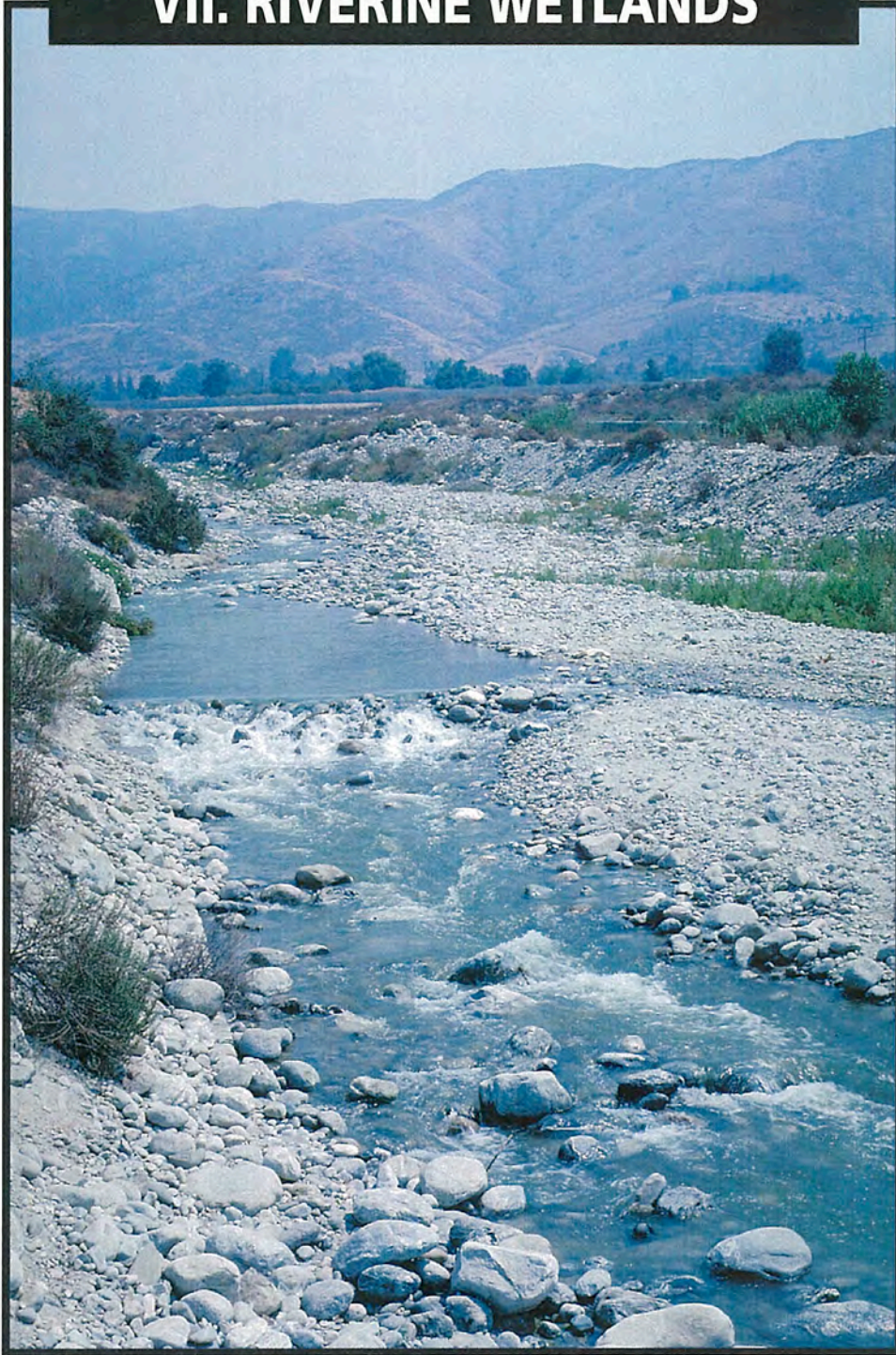


VII. RIVERINE WETLANDS



California, San Bernardino County: Santa Ana River

RIVERINE SYSTEM

Robert A. Leidy¹, Wayne R. Ferren, Jr.², and Peggy L. Fiedler³

INTRODUCTION

The Riverine System is characterized by unidirectional flow from upstream to downstream within a channel. Cowardin et al. (1979) define the system as follows:

The Riverine System...includes all wetlands and deepwater habitats contained within a channel, with two exceptions: (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, and (2) habitats with water containing ocean-derived salts in excess of 0.5 ppt. A channel is "an open conduit either naturally or artificially created which periodically or continuously contains moving water, or which forms a connecting link between two bodies of standing water" (Langbein and Iseri 1960:5).

Cowardin et al. (1979) also have provided a description of the limits of this system, including two major features: (1) the system terminates downstream where the concentration of ocean-derived salts in the water exceeds 0.5 ppt during the period of annual low flow (= Estuarine), or where the channel enters a lake (= Lacustrine); and (2) the system terminates upstream where tributary streams originate, or where the channel leaves a lake. On the landward side of the channel, the Riverine System is bounded by upland, or by wetland dominated trees, shrubs, persistent emergents, emergent mosses, or lichens (= Palustrine).

Riverine environments within the study region include most of the California Chaparral Province, as designated by Bailey (1976) and illustrated by Cowardin et al. (1979). In this province, freshwater is limited and the climate is Mediterranean. The province covers approximately 400

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miles of linear coastline and the adjacent study region includes many thousands of miles of riverine hydrogeomorphic units along hundreds of streams and rivers, some of which have been studied or visited during the course of this project (see Fig. VII-1).

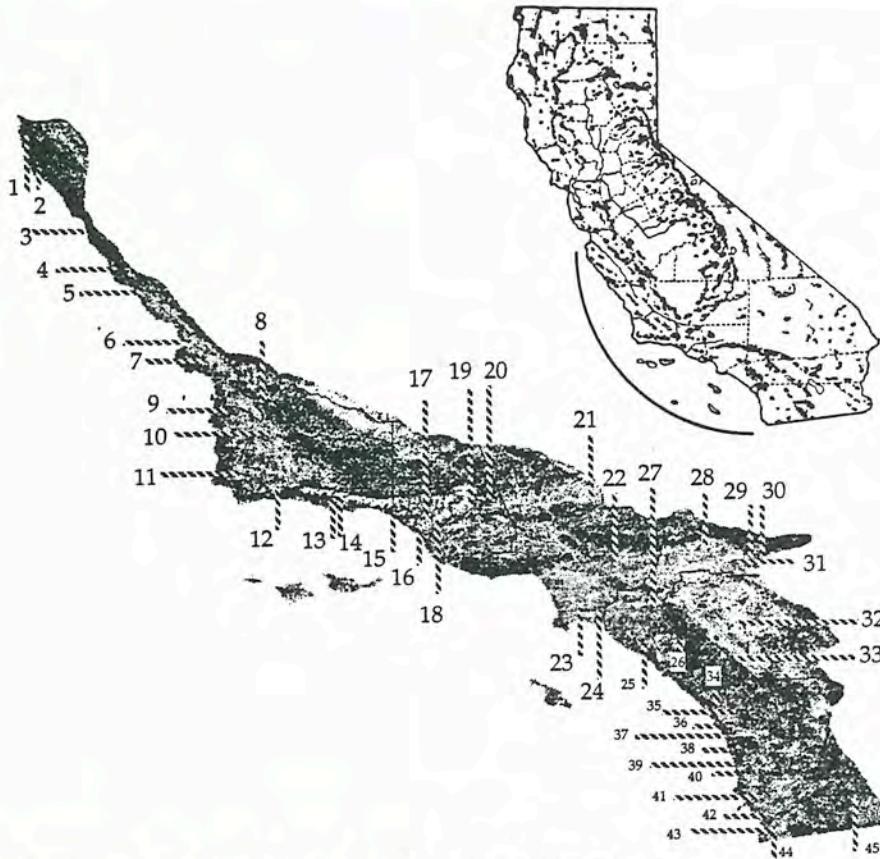
RIVERINE WETLANDS

Central and southern California coastal rivers and streams vary considerably along environmental, spatial, and temporal gradients. To have a greater appreciation for: (1) the richness of riverine wetland types (e.g., Figs. VII-2, VII-3, V-4); (2) their numerous ecosystem functions and socio-economic values (e.g., Figs. VII-5, VII-6); (3) the extent of impacts to and losses of riverine wetlands (e.g., Figs. VII-7, VII-8); and (4) the efforts to restore or create them, we believe it is necessary to review the classification of riverine environments. The many combinations of riverine wetland classes, subclasses, water regimes, water chemistry, series, units, and various hydrogeomorphic categories in a Mediterranean climate offer what may seem a limitless richness of wetland types.

Types of Rivers, Streams, and Washes

Although the environmental limits of the Riverine System in Cowardin et al. (1979) were intended for the entire United States, the special physical setting and processes of rivers, streams, and washes in coastal central and southern California require further examination. We present a brief description of these riverine types to demonstrate the importance of the differences in their physical, and subsequently, biological attributes.

There have been numerous attempts to classify rivers and streams based on geomorphology and hydrology (Gordon et al. 1992). These methods relied for the most part on measuring physical characteristics such as substrate, water quality, discharge, channel form, or gradient (singly or in some combination). Recently, Moyle and Eliason (1991) developed a hierarchical classification system for inland waters of California based largely on patterns of fish distribution and endemism, including fishless habitats. While this classification is useful for describing general patterns of fish distribution, it does not adequately reflect the great diversity of riverine wetland types within the study region, especially those that are fishless or do not support other well-known aquatic organisms. Another recent classification developed by Rosgen (1994) is a hierarchical, semi-quantitative stream classification system that employs indices of channel morphology. The system was developed for application at the river reach scale and is a helpful tool for viewing riverine wetlands within a watershed context. However, our methodology has been developed to describe



- Monterey Co. 1. Carmel River, 2. Big Sur River, 3. Mill Creek.
 San Luis Obispo Co. 4. Arroyo De La Cruz, 5. San Simeon Creek, 6. Morro Creek, 7. San Luis Obispo Creek, 8. Cuyama River, 9. Santa Maria River.
 Santa Barbara Co. 10. Sisquoc River, 11. Santa Ynez River, 12. Gaviota Creek, 13. San Jose Creek, 14. Atascadero Creek, 15. Carpinteria Creek.
 Ventura Co. 16. Ventura River, 17. Matilija Creek, 18. Santa Clara River, 19. Sespe Creek, 20. Piru Creek.
 Los Angeles Co. 21. Soledad Creek, 22. Tujunga Wash, 23. Los Angeles River, 24. San Gabriel River.
 Orange Co. 25. San Diego Creek, 26. Arroyo Trabuco, 27. Santa Ana River.
 Riverside Co. 28. San Jacinto River, 29. Murrieta Creek.
 San Bernardino Co. 30. Cajon Wash, 31. Santa Ana Wash, 32. Santa Ana River, 33. Vivian Creek, 37. Agua Hedionda Creek, 38. Escondido Creek, 39. San Dieguito River, 40. Los Penasquitos Creek, 41. San Diego River, 42. Sweetwater River, 43. Otay River, 44. Tijuana River, 45. Cottonwood Creek.
 Riverside Co. 32. San Jacinto River, 33. Murrieta Creek.
 San Diego Co. 34. Santa Margarita River, 35. San Luis Rey River, 36. Buena Vista Creek, 37. Agua Hedionda Creek, 38. Escondido Creek, 39. San Dieguito River, 40. Los Penasquitos Creek, 41. San Diego River, 42. Sweetwater River, 43. Otay River, 44. Tijuana River, 45. Cottonwood Creek.

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

riverine wetlands below the level of the reach, at the level of hydrogeomorphic units as defined in our classification.

Riverine Wetland Subsystems, Classes and Subclasses

In the United States as a whole, the Riverine System (System No. 30.000 in our classification) includes four subsystems (Cowardin et al. 1979). We have modified the Cowardin et al. (1979) to include four additional subsystems to reflect hydrogeomorphic conditions within the study region. These eight subsystems include: 31.000 Tidal, 32.000 Upper Intermittent, 33.000 Mid Intermittent, 34.000 Lower Intermittent, 35.000 Upper Perennial, 36.000 Mid Perennial, 37.000 Lower Perennial, and 38.000 Limnetic (Deepwater Habitats). All subsystems are not always present along the length of a particular river or stream or within a particular watershed. A key to these subsystems has been provided in Section IV of this volume. Each of the eight subsystems occurs within the study region with the exception of the Tidal and Limnetic subsystems. A "Key to the Riverine Subsystems and Classes", occurs at the end of the discussion on riverine wetlands and before a table of the hydrogeomorphic units (Table VII-1) and the "Catalogue of the Riverine Wetlands".

32.000 Subsystem Upper Intermittent. Subsystem Upper Intermittent is well represented throughout the study region in the headwaters of all the major watersheds. The subsystem is within an erosional landform typically characterized by a relatively high gradient (>4%) channel that contains nontidal flowing water for a portion of the year (Cowardin et al. 1979). Flows are often "flashy" and closely tied to specific rainfall events. When flowing water is absent, small, widely scattered, isolated pools or a series of interconnected small pools may persist. The channel often is confined and deeply entrenched, the banks steep, and the adjacent floodplain poorly developed. The channel has a low sinuosity (i.e., the ratio of stream length to down valley length). The substrate is typically dominated by large particle size sediments such as bedrock, boulder, cobble and large gravel, but in some instances may be dominated by coarse sands. An example of upper intermittent riverine wetlands are the small drainages forming the headwaters of the Ventura River watershed, in Ventura Co. (Fig. VII-9).

33.000 Subsystem Mid Intermittent. This subsystem is a depositional landform with a moderate gradient (1.5-4%) and low sinuosity. The channel may vary from slightly to deeply confined and entrenched. The substrate ranges from bedrock to sand. As in Subsystem Upper Intermittent, isolated pools of varying size may persist through the drier summer and fall months. These "remnant" pools are often act as refugia for native amphibians and fish during the driest



FIG. VII-2. VENTURA CO., VENTURA RIVER. View upriver, northward from bridge at Shell Rd., along the main stem of the Ventura River. As illustrated here at low-flow conditions, many riverine hydrogeomorphic habitats are apparent, including (1) the river channel from bank to bank; (2) the river-channel bed; (3) a river-channel bar; and (4) a back-bar channel. Several wetland classes present include unconsolidated-shore wetland, unconsolidated-bottom wetland, emergent wetland, scrub-shrub wetland, and forested wetland.



FIG. VII-3. SAN DIEGO CO., UPPER SAN LUIS REY RIVER WATERSHED, MATAGUAL CREEK. View upstream from State Route 79 Bridge. This intermittent portion of the stream is characterized by an unconsolidated-bed composed of sand.



FIG. VII-4. SAN DIEGO CO., SAN LUIS REY RIVER WATERSHED, MATAGUAL CREEK ABOVE LAKE HENSHAW. View upstream from State Route 79 Bridge. The unconsolidated-shore (left and right center) is characterized by nonpersistent emergent plants.

portions of the year. Numerous examples of Subclass Mid Intermittent wetlands occur along rivers (e.g., Ventura River; Santa Clara River, Los Angeles Co.; San Luis Rey River, San Diego Co.; Sweetwater River, San Diego Co.), streams (Cottonwood Creek, San Luis Obispo Co. [Fig. VII-10], Santa Ysabel Creek, San Diego Co.) and washes (Soledad Canyon, Los Angeles Co. and Ballinger Canyon, Santa Barbara Co. [Figs. VII-11, VII-12] in the study region.

34.000 Subsystem Lower Intermittent. The gradient in this subsystem is low (1.5% or less) and is a depositional landform. As such, the floodplain is moderately- to well-developed, the valley slightly confined, and the channel may show slight to moderate entrenchment. In areas of excessive instream aggregate mining, the channel may become deeply entrenched. Channel sinuosity ranges from moderate to high. Subsystem Lower Intermittent may be considered as residing in a "lowland" or "valley" landscape position. Examples of this subsystem occur along the lower reaches of several large river systems within the study region including the Santa Maria River, San Luis Obispo Co.; Cuyama River, San Luis Obispo and Ventura cos.; Santa Clara River; Santa Ana River, Riverside Co.; San Jacinto River, Riverside Co.; San Luis Rey River; San Dieguito River, San Diego Co.; San Clemente Canyon, San Diego Co; [Fig. VII-13, VII-14]; Sweetwater River; and Otay River, San Diego Co.

35.000 Subsystem Upper Perennial. Perennial subsystems all contain some flowing water all year. As in Subsystem Upper Intermittent, Subsystem Upper Perennial is high gradient (>4%) erosional landform, the channel is entrenched and the valley confined. As such there is little floodplain development and sinuosity is low. Water velocities are moderate to high, especially during the peak winter and spring runoff. The substrate is dominated by bedrock, boulder, cobble, and gravel. Sand is typically a minor component of the substrate except in certain washes or where human activities have increased sedimentation to the channel. This subsystem supports organisms adapted to moderate to high water velocities, and cool water temperatures. For example, Subsystem Upper Perennial often support populations of *Oncorhynchus mykiss mykiss* (rainbow trout), *O. m. gairdneri* (steelhead), and other native fishes and amphibians. Examples within the study region include those portions of many higher elevation rivers and streams of the Santa Lucia Range, Monterey and San Luis Obispo cos.; Santa Ynez and San Rafael Mountains, Santa Barbara Co. [Fig. VII-15, VII-17]; San Gabriel and San Bernardino Mountains, San Bernardino Co. [Fig. VII-19, VII-21]; San Jacinto Mountains, Riverside Co.; Santa Ana Mountains, Orange and Riverside Cos; Santa Margarita and Palomar Mountains San Diego and Riverside cos.; and the Cuyamaca and Laguna Mountains, San Diego Co.

RIVERINE WETLANDS



FIG. VII-5. VENTURA CO., VENTURA RIVER. View downriver, southward from bridge at Shell Rd. One important ecosystem function of riverine wetlands is habitat for fish. This function translates into socio-economic values when the wetlands support sport-fishing or the potential for economically significant fisheries. As illustrated here in spring 1994, a net approach is employed by local youths to catch fish.



FIG. VII-6. VENTURA CO., VENTURA RIVER. View upstream at a successful day's catch of Steelhead Trout. Streams and rivers of coastal watersheds in central and southern California were historically important for spawning habitats for anadromous fish such as Steelhead Trout. Only a few streams and rivers currently support spawning sites for Steelhead, which has been reduced to so few numbers that the southern California population has been petitioned for listing as endangered by the U.S. Fish and Wildlife Service. As illustrated here near Casitas Springs in 1979, the Ventura River was important for Steelhead, and remains today one of the few streams or river systems in southern California still accessible to anadromous fish. (Photograph by M. Capelli)

36.000 Subsystem Mid Perennial. This subsystem is typically a depositional landform of moderate gradient (1.5 - 4.0% and low sinuosity). The substrate is highly variable but is dominated primarily by cobble, gravel and sand. It is not uncommon for the streambed to be vegetated with non-persistent vascular plants or attached algae, especially during summer and early fall. Flows may range from high to low velocities depending on the season and amount of rainfall in a given storm event or year. During summer months flows may become quite low and water temperatures elevated. Subsystem Mid Perennial provides important nursery and rearing habitat for native amphibians and fish. Examples of these subsystems may be found at slightly lower elevations, but contiguous with Subsystem Upper Perennial riverine wetlands in mountains listed above (Figs. VII-22, VII-23, VII-24, VII-25).

37.000 Subsystem Lower Perennial. The gradient is low (<1.5%) and water velocity is slow during summer and fall however, winter and spring runoff can be extreme and generate large discharges with high velocities. This depositional landform has a well-developed floodplain often consisting of a network of abandoned distributary channels and terraces. The channel is usually not entrenched except in situations where human activities (e.g., sand and gravel extraction, dam construction) have altered sediment budgets. Channel sinuosity typically is high for the larger alluvial rivers but is low in many of the smaller drainages. The substrate may be dominated by mud, sand, gravel, cobble, or boulder. Summer water temperatures may become elevated and oxygen deficits also occur. As in Subsystem Mid Perennial, it is not uncommon for the channel to be dominated by emergent, nonpersistent vascular plants or attached algae (Figs. VII-30, VII-31). Examples include Mill Creek and Big Sur River, Monterey Co. (Figs. VII-26, VII-27); Arroyo de la Cruz, San Luis Obispo Co. (Fig. VII-28); Santa Ynez River, Ventura Co.; Ventura River, Santa Clara River (Fig. VII-29); and the Santa Margarita River, San Luis Rey River, and Tijuana River, San Diego Co.

In the United States as a whole, the Riverine System includes the following seven classes: 30.110 Rock Bottom, 30.120 Unconsolidated Bottom, 30.130 Streambed, 30.140 Rocky Shore, 30.150 Unconsolidated Shore, 30.210 Aquatic Bed, and 30.240 Emergent Wetland (Nonpersistent). The first five describe substrate and can be considered abiotic classes, whereas the second two describe dominant life forms and can be considered biotic classes. A key to these classes has been provided in Section IV of this volume. Each of the seven classes occur in coastal central and southern California.

30.110 Class Rock Bottom. Riverine Class Rock Bottom includes Subclasses Bedrock and Rubble/Boulder. We have documented each of these subclasses within the study region primarily



FIG. VII-7. **SANTA BARBARA CO., GOLETA VALLEY, ATASCADERO CREEK.** View downstream, westward along Atascadero Creek. The regional flood control district has maintained the flood capacity of such coastal plain streams by using bulldozers, backhoes, and dragline cranes to remove vegetation and sediment, thereby reducing the flood threat in urbanized areas. As shown here in 1983, all vegetation was removed except for willows on the left bank. In current practices, a preferred alternative that achieves riparian corridor management, including flood protection and preservation of wetland functions and values, has been implemented.



FIG. VII-8. **SANTA BARBARA CO., HOLLISTER RANCH.** View of a fish ladder, downstream from top of dam in a dissected coastal-plain canyon. Although the effort to provide access for fish to upstream habitats was well-intended, the small reservoir upstream from the dam has filled with sediment completely, resulting in a meadow-like plain without a clearly identifiable channel for use by fish.

within higher gradient erosive landscapes (Figs. VII-15, VII-17, VII-18, VII-19, VII-20, VII-21, VII-26). Rock bottom occurs in various water regimes but is most commonly encountered under permanently-flooded conditions. Hydrogeomorphic units most commonly associated with the subclasses include main-channel and scour pools, high-gradient riffles, montane stream channels, and canyon streambeds. These are typically cool water, high water velocity/energy, and well oxygenated wetland environments that support native fishes such as resident (*Oncorhynchus mykiss mykiss*) and sea-run trout (*O. m. gairdneri*) and various species of freshwater sculpin (*Cottus* spp.).

30.120 Class Unconsolidated Bottom. This class of riverine wetland includes subclasses Cobble-Gravel, Sand, Mud and Organic, all of which are present within the study area. Because of the highly erosive and alluvial nature of rivers within the study region there are numerous examples of the subclasses cobble-gravel and sand (Figs. VII-3, VII-22, VII-27, VII-28, VII-29). Class unconsolidated bottom occurs in various water regimes from permanently-flooded to seasonally-flooded. Subclass cobble-gravel wetlands are important spawning and rearing habitats for salmonids and other native fishes and amphibians.

30.130 Class Streambed. This class includes subclasses Bedrock, Rubble/Boulder, Cobble-Gravel, Sand, Mud, Organic, and Vegetated. With the possible exception of Subclass Organic, all other subclasses may be found within the study region. Class Streambed occurs in various water regimes from irregularly exposed to intermittently flooded. Examples of hydrogeomorphic units within this class in the study region include montane-stream channel, terrace-streambed, foothill-streambed, coastal-plain stream channel, and alluvial wash wetlands (Figs. VII-9, VII-10, VII-11, VII-12, VII-13, VII-14).

30.140 Class Rocky Shore. Class Rocky Shore includes subclasses Bedrock and Rubble/Boulder. Each of these subclasses occurs within the study region primarily in higher gradient erosive landscapes (Figs. VII-15, VII-18).

30.150 Class Unconsolidated Shore. Class Unconsolidated Shore includes the subclasses Cobble-Gravel, Sand, Mud, Organic, and Vegetated. The subclasses are primarily features of sediment transport and deposition zones of riverine wetlands with moderate to well developed floodplains (Figs. VII-2, VII-14, VII-21). Although these wetlands tend to be highly erosive environments during peak discharges, during periods of reduced flow (late-spring to early fall in the study region) the unconsolidated shore often becomes vegetated with weedy herbaceous annuals (e.g., *Xanthium strumarium*, *Leptochloa uninerva*, *L. fasciculata*, *Foeniculum vulgare*, *Piptatherum milliaceum*, *Polygonum* spp.) and seedlings and saplings of perennials (e.g., *Salix lasiolepis*, *Mimulus*

RIVERINE WETLANDS

Wetland Type No.: 32.131(28.1.211.1200)

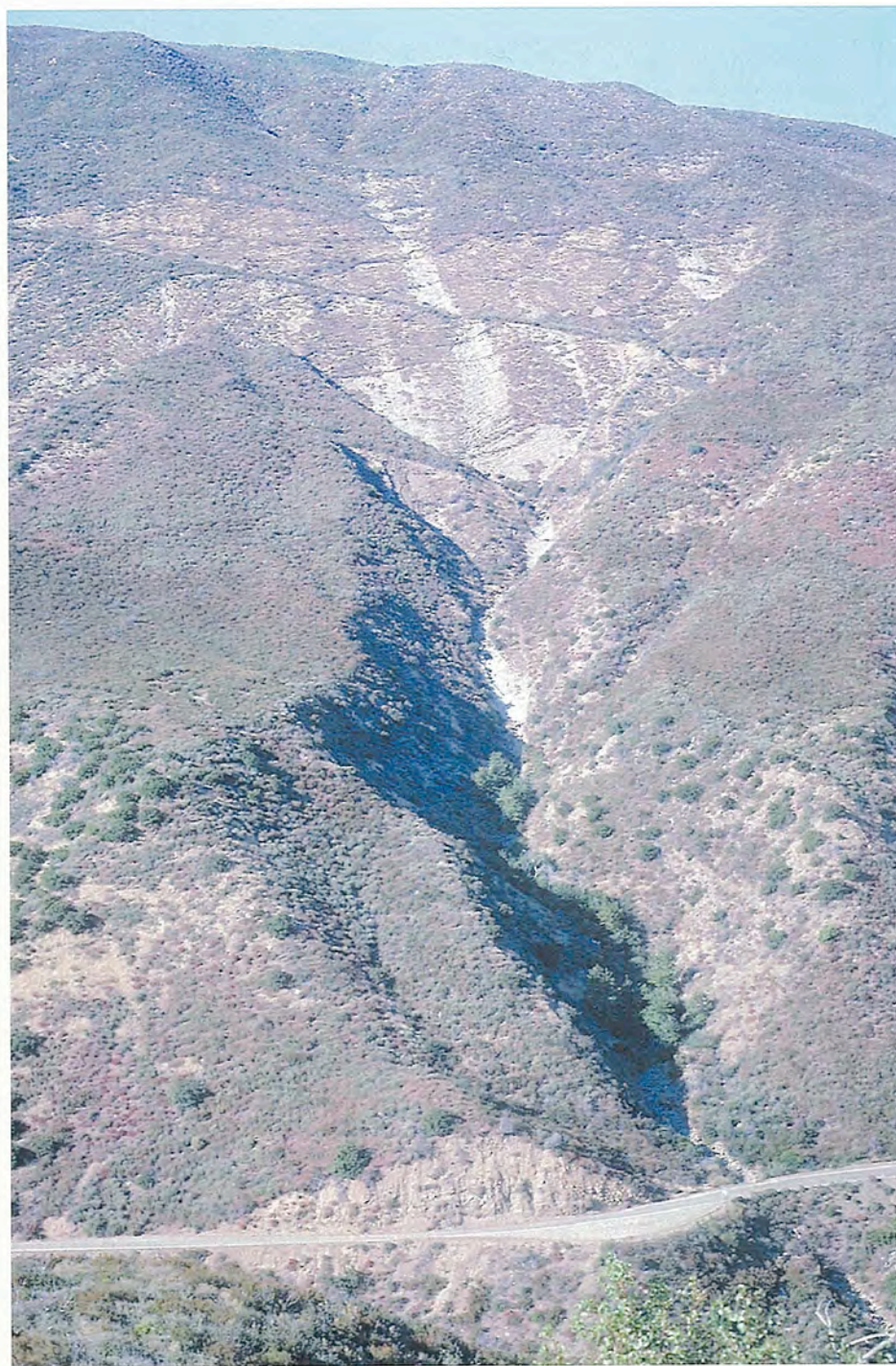


FIG. VII-9. RIVERINE UPPER-INTERMITTENT STREAMBED (BEDROCK) INTERMITTENTLY-FLOODED MONTANE-STREAM-CHANNEL WETLAND. Ventura Co., Dry Lakes Ridge, headwaters of the Ventura River. View northwestward from Highway 33 toward Dry Lakes Ridge.

spp., *Lotus* spp., *Echinochloa crus-galli*, *Paspalum dilatatum*, *Polygonum* spp.). Many of these species are not true hydrophytes and cannot tolerate flooding, so become absent during periods of prolonged inundation.

30.210 Class Aquatic Bed. Class Aquatic Bed includes plants that live in relatively permanent water or under conditions of repeated flooding where they either attach to the substrate or float freely in the water column above the bed or on the water surface (Cowardin et al. 1979). In the Riverine System, this class includes Algal, Aquatic Moss, Rooted Vascular, and Floating Vascular subclasses. Water regimes may range from permanently flooded to seasonally flooded. Algal beds are widespread in rivers and streams within the region. Typically, dense beds of the attached green alga *Enteromorpha* spp. form in late spring through late summer and early fall in the shallow, warm waters of pools and channel margins of intermittent and perennial streams (Fig. VII-10, Fig. VII-25, Fig. VII-28). Attached-algal dominated aquatic bed wetlands may also be associated with falls (Fig. VII-16). Subclass Rooted Vascular is also represented within the study region. For example, along shallow, perennial reaches of the lower Ventura River rooted vascular aquatic bed (e.g., *Potamogeton foliosus*, *P. pectinatus*, *Zannichellia palustris*, and *Ludwigia* spp.) and floating aquatic bed (i.e., *Lemna minor* and *Azolla filiculoides*) subclass and dominance types are found.

30.240 Class Emergent Wetland. Riverine emergent wetlands are nonpersistent because the erosive force of flooding seasonally scours the vegetation. Riverine emergent-nonpersistent wetlands often form shallow, mid-channel or back bar pools (Fig. VII-30) or occur as associations of mixed-vascular plant species on seasonally-flooded channel bars (Fig. VI-31).

Riverine Hydrogeomorphic Units

Riverine Water Bodies (HGM Category .100). Rivers (.170) and streams (.160) are generally defined as natural or human-modified watercourses that contain flowing water for a least part of the year (Fig. VII-2). We have adopted the convention of using river for larger watercourses and the term stream for smaller watercourses. Water in rivers and streams follows the path of least resistance to a lower elevation. Within a watershed smaller streams may flow into one another to form larger streams or rivers.

Rivers and streams are composed of a specific length of stream or **reach**. The reach is a relatively homogeneous section of river or stream characterized by a repeating sequence of physical features and habitat types (American Fisheries Society 1985). Each reach contains a series or

sequence of **pools (.110)**, **riffles (.120)**, and **runs (.124)**. Pools are channel or floodplain habitats containing water with no, or reduced current velocities. Pools are typically deeper than surrounding habitats (i.e., riffles, runs) and typically have a substrate of fine sediment (Gordon et. al. 1992). **Main-channel pools (.113)** are formed by mid-channel scour that encompasses greater than sixty percent of the wetted channel (California Department of Fish and Game 1991; Fig. VII-15). Typically, main-channel pools are low velocity and contain variable substrate (California Department of Fish and Game 1991). **Scour pools (.114)** are formed by flow directed either laterally or obliquely against a partial channel obstruction or bank (California Department of Fish and Game 1991; Gordon et. a. 1992; Figure VII-18). The scour pool is often enhanced by obstructions such as root wads, logs, bedrock or boulders and is generally confined to less than 60 percent of the wetted channel width (California Department of Fish and Game 1991). **Backwater pools (.115)** are confined to channel margins and are formed by eddies downstream from obstructions such as boulders, root wads and logs (American Fisheries Society 1985). Backwater pools are typically low velocity and are dominated by fine bed materials.

Riffles (.120) are shallow habitats characterized by faster-moving water over partially submerged, often coarse, substrate (Gordon et. al. 1992; Fig. VII-19). Riffles are often classified as either low gradient (< 4%) or high gradient (> 4%; California Department of Fish and Game 1991). **Rapids (.122)** are typically deeper and higher gradient than riffles with very fast moving water. The surface of rapids is highly agitated and the bed usually dominated by coarse substrate such as cobble and boulder (American Fisheries Society 1985). When riffles become extremely steep they become **Cascades (.123)**. Cascades consist of a stepped series of small waterfalls and pools over a bedrock or boulder substrate (California Department of Fish and Game 1991). **Runs (.124)** also are characterized by fast-moving water however, without surface agitation (American Fisheries Society 1985). Flow in a run is uniform and the substrate typically consists of gravel, cobble and boulder (Fig. VII-23).

Channels, Inverts, Falls (HGM Category .200). **Stream Channels (.210)**, including montane, foothill/terrace, valley, coastal plain channels, and canyon and **River Channels (.220)**, also including the above, are natural or artificial open conduits which continuously or periodically contain moving water, or which forms a connection between two bodies of water (Langbein and Iseri 1960). Channels form between two banks (Fig. VII-2). **Distributary Channels (.215, .225)** are a series of secondary channels diverging from the main channel across the floodplain. These channels may or may not contain moving water. **Backbar Channels (.230)** form behind a bar connected to the main channel but usually at a higher bed elevation than the main channel. Backbar channels may or may not contain flowing or standing water (Fig. VII-2). **Inverts (.250)** are small poorly-

defined drainages that are intermittently-flooded, such as within the watershed of upper Mill Creek in the Santa Lucia Mountains in Monterey County. **Falls (.125, .260)** are habitats where water is free-falling or moving along a precipitous descent (American Fisheries Society 1985). An example of this hydrogeomorphic unit is Nojoqui Falls, Santa Ynez Mountains, in Santa Barbara County (Fig. VII-16).

Shores, Banks, Margins (HGM Category .300). Hydrogeomorphic series and units in this category generally occur on the periphery of water bodies and can represent transitional areas between classes with systems or between systems. **Stream Shores (.340)** and **River Shores (.350)** are narrow strips of land bordering the stream or river bed or bottom (Fig. VII-14). Shores are typically unvegetated but may become sparsely colonized by nonpersistent weedy annuals or the seedlings of perennial plants. **Stream Banks (.370)** and **River Banks (.370)** refer to the portion of the channel cross section that restricts lateral movement of water at normal discharges. Banks often have a gradient steeper than 45° and exhibit a distinct break in slope from the stream bed (American Fisheries Society 1985). Shores, banks, and margins may support emergent non-persistent or persistent (=Palustrine) wetland vegetation.

Beds, Bottoms, Channel Bars (HGM Category .400). **Beds and Bottoms (.410, .450, .460)** are used synonymously and refer to the substrate plane, bounded by banks or shore, over which the water column at some point resides (American Fisheries Society 1985; Fig. VII-3). **Channel bars (.470, .480)** may be defined as a ridge/berm-like accumulation of sand, gravel, or other alluvial material that forms in the channel, along channel shores, or at the mouth of a river or stream, where reduced velocity induces deposition of sediment (American Fisheries Society 1985; Fig. VII-2). Channel bars may be scoured by flows either at regular intervals or rarely.

Washes (HGM Category .540). A **wash** is a watercourse associated with an alluvial fan (= **.543 Alluvial Washes**), stream or river channel (= **.541 Stream Washes; .542 River Washes**). Washes are often associated with arid environments and are characterized by large, high energy discharges with high bed-material load transport. Washes are often intermittent and their beds either sparsely vegetated or unvegetated, such as those found in the upper Santa Clara and Cuyuma river watersheds (Figs. VII-11, VII-12).

Ecosystem Functions and Socio-Economic Values

Central and Southern California coastal riverine ecosystems perform important physical, chemical, and biological functions. The classification of riverine wetlands must consider the various

ecosystem functions that may distinguish one type of riverine wetland from another. We present a brief overview of some of the categories of ecosystem functions and socioeconomic values to consider when evaluating wetlands for classification. Ecosystem functions may be considered within the context of hydrologic, biogeochemical, and plant and animal community processes.

Ecosystem Functions. Ecosystem functions are processes that are necessary for the self-maintenance of an ecosystem such as primary production, nutrient cycling, decomposition, etc. (L. C. Lee & Associates, Inc. 1993). We also include maintenance of habitat for particular ecosystem-dependent organisms and for the preservation of the richness of habitat and landforms. In the Riverine System, many of the functions are associated in the context of the functions of other wetland systems to which they are adjacent or within which they are embedded. We have arranged a brief discussion of riverine ecosystem functions as proposed by Sather and Smith (1984). It is not our intention to provide an exhaustive review of riverine wetland functions here. However, in our classification, ecosystem function must be considered when evaluating wetland types.

Food Chain Support/Nutrient Cycling Functions. Food chain support refers to the direct or indirect use of nutrients use of nutrient sources derived from wetlands by heterotrophic organisms [i.e., those 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." Sather and Smith list and discuss 68 wetland characteristics that are important to food chains; a sampling of these that can affect riverine wetlands are contiguity, watershed area, exposure, gradient, land cover of watershed, vegetation form, substrate, salinity, pH, flooding extent and duration, flow velocity and scouring, water depth, wetland-water edge, plant productivity, alkalinity, and eutrophic condition.

Differences in the complexity of food chain support and in the types of consumers (e.g., aquatic or terrestrial invertebrates, fish, waterfowl, resident wetland-dependent birds, amphibians, reptiles, etc.) also can contribute to the differentiation between types of wetlands that might otherwise have similar hydrogeomorphic units and vegetation physiognomy. These food chain differences also become important when natural wetland types are identified for use as reference sites for comparison against restored or created types to assess the issue of ecosystem success at the artificial sites. Our classification expands the system, class, and subclass hierarchy to include (1) water regime and chemistry types, (2) categories, series, and units of hydrogeomorphic types (i.e., "habitats"), and (3) substrate, dominance, or characteristic types to help distinguish wetland types and address the subtle physical and biological differences that might reflect differences in food chain

support and other ecosystem functions. Regarding "riparian" ecosystems, Onuf and Quammen (1985: 127) concluded, "Food chain support is not a general consequence of high productivity and high export. Rather, it is a special relationship involving a limited array of species in special circumstances, where changes resulting in increased primary productivity, in fact, can eliminate the food chain support function altogether in the sense of support for desirable species." Thus quantity of support is not necessarily a measure of importance. In California's often small, isolated, and often hydrologically variable wetlands, it is the special conditions of food chain support that may make this ecosystem function vital to consumers dependent on a particular wetland type. Identification of wetland types may be important to the identification of specialized food chains.

Habitat Functions. Riverine wetlands provide habitat for many groups of organisms or communities that have been documented or summarized by various researchers, for example: (1) native fishes (e.g., Moyle and Yoshiyama 1992; Swift et al. 1993); (2) native plant communities (e.g., Barbour and Major 1988; Faber et al. 1989); (3) reptiles and amphibians (e.g., riparian systems in Brode and Bury 1984); and (4) plant and animal species of special concern (see Appendix XV-1 and many of the above references). Regarding "riparian systems", including riverine wetlands, Onuf and Quammen (1990: 127) have concluded, "The paramount values of these systems are values of rarity, not of abundance as may be true in other regions...Coastal wetlands and riparian ecosystems provide critical needs for rare and endangered species and are essential wintering, breeding, and migrating sites." In a summary of Pacific wetland "regionality", (Zedler 1990: 14) observed, "The remaining wetland areas have great importance within the region as botanical and wildlife habitats. With highly variable climates, many mobile species may utilize wetlands as refugia during drought periods, and some non-mobile species may persist only in wetlands." Identification and classification in a hierarchical system of the many riverine wetlands of the study region provides a framework within which the various habitat functions can be differentiated by context at the level of ecosystem, wetland type, hydrogeomorphic unit.

Hydrology and Water Quality Functions. The dominant hydrological function of riverine wetlands is the transport of water and sediment (Collins 1990). Other important categories of function include: (1) flood control (e.g., wetlands associated with streams provide flood storage, slow flood waters, reduce flood peaks, and increase the duration of the flow; as summarized in Sather and Smith 1984); and (2) ground water recharge as related to water permanence, nature of the substrate, nature of surface outlets, the amount of edge, and the type and amount of vegetation (Sather and Smith 1984). Collins (1990), asserts that much of the energy necessary to naturally create riparian, estuarine, and coastal wetlands is distributed as upland flows of water...." In the study region, intermittent streams might be most important for the sediment storage because they

perform this function year-round (Collins 1990).

Regarding water quality, riverine wetlands are important, for example, in the transport and accumulation of sediments that readily absorb pollutants, the aeration of water, and the dispersal of nutrient and other pollutants to various types of wetlands where they can be absorbed by plants with high rates of productivity (Sather and Stuber 1984; Sather and Smith 1984; Zedler et al. 1990). The increased diversity of wetland types may be one of the factors determining their ability to retain large amounts of nutrient pollution (Sather and Smith 1994). With our increasing ability to create wetlands that have multiple ecosystem functions, one of which is increased water quality, the identification and classification of the various rivers, streams, and their corresponding wetlands provides a context in which to document ecosystem functions of the wetland types.

Socio-economic Values. Socio-economic values of wetlands belonging to the Riverine System are society's perceptions of the worth of a riverine ecosystem, typically stemming from whether the system provides a form of benefit or pleasure (adapted from L. C. Lee & Associates, Inc. 1993). Most of these values are derived from the various ecosystem functions that characterize a particular riverine wetland. We recognize four categories of socio-economic value: (1) Consumptive Values (e.g., sand and gravel mining in riverbeds); (2) Nonconsumptive Values (e.g., boating and sport fishing) (Figs. VII-5, VII-6), which also can have a consumptive element as illustrated in Figure VII-6; (3) Cultural Values (e.g., use of historic fishing sites and riverine wetland plants by Native Americans); and (4) Aesthetic and Natural Heritage Values (e.g., placement of recreational trails adjacent to major streams and rivers throughout the study region). Many of the region's stream and rivers now have local groups that assist with their management. In considering the importance of one of the region's rivers, The Santa Margarita River Foundation considers it to be "a refuge in an urbanizing land." Identification and preservation of the region's rich wetland heritage, including its many streams and rivers, contributes to the socio-economic values and quality of life enjoyed by local residents and visitors.

Impacts and Losses

The ability of coastal central and southern California riverine systems to perform various ecosystem functions is severely threatened over a broad geographic area. Rapid urbanization and its attendant alteration and destruction of aquatic habitats during the last century has altered the natural physical, chemical and biological patterns and processes of riverine systems with negative consequences to their functional integrity (Fig. VII-7). Of particular concern is the inability of many of these systems to function as repositories of native biodiversity. Finally, many of these riverine

systems have been transformed to the extent they no longer function in the same way as predisturbed systems and opportunities for the restoration of natural processes may be limited (Fig. VII-8).

Human activities have adversely affected the integrity of riverine systems processes largely through: (1) modification of natural hydrologic and hydraulic patterns; (2) physical changes to streambed morphology; (3) increased contaminant loading; and, (4) the introduction of exotic species. Below we discuss some of these impacts to riverine systems within the study area, with examples.

Modification of Natural Flow and Retention Patterns. Riverine systems are characterized by unidirectional flow from upstream to downstream. Within the region, annual variation in precipitation and discharge in rivers and streams can be extreme (Faber et al. 1989). Rivers such as the Santa Maria, Ventura, Santa Clara, Santa Ana, Santa Margarita, San Luis Rey and Tijuana can produce large floods with short recurrence intervals as well as exhibit periods of extremely low flow during summer months (Faber et al. 1989). These annual variations in flow are important for the creation and maintenance of a variety of different riverine wetland habitat types and to the survival of organisms that utilize these habitats.

Flows function to transport nutrients, sediments, pollutants, and organisms downstream. Under natural conditions various physical and biological mechanisms counteract downstream movement (i.e., retention) of these constituents. For example, riverine and palustrine wetland vegetation slows streamflows and traps sediments and nutrients entering from adjacent upland habitats. This is an important function of riverine wetlands.

Channelization has significantly modified natural flow and retention patterns in riverine wetlands within the study region. The effects of channelization on the physical and biological attributes of riverine systems is well documented (Simpson et al. 1982). Channelization typically results in the widening, realignment, clearing, and lining of the river channel. These activities may reduce habitat heterogeneity, reduce stream length, eliminate instream cover and riparian vegetation, modify the hydrologic cycle, alter stream hydraulics and sediment relationships, drain adjacent palustrine wetlands, degrade water quality, and alter trophic relationships (Simpson et al. 1982).

Faber et al. (1989) inventoried over 2,000 km of stream channel within seven riverine systems within Southern California (i.e., Ventura, Santa Clara, Los Angeles, San Gabriel, Santa Ana, San Luis Rey, and San Diego rivers) and found that an average of 25 percent of the total

length (i.e., 530 km) had been straightened and concrete-lined. The range for the concrete lining of these rivers was from 2% or less for the Ventura, San Luis Rey, and San Diego rivers to 82 percent for the Los Angeles River (Faber et al. 1989). Rivers that had not been extensively concrete-lined may nonetheless have been extensively straightened or had a large percentage of their adjacent floodplains converted to agricultural and urban uses.

External Threats: Riverine Systems as Open Ecosystems. Rivers and streams may be thought of as open ecosystems that act as sinks for energy and materials produced in terrestrial ecosystems. Riverine systems are particularly vulnerable to degradation from terrestrial land uses; because of their linear shape rivers have a high proportion of edge to area. Rivers, therefore, are products of their drainage basins, and land uses closest to the river have the greatest impact, with less impact the further from its edge. Land uses within the region such as urbanization of the floodplain, channelization, and rapid population growth have resulted in the increased loading of contaminants to riverine systems. For example, under natural conditions the Tijuana River was intermittent. Under present conditions, millions of gallons of raw sewage from Mexico flow daily through the lower Tijuana River valley and into its estuary. The river is not only highly polluted from sewage but has been changed to a perennial flow. One result has been the creation and maintenance of wetlands that are wetter than those that occurred under historic conditions.

Riverine Systems as Disturbance-Driven Ecosystems. The importance of patchiness or habitat heterogeneity in maintaining biodiversity is well documented. Variability in natural processes such as flooding creates and maintains habitat heterogeneity. Rivers are disturbance-driven ecosystems due to their natural variability in flow. The structure of the river-floodplain ecosystem is characterized by lateral, vertical, and upstream-downstream dimensions, each with distinct patches of habitat. Annual disturbance from flooding is necessary to maintain the health of riverine ecosystem processes. Natural spatial (i.e., magnitude) and temporal (i.e., timing, frequency) variability in discharge maintains riverine systems at dynamic equilibria and supports a mosaic of diverse wetland macro- and micro-habitats at various successional stages.

Many riverine and palustrine wetland plants exhibit physiological and physical adaptations to a flood driven disturbance regime. Floods maintain habitat heterogeneity which in turn, supports a diversity of plants and animals. One federally-endangered species, *Vireo bellii pusillus* (Least Bell's Vireo), demonstrates a preference for early to mid-successional *Salix* woodland (= palustrine wetland) habitats. Diverse multi-successional riparian habitats are created and maintained by natural flooding regimes.

Human activities within the region have drastically altered the timing, frequency, and magnitude of flow patterns in all but a few river drainages. For example, the construction of El Capitan and San Vicente Reservoirs on the San Diego River, San Diego County, has virtually eliminated large flood flows and drastically reduced sediment transport into the alluvial floodplain of the lower San Diego River. Elimination of flooding and reduction of sediment recruitment have resulted in a narrowing of the river channel, reduction in the lateral extent of flooding and the hydrologic isolation of upper riverine terraces, and an overall reduction in wetland habitat heterogeneity. Reduced flooding allowed for urban encroachment onto the floodplain. Urbanization has increased summer base flows. Reduction in sediment transport past upstream dams and instream sand and gravel extraction contributed to channel scour and further downcutting of the channel bed. Channel degradation further isolated floodplain terraces and lowered local groundwater tables used by adjacent riparian plants. Scour increased bank erosion and the perceived need to stabilize the rivers banks through channelization. Today, much of the channel of the lower San Diego River is confined within levees and consists largely of an inter-connected series of abandoned gravel ponds dominated by plants such as *Scirpus* spp., *Typha* spp., *Arundo donax*, water hyacinth, and large senescent stands of *Salix goodingii*. Hydrologic and hydraulic changes to the river have been so extensive, that the river no longer resembles physically or functionally its historical condition.

As discussed above dams and reservoirs have caused extensive changes to riverine habitats within the study area. Faber et al. (1989) found that for the Ventura, Santa Clara, Los Angeles, San Gabriel, Santa Ana, San Luis Rey, and San Diego rivers, between 37 (i.e., Santa Clara and San Luis Rey rivers) to 90 (i.e., Santa Ana River) percent of their total drainage basins are controlled by dams. For the Santa Ana River alone this amounts to over 3,900 km of stream with altered hydrologic and hydraulic functions. One of the most obvious impacts of dams, reservoirs, and diversions on riverine systems within the study region are the reduction of downstream flows. Flow reduction results in the direct loss of spawning and rearing habitat for fishes and other aquatic organisms. Dewatering of streams has been identified as a major cause of declines in populations of southern steelhead, a species currently under review for federal listing as an endangered species (Moyle and Yoshiyama 1992). In contrast, reservoir releases for irrigation increase downstream flows during the summer months, creating riverine wetland habitats relatively colder and larger than under natural conditions. This situation may be observed on the San Luis Rey River below Lake Henshaw (Fig. VII-23). These altered hydrologic conditions have allowed introduced fishes (e.g., catfish, sunfish, largemouth bass) from Lake Henshaw to colonize and reproduce downstream of the reservoir. The fish fauna now bears a greater resemblance to Midwestern lakes than that of the original river.

Dams reduce the amount of nutrients (e.g., detritus, silt, coarse organic material) transported downstream which may in turn have adverse effects on the productivity of riverine, estuarine, and marine communities (Moyle and Leidy 1992). Dams also block the upstream and downstream migrations of native fishes and other aquatic and terrestrial organisms. Recolonization by native aquatic organisms from below an impoundment or from adjacent tributary streams may no longer be possible.

Loss of Resistance and Resilience in Riverine Ecosystems. Because riverine ecosystems are disturbance driven they are adapted to withstand and recover quickly from natural disturbances. Disturbance is necessary to maintain habitat heterogeneity and the overall health of system. Habitat heterogeneity facilitates resilience (i.e., the ability to recover) to disturbance by providing multiple patches of potential colonizers. The health and resilience of riverine wetlands is intimately linked to their floodplain. Within the region, various human activities such as channelization, the construction of dams, floodplain urbanization, and pollution have eliminated or severely compromised the ability of riverine systems to recover from disturbance. This is especially evident along the lower reaches of the larger rivers, streams and washes of the Los Angeles floodplain where human activities have converted once extensive alluvial floodplains to urban uses and watercourses to armored channels and ditches.

Extraction of sand and gravel has had severe effects on the overall resilience of rivers within the region. Extraction of sand and gravel negatively effects riverine systems in several ways. Within several drainages the extraction of aggregate in quantities in excess of replenishment has resulted in bed degradation. For example, on the San Luis Rey River in northern San Diego County, and the Santa Maria River, Ventura County, extraction of sand in quantities far in excess of replenishment rates caused the channel to degrade thereby, changing its morphology from a broad, flat alluvial channel and floodplain to one that is narrow and deep. Changes in channel morphology locally lowered groundwater levels that resulted in the accelerated senescence and increased mortality of *Salix* spp.-dominated forested and shrub-scrub (palustrine) wetlands on the adjacent floodplain.

In addition, bed degradation led to a decrease in over-bank flooding and the creation of habitats suitable for the establishment of riparian vegetation. Finally, bed degradation increased rates of channel and bank erosion with further losses to riparian vegetation and undermining and exposure of bridges, pipelines, and roads. The effects of over-extraction of sand and gravel are not localized but have caused destabilization of river banks and changed channel morphology for many miles upstream and downstream of the actual operations.

Other effects of sand and gravel mining include the replacement of broad, flat alluvial channels with large, deep lakes. These lakes often support exotic fishes adapted to lacustrine habitats which may result in the displacement of native fishes. On the lower San Diego River historical gravel mining activities have created a series of ponds and lakes dominated by introduced fishes centrarchids, poecilids, and ictalurids. The fish fauna now bears a greater resemblance to Midwestern lakes and streams than that of the original river.

The effects of sand and gravel mining on riverine systems are significant if one considers the number of on-going operations within the region. There are a minimum of sixty-five ongoing instream aggregate mining operations within the study region (Eric Stein, pers. comm., U.S. Army Corps of Engineers 1994). This number does not include mining operations on floodplain terraces immediately adjacent to the river, stream or wash channel. On the Santa Maria River alone there are currently a minimum of eight instream mining operations (Eric Stein, pers. comm., U.S. Army Corps of Engineers 1994).

Restoration and Creation of Riverine Wetlands

In spite of the degraded state of many urban portions of rivers and streams in the study region, many restoration projects have been planned or initiated whose goals are to recover lost ecosystem functions (e.g., anadromous fish spawning) and socioeconomic values (urban recreation) of Southern California's waterways. One ambitious example is the restoration project planned for the Los Angeles River (see Coast and Ocean [2] 1993; and "River Rescue", Los Angeles Times, 20 Apr 1994). For such efforts to be successful ecologically it is necessary to know something about the region's rivers and the types of wetlands they support. Identification and classification of riverine wetlands on a regional scale will provide the framework for identifying goals and establishing criteria for assess the success of such efforts.

Rare and Threatened Riverine Wetlands

Moyle and Williams (1990) and Swift et al. (1993) consider all remaining native fishes within the Los Angeles region as needing formal protection to prevent further population declines and possible extinction. This includes native fishes that historically occurred within a variety riverine wetland types, from headwater springs (e.g., *Gasterosteus* sp., Shay Creek Stickleback) to valley and coastal-plain riverbeds (e.g., *Catostomus santaanae*, Santa Ana Sucker). The precarious status of native fishes and other aquatic organisms indicates that all riverine wetland types within the study region (especially the southern portion) are threatened. Riverine wetlands in the northern

RIVERINE WETLANDS

study region from Monterey County south to San Luis Obispo, are in better condition however, localized impacts (e.g., sedimentation, water diversions) pose significant threats to these wetlands as well. Within the southern-most region of the study area, especially San Diego and Riverside Counties, all remaining riverine wetlands are severely threatened with further degradation by continued population growth and its attendant urbanization.

Key to Riverine Subsystems and Classes

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

Water gradient is low and under the influence of oceanic tides (there are no examples of this subsystem in the study area, but there are in large river systems to the north).....**TIDAL SUBSYSTEM**

Substrates are continuously submerged (i.e., subtidal habitats):

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

Substrate of bedrock, boulders, rubble, 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 70% areal cover of bedrock, boulders, or rubble.....**Unconsolidated Bottom Class**

During the growing season of most years, percentage cover by vegetation (e.g., algae and submerged aquatic vascular plants such as *Potamogeton*, *Zannichellia*, *Elodea*) is 30% or greater**Aquatic Bed Class**

Substrates are at least irregularly exposed and flooded by oceanic tides (i.e., intertidal habitats):

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

Substrate of bedrock, boulders, rubble, or combinations of these covering 70% or more of the substrate.....**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**

RIVERINE WETLANDS

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

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

Vegetation intertidal, non-persistent emergent types (e.g *Callitriche*, *Elatine*)**Emergent Wetland Class**

Water gradient is low, high, or intermittent, but there is no influence from oceanic tides:

Water flows in the channel for only part of the year; when water is not flowing surface water may be absent, or water may occur as isolated pools.....

INTERMITTENT SUBSYSTEMS

Channel occurs within a relatively high gradient (4-10%), where flows are often flashy and closely tied to specific rainfall events, and is entrenched with steep banks and poorly defined floodplains.....**UPPER INTERMITTENT SUBSYSTEM**

During the growing season of most years, areal cover by vegetation is less than 30%.....**Streambed Class**

During the growing season of most years, percentage of area covered by vegetation is 30% or greater, composed largely of pioneering annuals and seedlings of perennials that occur at the time of substrate exposure.....**Streambed (Vegetated) Class**

Channel occurs within a depositional landform, with a moderate gradient (1.5-4%) and low sinuosity, and is slightly entrenched

MID INTERMITTENT SUBSYSTEM

During the growing season of most years, areal cover by vegetation is less than 30%.....**Streambed Class**

During the growing season of most years, percentage of area covered by vegetation is 30% or greater, composed largely of pioneering annuals and seedlings of perennials that occur at the time of substrate exposure.....**Streambed (Vegetated) Class**

Channel occurs within a depositional landform with a low gradient (1.5% or less), where the floodplain is moderate to well developed, the valley only slightly confined, and the channel only slightly entrenched.....

LOWER INTERMITTENT SUBSYSTEM

During the growing season of most years, areal cover by vegetation is less than 30%.....**Streambed Class**

During the growing season of most years, percentage of area covered by vegetation is 30% or greater, composed largely of pioneering annuals and seedlings of perennials that occur at the time of substrate exposure.....**Streambed (Vegetated) Class**

Some water flows in the channel throughout the year.....**PERENNIAL SUBSYSTEMS**

RIVERINE WETLANDS

Channel gradient is high (4-10%) and water velocity is at least seasonally or temporarily fast; substrates consist of rock, cobbles, or gravel with patches of sand; a floodplain is usually lacking or poorly developed.....
.....**UPPER PERENNIAL SUBSYSTEM**

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

Water regimes include permanently or semi-permanently flooded and intermittently exposed; substrate is usually not a soil; bottoms and beds:

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

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

Water regimes include seasonally flooded, temporarily flooded, intermittently flooded, saturated, or artificially flooded; shores and banks:

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

Substrate of sand, gravel, or cobble 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 herbaceous vegetation is 30% or greater:

Vegetation generally permanently-flooded algae, rooted aquatic, floating-leaved, or floating types.....**Aquatic Bed Class**

Vegetation dominated by nonpersistent emergent types:

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

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

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

During most years, vegetation is composed largely of nonpersistent perennials that dominate the substrate or flooded riverine habitat.....**Emergent Wetland Class**

Channel gradient is moderate (1.5-4%) and sinuosity low, and occurs in a depositional and form; substrate is variable but dominated by cobbles, gravel, and sand.....**MID PERENNIAL SUBSYSTEM**

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

Water regimes include permanently or semi-permanently flooded and intermittently exposed; substrate is usually not a soil; bottoms and beds:

Substrate of bedrock, boulders, rubble, 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 70% areal cover of bedrock, boulders, or rubble.....**Unconsolidated Bottom Class**

Water regimes include seasonally flooded, temporarily flooded, intermittently flooded, saturated, or artificially flooded; shores or banks:

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 herbaceous vegetation (e.g., algae, submerged aquatic and nonpersistent emergent vascular plants) is greater than 30%:

Vegetation generally permanently-flooded algae, rooted aquatic, floating-leaved, or floating types (e.g., *Potamogeton*, *Lemna*).....**Aquatic Bed Class**

Vegetation dominated by nonpersistent emergent types:

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

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

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

During most years, vegetation is composed largely of nonpersistent perennials that dominate the substrate or flooded riverine habitat.....**Emergent Wetland Class**

Channel gradient (1.5% or less) and water velocity are low; substrates are mostly sand and mud; a floodplain is often well developed.....
.....**LOWER PERENNIAL SUBSYSTEM**

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

Water regimes include permanently or semi-permanently flooded and intermittently exposed; substrate is usually not a soil; bottoms and beds:

Substrate of bedrock, boulders, rubble, 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 70% areal cover of bedrock, boulders, or rubble**Unconsolidated Bottom Class**

Water regimes include seasonally flooded, temporarily flooded, intermittently flooded, saturated, or artificially flooded; shores and banks:

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 herbaceous vegetation (e.g., algae, submerged aquatic and nonpersistent emergent vascular plants) is greater than 30%:

Vegetation generally permanently-flooded algae, rooted aquatic, floating-leaved, or floating types (e.g., *Potamogeton*, *Lemna*)
.....**Aquatic Bed Class**

Vegetation dominated by nonpersistent emergent types:

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

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

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

During most years, vegetation is composed largely of nonpersistent perennials that dominate the substrate or flooded riverine habitat.....**Emergent Wetland Class**

TABLE VII-1. TABLE OF RIVERINE 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 Substrate or Species)

(20.0) NONTIDAL WATER REGIMES (Riverine, Lacustrine, Palustrine Systems)

(21.0) PERMANENTLY-FLOODED NONTIDAL REGIME

(21.0.100.0000) Water Bodies (Hydrogeomorphic Context)

(21.0.110) Pools

(21.0.113) Main Channel Pools

(21.0.114) Scour Pools

(21.0.115) Backwater Pools

(21.0.120) Riffles

(21.0.121) Riffles

(21.0.122) Rapids

(21.0.123) Cascades

(21.0.124) Runs

(21.0.125) Falls

(21.0.160) Streams

(21.0.161) Montane Streams

(21.0.162) Foothill/Terrace Streams

(21.0.163) Valley Streams

(21.0.164) Coastal-Plain Streams

(21.0.165) Canyon Streams

(21.0.170) Rivers

(21.0.171) Montane Rivers

(21.0.172) Foothill Rivers

(21.0.173) Valley Rivers

(21.0.174) Coastal-Plain Rivers

(21.0.175) Canyon Streams

(21.0.180) Drainages

(21.0.181) Montane Drainages

(21.0.182) Coastal Canyon Drainages

(21.0.200.0000) Channels, Drainages, Inverts, Falls

(21.0.210) Stream Channels

- (21.0.211) Montane Stream Channels
- (21.0.212) Foothill/Terrace Stream Channels
- (21.0.213) Valley Stream Channels
- (21.0.214) Coastal-Plain Stream Channels
- (21.0.215) Distributary Stream Channels
- (21.0.216) Canyon Stream Channels

(21.0.220) River Channels

- (21.0.221) Montane River Channels
- (21.0.222) Foothill River Channels
- (21.0.223) Valley River Channels
- (21.0.224) Coastal Plain River Channels
- (21.0.225) Distributary River Channels
- (21.0.226) Canyon River Channels

(21.0.230) Backbar Channels

- (21.0.231) Stream Backbar Channels
- (21.0.232) River Backbar Channels

(21.0.260) Falls

- (21.0.261) Montane Stream Falls
- (21.0.262) Foothill Stream Falls
- (21.0.263) Montane River Falls
- (21.0.264) Foothill River Falls

(21.0.280) Artificial Ditches

(21.0.300.0000) Shores, Beaches, Banks, Margins

(21.0.400.0000) Beds, Bottoms, Bars

(21.0.410) Pool Beds/Bottoms

- (21.0.413) Main Channel Pools
- (21.0.414) Scour Pools
- (21.0.415) Backwater Pools

(21.0.450) Stream Beds/Bottoms

- (21.0.451) Montane Streambeds
- (21.0.452) Foothill/Terrace Streambeds
- (21.0.453) Valley Streambeds
- (21.0.454) Coastal Plain Streambeds
- (21.0.455) Canyon Streambeds

(21.0.460) River Beds/Bottoms

- (21.0.461) Montane Riverbeds
- (21.0.462) Foothill Riverbeds

- (21.0.463) Valley Riverbeds
- (21.0.464) Coastal-Plain Riverbeds
- (21.0.465) Canyon Riverbeds

(21.0.470) Stream-Channel Bars

- (21.0.471) Montane Stream-Channel Bars
- (21.0.472) Foothill/Terrace Stream-Channel Bars
- (21.0.473) Valley Stream-Channel Bars
- (21.0.474) Coastal-Plain Stream-Channel Bars
- (21.0.475) Canyon Stream-Channel Bars

(21.0.480) River-Channel Bars

- (21.0.481) Montane River-Channel Bars
- (21.0.482) Foothill River-Channel Bars
- (21.0.483) Valley River-Channel Bars
- (21.0.484) Coastal-Plain River-Channel Bars
- (21.0.485) Canyon River-Channel Bars

(21.0.500.0000) Flats, Plains, Fans, Washes, Bottomlands, Terraces

(21.0.600.0000) Headlands, Bluffs, Slopes

(21.0.700.0000) Seeps, Springs

(21.0.720) Springs

- (21.0.724) Stream Bank/Bed Springs
- (21.0.725) River Bank/Bed Springs

(21.0.800.0000) Palustrine Basins: Pools, Ponds, Lakes, Meadows, Marshes, Swales

(21.0.900.0000) Artificial Structures

(21.0.910) Stationary Artificial Structures

- (21.0.912) Bank Revetments
- (21.0.913) Dams/Levees
- (21.0.914) Earthen Berms/Dikes
- (21.0.915) Dredge Spoils
- (21.0.916) Pilings/Piers
- (21.0.917) Platforms
- (21.0.918) Boat Ramps
- (21.0.919) Wreckage

(21.0.920) Floating Artificial Structures

- (21.0.921) Hulls
- (21.0.922) Docks
- (21.0.923) Buoys
- (21.0.924) Logs

(22.0) INTERMITTENTLY-EXPOSED NONTIDAL REGIME (also see Regime 21.0)

(22.0.100.0000) Water Bodies (Hydrogeomorphic Context)

(22.0.200.0000) Channels, Drainages, Inverts, Falls

(22.0.210) Stream Channels

- (22.0.211) Montane Stream Channels
- (22.0.212) Foothill/Terrace Stream Channels
- (22.0.213) Valley Stream Channels
- (22.0.214) Coastal-Plain Stream Channels
- (22.0.215) Distributary Stream Channels
- (22.0.216) Canyon Stream Channels

(22.0.220) River Channels

- (22.0.221) Montane River Channels
- (22.0.222) Foothill River Channels
- (22.0.223) Valley River Channels
- (22.0.224) Coastal Plain River Channels
- (22.0.225) Distributary River Channels
- (22.0.226) Canyon River Channels

(22.0.230) Backbar Channels

- (22.0.231) Stream Backbar Channels
- (22.0.232) River Backbar Channels

(22.0.260) Falls

- (22.0.261) Montane Stream Falls
- (22.0.262) Foothill Stream Falls
- (22.0.263) Montane River Falls
- (22.0.264) Foothill River Falls

(21.0.280) Artificial Ditches

(22.0.300.0000) Beaches, Shores, Banks

(22.0.400.0000) Beds, Bottoms, Bars

(22.0.410) Pool Beds/Bottoms

- (22.0.413) Main-Channel Pool-Bottoms
- (22.0.414) Scour Pool-Bottoms
- (22.0.415) Backwater Pool-Bottoms

(22.0.450) Stream Beds/Bottoms

- (22.0.451) Montane Streambeds
- (22.0.452) Foothill/Terrace Streambeds
- (22.0.453) Valley Streambeds
- (22.0.454) Coastal Plain Streambeds
- (22.0.455) Canyon Streambeds

(22.0.460) River Beds/Bottoms

- (22.0.461) Montane Riverbeds
- (22.0.462) Foothill Riverbeds
- (22.0.463) Valley Riverbeds
- (22.0.464) Coastal-Plain Riverbeds
- (22.0.465) Canyon Riverbeds

(22.0.470) Stream-Channel Bars

- (22.0.471) Montane Stream-Channel Bars
- (22.0.472) Foothill/Terrace Stream-Channel Bars
- (22.0.473) Valley Stream-Channel Bars
- (22.0.474) Coastal-Plain Stream-Channel Bars
- (22.0.475) Canyon Stream-Channel Bars

(22.0.480) River-Channel Bars

- (22.0.481) Montane River-Channel Bars
- (22.0.482) Foothill River-Channel Bars
- (22.0.483) Valley River-Channel Bars
- (22.0.484) Coastal-Plain River-Channel Bars
- (22.0.485) Canyon River-Channel Bars

(22.0.500.0000) Flats, Plains, Washes, Bottomlands, Terraces

(22.0.600.0000) Headlands, Bluffs, Slopes

(22.0.700.0000) Seeps, Springs

(22.0.800.0000) Palustrine Basins: Pools, Ponds, Lakes, Meadows, Marshes, Swales

(22.0.900.0000) Artificial Structures

(23.0) SEMIPERMANENTLY-FLOODED NONTIDAL REGIME (also see Regime 21.0)

(23.0.100.0000) Water Bodies (Hydrogeomorphic Context)

(23.0.200.0000) Channels, Drainages, Inverts, Falls

(23.0.210) Stream Channels

- (23.0.211) Montane Stream Channels
- (23.0.212) Foothill/Terrace Stream Channels
- (23.0.213) Valley Stream Channels
- (23.0.214) Coastal-Plain Stream Channels
- (23.0.215) Distributary Stream Channels
- (23.0.216) Canyon Stream Channels

(23.0.220) River Channels

- (23.0.221) Montane River Channels
- (23.0.222) Foothill River Channels
- (23.0.223) Valley River Channels

- (23.0.224) Coastal Plain River Channels
- (23.0.225) Distributary River Channels
- (23.0.226) Canyon River Channels

(23.0.230) Backbar Channels

- (23.0.231) Stream Backbar Channels
- (23.0.232) River Backbar Channels

(23.0.260) Falls

- (23.0.261) Montane Stream Falls
- (23.0.262) Foothill Stream Falls
- (23.0.263) Montane River Falls
- (23.0.264) Foothill River Falls

(23.0.280) Artificial Ditches

(23.0.300.0000) Shores, Beaches, Banks, Margins

(23.0.340) Stream Shores

- (23.0.341) Montane Stream-Shores
- (23.0.342) Foothill/Terrace Stream-Shores
- (23.0.343) Valley Stream-Shores
- (23.0.344) Coastal-Plain Stream-Shores
- (23.0.345) Canyon Stream-Shores

(23.0.350) River Shores

- (23.0.351) Montane River-Shores
- (23.0.352) Foothill River-Shores
- (23.0.353) Valley River-Shores
- (23.0.354) Coastal-Plain River-Shores
- (23.0.355) Canyon River-Shores

(23.0.370) Stream Banks

- (23.0.371) Montane Stream-Banks
- (23.0.372) Foothill/Terrace Stream-Banks
- (23.0.373) Valley Stream-Banks
- (23.0.374) Coastal-Plain Stream-Banks
- (23.0.375) Canyon Stream-Banks

(23.0.380) River Banks

- (23.0.381) Montane River-Banks
- (23.0.382) Foothill River-Banks
- (23.0.383) Valley River-Banks
- (23.0.384) Coastal-Plain River-Banks
- (23.0.385) Canyon River-Banks

(23.0.400.0000) Beds, Bottoms, Bars

(23.0.410) Pool Beds/Bottoms

- (23.0.413) Main-Channel Pool-Bottoms
- (23.0.414) Scour Pool-Bottoms
- (23.0.415) Backwater Pool-Bottoms

(23.0.450) Stream Beds/Bottoms

- (23.0.451) Montane Streambeds
- (23.0.452) Foothill/Terrace Streambeds
- (23.0.453) Valley Streambeds
- (23.0.454) Coastal-Plain Streambeds
- (23.0.455) Canyon Streambeds

(23.0.460) River Beds/Bottoms

- (23.0.461) Montane Riverbeds
- (23.0.462) Foothill Riverbeds
- (23.0.463) Valley Riverbeds
- (23.0.464) Coastal-Plain Riverbeds
- (23.0.465) Canyon Riverbeds

(23.0.470) Stream-Channel Bars

- (23.0.471) Montane Stream-Channel Bars
- (23.0.472) Foothill/Terrace Stream-Channel Bars
- (23.0.473) Valley Stream-Channel Bars
- (23.0.474) Coastal-Plain Stream-Channel Bars
- (23.0.475) Canyon Stream-Channel Bars

(23.0.480) River-Channel Bars

- (23.0.481) Montane River-Channel Bars
- (23.0.482) Foothill River-Channel Bars
- (23.0.483) Valley River-Channel Bars
- (23.0.484) Coastal-Plain River-Channel Bars
- (23.0.485) Canyon River-Channel Bars

(23.0.500.0000) Flats, Plains, Washes, Bottomlands, Terraces

(23.0.600.0000) Headlands, Bluffs, Slopes

(23.0.700.0000) Seeps, Springs

(23.0.720) Springs

- (23.0.724) Stream Bank/Bed Springs
- (23.0.725) River Bank/Bed Springs

(23.0.800.0000) Palustrine Basins: Pools, Ponds, Lakes, Meadows, Marshes, Swales

(23.0.900.0000) Artificial Structures

(24.0) SEASONALLY-FLOODED NONTIDAL REGIME

(24.0.100.0000) Water Bodies (Hydrogeomorphic Context)

(24.0.110) Pools

- (24.0.113) Main Channel Pools
- (24.0.114) Scour Pools
- (24.0.115) Backwater Pools

(24.0.200.0000) Channels, Drainages, Inverts, Falls

(24.0.210) Stream Channels

- (24.0.211) Montane Stream Channels
- (24.0.212) Foothill/Terrace Stream Channels
- (24.0.213) Valley Stream Channels
- (24.0.214) Coastal-Plain Stream Channels
- (24.0.215) Canyon Stream Channels

(24.0.220) River Channels

- (24.0.221) Montane River Channels
- (24.0.222) Foothill River Channels
- (24.0.223) Valley River Channels
- (24.0.224) Coastal Plain River Channels
- (24.0.225) Canyon River Channels

(24.0.230) Backbar Channels

- (24.0.231) Stream Backbar Channels
- (24.0.232) River Backbar Channels

(24.0.260) Falls

- (24.0.261) Montane Stream Falls
- (24.0.262) Foothill Stream Falls
- (24.0.263) Montane River Falls
- (24.0.264) Foothill River Falls

(24.0.280) Artificial Ditches

(24.0.300.0000) Shores, Beaches, Banks, Margins

(24.0.340) Stream Shores

- (24.0.341) Montane Stream-Shores
- (24.0.342) Foothill/Terrace Stream-Shores
- (24.0.343) Valley Stream-Shores
- (24.0.344) Coastal-Plain Stream-Shores
- (24.0.345) Canyon Stream-Shores

(24.0.350) River Shores

- (24.0.351) Montane River-Shores
- (24.0.352) Foothill River-Shores

- (24.0.353) Valley River-Shores
- (24.0.354) Coastal-Plain River-Shores
- (24.0.355) Canyon River-Shores

(24.0.360) Beaches

- (24.0.361) River Beaches

(24.0.370) Stream Banks

- (24.0.371) Montane Stream-Banks
- (24.0.372) Foothill/Terrace Stream-Banks
- (24.0.373) Valley Stream-Banks
- (24.0.374) Coastal-Plain Stream-Banks
- (24.0.375) Canyon Stream-Banks

(24.0.380) River Banks

- (24.0.381) Montane River-Banks
- (24.0.382) Foothill River-Banks
- (24.0.383) Valley River-Banks
- (24.0.384) Coastal-Plain River-Banks
- (24.0.385) Canyon River-Banks

(24.0.400.0000) Beds, Bottoms, Bars

(24.0.450) Stream Beds/Bottoms

- (24.0.451) Montane Streambeds
- (24.0.452) Foothill/Terrace Streambeds
- (24.0.453) Valley Streambeds
- (24.0.454) Coastal Plain Streambeds
- (24.0.455) Canyon Streambeds

(24.0.460) River Beds/Bottoms

- (24.0.461) Montane Riverbeds
- (24.0.462) Foothill Riverbeds
- (24.0.463) Valley Riverbeds
- (24.0.464) Coastal-Plain Riverbeds
- (24.0.465) Canyon Riverbeds

(24.0.470) Stream-Channel Bars

- (24.0.471) Montane Stream-Channel Bars
- (24.0.472) Foothill/Terrace Stream-Channel Bars
- (24.0.473) Valley Stream-Channel Bars
- (24.0.474) Coastal-Plain Stream-Channel Bars
- (24.0.475) Canyon Stream-Channel Bars

(24.0.480) River-Channel Bars

- (24.0.481) Montane River-Channel Bars
- (24.0.482) Foothill River-Channel Bars
- (24.0.483) Valley River-Channel Bars
- (24.0.484) Coastal-Plain River-Channel Bars
- (24.0.485) Canyon River-Channel Bars

(24.0.500.0000) Flats, Plains, Fans, Washes, Bottomlands, Terraces

(24.0.530) Deltas

(24.0.532) River Deltas

(24.0.540) Washes

(24.0.541) Stream Washes

(24.0.542) River Washes

(24.0.543) Alluvial Washes

(24.0.600.0000) Headlands, Bluffs, Slopes

(24.0.700.0000) Seeps, Springs

(24.0.710) Seeps

(24.0.714) Stream Bank/Bed Seeps

(24.0.715) River Bank/Bed Seeps

(24.0.720) Springs

(24.0.724) Stream Bank/Bed Springs

(24.0.725) River Bank/Bed Springs

(24.0.800.0000) Palustrine Basins: Pools, Ponds, Lakes, Meadows, Marshes, Swales

(24.0.900.0000) Artificial Structures

(24.0.910) Stationary Artificial Structures

(24.0.912) Bank Revetments

(24.0.913) Dams/Levees

(24.0.914) Earthen Berms/Dikes

(24.0.915) Dredge Spoils

(24.0.916) Pilings/Piers

(24.0.917) Platforms

(24.0.918) Boat Ramps

(24.0.919) Wreckage

(24.0.920) Floating Artificial Structures

(24.0.921) Hulls

(24.0.922) Docks

(24.0.923) Buoys

(24.0.924) Logs

(27.0) TEMPORARILY-FLOODED NONTIDAL REGIME

(27.0.100.0000) Water Bodies (Hydrogeomorphic Context)

(27.0.180) Drainages

(27.0.181) Montane Drainages

(27.0.182) Coastal Canyon Drainages

(27.0.200.0000) Channels, Drainages, Inverts, Falls

(27.0.210) Stream Channels

(27.0.215) Distributary Stream Channels

(27.0.220) River Channels

(27.0.225) Distributary River Channels

(27.0.230) Backbar Channels

(27.0.231) Stream Backbar Channels

(27.0.232) River Backbar Channels

(27.0.280) Artificial Ditches

(27.0.300.0000) Beaches, Shores, Banks

(27.0.340) Stream Shores

(27.0.341) Montane Stream-Shores

(27.0.342) Foothill/Terrace Stream-Shores

(27.0.343) Valley Stream-Shores

(27.0.344) Coastal-Plain Stream-Shores

(27.0.345) Canyon Stream-Shores

(27.0.350) River Shores

(27.0.351) Montane River-Shores

(27.0.352) Foothill River-Shores

(27.0.353) Valley River-Shores

(27.0.354) Canyon River-Shores

(27.0.355) Coastal-Plain River-Shores

(27.0.360) Beaches

(27.0.361) River Beaches

(27.0.370) Stream Banks

(27.0.371) Montane Stream-Banks

(27.0.372) Foothill/Terrace Stream-Banks

(27.0.373) Valley Stream-Banks

(27.0.374) Coastal-Plain Stream-Banks

(27.0.375) Canyon Stream-Banks

(27.0.380) River Banks

(27.0.381) Montane River-Banks

(27.0.382) Foothill River-Banks

(27.0.383) Valley River-Banks

(27.0.384) Coastal-Plain River-Banks

(27.0.385) Canyon River-Banks

(27.0.400.0000) Beds, Bottoms, Bars

(27.0.470) Stream-Channel Bars

- (27.0.471) Montane Stream-Channel Bars
- (27.0.472) Foothill/Terrace Stream-Channel Bars
- (27.0.473) Valley Stream-Channel Bars
- (27.0.474) Coastal-Plain Stream-Channel Bars
- (27.0.475) Canyon Stream-Channel Bars

(27.0.480) River-Channel Bars

- (27.0.481) Montane River-Channel Bars
- (27.0.482) Foothill River-Channel Bars
- (27.0.483) Valley River-Channel Bars
- (27.0.484) Coastal-Plain River-Channel Bars
- (27.0.485) Canyon River-Channel Bars

(27.0.500.0000) Flats, Plains, Fans, Washes, Bottomlands, Terraces

(27.0.540) Washes

- (27.0.541) Stream Washes
- (27.0.542) River Washes
- (27.0.543) Alluvial Washes

(27.0.600.0000) Headlands, Bluffs, Slopes

(27.0.700.0000) Seeps, Springs

(27.0.800.0000) Palustrine Basins: Pools, Ponds, Lakes, Meadows, Marshes, Swales

(27.0.900.0000) Artificial Structures

(27.0.910) Stationary Artificial Structures

- (27.0.912) Bank Revetments
- (27.0.913) Dams/Levees
- (27.0.914) Earthen Berms/Dikes
- (27.0.915) Dredge Poils
- (27.0.916) Pilings/Piers
- (27.0.917) Platforms
- (27.0.918) Boat Ramps
- (27.0.919) Wreckage

(28.0) INTERMITTENTLY-FLOODED NONTIDAL REGIME

(28.0.100.0000) Water Bodies (Hydrogeomorphic Context)

(28.0.110) Pools

- (28.0.113) Main Channel Pools
- (28.0.114) Scour Pools
- (28.0.115) Backwater Pools

(28.0.120) Riffles

- (28.0.121) Riffles
- (28.0.122) Rapids
- (28.0.123) Cascades
- (28.0.124) Runs
- (28.0.125) Falls

(28.0.160) Streams

- (28.0.161) Montane Streams
- (28.0.162) Foothill/Terrace Streams
- (28.0.163) Valley Streams
- (28.0.164) Coastal-Plain Streams
- (28.0.165) Canyon Streams

(28.0.170) Rivers

- (28.0.171) Montane Rivers
- (28.0.172) Foothill Rivers
- (28.0.173) Valley Rivers
- (28.0.174) Coastal-Plain Rivers
- (28.0.175) Canyon Rivers

(28.0.180) Drainages

- (28.0.181) Montane Drainages
- (28.0.182) Coastal Canyon Drainages
- (28.0.183) Coastal Terrace Drainages

(28.0.200.0000) Channels, Drainages, Inverts, Falls

(28.0.210) Stream Channels

- (28.0.211) Montane Stream Channels
- (28.0.212) Foothill/Terrace Stream Channels
- (28.0.213) Valley Stream Channels
- (28.0.214) Coastal-Plain Stream Channels
- (28.0.215) Canyon Stream Channels

(28.0.220) River Channels

- (28.0.221) Montane River Channels
- (28.0.222) Foothill River Channels
- (28.0.223) Valley River Channels
- (28.0.224) Coastal-Plain River Channels
- (28.0.225) Canyon River Channels

(28.0.230) Backbar Channels

- (28.0.231) Stream Backbar Channels
- (28.0.232) River Backbar Channels

(28.0.240) Drainage Channels

- (28.0.241) Vernal Drainage Channels

(28.0.260) Falls

- (28.0.261) Montane Stream Falls
- (28.0.262) Foothill Stream Falls
- (28.0.263) Montane River Falls
- (28.0.264) Foothill River Falls

(28.0.280) Artificial Ditches

(28.0.300.0000) Shores, Beaches, Banks, Margins

(28.0.340) Stream Shores

- (28.0.341) Montane Stream-Shores
- (28.0.342) Foothill/Terrace Stream-Shores
- (28.0.343) Valley Stream-Shores
- (28.0.344) Coastal-Plain Stream-Shores
- (28.0.345) Canyon Stream-Shores

(28.0.350) River Shores

- (28.0.351) Montane River-Shores
- (28.0.352) Foothill River-Shores
- (28.0.353) Valley River-Shores
- (28.0.354) Coastal-Plain River-Shores
- (28.0.355) Canyon River-Shores

(28.0.360) Beaches

- (28.0.361) River Beaches

(28.0.370) Stream Banks

- (28.0.371) Montane Stream-Banks
- (28.0.372) Foothill/Terrace Stream-Banks
- (28.0.373) Valley Stream-Banks
- (28.0.374) Coastal-Plain Stream-Banks
- (28.0.375) Canyon Stream-Banks

(28.0.380) River Banks

- (28.0.381) Montane River-Banks
- (28.0.382) Foothill River-Banks
- (28.0.383) Valley River-Banks
- (28.0.384) Coastal-Plain River Banks
- (28.0.385) Canyon River Banks

(28.0.400.0000) Beds, Bottoms, Bars

(28.0.410) Pool Beds/Bottoms

- (28.0.413) Main-Channel Pool-Bottoms
- (28.0.414) Scour Pool-Bottoms
- (28.0.415) Backwater Pool-Bottoms

(28.0.450) Stream Beds/Bottoms

- (28.0.451) Montane Streambeds

- (28.0.452) Foothill/Terrace Streambeds
- (28.0.453) Valley Streambeds
- (28.0.454) Coastal Plain Streambeds
- (28.0.455) Canyon Streambeds

(28.0.460) River Beds/Bottoms

- (28.0.461) Montane Riverbeds
- (28.0.462) Foothill Riverbeds
- (28.0.463) Valley Riverbeds
- (28.0.464) Coastal-Plain Riverbeds
- (28.0.465) Canyon Riverbeds

(28.0.470) Stream-Channel Bars

- (28.0.471) Montane Stream-Channel Bars
- (28.0.472) Foothill/Terrace Stream-Channel Bars
- (28.0.473) Valley Stream-Channel Bars
- (28.0.474) Coastal-Plain Stream-Channel Bars
- (28.0.475) canyon Stream-Channel Bars

(28.0.480) River-Channel Bars

- (28.0.481) Montane River-Channel Bars
- (28.0.482) Foothill River-Channel Bars
- (28.0.483) Valley River-Channel Bars
- (28.0.484) Coastal-Plain River-Channel Bars
- (28.0.485) Canyon River-Channel Bars

(28.0.500.0000) Flats, Plains, Fans, Washes, Bottomlands, Terraces

(28.0.540) Washes

- (28.0.541) Stream Washes
- (28.0.542) River Washes
- (28.0.543) Alluvial Washes

(28.0.600.0000) Headlands, Bluffs, Slopes

(28.0.640) Alluvial Fans

- (28.0.641) Montane Alluvial Fans
- (28.0.642) Foothill Alluvial Fans
- (28.0.643) Valley Alluvial Fans

(28.0.700.0000) Seeps, Springs

(28.0.710) Seeps

- (28.0.714) Stream Bank/Bed Seeps
- (28.0.715) River Bank/Bed Seeps

(28.0.720) Springs

- (28.0.724) Stream Bank/Bed Springs
- (28.0.725) River Bank/Bed Springs

(28.0.900.0000) Artificial Structures

(28.0.910) Stationary Artificial Structures

- (28.0.912) Bank Revetments
- (28.0.913) Dams/Levees
- (28.0.914) Earthen Berms/Dikes
- (28.0.915) Dredge Spoils
- (28.0.916) Pilings/Piers
- (28.0.917) Platforms
- (28.0.918) Boat Ramps
- (28.0.919) Wreckage

(28.0.920) Floating Artificial Structures

- (28.0.921) Hulls
- (28.0.922) Docks
- (28.0.923) Buoys
- (28.0.924) Logs

CATALOGUE OF RIVERINE WETLANDS

This catalogue includes riverine 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 riverine 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 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.

* * * * *

30.000 SYSTEM RIVERINE
32.000 SUBSYSTEM UPPER-INTERMITTENT
32.120 CLASS UNCONSOLIDATED-BOTTOM
32.122 SUBCLASS SAND

Wetland Type No.: 32.122(23.1.463.1600)
RIVERINE UPPER-INTERMITTENT UNCONSOLIDATED-BOTTOM (SAND)
SEMIPERMANENTLY-FLOODED VALLEY-RIVERBED WETLAND. San Diego Co.,
Upper San Luis Rey River Watershed, Matagual Creek, immediately upstream from State
Route 79 bridge. **Section 404 Jurisdiction:** This named wetland is a jurisdictional
water under Section 404 to the ordinary high water mark. **FIG. VII-3.**

* * * * *

30.000 SYSTEM RIVERINE
32. SUBSYSTEM UPPER-INTERMITTENT
32.130 CLASS STREAMBED
32.131 SUBCLASS BEDROCK

RIVERINE WETLANDS

Wetland Type No.: 32.131(28.1.211.1200)

**RIVERINE UPPER-INTERMITTENT STREAMBED (BEDROCK)
INTERMITTENTLY-FLOODED MONTANE-STREAM-CHANNEL WETLAND.**

Ventura Co., Dry Lakes Ridge, headwaters of the Ventura River. **Section 404**

Jurisdiction: This named wetland is jurisdictional under Section 404 to the ordinary high water mark. **FIG. VII-9.**

* * * * *

30.000 SYSTEM RIVERINE

32.000 SUBSYSTEM UPPER-INTERMITTENT

32.130 CLASS STREAMBED

32.137 SUBCLASS VEGETATED

Wetland Type No.: 32.137(24.1.423.7000)

RIVERINE UPPER-INTERMITTENT STREAMBED-VEGETATED

SEASONALLY-FLOODED VALLEY-RIVERBED WETLAND. San Diego Co., San Luis Rey River Watershed, above Lake Henshaw, Matagual Creek, upstream from State Route 79 bridge. Vegetation within river channel is dominated by native and exotic weedy annuals. **Section 404 Jurisdiction:** This named wetland is jurisdictional under Section 404 to the ordinary high water mark. Vegetated wetlands on the shore and adjacent to the channel may or may not qualify as jurisdictional depending on the length of inundation and/or soil saturation. **FIG. VII-4.**

* * * * *

30.000 SYSTEM RIVERINE

33.000 SUBSYSTEM MID-INTERMITTENT

33.130 CLASS STREAMBED

33.133 SUBCLASS COBBLE-GRAVEL

Wetland Type No.: 33.133(24.1.452.1400)

RIVERINE MID-INTERMITTENT STREAMBED (COBBLE-GRAVEL)

SEASONALLY-FLOODED TERRACE-STREAMBED WETLAND San Luis Obispo Co., terrace of the Sierra Madre Mountain, Cottonwood Creek. **Section 404 Jurisdiction:** This named wetland is jurisdictional under Section 404 to the ordinary high water mark. There are potentially few jurisdictional wetlands adjacent to the streambed due to the lack of dominance by hydrophytic vegetation and adequate hydrology. **FIG. VII-10.**

Wetland Type No.: 33.133(28.1.541.1500)

RIVERINE MID-INTERMITTENT STREAMBED (COBBLE-GRAVEL)

INTERMITTENTLY-FLOODED STREAM-WASH WETLAND. Los Angeles Co., Santa

RIVERINE WETLANDS

Clara River Watershed, Soledad Canyon, north of Santa Clarita. **Section 404 Jurisdiction:** This named wetland is jurisdictional under Section 404 to the ordinary high water mark. There are potentially few jurisdictional wetlands adjacent to the streambed due to the lack of dominance by hydrophytic vegetation and adequate hydrology. **FIG. VII-11.**

* * * * *

30.000 SYSTEM RIVERINE
33.000 SUBSYSTEM MID-INTERMITTENT
33.130 CLASS STREAMBED

33.133 SUBCLASS COBBLE-GRAVEL

Wetland Type No.: 33.133(24.1.452.1400)
RIVERINE MID-INTERMITTENT STREAMBED (COBBLE-GRAVEL)
SEASONALLY-FLOODED TERRACE-STREAMBED WETLAND and RIVERINE
MID-INTERMITTENT AQUATIC-BED (ATTACHED-ALGAL)
SEASONALLY-FLOODED STREAMBED WETLAND. San Luis Obispo Co., terrace of the Sierra Madre Mountain, Cottonwood Creek. **Section 404 Jurisdiction:** This named wetland is jurisdictional under Section 404 to the ordinary high water mark. There are potentially few jurisdictional wetlands adjacent to the streambed due to the lack of dominance by hydrophytic vegetation and adequate hydrology. **FIG. VII-10.**

* * * * *

30.000 SYSTEM RIVERINE
33.000 SUBSYSTEM MID-INTERMITTENT
33.130 CLASS STREAMBED

33.134 SUBCLASS SAND

Wetland Type No.: 33.134(28.1.543.1600)
RIVERINE MID-INTERMITTENT STREAMBED (SAND)
INTERMITTENTLY-FLOODED ALLUVIAL-WASH WETLAND. Santa Barbara Co., Cuyuma River Watershed, Ballinger Canyon. **Section 404 Jurisdiction:** This named wetland is jurisdictional under Section 404 to the ordinary high water mark. There are potentially few jurisdictional wetlands adjacent to the streambed due to the lack of dominance by hydrophytic vegetation and adequate hydrology. **FIG. VII-12.**

30.000 SYSTEM RIVERINE
33.000 SUBSYSTEM MID-INTERMITTENT

33.210 CLASS AQUATIC-BED

33.211 SUBCLASS ATTACHED-ALGAL

Wetland Type No.: 33.211(24.1.452.2200)

RIVERINE MID-INTERMITTENT AQUATIC-BED (ATTACHED-ALGAL) SEASONALLY-FLOODED STREAMBED WETLAND. San Luis Obispo Co., terrace of the Sierra Madre Mountain, Cottonwood Creek. **Section 404 Jurisdiction:** This named wetland is jurisdictional under Section 404 to the ordinary high water mark. There are potentially few jurisdictional wetlands adjacent to the streambed due to the lack of dominance by hydrophytic vegetation and adequate hydrology. **FIG. VII-10.**

* * * * *

30.000 SYSTEM RIVERINE

34.000 SUBSYSTEM LOWER-INTERMITTENT

34.130 CLASS STREAMBED

34.133 SUBCLASS COBBLE-GRAVEL

Wetland Type No.: 34.133(27.1.452.1500)

RIVERINE LOWER-INTERMITTENT STREAMBED (COBBLE-GRAVEL) TEMPORARILY-FLOODED FOOTHILL-STREAMBED WETLAND. San Diego Co., San Clemente Canyon, south of State Route 52. **Section 404 Jurisdiction:** This named wetland is jurisdictional under Section 404 to the ordinary high water mark. There are potentially few jurisdictional wetlands adjacent to the streambed due to the lack of dominance by hydrophytic vegetation and adequate hydrology. **FIG. VII-13.**

* * * * *

30.000 SYSTEM RIVERINE

34.000 LOWER-INTERMITTENT

34.150 CLASS UNCONSOLIDATED-SHORE

34.151 SUBCLASS COBBLE-GRAVEL

Wetland Type No.: 34.151(27.1.322.1500)

RIVERINE LOWER-INTERMITTENT UNCONSOLIDATED-SHORE (COBBLE-GRAVEL) TEMPORARILY-FLOODED FOOTHILL-STREAM-SHORE WETLAND. Same location as Figure VII-13, above. **Section 404 Jurisdiction:** This named wetland is jurisdictional under Section 404 to the ordinary high water mark. There

RIVERINE WETLANDS

are potentially few jurisdictional wetlands adjacent to the streambed due to the lack of dominance by hydrophytic vegetation and adequate hydrology. **FIG.VII-14.**

* * * * *

30.000 SYSTEM RIVERINE
35.000 SUBSYSTEM UPPER-PERENNIAL
35.110 CLASS ROCK-BOTTOM

35.111 SUBCLASS BEDROCK

Wetland Type No.: 35.111(21.1.113.1200)

RIVERINE UPPER-PERENNIAL ROCK-BOTTOM (BEDROCK)

PERMANENTLY-FLOODED MAIN-CHANNEL-POOL WETLAND. Santa Barbara Co., South Coast, foothills of the Santa Ynez Mountains, San Jose Creek. This pool supports the habitat function at low water for fish (trout) and amphibians (newt).

Section 404 Jurisdiction: This named wetland is jurisdictional under Section 404 to the ordinary high water mark. Jurisdictional wetlands form a narrow fringe adjacent to the streambed where hydrophytic vegetation dominates, and where wetland hydrology and hydric soils are present. **FIG. VII-15.**

Wetland Type No.: 35.111(21.1.261.1200)

RIVERINE UPPER-PERENNIAL ROCK-BOTTOM (BED-ROCK)

PERMANENTLY-FLOODED MONTANE-STREAM-FALL WETLAND and RIVERINE UPPER-PERENNIAL AQUATIC-BED (ATTACHED-ALGAL)

PERMANENTLY-FLOODED MONTANE-STREAM-FALL WETLAND. Santa Barbara Co., Santa Ynez Mountains, Nojoqui Falls County Park. **Section 404 Jurisdiction:** These named wetlands are jurisdictional under Section 404 to the ordinary high water mark along the edge of the fall. **FIG. VII-16.**

* * * * *

30.000 SYSTEM RIVERINE
35.000 SUBSYSTEM UPPER-PERENNIAL
35.110 CLASS ROCK-BOTTOM

35.112 SUBCLASS BOULDER

Wetland Type No.: 35.112(21.1.113.1300)

RIVERINE UPPER-PERENNIAL ROCK-BOTTOM (BOULDER)

PERMANENTLY-FLOODED MAIN-CHANNEL-POOL WETLAND. Santa Barbara Co., foothills of the San Rafael Mountains, Sedgwick Ranch, headwater of Figueroa Creek. The main-channel-pools form a series of step-pools. **Section 404 Jurisdiction:**

This named wetland is jurisdictional under Section 404 to the ordinary high water mark. Jurisdictional wetlands form a very narrow fringe adjacent to the streambed where hydrophytic vegetation dominates, and where wetland hydrology and hydric soils are present. **FIG. VII-17.**

Wetland Type No.: 35.112(21.1.114.1300)

RIVERINE UPPER-PERENNIAL ROCK-BOTTOM (BOULDER)

PERMANENTLY-FLOODED SCOUR-POOL WETLAND. Ventura Co., Ventura River watershed, Matilija Creek, Wheeler Gorge. **Section 404 Jurisdiction:** This named wetland is jurisdictional under Section 404 to the ordinary high water mark. Jurisdictional wetlands form a very narrow fringe adjacent to the streambed where hydrophytic vegetation dominates, and where wetland hydrology and hydric soils are present. **FIG. VII-18.**

Wetland Type No.: 35.112(21.1.121.1300)

RIVERINE UPPER-PERENNIAL ROCK-BOTTOM (BOULDER)

PERMANENTLY-FLOODED-RIFFLE WETLAND. San Bernardino Co., San Bernardino Mountains, San Gorgonio Wilderness Area, Santa Ana River, South Fork. **Section 404 Jurisdiction:** This named wetland is jurisdictional under Section 404 to the ordinary high water mark. Jurisdictional wetlands form a very narrow fringe adjacent to the streambed where hydrophytic vegetation dominates, and where wetland hydrology and hydric soils are present. **FIG. VII-19.**

Wetland Type No.: 35.112(21.1.211.1300)

RIVERINE UPPER-PERENNIAL ROCK-BOTTOM (BOULDER)

PERMANENTLY-FLOODED MONTANE-STREAM-CHANNEL WETLAND. Santa Barbara County, Hollister Ranch, Santa Anita Canyon. **Section 404 Jurisdiction:** This named wetland is jurisdictional under Section 404 to the ordinary high water mark. Jurisdictional wetlands form a very narrow fringe adjacent to the streambed where hydrophytic vegetation dominates, and where wetland hydrology and hydric soils are present. **FIG. VII-20.**

Wetland Type No.: 35.112(21.1.211.1500)

RIVERINE UPPER-PERENNIAL ROCK-BOTTOM (BOULDER)

PERMANENTLY-FLOODED MONTANE-STREAM-CHANNEL WETLAND. San Bernardino Co., San Bernardino National Forest, San Gorgonio District, Vivian Creek. **Section 404 Jurisdiction:** This named wetland is jurisdictional under Section 404 to the ordinary high water mark. There are potentially few jurisdictional wetlands adjacent to the streambed, with the exception of the stands of *Alnus rhombifolia* forming a fringe along the channel, due to the lack of dominance by hydrophytic vegetation and adequate hydrology. **FIG. VII-21.**

* * * * *

**30.000 SYSTEM RIVERINE
35.000 SUBSYSTEM UPPER-PERENNIAL
35.210 CLASS AQUATIC-BED**

35.211 SUBCLASS ATTACHED-ALGAL

Wetland Type No.: 35.211(21.1.261.2200)

**RIVERINE UPPER-PERENNIAL AQUATIC-BED (ATTACHED-ALGAL)
PERMANENTLY-FLOODED MONTANE-STREAM-FALL WETLAND.** Santa Barbara Co., Santa Ynez Mountains, Nojoqui Falls County Park. **Section 404 Jurisdiction:** These named wetlands are jurisdictional under Section 404 to the ordinary high water mark along the edge of the fall. **FIG. VII-16.**

* * * * *

**30.000 SYSTEM RIVERINE
36.000 SUBSYSTEM MID-PERENNIAL
36.120 CLASS UNCONSOLIDATED-BOTTOM**

36.121 SUBCLASS COBBLE-GRAVEL

Wetland Type No.: 36.121(21.1.124.1500)

**RIVERINE MID-PERENNIAL UNCONSOLIDATED-BOTTOM (COBBLE-GRAVEL)
PERMANENTLY-FLOODED RIVER-RUN WETLAND.** San Diego Co., San Luis Rey River, downstream from Lake Henshaw. **Section 404 Jurisdiction:** This named wetland is jurisdictional under Section 404 to the ordinary high water mark. Jurisdictional wetlands form a very narrow fringe adjacent to the streambed where hydrophytic vegetation dominates, and where wetland hydrology and hydric soils are present. **FIG. VII-23.**

Wetland Type No.: 36.121(21.1.124.1500)

**RIVERINE MID-PERENNIAL UNCONSOLIDATED-BOTTOM (COBBLE-GRAVEL)
PERMANENTLY-FLOODED RIVER-RUN WETLAND.** Santa Barabara Co.; Los Padres National Forest, San Rafael Wilderness near Cliff Campground, Sisquoc River. **Section 404 Jurisdiction:** This named wetland is jurisdictional under Section 404 to the ordinary high water mark. Jurisdictional wetlands form a very narrow fringe adjacent to the streambed where hydrophytic vegetation dominates, and where wetland hydrology and hydric soils are present. **FIG. VII-22.**

Wetland Type No.: 36.121(23.1.482.1500)

**RIVERINE MID-PERENNIAL UNCONSOLIDATED-BOTTOM (COBBLE-GRAVEL)
SEMIPERMANENTLY-FLOODED FOOTHILL-RIVER CHANNEL-BAR WETLAND.**

Santa Barabara Co.; Los Padres National Forest, San Rafael Wilderness near Cliff Campground, Sisquoc River. **Section 404 Jurisdiction:** This named wetland is jurisdictional under Section 404 to the ordinary high water mark. Jurisdictional wetlands form a very narrow fringe adjacent to the streambed where hydrophytic vegetation dominates, and where wetland hydrology and hydric soils are present. **FIG. VII-22.**

* * * * *

30.000 SYSTEM RIVERINE
36.000 SUBSYSTEM MID-PERENNIAL
36.130 CLASS STREAMBED

36.137 SUBCLASS VEGETATED

Wetland Type No.: 36.137(21.1.214.6741)
RIVERINE MID-PERENNIAL STREAMBED-VEGETATED (*Paspalum distichum*)
PERMANENTLY-FLOODED COASTAL-PLAIN STREAM-CHANNEL WETLAND.
Ventura Co., Ventura River Watershed, San Antonio Creek. **Section 404 Jurisdiction:** This named wetland is jurisdictional under Section 404 to the ordinary high water mark. Jurisdictional wetlands form a very narrow fringe adjacent to the streambed where hydrophytic vegetation dominates, and where wetland hydrology and hydric soils are present. **FIG.VII-24.**

* * * * *

30.000 SYSTEM RIVERINE
36.000 SUBSYSTEM MID-PERENNIAL
36.210 CLASS AQUATIC-BED

36.211 SUBCLASS ATTACHED - ALGAL

Wetland Type No.: 36.211(21.1.124.1500)
RIVERINE MID-PERENNIAL AQUATIC-BED ATTACHED-ALGAL
PERMANENTLY-FLOODED MONTANE-STREAM WETLAND. Ventura Co., Piru Creek, 200 meters south of Agua Blanca and Piru Creek. Seasonally-flooded unconsolidated-shore habitat occurs adjacent to the permanent-floOded stream-bed. **Section 404 Jurisdiction:** This named wetland is jurisdictional under Section 404 to the ordinary high water mark. Jurisdictional wetlands form a very narrow fringe adjacent to the streambed where hydrophytic vegetation dominates, and where wetland hydrology and hydric soils are present. **FIG. VII-25.**

* * * * *

30.000 SYSTEM RIVERINE
37.000 SUBSYSTEM LOWER-PERENNIAL
37.110 CLASS ROCK-BOTTOM

37.112 SUBCLASS RUBBLE

Wetland Type No.: 37.112(21.1.455.1300)

RIVERINE LOWER-PERENNIAL ROCK-BOTTOM (RUBBLE)

PERMANENTLY-FLOODED CANYON-STREAMBED WETLAND. Monterey Co., Santa Lucia Mountains, Los Padres National Forest, Mill Creek, canyon mouth at State Route 1. Transitional area to marine wetlands. **Section 404 Jurisdiction:** This named wetland is jurisdictional under Section 404 to the ordinary high water mark. There are potentially few jurisdictional wetlands adjacent to the streambed due to the lack of dominance by hydrophytic vegetation and adequate hydrology. **FIG. VII-26.**

* * * * *

30.000 SYSTEM RIVERINE
37.000 SUBSYSTEM LOWER PERENNIAL
37.120 CLASS UNCONSOLIDATED-BOTTOM

37.121 SUBCLASS COBBLE - GRAVEL

Wetland Type No.: 37.121(21.1.464.1400)

RIVERINE LOWER-PERENNIAL UNCONSOLIDATED-BOTTOM

(COBBLE-GRAVEL) PERMANENTLY-FLOODED COASTAL-PLAIN RIVERBED

WETLAND. Monterey Co., Andrew Molera State Park, Big Sur River, west of State Route 1. **Section 404 Jurisdiction:** This named wetland is a jurisdictional water under Section 404 to the ordinary high water mark. There are potentially few jurisdictional wetlands adjacent to the streambed due to the lack of dominance by hydrophytic vegetation and adequate hydrology. **FIG.VII-27.**

Wetland Type No.: 37.121(24.1.474.1500)

RIVERINE LOWER-PERENNIAL UNCONSOLIDATED-BOTTOM

(COBBLE-GRAVEL) SEASONALLY-FLOODED COASTAL-PLAIN

STREAM-CHANNEL-BAR WETLAND. San Luis Obispo Co., Arroyo de la Cruz at State Route 1. The green alga *Enteromorpha* sp. characterizes the aquatic bed wetland in flooded portions of the channel. **Section 404 Jurisdiction:** This named wetland is jurisdictional under Section 404 to the ordinary high water mark. Jurisdictional wetlands form a very narrow fringe adjacent to the streambed where hydrophytic vegetation dominates, and where wetland hydrology and hydric soils are present. **FIG. VII-28.**

* * * * *

30.000 SYSTEM RIVERINE
37.000 SUBSYSTEM LOWER-PERENNIAL
37.120 CLASS UNCONSOLIDATED-BOTTOM

37.122 SUBCLASS SAND

Wetland Type No.: 37.122(24.1.464.1600)

RIVERINE LOWER-PERENNIAL UNCONSOLIDATED-BOTTOM (SAND)
SEASONALLY-FLOODED COASTAL-PLAIN-RIVERBED WETLAND. Ventura Co.,
Santa Clara River, Southern Pacific Milling Site. **Section 404 Jurisdiction:** This named
wetland is jurisdictional under Section 404 to the ordinary high water mark. Jurisdictional
wetlands form a very narrow fringe adjacent to the streambed where hydrophytic
vegetation dominates, and where wetland hydrology and hydric soils are present.
FIG.VII-29.

* * * * *

30.000 SYSTEM RIVERINE
37.000 SUBSYSTEM LOWER-PERENNIAL
37.120 CLASS UNCONSOLIDATED-BOTTOM

37.123 SUBCLASS MUD

Wetland Type No.: 37.123(21.1.211.1700)

RIVERINE LOWER-PERENNIAL UNCONSOLIDATED-BOTTOM (MIXED FINES
[MUD]) PERMANENTLY-FLOODED MONTANE-STREAM-CHANNEL WETLAND.
Riverside Co., Santa Rosa Plateau. Characteristic species include *Marsilea vestita* and
Callictriche heterophylla. **Section 404 Jurisdiction:** This named wetland is regulated
as other waters of the U.S. (stream channel bottom) with a narrow band of jurisdictional
wetland fringing the channel.

* * * * *

30.000 SYSTEM RIVERINE
37.000 SUBSYSTEM LOWER-PERENNIAL
37.240 CLASS EMERGENT WETLAND

37.242 SUBCLASS EMERGENT-NONPERSISTENT

Wetland Type No.: 37.242(21.1.224.5572)

RIVERINE LOWER-PERENNIAL EMERGENT-NONPERSISTENT (*LUDWIGIA HEXAPETALA*) PERMANENTLY-FLOODED COASTAL-PLAIN RIVER-CHANNEL WETLAND. Ventura Co., San Buenaventura Main Street Bridge, Ventura River.

Section 404 Jurisdiction: This named wetland is jurisdictional under Section 404 to the ordinary high water mark. Jurisdictional wetlands form a very narrow fringe adjacent to the streambed where hydrophytic vegetation dominates, and where wetland hydrology and hydric soils are present. **FIG. VII-30.**

Wetland Type No.: 37.242(23.1.391.4323,6751,6826,6832)

RIVERINE LOWER-PERENNIAL EMERGENT-NONPERSISTENT (*MARSILEA VESTITA, PASPALUM DISTICHUM, JUNCUS XIPHIODES, ELEOCHARIS MACROSTACHYA*) SEMIPERMANENTLY-FLOODED STREAM-MARGIN

WETLAND. Riverside Co., Santa Rosa Plateau. **Section 404 Jurisdiction:** This named wetland is regulated as other waters of the U.S. (stream channel bottom) with a narrow band of jurisdictional wetland fringing the channel.

Wetland Type No.: 37.242(24.1.474.5300, 5521, 5595, 5766)

RIVERINE LOWER-PERENNIAL EMERGENT-NONPERSISTENT (MIXED-VASCULAR-PLANT) SEASONALLY-FLOODED COASTAL-PLAIN STREAM-CHANNEL-BAR WETLAND. San Luis Obispo Co., Morro Creek, at Morro Bay.

Bar dominated by nonpersistent plants such as *Mimulus guttatus*, *Anthemis cotula*, and seedlings of *Salix lasiolepis*. **Section 404 Jurisdiction:** This named wetland is a jurisdictional water under Section 404 to the ordinary high water mark. Jurisdictional wetlands form a very narrow fringe adjacent to the streambed where hydrophytic vegetation dominates, and where wetland hydrology and hydric soils are present. **FIG.VII-31.**

RIVERINE WETLANDS

Wetland Type No.: 33.133(24.1.452.1400)

Wetland Type No.: 33.211(24.1.452.2200)



FIG. VII-10. RIVERINE MID-INTERMITTENT STREAMBED (COBBLE-GRAVEL) SEASONALLY-FLOODED TERRACE-STREAMBED WETLAND and RIVERINE MID-INTERMITTENT AQUATIC-BED (ATTACHED-ALGAL) SEASONALLY-FLOODED TERRACE-STREAMBED WETLAND. San Luis Obispo Co., terrace of the Sierra Madre Mountains, Cottonwood Creek. View upstream.

RIVERINE WETLANDS

Wetland Type No.: 33.133(28.1.541.1500)



FIG. VII-11. RIVERINE MID-INTERMITTENT STREAMBED (COBBLE-GRAVEL) INTERMITTENTLY-FLOODED STREAM-WASH WETLAND. Los Angeles Co., Santa Clara River Watershed, Soledad Canyon, north of Santa Clarita. View upstream.

Wetland Type No.: 33.133(28.1.543.1600)



FIG. VII-12. RIVERINE MID-INTERMITTENT STREAMBED (SAND) INTERMITTENTLY-FLOODED ALLUVIAL-WASH WETLAND. Santa Barbara Co., Cuyuma River Watershed, Ballinger Canyon. View upstream.

RIVERINE WETLANDS

Wetland Type No.: 34.133(27.1.452.1500)



FIG. VII-13. RIVERINE LOWER-INTERMITTENT STREAMBED (COBBLE-GRAVEL) TEMPORARILY-FLOODED FOOTHILL-STREAMBED WETLAND. San Diego Co., San Clemente Canyon, south of State Route 52. View upstream.

Wetland Type No.: 34.151(27.1.322.1500)



FIG. VII-14. RIVERINE LOWER-INTERMITTENT UNCONSOLIDATED-SHORE (COBBLE-GRAVEL) TEMPORARILY-FLOODED FOOTHILL-STREAM-SHORE WETLAND. Same location as Figure VII-13, above. View downstream.

RIVERINE WETLANDS

Wetland Type No.: 35.111(21.1.113.1200)



FIG. VII-15. RIVERINE UPPER-PERENNIAL ROCK-BOTTOM (BEDROCK) PERMANENTLY-FLOODED MAIN-CHANNEL-POOL WETLAND. Santa Barbara Co., South Coast, foothills of the Santa Ynez Mountains, San Jose Creek. View upstream.

RIVERINE WETLANDS

Wetland Type No.: 35.111(21.1.261.1200)

Wetland Type No.: 35.211(21.1.261.2200)

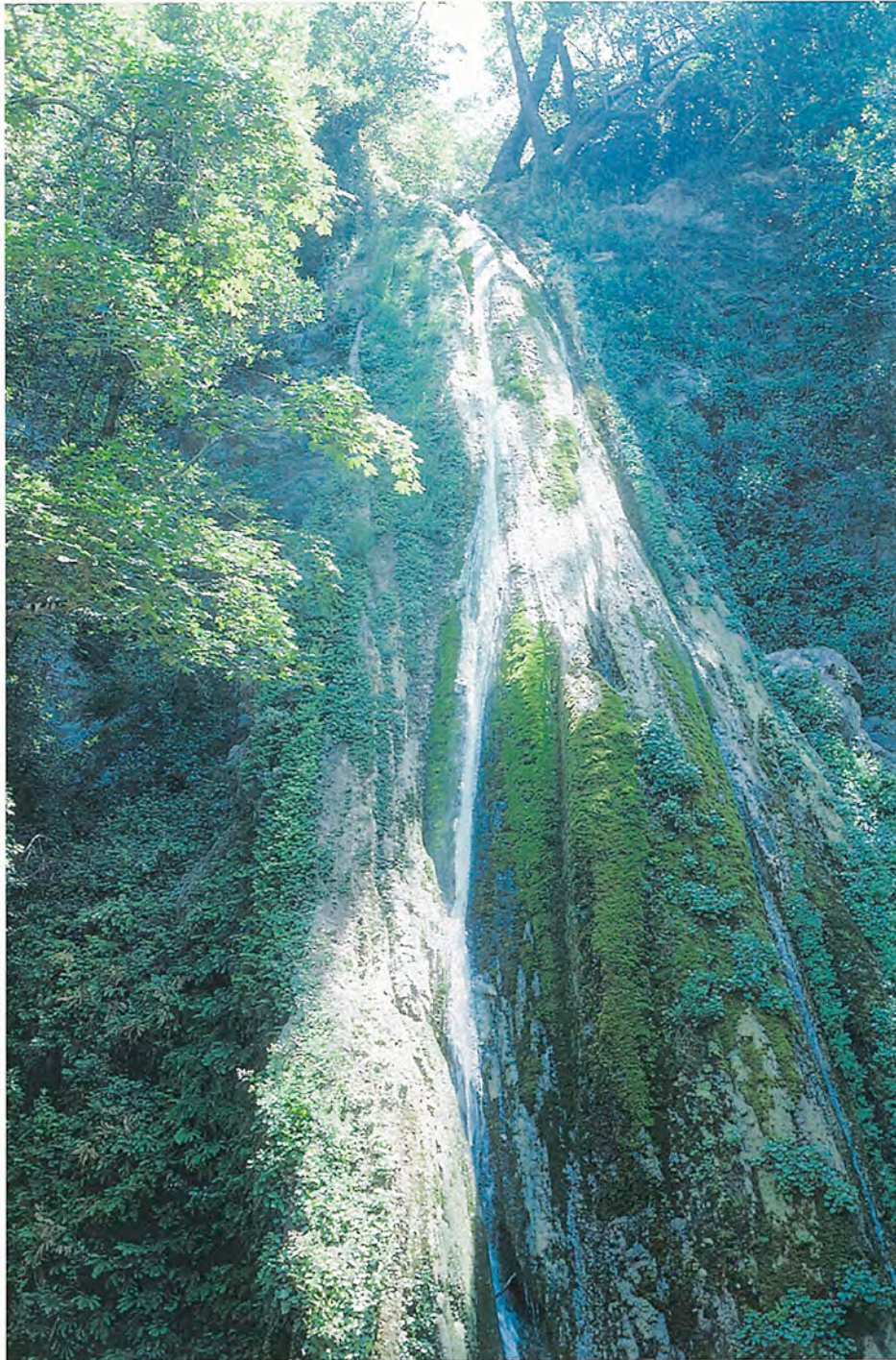


FIG. VII-16. RIVERINE UPPER-PERENNIAL ROCK-BOTTOM (BED-ROCK) PERMANENTLY-FLOODED MONTANE-STREAM-FALL WETLAND (center top) and RIVERINE UPPER-PERENNIAL AQUATIC-BED (ATTACHED-ALGAL) PERMANENTLY-FLOODED MONTANE-STREAM-FALL WETLAND (center bottom). Santa Barbara Co., Santa Ynez Mountains, Nojoqui Falls County Park.

RIVERINE WETLANDS

Wetland Type No.: 35.112(21.1.113.1300)



FIG. VII-17. RIVERINE UPPER-PERENNIAL ROCK-BOTTOM (BOULDER) PERMANENTLY-FLOODED MAIN-CHANNEL-POOL WETLAND. Santa Barbara Co., foothills of the San Rafael Mountains, Sedgwick Ranch, headwaters of Figueroa Creek. These main-channel-pools form a series of step-pools.

RIVERINE WETLANDS

Wetland Type No.: 35.112(21.1.114.1300)



FIG. VII-18. RIVERINE UPPER-PERENNIAL ROCK-BOTTOM (BOULDER) PERMANENTLY-FLOODED SCOUR-POOL WETLAND. Ventura Co., Ventura River watershed, Matilija Creek, Wheeler Gorge. View upstream.

Wetland Type No.: 35.112(21.1.121.1300)



FIG. VII-19. RIVERINE UPPER-PERENNIAL ROCK-BOTTOM (BOULDER) PERMANENTLY-FLOODED-RIFFLE WETLAND. San Bernardino Co., San Bernardino Mountains, San Geronimo Wilderness Area, Santa Ana River, South Fork. View upstream.

RIVERINE WETLANDS

Wetland Type No.: 35.112(21.1.211.1300)

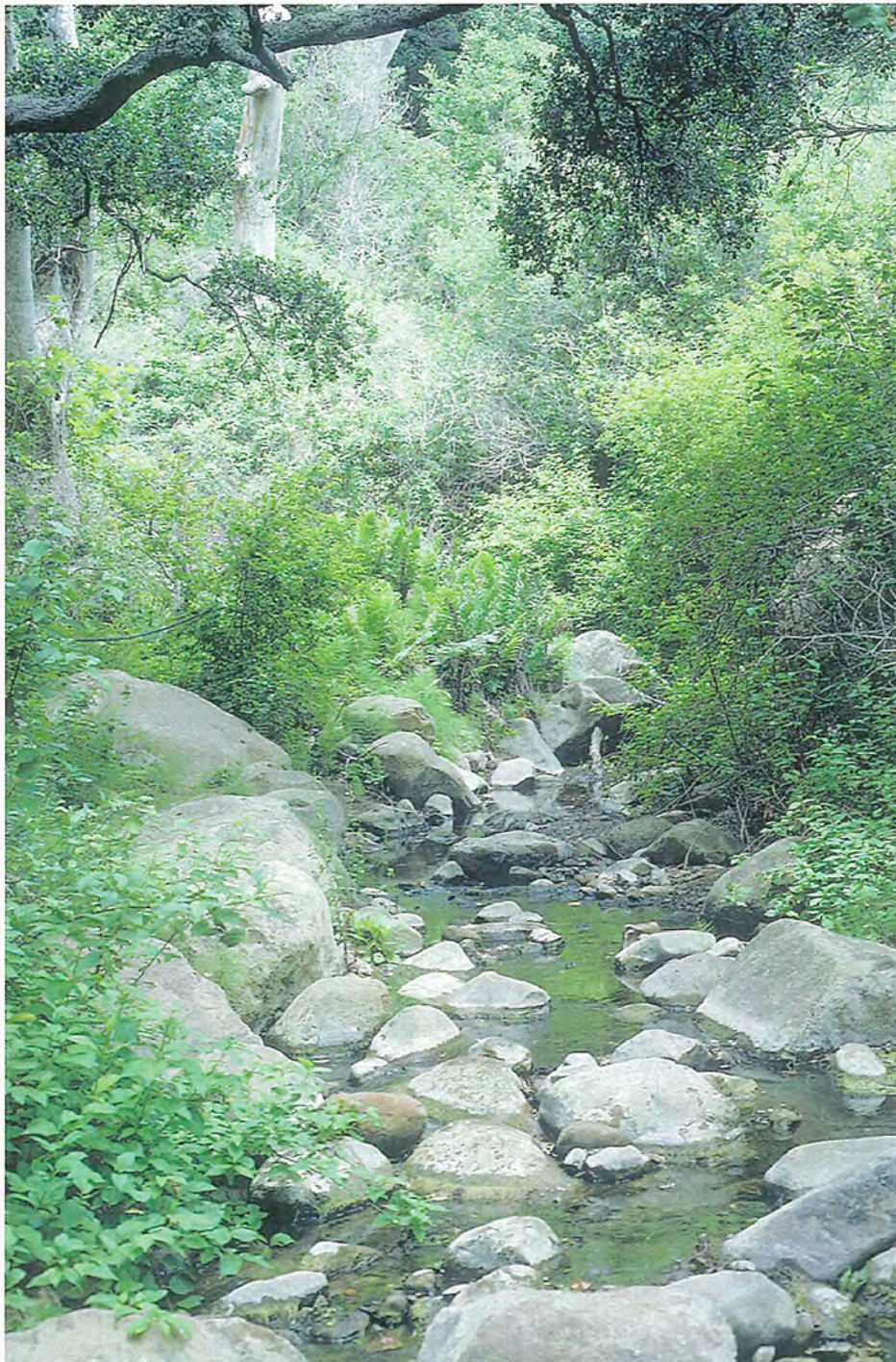


FIG. VII-20. RIVERINE UPPER-PERENNIAL ROCK-BOTTOM (BOULDER) PERMANENTLY-FLOODED MONTANE-STREAM-CHANNEL WETLAND. Santa Barbara County, Hollister Ranch, Santa Anita Canyon. View upstream.

RIVERINE WETLANDS

Wetland Type No.: 35.112(21.1.211.1500)



FIG. VII-21. RIVERINE UPPER-PERENNIAL ROCK-BOTTOM (BOULDER) PERMANENTLY-FLOODED MONTANE-STREAM-CHANNEL WETLAND. San Bernardino Co., San Bernardino National Forest, San Geronio District, Vivian Creek. View upstream.

RIVERINE WETLANDS

Wetland Type No.: 36.121(23.1.482.1500)

Wetland Type No.: 36.121(21.1.124.1500)



FIG. VII-22. RIVERINE MID-PERENNIAL UNCONSOLIDATED-BOTTOM (COBBLE-GRAVEL) SEMIPERMANENTLY-FLOODED FOOTHILL-RIVER CHANNEL-BAR WETLAND (bottom center and right) and RIVERINE MID-PERENNIAL UNCONSOLIDATED-BOTTOM (COBBLE-GRAVEL) PERMANENTLY-FLOODED RIVER-RUN WETLAND (bottom left). Santa Barbara Co.; Los Padres National Forest, San Rafael Wilderness near Cliff Campground, Sisquoc River. View downstream to northwest.

Wetland Type No.: 36.121(21.1.124.1500)



FIG. VII-23. RIVERINE MID-PERENNIAL UNCONSOLIDATED-BOTTOM (COBBLE-GRAVEL) PERMANENTLY-FLOODED RIVER-RUN WETLAND. San Diego Co., San Luis Rey River, downstream from Lake Henshaw. View downstream.

RIVERINE WETLANDS

Wetland Type No.: 36.137(21.1.214.6741)



FIG. VII-24. RIVERINE MID-PERENNIAL STREAMBED-VEGETATED (*PASPALUM DISTICHUM*) PERMANENTLY-FLOODED COASTAL-PLAIN STREAM-CHANNEL WETLAND. Ventura Co., Ventura River Watershed, San Antonio Creek. View downstream.

Wetland Type No.: 36.121(21.1.124.1500)



FIG. VII-25. RIVERINE MID-PERENNIAL AQUATIC-BED ATTACHED-ALGAL PERMANENTLY-FLOODED MONTANE-STREAM WETLAND. Ventura Co., Piru Creek, 200 meters south of Agua Blanca and Piru Creek. Seasonally-flooded unconsolidated-shore habitat occurs adjacent to the permanently-flooded streambed. (photograph by S. Sweet)

RIVERINE WETLANDS

Wetland Type No.: 37.112(21.1.455.1300)



FIG. VII-26. RIVERINE LOWER-PERENNIAL ROCK-BOTTOM (RUBBLE) PERMANENTLY-FLOODED CANYON-STREAMBED WETLAND. Monterey Co., Santa Lucia Mountains, Los Padres National Forest, Mill Creek, canyon mouth at State Route 1. View upstream from transition area to marine wetlands.

Wetland Type No.: 37.121(21.1.464.1400)



FIG. VII-27. RIVERINE LOWER-PERENNIAL UNCONSOLIDATED-BOTTOM (COBBLE-GRAVEL) PERMANENTLY-FLOODED COASTAL-PLAIN RIVERBED WETLAND. Monterey Co., Andrew Molera State Park, Big Sur River, west of State Route 1. View downriver.

RIVERINE WETLANDS

Wetland Type No.: 37.121(24.1.474.1500)



FIG. VII-28. RIVERINE LOWER-PERENNIAL UNCONSOLIDATED-BOTTOM (COBBLE-GRAVEL) SEASONALLY-FLOODED COASTAL-PLAIN STREAM-CHANNEL-BAR WETLAND (center). San Luis Obispo Co., Arroyo de la Cruz at State Route 1. View upstream. The green alga *Enteromorpha* sp. characterizes the aquatic bed wetland in flooded portions of the channel.

Wetland Type No.: 37.122(24.1.464.1600)

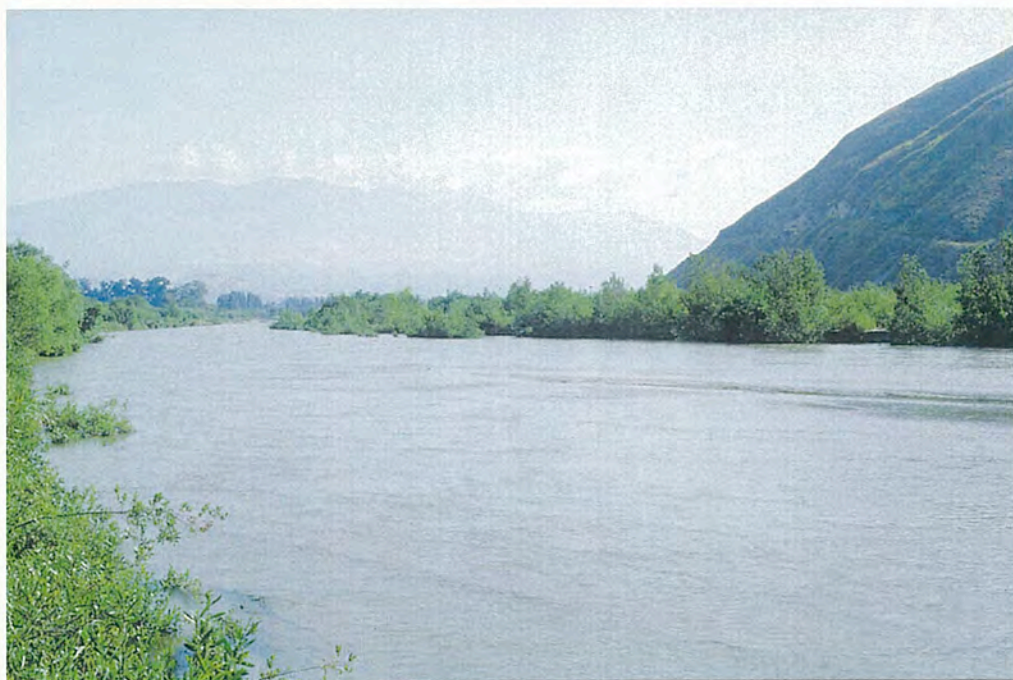


FIG. VII-29. RIVERINE LOWER-PERENNIAL UNCONSOLIDATED-BOTTOM (SAND) SEASONALLY-FLOODED COASTAL-PLAIN-RIVERBED WETLAND. Ventura Co., Santa Clara River, Southern Pacific Milling Site. View eastward upriver.

RIVERINE WETLANDS

Wetland Type No.: 37.242(21.1.224.5572)



FIG. VII-30. RIVERINE LOWER-PERENNIAL EMERGENT-NONPERSISTENT (*LUDWIGIA HEXAPETALA*) PERMANENTLY-FLOODED COASTAL-PLAIN RIVER-CHANNEL WETLAND. Ventura Co., San Buenaventura, Main Street Bridge, Ventura River. View northeastward along main stem of the Ventura River as it approaches the Ventura River Estuary.

Wetland Type No.: 37.242(24.1.474.5300,5521,5595,5766)



FIG. VII-31. RIVERINE LOWER-PERENNIAL EMERGENT-NONPERSISTENT (MIXED-VASCULAR-PLANT) SEASONALLY-FLOODED COASTAL-PLAIN STREAM-CHANNEL-BAR WETLAND. San Luis Obispo Co., Morro Creek, at Morro Bay. View of bar dominated by nonpersistent plants such as *Mimulus guttatus*, *Anthemis cotula*, and seedlings of *Salix lasiolepis*.