VI. ESTUARINE WETLANDS

California, Santa Barbara County: Carpinteria Salt Marsh
(photo by Curtis C. O'Shock)

ESTUARINE SYSTEM

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INTRODUCTION

The Estuarine System includes two subsystems: (1) Subsystem Subtidal, which includes deepwater habitats; and (2) Subsystem Intertidal, which includes wetlands. Cowardin et al. (1979) define the system as follows:

> *The Estuarine System...consists of deepwater tidal habitats and adjacent tidal wetlands that are usually semienclosed by land but have open, partly obstructed, or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land. The salinity may be periodically increased above that of the open ocean by evaporation. Along some low-energy coastlines there is appreciable dilution of sea water. Offshore areas with typical estuarine plants and animals, such as mangroves...and eastern oysters...are also included in the Estuarine System.*

Cowardin et al. also have provided a description of the limits of this system, including three main features: (1) the Estuarine System extends upstream or toward land to the area where salinity from ocean-derived salts (i.e., largely sodium chloride) is less than 0.5 ppt (parts per thousand) during the average annual low flow of freshwater input; (2) downstream to an imaginary line that closes the mouth of an estuary (e.g., a river, bay, or sound); and (3) extending to the seaward limit of estuarine vegetation dominated by emergents, shrubs, or trees and to the seaward limit of offshore areas continuously diluted by runoff to salinities less than those of the Marine

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System.

Estuaries of the study region occur within the Californian Marine and Estuarine 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). The study region covers approximately 400 miles of this coastline and includes numerous estuaries, many of which have been studied or visited during the course of this project (Fig. VI-1).

ESTUARINE WETLANDS

To have a greater appreciation for: (1) the richness of estuarine wetland types; (2) their numerous ecosystem functions and socio-economic values; (3) the extent of the impacts to and of losses estuarine wetlands; and (4) the efforts to restore or create them, we believe it is necessary to review the various types of estuaries in the study area and their characteristic or unique attributes, and the differences among them. Conservation and management of the various estuarine wetlands requires 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.

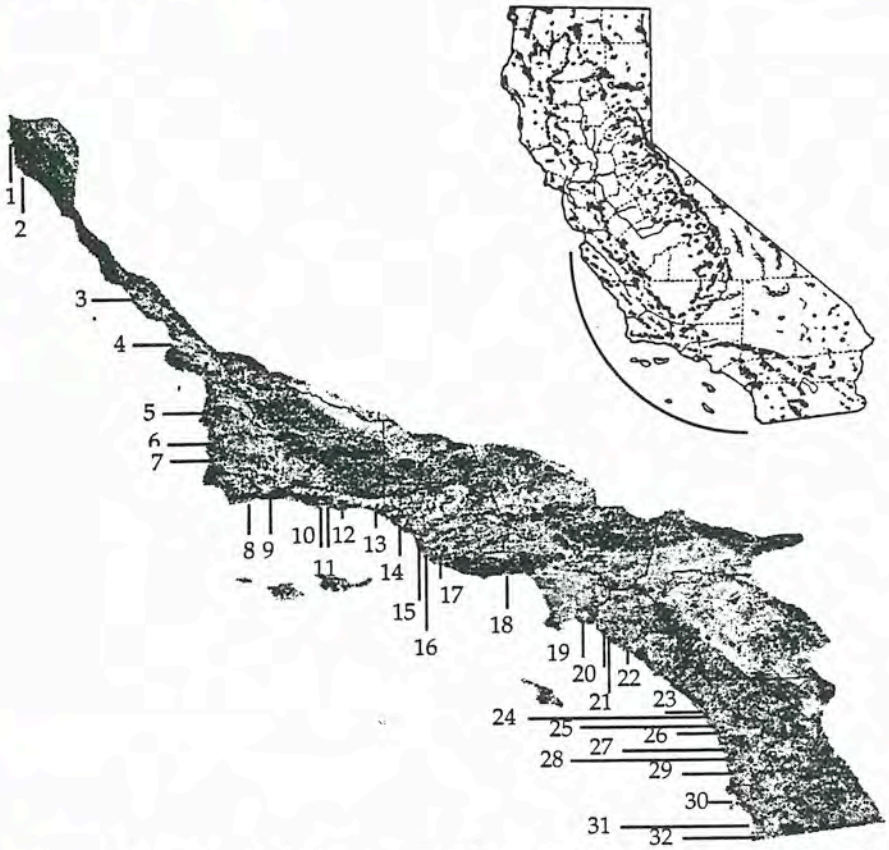
Types of Estuaries

Although the environmental limits of the Estuarine System in Cowardin et al. (1979) were intended for the entire United States, the special attributes of estuaries in coastal central and southern California require further examination. We have identified at least seven major types of estuaries in this region, four of which have been described by Ferren (1990). Various estuarine wetlands have been documented herein in the context of the type of estuary in which they occur. We present a brief description of these estuaries to demonstrate the importance of the differences in their physical, and subsequently, biological attributes.

River Mouth Estuaries. River mouth estuaries occur at the mouths of large rivers that generally have some perennial flow producing nearly permanently brackish conditions in the estuary. The Santa Clara River Estuary at McGrath State Beach in Ventura County (Fig. I-2) is representative of those river-mouth estuaries without extensive bays and adjacent estuarine wetlands. The Ventura River Estuary in Ventura County (see Chapter X) is a another example of the river-mouth type with perennial flow (Ferren 1990; Ferren et al. 1990). The watershed of this

river extends 37 km (23 mi) inland, covers 580 km^2 (226 sq mi), reaches an elevation of 1900 m (6,000 ft), and flood flows have been measured near the estuary at rates from 11,000 to 58,000 ft per second. Physical characteristics of this estuary include: (1) year-round freshwater runoff and occasional catastrophic flooding and flushing as a result of large winter storms; (2) a cobble and sand bar that separates the ocean from an estuarine lagoon except during periods of flushing, particularly during storms; (3) brackish water conditions throughout the estuary when the mouth is open, but a freshwater or slightly brackish layer on the lagoon surface when the mouth has been closed by a cobble and sand bar for extended periods, thus temporarily extending the riverine environment into the estuary; and (4) a brackish lower layer that has reduced levels of dissolved oxygen during periods without flushing (Ferren et al. 1990). Biotic communities and wetland functional values supported by this type of estuarine environment reflect the brackish lagoonal conditions at the Ventura River (Ferren et al. 1990; Hunt et al. 1992). The Tijuana Estuary at the mouth of the Tijuana River is another example of this type of estuary that has been the subject of extensive investigation (e.g., Zedler 1982, Zedler et. al 1992). Because of its large size and extensive low marsh habitats, it has attributes of the bay type estuary.

Canyon Mouth Estuaries. Emergent portions of the southern California coastline are characterized by a series of incised, parallel canyons, arroyos or barrancas, and valleys that drain watersheds in mountain, foothill, coastal plain, and coastal mesa landscapes. These various "canyons" empty into the ocean through small estuaries that are quite variable in size, frequency of tidal flushing, salinity regimes, and biota. Arroyo Burro Estuary in Santa Barbara County (Figs. VI-2, VI-3) is one type of canyon-mouth estuary with mixohaline water because of perennial runoff. It supports brackish indicator species such as *Ruppia cirrhosa* (Spiral Ditchgrass) and an endangered fish, *Eucyclogobius newberryi* (Tide Water Goby). Devereux Slough, which is located at Coal Oil Point Reserve at the University of California, Santa Barbara, is another type of canyon-mouth estuary. It covers approximately 30 ha (70 ac) and has a coastal terrace and foothill watershed with elevations ranging from 3 to 238 m (10 to 575 ft), with a predicted average annual runoff of 737 acre-feet of fresh water (Stanley 1985; Ferren et al. 1987; Davis et al. 1990). Devereux Slough is impounded most of each year by a natural sand barrier. Following months of dry season evaporation, winter storm runoff fills the main portion of the estuary to an elevation exceeding 2.3 m (7 ft) above mean sea level. This level exceeds the elevation of tidal flushing, and thus the delineation of estuarine wetlands for the purpose of this treatment extends landward into habitats not directly flooded by tides, but flooded by brackish water that is seasonally impounded in the estuary. Breaching of the sand barrier occurs between December and April, but in some years may not occur if there is insufficient runoff. After breaching of the barrier, tidal flushing can occur up to several weeks before the sand bar again blocks a surface connection between the marine and estuarine environments.



Monterey Co. 1. Carmel River Estuary and Carmel River State Park, 2. Big Sur River Estuary and Andre Molera State Park.
San Luis Obispo Co. 3. San Simeon Creek Estuary and San Simeon State Beach, 4. Morro Bay and Morro Bay State Park, 5. Santa Maria River Estuary.
Santa Barbara Co. 6. San Antonio Creek Estuary and Vandenberg Air Force Base, 7. Santa Ynez River Estuary, 8. Santa Anita Estuary and Hollister Ranch, 9. Gaviota Creek Estuary and Gaviota State Park, 10. Devereux Slough and Coal Oil Point Reserve, 11. Goleta Slough State Ecological Reserve, 12. Arroyo Burro Estuary and County Park, 13. Carpinteria Salt Marsh Reserve.
Ventura Co. 14. Ventura River Estuary, Seaside Wilderness Park, and Emma Wood State Beach, 15. Santa Clara River Estuary and McGrath State Beach, 16. Ormond Beach Wetlands, 17. Mugu Lagoon.
Los Angeles Co. 18. Malibu Lagoon, 19. Ballona Wetlands.
Orange Co. 20. Seal Beach National Wildlife Refuge, 21. Bolsa Chica Ecological Reserve, 22. Newport Backbay State Ecological Reserve.
San Diego Co. 23. Santa Margarita River Estuary and Camp Pendelton Marine Base, 24. San Luis Rey River Estuary, 25. Buena Vista Lagoon and State Ecological Reserve, 26. Agua Hedionda Lagoon, 27. Batisquitos Lagoon and South Carlsbad State Beach, 28. San Elijo Lagoon Reserve and Regional Park, 29. San Dieguito Lagoon, 30. Mission Bay and Kendall-Frost Reserve, 31. San Diego Bay, Sweetwater Reserve, and Chula Vista Wildlife Reserve, 32. Tijuana River National Estuarine Research Reserve.

FIGURE VI-1. **EXAMPLE WETLAND SITES IN THE ESTUARINE SYSTEM IN THE CENTRAL AND SOUTHERN CALIFORNIA COAST AND COASTAL WATERSHEDS.** The estuarine study region extends from the Carmel River watershed south to the Tijuana River watershed as bounded by the United States-Mexican border.

Runoff, tidal flushing, and evaporation have a significant impact on the salinity of Devereux Slough. In contrast to river mouth estuaries where runoff generally exceeds evaporation throughout the year, many canyon mouth estuaries such as Devereux Slough receive virtually no runoff during the dry season, and subsequently, evaporation results in a loss of all water in the estuary except for some. Salinities range from near fresh water on the surface during maximum flooding to at least 80 ppt in channels during periods of maximum desiccation (Ferren et al. 1987). Although high inter-annual variation characterizes the hydrology of Devereux Slough (Davis et al. 1990), the sequential processes of runoff and ponding, draining and flushing, and evaporation produce the generally annual euryhaline (fluctuating salinity) regimes that often characterize the overall salinity of this type of estuary. The dynamic physical environment of Devereux Slough plays a major role in determining the distribution and composition of the biotic communities that characterize this type of estuary (Ferren 1990).

Lagoonal Estuaries. Many estuaries in southern California can be described as having lagoons at their mouths. This is true for: (1) Arroyo Burro and Malibu Lagoon, canyon-mouth estuaries; (2) Carpinteria Salt Marsh, a structural-basin estuary; and (3) the Santa Ynez River and Ventura River, two river-mouth estuaries. Lagoonal estuaries, however, are those primarily found in San Diego County that have mouths closed by sand bars most of the year, are generally characterized by brackish fringe-marshes rather than vegetated flats, often have salinities that can approach those of fresh water, and support fauna typical of brackish to fresh water conditions. Buena Vista Lagoon (Fig. VI-4) is a lagoonal estuary in an urban setting (California State Coastal Conservancy 1989).

Coastal Dune-Creek Estuaries. Although they are often similar in size to canyon mouth estuaries and with seasonal sand bar impoundments, coastal dune estuaries are characterized by having a perennial source of fresh water from the adjacent dunes, and thus are not euryhaline overall but rather are generally slightly brackish most of the year. Examples include Oso Flaco Creek Estuary (Fig. VI-5) at the Guadalupe Dunes in San Luis Obispo County, and San Antonio Creek Estuary and Shuman Creek Estuary (Mahrdt et al. 1976) at San Antonio Dunes Terrace on Vandenberg Air Force Base in Santa Barbara County. These extensive coastal dunes contain significant amounts of fresh water that continually replace water lost from evaporation in addition to perennial runoff from some streams (e.g., Oso Flaco Creek). Because of dune encroachment into the wetlands and because of the erosion of dunes by runoff, wetlands associated with the small lagoonal estuaries are not extensive, but when present, reflect the permanently brackish nature of the systems. Dune ponds and dune lakes are excluded from the Estuarine System, although some are linked to the estuary of the creek that flows through them. Some of these habitats may have

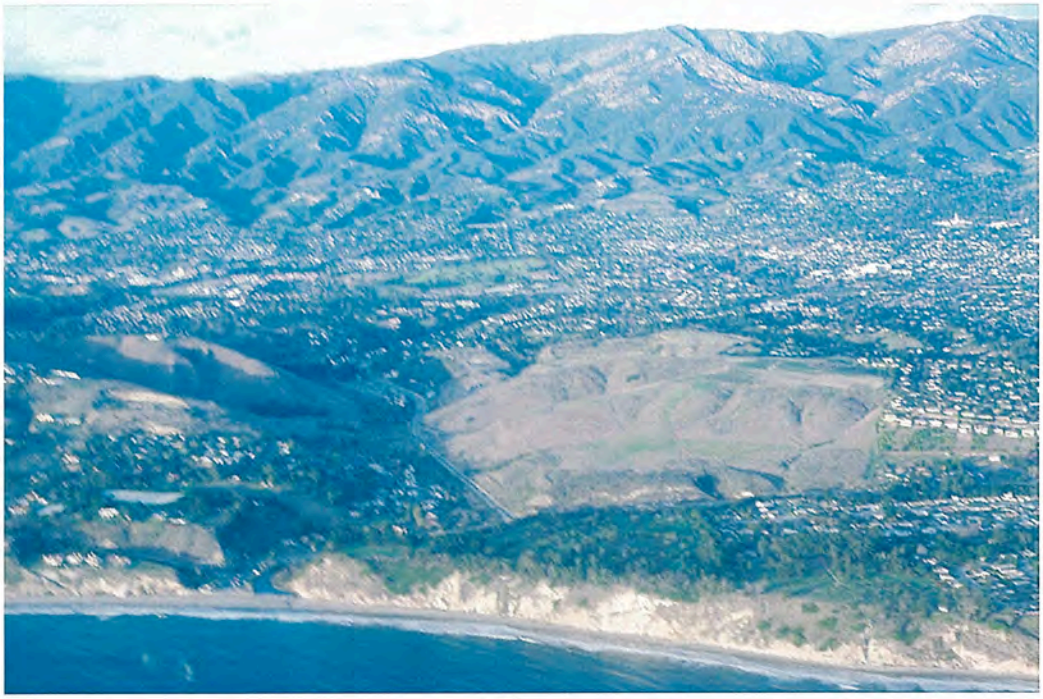


FIG. VI-2. **SANTA BARBARA CO., SANTA BARBARA, ARROYO BURRO AND ARROYO BURRO ESTUARY**. View northward along the coast of Santa Barbara toward the Santa Ynez Mountains. Arroyo Borro, the central canyon, ends at Hope Ranch and Arroyo Burro County Park (left) and the Wilcox Property (right) which are separated by a small canyon-mouth estuary.

FIG. VI-3. **SANTA BARBARA CO., ARROYO BURRO ESTUARY**. View northward from beach toward the estuary at mouth of Arroyo Burro, and the Santa Ynez Mountains (background). This estuary is predominantly brackish (mixohaline) in chemistry, unlike many regional estuaries that are haline or hyperhaline, demonstrating a perennial source of fresh water from Arroyo Burro. This estuary supports a biota typical of such conditions in the region, including the Tide Water Goby, an endangered fish.

been estuarine historically when they apparently were the mouths of rivers or streams before a change in the flow of these systems resulted in the abandonment of the mouths for new sites. In Ventura County, for example, McGrath Lake is the historic mouth of the Santa Clara River, but no longer functions as an estuary. Today it supports palustrine wetlands and is the only dune pond in southern California.

Bay Estuaries. Estuaries with large areas of subtidal habitat (bays) and low elevation salt marsh on the bay margins are another major type of estuary. Morro Bay (Eabry 1992; Fig. VI-6) in central California, and Bolsa Chica, Anaheim Bay, Upper Newport Bay (Stevenson and Emery 1958), Mission Bay and Kendall-Frost Reserve (UC Natural Reserve System 1991), and San Diego Bay in southern California are examples of bay estuaries (Ferren 1990). There is a strong marine influence in bay estuaries because there is: (1) a consistently open and generally wide mouth; (2) a large body of marine water that floods wetland habitats; and (3) the low elevation of adjacent marshes that results in diurnal (twice daily) tidal flooding of these marshes. Regarding the Tijuana Estuary in San Diego County, Zedler and Nordby (1986) demonstrated that it "...is a highly variable system that may best be described as an intermittent estuary. During the winter wet season, its waters are diluted by rainfall and streamflow; during the rest of the year, it is an extension of the ocean." Bay estuaries generally do not occur in areas of rapid geologic uplift and landscape evolution (e.g., the coastline of the Santa Ynez Mountains in Santa Barbara and Ventura counties, but generally occur in coastal basins (e.g., Anaheim Bay) that have received extensive flooding or submergence. As with other types of estuaries, distinctive habitats (extensive low elevation intertidal mud flats) and biotic communities (cordgrass and eel-grass wetlands) characterize bay estuaries (Zedler 1982; Zedler et al. 1992).

Structural Basin Estuaries. In regions characterized by considerable tectonic activity such as coastal Santa Barbara County, down-faulted and down-folded geologic structures may support estuaries of moderate size (200-300 ac). The South Coast region of this county occurs along the south side of the Santa Ynez Mountains and includes uplifted coastal mesas and foothills and down-faulted basins, such as the one containing Goleta Slough (Fig. VI-7) in the Goleta Valley, or down-folded (synclinal) basins such as the one containing Carpinteria Salt Marsh in the Carpinteria Valley (Ferren 1985; Ferren 1990). These structural basins have steep but short watersheds rising to approximately 1130 m (3500 ft) in elevation, and are characterized by occasional catastrophic flooding and sedimentation, particularly from large storms that may occur after chaparral fires in the adjacent foothills and mountains. Today, the estuaries at Goleta and Carpinteria apparently represent late successional stages of estuarine ecosystem evolution. Prehistoric bays or lagoons that once characterized the sites are now largely filled with sediment and lack extensive subtidal and

FIG. VI-4. **SAN DIEGO CO., CARLSBAD, BUENA VISTA LAGOON**. View northward across the narrow lagoon-type estuary toward a private community in Oceanside. Such estuaries have mouths that are generally separated from the ocean by sandbars, are usually flooded, and receive tidal flushing only occasionally. As illustrated here, estuaries along the urbanized coast of southern California often have development constructed to their banks, which also can be artificial. At Buena Vista Lagoon, the surface water can have salinities low enough to support breeding sites for frogs and other typically freshwater species.

low marsh habitats. The middle and high marsh habitats are irregularly flooded and frequently contain hyperhaline or euryhaline soils, particularly in the vicinity of stream deltas that form salt flat habitats in high marsh areas along deltaic gradients from upland to estuarine wetland (Callaway et al. 1990; Pennings and Callaway 1993).

Artificial Drain Estuaries. Both agricultural and urban drains along the coast of central and southern California form small, narrow estuaries when they reach the coast. Some of these exist in the form of small wetlands on sandy beaches at the mouths of culverts and storm drains. Others reach the coast as canals and have tidal channels with fringe marshes on their margins. Many urban drains are the downstream limit of coastal streams that have their headwaters in the adjacent mountains beyond the urban development. Depending on the type of agricultural or urban runoff, these small estuaries may vary from being extremely polluted to relatively average in water quality. At the Oxnard Drain in Ventura County, for example, both agricultural and urban runoff drain to the mouth. In addition to these sources, springs in a tributary to the mouth contribute to the estuary. Lafferty (pers. obser. 1994) has found Tide Water Gobies at this site, suggesting that estuarine conditions are adequate to sustain a population of this endangered fish.

Some estuaries are characterized by a combination of features from different estuary types. The Tijuana Estuary occurs at the mouth of the Tijuana River and is a bay-type estuary. Unlike various other river-mouth estuaries (e.g., Carmel, Big Sur, Santa Maria, Santa Ynez, Ventura, Santa Clara rivers), it is influenced perhaps more by the extent of deepwater habitats, adjacent low marshes and flats, and oceanic water than by the runoff of the river, except during catastophic flooding events (see Zedler et al. 1992).

Estuarine Wetland Classes and Subclasses

In the United States as a whole, the Estuarine System (System No. 20.000) includes the following ten classes: 20.110 Rock Bottom Wetland, 20.120 Unconsolidated Bottom Wetland, 20.130 Streambed Wetland, 20.140 Rocky Shore Wetland, 20.150 Unconsolidated Shore Wetland, 20.210 Aquatic Bed Wetland, 20.220 Reef Wetland, 20.240 Emergent Wetland, 20.250 Scrub-Shrub Wetland, and 20.260 Forested Wetland. The first five describe and differentiate substrates and can be considered abiotic classes, whereas the second five describe dominant life forms and can be considered biotic classes. A key to these classes has been provided in Section IV of this volume. Except for Estuarine Rock Bottom and Rocky Shore Wetlands, which are characteristic of some fjord type estuaries, and for Estuarine Forested Wetlands, which are confined to types of mangrove vegetation, each of the remaining seven classes occur in coastal central and southern California. The

FIG. VI-5. **SAN LUIS OBISPO CO., PISMO STATE BEACH, OSO FLACO ESTUARY**. View from beach area, westward along narrow axis of the estuary of Oso Flaco Creek. This example of a dune-stream estuary is typically brackish because of a perennial supply of freshwater from runoff and from water in the dunes. Dune-stream estuaries support a biota typical of brackish estuaries, including the Tide Water Goby, an endangered fish endemic to estuaries in southern California.

Estuarine Subsystem Intertidal (= wetlands) is designated as Subsystem No. 21.000. A "Key to the Estuarine Classes" occurs at the end of the discussion on estuaries and estuarine wetlands and before the "Catalogue of the Estuarine Wetlands."

21.120 Class Unconsolidated Bottom Wetland. Estuarine Class Unconsolidated-Bottom includes Subclasses Cobble-Gravel, Sand, Mud, Organic, and Vegetated. Each of these has been documented in the study region (e.g., Ferren et al. 1990; Zedler 1982; Zedler et al. 1992). This subclass occurs in both subsystems and the characteristic water regimes include subtidal, irregularly exposed, regularly-flooded, irregularly-flooded, and seasonally-flooded. Subclass Cobble-Gravel occurs in situations such as the mouth channel of Carpinteria Salt Marsh (Kevitt 1993), where the cobble and gravel beds support a rich association of over 80 invertebrate species (approximately 60% of the entire benthic and epibenthic invertebrate fauna of the estuary) including a colony or reef of *Ostreola conchaphila* (Olympia Oyster), a sensitive and declining native species, and *Mytilus galloprovinvialis* (Blue Mussel). Subclass Sand occurs in channel beds, and lagoon and bay bottoms that generally occur near the mouths of estuaries where there is an influx of sand from the adjacent ocean. This subclass can support extensive colonies of benthic bivalves including *Macoma nasuta* (Bent-Nose Macoma), *Protothaca staminea* (Pacific Littleneck), and *Tagelus californicus* (California Tagelus). Subclass Mud (including substrate type Mixed-Fines) is generally found away from the mouth of estuaries and channels leading from mouths and is often characterized by extensive colonies of *Cerithidea californica* (California Hornsnail), *Hemigrapsus oregonensis* (Yellow Shore Crab), and *Callianassa californiensis* (Bay Ghost Shrimp) and diatoms such as *Nitschia longissima* and *Pleurosigma estuarii*.

We have added Subclass Vegetated to the Cowardin et al. (1979) classification for this system because there are irregularly or seasonally exposed estuary beds (e.g., Ventura River Estuary; Ferren et al. 1990) that can become colonized by annual vascular plants (e.g., *Atriplex triangularis, Chenopodium macrospermum, Spergularia marina*). These wetlands might more accurately be described as Class Unconsolidated-Bottom Subclass Vegetated than Class Emergent Wetland Subclass Nonpersistent (see Figs. VI-39, VI-40).

21.130 Class Streambed Wetland. Cowardin et al. include with Class Streambed all estuarine channels completely dewatered at low tide. Subclasses include Cobble-Gravel, Sand, Mud, and Organic. In many cases, however, the unconsolidated bottoms of these channels are rather indistinguishable from other intertidal unconsolidated bottom habitats in estuaries. Thus we often describe channel bottoms in Class Unconsolidated Bottom (e.g., see Figs. VI-10, VI-11). There are situations, however, where streams from adjacent watersheds flow into estuaries (e.g., Morro Creek

FIG. VI-6. **SAN LUIS OBISPO CO., MORRO BAY**. View northwestward across Morro Bay toward Morro Rock. Bay-type estuaries are characterized generally by extensive deepwater habitat with adjacent, regularly-flooded, mud-flat and low-marsh habitats. Shown here near low-tide conditions, Morro Bay is the only bay-type estuary in the central California portion of the study area. Examples in southern California include Anaheim Bay, Newport Backbay, and Tijuana Estuary.

FIG. VI-7. **SANTA BARBARA CO., GOLETA SLOUGH**. View westward along main channel (Tecolotito Creek) toward the University of California, Santa Barbara. Goleta Slough is a structural-basin type of estuary that is situated in a graben-like down-faulted basin. Carpinteria Salt Marsh, another structural-basin estuary in Santa Barbara County, is located in the trough of a syncline.

at Morro Bay in San Luis Obispo County) and continue to maintain stream channel morphology (e.g., stream banks, bars, back-bar channels, gravel-beds, nonpersistent-emergent vegetation, etc.) for some distance into the estuary. These examples are perhaps more accurately classified in Class Streambed.

21.140 Class Rocky Shore Wetland. Most examples attributed to Class Rocky Shore in the study region (e.g., at Goleta Slough and Carpinteria Salt Marsh) are artificial revetments that have been constructed to stabilize banks and protect property, as in the Marine System (see Section V). Rocky shores are often colonized by the same invertebrates that occur at sites classified as Class Unconsolidated Bottom Subclass Cobble-Gravel. Some small examples of natural estuarine rocky shores occur when coastal bluffs occur immediately adjacent to estuary channels (e.g., Arroyo Burro Estuary).

21.150 Class Unconsolidated Shore Wetland. Numerous examples of unconsolidated shores occur along estuaries in the study region (e.g., Big Sur River Estuary, Morro Bay, Mugu Lagoon, Malibu Lagoon, Santa Margarita River Estuary, Tijuana Estuary). Unconsolidated shores of Subclass Sand are common toward the mouths of estuaries, whereas Subclass Mud can occur along estuarine channels. Cobble-benches (a hydrogeomorphic unit) are another form of unconsolidated shore that can develop near the mouths of estuaries (e.g., Carpinteria Salt Marsh) and are different than unconsolidated-bottom types because they often reach elevations that reach extreme high water and are attached to and slope away from shores. These and other unconsolidated shores are important resting places for shore birds.

21.210 Class Aquatic Bed Wetland. From the three Cowardin et al. subclasses Algal, Rooted Vascular, and Floating, we have developed the five subclasses: Attached Algal, Floating Algal, Aquatic Moss, Rooted Vascular, and Floating Vascular. Although there are mosses in the irregularly-flooded estuarine wetlands, these are not dominant to the overstory of vascular plants, and are not included in Subclass Aquatic Moss in the Estuarine System. Most of the intertidal sites classified as Subclass Attached Algal (e.g., unconsolidated bottom habitats) are dominated by green algae (e.g., *Ulva, Enteromorpha*). Nutrient-enriched channels in estuaries can become covered with *Enteromorpha clathrata*, and thus are considered Subclass Floating Algal (see Fig. VI-20). Subclass Rooted-Vascular pertains to a group of pondweeds, ditch-grasses, and horned-pondweeds that occur in various types of estuaries. In predominantly brackish estuaries (e.g., Shuman Creek Estuary, San Antonio Creek, and Santa Anita Estuary in Santa Barbara County), *Potamogeton pectinatus* (Pondweed), *Ruppia cirrhosa* (Spiral Ditch-Grass), and *Zannichellia palustris* (Horned Pondweed) are characteristic; whereas in euhaline estuaries or euryhaline estuaries (e.g., Devereux Slough; Fig. VI-

23), *Ruppia maritima* predominates. In bay estuaries (e.g., Morro Bay; Fig. VI-12), *Zostera marina* (Eel Grass) occurs on unconsolidated bottom habitat in both subsystems.

21.220 Class Reef Wetland. Organic reefs in the Estuarine System are generally small and occur at localized sites such as cobble-beds and revetment. As mention under Class Unconsolidated Bottom, native oysters and mussels can occur in large enough colonies to be considered reefs (Subclass Mollusk). In one unusual situation, however, a reef of *Crassostrea gigas* (Pacific Oyster) occurs in the irregularly-exposed unconsolidated-bottom at Morro Bay. This oyster was introduced from Japan for a commercial mariculture operation, and approximately 1000 ac of bay bottom have been approved for mariculture. Because of a limited tolerance to specific water temperatures, this species cannot reproduce at Morro Bay and the site has to be "reseeded" each year.

21.230 Class Emergent Wetland. Class Emergent Wetland includes two Cowardin et al. subclasses: Persistent and Nonpersistent types. Extensive research has been conducted on a number of the wetland type hydrogeomorphic units resulting in numerous publications (e.g., Callaway et al. 1989; Ferren 1985, 1990; Ferren et al. 1990; Henrickson 1976; Macdonald 1977; Manion and Dillingham 1989; Onuf 1987; Pennings and Callaway 1992; Purer 1942; Vogl 1966; Zedler 1977, 1980, 1982; Zedler and Cox 1984; and Zedler et al. 1992). Emergent-Persistent Wetlands are dominated in the Estuarine System by perennial vascular plant species (e.g., *Salicornia virginica* and *Spartina foliosa*) that remain standing at least until the beginning of the next growing season. In salt marshes that are typically euhaline or hypersaline, many of these species (e.g., *Frankenia salina, Arthrocnemum subterminale*) are partially woody at the base and are considered "suffrutescent", but here are considered Emergent Wetland and are not placed in Class Scrub-Shrub Wetland. In brackish marshes (see Figs. VI-24, VI-25, VI-26, VI-35, VI-36), Emergent-Persistent Wetlands often are dominated by cattails (e.g., *Typha domingensis*), rushes (e.g., *Juncus acutus*) and bulrushes (e.g., *Scirpus americanus, S. californicus, S. maritimus, S. robustus*). Estuarine Emergent-Nonpersistent Wetlands are not common in the study region, but occur on: (1) irregularly-flooded flats in euryhaline conditions (see Figs. VI-37, VI-38) where annual plants such as the endangered *Lasthenia glabrata* spp. *coulteri* (Salt Marsh Goldfields) dominate or co-dominate with scattered perennials and other annual plants; and (2) on irregularly-exposed brackish substrates (see Figs. VI-39, VI-40) that can also be placed in Subclass Vegetated, Class Unconsolidated Bottom (see above) and Class Unconsolidated Shore. Refer to Hydrogeomorphic Units and the Catalogue for additional information.

21.250 Class Scrub-Shrub Wetland. We recognize eight subclasses of Estuarine Scrub-Shrub Wetland. Only one of these, Broadleaved Evergreeen, is locally important, although some small patches of deciduous willows occur uncommonly. Unlike temperate estuarine wetlands of eastern North America, there are few examples of Estuarine Scrub-Shrub Wetland in the study region (see Figs. VI-41, VI-42). Isolated examples occur on remnants of deltaic gradients, artificial berms, and margins of estuaries. Because extensive impacts have occurred in high marsh, deltaic transition habitats, and margins, few examples remain of what were probably more extensive wetlands in the past. Common shrubs in Estuarine Scrub-Shrub Wetland in southern California include *Atriplex lentiformis* (Brewer's Salt Bush), *Isocoma menziesii* (Coast Golden Bush), *Suaeda taxifolia* (Wooly Sea-Blite), and the suffrutescent species *Carpobrotus edulis* (Hottentot Fig, an introduced invasive exotic iceplant) and *Arthrocnemum subterminale* (Parish's Glasswort). An Estuarine Scrub-Shrub Wetland of special concern in coastal central California is dominated by *Suaeda californica* (California Sea-Blite), which is an endangered species restricted only to the shores of Morro Bay. Although this shrub often occurs as scattered individual plants, there are situations where the cover is extensive enough to consider the grouping a form of vegetation rather than a few individuals within some other wetland classification.

Estuarine Hydrogeomorphic Units

Estuarine hydrogeomorphic units are landforms characterized by a specific origin, geomorphic setting, water source, and hydrodynamic (water regime). These features, coupled with water chemistry and physiognomy of vegetation, provide an opportunity to differentiate estuarine wetlands beyond the class and subclass levels. Although some redundancy of terminology in the Estuarine System occurs between the Cowardin classes, subclasses, and our hydrogeomorphic units, it is necessary to distinguish site characteristics from higher orders of classification. This is true throughout our classification and within each system. Refer to: (1) the combined marine and estuarine hydrogeomorphic classification (Section III, Table III-5) for the hierarchical relationship of the units; (2) Table VI-1 for the distribution of the units among the various water regimes in the Estuarine System; and (3) Section XIII, Glossary, for definitions of the hydrogeomorphic units.

Water Bodies (HGM Category .100). Our discussion of the different types of estuaries (Water Body Series No. 130) discussed previously in this section provides the ecosystem context for the various estuarine wetlands. These estuaries also can be described separately from their wetlands by the numbers included with this classification: (131) Bay Estuaries such as Morro Bay in San Luis Obispo County; (132) Lagoonal Estuaries such as Buena Vista in San Diego County;

(133) River-Mouth Estuaries such as Santa Maria River Estuary in Santa Barbara County; (134) Canyon-Mouth Estuaries such as Santa Anita Estuary in Santa Barbara County; (135) Structural-Basin Estuaries such as Carpinteria Salt Marsh in Santa Barbara County; (136) Dune-Stream Estuaries such as Oso Flaco Creek Estuary in San Luis Obispo County; (137) Agricultural Drainage Mouths; and (138) Urban Drainage Mouths, such as the Oxnard Drain in Ventura County. Other water bodies present in the estuarine system other than in channels include Tidal Ponds [Unit Series No. (.170)], including Tidal Dune-Swale Ponds such as the one associated with Devereux Slough in Santa Barbara County, and Tidal Marsh Ponds, which are small basins within salt marsh vegetation or local impoundments that are filled permanently or seasonally with water (e.g., near the mouth of San Dieguito Lagoon).

Channels, Drainages, Ditches (HGM Category .200). Channels within the Estuarine System belong to several hydrogeomorphic series, including: (.220) Estuarine Channels, which are the primary channels near the mouths of estuaries; (.230) Tidal-River Channels, which are similar to estuarine channels but are the tidal portion of the main stem of rivers, such as the Ventura River in Ventura County (see Fig. VI-35); (.240) Tidal-Stream Channels, which generally occur in channels at the mouths of canyons and in streams that enter larger estuaries, such as Morro Creek at Morro Bay; (.250) Tidal Marsh Channels, which include large and small intertidal and subtidal channels in salt and brackish marshes; and (.290) Tidal Ditches, which are generally small artificial channels in estuarine marshes.

Shores, Beaches, Banks, Benches, Terraces (HGM Category .300). Margins of estuaries and estuarine channels contain several major series of hydrogeomorphic units including: (.310) Shores, which are mostly unconsolidated and regularly or irregularly flooded; (.320) Beaches, such as recreational sites along estuaries that are often managed for open sandy areas; (.330) Banks, such as tidal banks along estuarine channels; (.340) Benches, which are often composed of cobble-gravel substrates sloping from shores; and (.350) Terraces, which are rare but can occur at elevations above sea level along seasonally-flooded margins of estuaries (e.g., Devereux Slough; Fig. VI-36).

Bottoms, Beds, Bars, Reefs (HGM Category .400). This hydrogeomorphic category combines bed and reef aspects of Cowardin et al. (1979). Intertidal beds and bottoms (.412) occur in exposed bays bottoms and tidal channel bottoms and tidal streambeds. Intertidal bars (.420) general occur in channels where back-bar channels develop that are associated with bars. Although the Marine System can include rock-reefs, the Estuarine System includes only organic reefs formed by bivalves such as mussels and oysters (see previous discussion regarding Class Reef).

Flats, Deltas (HGM Category .500). Tidal Flats (.510) include a series of hydrogeomorphic units that vary with flooding, chemistry, and plant cover. Tidal flats form in estuaries with the accumulation of sediments and thus are grouped here with other plain features such as deltas, with which they are often associated (e.g. salt flats associated with the coalesced deltas of Franklin and Santa Monica Creeks at Carpinteria Salt Marsh (Ferren 1985; Callaway et al. 1990). Mineral (Sand, Mud) Flats (.511), Precipitate (Salt) Flats and Pannes (.512), and Vegetated Flats both Algal (.513) and Plant (.514) are the types in the series Estuary Flats. Estuarine Deltas (.520) can be large-scale landforms in which estuaries occur (e.g., the Ventura River Estuary at the Ventura River Delta), or can be small landforms that develop at the mouths of streams that dump their sediment loads into estuaries, such as at Carpinteria.

Headlands, Slopes (HGM Category .600). Slopes have differing degrees of importance in the various systems. Depending on their position in the ecosystem context (i.e., type of estuary), Estuary Slopes (.633) can be considered related to channels, shores, banks, and benches. When the tidal amplitude of a site is sufficiently large, intertidal slopes along the margins of bays (bay-slopes) and large channels (channel-slopes) generally exceed the more specific flooding regimes of hydrogeomorphic units such as beds, banks, shores, etc. At the Ventura River Estuary, estuarine "slip-off slopes" at channel bends are an example.

Seeps, Springs (HGM Category .700). Many estuaries in the study region are affected by the intrusion of fresh water from sources other than in channels from the adjacent watershed. Seeps (.711) and Springs (.712) often arise from perched water tables, dune water lenses, and beds of vernal drainages that adjoin the estuarine habitats. At Morro Bay, these seeps and springs provide habitat for brackish marshes at sites otherwise dominated by salt marsh vegetation (see Figs. VI-25, VI-26).

Marshes (HGM Category .800). Because of the different types of estuaries, varying water regimes and water chemistry, and vegetation composition along the latitudinal gradient, many types of estuarine marshes occur in the study region (Henrickson 1976; Macdonald 1977; Zedler 1982; Onuf 1987; Zedler et al. 1992). The series Salt Marsh (.810) includes Low (.811), Middle (.812), and (.813) High-Intertidal types. Low Salt Marshes are often dominated by *Spartina foliosa* (Cordgrass; see Figs. VI-29, VI-30) and *Salicornia virginica* (Pickleweed; see Figs. VI-27, VI-28) and are characterized by an irregularly-exposed or regularly-flooded water regime and varying water chemistry including euhaline, mixohaline, euryhaline, and hyperhaline situations depending on the setting, tides, drought conditions, and time of year (Zedler 1983; Onuf 1987; Zedler et al. 1992). Middle Salt Marsh is generally characterized by an irregularly-flooded water regime and varying

salinities including euhaline, mixohaline, euryhaline, and hyperhaline types. Dominant plants can form mosaics or gradient patterns, but *S. virginica* often dominates in association with other species such as *Distichlis spicata* (Saltgrass), *Frankenia salina* (Alkali Heath), *Jaumea carnosa* (Jaumea), and *Limonium californicum* (Sea-Lavender; see Fig. VI-33), *Suaeda esteroa* (Estero Sea-Blite; Fig. VI-31) and *Triglochin concinna* (Arrow-Grass). High Salt Marsh is generally characterized by an irregularly-flooded water regime, euryhaline or hyperhaline salinity, and is often dominated by *Arthrocnemum subterminale* (Parish's Glasswort), *Monanthochloe littoralis* (Shoregrass), and *S. virginica*. Detailed discussion of vegetation composition, cover, and zonation have been presented by many of the authors cited herein, particularly Zedler (1982).

Brackish Marsh (.820) generally occurs where a mixohaline salinity is more consistently established or where catastrophic flooding events have converted salt marsh sites to brackish marsh areas (see Zedler and Beare 1986, Beare and Zedler 1991). Low (.831), Middle (.832), and High (.833) Brackish Marsh types occur in the study region. Their tidal water regimes are similar to those described for salt marshes, but in some situations the low-marsh emergent vegetation occurs in virtually permanently-flooded (intermittently-exposed?) rather than irregularly-exposed conditions (e.g., *Scirpus californicus* in the Santa Ynez River Estuary in Santa Barbara County). Dominant species often include cattails, rushes, and bulrushes (see Class Emergent Wetland).

Other estuarine marshes included in the classification are related to their size, shape, or confinement rather than to estuarine processes and dominance types. Fringe Marshes (.830) occur in linear patches along channels or margins of estuaries, and Diked Marsh (.840) occurs in basins that are artificially isolated from the larger area of an estuary (e.g. Goleta Slough), which can have important and deleterious impacts to the ecological functions of the marsh. Diked marshes that have restricted tidal flushing are maintained in the Estuarine System, whereas sites that no longer receive flushing by tides but retain their wetland characteristics are classified in the Palustrine System.

Artificial Structures (HGM Category .900). Artificial Structures in estuaries can be Stationary (.910) types such as pilings and levees, or Floating (.920) types such as docks and buoys, and can support estuarine biotic associations. A classification of types is provided for the Marine and Estuarine systems (see Table VI-1); Artificial Structures are discussed in some detail in Section V, The Marine System.

Ecosystem Functions and Socio-economic Values

The classification of estuarine wetlands must also include a consideration of the various ecosystem functions and socio-economic values that may distinguish one type of estuarine wetland from another. We present a brief overview of some of the categories of functions and values to consider when evaluating wetlands for classification.

Ecosystem Functions. Ecosystem functions in the Estuary System are processes that are necessary for the self-maintenance of the various estuarine ecosystems (adapted from L. C. Lee & Associates, Inc. 1993). Different estuarine wetlands that may occur on similar hydrogeomorphic units and that may be dominated by the same or related species may have different ecosystem functions (e.g., endangered species habitat) because of the latitude at which they occur, and thus are considered herein to be different wetland types because of their different functions. In our classification, function must be considered when evaluating a wetland type.

Foodchain Support and Nutrient Cycling. "The food chain support function of wetlands refers to the direct or indirect use of nutrient sources derived from wetlands by heterotrophic organisms [i.e., organisms that do not produce their own food]" (Sather and Smith 1984:21). Alternatively, Zedler et al. (1990:3) proposed the definition, "...the production of organic matter and its direct or indirect use, in any form, by organisms inhabiting, or associated with, wetland ecosystems." Categories of this function include primary production, decomposition, nutrient export, and nutrient utilization. Adamus (1983) and Sather and Stuber list 68 wetland characteristics that are important to food chains; some of these are: constriction of basin's outlet, vegetation form, substrate type, salinity, hydroperiod, tidal range, plant form richness, invertebrate density, suspended solids, and bottom water temperature. In estuaries of western North America, salt marsh algae apparently are more important in supporting food chains than they are in other regions of North America (Zedler et al. 1992). Vascular plant productivity in western estuaries of the study region has been shown to be lower and more variable than that of estuaries in eastern North America and the Gulf of Mexico, as summarized in a case history for the Tijuana River Estuary in Zedler et al. (1992). They concluded that, "Variability is the rule; it is high from species to species, season to season, and year to year" (Zedler et al. 1992:88). They also report that in previous studies by others at this estuary, it was concluded that, "...bacteria and phytoplankton are more important in the funneling of estuarine productivity to benthic consumers than detritus from vascular plants" (Zedler et al. 1992:94).

Habitat. The habitat role of estuarine wetlands may be the most important function of all in the wetland systems in the study region. Many species of special concern (see Section XV, Appendix XV-1) use or require estuarine habitats, including species of endangered plants (e.g.,Salt Marsh Bird's Beak; see Fig. VI-34), mammals (Southern California Salt Marsh Shrew), birds (Belding's Savannah Sparrow), fish (Tide Water Goby), and insects (Mudflat Tiger Beetle). Estuaries also provide habitats for non-listed declining species such as the Olympia Oyster. Based on recently observed densities of this declining species, Kevitt (1993:24) concluded, "With a sizeable population now located the ecological value of [Carpinteria Salt Marsh] as a stronghold for species threatened by development of estuaries has been increased." Other habitat roles include habitat for: (1) estuarine dependent plants and animals; (2) migratory waterfowl including wintering ducks, shorebirds, brants, pelicans, and some gulls and terns (see Onuf and Quammen 1990); (3) anadromous fish such as Steelhead Trout, which is proposed for listing as endangered, and (4) the Pacific Lamprey (Hunt et al. 1992; Capelli 1994); and estuarine-dependent young-of-the-year marine fish such as halibut (Onuf and Quammen 1985, 1990).

Hydrology. Storage of flood waters is one major function of estuaries. Characteristics that are most often cited as having a role in controlling flood waters are size of the wetland, location within the watershed, texture of the substrate, and lifeform of the vegetation (Sather and Smith 1984). In Santa Barbara County, the role of estuaries in flood control has been incorporated into an environmentally preferred alternative to routine flood control maintenance of regional stream, rivers, and estuaries (Philbrick 1991). Groundwater recharge and discharge is another hydrologic function of wetlands that is less apparent in the Estuarine System than in other systems, although estuaries serve as an interface between water exiting the adjacent watershed and the open ocean. A third hydrologic function is the role of wetlands in shoreline anchoring and the dissipation of erosive forces (Sather and Smith 1984). In southern California, estuaries protect inland sites from storm tides and wave action and in general provide a buffer between the forces of the Marine System and non-estuarine wetlands and upland property of the lower watersheds.

Water Quality. Wetlands are important in maintaining water quality because they function as filters to remove pollutants and sediments from moving waters (Sather and Smith 1984). In the study region, nutrients from agricultural runoff and seepage from local perched water tables are significant contributors to degraded water quality in many estuaries of the study region. At Carpinteria Salt Marsh, studies by Page et al. (1994, pers. comm 1994) suggest that the large amounts of nitrate nitrogen that enter the marsh from fertilizers used in the surrounding watershed are partially consumed by the estuarine wetland vegetation. Thus, water exiting the marsh into the Santa Barbara Channel would most likely have higher concentrations of nutrient pollution if the

estuary did not process some of the fertilizer-derived nitrate before it reached the ocean. Zedler et al. (1990) suggest that algae play an important role in filtering nutrients and improving water quality, possible exceeding the importance of vascular plants dominating the sites. They also suggest the role in accumulating sediments may be a function of depth, which provides a physical sediment trap during catastrophic flooding.

Socio-economic Values. Socio-economic values of wetlands in the Estuarine System are society's perceptions of the worth of an estuarine ecosystem, typically stemming from whether the system provides a form of benefit or pleasure (adapted from L. C. Lee & Associates 1993). Most of the values are derived from the various ecosystem functions that a characterize a particular wetland or ecosystem (e.g., fishing for Steelhead Trout is derived from the function an estuary has to support anadromous fish such as these trout.

Consumptive Values. The consumptive value of estuaries for regional commercial fisheries has probably been underestimated. Halibut are now considered estuarine-dependent species because of the importance of estuaries to their young-of-the-year (Onuf and Quammen 1990). Young of many other species (e.g., Diamond Turbot, Starry Flounder, Sea Bass) also use estuaries as nurseries (as recorded for Carpinteria Salt Marsh; A. Brooks, pers. comm., 1994). In an indirect sense, estuaries also provide large flat surfaces that have been ideal for the placement of airports (e.g., Santa Barbara Municipal Airport) and commerical and industrial enterprises, but at enormous expense to the environment in lost wetland habitat and functions. Similarly, the estuarine opening to the adjacent open ocean has made them ideal sites for the excavation of harbors and ports (e.g., Los Angeles Harbor, Port Hueneme, Marina Del Rey, Mission Bay, San Diego Port, etc.), where wetlands have been converted to deepwater habitats.

Nonconsumptive Values. Many nonconsumptive values are attributed to estuaries and estuarine wetlands that generally relate to the enhancement of the quality of life for humans that live near or visit them. Examples include: (1) sport fishing (Morro Bay); (2) hunting (Santa Ynez River Estuary); (3) boating (Morro Bay and Newport Backbay); (4) swimming (Mission Bay); (5) bird watching (e.g., various chapters of the Audubon Society at most estuaries); (6) botanizing (e.g., various chapters of the California Native Plant Society and California Botanical Society at most estuaries); (7) painting (e.g., Oak Group Painters at estuaries in Santa Barbara County); (8) and hiking, walking, jogging, and biking along trails on berms through or adjacent to estuaries (e.g., at Big Sur River, Morro Bay, Goleta Slough, Ventura River, Bolsa Chica, Newport Backbay, San Dieguito River Estuary, Silver Strand at San Diego Bay, and Tijuana Estuary).

Educational programs, research sites, and conservation areas also are tributes to the acknowledged values of estuaries and estuarine wetlands. Various municipalities use urban estuaries as part of their parks and recreation educational programs (e.g. City of San Buenaventura's use of Sea Side Wilderness Park and Emma Wood State Beach at the Ventura River Estuary). Universities and colleges have conservation and research programs that focus on estuaries, such as the Pacific Estuarine Research Program at San Diego State University, the National Estuarine Research Reserve at the Tijuana Estuary, and the University of California Natural Reserve System that maintains Coal Oil Point Reserve (including Devereux Slough), Carpinteria Salt Marsh Reserve, San Joaquin Marsh (mostly palustrine) at Newport Backbay, and Kendall-Frost Reserve at Mission Bay. Furthermore, federal, state and county agencies maintain parks, reserves, and refuges to protect estuaries and their functions and values in the public trust. Examples in the study region include but are not limited to:

(1) **Monterey County**: Carmel River State Beach at Carmel River Estuary, Andrew Molera State Park at Big Sur River Estuary, and many small canyon-mouth estuaries in the California Sea Otter Game Refuge;

(2) **San Luis Obispo County**: San Simeon State Beach at San Simeon Creek Estuary; Morro Bay State Park, Sweetsprings Reserve, and Montano De Oro State Park at Morro Bay;

(3) **Santa Barbara County**: Ocean County Park at the Santa Ynez River Estuary, Gaviota State Park at Gaviota Creek Estuary, Refugio State Park at Refugio Creek Estuary, Goleta Slough State Ecological Reserve, Carpinteria State Beach at Carpinteria Creek;

(4) **Ventura County**: Emma Wood State Beach at the Ventura River Estuary, McGrath State Beach at the Santa Clara River Estuary, Mugu Lagoon Reserve;

(5) **Los Angeles County**: Topanga-Las Virgenes Resource Conservation District at Malibu Lagoon;

(6) **Orange County**: Seal Beach National Wildlife Refuge at Anaheim Bay, Bolsa Chica Beach State Park at Bolsa Chica, Newport State Ecological Reserve at Newport Backbay;

(7) **San Diego County**: Torrey Pines State Beach at Carmel Valley Estuary, San Elijo Lagoon Ecological Rserve and Regional Park, Silver Strand State Beach and Chula Vista Wildlife Reserve at San Diego Bay, and Border Field State Park and Tijuana National Estuarine Research Reserve at Tijuana Estuary.

Cultural Values. Socio-economic values of estuarine wetlands were extremely high for native American cultures before Euro-American culture replaced the earlier cultures. At Carpinteria Salt Marsh and Goleta Slough in Santa Barbara County, for example, there are approximately 9,000 years of continuous residence by humans in the vicinity of these estuaries. Over a period of millenia, there was an evolution of the Native American culture toward a greater dependence on marine and estuarine natural resources (Ferren 1985). The later cultural group, the Canalino Chumash, used plants, shellfish and fish from the estuaries of the Santa Barbara region. Today these estuaries and their adjacent habitats continue to be a source of small, remnant populations of native wetland plants (e.g., *Anemopsis californica* for medicinal purposes; *Juncus textilis* for basketry).

Aesthetic and Natural Heritage Values. The various natural features of estuaries and their wetlands provide important values to viewshed and landscape aesthetics. Many associated with parks and recreational sites provide alternatives to artificial urban settings that now extend over much of coastal southern California. Real estate values of land near estuaries are high, evidence of the aesthetic desireability of these ecosystems. Their aesthetic and other socio-economic values will undoubtedly increase as the land surrounding them is populated by increasingly dense metropolitan centers.

California's changing landscape as a result of rapidly expanding population and urbanization, in addition to past changes as a result of extensive agricultural development, puts at risk the future of the State's natural heritage, particularly its wetlands (see Losses below). The combination of geological history, climate, proximity of various wetland systems, evolution of a rich wetland biota, and ecosystem functions have formed a large number of unique and/or endemic wetland types or their ecosystem context types. Examples from the Estuarine System include structural basin estuaries (e.g., Goleta Slough; dune creek estuaries (e.g., Oso Flaco Creek); canyon mouth estuaries (Arroyo Burro); southern California river mouth estuaries (e.g., Ventura River Estuary); euryhaline wetlands (e.g., Carpinteria Salt Marsh); California Sea-Blite Scrub (Morro Bay, San Luis Obispo Co.); and southern California estuarine wetlands as a whole for the number of endemic/endangered plants and animals they support. The ecosystem function of natural heritage contributes to the biological diverisity of the region because, for example, with the seven types of estuaries each with their unique combination of ecosystem functions and socio-economic values, the overall siginificance of the central and southern California coast and coastal watersheds is enhanced. Clearly and importantly, the entire study region has greater ecosystem functions and socio-economic values than the sum of its separate natural heritage elements.

Estuarine Wetlands: Losses and Impacts

Losses. Estimates between 75% (J. Zedler 1982) and 90% (California Coastal Commission 1989) have been made for the amount of estuarine wetland lost in southern California as a result of filling or dredging during the last century. The remaining 10-25% (ca. 16,763 acres; Dennis and Marcus 1984) have been degraded through fragmentation, water quality degradation, introduction of invasive plants and feral animals, unregulated access, and other forms of environmental perturbation. The remaining estuarine wetlands are especially important, however, because of the many ecosystem functions they provide. Of these functions, perhaps that of habitat for rare and endangered species is the most important because of the many plants and animals restricted to the remaining examples of estuarine wetland (Zedler et al. 1990). Due to the continuing urbanization of the coast of California, and the extensive losses of habitat that already have occurred, all remaining examples of estuarine wetland should be considered threatened habitat. Detailed classification of estuarine wetlands is critical if we are going to understand better what we have so we will know what or how to conserve the resources and their associated ecosystem functions and socio-economic values for the future.

Impacts. Changes in estuarine wetlands as a result of various imacts to the resources can affect the classification of these wetlands. Wetlands can be converted from one type to another or from one system to another (diking, dregding, etc.). Impacts to estuarine ecosystems can come from natural sources such as catastrophic floods, tidal storm surges, and earthquakes in structural basins. Additional sources associated with human activities are numerous (see Figs. VI-8, VI-9) and can be grouped, for example, into those related to: (1) **agricultural development** (e.g., deforestation, draining, increased sedimentation, fragmentation, nutrient enrichment, pesticide pollution); (2) **urbanization** (e.g., filling for development, landfill, excavation, fragmentation, diking, impoundment, runoff and effluent pollution and nutrient enrichment, sedimentation); (3) **agency activities** (e.g., channelization and flood control, ditching and chemical treatment for mosquito abatement); (4) **resource extraction** (e.g., petrochemicals, sediments, water, salts, fisheries); (5) **access** (e.g., compaction of soil, removal and disturbance of organisms); and (6) **introduction of invasive exotic species** (e.g., plants such as *Arundo donax* [Giant Reed] and *Limonium ramosissimum* [a European sea lavender]; and animals such as Red Fox, and feral cats).

Restoration and Creation of Estuarine Wetlands

Enhancement, restoration, creation and recreation of ecosystems are another group of processes that can affect the classification of wetlands. Similar to deleterious impacts,

manipulation of habitats can convert one type of wetland to another or from one system to another. Throughout much of the study region, many estuaries have had managment plans prepared for them that include small as well as large scale ecological restoration proposals (e.g., at the Ventura River, Wetland Research Associates et al. 1994; Carpinteria Salt Marsh, Rivertech and Spectra 1991; and others, Josselyn and Chamberlin 1994). Although various efforts have been implemented, particularly in San Diego County (e.g., Zedler 1988, 1993, Zedler and Langis 1991, Zedler et al.1992), results have revealed that goals to restore functions have not been achieved and "successful" ecosystem restoration has yet to be demonstrated (Zedler et al. 1992). Thus mitigation as a technique to compensate for losses or impacts should be view with concern. Zedler et al. (1992:137) have found that, "Few mitigation projects increase habitat area; most simply change one type of wetland habitat into another. Yet changes in habitat quality do not compensate for reduced wetland area. More likely, they cause a loss in wetland functioning."

Rare or Threatened Estuarine Wetlands

Although classification of estuaries can provide a useful tool for understanding the functional differences among estuaries, in reality each estuary is unique as defined by its size, nature of its watershed, latitudinal position along the coast, disturbance history, and relationship to the open ocean. Because of the inter-relatedness of many of the characteristics of estuaries as described herein, many estuaries exhibit characteristics of more than one of the major categories of estuaries (Ferren 1990). An understanding of the similarities and differences among estuaries is invaluable when an assessment is made on the sensitivity of habitats. Particularly rare examples such as *Estuarine-Intertidal Emergent-Nonpersistent Irregularly-Flooded Euryhaline Delta Wetland* (Ferren and Fiedler 1993) are identified in the classification presented below. Because of the extensive losses in estuarine wetland in the study region as noted previously (75-90%), and the many important functions and values of those that remain, many of which are degraded, all estuarine wetlands should be considered rare and threatened. In assessing of the ecosystem functions of the central and southern California coastal wetlands we quote Onuf and Quammen, "The paramount values of these systems are values of rarity, not of abundance as may be true of other regions. Even in support of commercially important fish stocks, limited special conditions are critical, not life requisites of profusion. Coastal wetlands and riparian ecosystems provide critical needs for rare and endangered species and are essential wintering, breeding, feeding and migrating sites (Onuf and Quammen 1990).

FIG. VI-8. **VENTURA CO., VENTURA RIVER ESTUARY**. Oblique view northward across the Ventura River Estuary and along the main stem of the Ventura River. As illustrated here, this river-mouth type estuary and related wetlands have received many impacts, including fragmentation by transportation corridors, infilling of wetlands, nutrient enrichment from sanitary district effluent, growth of invasive exotic plants such as Giant Reed, and disturbance from unfocused human access. In spite of the many perturbations, this important estuary provides many ecosystem functions (e.g, endangered species habitats) and socio-economic values (e.g., passive recreation activities). The Ventura River Estuary supports many types of wetlands and estuarine-dependent species. It also is an important site for access to riverine habitats by anadromous fish such as Steelhead Trout and Pacific Lamprey.

FIG. VI-9. **SAN DIEGO CO., CAMP PENDLETON, SAN LUIS REY RIVER ESTUARY**. View eastward from the estuary, across a road berm and up the San Luis Rey River. Fragmentation of coastal waterways and the separation of estuaries from their adjacent riverine habitats and watersheds is a common phenomenon in California. Although this road tends to be temporary during high-flow conditions following storms, when it is in place there is a restricted hydrological and biological connection between the river and the estuary. Other examples include sites where there is no longer a transition between the riverine and estuarine systems, but instead there are abrupt, physical barriers such as concrete box culverts and dams.

CLASSIFICATION OF ESTUARINE WETLANDS

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

Key to Estuarine Classes

Estuarine substrate is continuously submerged (i.e., subtidal habitats, which are not included in this volume, except where emergent species dominate in subtidal channels.....**DEEPWATER HABITAT SUBSYSTEM**

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

Substrate formed by the colonization of sedentary (i.e., attached) invertebrates (e.g., mussels, oysters).....**Reef Class**

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

Substrate of bedrock, boulders, stones, or combinations of these covering 70% or more of the habitat.....**Rock Bottom Class**

Substrate of organic material, mud, sand, gravel, or cobbles with less than 75% areal cover of bedrock, boulders, or rubble.....
.....**Unconsolidated Bottom Class**

During the growing season of most years, percentage of habitat covered by vegetation (e.g., algae and estuarine aquatic flowering plants such as *Ruppia*) is 30% or greater.....
.....**Aquatic Bed Class**

Estuarine substrate is at least irregularly exposed and flooded by oceanic tides .....**INTERTIDAL SUBSYSTEM**

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

Substrate formed by the colonization of sedentary invertebrates (e.g., mussels) .....**Reef Class**

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

Habitat contained within a channel bed.....**Streambed Class**

Habitat along a shoreline:

Substrate of bedrock, boulders, rubble, or combinations of these covering 70% or more of the habitat.....**Rocky Shore Class**

Substrate of organic material, mud, sand, gravel, or cobbles with less than 70% areal cover of bedrock, boulders, or rubble ....**Unconsolidated Shore Class**

During the growing season of most years, percentage of area covered by vegetation (e.g., algae, aquatic and emergent vascular plants, or shrubs) is 30% or greater:

Vegetation composed predominantly by macrophytic algae.....**Aquatic Bed Class**

Vegetation composed predominantly of vascular species:

Vegetation herbaceous:

Vegetation tidally-submerged rooted-aquatic, floating-leaved, or floating types (e.g., *Ruppia, Potamogeton, Lemna*). ....**Aquatic Bed Class**

Vegetation emergent types:

During the growing season most years, the vegetation is composed largely of pioneering annuals and seedlings of perennials that occur at the time of substrate exposure:

Vegetation occurs on unconsolidated bottom or bed habitats..... .....**Unconsolidated Bottom (Vegetated) Class**

Vegetation occurs on unconsolidated shore or bank habitats..... .....**Unconsolidated Shore (Vegetated) Class**

During most years, the vegetation is composed largely of persistent species that dominant the substrate (e.g., *Salicornia, Scirpus, Spartina*).....**Emergent Wetland Class**

Vegetation shrubs or trees:

Dominant plants less than 5 meters (15 feet) tall and composed of shrubs or stunted trees.....**Scrub/Shrub Wetland Class**

Dominant plants 5 meters tall or taller (does not occur in Calif.) .....**Forested Wetland Class**

TABLE VI-1. **TABLE OF ESTUARINE HYDROGEOMORPHIC UNITS ARRANGED WITHIN CORRESPONDING WATER REGIMES.** Refer to Section III, Classification, of this volume for an explanation of the classification methodology and for tables regarding an explanation of water regimes(Table III-2), water chemistry (Table III-3), and substrate, dominance, and characteristic types (Table III-7).

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

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

(11.0) PERMANENTLY-FLOODED SUBTIDAL REGIME (Deepwater Habitats Excluded Here)

(12.0) IRREGULARLY-EXPOSED INTERTIDAL REGIME

(12.0.100.0000) Water Bodies (Hydrogeomorphic Context)

(12.0.130) Estuaries
(12.0.131.0000) Bay Estuaries
(12.0.132.0000) Lagoonal Estuaries
(12.0.133.0000) River-Mouth Estuaries
(12.0.134.0000) Canyon-Mouth Estuaries
(12.0.135.0000) Structural-Basin Estuaries
(12.0.136.0000) Dune-Stream Estuaries
(12.0.137.0000) Agricultural Drainage Mouths
(12.0.138.0000) Urban Drainage Mouths

(12.0.170) Tidal Ponds
(12.0.172.0000) Tidal Marsh Ponds

(12.0.200.0000) Channels, Fissures, Caves

(12.0.220.0000) Estuarine Channels
(12.0.221) Deep (Subtidal) Natural Estuarine Channels
(12.0.222) Shallow (Intertidal) Natural Estuarine Channels
(12.0.223) Deep (Subtidal) Artificial Estuarine Channels
(12.0.224) Shallow (Intertidal) Artificial Estuarine Channels

(12.0.230.0000) Tidal-River Channels
(12.0.231) Deep (Subtidal) Main-Stem River-Channels
(12.0.232) Shallow (Intertidal) Main-Stem River-Channels
(12.0.233) Deep (Subtidal) Distributary River-Channels
(12.0.234) Shallow (Intertidal) Distributary River-Channels

(Table VI-1 Continued)

(12.0.240.0000) Tidal-Stream Channels
- (12.0.241) Deep (Subtidal) Canyon-Stream Channels
- (12.0.242) Shallow (Intertidal) Canyon-Stream Channels
- (12.0.243) Deep (Subtidal) Dune-Stream Channels
- (12.0.244) Shallow (Intertidal) Dune-Stream Channels

(12.0.250.0000) Tidal-Marsh Channels
- (12.0.251) Deep (Subtidal), Large, Tidal-Marsh Channels
- (12.0.252) Shallow (Intertidal), Large, Tidal-Marsh Channels
- (12.0.253) Deep (Subtidal), Intermediate, Tidal-Marsh Channels
- (12.0.254) Shallow (Intertidal), Intermediate, Tidal-Marsh Channels
- (12.0.255) Deep (Subtidal), Small, Tidal-Marsh Channels
- (12.0.256) Shallow (Intertidal), Small, Tidal-Marsh Channels

(12.0.280.0000) Culverts
- (12.0.281) Large (Wide/Long) Concrete Culverts
- (12.0.282) Small (Narrow/Short) Concrete Culverts
- (12.0.283) Large (Wide/Long) Metal Culverts
- (12.0.284) Small (Narrow/Short) Metal Culverts

(12.0.290.0000) Tidal Ditches
- (12.0.291) Deep (Subtidal) Large Tidal-Ditches
- (12.0.292) Shallow (Intertidal) Large Tidal-Ditches
- (12.0.293) Deep (Subtidal) Intermediate Tidal-Ditches
- (12.0.294) Shallow (Intertidal) Intermediate Tidal-Ditches
- (12.0.295) Deep (Subtidal) Small Tidal-Ditches
- (12.0.296) Shallow (Intertidal) Small Tidal-Ditches

(12.0.300.0000) Shores, Beaches, Banks, Benches

(12.0.310.0000) Shores
- (12.0.313) Estuary Shores

(12.0.330.0000) Banks
- (12.0.331) Estuary Banks

(12.0.340.0000) Benches
- (12.0.343) Estuary Benches

(12.0.400.0000) Bottoms, Beds, Bars, Reefs

(12.0.410.0000) Beds/Bottoms/Floors
- (12.0.412) Shallow (Intertidal) Beds/Bottoms/Floors

(12.0.420.0000) Bars
- (12.0.421) Shallow (Intertidal) Bars

(12.0.430.0000) Reefs
- (12.0.431) Large Reefs
- (12.0.432) Small Reefs

(Table VI-1 Continued)

(12.0.500.0000) Flats, Deltas

(12.0.510.0000) Flats
(12.0.511) Mineral (Sand, Mud) Flats
(12.0.513) Vegetated-Algal Flats

(12.0.520.0000) Deltas
(12.0.521) Deltas

(12.0.600.0000) Headlands, Cliffs, Slopes

(12.0.800.0000) Marshes

(12.0.810.0000) Salt Marshes
(12.0.811) Low-Intertidal Salt Marshes

(12.0.820.0000) Brackish Marshes
(12.0.821) Low-Intertidal Brackish Marshes

(12.0.830.0000) Fringe Marshes
(12.0.831) Low-Intertidal Fringe Marshes

(12.0.840.0000) Diked Marshes
(12.0.841) Low-Intertidal Diked Marshes

(12.0.900.0000) Artificial Structures

(12.0.910.0000) Stationary Artificial Structures
(12.0.911) Jetties/Breakwaters
(12.0.912) Sea Walls/Revetment
(12.0.913) Dams/Levees
(12.0.914) Earthern Berms/Dikes
(12.0.915) Dredge Spoils
(12.0.916) Pilings/Piers
(12.0.917) Platforms
(12.0.918) Boat Ramps
(12.0.919) Wreckage

(12.0.920.0000) Floating Structures
(12.0.921) Hulls
(12.0.922) Docks
(12.0.923) Buoys
(12.0.924) Logs

(13.0) REGULARLY-FLOODED INTERTIDAL REGIME

(13.0.100.0000) Water Bodies (Hydrogeomorphic Context)

(13.0.130.0000) Estuaries
(13.0.131) Bay-Estuaries

(Table VI-1 Continued)

(13.0.132) Lagoonal Estuaries
(13.0.133) River-Mouth Estuaries
(13.0.134) Canyon-Mouth Estuaries
(13.0.135) Structural-Basin Estuaries
(13.0.136) Dune-Stream Estuaries
(13.0.137) Agricultural Drainage Mouths
(13.0.138) Urban Drainage Mouths

(13.0.200.0000) Channels

(13.0.220.0000) Estuarine Channels
(13.0.222) Shallow (Intertidal) Natural Estuarine Channels
(13.0.224) Shallow (Intertidal) Artificial Estuarine Channels

(13.0.230.0000) Tidal River Channels
(13.0.232) Shallow (Intertidal) Main-Stem River Channels
(13.0.234) Shallow (Intertidal) Distributary River Channels

(13.0.240.0000) Tidal Stream Channels
(13.0.242) Shallow (Intertidal) Canyon-Stream Channels
(13.0.244) Shallow (Intertidal) Dune-Stream Channels

(13.0.250.0000) Tidal Marsh Channels
(13.0.252) Shallow (Intertidal), Large, Tidal-Marsh Channels
(13.0.254) Shallow (Intertidal), Intermediate, Tidal-Marsh Channels
(13.0.256) Shallow (Intertidal), Small, Tidal-Marsh Channels

(13.0.280.0000) Culverts
(13.0.281) Large (Wide/Long) Culverts
(13.0.282) Small (Narrow/Short) Culverts

(13.0.290.0000) Ditches
(13.0.292) Shallow (Intertidal) Large Tidal-Ditches
(13.0.294) Shallow (Intertidal) Intermediate Tidal-Ditches
(13.0.296) Shallow (Intertidal) Small Tidal-Ditches

(13.0.300.0000) Beaches, Shores, Banks, Benches

(13.0.310.0000) Shores
(13.0.313) Estuary Shores

(13.0.320.0000) Beaches
(13.0.323) Estuary Beaches

(13.0.330.0000) Banks
(13.0.331) Estuary Banks

(13.0.340.0000) Benches
(13.0.343) Estuary Benches

(Table VI-1 Continued)

(13.0.450.0000) Terraces
(13.0.351) Estuary Terraces

(13.0.400.0000) Bottoms, Beds, Bars, Reefs

(13.0.410.0000) Beds/Bottoms/Floors
(13.0.412) Shallow (Intertidal) Beds/Bottoms/Floors

(13.0.420.0000) Bars
(13.0.422) Shallow (Intertidal) Bars

(13.0.430.0000) Reefs
(13.0.431) Large Reefs
(13.0.432) Small Reefs

(13.0.500.0000) Flats, Deltas

(13.0.510.0000) Flats
(13.0.511) Mineral (Sand, Mud) Flats
(13.0.513) Vegetated-Algal Flats
(13.0.514) Vegetated-Plant Flats

(13.0.520.0000) Deltas
(13.0.521) Deltas

(13.0.600.0000) Headlands, Bluffs, Slopes

(13.0.630.0000) Slopes
(13.0.633) Estuary Slopes

(13.0.700.0000) Seeps, Springs

(13.0.710.0000) Seeps
(13.0.711) Seeps

(13.0.720.0000) Springs
(13.0.712) Springs

(13.0.800.0000) Marshes

(13.0.810.0000) Salt Marshes
(13.0.811) Low-Intertidal Salt Marshes

(13.0.820.0000) Brackish Marshes
13.0.821 Low-Intertidal Brackish Marshes

(13.0.830.0000) Fringe Marshes
(13.0.831) Low-Intertidal Fringe Marshes

(Table VI-1 Continued)

(13.0.840.0000) Diked Marshes
(13.0.841) Low-Intertidal Diked Marshes

(13.0.900.0000) Artificial Structures

(13.0.910.0000) Stationary Artificial Structures
(13.0.911) Jetties/Breakwaters
(13.0.912) Sea Walls/Revetment
(13.0.913) Dams/Levees
(13.0.914) Earthen Berms/Dikes
(13.0.915) Dredge Spoils
(13.0.916) Pilings/Piers
(13.0.917) Platforms
(13.0.918) Boat Ramps
(13.0.919) Wreckage

(13.0.920.0000) Floating Artificial 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)

(14.0.130.0000) Estuaries
(14.0.131) Bay-Estuaries
(14.0.132) Lagoonal Estuaries
(14.0.133) River-Mouth Estuaries
(14.0.134) Canyon-Mouth Estuaries
(14.0.135) Structural Basin Estuaries
(14.0.136) Dune-Stream Estuaries
(14.0.137) Agricultural Drainage Mouths
(14.0.138) Urban Drainage Mouths

(14.0.170.0000) Tidal Ponds
(14.0.171) Tidal Dune-Swale Ponds

(14.0.200.0000) Channels

(14.0.220.0000) Estuarine Channels
(14.0.222) Shallow (Intertidal) Natural Estuarine Channels
(14.0.224) Shallow (Intertidal) Artificial Estuarine Channels

(14.0.230.0000) Tidal River Channels
(14.0.232) Shallow (Intertidal) Main-Stem River Channels
(14.0.234) Shallow (Intertidal) Distributary River Channels

(Table VI-1 Continued)

(14.0.240.0000) Tidal Stream Channels
(14.0.242) Shallow (Intertidal) Canyon-Stream Channels
(14.0.244) Shallow (Intertidal) Dune-Stream Channels

(14.0.250.0000) Tidal Marsh Channels
(14.0.252) Shallow (Intertidal), Large, Tidal-Marsh Channels
(14.0.254) Shallow (Intertidal), Intermediate, Tidal-Marsh Channels
(14.0.256) Shallow (Intertidal), Small, Tidal-Marsh Channels

(14.0.280.0000) Culverts
(14.0.281) Large (Wide/Long) Concrete Culverts
(14.0.282) Small (Narrow/Short) Concrete Culverts

(14.0.290.0000) Tidal Ditches
(14.0.292) Shallow (Intertidal) Large Tidal-Ditches
(14.0.294) Shallow (Intertidal) Intermediate Tidal-Ditches
(14.0.296) Shallow (Intertidal) Small Tidal-Ditches

(14.0.300.0000) Shores, Beaches, Banks, Benches

(14.0.310.0000) Shores
(14.0.313) Estuary Shores

(14.0.320.0000) Beaches
(14.0.323) Estuary Beaches

(14.0.330.0000) Banks
(14.0.331) Estuary Banks

(14.0.340.0000) Benches
(14.0.343) Estuary Benches

(14.0.350.0000) Terraces
(14.0.351) Estuary Terraces

(14.0.400.0000) Bottoms, Beds, Bars, Reefs

(14.0.410.0000) Beds/Bottoms/Floors
(14.0.412) Shallow (Intertidal) Beds/Bottoms/Floors

(14.0.420.0000) Bars
(14.0.422) Shallow (Intertidal) Bars

(14.0.430.0000) Reefs
(14.0.431) Large Reefs
(14.0.432) Small Reefs

(14.0.500.0000) Flats, Deltas

(14.0.510.0000) Flats

(Table VI-1 Continued)

(14.0.511) Mineral (Sand, Mud) Flats
(14.0.512) Precipitate (Salt) Flats (Pannes)
(14.0.513) Vegetated-Algal Flats
(14.0.514) Vegetated-Plant Flats

(14.0.520.0000) Deltas
(14.0.521) Deltas

(14.0.600.0000) Headlands, Bluffs, Slopes

(14.0.610.0000) Headlands
(14.0.611) Large Headlands
(14.0.612) Small Headlands

(14.0.620.0000) Cliffs/Bluffs
(14.0.621) Cliffs/Bluffs

(14.0.630.0000) Slopes
(14.0.633) Estuary Slopes

(14.0.700.0000) Seeps, Springs

(14.0.710.0000) Seeps

(14.0.711) Seeps

(14.0.720.0000) Springs
(14.0.712) Springs

(14.0.800.000) Marshes

(14.0.810.0000) Salt Marshes
(14.0.812) Middle-Intertidal Salt Marshes
(14.0.813) High-Intertidal Salt Marshes

(14.0.820.0000) Brackish Marshes
(14.0.822) Middle-Intertidal Brackish Marshes
(14.0.823) High-Intertidal Brackish Marshes

(14.0.830.0000) Fringe Marshes
(14.0.832) Middle-Intertidal Fringe Marshes
(14.0.833) High-Intertidal Fringe Marshes

(14.0.840.0000) Diked Marshes
(14.0.842) Middle-Intertidal Diked Marshes
(14.0.843) High-Intertidal Diked Marshes

(14.0.900.0000) Artificial Structures

(Table VI-1 Continued)

(14.0.910.0000) Stationary Artificial Structures
(14.0.911) Jetties/Breakwaters
(14.0.912) Sea Walls/Revetment
(14.0.913) Dams/Levees
(14.0.914) Earthen Berms/Dikes
(14.0.915) Dredge Spoils
(14.0.916) Pilings/Piers
(14.0.917) Platforms
(14.0.918) Boat Ramps
(14.0.919) Wreckage

(14.0.920.0000) 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

(15.0.100.0000) Water Bodies

(15.0.130.0000) Estuaries
(15.0.132) Lagoonal Estuaries
(15.0.133) River-Mouth Estuaries
(15.0.134) Canyon-Mouth Estuaries

(15.0.170.0000) Tidal Ponds
(15.0.171) Tidal Dune-Swale Ponds

(15.0.200.0000) Channels

(15.0.220.0000) Estuarine Channels
(15.0.222) Shallow (Intertidal) Natural Estuarine Channels
(15.0.224) Shallow (Intertidal) Artificial Estuarine Channels

(15.0.230.0000) Tidal River Channels
(15.0.232) Shallow (Intertidal) Main-Stem River Channels
(15.0.234) Shallow (Intertidal) Distributary River Channels

(15.0.240.0000) Tidal Stream Channels
(15.0.242) Shallow (Intertidal) Canyon-Stream Channels
(15.0.244) Shallow (Intertidal) Dune-Stream Channels

(15.0.250.0000) Tidal Marsh Channels
(15.0.252) Shallow (Intertidal), Large, Tidal-Marsh Channels
(15.0.254) Shallow (Intertidal), Intermediate, Tidal-Marsh Channels
(15.0.256) Shallow (Intertidal), Small, Tidal-Marsh Channels

Wetland Type No.: 21.122(13.5.224.8342,8346)

FIG. VI-10. **ESTUARINE-INTERTIDAL UNCONSOLIDATED-BOTTOM (SAND) REGULARLY-FLOODED MIXOHALINE SHALLOW-ARTIFICIAL ESTUARINE-CHANNEL WETLAND**. Santa Barbara County, Carpinteria Valley, Carpinteria Salt Marsh Reserve. View southward along artificial channel in this structural-basin estuary. Dominant or characteristic species include the molluscs *Macoma* and *Tagalus*.

Wetland Type No.: 21.123(13.5.224.1700.2110,2200,8311)

FIG. VI-11. **ESTUARINE-INTERTIDAL UNCONSOLIDATED-BOTTOM (MIXED-FINES) REGULARLY-FLOODED MIXOHALINE SHALLOW-ARTIFICIAL ESTUARY-CHANNEL WETLAND**. Santa Barbara Co., Carpinteria Valley, Carpinteria Salt Marsh Reserve. View westward along artificial channel. Dominance or characteristic types include diatoms, green-algae, and the gastropod *Cerithidea*.

Wetland Type No.: 21.123(12.4.412.1800)
Wetland Type No.: 21.214(12.4.412.6143)

FIG. VI-12. **ESTUARINE-INTERTIDAL UNCONSOLIDATED-BOTTOM (MUD) IRREGULARLY-EXPOSED EUHALINE SHALLOW-BOTTOM WETLAND** (foreground) and **ESTUARINE-INTERTIDAL AQUATIC-BED ROOTED-VASCULAR (*ZOSTERA MARINA*) IRREGULARLY-EXPOSED EUHALINE SHALLOW-BOTTOM WETLAND** (lower-center). San Luis Obispo Co., Morro Bay, Baywood Park, view northwestward from Sweet Springs Nature Preserve across bay at low tide.

Wetland Type No.: 21.123(13.4.412.1800)

FIG. VI-13. **ESTUARINE-INTERTIDAL UNCONSOLIDATED-BOTTOM (MUD) REGULARLY-FLOODED EUHALINE SHALLOW-BOTTOM WETLAND**. Orange Co., Newport Backbay, view westward across bay at low tide.

Wetland Type No.: 21.123(13.5.511.1800,2200,8311)

FIG. VI-14. **ESTUARINE-INTERTIDAL UNCONSOLIDATED-BOTTOM (GREEN-ALGAE, *CERITHIDEA*) REGULARLY-FLOODED MIXOHALINE MUD-FLAT WETLAND**. San Diego Co., Imperial Beach, Tijuana Estuary, Tijuana River National Estuarine Research Reserve. View southward across regularly-flooded mud-flats and small tidal-channel toward emergent wetland dominated by *Spartina foliosa*.

Wetland Type No.: 21.123(13.5.511.1800,2200,8311)
Wetland Type No.: 21.241(13.5.811.5331)

FIG. VI-15. **ESTUARINE-INTERTIDAL UMCONSOLIDATED-BOTTOM (GREEN-ALGAE, *CERITHIDEA*) REGULARLY-FLOODED MIXOHALINE MUD-FLAT WETLAND** (center and left) and **ESTUARINE EMERGENT-PERSISTENT (*SALICORNIA VIRGINICA*) REGULARLY-FLOODED MIXOHALINE LOW-SALT-MARSH WETLAND** (right). San Diego Co., Imperial Beach, Tijuana Estuary, Tijuana River National Estuarine Research Reserve. View southward toward access berm.

Wetland Type No.: 21.123(14.7.512.1700)

FIG. VI-16. **ESTUARINE-INTERTIDAL UNCONSOLIDATED-BOTTOM (MIXED-FINE) IRREGULARLY-FLOODED HYPERSALINE SALT-FLAT WETLAND**. San Diego Co., Camp Pendleton, San Margarita River Estuary. Because this site is near the mouth of the estuary, beach sand is mixed with clay-size particles from the estuary to form extensive flats behind the mouth barrier and between the river channel and the shore of the estuary.

Wetland Type No.: 21.152(14.7.512.8640)

FIG. VI-17. **ESTUARINE-INTERTIDAL UNCONSOLIDATED-SHORE (MUD) IRREGULARLY-FLOODED HYPERSALINE SALT-FLAT WETLAND**. Santa Barbara Co., Carpinteria Valley, Carpinteria Salt Marsh, Carpinteria Salt Marsh Reserve. View westward across desiccated portion of margin of delta of Santa Monica Creek at this structural-basin type of estuary. Staphylinid beetles are the dominant or characteristic organism of this wetland type. Irregularly-flooded haline and euryhaline emergent wetland dominated by Ar*throcnemum subterminale* and *Salicornia virginica* occurs downslope adjacent to the hyperhaline salt flats.

Wetland Type No.: 21.152(13.5.313.1600)
Wetland Type No.: 21.152(13.5.323.1600)

FIG. VI-18. **ESTUARINE-INTERTIDAL UNCONSOLIDATED-SHORE (SAND) REGULARLY-FLOODED MIXOHALINE ESTUARY-SHORE AND ESTUARY-BEACH WETLAND**. Monterey Co., Andrew Molera State Park, Big Sur River Estuary. View eastward across river-mouth barrier toward the Santa Lucia Mountains. Marine Unconsolidated-Shore Wetland and Palustrine Scrub-Shrub and Forested Wetlands occur adjacent to the irregularly-exposed, regularly-flooded, and irregularly-flooded estuarine wetlands.

Wetland Type No.: 21.152(13.6.323.1600)

FIG.VI-19. **ESTUARINE-INTERTIDAL UNCONSOLIDATED-SHORE (SAND) REGULARLY-FLOODED EURYHALINE ESTUARY-BEACH WETLAND**. Los Angeles Co., Malibu, Malibu Lagoon. View southward from mouth of estuary along sand-barrier. This transition between marine and estuarine environments includes a series of wetland types that vary between systems, subsystems, and classes depending on the time of year, frequency of storm and runoff conditions, and closure of the estuary mouth.

Wetland Type No.: 21.212(13.5.224.2262)

FIG. VI-20. **ESTUARINE-INTERTIDAL AQUATIC-BED FLOATING-ALGAL (*ENTEROMORPHA*) REGULARLY-FLOODED MIXOHALINE SHALLOW-ARTIFICAL ESTUARY-CHANNEL WETLAND**. Santa Barbara Co., Carpinteria Valley, Carpinteria Salt Marsh Reserve. View during summer, southward along channel of Santa Monica Creek at approximately high tide. E*nteromorpha clathrata* dominates the surface of channels that become filled with sediment and are enriched with nutients in runoff and seepage from a perched water table.

Wetland Type No.: 21.211(14.6.513.2600)

FIG. VI-21. **ESTUARINE-INTERTIDAL AQUATIC-BED ATTACHED-ALGAL (BLUE-GREEN ALGAE) IRREGULARLY-FLOODED EURYHALINE VEGETATED-FLAT WETLAND**. Santa Barbara Co., Carpinteria Valley, Carpinteria Salt Marsh Reserve. View southeastward across flats on margin of delta of Santa Monica Creek. Exposed and desiccated algae flats are adjacent to estuarine hyperhaline salt-flats and emergent wetland.

Wetland Type No.: 21.214(12.5.222.6122)

FIG. VI-22. **ESTUARINE-INTERTIDAL AQUATIC-BED ROOTED-VASCULAR (*RUPPIA CIRRHOSA*) IRREGULARLY-EXPOSED MIXOHALINE SHALLOW-NATURAL-CHANNEL WETLAND**. Santa Barbara Co., Hollister Ranch, Santa Anita Estuary. View from this canyon-mouth type estuary southward toward Pacific Ocean. Estuarine Emergent-Persistent Wetlands occur to the east and west of the channel.

Wetland Type No.: 21.214(15.6.412.6123)

FIG. VI-23. **ESTUARINE-INTERTIDAL AQUATIC-BED ROOTED-VASCULAR (*RUPPIA MARITIMA*) SEASONALLY-FLOODED EURYHALINE SHALLOW-BOTTOM WETLAND**. Santa Barbara Co., Goleta Valley, University of California Santa Barbara, Coal Oil Point Reserve, Devereux Slough. View northwestward across canyon-mouth type estuary. Unconsolidated-bottom and aquatic-bed wetlands exposed when sand mouth barrier broke open following flooding from winter storms.

Wetland Type No.: 21.241(12.5.821.6232)

FIG. VI-24. **ESTUARINE-INTERTIDAL EMERGENT-PERSISTENT (*SCIRPUS CALIFORNICUS*) IRREGULARLY-EXPOSED MIXOHALINE LOW-BRACKISH-MARSH WETLAND** (center and right). Los Angeles Co., Malibu, Malibu Lagoon. View northward along marin of brackish marsh in small tidal channel. Emergent wetland dominated by *Salicornia virginica* (left) occurs along the banks of the channel.

Wetland Type No.: 21.241(12.5.821/831.6231)

FIG. VI-25. **ESTUARINE-INTERTIDAL EMERGENT-PERSISTENT (*SCIRPUS AMERICANUS*) IRREGULARLY-EXPOSED MIXOHALINE LOW-BRACKISH FRINGE-MARSH WETLAND** (left center). San Luis Obispo Co., Morro Bay, Los Osos, Los Osos Creek. View northwestward across Los Osos Creek toward brackish fringe-marsh in low flooded area supported by seep from adjacent palustrine forested wetland (left center) but flooded by tidal water irregularly.

Wetland Type No.: 21.241(12.5.821/831.6232,6233,6235)

FIG. VI-26. **ESTUARINE-INTERTIDAL EMERGENT-PERSISTENT (*SCIRPUS CALIFORNICUS, S. MARITIMUS, S. ROBUSTUS*) IRREGULARLY-EXPOSED MIXOHALINE LOW-BRACKISH FRINGE-MARSH WETLAND** (left to right center). San Luis Obispo Co., Morro Bay, Los Osos, Los Osos Creek. View southeastward across todal portion of Los Osos Creek toward brackish fringe-marsh that occurs in flooded low area supported by seeps but flooded by tide water irregularly. Adjacent palustrine forested wetland (background) dominated by Sa*lix lasiolepis*.

Wetland Type No.: 21.241(13.5.330.5331)

FIG. VI-27. **ESTUARINE-INTERTIDAL EMERGENT-PERSISTENT (*SALICORNIA VIRGINICA*) REGULARLY-FLOODED MIXOSALINE ESTUARY-BANK WETLAND**. San Luis Obispo Co., Morro Bay State Park, Morro Bay near Morro Creek. View northward along estuarine channel with regularly-flooded banks (especially left-center) dominated by pickleweed (*Salicornia virginica*). Irregularly-flooded salt marsh occurs adjacent to the lower-bank hydrogeomorphic type and Unconsolidated-Bottom Wetland occurs in the natural estuarine channel.

Wetland Type No.: 21.241(13.5.330.5331)

FIG. VI-28. **ESTUARINE-INTERTIDAL EMERGENT-PERSISTENT (*SALICORNIA VIRGINICA*) REGULARLY-FLOODED MIXOSALINE ESTUARY-BANK WETLAND**. Los Angeles Co., Malibu State Beach, Malibu Lagoon. View northward along artificial secondary channel. Regularly-flooded channel-banks are dominated by pickleweed. Unconsolidated-Shore Wetland and Unconsolidated-Bottom Wetland also occur in the channel.

Wetland Type No.: 21.241(13.5.811.6441)

FIG. VI-29. **ESTUARINE-INTERTIDAL EMERGENT-PERSISTENT (*SPARTINA FOLIOSA*) REGULARLY-FLOODED MIXOHALINE LOW-SALT-MARSH WETLAND**. San Diego Co., Imperial Beach, Tijuana River Estuary, Tijuana River National Estuarine Research Reserve. View northeastward across low salt marsh dominated by cordgrass (*Spartina foliosa*).

Wetland Type No.: 21.241(13.5.811.6441)
Wetland Type No.: 21.150(13.5.252.1500,1600)

FIG. VI-30. **ESTUARINE-INTERTIDAL EMERGENT-PERSISTENT (*SPARTINA FOLIOSA*) REGULARLY-FLOODED MIXOHALINE LOW-SALT-MARSH WETLAND** (upper center, left and right) and **ESTUARINE-INTERTIDAL UNCONSOLIDATED-SHORE (MIXED-COARSE AND SAND) REGULARLY-FLOODED MIXOHALINE LARGE TIDAL-MARSH-CHANNEL WETLAND** (lower left). San Diego Co., Imperial Beach, Tijuana River Estuary, Tijuana River National Estuarine Research Reserve. View northward along channel with subtidal deepwater habitats and intertidal wetlands.

Wetland Type No.: 21.241(14.5.812.5331,5341)
Wetland Type No.: 21.241(13.5.811.5331,5411)

FIG. VI-31. **ESTUARINE-INTERTIDAL EMERGENT-PERSISTENT (*SALICORNIA VIRGINICA, SUAEDA ESTEROA*) IRREGULARLY-FLOODED MIXOHALINE MIDDLE-SALT-MARSH WETLAND** (left) and **ESTUARINE-INTERTIDAL EMERGENT-PERSISTENT (*SALICORNIA VIRGINICA, BATIS MARITIMA*) REGULARLY-FLOODED MIXOHALINE LOW-SALT-MARSH WETLAND** (right). Ventura Co., Point Mugu Pacific Naval Air Station, Mugu Lagoon. View northwestward towards military facilities and Pacific Ocean. Rack line delineates approximate boundary between wetland types.

Wetland Type No.: 21.241(13.5.811.5331,5341)
Wetland Type No.: 21.123(13.5.256.1800)

FIG. VI-32. **ESTUARINE-INTERTIDAL EMERGENT-PERSISTENT (*SALICORNIA VIRGINICA, BATIS MARITIMA*) REGULARLY-FLOODED MIXOHALINE LOW-SALT-MARSH WETLAND** (foreground) and **ESTUARINE UNCONSOLIDATED-BOTTOM (MUD) REGULARLY-FLOODED MIXOHALINE SMALL TIDAL-MARSH-CHANNEL WETLAND** (center and left). Ventura Co., Point Mugu Pacific Naval Air Station, Mugu Lagoon. View westward toward the Pacific Ocean. Irregularly-flooded emergent wetland (left) is dominated by *Salicornia virginica* and *Suaeda esteroa*.

Wetland Type No.: 21.241(14.5.812.5331,5451)

FIG. VI-33. **ESTUARINE-INTERTIDAL EMERGENT-PERSISTENT (*SALICORNIA VIRGINICA, LIMONIUM CALIFORNICUM*) IRREGULARLY-FLOODED MIXOHALINE MIDDLE-SALT-MARSH WETLAND**. San Luis Obispo Co., Morro Bay, Morro Bay State Beach. View southward toward Los Osos, Baywood Park, and Montano De Oro State Park. Salinity may vary and reach hypersaline concentrations.

Wetland Type No. 21.241(14.5.812.5332, 5551)

FIG. VI-34. **ESTUARINE-INTERTIDAL PERSISTENT-EMERGENT (*SALICORNIA VIRGINICA, CORDYLANTHUS MARITIMUS*) IRREGULARLY-FLOODED MIXOHALINE MIDDLE-SALT-MARSH WETLAND**. Santa Barbara Co., Carpinteria Valley, Carpinteria Salt Marsh Reserve. View northwestward toward Santa Ynez Mountains. *Cordylanthus maritimus* ssp. *maritimus* is a nonpersistent annual plant that seasonally occurs co-dominantly with *Salicornia virginica* and other middle and upper marsh species such as *Arthrocnemum subterminale, Atriplex watsonii*, and *Monanthochloe littoralis.*

Wetland Type No.: 21.241(15.5.833.6232)

FIG. VI-35. **ESTUARINE-INTERTIDAL EMERGENT-PERSISTENT (*SCIRPUS CALIFORNICUS*) SEASONALLY-FLOODED MIXOHALINE HIGH-FRINGE-MARSH WETLAND** (left center). Ventura Co., San Buenaventura, Emma Wood State Beach, Ventura River Estuary. View southwestward toward railroad bridge and the Pacific Ocean. Irregularly-exposed unconsolidated bottom wetlands occur in the estuarine river channel and palustine scrub-shrub and forested wetlands occur on the river delta.

Wetland Type No.: 21.241(15.5.351.5441,6235)

FIG. VI-36. **ESTUARINE-INTERTIDAL EMERGENT-PERSISTENT (*FRANKENIA SALINA, SCIRPUS ROBUSTUS*) SEASONALLY-FLOODED MIXOHALINE ESTUARY-TERRACE WETLAND**. Santa Barbara Co., Goleta Valley, University of California Santa Barbara, Coal Oil Point Reserve, Devereux Slough. View westward toward palustrine forested and scrub-shrub wetlands adjacent to the estuarine wetlands that flood seasonally when the mouth of the estuary is closed.

Wetland Type No.: 21.242(14.7.520.5512)

FIG. VI-37. **ESTUARINE-INTERTIDAL EMERGENT-NONPERSISTENT (*LASTHENIA GLABRATA*) IRREGULARLY-FLOODED EURYHALINE DELTA WETLAND**. Santa Barbara Co., Carpinteria Valley, Carpinteria Salt Marsh Reserve. View westward from estuarine delta of Santa Monica Creek toward the Santa Ynez Mountains. Emergent-Nonpersistent Wetland dominated by *Lasthenia glabrata* ssp. *coulteri* also occurs with the perennial plants *Arthrocnemum subterminale, Salicornia virginica,* and *Monanthechloe littoralis* and is bounded by lower-elevation hyperhaline salt flats downslope (background) and other euryhaline wetlands dominated by the annual grass *Lolium multiflorum* (foreground).

Wetland Type No.: 21.242(14.7.520.5512)

FIG. VI-38. **ESTUARINE-INTERTIDAL EMERGENT-NONPERSISTENT (*LASTHENIA GLABRATA*) IRREGULARLY-FLOODED EURYHALINE DELTA WETLAND**. Santa Barbara Co., Carpinteria Valley, Carpinteria Salt Marsh Reserve. Photograph taken in April 1993. Other "winter" annuals that occur with *Lasthenia glabrata* ssp. *coulteri* and also can be dominant include *Juncus bufonius, Hutchinsia procumbens, Parapholis incurva*, and *Spergularia marina.*

Wetland Type No.: 21.242(15.5.420.5531,5541,5542)

FIG. VI-39. **ESTUARINE-INTERTIDAL EMERGENT-NONPERSISTENT (*SPERGULARIA, ATRIPLEX, CHENOPODIUM*) SEASONALLY-FLOODED MIXOHALINE SHALLOW-BAR WETLAND**. Ventura Co., San Buenaventura, Seaside Wilderness Park, Ventura River Estuary. View southward toward Pacific Ocean at low tide and with mouth-barrier open. When nonpersistent vegetation is lacking, this site belongs to Class Unconsolidated-Bottom. Depending on the status of estuary mouth opening or closure and the elevation of the bars and bed, the water regime can be Irregularly-Exposed, Regularly-Flooded, Irregularly-Flooded, or Seasonally-Flooded.

Wetland Type No. 21.242(15.5.420.5531,5541,5542)

FIG. VI-40. **ESTUARINE-INTERTIDAL EMERGENT-NONPERSISTENT SEASONALLY-FLOODED MIXOHALINE SHALLOW-BED WETLAND**. Ventura Co., San Buenaventura, Seaside Wilderness Park, Ventura River Estuary. View southeastward across the main estuary channel at low tide with the mouth-barrier open. Estuarine-Intertidal Unconsolidated-Bottom Irregularly-Exposed Wetland and Subtidal Deepwater Habitat (upper center) occurs adjacent to the Emergent-Nonpersistent Wetland (foreground).

Wetland Type No.: 21.253(14.4.313.5632)

FIG. VI-41. **ESTUARINE-INTERTIDAL SCRUB-SHRUB BROADLEAVED-EVERGREEN (*SUAEDA CALIFORNICA*) IRREGULARLY-FLOODED EUHALINE ESTUARY-SHORE WETLAND**. San Luis Obispo Co., Morro Bay, Morro Bay State Park. View northwestward toward Morro Rock and the Pacific Ocean. A narrow band of this succulent halophyte shrub occurs in scattered locations on the margin of the estuary adjacent to unconsolidated shore wetland or emergent (salt marsh) wetland and upland habitats. As viewed here, regularly-flooded unconsolidated-bottom wetland (left center) is exposed at low tide.

Wetland Type No.: 21.253(14.5.313.5611,5624,5631,5633)

FIG. VI-42. **ESTUARINE-INTERTIDAL SCRUB-SHRUB BROADLEAVED-EVERGREEN (*CARPOBROTUS, ISOCOMA, ATRIPLEX, SUAEDA*) IRREGULARLY-FLOODED MIXOHALINE ESTUARY-SHORE WETLAND**. San Diego Co., Camp Pendleton, Santa Margarita River Estuary. View northwestward at mouth of estuary. Dominants or characteristic species include *Carpobrotus edulis* (naturalized), *Isocoma menziesii, Atriplex lentiformis,* and *Suaeda taxifolia*.

(Table VI-1 Continued)

(15.0.280.0000) Culverts
(15.0.281) Large (Wide/Long) Concrete Culverts
(15.0.282) Small (Narrow/Short) Concrete Culverts

(15.0.290.0000) Ditches
(15.0.292) Shallow (Intertidal) Large Tidal-Ditches
(15.0.294) Shallow (Intertidal) Intermediate Tidal-Ditches
(15.0.296) Shallow (Intertidal) Small Tidal-Ditches

(15.0.300.0000) Shores, Beaches, Banks, Benches

(15.0.310.0000) Shores
(15.0.313) Estuary Shores

(15.0.320.0000) Beaches
(15.0.313) Estuary Beaches

(15.0.330.0000) Banks
(15.0.331) Estuary Banks

(15.0.340.0000) Benches
(15.0.343) Estuary Benches

(15.0.350.0000) Terraces
(15.0.351) Estuary Terraces

(15.0.400.0000) Bottoms, Beds, Bars, Reefs

(15.0.410.0000) Beds/Bottoms/Floors
(15.0.412) Shallow (Intertidal) Beds/Bottoms/Floors

(15.0.420.0000) Bars
(15.0.422) Shallow (Intertidal) Bars

(5.0.500.0000) Flats, Deltas

(15.0.510.0000) Flats
(15.0.511) Mineral Flats
(15.0.512) Precipitate Flats
(15.0.513) Vegetated-Algal Flats
(15.0.514) Vegetated-Plant Flats

(15.0.520.0000) Deltas
(15.0.521) Deltas

(15.0.600.0000) Headlands, Bluffs, Slopes

(15.0.610.0000) Headlands
(15.0.611) Large Headlands
(15.0.612) Small Headlands

(Table VI-1 Continued)

(15.0.620.0000) Cliffs/Bluffs
(15.0.621) Cliffs/Bluffs

(15.0.630.0000) Slopes
(15.0.633) Estuary Slopes

(15.0.700.0000) Seeps, Springs

(15.0.710.0000) Seeps
(15.0.711) Seeps

(15.0.720.0000) Springs
(15.0.712) Springs

(15.0.800.000) Marshes

(15.0.810.0000) Salt Marshes
(15.0.811) Low-Intertidal Salt Marshes
(15.0.812) Middle-Intertidal Salt Marshes
(15.0.813) High-Intertidal Salt Marshes

(15.0.820.0000) Brackish Marshes
(15.0.811) Low-Intertidal Brackish Marshes
(15.0.822) Middle-Intertidal Brackish Marshes
(15.0.823) High-Intertidal Brackish Marshes

(15.0.830.0000) Fringe Marshes
(15.0.831) Low-Intertidal Fringe Marsh
(15.0.832) Middle-Intertidal Fringe Marsh
(15.0.833) High-Intertidal Fringe Marsh

(15.0.840.0000) Diked Marshes
(15.0.841) Low-Intertidal Diked Marsh
(15.0.842) Middle-Intertidal Diked Marsh
(15.0.843) High-Intertidal Diked Marsh

(15.0.900.0000) Artificial Structures

(15.0.910.0000) Stationary Artificial Structures
(15.0.911) Jetties/Breakwaters
(15.0.912) Sea Walls/Revetment
(15.0.913) Dams/Levees
(15.0.914) Earthen Berms/Dikes
(15.0.915) Dredge Spoils
(15.0.916) Pilings/Piers
(15.0.917) Platforms
(15.0.918) Boat Ramps
(15.0.919) Wreckage

(Table VI-1 Continued)

(15.0.920.0000) Floating Artificial Structures
(15.0.921) Hulls
(15.0.921) Docks
(15.0.923) Buoys
(15.0.924) Logs

CATALOGUE OF ESTUARINE WETLANDS

This catalogue includes estuarine wetland types identified during the course of this study. The catalogue is arranged by subclass as identified using the preceding key. Within the subclasses, the wetlands are arranged according to the hierarchical wetland type number. There was no attempt on the part of the authors to include all types of wetlands from each level of the hierarchy. Instead, we attempted to include examples of types from various classes, subclasses, water regimes, salinities, hydrogeomorphic units, and dominance types. Illustrated and described examples of estuarine wetland types occur at the end of this catalogue and are cited herein by figure number within the appropriate wetland type. 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 Unites 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.

20.000 SYSTEM ESTUARINE
21.000 SUBSYSTEM INTERTIDAL
21.110 CLASS ROCK-BOTTOM

21.112 SUBCLASS RUBBLE-BOULDER

* * * *

20.000 SYSTEM ESTUARINE
21.000 SUBSYSTEM INTERTIDAL
21.120 CLASS UNCONSOLIDATED-BOTTOM

21.121 SUBCLASS COBBLE-GRAVEL

* * * *

20.000 SYSTEM ESTUARINE
21.000 SUBSYSTEM INTERTIDAL
21.120 CLASS UNCONSOLIDATED-BOTTOM

21.122 SUBCLASS SAND

Wetland Type No.: 21.122(13.5.224.8342,8346)
ESTUARINE-INTERTIDAL UNCONSOLIDATED-BOTTOM (SAND) REGULARLY-FLOODED MIXOHALINE SHALLOW-ARTIFICIAL ESTUARINE-CHANNEL WETLAND.
Santa Barbara County, Carpinteria Valley, Carpinteria Salt Marsh Reserve. **Section 10/404**

Jurisdiction: This named wetland is a tidal water of the United States with Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the limit of the adjacent wetland. **FIG. VI-10.**

Wetland Type No.: 21.122(12.5.821/831.6231)
ESTUARINE-INTERTIDAL EMERGENT-PERSISTENT (*SCIRPUS AMERICANUS*) IRREGULARLY-EXPOSED MIXOHALINE LOW-BRACKISH FRINGE-MARSH WETLAND (left center). San Luis Obispo Co., Morro Bay, Los Osos, Los Osos Creek. **Section 10/404 Jurisdiction:** This named wetland is a tidal water of the United States with Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the limit of the wetland adjacent to tidal waters. **FIG. VI-25.**

* * * *

20.000 SYSTEM ESTUARINE
21.000 SUBSYSTEM INTERTIDAL
21.120 CLASS UNCONSOLIDATED-BOTTOM

21.123 SUBCLASS MUD

Wetland Type No.: 21.123(13.5.256.1800)
ESTUARINE UNCONSOLIDATED-BOTTOM (MUD) REGULARLY-FLOODED MIXOHALINE SMALL-TIDAL-MARSH CHANNEL WETLAND. Ventura Co., Point Mugu Pacific Naval Air Station, Mugu Lagoon. Irregularly-flooded emergent wetland is dominated by *Salicornia virginica* and *Suaeda esteroa*. **Section 10/404 Jurisdiction:** These named wetlands are tidal waters of the United States with Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the limit of the wetland adjacent to the tidal channel. **FIG. VI-32.**

Wetland Type No.: 21.123(12.4.412.1800)
ESTUARINE-INTERTIDAL UNCONSOLIDATED-BOTTOM (MUD) IRREGULARLY-EXPOSED EUHALINE SHALLOW-BOTTOM WETLAND. San Luis Obispo Co., Morro Bay, Baywood Park, Sweetwater Springs Reserve. **Section 10/404 Jurisdiction:** This named wetland is a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line. **FIG. VI-12.**

Wetland Type No.: 21.123(13.4.412.1800)
ESTUARINE-INTERTIDAL UNCONSOLIDATED-BOTTOM (MUD) REGULARLY-FLOODED EUHALINE SHALLOW-BOTTOM WETLAND. Orange Co., Newport Backbay. **Section 10/404 Jurisdiction:** This named wetland is a tidal water of the United States with Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the limit of the adjacent wetland. **FIG. VI-13.**

Wetland Type No.: 21.123(13.5.224.1700,2110,2200,8311)
ESTUARINE-INTERTIDAL UNCONSOLIDATED-BOTTOM (MUD) REGULARLY-FLOODED MIXOHALINE SHALLOW-ARTIFICIAL ESTUARY-CHANNEL WETLAND. Santa Barbara Co., Carpinteria Valley, Carpinteria Salt Marsh Reserve. Dominance or characteristic types include diatoms, green algae, and the gastropod *Cerithidea*. **Section 10/404 Jurisdiction:** This named wetland is a tidal water of the United States with Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the limit of the adjacent wetland. **FIG. VI-11.**

Wetland Type No.: 21.123(13.5.511.1880,2200,8311)
ESTUARINE-INTERTIDAL UNCONSOLIDATED-BOTTOM (GREEN-ALGAE, *CERITHIDEA*) REGULARLY-FLOODED MIXOHALINE MUD-FLAT WETLAND. San Diego Co., Imperial Beach, Tijuana Estuary, Tijuana River National Estuarine Research Reserve. **Section 10/404 Jurisdiction:** This named wetland is a tidal water of the United States with Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the limit of the adjacent wetland. **FIG. VI-14**.

Wetland Type No.: 21.123(14.7.512.1700)
ESTUARINE-INTERTIDAL UNCONSOLIDATED-BOTTOM (MIXED-FINE) IRREGULARLY-FLOODED HYPERSALINE SALT-FLAT WETLAND. San Diego Co., Camp Pendleton, San Margarita River Estuary. **Section 10/404 Jurisdiction:** This named wetland is within Section 10/404 jurisdiction. It consists of tidal areas and a mosaic of wetlands and other waters of the United States regulated under the commerce connection. **FIG. VI-16**.

* * * *

20.000 SYSTEM ESTUARINE
21.000 SUBSYSTEM INTERTIDAL
21.140 CLASS ROCKY-SHORE

21.142 SUBCLASS RUBBLE-BOULDER

Wetland Type No.: 21.142(12.5.821/831.6232,6233,6235)
ESTUARINE-INTERTIDAL EMERGENT-PERSISTENT (*SCIRPUS CALIFORNICUS, S. MARITIMUS, S. ROBUSTUS*) IRREGULARLY-EXPOSED MIXOHALINE LOW-BRACKISH FRINGE-MARSH WETLAND. San Luis Obispo Co., Morro Bay, Los Osos, Los Osos Creek. **Section 10/404 Jurisdiction:** This named wetland is a tidal water of the United States with Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the landward limit of the wetland adjacent to tidal waters. **FIG. VI-26**.

* * * *

20.000 SYSTEM ESTUARINE
21.000 SUBSYSTEM INTERTIDAL
21.150 CLASS UNCONSOLIDATED-SHORE

21.151 SUBCLASS COBBLE-GRAVEL

Wetland Type No.: 21.150(13.5.252.1500,1600)
ESTUARINE-INTERTIDAL UNCONSOLIDATED-SHORE (MIXED-COARSE AND SAND) REGULARLY-FLOODED MIXOHALINE LARGE TIDAL-MARSH-CHANNEL WETLAND. San Diego Co., Imperial Beach, Tijuana River Estuary, Tijuana River National Estuarine Research Reserve. **Section 10/404 Jurisdiction:** These named wetlands are tidal waters of the United States with Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the limit of the wetland adjacent to the tidal channel. **FIG. VI-30**.

* * * *

20.000 SYSTEM ESTUARINE
21.000 SUBSYSTEM INTERTIDAL
21.150 CLASS UNCONSOLIDATED-SHORE

21.152 SUBCLASS SAND

Wetland Type No.: 21.152(13.5.313.1600)
ESTUARINE-INTERTIDAL UNCONSOLIDATED-SHORE (SAND) REGULARLY-FLOODED MIXOHALINE ESTUARY-SHORE WETLAND. Monterey Co., Andrew Molera State Park, Big Sur River Estuary. **Section 10/404 Jurisdiction:** This named wetland is a tidal water of the United States with Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the landward limit of the high tide line or to the limit of the wetland adjacent to the tidal estuary, which ever is greater. **FIG. VI-18**.

Wetland Type No.: 21.152(13.5.323.1600)
ESTUARINE-INTERTIDAL UNCONSOLIDATED-SHORE (SAND) REGULARLY-FLOODED MIXOHALINE ESTUARY-BEACH WETLAND. Monterey Co., Andrew Molera State Park, Big Sur River Estuary. **Section 10/404 Jurisdiction:** This named wetland is a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line. **FIG. VI-18**.

Wetland Type No.: 21.152(13.4.323.1600)
ESTUARINE-INTERTIDAL UNCONSOLIDATED-SHORE (SAND) REGULARLY-FLOODED HALINE ESTUARY-BEACH WETLAND. Los Angeles Co., Malibu, Malibu Lagoon. **Section 10/404 Jurisdiction:** This named wetland is a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line. **FIG. VI-19**.

* * * *

20.000 SYSTEM ESTUARINE
21.000 SUBSYSTEM INTERTIDAL
21.150 CLASS UNCONSOLIDATED-SHORE

21.153 SUBCLASS MUD

Wetland Type No.: 21.152(14.7.512.8640)
ESTUARINE-INTERTIDAL UNCONSOLIDATED-SHORE (MUD) IRREGULARLY-FLOODED HYPERSALINE SALT-FLAT WETLAND. Santa Barbara Co., Carpinteria Valley, Carpinteria Salt Marsh, Carpinteria Salt Marsh Reserve. **Section 10/404 Jurisdiction:** This named wetland is within Section 10/404 jurisdiction. It consists of tidal areas and a mosaic of wetland and other waters of the United States regulated under the commerce connection. **FIG. VI-17**.

* * * *

20.000 SYSTEM ESTUARINE
21.000 SUBSYSTEM INTERTIDAL
21.220 CLASS AQUATIC-BED

21.211 SUBCLASS ATTACHED-ALGAL

Wetland Type No.: 21.211(14.6.513.2600)
ESTUARINE-INTERTIDAL AQUATIC-BED ATTACHED-ALGAL (BLUE-GREEN ALGAE) IRREGULARLY-FLOODED EURYHALINE VEGETATED-FLAT WETLAND. Santa Barbara Co., Carpinteria Valley, Carpinteria Salt Marsh Reserve. **Section 10/404 Jurisdiction:** This named wetland is a tidal water of the United States with Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the limit of the wetland adjacent to the tidal flat. **FIG. VI-21**.

* * * *

20.000 SYSTEM ESTUARINE
21.000 SUBSYSTEM INTERTIDAL
21.220 CLASS AQUATIC-BED

21.212 SUBCLASS FLOATING-ALGAL

Wetland Type No.: 21.212(13.5.224.2262)
ESTUARINE-INTERTIDAL AQUATIC-BED FLOATING-ALGAL (*ENTEROMORPHA*) REGULARLY-FLOODED MIXOHALINE SHALLOW-ARTIFICAL ESTUARY-CHANNEL WETLAND. Santa Barbara Co., Carpinteria Valley, Carpinteria Salt Marsh Reserve. **Section 10/404 Jurisdiction:** This named wetland is a tidal water of the United States with Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the limit of the wetland adjacent to the tidal channel. **FIG. VI-20.**

* * * *

20.000 SYSTEM ESTUARINE
21.000 SUBSYSTEM INTERTIDAL
21.220 CLASS AQUATIC-BED

21.214 SUBCLASS ROOTED-VASCULAR

Wetland Type No.: 21.214(12.4.412.6143)
ESTUARINE-INTERTIDAL AQUATIC-BED ROOTED-VASCULAR (*ZOSTERA MARINA*) IRREGULARLY-EXPOSED EUHALINE SHALLOW-BOTTOM WETLAND (lower-center). San Luis Obispo Co., Morro Bay, Baywood Park, Sweetwater Springs Reserve. **Section 10/404 Jurisdiction:** This named wetland is a tidal water of the United States with Section 10/404 jurisdiction extending landward to the high tide line. **FIG. VI-12**.

Wetland Type No.: 21.214(12.5.172.6122)
ESTUARINE-INTERTIDAL AQUATIC-BED ROOTED-VASCULAR (*RUPPIA CIRRHOSA*) IRREGULARLY-EXPOSED MIXOHALINE TIDAL-MARSH-POND WETLAND. San Diego Co., Del Mar, San Dieguito Lagoon. **Section 10/404 Jurisdiction:** This named wetland is a jurisdictional wetland under Section 404.

Wetland Type No.: 21.214(12.5.222.6122)
ESTUARINE-INTERTIDAL AQUATIC-BED ROOTED-VASCULAR (*RUPPIA CIRRHOSA*) IRREGULARLY-EXPOSED MIXOHALINE SHALLOW-NATURAL-CHANNEL WETLAND. Santa Barbara Co., Hollister Ranch, Santa Anita Estuary. **Section 10/404 Jurisdiction:** This

named wetland is a tidal water of the United States with Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the limit of the wetland adjacent to the tidal channel. **FIG. VI-22.**

Wetland Type No.: 21.214(13.5.422.1600)
ESTUARINE-INTERTIDAL UNCONSOLIDATED-BOTTOM (SAND) REGULARLY-FLOODED MIXOHALINE SHALLOW-BAR WETLAND. San Diego Co., Del Mar, San Dieguito Lagoon. **Section 10/404 Jurisdiction:** This named wetland is regulated to the landward extent of the high tide.

Wetland Type No.: 21.214(14.5.912.1300)
ESTUARINE-INTERTIDAL ROCKY-SHORE (RUBBLE) IRREGULARLY-FLOODED MIXOHALINE REVETMENT WETLAND. San Diego Co., Del Mar, San Dieguito Lagoon. **Section 10/404 Jurisdiction:** This named wetland is regulated to the landward extent of the high tide.

Wetland Type No.: 21.214(15.6.412.6123)
ESTUARINE-INTERTIDAL AQUATIC-BED ROOTED-VASCULAR (*RUPPIA MARITIMA*) SEASONALLY-FLOODED EURYHALINE SHALLOW-BOTTOM WETLAND. Santa Barbara Co., Goleta Valley, University of California Santa Barbara, Coal Oil Point Reserve, Devereux Slough. **Section 10/404 Jurisdiction:** This named wetland is a tidal water of the United States with Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the limit of the wetland adjacent to tidal waters. **FIG. VI-23.**

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20.000 SYSTEM ESTUARINE
21.000 SUBSYSTEM INTERTIDAL
21.220 CLASS AQUATIC-BED

21.215 SUBCLASS FLOATING-VASCULAR

* * * *

20.000 SYSTEM ESTUARINE
21.000 SUBSYSTEM INTERTIDAL
21.240 CLASS EMERGENT WETLAND

21.241 SUBCLASS EMERGENT-PERSISTENT

Wetland Type No.: 21.241(12.5.821.6232)
ESTUARINE-INTERTIDAL EMERGENT-PERSISTENT (*SCIRPUS CALIFORNICUS*) IRREGULARLY-EXPOSED MIXOHALINE LOW-BRACKISH-MARSH WETLAND. Los Angeles Co., Malibu, Malibu Lagoon. **Section 10/404 Jurisdiction:** This named wetland is a tidal water of the United States with Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the landward limit of the wetland adjacent to tidal waters. **FIG. VI-24.**

Wetland Type No.: 21.241(13.5.330.5331)
ESTUARINE-INTERTIDAL EMERGENT-PERSISTENT (*SALICORNIA VIRGINICA*)

REGULARLY-FLOODED MIXOSALINE ESTUARY-BANK WETLAND. San Luis Obispo Co., Morro Bay State Park, Morro Bay near Morro Creek; Los Angeles Co., Malibu State Beach, Malibu Lagoon. **Section 10/404 Jurisdiction:** This named wetland is a tidal water of the United States with Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the limit of the wetland adjacent to tidal waters. **FIGS. VI-27, VI-28**.

Wetland Type No.: 21.241(13.5.811.6441)
ESTUARINE-INTERTIDAL EMERGENT-PERSISTENT (*SPARTINA FOLIOSA*) REGULARLY-FLOODED MIXOHALINE LOW-SALT-MARSH WETLAND. San Diego Co., Imperial Beach, Tijuana River Estuary, Tijuana River National Estuarine Research Reserve. **Section 10/404 Jurisdiction:** This named wetland is a tidal water of the United States with Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the limit of the wetland adjacent to tidal waters. **FIGS. VI-29, VI-30**.

Wetland Type No.: 21.241(13.5.811.5331)
ESTUARINE EMERGENT-PERSISTENT (*SALICORNIA VIRGINICA*) REGULARLY-FLOODED MIXOHALINE LOW-SALT-MARSH WETLAND. San Diego Co., Imperial Beach, Tijuana Estuary, Tijuana River National Estuarine Research Reserve. **Section 10/404 Jurisdiction:** This named wetland is a tidal water of the United States with Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the limit of the wetland adjacent to tidal waters. **FIG. VI-31.**

Wetland Type No.: 21.241(13.5.811.5331,5411)
ESTUARINE-INTERTIDAL EMERGENT-PERSISTENT (*SALICORNIA VIRGINICA, BATIS MARITIMA*) REGULARLY-FLOODED MIXOHALINE LOW-SALT-MARSH WETLAND. Ventura Co., Point Mugu Pacific Naval Air Station, Mugu Lagoon. **Section 10/404 Jurisdiction:** This named wetland is a tidal water of the United States with Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the landward limit of the wetland adjacent to tidal waters. **FIGS. VI-31, VI-32**.

Wetland Type No.: 21.241(14.5.812.5331,5341)
ESTUARINE-INTERTIDAL EMERGENT-PERSISTENT (*SALICORNIA VIRGINICA, SUAEDA ESTEROA*) IRREGULARLY-FLOODED MIXOHALINE MIDDLE-SALT-MARSH WETLAND. Ventura Co., Point Mugu Pacific Naval Air Station, Mugu Lagoon. **Section 10/404 Jurisdiction:** This named wetland is a tidal water of the United States with Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the landward limit of the wetland adjacent to tidal waters. **FIGS. VI-31, VI-32**.

Wetland Type No.: 21.241(14.5.812.5331,5451)
ESTUARINE-INTERTIDAL EMERGENT-PERSISTENT (*SALICORNIA VIRGINICA, LIMONIUM CALIFORNICUM*) IRREGULARLY-FLOODED MIXOHALINE MIDDLE-SALT-MARSH WETLAND. San Luis Obispo Co., Morro Bay, Morro Bay State Beach. **Section 10/404 Jurisdiction:** This named wetland is a tidal water of the United States with Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the landward limit of the wetland adjacent to tidal waters. **FIG. VI-33**.

Wetland Type No. 21.241(14.5.812.5332, 5551)
ESTUARINE-INTERTIDAL PERSISTENT-EMERGENT (*SALICORNIA VIRGINICA, CORDYLANTHUS MARITIMUS*) IRREGULARLY-FLOODED MIXOHALINE MIDDLE-SALT-MARSH WETLAND. Santa Barbara Co., Carpinteria Valley, Carpinteria Salt Marsh Reserve. *Cordylanthus maritimus* ssp. *maritimus*, an endangered species, is a nonpersistent annual plant that seasonally can occur co-dominantly with *Salicornia virginica* and other middle and upper marsh species such as *Arthrocnemum subterminale, Atriplex watsonii*, and *Monanthochloe littoralis.* **Section 10/404 Jurisdiction:** This named wetland is a tidal water of the United States with

Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the landward limit of the wetland adjacent to tidal waters. **FIG. VI-34.**

Wetland Type No. 21.241(15.5.331.5331, 6232,6521)
ESTUARINE-INTERTIDAL EMERGENT-PERSISTENT (*PLUCHEA ODORATA, SCIRPUS CALIFORNICUS, TYPHA DOMINGENSIS*) IRREGULARLY-EXPOSED MIXOHALINE ESTUARY-BANK WETLAND. San Diego Co., Buena Vista Lagoon. **Section 10/404 Jurisdiction:** This named wetland is regulated under Section 10 to the landward extent of the high tide when the lagoon mouth is open and to the ordinary high water mark when the mouth is closed. The wetland is regulated as an adjacent wetland under Section 404 within a narrow band fringing the shoreline of the lagoon.

Wetland Type No.: 21.241(16.5.351.5441,6235)
ESTUARINE-INTERTIDAL EMERGENT-PERSISTENT (*FRANKENIA SALINA, SCIRPUS ROBUSTUS*) SEASONALLY-FLOODED MIXOHALINE ESTUARY-TERRACE WETLAND. Santa Barbara Co., Goleta Valley, University of California Santa Barbara, Coal Oil Point Reserve, Devereux Slough. **Section 10/404 Jurisdiction:** This named wetland is a tidal water of the United States with Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the limit of the wetland adjacent to tidal waters. **FIG. VI-36.**

Wetland Type No.: 21.241(16.5.422.6256)
ESTUARINE-INTERTIDAL EMERGENT-PERSISTENT (*SCIRPUS PUNGENS*) SEASONALLY-FLOODED MIXOHALINE SHALLOW-BAR WETLAND. San Diego Co., Buena Vista Lagoon. **Section 10/404 Jurisdiction:** This named wetland is regulated under Section 404 to the ordinary high water mark when the mouth is closed and to the landward extent of the high tide under Section 10/404 when the mouth is open.

Wetland Type No.: 21.241(16.5.833.6232)
ESTUARINE-INTERTIDAL EMERGENT-PERSISTENT (*SCIRPUS CALIFORNICUS*) SEASONALLY-FLOODED MIXOHALINE HIGH-FRINGE-MARSH WETLAND. Ventura Co., San Buenaventura, Emma Wood State Beach, Ventura River Estuary. **Section 10/404 Jurisdiction:** This named wetland is a tidal water of the United States with Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the landward limit of the wetland adjacent to tidal waters. **FIG. VI-35.**

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20.000 SYSTEM ESTUARINE
21.000 SUBSYSTEM INTERTIDAL
21.240 CLASS EMERGENT WETLAND

21.242 SUBCLASS NONPERSISTENT

Wetland Type No.: 21.242(14.7.520.5512)
ESTUARINE-INTERTIDAL EMERGENT-NONPERSISTENT (*LASTHENIA GLABRATA*) IRREGULARLY-FLOODED EURYHALINE DELTA WETLAND. Santa Barbara Co., Carpinteria Valley, Carpinteria Salt Marsh Reserve. Emergent-Nonpersistent Wetland dominated by *Lasthenia glabrata* ssp. *coulteri* also occurs with the perennial plants *Arthrocnemum subterminale, Salicornia virginica,* and *Monanthochloe littoralis*. Other "winter" annuals that occur with *Lasthenia* and also can be dominant include *Juncus bufonius, Hutchinsia procumbens, Parapholis incurva*, and *Spergularia marina.* The euryhaline type is bounded by lower-elevation hyperhaline salt flats downslope and other euryhaline wetlands upslope, dominated by the annual grass *Lolium multiflorum*. **Section 10/404 Jurisdiction:** This named wetland is a tidal water

of the United States with Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the landward limit of the wetland adjacent to tidal waters. **FIGS. VI-37, 38.**

Wetland Type No.: 21.242(15.5.420.5531,5541,5542)
ESTUARINE-INTERTIDAL EMERGENT-NONPERSISTENT (*SPERGULARIA, ATRIPLEX, CHENOPODIUM*) SEASONALLY-FLOODED MIXOHALINE SHALLOW-BAR WETLAND. Ventura Co., Ventura, Seaside Wilderness Park, Ventura River Estuary. When nonpersistent vegetation is lacking, this site belongs to Class Unconsolidated-Bottom. Depending on the status of estuary mouth opening or closure and the elevation of the bars and bed, the water regime can be Irregularly-Exposed, Regularly-Flooded, Irregularly-Flooded, or Seasonally-Flooded. **Section 10/404 Jurisdiction:** This named wetland is a tidal water of the United States with Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the landward limit of the wetland adjacent to tidal waters. **FIGS. VI-39, 40.**

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20.000 SYSTEM ESTUARINE
21.000 SUBSYSTEM INTERTIDAL
21.250 CLASS SCRUB-SHRUB WETLAND

21.253 SUBCLASS BROADLEAVED-EVERGREEN

Wetland Type No.: 21.253(14.4.313.5632)
ESTUARINE-INTERTIDAL SCRUB-SHRUB BROADLEAVED-EVERGREEN (*SUAEDA CALIFORNICA*) IRREGULARLY-FLOODED EUHALINE ESTUARY-SHORE WETLAND. San Luis Obispo Co., Morro Bay, Morro Bay State Park. A narrow band of this succulent halophyte shrub occurs in scattered locations on the margin of the estuary adjacent to unconsolidated shore wetland or emergent (salt marsh) wetland and upland habitats. *Suaeda californica* is an endangered species that currently is known only from Morro Bay. **Section 10/404 Jurisdiction:** This named wetland is a tidal water of the United States with Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the landward limit of the wetland adjacent to tidal waters. **FIG. VI-41.**

Wetland Type No.: 21.253(14.5.313.5611,5624,5631,5633)
ESTUARINE-INTERTIDAL SCRUB-SHRUB BROADLEAVED-EVERGREEN (*CARPOBROTUS, ISOCOMA, ATRIPLEX, SUAEDA*) IRREGULARLY-FLOODED MIXOHALINE ESTUARY-SHORE WETLAND. San Diego Co., Camp Pendleton, Santa Margarita River Estuary. Dominants or characteristic species include *Carpobrotus edulis* (naturalized), *Isocoma menziesii, Atriplex lentiformis, Suaeda taxifolia.* **Section 10/404 Jurisdiction:** This named wetland is a tidal water of the United States with Section 10 jurisdiction extending landward to the high tide line. Section 404 jurisdiction extends to the landward limit of the wetland adjacent to tidal waters. **FIG. VI-42.**