... **UNCONSOLIDATED SHORE CLASS**

>25% cover of rock fragments 8-25 cm diameter: .... **Cobble-Gravel Subclass**

>25% cover of particles 0.1 - 2 mm diameter:................................... **Sand Subclass**

>25% cover of sediment < 0.1 mm diameter: .... **Mud Subclass**

Table V-1. **TABLE OF HYDROGEOMORPHIC UNITS IN THE MARINE SYSTEM ARRANGED WITHIN CORRESPONDING WATER REGIMES**

("00") = Water Regime
(00."0") = Water Chemistry
(00.0."000") = Hydrogeomorphic Unit
(00.0.000."0000") = Dominance Type (Dominant Substrate/Species)

(10.0) TIDAL WATER-REGIMES (Marine and Estuarine Systems)

(11.0) SUBTIDAL DEEPWATER HABITATS (Deepwater Habitats Excluded Here)

(12.0) IRREGULARLY-EXPOSED INTERTIDAL REGIME

(12.0.100.0000) Water Bodies (Hydrogeomorphic Context)

(12.0.110) Oceans

(12.0.120) Exposed Bays
- (12.0.121) Large Exposed Bays
- (12.0.122) Small Exposed Bays

(12.0.140) Coves
- (12.0.141) Coves

(12.0.150) Lagoons
- (12.0.151) Lagoons

(12.0.160) Harbors/Ports
- (12.0.161) Large Harbors/Ports
- (12.0.162) Small Harbors/Ports

(12.0.180) Tide Pools
- (12.0.181) Large Tide Pools
- (12.0.182) Small Tide Pools

(Table V-1 Continued)

(12.0.200.0000) Channels, Fissures, Caves

(12.0.210) Surge Channels
- (12.0.211) Large (Wide/Long) Surge Channels
- (12.0.212) Small (Narrow/Short) Surge Channels

(12.0.260) Fissures
- (12.0.261) Large (Wide/Long) Fissures
- (12.0.262) Small (Narrow/Short) Fissures

(12.0.270) Sea Caves
- (12.0.271) Large Sea-Caves
- (12.0.272) Small Sea-Caves

(12.0.280) Culverts
- (12.0.281) Large (Wide/Long) Culverts
- (12.0.282) Small (Narrow/Short) Culverts

(12.0.300.0000) Shores, Beaches, Benches

(12.0.310) Shores
- (12.0.311) Ocean Shores
- (12.0.312) Exposed Bay Shores
- (12.0.314) Cove Shores
- (12.0.315) Lagoon Shores
- (12.0.316) Harbor Shores

(12.0.340) Benches
- (12.0.341) Ocean Benches
- (12.0.342) Exposed Bay Benches
- (12.0.344) Coves Benches
- (12.0.345) Lagoon Benches
- (12.0.346) Harbor Benches

(12.0.360) Ledges/Ridges
- (12.0.361) Ledges
- (12.0.362) Hogback Ridges

(12.0.400.0000) Bottoms, Beds, Bars, Reefs, Sea Stacks, Islets

(12.0.410) Beds/Bottoms/Floors
- (12.0.412) Shallow (Intertidal) Beds/Bottoms/Floors

(12.0.420) Bars
- (12.0.422) Shallow (Intertidal) Bars

(Table V-1 Continued)

(12.0.430) Reefs
- (12.0.441) Large Reefs
- (12.0.442) Small Reefs

(12.0.440) Sea-Stacks
- (12.0.441 Large Sea-Stacks
- (12.0.442 Small Sea-Stacks

(12.0.450) Islets
- (12.0.451) Large Islets
- (12.0.452) Small Islets

(12.0.500.0000) Deltas

(12.0.520) Deltas
- (12.0.521) Deltas

(12.0.600.0000) Headlands, Cliffs

(12.0.610) Headlands
- (12.0.611) Large Headlands
- (12.0.612) Small Headlands

(12.0.620) Cliffs/Bluffs
- (12.0.621) Cliffs

(12.0.700.0000) Seeps

(12.0.710) Seeps
- (12.0.710) Seeps

(12.0.900.0000) Artificial Structures

(12.0.910) Stationary Artificial Structures
- (12.0.911) Jetties/Breakwaters
- (12.0.912) Sea Walls/Revetment
- (12.0.916) Pilings/Piers
- (12.0.917) Platforms
- (12.0.918) Boat Ramps
- (12.0.919) Wreckage

(12.0.920) Floating Artificial Structures
- (12.0.921) Hulls
- (12.0.922) Docks
- (12.0.923) Buoys
- (12.0.924) Logs

(Table V-1 Continued)

(13.0) REGULARLY FLOODED INTERTIDAL REGIME

(13.0.100.0000) Water Bodies (Hydrogeomorphic Context)

(13.0.180 Tide Pools
- (13.0.181) Large Tide Pools
- (13.0.182) Small Tide Pools

(13.0.200.0000) Channels, Fissures, Caves

(13.0.210) Surge-Channels
- (13.0.211) Large (Wide/Long) Surge-Channels
- (13.0.212) Small (Narrow/Short) Surge-Channels

(13.0.260) Fissures
- (13.0.261) Large (Wide/Long) Fissures
- (13.0.262) Small (Narrow/Short) Fissures

(13.0.270) Sea Caves
- (13.0.271) Large Sea-Caves
- (13.0.272) Small Sea-Caves

(13.0.280) Culverts
- (13.0.281) Large (Wide/Long) Culverts
- (13.0.282) Small (Narrow/Short) Culverts

(13.0.300.0000) Shores, Beaches, Benches

(13.0.310) Shores
- (13.0.311) Ocean Shores
- (13.0.312) Exposed Bay Shores
- (13.0.314) Cove Shores
- (13.0.315) Lagoon Shores
- (13.0.316) Harbor Shores

(13.0.320) Beaches
- (13.0.321) Ocean Beaches
- (13.0.322) Exposed Bay Beaches
- (13.0.324) Cove Beaches
- (13.0.325) Lagoon Beaches
- (13.0.326) Harbor Beaches

(13.0.340) Benches
- (13.0.341) Ocean Benches

(Table V-1 Continued)

(13.0.342) Exposed Bay Benches
- (13.0.344) Cove Benches
- (13.0.345) Lagoon Benches
- (13.0.346) Harbor Benches

(13.0.360) Ledges/Ridges
- (13.0.361) Ledges
- (13.0.362) Hogback Ridges

(13.0.400.0000) Bottoms, Beds, Bars, Reefs, Sea Stacks, Islets

(13.0.410) Beds/Bottoms/Floors
- (13.0.412) Shallow (Intertidal) Beds/Bottoms/Floors

(13.0.420) Bars
- (13.0.422) Shallow (Intertidal) Bars

(13.0.430) Reefs
- (13.0.431) Large Reefs
- (13.0.432) Small Reefs

(13.0.440) Sea Stacks
- (13.0.441) Large Sea-Stacks
- (13.0.442) Small Sea-Stacks

(13.0.450) Islets
- (13.0.451) Large Islets
- (13.0.452) Small Islets

(13.0.500.0000) Deltas

(13.0.520) Deltas
- (13.0.521) Deltas

(13.0.600.000) Headlands, Bluffs, Slopes

(13.0.610 Headlands
- (13.0.611) Large Headlands
- (13.0.612) Small Headlands

(13.0.620) Cliffs/Bluffs
- (13.0.621) Cliffs

(Table V-1 Continued)

(13.0.700.000) Seeps

(13.0.710) Seeps
(13.0.710) Seeps

(13.0.800.000) Marshes

(13.0.900.000) Artificial Structures

(13.0.910) Stationary Artificial Structures
(13.0.910) Jetties/Breakwaters
(13.0.920) Sea Walls/Revetment
(13.0.960) Pilings/Piers
(13.0.970) Oil Platforms
(13.0.980) Boat Ramps
(13.0.990) Wreckage

(13.0.920) Floating Structures
(13.0.921) Hulls
(13.0.922) Docks
(13.0.923) Buoys
(13.0.924) Logs

(14.0) IRREGULARLY-FLOODED INTERTIDAL REGIME

(14.0.100.0000) Water Bodies (Hydrogeomorphic Context)

(14.0.180) Tide Pools
(14.0.181) Large Tide Pools
(14.0.182) Small Tide Pools

(14.0.200.0000) Channels, Fissures, Caves

(14.0.260) Fissures
(14.0.261) Large (Wide/Long) Fissures
(14.0.262) Small (Narrow/Short) Fissures

(14.0.270) Sea Caves
(14.0.271) Large Sea Caves
(14.0.272) Small Sea Caves

(14.0.280) Culverts
(14.0.281) Large (Wide/Long) Culverts
(14.0.282) Small (Narrow/Short) Culverts

(Table V-1 Continued)

(14.0.300.0000) Shores, Beaches, Benches

(14.0.310) Shores
- (14.0.311) Ocean Shores
- (14.0.312) Exposed Bay Shores
- (14.0.314) Cove Shores
- (14.0.315) Lagoon Shores
- (14.0.316) Harbor Shores

(14.0.320) Beaches
- (14.0.321) Ocean Beaches
- (14.0.322) Exposed Bay Beaches
- (14.0.324) Cove Beaches
- (14.0.325) Lagoon Beaches
- (14.0.326) Harbor Beaches

(14.0.340) Benches
- (14.0.341) Ocean Benches
- (14.0.342) Exposed Bay Benches
- (14.0.343) Cove Benches
- (14.0.344) Lagoon Benches
- (14.0.345) Harbor Benches

(14.0.350) Ledges/Ridges
- (14.0.471) Ledges
- (14.0.472) Hogback Ridges

(14.0.400.0000) Bottoms, Beds, Bars, Reefs, Sea Stacks, Islets

(14.0.440) Sea Stacks
- (14.0.441) Large Sea-Stacks
- (14.0.442) Small Sea-Stacks

(14.0.450) Islets
- (14.0.451) Large Islets
- (14.0.452) Small Islets

(14.0.500.0000) Deltas

(14.0.520) Deltas
- (14.0.521) Deltas

(Table V-1 Continued)

(14.0.600.000 Headlands, Bluffs

(14.0.610) Headlands
(14.0.611) Large Headlands
(14.0.612) Small Headlands

(14.0.620) Cliffs/Bluffs
(14.0.621) Cliffs

(14.0.700.0000) Seeps, Springs

(13.0.710) Seeps
(13.0.710) Seeps

(14.0.800.0000) Marshes

(14.0.900.0000) Artificial Structures

(14.0.910) Stationary Artificial Structures
(14.0.910) Jetties/Breakwaters
(14.0.920) Sea Walls/Revetment
(14.0.930) Dams/Levees
(14.0.940) Earthen Berms/Dikes
(14.0.950) Dredge Spoils
(14.0.960) Pilings/Piers
(14.0.970) Platforms
(14.0.980) Boat Ramps
(14.0.990) Wreckage

(14.0.920) Floating Artificial Structures
(14.0.921) Hulls
(14.0.922) Docks
(14.0.923) Buoys
(14.0.924) Logs

(15.0) SEASONALLY-FLOODED INTERTIDAL REGIME (None in the Marine System)

CATALOGUE OF THE MARINE WETLANDS

This catalogue includes major marine wetland types identified during the course of the study. We attempted to provided at least one example of the various classes, subclasses, and major groups of hydrogeomorphic units and dominance types within the intertidal. However, by no means are all the possible types of marine wetlands from the hierarchy listed. The catalogue is arranged by subclass as identified using the preceding key. The wetlands are arranged according to the hierarchical wetland type number. Illustrated and described examples of marine wetland types occur at the end of this catalogue and are cited by figure number. For each wetland type we have assessed the likelihood of jurisdiction under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. Section 404 of the Clean Water Act regulates the discharge of dredged and fill material into "waters of the United States", and is administered jointly at the federal level by the U.S. Army Corps of Engineers and U.S. Environmental Protection Agency. Under Section 10 of the Rivers and Harbors Act of 1899, the Corps of Engineers regulates dredging, filling, and construction activities in navigable waters.

10.000 SYSTEM MARINE
11.000 SUBSYSTEM INTERTIDAL
11.130 CLASS ROCKY-SHORE

11.141 SUBCLASS BEDROCK

Wetland Type No.: 11.141(12.4.181.2472)
MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) IRREGULARLY-EXPOSED LARGE-TIDE-POOL WETLAND. San Diego Co., Ocean Beach, Sunset Cliffs Park on Sunset Cliffs Blvd. at Ladera St. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line. **FIG. V-7**.

Wetland Type No.: 11.141(12.4.182.2472)
MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) IRREGULARLY-EXPOSED SMALL-TIDE-POOL WETLAND. San Diego Co., Ocean Beach, Sunset Cliffs Park on Sunset Cliffs Blvd. at Ladera St. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line. **FIG. V-8**.

Wetland Type No.: 11.141(13.4.211.2472)
MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED LARGE-SURGE-CHANNEL WETLAND. Los Angeles Co., Palos Verdes Peninsula, San Pedro, White Point, end of Kay Fiorentino Dr. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line. **FIG. V-9**.

Wetland Type No.: 11.141(13.4.261.2472)
MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED LARGE-FISSURE WETLAND. Los Angeles Co., Palos Verdes Peninsula, San Pedro, White Point, end of Kay Fiorentino Dr. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line. FIG. **V-10**.

Wetland Type No.: 11.141(13.4.271.2472)
MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED LARGE-SEA-CAVE WETLAND. Santa Barbara Co., north side of Santa Cruz Island, Painted Cave. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line.

Wetland Type No.: 11.141(13.4.341.8212)
MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED OCEAN-BENCH WETLAND. Ventura Co., Point Mugu State Park, Sycamore Cove, 9000 Pacific Coast Highway. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line. **FIG. V-11**.

Wetland Type No.: 11.141(13.4.341.8331)
MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED OCEAN-BENCH WETLAND. Santa Barbara Co., Carpinteria, Chevron Pt. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line. **FIG. V-12**.

Wetland Type No.: 11.141(13.4.342.2262)
MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED EXPOSED-BAY-BENCH WETLAND. Santa Barbara Co., Goleta, UCSB, between Campus Point and Goleta Pier. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line. **FIG. V-13**.

Wetland Type No.: 11.141(13.4.361.8524)
MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED LEDGE WETLAND. Los Angeles Co., Malibu, Leo Carrillo State Beach, 36000 Pacific Coast Hwy. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line. **FIG. V-14**.

Wetland Type No.: 11.141(13.4.362.2262)
MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED HOGBACK-RIDGE WETLAND. Santa Barbara Co., Carpinteria Bluffs. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line. **FIG. V-15**.

Wetland Type No.: 11.141(13.4.441.1200)
MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED LARGE-SEA-STACK WETLAND. Santa Barbara Co., south side of Santa Cruz Island, Willows Anchorage. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line.

Wetland Type No.: 11.141(13.4.611.1300)
MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED LARGE-HEADLAND WETLAND. Los Angeles Co., Palos Verdes Peninsula, Resort Point. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line. **FIG. V-16**.

Wetland Type No.: 11.141(13.4.612.1200)
MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED SMALL-HEADLAND WETLAND. Santa Barbara Co., Goleta, east of Goleta Pier. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line. **FIG. V-17**.

Wetland Type No.: 11.141(13.4.621.1200)
MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED CLIFF WETLAND. Ventura Co., East Anacapa Island. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line.

Wetland Type No.: 11.141(13.4.920.1200)
MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED SEA-WALL WETLAND. San Diego Co., La Jolla, Marine Room, south of La Jolla Shores Beach. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line. **FIG. V-18**.

Wetland Type No.: 11.141(13.4.920.2262)
MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED SEA-WALL WETLAND. Ventura Co., southeast from Faria County Park, Solimar Beach. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line. **FIG. V-19**.

Wetland Type No.: 11.141(13.4.960.8331)
MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED PILING WETLAND. Orange Co., South Laguna, 31000 block of Pacific Coast Hwy., Aliso Pier. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending to the high tide line.

Wetland Type No.: 11.141(14.4.451.1200)
MARINE INTERTIDAL ROCKY-SHORE (BEDROCK) IRREGULARLY-FLOODED LARGE-ISLET WETLAND. San Diego Co., Ocean Beach, on Sunset Cliffs Blvd. between Point Loma Ave. and Ladera St. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line. **FIG. V-20**.

Wetland Type No.: 11.141(14.4.452.1200)
MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) IRREGULARLY-FLOODED SMALL-ISLET WETLAND. Santa Barbara Co., Goleta, More Mesa Beach. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending to the high tide line. **FIG. V-21**.

* * * *

10.000 SYSTEM MARINE
11.000 SUBSYSTEM INTERTIDAL
11.130 CLASS ROCKY-SHORE

11.142 SUBCLASS RUBBLE

Wetland Type No: 11.142(12.4.161.1100)
MARINE-INTERTIDAL ROCKY-SHORE (RUBBLE) IRREGULARLY-EXPOSED LARGE-PORT WETLAND. Ventura Co., Port Hueneme, W. end of Hueneme Rd. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line. **FIG. V-22.**

Wetland Type No: 11.142(12.4.161.1100)
MARINE-INTERTIDAL ROCKY-SHORE (RUBBLE) IRREGULARLY-EXPOSED LARGE-HARBOR WETLAND. Orange Co., Dana Point, off Pacific Coast Hwy., 7.5 mi. S.E. of Laguna Beach. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line. **FIG. V-23.**

Wetland Type No: 11.142(12.4.311.2231)
MARINE-INTERTIDAL ROCKY-SHORE (RUBBLE) IRREGULARLY-EXPOSED OCEAN-SHORE WETLAND. Ventura Co., Old Pacific Coast Hwy. at Hwy. 101, Emma Wood State Beach. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line. FIG. **V-24**.

Wetland Type No: 11.142(13.4.920.1300)
MARINE-INTERTIDAL ROCKY-SHORE (RUBBLE) REGULARLY-FLOODED SEA-WALL WETLAND. Santa Barbara Co., Carpinteria, foot of Ash Ave., Carpinteria Beach. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line. **FIG. V-25.**

* * * *

10.000 SYSTEM MARINE
11.000 SUBSYSTEM INTERTIDAL
11.150 CLASS UNCONSOLIDATED-SHORE

11.151 SUBCLASS COBBLE-GRAVEL

Wetland Type No: 11.151(12.4.311.2231)
MARINE-INTERTIDAL UNCONSOLIDATED-SHORE (COBBLE-GRAVEL) IRREGULARLY-EXPOSED OCEAN-SHORE WETLAND. Ventura Co., off old Pacific Coast Hwy., just south of Seacliff, Hobson County Park. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high

tide line. **FIG. V-26**.

Wetland Type No: 11.151(13.4.311.1400)
MARINE-INTERTIDAL UNCONSOLIDATED-SHORE (COBBLE-GRAVEL) REGULARLY-EXPOSED OCEAN-SHORE WETLAND. San Diego Co., Carlsbad, West of Batiquitos Lagoon, South Carlsbad State Beach. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line. **FIG. V-27**.

* * * *

10.000 SYSTEM MARINE
11.000 SUBSYSTEM INTERTIDAL
11.150 CLASS UNCONSOLIDATED-SHORE

11.152 SUBCLASS SAND

Wetland Type No: 11.152(13.4.321.1600)
MARINE-INTERTIDAL UNCONSOLIDATED-SHORE (SAND) REGULARLY-FLOODED OCEAN-BEACH WETLAND. Monterey Co., Big Sur Coast, off Hwy. 1, 21 mi. S. of Carmel, Andre Molera State Park. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10 jurisdiction extending landward to the high tide line. In the adjacent lagoon, Section 404 jurisdiction extends to the ordinary high water mark, or when adjacent wetlands are present, the jurisdiction extends to the landward limit of the adjacent wetland. **FIG. V-28**.

Wetland Type No.: 11.152(13.4.322.1600)
MARINE-INTERTIDAL UNCONSOLIDATED-SHORE (SAND) REGULARLY-FLOODED EXPOSED-BAY-BEACH. Santa Barbara Co., Goleta, UCSB. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line. **FIG. V-29**.

Wetland Type No: 11.152(13.4.324.1600)
MARINE-INTERTIDAL UNCONSOLIDATED-SHORE (SAND) REGULARLY-FLOODED COVE-BEACH WETLAND. San Diego Co., La Jolla, along Coast Blvd., Children's Pool. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line. **FIG. V-30**.

Wetland Type No.: 11.152(13.4.324.1600)
MARINE-INTERTIDAL UNCONSOLIDATED-SHORE (SAND) REGULARLY-FLOODED COVE-BEACH WETLAND. Monterey Co., Big Sur, end of Sycamore Canyon Rd., Pfeiffer Beach. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10 jurisdiction extending landward to the high tide line. Within the adjacent river mouth/lagoon depicted in the photograph, Section 404 jurisdiction extends to the ordinary high water mark. **FIG. V-31**.

* * * *

10.000 SYSTEM MARINE
11.000 SUBSYSTEM INTERTIDAL
11.150 CLASS UNCONSOLIDATED-SHORE

11.153 SUBCLASS MUD

Wetland Type No: 11.153(12.4.151.1800,2262)
MARINE-INTERTIDAL UNCONSOLIDATED-SHORE (MUD) IRREGULARLY-EXPOSED LAGOON WETLAND. Santa Barbara Co., Goleta, UCSB, Campus Point. The input for this lagoon is the outfall from the UCSB marine lab. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the ordinary high water mark, or when adjacent wetlands are present, the jurisdiction extends to the limit of the adjacent wetland.

* * * *

10.000 SYSTEM MARINE
11.000 SUBSYSTEM INTERTIDAL
11.210 CLASS AQUATIC BED

11.211 SUBCLASS ATTACHED ALGAL

Wetland Type No: 11.211(13.4.311.2323)
MARINE-INTERTIDAL AQUATIC-BED-ATTACHED-ALGAL (<u>Fucus</u> <u>distichus</u>) REGULARLY-FLOODED OCEAN-SHORE WETLAND. San Luis Obispo Co., Hearst State Beach, overlook north of San Simeon Point along Hwy. 1. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line. **FIG. V-32.**

* * * *

10.000 SYSTEM MARINE
11.000 SUBSYSTEM INTERTIDAL
11.210 CLASS AQUATIC BED

11.214 SUBCLASS ROOTED VASCULAR

Wetland Type No.: 11.214(12.4.521.6141)
MARINE-INTERTIDAL AQUATIC-BED-ROOTED-VASCULAR (Phyllospadix torreyi) IRREGULARLY-EXPOSED DELTA WETLAND. Ventura Co., S.E. of Hwy. 101 at Hwy. 33, Ventura River Delta. **Section 10/404 Jurisdiction:** This named wetland is regulated as a tidal water of the United States with Section 10/404 jurisdiction extending to the high tide line. **FIG. V-33**.

MARINE WETLAND — *No.: 11.141(12.4.181.2472)*, **Fig. V-7.** *No.: 11.141(12.4.182.2472)*, **Fig. V-8.**

NAME: ***MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) IRREGULARLY-EXPOSED LARGE-AND SMALL-TIDE-POOL WETLANDS***

CLASSIFICATION:

System: 10 marine
Subsystem: 11 marine intertidal
Class: 11.140 rocky-shore
Subclass: 11.141 rocky-shore bedrock
Water Regime: (12) irregularly-exposed
Water Chemistry: (12.4) haline
HGM Unit: (12.4.181) large-tide-pool
HGM Unit: (12.4.182) small-tide-pool
Substrate/Dominance Type: (12.4.180.2472) *Corallina sp.*

DESCRIPTION: Tidepools are formed in the intertidal zone when the tide recedes leaving water trapped in depressions. Usually, these depressions are formed in bedrock but can be comprised of any substrate. Because they remain wet during low tides they provide a refuge for fishes, invertebrates and algae that are sensitive to desiccation.

SPECIES: Characteristic: no particular species consistently characterize tidepools. Associated: Tidepool fishes include several species of sculpin and blennies. Juvenile opaleye (*Girella nigricans*) are also common. Purple urchins (*Strongylocentrotus purpuratus*) and Anemones (*Anthopleura spp.*) may be quite common. The copepod (*Tigriopus) is characteristic of tidepools in* upper zones.

FUNCTIONS and VALUES: Ecosystem Functions: Tidepools provide a refuge in the intertidal zone for species sensitive to desiccation. Socioeconomic Values: Tidepools allow seashore visitors direct interaction with marine life.

REFERENCE EXAMPLES: CA, San Diego Co. (opposing page) & all coastal counties.

IMPACTS: Collecting/foraging, trampling.

CONSERVATION EFFORTS: Areas with tidepools are often designated as "Marine Preserves" where collecting is prohibited.

LITERATURE: (Tway 1991)

Wetland Type No.: 11.141(12.4.181.2472)

FIG. V-7. **MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) IRREGULARLY-EXPOSED LARGE-TIDE-POOL WETLAND**. San Diego Co., Ocean Beach, Sunset Cliffs Park on Sunset Cliffs Blvd. at Ladera St.

Wetland Type No: 11.141(12.4.182.2472)

FIG. V-8. **MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) IRREGULARLY-EXPOSED SMALL-TIDE-POOL WETLAND**. San Diego Co., Ocean Beach, Sunset Cliffs Park on Sunset Cliffs Blvd. at Ladera St. A large chiton specimen (center) is visible in the photograph.

MARINE WETLAND — ***No.: 11.141(13.4.211.2472), Fig. V- 9.*** ***No.: 11.141(13.4.261.2472), Fig. V-10.***

NAME: ***MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED LARGE-SURGE-CHANNEL AND FISSURE WETLANDS***

CLASSIFICATION:

System: 10 marine
Subsystem: 11 marine intertidal
Class: 11.140 rocky-shore
Subclass: 11.141 rocky-shore bedrock
Water Regime: (13) regularly-flooded
Water Chemistry: (13.4) haline
HGM Unit: (13.4.211) large-surge-channel
HGM Unit: (13.4.261) large-fissure
Substrate/Dominance Type: (13.4.200.2472) *Corallina sp.*

DESCRIPTION: Surge channels and fissures are areas, found within rocky bench habitats that intensify the strong currents and water movement associated with the surf zone.

SPECIES: Characteristic: Many species are not able to remain permanently attached in these areas. Coraline algae often cover the rock surfaces. Associated: Larger brown algae, such as *Egregia menzeisii, and surf grass, Phyllospadix scouleri*, may be present as aquatic bed in the lower zones of surge channels. Black abalone (where they remain), *Haliotis cracherodii*, are frequently stacked in fissures.

FUNCTIONS and VALUES: Ecosystem Functions: Surge channels and fissures provide a refuge in the intertidal zone for species sensitive to desiccation. Surge channels may be used by larger fishes which enter from deeper nearshore waters. Socioeconomic Values: Surge channels are favored fishing spots and fissures may create interesting "blow-holes".

REFERENCE EXAMPLES: CA, Los Angeles Co. (opposing page) & all coastal counties.

IMPACTS: Fishing.

CONSERVATION EFFORTS: None specific to these habitats.

LITERATURE: (Littler and Littler 1980, Tway 1991).

Wetland Type No.: 11.141(13.4.211.2472)

FIG. V-9. **MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED LARGE-SURGE-CHANNEL WETLAND**. Los Angeles Co., Palos Verdes Peninsula, San Pedro, White Point, end of Kay Fiorentino Dr. The surge-channel (center) fills and drains with each wave.

Wetland Type No: 11.141(13.4.261.2472)

FIG. V-10. **MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED LARGE-FISSURE WETLAND**. Los Angeles Co., Palos Verdes Peninsula, San Pedro, White Point, end of Kay Fiorentino Dr.

MARINE WETLAND — *No.: 11.141(13.4.341.8212)*, **Fig. V-11.** *No.: 11.141(13.4.341.8331)*, **Fig. V-12.**

NAME: MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED OCEAN-BENCH WETLAND

CLASSIFICATION:

System: 10 marine
Subsystem: 11 marine intertidal
Class: 11.140 rocky-shore
Subclass: 11.141 rocky-shore bedrock
Water Regime: (13) regularly-flooded
Water Chemistry: (13.4) haline
HGM Unit: (13.4.341) ocean bench
Substrate/Dominance Type: (13.4.341.8212) *Anthopleura*
Substrate/Dominance Type: (13.4.341.8331) *Mytilus*

DESCRIPTION: Benches are large rocky platforms with extensive horizontal relief, rocky benches are the habitat which best represents the classic examples of the rocky intertidal zone. By providing contiguous expanses of consolidated substrate relatively free from the scouring effects of sand, they provide a stable habitat for a variety of algae and invertebrates.

SPECIES: Characteristic: Rocky benches are commonly occupied by dense beds of the California mussel, *Mytilus californianus*. Colonial anemones, *Anthopleura elegantissima*, also may reach a high percent cover over large areas. Associated: As mentioned previously, a very large number of species colonize this habitat and a detailed species list would be difficult to describe in this context. Red, green and brown algae are common, as are barnacles (*Balanus, Cthamalus, Tetraclita* and *Pollicipes*), urchins (*Strongylocentrotus purpuratus*), snails (particularly limpets and chitons), shore crabs (*Pachygrapsus crassipes*), and seastars (*Pisaster ochraceus*).

FUNCTIONS and VALUES: Ecosystem Functions: Rocky benches provide habitat for a variety of ecologically important species. Socioeconomic Values: Rocky benches are frequently used for observing marine life, collecting bait, and fishing.

REFERENCE EXAMPLES: CA, Ventura Co. & Santa Barbara Co. (opposing page) & all coastal counties.

IMPACTS: Collecting/foraging, trampling.

CONSERVATION EFFORTS: Areas are often designated as "Marine Preserves".

LITERATURE: (Deering 1976, Interface Planning and Counseling Corporation 1989, Morin 1978, State Water Resources Control Board 1979, Tway 1991).

Wetland Type No.: 11.141(13.4.341.8212)

FIG. V-11. **MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED OCEAN-BENCH WETLAND.**. Ventura Co., Point Mugu State Park, Sycamore Cove, 9000 Pacific Coast Highway.

Wetland Type No: 11.141(13.4.341.8331)

FIG. V-12. **MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED OCEAN-BENCH WETLAND**. Santa Barbara Co., Carpinteria, Chevron Pt. This bedrock bench is used by Harbor Seals (*Phoca vitulina*) as a haul-out and pupping area.

MARINE WETLAND *No.: 11.141(13.4.342.2262)*, **Fig. V-13.**

NAME: MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED EXPOSED-BAY-BENCH WETLAND

CLASSIFICATION:

System: 10 marine
Subsystem: 11 marine intertidal
Class: 11.140 rocky-shore
Subclass: 11.141 rocky-shore bedrock
Water Regime: (13) regularly-flooded
Water Chemistry: (13.4) haline
HGM Unit: (13.4.342) exposed-bay-bench
Substrate/Dominance Type: (13.4.342.2262) *Enteromorpha*

DESCRIPTION: Rocky benches such as this may be covered during the summer when depositional forces associated with mild surf leave sand in the intertidal zone. When exposed in the fall, these areas are quickly colonized by fast colonizing species.

SPECIES: Characteristic: Colonizers such as *Enteromorphora intestinalis* and *Ulva spp* may be seasonal, colonial anemones (*Anthopleura elegantissima*) may also resist seasonal burial and live for several decades. Associated: Several species of barnacles, pholad clams, limpets, littorine snails, hermit crabs may be seasonally associated with these habitats.

FUNCTIONS and VALUES: Ecosystem Functions: May provide an "island" of hard substrate in otherwise sandy environments. Socioeconomic Values: None known.

REFERENCE EXAMPLES: CA, Santa Barbara Co. (opposing page) & all coastal counties.

IMPACTS: Erosion and interference with movement of sand might alter the duration of sand burial.

CONSERVATION EFFORTS: None known.

LITERATURE: (Tway 1991).

Wetland Type No: 11.141(13.4.342.2262)

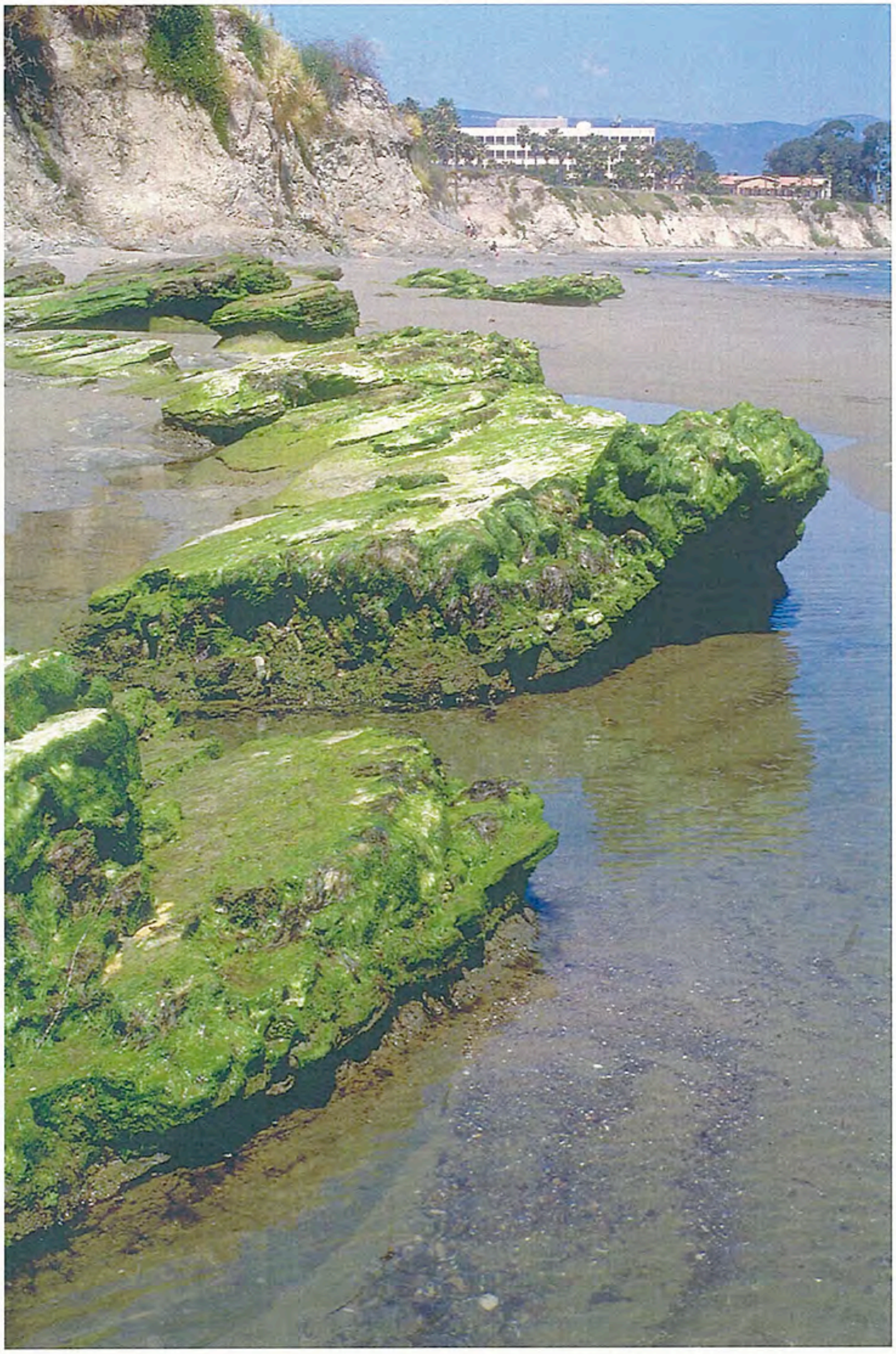

FIG. V-13. **MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED EXPOSED-BAY-BENCH WETLAND**. Santa Barbara Co., Goleta, UCSB, between Campus Point and Goleta Pier. Winter storms carry sand offshore exposing these benches, which are then quickly overgrown by green algae (*Enteromorpha*).

MARINE WETLAND **No.: 11.141(13.4.361.8524), Fig. V-14.** **No.: 11.141(13.4.362.2262), Fig. V-15.**

NAME: *MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED LEDGES AND HOGBACK-RIDGES WETLANDS*

CLASSIFICATION:
- **System:** 10 marine
  - **Subsystem:** 11 marine intertidal
    - **Class:** 11.140 rocky-shore
      - **Subclass:** 11.141 rocky-shore bedrock
        - **Water Regime:** (13) regularly-flooded
        - **Water Chemistry:** (13.4) haline
          - **HGM Unit:** (13.4.361) ledges
          - **HGM Unit:** (13.4.362) hogback-ridges
            - **Substrate/Dominance Type:** (13.4.361.8524) *Pollicipes*
            - **Substrate/Dominance Type:** (13.4.362.2262) *Enteromorpha*

DESCRIPTION: Ledges and ridges are small scale features that provide vertical relief to rocky bench habitats. The ridges in figure V-15 are covered with sand in the summer.

SPECIES: Characteristic: Species vary with tidal height and exposure to sand. Associated: Some species, such as sand castle worms (*Phragmatopoma californica*), goose barnacles (*Pollicipes polymerus*) black abalone (*Haliotis cracherodii*), Owl limpets (*Lottia gigantea*) and Ochre stars (*Pisaster ochraceus*) seem to be relatively common on vertical surfaces.

FUNCTIONS and VALUES: Ecosystem Functions: Add relief and complexity to rocky benches. Socioeconomic Values: None known.

REFERENCE EXAMPLES: CA, Los Angeles & Santa Barbara Cos. (opposing page) & all coastal counties.

IMPACTS: Collecting/foraging, trampling.

CONSERVATION EFFORTS: None known

LITERATURE: (Interface Planning and Counseling Corporation 1989, Tway 1991).

Wetland Type No: 11.141(13.4.361.8524)

FIG. V-14. **MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED LEDGE WETLAND**. Los Angeles Co., Malibu, Leo Carrillo State Beach, 36000 Pacific Coast Hwy.

Wetland Type No.: 11.141(13.4.362.2262)

FIG. V-15. **MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED HOGBACK-RIDGE WETLAND**. Santa Barbara Co., Carpinteria, view from Carpinteria Bluffs.

MARINE WETLAND — *No.: 11.141(13.4.611.1300), Fig. V-16.* *No.: 11.141(13.4.612.1200), Fig. V-17.*

NAME: MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED LARGE-AND SMALL-HEADLAND WETLANDS

CLASSIFICATION:

System: 10 marine
Subsystem: 11 marine intertidal
Class: 11.140 rocky-shore
Subclass: 11.141 rocky-shore bedrock
Water Regime: (13) regularly-flooded
Water Chemistry: (13.4) haline
HGM Unit: (13.4.611) large-headland
HGM Unit: (13.4.612) small-headland
Substrate/Dominance Type: (13.4.611.1300) boulder types
Substrate/Dominance Type: (13.4.612.1200) bedrock types

DESCRIPTION: Headlands are large (generally) rocky outcropping which project seaward from the shore. These sites often are comprised of large areas of consolidated substrate.

SPECIES: Characteristic: The scale of these features is too large to list characteristic or associated species (see other consolidated substrate examples for more specific examples).

FUNCTIONS and VALUES: Ecosystem Functions: Headlands provide hard substrate. They may exist as islands of hard substrate between coves or beaches of unconsolidated substrate and thus act to interrupt the continuity of these habitats. Headlands may deflect currents and act to separate water masses and species' distributions. Socioeconomic Values: Some headlands are "point breaks" popular with surfers.

REFERENCE EXAMPLES: CA, Los Angeles & Santa Barbara Co. (opposing page) & all coastal counties.

IMPACTS: Collecting/foraging, trampling, erosion.

CONSERVATION EFFORTS: None specific to headlands.

LITERATURE: (Tway 1991).

Wetland Type No: 11.141(13.4.611.1300)

FIG. V-16. **MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED LARGE-HEADLAND WETLAND**. Los Angeles Co., Palos Verdes Peninsula Resort Point, view southwestward across Lunada Bay. Other pictured hydrogeomorphic types include: rubble shore, islets, and subtidal algal beds.

Wetland Type No.: 11.141(13.4.612.1200)

FIG. V-17. **MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED SMALL-HEADLAND WETLAND**. Santa Barbara Co., Goleta, east of Goleta Pier. Petroleum-affected sandstone, oozing imperceptibly from the bluffs, forms this small headland.

MARINE WETLAND — *No.: 11.141(13.4.920.1200),* **Fig. V-18.** *No.: 11.141(13.4.920.2262),* **Fig. V-19.**

NAME: ***MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED SEA-WALL WETLAND***

CLASSIFICATION:

System: 10 marine
Subsystem: 11 marine intertidal
Class: 11.140 rocky-shore
Subclass: 11.141 rocky-shore bedrock
Water Regime: (13) regularly-flooded
Water Chemistry: (13.4) haline
HGM Unit: (13.4.920) sea wall
Substrate/Dominance Type: (13.4.920.1200) bedrock types
Substrate/Dominance Type: (13.4.920.2262) *Enteromorpha*

DESCRIPTION: Seawalls are artificial structures made of concrete or other consolidated material usually intended to prevent erosion from waves.

SPECIES: Characteristic: No particular species consistently characterize seawalls. However, they are usually relatively low in diversity, perhaps because they are comprised of a relatively uniform, flat surface.

FUNCTIONS and VALUES: Ecosystem Functions: Provide hard substrate (often this is in areas where no hard substrate previously existed. Socioeconomic Values: Provide a "hard solution" to shoreline erosion.

REFERENCE EXAMPLES: CA, San Diego & Ventura Cos. (opposing page) & all coastal counties.

IMPACTS: None known.

CONSERVATION EFFORTS: None known.

LITERATURE: (Deering 1976, Tway 1991)

Wetland Type No: 11.141(13.4.920.1200)

FIG. V-18. **MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED SEA-WALL WETLAND**. San Diego Co., La Jolla, Marine Room, south of La Jolla Shores Beach.

Wetland Type No.: 11.141(13.4.920.2262)

FIG. V-19. **MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) REGULARLY-FLOODED SEA-WALL WETLAND**. Ventura Co., southeast from Faria County Park, Solimar Beach.

MARINE WETLAND — *No.: 11.141(14.4.451.1200),* **Fig. V-20.** *No.: 11.141(14.4.452.1200),* **Fig. V-21.**

NAME: *MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) IRREGULARLY-FLOODED LARGE & SMALL ISLET WETLANDS*

CLASSIFICATION:

System: 10 marine
Subsystem: 11 marine intertidal
Class: 11.140 rocky-shore
Subclass: 11.141 rocky-shore bedrock
Water Regime: (14) irregularly-flooded
Water Chemistry: (14.4) haline
HGM Unit: (14.4.451) large-islet
HGM Unit: (14.4.452) small-islet
Substrate/Dominance Type: (14.4.450.1200) Bedrock

DESCRIPTION: Islets are areas disconnected from the shoreline that have a terrestrial component. In California, they are nearly entirely comprised of rocky substrate. Sea stacks, as shown in Figure V-20, are a particular type of islet and may be given their own classification under our system. Figure V-21, shown at high tide, represents either a small islet or a rocky reef (we are not sure that it is high enough above sea level to have a terrestrial component).

SPECIES: Characteristic: no particular species consistently characterize islets. See rocky bench habitats for specific lists. Associated: Seabirds and pinnipeds frequently rest on islets.

FUNCTIONS and VALUES: Ecosystem Functions: Islets provide refugia for resting pinnipeds and seabirds. They are often removed from the influence of sand scour. Socioeconomic Values: Islets add a pleasing aspect to the horizon.

REFERENCE EXAMPLES: CA, San Diego & Santa Barbara Cos. (opposing page) & all coastal counties.

IMPACTS: None known.

CONSERVATION EFFORTS: None known.

LITERATURE: (Treiberg 1993, Tway 1991).

Wetland Type No: 11.141(14.4.451.1200)

FIG. V-20. **MARINE INTERTIDAL ROCKY-SHORE (BEDROCK) IRREGULARLY-FLOODED LARGE-ISLET WETLAND**. San Diego Co., Ocean Beach, on Sunset Cliffs Blvd. between Point Loma Ave. and Ladera St.

Wetland Type No.: 11.141(14.4.452.1200)

FIG. V-21. **MARINE-INTERTIDAL ROCKY-SHORE (BEDROCK) IRREGULARLY-FLOODED SMALL-ISLET WETLAND**. Santa Barbara Co., Goleta, More Mesa Beach. Harbor Seals (*Phoca vitulina*) sun themselves on this islet and feed within the offshore kelp beds (*Macrocystis* spp.) that occur in adjacent deepwater habitats.

MARINE WETLAND — ***No.: 11.142(12.4.161.1100)*, Fig. V-22.**
***No.: 11.142(12.4.161.1100)*, Fig. V-23.**

NAME: ***MARINE-INTERTIDAL ROCKY-SHORE (RUBBLE) IRREGULARLY-EXPOSED LARGE PORT & HARBOR WETLANDS***

CLASSIFICATION:

System: 10 marine
Subsystem: 11 marine intertidal
Class: 11.140 rocky-shore
Subclass: 11.142 rocky-shore rubble
Water Regime: (12) irregularly-exposed
Water Chemistry: (12.4) haline
HGM Unit: (12.4.161) large-port
HGM Unit: (12.4.161) large-harbor
Substrate/Dominance Type: (12.4.161.1200) 0pen water

DESCRIPTION: Ports and Harbors are artificial or highly modified habitats. Often these areas add consolidated substrate in the form of jetties, seawalls, etc. They also provide a variety of concrete, piling and floating substrates. Since the water is relatively calm inside these areas, the bottoms are often sandy or muddy.

SPECIES: Characteristic: no particular species consistently characterize harbors and ports. Associated: A diverse set of communities can be found in harbors and ports in association with the various substrates mentioned above.

FUNCTIONS and VALUES: Ecosystem Functions: Harbors and ports often are the sites where alien species are introduced into our waters. They also export a wide variety of pollutants into surrounding waters. Socioeconomic Values: Harbors and ports provide a wide variety of economic benefits including access for shipping, boating, commercial and sportfishing. They may also attract tourism.

REFERENCE EXAMPLES: CA, Ventura & Orange Cos. (opposing page) & all coastal counties.

IMPACTS: Harbors and ports are subjected to run-off from adjacent urban areas and are impacted by antifouling paints, petroleum and litter.

CONSERVATION EFFORTS: None known.

LITERATURE: (Deering 1976, Tway 1991).

Wetland Type No: 11.142(12.4.161.1100)

FIG. V-22. **MARINE-INTERTIDAL ROCKY-SHORE (RUBBLE) IRREGULARLY-EXPOSED LARGE-PORT WETLAND**. Ventura Co., Port Hueneme, W. end of Hueneme Rd. Aerial view from offshore and west.

Wetland Type No.: 11.14212.4.161.1100)

FIG. V-23. **MARINE-INTERTIDAL ROCKY-SHORE (RUBBLE) IRREGULARLY-EXPOSED LARGE-HARBOR WETLAND**. Orange Co., Dana Point, off Pacific Coast Hwy., 7.5 mi. S.E. of Laguna Beach. View from Ken Sampson Lookout.

MARINE WETLAND — ***No.: 11.142(12.4.311.2231), Fig. V-24.*** ***No.: 11.142(12.4.920.1300), Fig. V-25.***

NAME: ***MARINE-INTERTIDAL ROCKY-SHORE (RUBBLE) IRREGULARLY-EXPOSED OCEAN-SHORE & REGULARLY FLOODED SEA WALL WETLANDS***

CLASSIFICATION:

System: 10 marine
Subsystem: 11 marine intertidal
Class: 11.140 rocky-shore
Subclass: 11.142 rocky-shore rubble
Water Regime: (12) irregularly-exposed
Water Regime: (13) regularly-flooded
Water Chemistry: (10.4) haline
HGM Unit: (10.4.311) ocean-shore
HGM Unit: (10.4.920) sea-wall
Substrate/Dominance Type: (12.4.161.2231) green algal
Substrate/Dominance Type: (12.4.161.1300) boulder

DESCRIPTION: Rubble habitats are characteristic of both natural and artificial habitats. They are made up of collections of large rocks and boulders. Rubble can come in a variety of sizes and provides a hard substrate for sessile organisms.

SPECIES: Characteristic: No species consistently characterize rubble habitats. Associated: The species composition of rubble habitats varies depending on the size of the rubble (this determines how frequently the substrate is disturbed by waves), the extent of sand influence, and the degree of exposure. Many species, such as octopus, sponges and crabs, exploit the interstitial and undersurface habitats created in rubble areas. Algae in these areas are more likely to be annual or seasonal species due to the likelihood of being damaged in the winter and buried in the summer.

FUNCTIONS and VALUES: Ecosystem Functions: All rubble areas provide hard substrate for sessile organisms. Socioeconomic: Values Artificial rubble areas have value with respect to combating erosion or blocking swell.

REFERENCE EXAMPLES: CA, Ventura & Santa Barbara Cos. (opposing page) & all coastal counties.

IMPACTS: Collecting and trampling.

CONSERVATION EFFORTS: None known.

LITERATURE: (Deering 1976, Interface Planning and Counseling Corporation 1989, Tway 1991).

Wetland Type No: 11.142(12.4.311.2231)

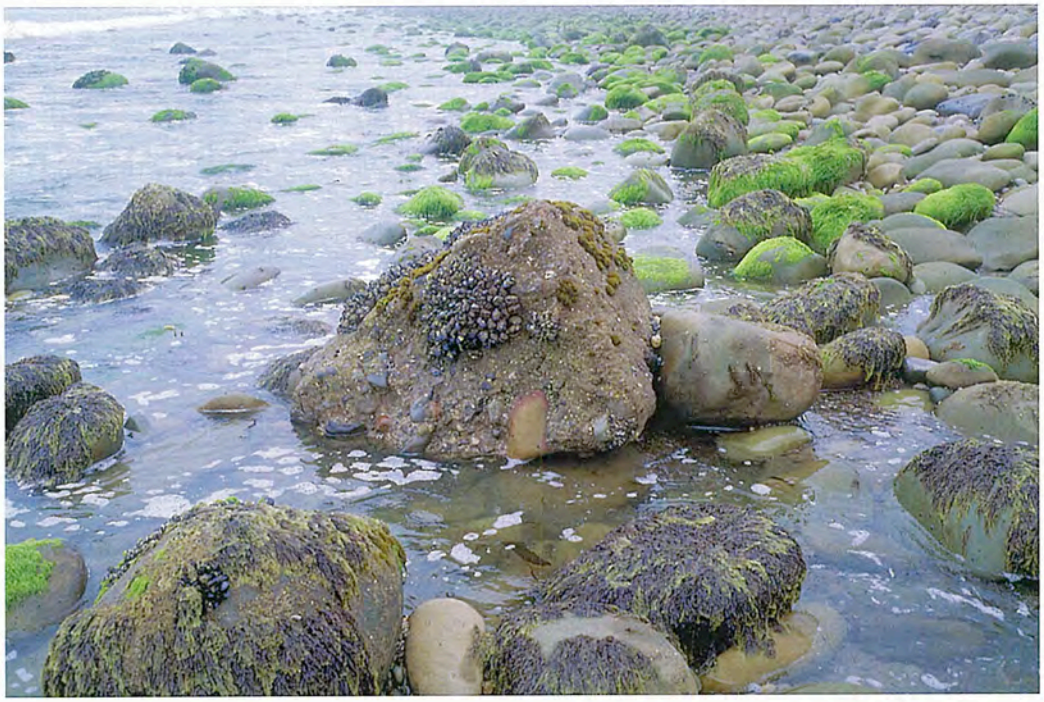

FIG. V-24. **MARINE-INTERTIDAL ROCKY-SHORE (RUBBLE) IRREGULARLY-EXPOSED OCEAN-SHORE WETLAND**. Ventura Co., Old Pacific Coast Hwy. at Hwy. 101, Emma Wood State Beach.

Wetland Type No.: 11.142(13.4.920.1300)

FIG. V-25. **MARINE-INTERTIDAL ROCKY-SHORE (RUBBLE) REGULARLY-FLOODED SEA-WALL WETLAND**. Santa Barbara Co., Carpinteria, foot of Ash Ave., Carpinteria Beach.

MARINE WETLAND — *No.: 11.151(12.4.311.2231),* Fig. V-26. *No.: 11.151(13.4.311.1400),* Fig. V-27.

NAME: *MARINE-INTERTIDAL UNCONSOLIDATED-SHORE (COBBLE-GRAVEL) IRREGULARLY & REGULARLY-EXPOSED OCEAN-SHORE WETLANDS*

CLASSIFICATION:

System: 10 marine
Subsystem: 11 marine intertidal
Class: 11.150 unconsolidated-shore
Subclass: 11.152 unconsolidated-shore cobble-gravel
Water Regime: (13) irregularly-exposed
Water Regime: (13) regularly-exposed
Water Chemistry: (13.4) haline
HGM Unit: (13.4.321) ocean-shore
Substrate/Dominance Type: (12.4.320.2231) sand
Substrate/Dominance Type: (12.4.320.1400) sand

DESCRIPTION: Cobble habitats are made up of collections of small rocks and boulders. Cobble-gravel can come in a variety of sizes and may provides a hard substrate for some sessile organisms. They may be associated with cobble deltas.

SPECIES: Characteristic: No species consistently characterize cobble-gravel habitats. Associated: The species composition of cobble habitats varies depending on the size of the cobble (this determines how frequently the substrate is disturbed by waves), the extent of sand influence, and the degree of exposure. Many species, such as octopus, sponges and crabs, exploit the interstitial and undersurface habitats created in cobble areas. Algae in these areas are more likely to be annual or seasonal species due to the likelihood of being damaged in the winter and buried in the summer.

FUNCTIONS and VALUES: Ecosystem Functions: Cobble areas provide a dynamic, frequently disturbed habitat. Much of the available habitat is interstitial. Socioeconomic Values These areas may provide habitat suitable for collecting cockles.

REFERENCE EXAMPLES: CA, Ventura & Santa Barbara Cos. (opposing page) & all coastal counties.

IMPACTS: Collecting and trampling.

CONSERVATION EFFORTS: None known specifically for cobble-gravel habitats though sites with this habitat, such as the Ventura River Mouth, have been subject to protection.

LITERATURE: (Deering 1976, Tway 1991).

Wetland Type No: 11.151(12.4.311.2231)

FIG. V-26. **MARINE-INTERTIDAL UNCONSOLIDATED-SHORE (COBBLE-GRAVEL) IRREGULARLY-EXPOSED OCEAN-SHORE WETLAND**. Ventura Co., off old Pacific Coast Hwy., just south of Seacliff, Hobson County Park. Green and red algae (*Ulva lactuca* and *Gigartina leptorhynchos*, respectively) and solitary anemones (*Anthopleura xanthogrammica*) are most apparent on this cobble shore.

Wetland Type No.: 11.151(13.4.311.1400)

FIG. V-27. **MARINE-INTERTIDAL UNCONSOLIDATED-SHORE (COBBLE-GRAVEL) REGULARLY-EXPOSED OCEAN-SHORE WETLAND**. San Diego Co., Carlsbad, west of Batiquitos Lagoon, South Carlsbad State Beach. View south along steep cobble-gravel shore with no conspicuous species.

MARINE WETLAND

No.: 11.152(13.4.321.1600), Fig. V-28.
No.: 11.152(13.4.322.1600), Fig. V-29.

NAME: ***MARINE-INTERTIDAL UNCONSOLIDATED-SHORE (SAND) REGULARLY-FLOODED OCEAN-BEACH & EXPOSED-BAY-BEACH WETLANDS***

CLASSIFICATION:

System: 10 marine
Subsystem: 11 marine intertidal
Class: 11.150 unconsolidated-shore
Subclass: 11.152 unconsolidated-shore sand
Water Regime: (13) regularly-flooded
Water Chemistry: (13.4) haline
HGM Unit: (13.4.321) ocean-beach
HGM Unit: (13.4.322) exposed-bay-beach
Substrate/Dominance Type: (12.4.320.1600) sand

DESCRIPTION: Sandy beaches are intertidal shores comprised of coarse-grain particles subject to surf. These habitats are dynamic and change in appearance seasonally.

SPECIES: Characteristic: The mole crab, *Emerita analoga*, can achieve high densities in aggregations within the surf zone. Associated: Polychaete worms, and clams are also characteristic of the lower intertidal zone. Beach hoppers (amphipods), and a variety of insects are characteristic of the upper sections of the beach.

FUNCTIONS and VALUES: Ecosystem Functions: Sandy beaches support a unique fauna, but are relatively low in diversity relative to rocky shores. Socioeconomic Values: Sandy beaches are highly valued as places for sunbathing, strolling, surfing and other forms of outdoor recreation.

REFERENCE EXAMPLES: CA, Monterey & Santa Barbara Cos. (opposing page) & all coastal counties.

IMPACTS: River damming, erosion, litter, clamming and surfcasting.

CONSERVATION EFFORTS: These areas are usually targeted for public access.

LITERATURE: (Straughn 1982, Tway 1991).

Wetland Type No: 11.152(13.4.321.1600)

FIG. V-28. **MARINE-INTERTIDAL UNCONSOLIDATED-SHORE (SAND) REGULARLY-FLOODED OCEAN-BEACH WETLAND**. Monterey Co., Big Sur Coast, off Hwy. 1, 21 mi. S. of Carmel, Andrew Molera State Park. View S.E. down coast of beach and Big Sur River mouth (left).

Wetland Type No.: 11.152(13.4.322.1600)

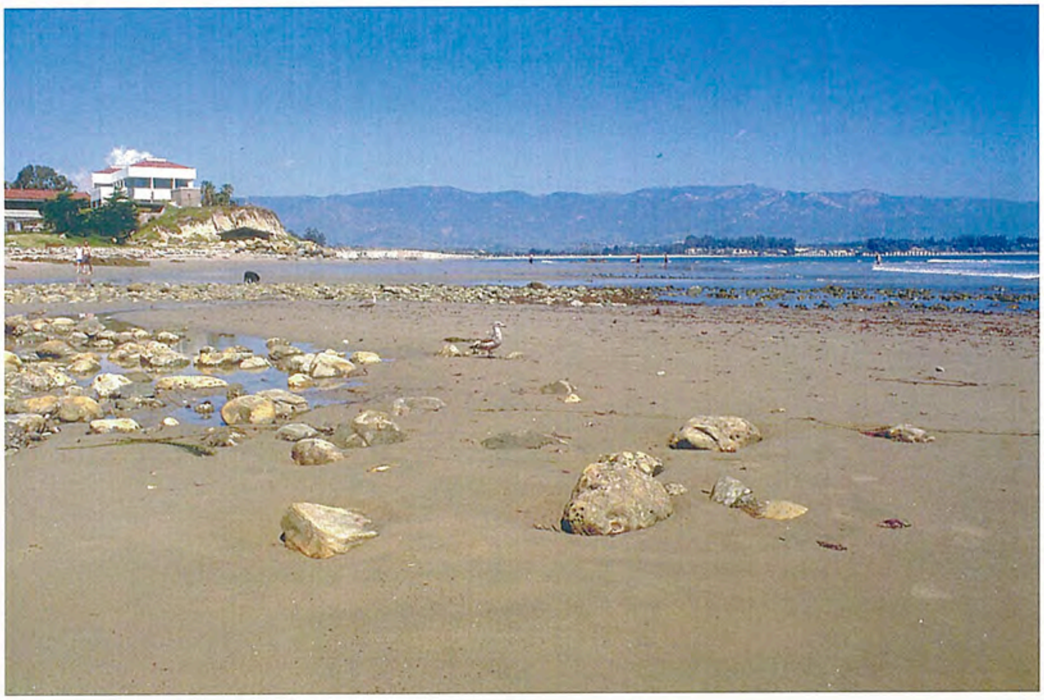

FIG. V-29. **MARINE-INTERTIDAL UNCONSOLIDATED-SHORE (SAND) REGULARLY-FLOODED EXPOSED-BAY-BEACH**. Santa Barbara Co., Goleta, UCSB. View east between Campus Point and Goleta Beach.

MARINE WETLAND — *No.: 11.152(13.4.324.1600)*, **Fig. V-30.** *No.: 11.152(13.4.324.1600)*, **Fig. V-31.**

NAME: ***MARINE-INTERTIDAL UNCONSOLIDATED-SHORE (SAND) REGULARLY-FLOODED COVE-BEACH WETLANDS***

CLASSIFICATION:

System: 10 marine
Subsystem: 11 marine intertidal
Class: 11.150 unconsolidated-shore
Subclass: 11.152 unconsolidated-shore sand
Water Regime: (13) regularly-flooded
Water Chemistry: (13.4) haline
HGM Unit: (13.4.324) cove-beach
Substrate/Dominance Type: (12.4.320.1600) sand

DESCRIPTION: Coves contain beaches bordered by headlands. Their beaches are often sandy and change in appearance seasonally.

SPECIES: Characteristic: The mole crab, *Emerita analoga*, can achieve high densities in aggregations within the surf zone. Associated: Polychaete worms, and clams are also characteristic of the lower intertidal zone. Beach hoppers (amphipods), and a variety of insects are characteristic of the upper sections of the beach.

FUNCTIONS and VALUES: Ecosystem Functions: Sandy beaches support a fauna unique, but relatively low in diversity relative to rocky shores. Socioeconomic Values: Sandy beaches are highly valued as places for sunbathing, strolling, surfing and other forms of outdoor recreation. Coves may have limited public access from up and down coast and are the marine wetlands most likely to be under private control.

REFERENCE EXAMPLES: CA, San Diego & Monterey Cos. (opposing page) & all coastal counties.

IMPACTS: Heavy casual human usage.

CONSERVATION EFFORTS: These may be protected by privately imposed rules and limited access.

LITERATURE: (Straughn 1982).

Wetland Type No: 11.152(13.4.324.1600)

FIG. V-30. **MARINE-INTERTIDAL UNCONSOLIDATED-SHORE (SAND) REGULARLY-FLOODED COVE-BEACH WETLAND**. San Diego Co., La Jolla, along Coast Blvd., Children's Pool. When the seawall was built, the longshore current filled this artificial cove with sand, creating a protected beach on an otherwise exposed and cliff-faced coast along La Jolla bluffs.

Wetland Type No.: 11.152(13.4.324.1600)

FIG. V-31. **MARINE-INTERTIDAL UNCONSOLIDATED-SHORE (SAND) REGULARLY-FLOODED COVE-BEACH WETLAND**. Monterey Co., Big Sur, end of Sycamore Canyon Rd., Pfeiffer Beach. Sycamore Creek empties onto the beach into the small lagoon (lower).

MARINE WETLAND — *No.: 11.211(13.4.311.2323)*, Fig. V-32. *No.: 11.214(12.4.521.6141)*, Fig. V-33.

NAME: ***MARINE-INTERTIDAL AQUATIC BED-ATTACHED ALGAL (*****FUCUS DISTICHUS*****) & ROOTED-VASCULAR (*****PHYLLOSPADIX TORREYI*****) REGULARLY-FLOODED OCEAN SHORE & IRREGULARLY-EXPOSED DELTA WETLANDS***

CLASSIFICATION:

System: 10 marine
Subsystem: 11 marine intertidal
Class: 11.210 aquatic bed
Subclass: 11.211 attached algal
Subclass: 11.214 rooted vascular
Water Regime: (13) regularly-flooded
Water Regime: (12) irregularly-exposed
Water Chemistry: (13.4) haline
HGM Unit: (13.4.311) ocean-shore
HGM Unit: (12.4.521) delta wetland
Substrate/Dominance Type: (13.4.311.2323) *Fucus*
Substrate/Dominance Type: (12.4.521.6141) *Phyllospadix*

DESCRIPTION: Aquatic beds are areas of extensive single species plant cover in the intertidal zone. This class, while quite representative of most other wetland systems, is not how marine ecologists have typically classified the marine system. Instead, marine ecologists have categorized marine wetlands primarily on the basis of substrate type. The utility of class aquatic bed is best at a small spatial scale when one wants to describe the community in direct association with the plants.

SPECIES: Characteristic: The plant which comprises the aquatic bed is the characteristic species. Associated: Many amphipods and isopods (e.g., *Idotea* spp.) are closely associated with algal beds. Some limpets (*Notoamea paleacea*) and polychaetes have a specific association with surf grass.

FUNCTIONS and VALUES: Ecosystem Functions: Aquatic beds provide a food resource (via the detritral food chain) and habitat for a variety of invertebrates and fishes. Socioeconomic Values: Some intertidal algae are harvested for individual or small scale commercial use.

REFERENCE EXAMPLES: CA, San Luis Obispo & Ventura Cos. (opposing page) & all coastal counties.

IMPACTS: Trampling.

CONSERVATION EFFORTS: These may be protected by privately imposed rules and limited access.

LITERATURE: (Deering 1976, Ferren et al. 1990, Kinnetics Laboratories 1992, Straughn 1982, Tway 1991).

Wetland Type No: 11.211(13.4.311.2323)

FIG. V-32. **MARINE-INTERTIDAL AQUATIC-BED-ATTACHED-ALGAL (*FUCUS DISTICHUS*) REGULARLY-FLOODED OCEAN-SHORE WETLAND**. San Luis Obispo Co., Hearst State Beach, overlook north of San Simeon Point along Hwy. 1.

Wetland Type No.: 11.214(12.4.521.6141)

FIG. V-33. **MARINE-INTERTIDAL AQUATIC-BED ROOTED-VASCULAR (*PHYLLOSPADIX TORREYI*) IRREGULARLY-EXPOSED DELTA WETLAND**. Ventura Co., S.E. of Hwy. 101 at Hwy. 33, Ventura River Delta.