SOUTHERN CALIFORNIA WETLANDS RECOVERY PROJECT

REGIONAL STRATEGY

NOVEMBER 2001

Southern California Wetlands Recovery Project

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I: Introduction

A. Coastal Southern California and its Wetlands

Southern California's vitality depends in large part on the appeal of its natural environment, especially its rivers, streams, wetlands, and nearshore waters (collectively "wetlands"). The state's five southernmost coastal counties, which constitute only 8.6 percent of the state's land area, are home to half the state's inhabitants and account for 42% percent of its economy. The $500 billion annual regional output is larger than the gross national product of all but 11 of the world's nations and constitutes six percent of the nation's gross national product. The Los Angeles-Long Beach Port Complex is the largest in the United States and the third largest in the world, placing it at the center of the nation's vast trade network. People continue to flock here to enjoy the warm, dry summers and mild winters, the dramatic coastline and famous beaches. By 2020, the population is expected to rise from 16 million to 23 million.

While the natural environment continues to act as magnet for people and commerce, the resulting pressures have radically altered and degraded its waters, threatening to undermine public health, economic wellbeing, and the quality of life. The National Research Council has determined that California has lost a greater percentage of its wetlands than any other state, especially in the southern region, which comprises San Diego, Orange, Los Angeles, Ventura, and Santa Barbara Counties. In Los Angeles County, wetland losses exceed 95 percent.

Southern California has more flood control dams, debris basins, and miles of concrete-encased stream channels than any other region in the nation. Waterways and wetlands have been dammed, diverted, channelized, filled, and polluted. Flood waters are typically shunted to the sea rather than used to recharge aquifers. Meanwhile, the enormous infrastructure constructed to import water has drastically altered the natural hydrologic regime and deprived beaches of sand supplies.

Water pollution is a growing concern. Southern California is one of the few major urban regions in the nation where contaminated runoff flows directly into streams and drains to nearshore waters rather than being diverted to wastewater treatment plants first. Over 150 beach closures occurred during summer 2000, undermining a $7 billion tourism and recreation industry.

The rich biodiversity of the region is rapidly being lost. Noted biologist E.O Wilson has designated southern California as one of the world's eighteen "hotspots" – the only one in North America – because of the scale of the threat to its biodiversity. At this time, 150 animal and 52 plant species that depend on rivers, streams, and wetlands are considered as threatened or endangered by either state or federal agencies. The region's coastal wetlands from Point Mugu to Tijuana Estuary have been nominated by the U.S. Fish and Wildlife Service as wetlands of international significance under the Ramsar Convention because of their importance to migratory birds, fisheries, endangered species, and biodiversity.

Despite staggering losses, however, precious natural areas survive or can be recovered. To be sure, restoration in this heavily urbanized region is a daunting task. The physical and hydrological landscape has been irreversibly altered and it is often impossible to re-establish historic conditions. Opportunities for coastal wetland restoration are limited by extensive development, as well as by geologic and topographic constraints. Opportunities to preserve and restore stream corridors and riparian habitat are more numerous but are constrained by encroaching development and flood management concerns.

Nonetheless, the values resulting from strategically planned restoration are momentous, not only for the economic potential of their hydrological, habitat, and water purification functions, but for their potential to enhance the quality of life in this highly developed region. The lure of rivers, streams, wetlands, and nearshore waters is powerful. These are favored destinations for school trips, family outings, contemplative and recreational activities, and vacations. They offer a welcome contrast to the uniformity of the urban landscape and kindle curiosity about the natural world and the role of humans in it.

Common Wetlands Functions

- Fish and wildlife habitat
- Food chain support (primary productivity)
- Flood water storage
- Shoreline and streambank anchoring
- Sediment Trapping
- Water quality and nutrient processing
- Groundwater

Coastal Southern California is a region like no other in terms of the growth and environmental transformation it has experienced. It also stands alone in terms of its geologic, hydrologic, climatic, and ecological characteristics. Wetlands research that has been based primarily on coastal systems of the Atlantic and Gulf region, has resulted in scientific findings, public policies, and educational programs that show little understanding of coastal Southern California's distinctive, highly dynamic wetland conditions. Against this backdrop of loss and lack of understanding, the Southern California Wetlands Recovery Project was formed to develop a more coordinated and comprehensive strategy for preserving and restoring the region's waters.

B. The Wetlands Recovery Project

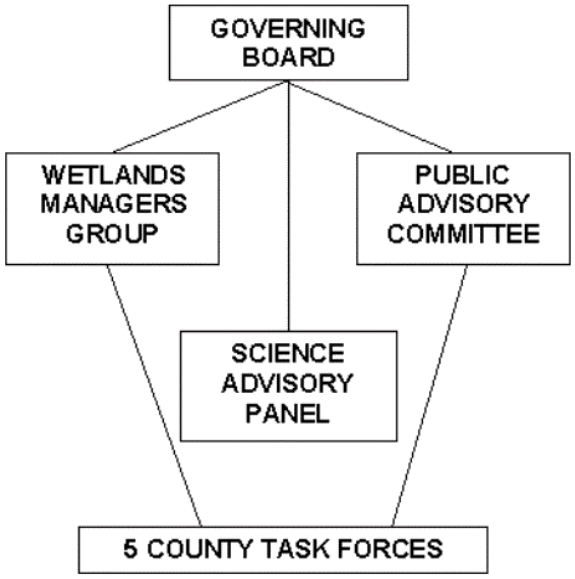
The Southern California Wetlands Recovery Project (WRP) is a novel and broad-based partnership of 17 state and federal agencies working in concert with scientists, local governments, environmental organizations, business leaders, and educators. The geographic scope of the WRP includes coastal wetlands and watersheds from Point Conception (in Santa Barbara County) south to the U.S.-Mexico border. The WRP employs three primary strategies to recover wetlands: (1) acquisition of property from willing sellers, (2) restoration and enhancement of wetlands where allowed by landowners and land managers, and (3) outreach and education about best practices to protect wetlands. The California State Coastal Conservancy manages the WRP and assists local partners in developing and implementing projects. The WRP ultimately seeks to reestablish a mosaic of functioning wetland and riparian systems that supports a diversity of species, while also providing refuges for humans within the urban landscape.

While some of the WRP's partner agencies protect wetlands through regulation, the WRP partnership itself was created to pool resources and recover wetlands using non-regulatory

strategies.[1] Over 50 percent of wetlands nationwide have disappeared, with over 90 percent lost in California. Federal and state regulations have stemmed losses, but have not reached the "no net loss" objective. As the value of services performed by wetlands becomes clearer, the motivation to protect existing wetlands and recover lost wetlands increases. The WRP, because it seeks to recover functioning systems, does not limit its preservation and restoration activities to "wetlands" as defined by regulatory agencies, but includes within its ambit historic wetlands, areas fringing wetlands, and uplands integrally related to a healthy wetland ecosystem.

Weaving together an integrated structure in a region as large and fragmented as coastal Southern California presents formidable challenges. The WRP began as an agency initiative in 1998 with the execution of a memorandum of understanding—the Working Agreement—which committed the signatories to develop and carry out a "regional prioritization plan" for acquisition and restoration in order to increase "the quantity and quality of the region's wetlands." The Working Agreement described an organizational framework which has continued to evolve (Figure A).

Figure A: Organizational Chart



The Secretary of the State Resources Agency chairs the **Governing Board**, the overarching policy making body for the WRP, which comprises the top officials from the 17 state and federal partner agencies as well as the chairs the Science Advisory Panel and Public Advisory Committee. High-level staff representing the Government Board members constitute the **Wetlands Managers Group**, whose role is to identify for the Board a set of projects and activities to implement the regional strategy, facilitate interagency coordination, and generate policy proposals for Governing Board consideration. The **Science Advisory Panel** consists of leading researchers and restoration practitioners in fields related to wetlands science. They identify key scientific questions for research funding, develop position papers for the Board's consideration, and help to ensure WRP actions are informed by sound science. Local elected officials, environmental leaders, business people, and educators serve on the **Public Advisory Committee.** They engender support for wetlands recovery throughout the region and represent community interests in the WRP partnership.

The innovative structure of the five **County Task Forces** endows the WRP with its distinctive vitality. Each is co-chaired by a County Supervisor and an environmental leader, both of whom sit on the Public Advisory Committee. The Task Forces provide a county-wide forum for public, private, and non-profit wetlands and watershed stakeholders. Participants work collaboratively to

[1] Partner agencies with regulatory authority include both federal agencies (Environmental Protection Agency, the Fish and Wildlife Service, the National Marine Fisheries Service, the Army Corps and Engineers) and state agencies (California Coastal Commission, Department of Fish and Game, State and Regional Water Boards).

identify critical wetland resources, help implement feasible projects, and promote wetlands education and information-gathering. The Task Forces are creating integrated watershed networks throughout each county to share information, mobilize support for funding, channel community concerns to the PAC and WRP as a whole, and incorporate wetlands protection and recovery more fully into local government processes.

The breadth of the WRP's participation requires skillful management. The **State Coastal Conservancy** administers the WRP partnership. It helps staff the different organizational units—the Managers Group, the Science Advisory Panel, the Public Advisory Committee, and the County Task Forces. It serves as the fiscal agent for the majority of the state funding that comes to the WRP; it implements or oversees implementation of the WRP's acquisition and restoration projects; and it manages several communication channels including a web site and an electronic newsletter.

C. The Regional Strategy

The Regional Strategy articulates long-term goals and specific implementation strategies to guide the efforts of the WRP and its partners. These goals will serve as a point of reference for all of the partners of the WRP– at the federal, state, and local level—to ensure that individual wetlands projects are part of a comprehensive and coordinated recovery effort.

The Regional Strategy has been evolving along with the WRP. An early iteration resulted from the first meeting of the Science Advisory Panel (SAP) in October 1997 which identified some criteria for regional wetlands planning and recommended an initial set of acquisition and restoration priorities. Strategic thinking has been refined during the formulation of each Annual Work Plan—the set of projects approved by the Governing Board. State funds to implement projects on the Work Plan are typically routed through the State Coastal Conservancy budget. The Work Plan, however, also serves as the template to guide funding by state, federal, and local partners through their distinct budget processes. The Wildlife Conservation Board, for example, uses the Work Plan to target some of its Southern California spending. Work Plan discussions within the Managers Group and Task Forces have served to clarify goals and to highlight some of the perplexing issues that attend restoration in a highly urbanized environment. In October 2000, the WRP hosted a Symposium for over 100 participants, representing all of the WRP's organizational units, to further consider the WRP's regional goals and priorities. From this material, the WRP Managers Group prepared a draft Regional Strategy, and oversaw a year-long process through which the draft was extensively reviewed, commented upon, revised, and then endorsed by each of the WRP's constituent units. With this underlying collaborative effort, the Regional Strategy represents a truly collective vision for the recovery of the region's wetlands.

This Regional Strategy is divided into five chapters and two appendices. This chapter has provided an introductory overview of the region, the wetlands, the WRP and the development of this Regional Strategy. Chapter 2 summarizes the conditions prevailing in the region's coastal wetlands and coastal watersheds, which are described in Appendix A in greater detail. The goals framing the Regional Strategy and selected strategies for realizing these goals are described in Chapter 3, and are followed by a description of county-specific objectives in Chapter 4. Finally, Chapter 5, which is bound separately, contains the WRP's five year implementation plan,

explaining how the goals are to be implemented over the next phase of the WRP's evolution. Appendix B summarizes regional plans that relate to wetlands recovery and have been integrated into the WRP's deliberations.

The WRP encompasses wetlands recovery efforts at the federal, state, and local level. The Regional Strategy articulates a shared vision that each partner can turn to for guidance in how to manage staff effort, direct resources, and measure progress. Success depends not only on a few agencies actively engaged, but on each and every partner, at all levels, seeking to enhance the overall program with the particular resources that they wield. A key to success will be ongoing integration – integration of the Regional Strategy into the decision-making processes of the WRP partners, integration of t related regional planning resources and objectives into WRP deliberations, and, ultimately, the integration of wetlands and watershed recovery into the thinking of all of those who affect the vitality of these critical resources. This Regional Strategy is one step in that direction. Much information remains to be collected and analyzed. More research remains to be done. Better integrative tools need to be developed. One important outcome of the Regional Strategy is that it sets the course for this further evolution.

II: Southern California Wetlands[1]

The Southern California Bight is a distinct bioregion of California. It extends from Point Conception in Santa Barbara County to Punta Banda, south of Ensenada, in Baja California, Mexico and includes the marine-coastal interface and the coastal wetlands and watersheds. The Bight's embayments, marshes and estuaries are among the most productive and densely populated habitats on the Pacific coast. Within the coastal zone of the Bight, over 60 species of fishes are known to frequent bays and estuaries while no less than 195 species of birds have been identified (Dailey et al. 1993). Coastal wetlands are nursery areas for both commercial and recreational fisheries, such as halibut. They also support many other animals, including the endangered light-footed clapper rail, which nest in marshes, and the California brown pelican, which roosts in lagoons and river mouths. South coast wetlands are also important to migratory birds traveling on the Pacific Flyway. For example, the Arctic Tern travels thousands of miles to nest in the Bolsa Chica wetlands. Rare and colorful songbirds migrate from the south to nesting areas such as Goleta Slough.

The physical features, climate, and hydrology of coastal Southern California have produced an unusual set of conditions and a diversity of plants and animals that sharply distinguish the region from any other in North America. Unlike the broad, gradually sloping coastal plains of the Atlantic and Gulf Coasts, Southern California has steep, coastal mountains that descend sharply to the ocean. Summers are hot and dry in this semi-arid, Mediterranean climate, while winters are cool with rainfall varying in amount and intensity, from droughts to steady rains to torrential downpours. The San Gabriel and San Bernardino Mountains can experience more rain in a twelve-hour period than anywhere else in the continental United States.

This chapter provides an overview of the ecological setting in Southern California including the geomorphology, climate, hydrology, and common wetland types. The chapter also discusses the extent of wetland loss and degradation in the region and the anthropogenic causes of this decline.

Regional Setting

The appearance of wetlands along the Pacific coastline coincided with sea level rise following the last ice age. About 18,000 years ago, sea level was some 400 feet lower than current conditions, and the shoreline lay miles to the west. Over thousands of years, rivers and creeks cut canyons and hollowed wide valleys. These "drowned" valleys became the bays and lagoons of today. Eventually, sea level rise slowed enough to equal the geologic uplift of the continent. The shoreline took on a contour similar to that existing today. Landward, sediment flowing down creeks slowly created mudflats and marsh communities.

[1] For a general profile and characterization of southern California's wetlands, see: 1) Wayne R. Ferren, Jr. Peggy L. Fiedler, Robert A. Leidy, Kevin D. Lafferty, and Leal A. K. Mertes. "Wetlands of Southern California." *Madroño: The West American Journal of Botany*. 105-233. 2) J.B. Zedler. 1982. *The ecology of southern California coastal salt marshes: a community profile.* US Fish and Wildlife Service. Biological Services Program. Washington, D.C. FWS/OBS-81/54.

Geomorphology

Several topographic and geologic features make the southern California region unique. The shape of California's coastline is a product of tectonic activity and erosion. Coastal mountain ranges include two geomorphic provinces, the Transverse Ranges and the Peninsular Ranges. These ranges form a natural "amphitheater" to the coastline, and provide a unique setting for watersheds and wetlands.

The Transverse Ranges form the northern border of the Los Angeles Basin and include the San Gabriel, San Bernardino, Santa Ynez, and Santa Monica Mountains. The Transverse Ranges are characterized by east-west trending faulting and folding and geomorphic features (mountain ranges and valleys). Tertiary marine and non-marine sedimentary rocks are exposed in the western Transverse Ranges, including the Santa Ynez Mountains. Tertiary volcanic rocks, Mesozoic metamorphic rocks, and Tertiary sedimentary rocks are exposed in the Santa Monica Mountains. Precambrian to Mesozoic age granitic rocks overlain by metamorphic rocks are exposed in the San Gabriel and San Bernardino Mountains of the eastern Transverse Ranges.

The coastal portion of the Peninsular Ranges begin in Orange County and form the northern end of the Baja peninsula. From north to south along the main ridge of the Peninsular Ranges are the San Jacinto Mountains, Santa Rosa Mountains, and Laguna Mountains. The Peninsular Ranges are characterized by northwest-southeast trending faulting and folding and geomorphic features. The granitic rocks of the Southern California Batholith form the core of the Peninsular Ranges and are exposed in the inland areas. Mesozoic and Tertiary sedimentary rocks outcrop along the coastal areas of Los Angeles, Orange, and San Diego Counties.

Rocky headlands and cliffs loom above the shore where the hills and mountain of the Transverse and Peninsular Ranges approach the coastline, and sandy beaches and dune fields extend along the water's edge where valleys or basins, such as the Oxnard Plain and Los Angeles Basin, intersect the coastline. In some areas, marine terraces have been formed by sea cliff erosion. In other areas, including San Onofre, Oceanside, the Palos Verdes Peninsula and the southern flank of the Santa Ynez Mountains, uplift of the shoreline has elevated these wave-cut benches into a series of terraces.

Climate

Southern California is noted for its mild temperatures, short wet winters, and long dry summers, characteristic of a semiarid Mediterranean climate. California has a greater climatic diversity than any other state, and its vegetational diversity is reflective of this varied climate. Although in many regions latitude is a major factor in determining climate, here the major determinant is physical geography – such as proximity to the coast. The region includes various types of both Mediterranean and desert climates. Mean annual air temperatures are similar throughout the region, and generally mild due to the proximity of the Pacific Ocean. The annual average temperature in Los Angeles is 66º F, 59º F in Santa Barbara and 64º F in San Diego (National Climatic Data Center).

Rainfall amounts decrease slightly from the north to south in the region. Rainfall amounts for the southern portion of the region average about 8-10 inches, occurring mostly from November through March. Evaporation exceeds rainfall throughout most of the year in this area. In the central and northern portions of the region, average annual precipitation is from 12 to 14 inches, with slightly higher amounts falling in mountainous and vegetated areas, such as the Santa Monica Mountains. Most precipitation falls during the 6-month period from November to April, and is produced primarily by frontal systems transiting the area.

Weather fluctuations caused by El Niño and La Niña conditions can significantly affect the region's precipitation. El Niño events occur irregularly at intervals of 2-7 years, with an average of about once every 3-4 years, and typically last 12-18 months. El Niño events are characterized by a large scale weakening of the trade winds and warming of the surface layers in the eastern and central equatorial Pacific Ocean. El Niño events produce significantly more rainfall in Southern California – in the 1983 El Niño, rainfall in Los Angeles was 230 percent higher than average. In contrast, La Niña events are characterized by periods of anomalously cold sea surface temperatures in the equatorial Pacific and typically produce less rainfall in a given year.

Hydrology

The annual cycle of wet and dry seasons drives the hydrologic patterns seen in Southern California. Historically, many of the region's streams were intermittent, drying up in the summer. Perennial streams and rivers were fed either by groundwater or snowmelt. Floods and drought cycles occur regularly and are influenced by the cyclical El Niño and La Niña events. Almost all of the significant flood events in Southern California have occurred during El Niño winters.

Wetland Types

Wetlands are transitional lands between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is often covered by shallow water during some parts of the year. In general, wetlands are shaped by the specific climate, geology, topography, and hydrology of a region. Coastal wetlands in Southern California have a unique character due to the distinct setting of this region. The following broad categories cover the four main types of wetlands found in Southern California.

- **Estuarine wetlands** – Most of Southern California's coastal wetlands are estuarine salt marshes with associated tidal channels and mudflats. An estuary is a semi-enclosed body of water that receives both fresh water and seawater. Estuarine wetlands in Southern California include river mouth estuaries, canyon mouth estuaries, bay, lagoons, and structural basin estuaries (Ferren et al. 1995). The size of estuarine wetlands is dependent on a number of factors, including topography, geology, and hydrology. Tidal wetlands are highly impacted by sediment flows because small changes in marsh topography (e.g., 6 inches) can have large impacts on marsh habitats.

- **Riparian wetlands** – Riparian wetlands form as a result of fluvial processes in floodplains and along river and stream corridors. Annual disturbance from flooding is necessary to maintain the health of riverine ecosystem processes. Many riparian 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 (Ferren et al. 1995).

- **Freshwater marshes (seasonal and perennial)** – Freshwater marshes form in a variety of locations, and are often associated with lakes, ponds, and riparian systems. Freshwater marshes may border inflowing creeks. Along larger streams, freshwater marshes often grade into riparian woodlands; along the coastline, they grade into salt marshes.

- **Vernal pools** – Vernal pools occur in small depressions underlain by dense, impenetrable claypan soils that allow water to accumulate in winter and spring (Ferren et al. 1996). The pools support small, usually annual plants, which flower as the water in the pools begins to evaporate. Vernal pools are less common than other types of wetlands along the Southern California coast, and occur primarily in San Diego and Santa Barbara Counties.

Decline of Southern California Wetlands

Historical Conditions

Prior to the 1800's, southern California contained rivers with wide, unobstructed floodplains that were fed by numerous tributaries and flowed freely to the sea. All of the river systems supported large estuaries at their mouths with a diversity of wetland habitats that transitioned from salt marsh habitat to brackish and freshwater marsh to riparian habitat. Approximately twenty-eight large, distinct estuarine wetlands were found along the south coast in 1850 (Office of Technology Assessment 1982). Riparian vegetation consisting of cottonwood, alder, willow and freshwater marsh species lined most of the coastal rivers and creeks. In addition, vernal pools were found in scattered locations throughout the region. This mosaic of marsh and riparian habitats existed for thousands of years. The coastal wetlands remained in a dynamic equilibrium between terrestrial and marine influences.

Southern California coastal wetlands and watersheds have been dramatically altered or destroyed by human activities over the past 150 years. Most of the riparian areas of the region's coastal rivers and streams have been lost. Rivers and creeks have been rerouted, dammed, channelized, and paved. Wetlands have been filled. Important freshwater and salt water inputs to coastal wetlands have been altered. Few estuaries are open to the necessary tidal influence. The overall general health and integrity of the region's watersheds and wetland habitats has declined

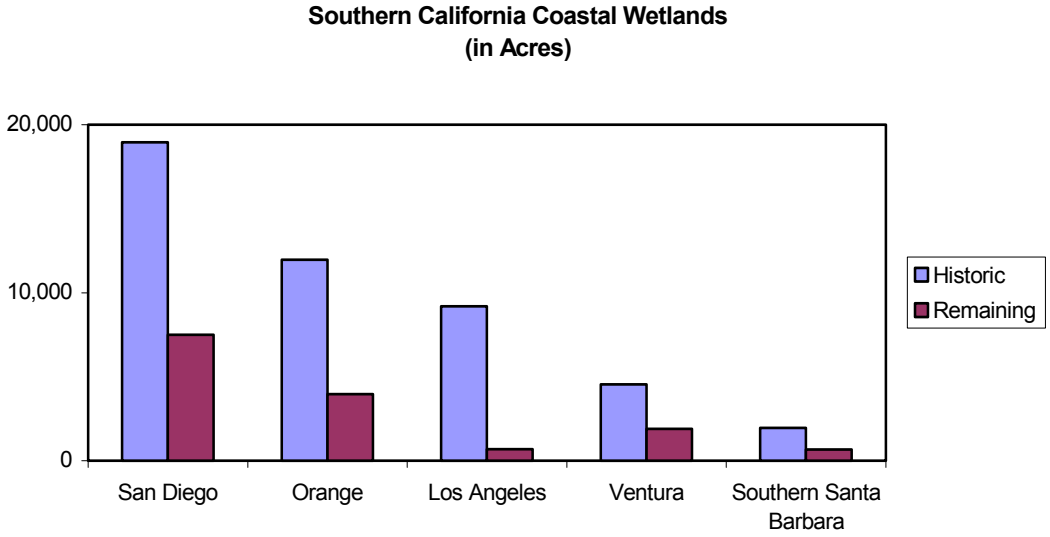
It is difficult to accurately estimate the historical extent of wetlands and the subsequent loss of wetlands due to the lack of detailed historical data. The Southern California Coastal Wetland Inventory prepared by the Coastal Conservancy estimated the total historic extent of wetlands at 41 key sites in the region to be between 45,000 and 55,000 acres, with a only about 30 percent

remaining (see Figure 2.2). The California Department of Parks and Recreation (1988) estimated a 75 percent reduction in coastal wetlands, from approximately 53,000 acres to 13,000 acres. Other estimates of wetland types that have been significantly reduced in southern California include:

- Estuarine wetlands (i.e., salt marshes) as an entire subsystem at 75-90 percent (J. Zedler 1982; California Department of Fish and Game 1983; California Coastal Commission 1989);
- The "riparian community" at 90-95 percent (Faber et al. 1989) including loss of 40 percent of the riparian wetlands in San Diego County during the last decade alone (CDPR 1988);
- Vernal pools at 90 percent (P. Zedler 1987).

The loss and degradation of the region's wetland ecosystems is reflected in the significant decline in the abundance of several species of fishes, shorebirds, seabirds, kelp habitats, and the supply of food observed since 1950 (McGowan et al. 1998). It is estimated that 55 percent of the animals and 25 percent of the plants designated as threatened or endangered by the State depend on wetland habitats. Southern steelhead trout, for example, have been reduced in the past century from tens of thousands in number to approximately 200 to 300 (Pacific Marine Fisheries Council 2000). In the U.S., California ranks second in the number of aquatic species that are endangered (Allendorf 1982).

Figure 2.2 – Estimated Historical and Existing Wetland Acreage by County for at 41 Coastal Wetlands in Southern California.



Estimated from the Southern California Coastal Wetlands Inventory which compiled information on 41 coastal wetlands from Point Conception in Santa Barbara County south to the Mexican Border. Estimates of historic and current wetland acreages were compiled from the literature and U. S. Coast and Geodetic Survey maps created between 1851 to 1893. The types of wetland habitats included in these acreage estimates vary, making it difficult to compare between sites or draw accurate region-wide conclusions. In some cases, the available historic maps did not encompass the entire historical wetland area, and the mapped boundary of the historical wetland was truncated where the available map(s) ended.

Impacts of Regional Development

As Figure 2.2 indicates, Southern California's coastal wetlands and watersheds have been heavily impacted by agricultural and urban development over the past 150 years. Rapid population growth in Santa Barbara, Los Angeles, and Ventura Counties began in the early 1900's, and Orange and San Diego Counties followed in the 1940s and 1950s. Along with this rapid growth came many alterations to the fragile ecological relationships that shape coastal wetland processes, structures and functions. Today, urban and agricultural development continues to significantly fragment the ecological connections between coastal watersheds, wetlands, and the marine system. This section discusses the primary contributors to the regional decline in wetland and riparian ecosystems. These are also summarized in Table 2.1.

Draining, Filling, and Converting Wetlands

As discussed above, at least 75 percent of the coastal wetlands in Southern California have been lost. Large-scale destruction of coastal wetlands began during the second half of the 19th century. At that time, coastal wetland and estuarine habitats were generally seen as breeding grounds for disease-carrying mosquitoes. Many were used as dumps. Federal, State, and local policies encouraged the draining and filling of wetlands and their conversion to agricultural, urban, and military land uses. The direct loss of wetland habitat is probably most striking with the historic wetlands of the Los Angeles River floodplain. The extensive marshes, streams, lakes and seeps associated with the river covered much of present day downtown Los Angeles to San Pedro Bay and eastward to the San Gabriel River. Almost of all of that habitat has been lost.

Hydrologic Modification

Southern California's hydrologic landscape has been massively altered by dams, channelization, groundwater pumping, imported water, and other human activities. These projects have affected the quantity and timing of surface water flows, sediment transport functions, and flood regimes, which in turn have impacted aquatic and riparian habitat, channel geometry, and many other processes. The primary hydrologic modifications seen in the region and their impacts are outlined below.

As discussed in the Regional Setting section, Southern California is characterized by periodic large floods associated with El Niño events. As the region grew, these floods had increasingly devastating impacts on human activities. The most extensive hydromodifications in the region arose from efforts to control flood waters. Rivers and creeks were dammed, redirected, confined within levees, and lined with concrete. These "improvements" allowed urban and agricultural development to encroach further into the floodplains. Today, flood control projects continue to dam and channelize the region's waterways. Dams and diversions have also been constructed in many watersheds to supply water for urban and agricultural uses. In the 24 major drainage systems within the Southern California Bight, 53 percent of the drainage area is controlled by major water retention structures, such as dams and reservoirs (Brownlie and Taylor 1981).

Water supply and flood control projects implemented throughout Southern California have had widespread impacts on the region's wetland and aquatic ecosystems. One of the most significant impacts has been the loss of floodplain and riparian habitat along stream corridors. As discussed above, it is estimated that 90-95 percent of the riparian habitat in the region has been lost. Dams and diversions also change quantity and timing of stream flows and disrupt sediment transport to coastal wetlands and estuaries.

Sprawling urban development throughout Southern California has also changed the region's hydrologic conditions. As an area is developed, roads, sidewalks, driveways, and other impervious surfaces are constructed that reduce infiltration of water into the ground. When it rains, water which previously would have been absorbed into the ground, flows freely into rivers and streams, increasing the volume and rate of storm flows. Urbanization is estimated to increase runoff from an area as much as two to five times the normal flow (Krug and Goddard 1986). The increase in runoff volume and peak flows often destabilizes urban creeks, leading to severe channel and bank erosion and loss of riparian habitat. In Southern California, the common cure for creek destabilization has been concrete; that is, line the channel with concrete so that it will not erode.

Other human activities that have changed both the quantity and timing of surface water flows include irrigation, wastewater discharges, groundwater pumping, and use of imported water. Flows from urban and agricultural runoff and treated wastewater have significantly increased dry season flows so that many previously intermittent streams are now perennial. Use of imported water has increased the overall amount of water available in Southern California. In some areas, extensive groundwater pumping has caused natural springs and seeps to dry up, leading to loss of wetland habitat.

A disturbance in the hydrology can alter the physical, chemical, and biological processes of a coastal wetland. When the hydrology of a wetland changes slightly, the biota may respond with changes in species composition and richness. The primary and secondary levels of ecological productivity are also impacted by hydrological modifications. Excess depths, frequencies, and duration of inundation in wet seasons, or water deficiencies in dry seasons, have the potential to alter the vegetative community and, thus affect the wildlife and aquatic organisms that use the wetland. Too much or too little freshwater can adversely affect fish spawning, shellfish survival, bird nesting, seed propagation, and other seasonal activities of fish and wildlife.

Changes in the availability and timing of freshwater also impact water quality by altering water temperature, salinity, pH, nutrients, oxygen availability, and turbidity, as well as the frequency and extent of tidal mixing and flushing. At lagoons with intermittent tidal influence, barrier beaches may be breached more or less often.

Alterations of Sediment Transport Processes

Transport of sediment is a natural function of a healthy watershed and maintains a delicate balance between erosion and sedimentation. Changes in water level, flow, flood frequency, or groundwater availability will alter erosion and sedimentation balances. In Southern California, sediment transport processes have been altered in many ways, including:

- Dams in the upper watersheds have created physical barriers to sediment transport.
- Dams and water diversions have reduced winter storm flows, thereby reducing downstream scouring of bays and estuaries and sediment delivery to the nearshore waters.
- Ground disturbance associated with urban and agricultural development has caused increased erosion in many watersheds, and frequently has resulted in excess sedimentation of downstream wetlands.
- Increased storm runoff and peak flows have increased bank erosion and channel incision in urban watersheds.
- Levees and canals have altered the geomorphic equilibrium of watersheds, causing destabilization and erosion of natural channels, wetlands, and estuaries.

Conditions in each watershed are unique depending on both the natural environment and human activities. In general, however, three trends are seen in the region: 1) increased sediment flows in coastal streams in urban or developing areas; 2) increased sedimentation in coastal wetlands; and 3) decreased delivery of sediment to the nearshore waters.

Each of southern California's coastal wetlands exists in a delicate sediment balance. Excess sediment delivery can smother riverine, estuarine, and marine habitats, destroy benthic organisms, reduce colonization, interfere with feeding, and reduce the abundance and diversity of plants associated with wetlands. Conversely, insufficient sediment delivery can result in erosion and conversion of wetlands to open water habitat. Sediment flows are also a main transport mechanism for pesticides that adhere to soil particles. The most significant impacts on coastal wetlands of altered sediment transport processes have been caused by accumulated soils washed into surface waters by winter storms and periodic floods.

Degraded Water Quality

Both urban and agricultural development have contributed to a degradation of the region's water quality resulting in increased water temperature, turbidity, and concentrations of nutrients and contaminants (including heavy metals and organic compounds).[2] Impacts to coastal wetlands and estuaries from point and non-point source pollution are diverse and include direct toxicity to biota, eutrophication, oxygen depletion, and sedimentation. Excessive amounts of decaying organic matter, for example, can decrease available oxygen in the water, making habitat unsuitable for fish and other aquatic life.

2 Sidebar
Golf courses discharge a variety of pollutants, including nutrients, pesticides, herbicides, and organic materials, to the watersheds of coastal wetlands and estuaries. These impacts are most pronounced in golf courses that were constructed decades ago when vegetative buffers were not a requirement for receiving water quality certification from the state. In such older courses, turf grass is commonly manicured and maintained down to the edge of the creeks or rivers, which traverse them. This direct connection between the streams and the manicured turf grass facilitates the transport of fertilizers, pesticides, and grass clippings into the streams and ultimately to coastal wetlands and estuaries. Pollutant releases from golf courses are of particular concern in the reduction of water quality in several areas of the region.

Non-point source (NPS) pollution is the leading cause of water quality impairment to wetlands and estuaries in southern California. Unlike pollution from distinct, identifiable point sources (e.g., a municipal wastewater treatment plant), NPS pollution comes from many sources. NPS pollution is transported by storm and irrigation runoff moving over and through the ground. As the runoff moves, it picks up and carries pollutants, which can be deposited in lakes, rivers, wetlands, and the marine system. Sources of storm water pollution in the watershed are numerous. Copper contamination, for instance, comes from the degradation of automobile and truck brake shoes. NPS pollutants include:

- Excess fertilizers, herbicides, and insecticides from agricultural lands and residential areas;
- Oil, grease, metals, and organic chemicals from urban runoff;
- Sediment from improperly managed construction sites, croplands, and eroding stream banks;
- Bacteria and nutrients from livestock, pet wastes, and faulty septic systems;
- Salt from irrigation practices;
- Deposition of air pollutants.

During a rain storm, especially the first of the season, the particles that have fallen to highways, streets, parking lots, and driveways become washed into roadside ditches, which dump into storm drains or creeks, and eventually into coastal watersheds.

Increased loading of nutrients to Southern California's coastal wetlands is of particular concern because it can result in the rapid growth of aquatic plants and plankton, decreasing biological productivity and diversity and leading to depletion of oxygen in coastal wetlands. Major sources of nutrients include runoff fertilizer-laden runoff from agricultural lands and urban landscaping, runoff from livestock areas, wastewater discharge, and sewage spills. Nutrient-laden runoff can be reduced through implementation of management practices such as drip irrigation.

At the Carpinteria Salt Marsh, Page (1999) has linked development of greenhouses in the watershed to elevated levels of nutrients at the marsh. During periods of reduced or no tidal flushing, nitrate enriched runoff results in the rapid growth of macroalgae. Potential impacts of algal blooms include reduction in the abundance and diversity of invertebrates, inhibition of bird feeding behavior, and reduction of oxygen concentration in the water column during algal growth and decay.

Introduction of Exotic Species [3]

Intentional or accidental introduction of invasive non-native species may result in unexpected ecological, economic, and social impacts to wetland ecosystems. Non-native plants often provide little or no habitat value to native fish and wildlife, and introduced animals may threaten native species through predation and competition. Introduced species may have no natural predators in the region. Through predation and competition, introduced species have contributed to the decline of several native populations, fundamentally altering the food web.

Invasive plant species of particular concern in Southern California include Arundo, pampass grass pepperweed, tamarisk, and castor bean. Red fox, feral cats, and off-leash dogs are major introduced predators of wildlife, particularly birds, in coastal wetland ecosystems. In the summer of 2000, *Caulerpa taxifolia*, a highly invasive marine algae, was discovered in two coastal embayments of Southern California. If this algae is not eradicated, it threatens to significantly alter the region's estuarine ecosystems, and could destroy commercial and recreational fisheries.

Resource Extraction

Coastal watershed and wetland systems have also been impacted by resource extraction activities. For instance, salt extraction occurs in south San Diego Bay, aquaculture is conducted in Agua Hedionda Lagoon, and sand and gravel has been mined from many creeks and rivers in the area. In Orange and Los Angeles counties, oil extraction facilities have been located in several coastal wetlands. Impacts to coastal wetlands and streams from resource extraction activities range from disturbance and extraction of wetland species to habitat destruction.

Recreational Use

Southern California is the most highly urbanized region in the state. Open space and opportunities to interact with nature are extremely limited. This situation has created great pressure to provide recreational access to coastal wetlands and stream corridors. Unfortunately, the presence of humans, pets, and motorized vehicles can disturb species that depend on these habitat areas. Off-trail use by hikers, bikers, and equestrian users can trample plants and lead to increased erosion and habitat destruction. Off-leash dogs can disturb wildlife and cause considerable damage to fragile plant species. These impacts are likely to increase as the region's population grows.

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3 Sidebar

Arundo donax is a fast-growing invasive riparian species that propagates vegetatively either from roots or from stems or rhizomes that break off and establish new patches downstream. Having no natural competitors or predators in California, its growth is rapid, allowing it to completely infill stream channels and grow to heights exceeding 25 feet.

The deleterious effects of *Arundo* include the displacement of native riparian vegetation with monocultures of Arundo that have little habitat value for native species. Dislodged *Arundo* plants can choke stream channels and create debris dams that impede fish passage and flood flows. Because *Arundo* is highly flammable, the probability of wildfire increases in infested areas. Its prodigious rate of water consumption can reduce stream flow and groundwater recharge and reduces available water for native species. *Arundo* stalks provide little shade; consequently, exposure to direct sunlight increases water temperatures thereby lowering dissolved oxygen, and promoting algal growth that also alters the pH. These effects all contribute to habitat degradation and loss of life and for many aquatic species.

Climate Change

Climatologists generally expect an anthropogenic global warming that could raise sea level 20-60 inches in the next century and more thereafter. Because coastal wetlands and estuaries are mostly within a few feet of sea level they are particularly vulnerable to rising sea level. If the rise in sea level is not matched by vertical accretion of sediments in wetlands, there will be a gradual conversion of coastal wetlands to open water habitat. Although the inundation of adjacent lands near wetlands would enable new wetlands to form, much of this land is or will soon be developed. If adjacent development is not removed, all coastal wetlands could be squeezed between the rising sea and the dikes or bulkheads used to protect development.

Summary

Southern California's natural landscape has been greatly altered by human activities over the past 150 years, leading to extensive loss and degradation of coastal wetlands and stream corridors. Significant changes in hydrologic patterns and sediment flows, increased inputs of pollutants, channelization of stream corridors, and encroachment of urban development present a complex set of challenges for preserving and restoring the remaining wetlands resources. These challenges increase as population growth and urban development continue throughout the region.

Table 2.1 Anthropogenic Impacts on Wetlands and Stream Corridors

Activity and pathway	Sediment and soil disturbance	Vegetation removal	Hydrologic regime modification	Conversion of wetlands and submerged lands to dry land	Increased sediment delivery	Increased turbidity	Increased runoff volume and flow rate	Increased erosion	Decreased salinity in brackish, estuarine, or saltwater wetlands	Decreased wetland water supply	Increased wetland water salinity	Increased water temperatures	Resuspension of sequestered pollutants	Toxicity to wetland biota	Eutrophication	Introduction of non-native species resulting in reduced native biodiversity	Submerge existing coastal wetlands
Construction, Development, and Urbanization																	
Direct physical modification	X	X	X	X													
Ground disturbance					X	X											
Increased impervious surface area							X	X	X								
Discharges and runoff of imported water and wastewater									X								
Water diversion										X	X						
Removal of riparian canopy												X					
Air and water pollution (polycyclic aromatic hydrocarbons, petroleum products, metals, other toxic substances)														X			
Channelization																	
Direct physical modification	X	X	X	X													
Removal of riparian canopy												X					
Dredging and Filling																	
Direct physical modification	X	X	X	X													
Sediment disturbance						X							X				
Agriculture																	
Direct physical modification	X	X	X	X													
Ground disturbance					X	X											
Agricultural runoff (salt, pesticides, nutrients)											X			X	X		
Animal waste runoff (salt, pathogens, nutrients)											X			X	X		
Pesticides														X			
Animal feed																X	
Nurseries, Landscaping, and Gardening																	
Runoff (salt, pesticides, nutrients)											X			X	X		

Table 2.1 Anthropogenic Impacts on Wetlands and Stream Corridors

Activity and pathway	Sediment and soil disturbance	Vegetation removal	Hydrologic regime modification	Conversion of wetlands and submerged lands to dry land	Increased sediment delivery	Increased turbidity	Increased runoff volume and flow rate	Increased erosion	Decreased salinity in brackish, estuarine, or saltwater wetlands	Decreased wetland water supply	Increased wetland water salinity	Increased water temperatures	Resuspension of sequestered pollutants	Toxicity to wetland biota	Eutrophication	Introduction of non-native species resulting in reduced native biodiversity	Submerge existing coastal wetlands
Introduction of self-propagating non-native species																X	
Sewage Conveyance, Treatment, and Disposal																	
Runoff, direct discharge, and spills (salt, pathogens, nutrients)											X			X	X		
Discharge of chlorine														X			
Discharges of wastewater									X								
Water Supply and Treatment																	
Chlorine discharge from spills and leaks, pipeline and tank dewatering, and runoff														X			
Pipeline and Tank dewatering					X	X		X									
Direct application of metals (copper sulfate)														X			
Global Climate Change																	
Sea-level rise																	X

III. Regional Goals

The long-term objective of the Southern California Wetlands Recovery Project is to reestablish a mosaic of fully functioning wetlands systems, with a diversity of habitat types and connections to upland communities, which preserves and recovers self-sustaining populations of species. A fully-functioning regional mosaic of wetlands will also provide important socio-economic values such as: sustainable habitat and food support for fish and wildlife, including some commercially important species; improved water quality in coastal streams, beaches, and the nearshore waters; increased potential to buffer flood waters and recharge groundwater aquifers; increased opportunities for human interaction with nature – a valuable resource in a highly urbanized landscape; and increased opportunities for public education and research on the unique natural landscape features of southern California coastal watersheds.

The WRP has identified six regional goals to guide its efforts towards achieving this long-term vision:

1. Preserve and restore[1] coastal wetland ecosystems
2. Preserve and restore stream corridors and wetland ecosystems in coastal watersheds
3. Recover native habitat and species diversity
4. Integrate wetlands recovery with other public objectives
5. Promote education and compatible access related to coastal wetlands and watersheds
6. Advance the science of wetlands restoration and management in Southern California

These goals, along with key strategies for achieving each of them, are discussed below and summarized in Table 3.1.

Goal 1: Preserve and restore coastal wetland ecosystems.

Statement of Need

Southern California's coastal wetlands are among the most productive habitats on the Pacific Coast. The wetlands provide habitat for hundreds of fish and wildlife species, including feeding and nesting habitat for migratory birds on the Pacific Flyway and habitat and food chain support for commercial and recreational fisheries. As discussed in Chapter 2, Southern California's coastal wetlands have been severely impacted by human activity, with only about 25 percent, or roughly 15,000 acres, of the historic coastal wetlands remaining. Portions of many coastal

[1] Preservation, as used in this document, is defined as any actions that facilitate protection of existing resources, including acquisition of property in fee by public agencies or through partnerships with private conservation organizations, acquisition of conservation easements, or implementation of best management practices on private property. The WRP relies on a non-regulatory approach and will only acquire property from willing sellers.

Restoration is also defined broadly to include any efforts that increase the quantity or quality of wetland resources in the region, including wetlands enhancement and improvement projects.

Table 3.1 Regional Goals and Key Strategies

REGIONAL GOAL	KEY STRATEGIES
Goal 1: Preserve and restore coastal wetland ecosystems.	A. Acquire privately-owned coastal wetlands and associated uplands. B. Acquire contiguous wetland and upland areas at sites that are already primarily in public (or conservation) ownership. C. Restore diversity and quality of wetland habitat types. D. Restore ecosystem functions. E. Address watershed impacts.
Goal 2: Preserve and restore stream corridors and wetland ecosystems in coastal watersheds.	A. Preserve riparian and aquatic habitat along stream corridors. B. Restore riparian and aquatic habitat along stream corridors. C. Reconnect creek and river corridors to their floodplains. D. Restore sediment transport functions and characteristic patterns. E. Reduce erosion, both along stream channels and from upland areas. F. Improve water quality. G. Preserve and restore wetlands, particularly vernal pools, in coastal watersheds.
Goal 3: Recover native habitat and species diversity.	A. Restore a diversity of habitat types. B. Employ a multi-species approach to wetlands recovery. C. Preserve and restore habitat linkages and fish and wildlife corridors. D. Preserve and restore rare wetlands, including vernal pools. E. Preserve and restore surrounding upland and dune habitat. F. Remove exotic species and re-establish native species. G. Recover native, extirpated species.
Goal 4: Integrate wetlands recovery with other public objectives.	A. Promote integration of wetlands conservation planning and priorities into related public policies and projects. B. Promote wetlands projects that achieve multiple public objectives.
Goal 5: Promote education and compatible access related to coastal wetlands and watersheds.	A. Develop compatible public access opportunities. B. Integrate interpretive programs into wetlands and watershed projects. C. Promote opportunities for experiential learning. D. Promote development and dissemination of educational materials and activities related to coastal wetlands and coastal watersheds. E. Research and disseminate information about the economic value of wetlands. F. Promote practices to reduce urban impacts on wetlands and watersheds.
Goal 6: Advance the science of wetlands restoration and management in Southern California.	A. Promote research on wetland ecology and restoration science, as well as on issues affecting the success and long-term sustainability of wetland restorations in Southern California. B. Promote development of more effective monitoring programs for both regional and project-specific assessments. C. Disseminate Information.

wetlands were filled for agricultural or urban development. Oil extraction facilities have been erected in several coastal wetlands. In others, ponds have been created for salt extraction, sewage treatment, or duck hunting purposes. In those areas where wetland habitat remains, urban development has typically reduced, degraded, or eliminated the surrounding upland habitat that is a critical part of the wetland ecosystem. The loss of wetland habitat has left several species struggling to survive.

In addition to providing critical habitat for plants and animals, coastal wetlands serve many other critical functions. These include:

- Water quality functions, including the filtering and transformation of pollutants from watershed runoff;
- Hydrology, including flood control, moderating sediment delivery, groundwater recharge, and protection of shoreline from erosion;
- Food chain support, including the production of material that fuels both aquatic and terrestrial ecosystems.

Losses of coastal wetlands in Southern California, as well as the degraded state of those remaining, have greatly reduced the natural functions in the landscape.

The dramatic reduction of water quality functions in coastal wetlands severely impairs the quality of one of Southern California's most valuable resources: its coastal waters. Wetlands detoxify contaminants, filter bacteria, and remove and transform nutrients that enter into streams and rivers from urban and agricultural development. The loss of wetlands in coastal watersheds has contributed to deteriorating water quality in beaches, coastal lagoons and bays, and the marine environment. The decline in water quality in these areas ultimately affects the revenue that California earns from tourism and commercial fisheries.

As discussed in Chapter 2, the natural hydrology of the coastal wetlands has been greatly modified. Water is imported into the region for urban and agricultural use, and the discharge of this water as wastewater effluent and non-point source flows has changed the quantity as well as the seasonal pattern of freshwater discharge to the coast. These changes have resulted in the disturbance of the natural habitats in coastal wetlands, stressing native plant and animal communities and allowing for the invasion of opportunistic exotic species. Tide gates, diking, roadway construction, and coastal developments have greatly restricted natural tidal connections, resulting in reduced tidal prisms. This reduces the natural scouring in creek channels and coastal lagoons and bays, and exacerbates sedimentation problems in these areas.

Population growth and related development pressures continue to impact the region's coastal wetlands, and will increase as the population grows. Supporting upland habitat continues to be lost and corridors that link coastal wetlands to upstream habitats are quickly disappearing. Wetlands created in upland areas to mitigate for coastal wetland loss from development often do not perform the same ecological functions as those that were destroyed. Filled areas that were historically part of a coastal wetland can potentially be restored to wetland; however, these areas may not be fully protected under state and federal wetlands statutes and could be lost if not

acquired. Hydrologic and land use changes in the coastal watersheds also continue to impact downstream wetlands.

Natural variability on seasonal, annual, and decadal time scales are inherent in the physical processes (such as temperature, rainfall, sea level) affecting wetlands. While healthy ecosystems are generally resilient to natural variability, wetlands stressed by encroaching development are particularly vulnerable to change. Thus, global climate change and the predicted rise in sea level could have an enormous impact on Southern California's coastal wetlands. Tidal marshes are extremely sensitive to elevation changes, where a six-inch elevation difference can produce significantly different habitats. The encroachment of surrounding development leaves few opportunities for coastal wetlands to migrate landward if sea level should rise. Climate change may also result in a change in the quantity, delivery method (e.g., snow versus rain), and timing of water delivered to the coast. Higher frequencies of catastrophic flooding events or droughts may act as an additional stressor to the native plant and animal communities that have adapted to coastal wetlands.

Tidal wetlands in Southern California are small and relatively scarce, particularly in comparison to tidal wetlands along the Atlantic and Gulf coasts. This was true even historically. Tidal wetlands are a transitional habitat between terrestrial and marine environments, and can only be established within a small elevation range and a compatible geologic setting. The region's rugged topography and actively uplifting coastline limits the establishment of tidal wetlands. This, combined with extensive coastal development, restricts opportunities for restoring or creating tidal wetlands in Southern California.

Key Strategies

Given the extent of historical loss and the limited opportunities remaining, preservation and restoration of tidal wetlands in the region is a high priority. Wetland restoration in Southern California encompasses a broad range of activities, from small enhancement efforts to large-scale reconstruction of wetland systems. Significant changes in land use, watershed hydrology, and site topography limit the extent to which historic conditions can be feasibly restored. In many cases, restoration will involve creating a functioning wetland system, but not re-creating the historic conditions. For the Wetlands Recovery Project, restoration is viewed broadly to include any efforts that increase the quantity or quality of coastal wetland habitat in the region.

A. Acquire from willing sellers coastal wetlands and associated upland habitats that are primarily privately owned, and not subject to any conservation guarantees. High priority sites for acquisition include the Oxnard Plain, Ballona wetlands complex, Los Cerritos wetlands complex, and the Huntington Beach/Santa Ana River Mouth wetlands complex. These sites are consistent with the priorities identified by the WRP Science Advisory Panel at a regional planning meeting in 1997.

B. Acquire from willing sellers contiguous wetland and upland areas that function as part of the wetland ecosystem at sites that are already primarily in public (or conservation) ownership. Several of the remaining coastal wetlands in Southern California are already primarily in public ownership. At most of these sites there is additional wetland, riparian, or upland habitat that is part of the wetland ecosystems that is privately owned. Acquisition of these

areas will help preserve the entire wetland ecosystem and possibly provide space for the wetland to migrate in response to a rise in sea level.

C. Restore diversity and quality of wetland habitat types (see Goal #3 for discussion).

D. Restore ecosystem functions. The goal of restoration is to restore the physical and biological processes that are characteristic of healthy wetland ecosystems. In addition to providing quality habitat, restoration of these processes can result in water quality improvements, groundwater replenishment, and better flood control. A recent National Academy of Science study found that while many wetlands are recreated or restored to compensate for wetland loss in other areas, many of these wetlands do not replicate the same level of functions provided by natural wetlands. Restoration of ecological functions through proper conceptual design and long-term maintenance, monitoring, and adaptive management is a priority. One key ecological function to restore is tidal exchange and circulation within tidal salt marshes. As discussed above, anthropogenic changes in wetland and watershed hydrodynamics have significantly reduced the tidal prism and circulation in many of Southern California's salt marshes. Re-establishing tidal circulation will improve the health and functioning of these ecosystems.

E. Address impacts of watershed inputs affecting coastal wetlands, including freshwater, sediment, nutrients, water contaminants, and invasive species. Watershed impacts should be addressed through both source control measures, such as implementation of best management practices (BMPs) on upstream property, and treatment measures such as sediment basins.

Goal 2: Preserve and restore stream corridors and wetland ecosystems in coastal watersheds.

Statement of Need

Many of the creeks and rivers in Southern California's coastal watersheds have been significantly altered as a result of agricultural and urban development over the past 100 years. Dams were built in the upper watersheds for water storage, flood control, and hydroelectric purposes. Creek and river systems have been highly engineered with channels moved, confined to concrete, and placed underground. Extensive urban development has replaced native vegetation with concrete. The ever-increasing population has spurred the import of water from a variety of sources – fundamentally changing the region's hydrologic landscape. Human activities have generated billions of pounds of contaminants, much of which has ended up in the region's waterways. These changes have severely degraded the habitat, ecosystem functions, and water quality of the region's stream corridors.

The confinement and hardscaping of Southern California's creeks and rivers has led to substantial losses of the region's floodplain, riparian, and aquatic habitats. Faber et al. (1989) estimated that 90-95 percent of the riparian community has been lost. Some systems, such as the Los Angeles River, have been almost completely disconnected from their floodplain and denuded of nearly all riparian habitat. Several species that rely on these habitats are listed as

species of concern, including the least Bell's vireo, steelhead trout, red-legged frog, and arroyo toad. Historically, migratory birds also used this habitat, but now face population declines due to overcrowding and disease. Riparian corridors often function as linkages between larger habitat areas. Loss of these movement corridors has contributed to fragmentation of the remaining wildlife habitat in the region. Invasive species such as *Arundo donax* have reduced the quality of riparian and aquatic habitat.

Urban and agricultural development in Southern California coastal watersheds has also significantly altered other natural stream functions including water quality, hydrology, and sediment transport functions. Water quality impairments include increases of both non-toxic elements such as sediment, nutrients, and water temperature, as well as toxic contaminants such as pesticides and heavy metals. The loss of wetland habitat throughout the coastal watersheds has aggravated water quality problems, since wetlands can improve water quality by removing or sequestering many contaminants. The degraded water quality affects fish and wildlife habitat quality, and limits recreational use of Southern California beaches, bays, and lagoons.

Hydrologic patterns in Southern California watersheds have been altered by many different factors. Thousands of square miles of the region have been paved, increasing the quantity and speed of storm water runoff. The loss of floodplains in many watersheds has intensified this effect. Irrigation of both agricultural and urban areas increases dry-season flows in the region's creeks and rivers. Many streams that were previously intermittent now flow year round. Base flows have also increased due to the significant amount of water imported into the region. Conversely, in some systems water diversions and groundwater pumping have depleted base flows. Today, the Santa Ana River, which drains the largest watershed in Southern California, rarely flows to the ocean due to diversions for groundwater recharge.

Sediment flows in coastal streams have been changed in several ways. First, dams in the upper watersheds of streams and rivers create barriers to sediment transport, thereby reducing flows of sediment to downstream areas. Conversely, urbanization has increased storm water runoff, increasing channel and bank erosion. Disturbance of the natural vegetation cover – usually as a result of urban or agricultural development activities – has led to excessive erosion within many watersheds and along stream corridors. Another change is that erosion now occurs year round as a result of urban and agricultural runoff during the dry season, and dry season root growth makes it more difficult to flush excess sediment from the area's streams. Finally, flood management practices have reduced the scouring of creek channels and downstream estuaries and flushing of sediments into the ocean. As a result, the region suffers simultaneously from excess sedimentation in downstream estuaries, causing the infilling of stream channels, bays and coastal lagoons, and from a lack of natural sand replenishment to beaches and dunes.

Vernal pool habitat in Southern California has been reduced by approximately 90 percent. Vernal pools are a wetland type unique to Mediterranean climates, and in Southern California are found primarily in San Diego and Santa Barbara Counties. Vernal pools are dependent on runoff from surrounding uplands for their water. Thus, vernal pools have been lost due to both direct impacts to the pools, and indirect changes to the hydrology of surrounding upland areas.

Population growth and related development in Southern California will continue to exacerbate impacts to coastal wetlands and watersheds.

Key Strategies

The Wetlands Recovery Project has identified several considerations to help focus its work in coastal watersheds. High priority areas include: 1) areas where humans activities in the watershed are significantly impacting downstream coastal wetlands or other coastal resources; 2) stream corridors that provide connections to upland habitat areas; and 3) stream corridors that provide existing or potential anadromous fish habitat (e.g., for steelhead). The WRP will focus on preserving and restoring aquatic and riparian habitat, and re-establishing ecosystem functions such as hydrologic processes (including groundwater recharge and buffering of flood waters), erosion control and sediment transport, and water quality polishing. Many of the strategies aimed at improving habitat will also improve water quality.

A. Preserve riparian and aquatic habitat along stream corridors. Stream corridors will be preserved through several mechanisms, including acquisition of property, acquisition of conservation and agricultural easements, and coordination with landowners to implement practices that preserve and protect stream corridors.

B. Restore riparian and aquatic habitat along stream corridors. Key restoration activities include removing exotic species and revegetating with native species, removing fish passage barriers, stabilizing creek banks and channels through environmentally sensitive measures, replacing concrete and other hardscaping with biotechnical flood control and stabilization mechanisms, and "daylighting" creeks.

C. Reconnect creek and river corridors to their floodplains. Floodplains perform many important ecosystem functions in a watershed, including supporting riparian habitat, detaining flood waters to slow and reduce flood peaks, and facilitating groundwater recharge. Periodic flooding is a critical component of healthy riparian ecosystems. Opportunities in Southern California to reconnect creeks and rivers to their floodplains are very limited due to the encroachment of development. For this reason, preserving systems with intact floodplains and areas where floodplains can be re-established are high priorities for the WRP.

D. Restore sediment transport functions and characteristic patterns. As described above, sediment transport functions have been altered in several ways. Restoration activities could include removing dams and other barriers to sediment transport, managing storm flows to increase scouring and flushing of downstream sediments, trapping sediment, and removing excess sediment in downstream estuaries. Specific priorities must be set individually for each watershed.

E. Reduce erosion, both along stream channels and from upland areas. Stream bank and channel erosion should be controlled through environmentally-sensitive stabilization measures that minimize channel hardscaping. Efforts to reduce erosion from upland areas will focus on working with landowners to implement erosion control management measures.

F. Improve water quality. Several of the strategies discussed above will have beneficial impacts on water quality by reducing sediment flows, contaminant loads, and water temperatures, and by detaining storm waters. Water quality concerns should be addressed through both source control measures, such as implementation of BMPs on upstream property, and treatment measures such as sediment detention basins.

G. Preserve and restore wetlands, particularly vernal pools, in coastal watersheds. As discussed above, both the vernal pool and its supporting upland area must be preserved to ensure survival of the pool.

Goal 3: Recover native habitat and species diversity.

Statement of Need

As a result of the region's extensive development, the region's coastal wetland habitats and wetland-dependent species have declined sharply from historical ranges and some have completely disappeared. Over 90 species of concern rely on Southern California's coastal wetlands for breeding and foraging habitat, and many more species of concern are found in the coastal watersheds.

The biological diversity of Southern California's coastal wetlands and watersheds has been affected on several different scales. On a regional scale, there have been significant losses of all types of habitat as a result of agricultural and urban development, with tidal wetlands and lower riverine habitat affected the most severely. Diversity of habitat types within individual wetland ecosystems has also suffered as portions have been filled or degraded.

Habitat and species diversity has also declined due to the loss of connectivity between habitats. Linkages between habitat areas are critical for species that require large ranges or access to a diversity of habitat types. Linkages are also critical for supporting multiple populations of species, which in turn helps to maintain genetic diversity. Natural habitat areas in Southern California are now highly fragmented by widespread development. In particular, the channelization and destruction of stream corridors has severely reduced movement corridors between regional habitat areas. On a smaller scale, connections between wetland habitats and surrounding upland and dune habitats have also been lost, degrading the overall functioning of these wetland ecosystems.

Species diversity is highly dependent on habitat diversity, and similar patterns of impact are seen. For instance, many species that rely on tidal wetlands have declined in numbers and are now species of concern. Species that depend on multiple habitat types for different activities or different life stages have also declined. Vernal pools are one of the rarest wetland types found in Southern California, and they contribute significantly to regional biodiversity. Several species that depend on these pools are now listed as species of concern. Extensive habitat modification has greatly reduced the carrying capacity of the regional ecosystem, and hence native species abundance.

Biological diversity in Southern California has also been impacted by the introduction of exotic species. Invasive exotic plants, such as Arundo and tamarisk, alter the hydrology, community structure and function, nutrient cycling, burn frequency, and soil chemistry of wetland ecosystems, and they compete with, hybridize, or exclude native species. Exotic predators, such as red fox and bullfrogs, have decimated populations of native fish and wildlife.

Key Strategies

The efforts of the WRP to preserve and restore coastal wetlands and stream corridors in coastal watersheds are largely aimed at preserving and recovering the region's biodiversity. Significant changes to the natural landscape and the related reduction in the carrying capacity of the regional ecosystem limit the extent to which historic habitat and species conditions can be restored. Therefore, the WRP will focus its efforts on: 1) preserving and restoring the regional diversity of wetland habitats; 2) restoring fully functioning wetlands ecosystems with a diversity of habitat types and connections to upland communities; and 3) preserving and recovering self-sustaining populations of species. Key strategies for accomplishing these goals include:

A. Restore a diversity of habitat types within individual wetland ecosystems (where appropriate and feasible). Larger wetlands will be best able to sustain a diversity of habitat types.

B. Employ a multi-species approach to wetlands recovery. The WRP advocates a multiple-species approach that also recognizes the more imminent threat to listed species. In general, this approach focuses on biological diversity at the ecosystem and habitat level, rather than on the species level. Listed species will continue to receive special attention; however, the objective is to maximize diversity and abundance of both listed and non-listed species.

C. Preserve and restore habitat linkages and fish and wildlife corridors. This includes linkages from the coastal wetlands up into the watersheds, as well as between wetlands along the coast.

D. Preserve and restore rare wetlands, including vernal pools.

E. Preserve and restore surrounding upland and dune habitat that are part of the wetland ecosystem.

F. Remove exotic species and re-establish native species, including plant, fish and predator species. For non-native species that are dispersed through the water, such as Arundo, removal and management efforts must be planned and implemented on a watershed scale.

G. Recover native, extirpated species.

Goal 4: Integrate wetlands recovery with other public objectives.

Statement of Need

Wetlands recovery efforts should be integrated with efforts to achieve other public objectives such as stormwater management, water quality improvement, beach nourishment, groundwater recharge, and recreation. Without an integrated approach, efforts to achieve these other public objectives may frustrate wetland recovery efforts. For example in many watersheds in Southern California, flood management efforts have worked at odds with wetland recovery objectives. Channelization of waterways and removal of riparian habitat are common flood control practices throughout the region. These practices continue in the rapidly urbanizing areas of the region, despite efforts in older areas to restore stream corridors and take a more integrated approach to flood management. With its extensive network of federal, state, and local agencies, the WRP is well-situated to facilitate agency communication and cooperation.

Key Strategies

A. Promote integration of wetlands conservation planning and priorities into related public policies and projects. Many of the federal, state and local agencies that are responsible for pursuing or regulating the other public objectives listed above participate in the Wetlands Recovery Project. The WRP will use these agency connections to promote a more integrated approach to achieving multiple public benefits. A key strategy is including consideration of wetlands issues and wetlands objectives in planning and policy documents for other types of projects. Key public objectives that relate to WRP efforts include:

- Stormwater management
- Transportation and other infrastructure projects
- Water quality improvements
- Recreation
- Fire suppression measures
- Public safety
- Landscaping of public property

B. Promote wetland projects that achieve multiple public objectives. The WRP will place priority on wetlands and watershed projects that achieve public objectives in addition to habitat objectives. Types of wetland and watershed projects that could facilitate other such public objectives are outlined below. Several of these strategies are discussed in greater detail under another Regional Goal.

- Stormwater management:
  - Reconnect creek and river corridors to their floodplains. As discussed under Goal 2, reconnecting creek and river corridors to their floodplains will not only provide additional storage capacity for storm waters, it will also increase riparian and aquatic habitat, facilitate groundwater recharge, and improve water quality by reducing erosion and sedimentation.

- Restore or create wetlands adjacent to stream corridors. Similar to floodplains, these wetlands can be designed to provide additional storage capacity for stormwater.
- Promote vegetation management practices that both limit flood impacts and achieve habitat objectives.

- Water quality
  - Promote projects that integrate water quality and habitat objectives. Treatment wetlands can be designed to remove specific constituents from water such as nutrients, metals, or bacteria. These are *new* wetlands created in upland areas. Although water quality objectives will be paramount in these projects, habitat objectives can also be achieved.
  - Restore watershed ecological functions. Almost all of the strategies discussed under Goal 2 will also benefit water quality. These include restoring stream corridors, reconnecting waterways with their floodplains, restoring sediment transport functions, reducing erosion, and preserving and restoring wetland habitat.

- Beach nourishment
  - Promote nearshore disposal of sediments. Several wetland sites in Southern California will require significant removal of sediments as part of any future restoration. Disposal of these sediments in the nearshore waters would facilitate sand replenishment on area beaches. The WRP will work with state and federal partners to develop protocols for nearshore disposal of sediments that both protects water quality and maximizes beach nourishment impacts.
  - Remove barriers to sediment transport in stream corridors.

- Recreation and access
  - Provide compatible access and recreation opportunities. As discussed under Goal 5, the WRP wants to promote compatible access to wetland and watershed resources. It must be recognized that in Southern California natural habitats are limited not only for birds and wildlife, but also for people. Southern California's coastal wetlands and watersheds provide oases of calm in the hectic urban landscape. The WRP is committed to the idea that through compatible access measures, humans and wildlife can successfully share these remaining pieces of nature.

Goal 5: Promote education and compatible access related to coastal wetlands and watersheds.

Statement of Need

Recovery of Southern California coastal wetlands and coastal watersheds cannot be achieved by a single agency or even a group of agencies. It can only be realized with the sustained support and commitment of the region's communities. Education[2] is a critical tool for building this

[2] Education is defined broadly and includes public awareness campaigns.

support and achieving long-term success. Communities will only be committed to preserving and restoring their wetland and watershed resources if they understand their ecological, economic, and aesthetic value.

Education about coastal wetlands and watersheds must be targeted at the decision-makers of both today and tomorrow – that is, at both adults and children. In addition, education efforts must also be targeted to reach key ethnic communities found in Southern California. Given the strong ecological connections between Southern California and Baja, Mexico, international education efforts are also needed.

For all communities and ages, one of the most effective education methods will be through first-hand experience of the resources. Thus, there is a great need to incorporate public access, interpretive programs, and opportunities for experiential learning into wetlands and watershed projects. Public access, however, must be structured in a way that is compatible with wetland resources.

Key Strategies

A. Develop compatible public access opportunities. Public access must be designed to be compatible with the overall habitat goals of wetlands recovery efforts. In general, compatible access to wetland and watershed resources should be located around the edges of habitat areas to leave large areas in the middle undisturbed by human presence. Seasonal restrictions on access may be needed to adequately protect species during critical life stages. Access limitations may vary with user groups; for instance, a group of volunteers working on removal of exotic plants could have a greater level of access than a group of school children on a field trip. Even restrictions on access provide opportunities for learning if properly explained through interpretive signs. Areas where access is restricted in order to protect a sensitive species or a re-establishing habitat can highlight the fragility of the system and the need for cooperative efforts to protect it.

B. Integrate interpretive programs into wetland and watershed projects. Interpretive signs at viewing areas and along access trails are a simple way to promote wetlands education. The WRP will encourage and fund the installation of interpretive signs and development of other interpretive materials as part of restoration projects. The WRP will also promote the development of wetland and watershed interpretive centers distributed throughout Southern California. The WRP Small Grants Program will continue to prioritize restoration and enhancement projects with an education element.

C. Promote opportunities for experiential learning. Experiential learning opportunities include hands-on projects related to wetlands and watershed resources. Common examples include citizen monitoring programs, creek clean-ups, and volunteer work brigades to remove invasive plants or plant native species. Opportunities for student research projects can be coordinated with local high schools and colleges. The WRP Small Grants Program will continue to target restoration and enhancement projects with a community involvement element.

D. Promote development and dissemination of educational materials and activities related to coastal wetlands and coastal watersheds. The Education subcommittee of the Public Advisory Committee will continue to produce materials and sponsor activities that describe the values of wetlands and watersheds to target audiences, and will facilitate dissemination of materials developed by other sources. The subcommittee will also work with the Science Advisory Panel to identify opportunities for promoting wetlands and watershed education at the university level.

E. Research and disseminate information about the economic value of wetlands and habitat preservation based on factors such as tourist economy, water quality benefits, groundwater retention, and avoided stormwater conveyance costs.

F. Promote practices to reduce urban impacts on wetlands and watersheds. This includes implementation of best management practices on private property, as well as behavioral changes such as staying on trails and keeping dogs leashed.

Goal 6: Advance the science of wetlands restoration and management in Southern California.

Statement of Need

Advancing the understanding of wetlands restoration science and incorporating this new knowledge into project designs are critical for the long-term success of wetlands recovery efforts in Southern California. As the science advances, the efficacy and cost-effectiveness of restoration and management efforts will improve. By investing in a greater understanding of restoration science now, the WRP will save far more money in the future.

Wetlands restoration is a relatively new practice, and much remains to be learned about the design and implementation of successful restoration projects. Research on coastal wetlands ecology and restoration has generally been focused on wetlands found along the Altantic and Gulf coasts. Very little information that is specific to the unique climatic, geologic, and hydrologic conditions in Southern California is available, and research is needed to develop this knowledge. The WRP Science Advisory Panel has placed a high priority on research regarding the ecology of restoration sites in Southern California, as well as the restoration techniques that will optimize results. One priority identified by the WRP Science Advisory Panel is to develop and evaluate better restoration practices including, but not limited to, the physical design of restoration projects and techniques for promoting plant establishment.

Monitoring is a critical tool for evaluating both individual restoration projects and the health of the regional ecosystem. Currently, most monitoring for wetlands restoration projects is driven by permit requirements, and may not adequately evaluate ecological development of the system. A priority should be placed on restoration projects that incorporate experimental approaches. These projects, such as the Model Marsh restoration in the Tijuana Estuary (San Diego county), allow for evaluation of restoration techniques through continued monitoring, and for the adaptive management of the system. Additional research into monitoring protocols and appropriate

indicators (such as edge and indicator species) could increase the cost-effectiveness of monitoring. Existing long-term monitoring datasets can be analyzed to refine restoration designs, and determine more cost-effective management strategies. One consideration in designing monitoring programs is to gather the most useful information within a limited budget. Additional research into monitoring protocols and appropriate indicators (such as edge and indicator species) could increase the cost-effectiveness of monitoring.

Key Strategies

A. Promote research on wetland ecology and restoration science, as well as on issues affecting the success and long-term sustainability of wetland restorations in Southern California. The WRP will promote wetlands restoration research in two main ways. First, the WRP will work with researchers to integrate wetland restoration research into WRP projects, similar to what was done at the Tijuana Estuary Model Marsh. Second, the WRP will develop an extramurally-funded research program on wetland ecology and restoration science through the Science Advisory Panel. The WRP Science Advisory Panel has identified three key areas for which additional data and research is needed:

- Prioritizing wetlands acquisition and restoration Projects – In order to most effectively and efficiently achieve the WRP's regional goal, the WRP needs to target its limited resources to the highest priority projects. The Science Advisory Panel is currently working to create an analytical framework for prioritizing acquisition and restoration projects based on ecological benefits to the region. This analytical framework will be refined and revised as additional information becomes available. Key data and research priorities for building this decision support tool include:

    - Estimate of historical quantity and distribution of wetland habitat types.
    - Estimate of current quantity and distribution of wetland habitat types. The Southern California Coastal Wetlands Inventory compiled acreage data on existing wetland habitat types for the major coastal wetlands in the region, but did not compile spatial data on habitat types. No estimates of riparian habitat for the region have been made.
    - Research and describe the ecological relationships in wetland and stream ecosystems, including the connections and interdependence between wetlands and adjacent uplands, and the role and effectiveness of habitat corridors.

- Addressing constraints to restoration projects – Wetlands restoration projects in Southern California take place in a highly complex urban environment. The effects of these urban surroundings on water and sediment quality can constrain the ability of the WRP to implement projects. Further research is needed to assess the scientific basis of these constraints, identify the circumstances under which they are most likely to be important, and identify how they should be addressed in project designs to ensure the WRP's long-term success. Key areas for further research and data collection include:

    - Identify the most common and difficult impediments to wetlands restoration.
    - Evaluate the role of marshes in nearshore public health issues, including, but not limited to, bacteria, viruses, pathogens, and mosquitoes. Estimate natural background levels of bacteria in coastal waters.

- Evaluate the effects of watershed sediment dynamics and sediment management practices on the health of coastal marshes.
- Evaluate the role and function of coastal wetlands in urban runoff control and management.
- Evaluate the effects of natural and anthropogenic changes to water level, tidal exchange, and shoreline stability on coastal wetlands.

- Optimizing restoration implementation and evaluation – Restoration of coastal wetlands and riparian corridors is a relatively new practice, and there is still much to be learned about the design and implementation of successful restoration projects. Every project provides opportunities for increasing our understanding of key ecological processes and beneficial restoration techniques which will improve the success of future restoration efforts. Effective monitoring is a critical tool for capitalizing on these opportunities. Key areas for further research and data collection include:

  - Develop and evaluate better restoration techniques including, but not limited to, the physical design of restoration projects and techniques for promoting plant establishment, including rare and endangered plants.
  - Define success criteria for individual projects and identify measurable indicators of those criteria.
  - Define and test performance curves for assessing restoration progress and success.
  - Test and implement a region-wide monitoring program.
  - Identify important edge species that can serve as indicators of ecosystem integrity and evaluate their habitat requirements.

B. Promote development of more effective monitoring programs for both regional and project-specific assessments. The WRP will promote the development of better monitoring programs by requiring *and funding* monitoring programs for WRP projects. The WRP will also pursue development of standardized monitoring guidelines and more cost-efficient monitoring techniques. Key areas for further research are discussed under section A above.

C. Disseminate information. Through its network of federal, state, and local partners, the WRP will serve as a clearinghouse for information about wetlands research and restoration practices. Monitoring data from WRP projects will be made available on the WRP web site. In addition, the WRP will create forums for sharing research findings and recommendations. The WRP will also create or facilitate the creation of a data repository for wetlands restoration research.

IV. County Objectives

The WRP Regional Goals and key strategies provide a general framework for guiding the WRP's efforts. In this chapter, more specific needs and objectives have been identified for each coastal county. These objectives were developed by the County Task Forces working in collaboration with the Wetlands Managers Group. In each county a few high priority projects are identified, but for the most part the listed objectives have not been prioritized. In fact, one common theme expressed by the Task Forces was the need to develop a system for setting priorities. The Science Advisory Panel is currently working with NOAA to develop a decision support tool for use by the Task Forces and Wetlands Managers Group to meet this need. The County Objectives identified in this chapter will be periodically revised to reflect changing conditions and new information.

This Chapter is organized by County, and each County discussion is divided into two sections. The first section is an overview of existing conditions at key coastal wetlands and watersheds in the county. Appendix B contains additional information about the coastal watersheds. The second section summarizes specific objectives for the county using the following format:

- Brief narrative summary of objectives and identified priorities.
- Listed objectives:
  - Ecological objectives separated into county-wide and site-specific objectives.
  - Organizational objectives, including education objectives.
  - Data and research needs.

To avoid repetition, objectives that are essentially the same as the Regional Goals and key strategies are not repeated in this chapter.

San Diego County

Summary of Existing Conditions

San Diego County includes the watersheds and associated wetlands from the Tijuana River north to San Mateo Creek. On average,the coastal plain in the county extends 10-15 miles inland. The climate is arid, with average annual rainfall of 10-14 inches. There are several large rivers in the county including the Tijuana, Otay, San Diego, San Luis Rey, and Santa Margarita Rivers. These rivers historically supported large wetlands systems at their mouths. Over one-third of the remaining coastal wetland acreage in Southern California is located in San Diego County. The majority of the coastal wetlands are already in public (or conservation) ownership. In northern San Diego County, a string of coastal lagoons are found at the mouths of smaller watersheds. The county also contains the largest area of vernal pools in Southern California.

Tijuana River Watershed

In the southwest corner of San Diego County, between the cities of Imperial Beach and Tijuana, Mexico, the Tijuana River meanders its way to the sea. The river's watershed encompasses 1700 square miles; 1245 in Mexico and 455 in the United States. The U.S. portion of the watershed is not highly developed; however, the Mexican portion flows through Tijuana, one of the fastest growing cities in Mexico. Key issues within the watershed include inflows of sediment and the periodic release of untreated sewage from the Mexican side of the watershed, and the spreading of *Arundo* and other exotic plants throughout the watershed.

Tijuana Estuary at the mouth of the river is one of the most important tidal wetlands on the Southern California coast, and has been designated by NOAA as a National Estuarine Research Reserve (NERR). The estuary has been less disturbed than many others in the region and supports several species of concern; however, raw sewage has been discharged to the river and side canyons intermittently for over fifty years. Sedimentation is also a significant problem in the estuary.

The Tijuana Estuary Tidal Restoration Program (TETRP) will eventually restore 500 acres of tidal marsh in the south arm of the estuary. The Model Marsh restoration was the first phase of this program. Implementation of the TETRP will require removing substantial amounts of sediment, and will be accomplished in association with several sediment management projects.

San Diego Bay

San Diego Bay covers 10,532 acres of water and 4,419 acres of tidelands. There are several coastal watersheds that discharge to the Bay, including the Otay and Sweetwater Rivers. Historically, the San Diego River also drained into the Bay. Dams were built on the Sweetwater and Otay Rivers that affect the pattern and quantity of freshwater inflow, as well as sedimentation. Only about 18 percent of the original Bay floor remains undisturbed by dredge or fill (Smith 1976).

Until recently, the Otay River watershed was largely unaffected by impacts of urban development. However, it is now one of the most rapidly developing areas of San Diego County. Key issues in the watershed include preservation of wildlife corridors, and riparian and floodplain habitat. The Otay River Regional Park was created in part to address these issues. At the mouth of the Otay River lies the South San Diego Bay National Wildlife Refuge (NWR). This NWR was formed in 1999 and restoration plans are in preparation.

Sweetwater Marsh is located at the mouth of the Sweetwater River and is also included in the planning for the South San Diego Bay NWR. The Sweetwater Authority, a water supply special district, conducts a watershed management program for the river. This program is focused primarily on water supply and water quality, rather than habitat concerns. Sediment quality is an issue in both the watershed and at the marsh.

San Diego River

Historically, the San Diego River drained into northern San Diego Bay. A large wetland complex at its mouth included coastal marshes and mud flats linking San Diego Bay and False Bay

(Mission Bay). In 1850, the River was rerouted by the Army Corps of Engineers to drain into False Bay. A century later, False Bay was dredged to create Mission Bay Park, and the river was once again rerouted. A flood control channel now carries the lower river to the sea. The upper watershed contains over 800 acres of riparian forest, which provide habitat for the endangered Least Bell's vireo and migratory bird species.

There are two remnants of the river's natural marsh system– Kendall Frost Marsh Preserve in Mission Bay and Famosa Slough. Two pairs of breeding light-footed clapper rails and Belding's savannah sparrows were observed in 1995 at the Kendall Frost Reserve. Famosa Slough contains freshwater, brackish, and salt marsh habitats that support a diverse array of shore bird species, including least terns.

Mission Bay is a small-craft harbor and recreation area that is surrounded by a number of hotels, theme parks, and residential developments. A rip-rapped channel connects Mission Bay and the Ocean. There are 69 storm drains that enter the Bay. A 1994 report characterized the bay's primary water quality problem as contamination from urban runoff combined with poor tidal flushing. The eelgrass habitats of the Bay support over 25 species of marine fish and numerous invertebrates (California Coastal Conservancy 1989). Several of these species are important commercial and recreational fisheries. The islands within the Bay are used by nesting California least tern. The mudflats and marsh are habitats for the endangered light-footed clapper rail, Belding's Savannah sparrow, western snowy plover, California brown pelican, California horned lark and other species. A great blue heron rookery is also found within the Bay.

North County Lagoons

A string of lagoons line the northern coast of San Diego County. With the exception of Buena Vista Lagoon, all of the lagoons are tidal to some extent. Development in the watersheds of these lagoons has created a similar set of issues at each site, including:

- Altered hydrologic patterns and constrictions to tidal exchange resulting in more frequent closing of ocean inlets;
- Increased sedimentation and conversion of habitats (open water to marsh, marsh to dryland);
- Increased freshwater flows and conversion of salt and brackish marsh to freshwater marsh;
- Invasions of non-native species; and
- Encroachment of development and loss of wetland and supporting upland habitat.

Impacts of development in the watersheds of the lagoons vary significantly. The Los Penasquitos watershed is the most rapidly growing area in the City of San Diego, and has experienced significant increases in erosion from developing areas and construction sites. Preservation and restoration of wildlife corridors is a key concern, and was one of the factors used in prioritizing areas in the County's Multiple Species Conservation Plan (MSCP).

Santa Margarita River

The Santa Margarita River is the least disturbed river system south of Point Conception, and contains some of the largest remaining populations in the state of several bird species, including the Least Bell's vireo and the California least tern (State Coastal Conservancy 1989). Twenty-seven miles of free-flowing river exist. The riparian habitat along the banks of the river is of particularly high quality, and is the most extensive riparian habitat in San Diego County. These riparian habitats are essential for the protection of migrating waterfowl and a number of endangered plants and animals. Approximately 200 acres of wetland habitat remain at the Santa Margarita estuary. These wetlands support a diversity of aquatic and plant species. The estuary supports clapper rails in the brackish marsh areas, endangered tidewater gobies in the brackish water, and a rich array of other special status species.

San Mateo Creek

The San Mateo Creek watershed falls within both San Diego and Orange Counties. Approximately 70 percent of the watershed is within the Camp Pendleton U.S. Marine Corps Base and the Cleveland National Forest. In 1999, steelhead trout were found in San Mateo Creek, which has focused much greater attention on the creek and opportunities for restoring steelhead habitat.

Vernal Pools in San Diego County

The main portion of the San Diego Vernal Pool Region occupies the extreme southwestern portion of the state stretching along the coast from the Camp Pendleton area near the Orange-San Diego county border south to the Otay Mesa area adjacent to the Mexican border. It extends inland in a continuous belt to the vicinity of Ramona about 40 miles from the coast. Two types of vernal pools (San Diego Mesa Claypan and San Diego Mesa Hardpan) have been identified as endemic to the county. Many vernal pools have been lost to development. The greatest loss of vernal pools in the County has occurred in the Mira Mesa, Peñasquitos, and Miramar industrial areas which account for 73 percent of all the pools lost in the county between 1979 and 1986. Other substantial losses have occurred in the Otay Mesa area where over 40 percent of the pools were lost between 1979 and 1990.

San Diego County Objectives

As stated above, the majority of the coastal wetlands in San Diego County are already in conservation ownership; therefore, WRP efforts to preserve and restore coastal wetlands in San Diego will focus on: 1) preserving adjacent transitional and upland habitats that support the wetland ecosystems; 2) restoring and enhancing tidal wetlands; and 3) reducing impacts from watershed inputs. The WRP's work in coastal watersheds in the county will focus initially on watersheds with adverse impacts on downstream wetlands or other coastal resources, and on preserving stream corridors that support substantial riparian and aquatic habitat or serve as a linkage between habitat areas.

One goal of the San Diego County Task Force is to develop a system for prioritizing wetland and watershed efforts based on all six of the WRP's regional goals. Possible criteria for the prioritization scheme include:

- High value wetland habitat.
- Preservation of habitat linkages and movement corridors.
- Areas identified in the MSCP, MHCP, or other habitat conservation plans.
- Areas identified in recovery plans for listed species.
- 303d-listed impaired waterbodies, or waterbodies where impairment is imminent.
- Areas facing the most imminent threats.

In San Diego County, there are two excellent organizations to help further the WRP's goal of advancing wetlands restoration science in Southern California. First, the Tijuana Estuary NERR was created to serve as a "living laboratory" in which scientists could conduct research and educators communicate research results. For this reason, the WRP will promote integration of wetlands restoration research studies into projects implemented in Tijuana Estuary. The Pacific Estuarine Research Laboratory (PERL) at San Diego State University has been a leader in wetlands restoration science in Southern California for many years. PERL has conducted research and monitoring at many sites throughout the county, including the Tijuana Estuary Model Marsh. The WRP will continue to coordinate and collaborate with PERL on wetlands research efforts.

More detailed objectives identified by the Wetlands Recovery Project and San Diego County Task Force are outlined below.

Ecological Objectives

County-wide Objectives

- Assess impacts of transportation corridors on coastal wetlands and watersheds. Examples include Interstate 5, the railroad, Pacific Coast Highway, and the planned toll road in the north county.
- Address erosion and sediment transport issues in the watersheds and coastal wetlands. Identify opportunities to modify dams to include sediment bypasses and manage water releases to simulate seasonal pulses.
- Address exotic species on a watershed basis.
- Identify priority projects for each watershed and wetland in the county.
- Restore habitat functionality of wetlands and stream corridors.
- Develop and implement removal and management programs for exotic species in the watersheds.

Site-Specific Objectives

Tijuana Estuary and Watershed

- Complete the Goat Canyon Enhancement Project.
- Develop and implement additional sediment management projects.
- Complete the 500-acre, multi-phased Tijuana Estuary Tidal Restoration Program.

South San Diego Bay and Watersheds

- Restore and enhance the South San Diego Bay wetlands in accordance with the restoration plan being developed by the U.S. Fish and Wildlife Service.

San Diego River and Watershed
- Continue to implement the Famosa Slough Enhancement Plan.
- Identify preservation and restoration priorities within the watershed.

Mission Bay and Watershed
- Enhance salt marsh habitat at Rose Creek and Kendall Frost Reserve.
- Address impacts of watershed inputs, including freshwater, sediment, nutrients, and contaminants.

North County Lagoons
- Address impacts of watershed inputs, including freshwater, sediment, nutrients, and contaminants.
- Develop long-term management plans and funding mechanisms for the lagoons.

San Luis Rey River
- Identify preservation and restoration priorities within the watershed.

Santa Margarita River
- Develop a watershed management plan for the river and its tributaries.
- Preserve and enhance the high quality habitat along the Santa Margarita River.
- Coordinate with the U.S. Marine Corps to protect and enhance the lower watershed.

San Mateo Creek
- Enhance habitat for steelhead trout in San Mateo Creek.

Organizational Objectives

- Coordinate and integrate watershed planning efforts in the county.
    - Create a regional wetlands/watersheds coordinator position to foster more cooperative activity among wetlands and watershed efforts in the county.
    - Develop a system of communication and information exchange among all of the wetlands and watershed stakeholders in the county.
    - Promote watershed planning throughout the county for each watershed with special attention to sediment flows.
- Establish position to coordinate related work being done on the stormwater permit and watershed management efforts. Explore how the regional stormwater permit can serve as a vehicle to promote broader coordination among those with interests in habitat and water quality in the county.
- Integrate wetlands objectives into the MSCP and General Plan 2020.
- Promote development of cross-jurisdictional transferable development rights (TDRs) to preserve large swaths of land in less developed areas.
- Promote cooperation with Orange County in the San Mateo Creek watershed.

Orange County

Summary of Existing Conditions

Orange County is divided into two distinct physiographic subregions. Southern Orange County extends from the San Diego County line up through Laguna Beach and is characterized by short, steep watersheds with few coastal wetlands. Northern Orange County is part of the Los Angeles Basin and has a much broader coastal plain with larger river systems and relatively large coastal wetlands. The northern subregion extends from the San Diego Creek watershed north to the San Gabriel River.

Southern Orange County

Southern Orange County falls within the San Juan Hydrologic Unit, which extends from San Mateo Creek north to Laguna Beach. Several of the coastal creeks in this subregion have been impacted by development in their watersheds. Degraded water quality, loss of riparian and aquatic habitat, infestation of exotic species, and excessive channel and bank erosion are common issues in these watersheds. The Army Corps of Engineers has been working with the County of Orange to develop comprehensive watershed management and restoration plans for the San Juan and Aliso Creek watersheds. As discussed under San Diego County, steelhead trout were found in San Mateo Creek in 1999. San Juan Creek also supports potential steelhead habitat.

Northern Orange County

In Northern Orange County, the coastal plain broadens, extending 30 miles or more inland. Three large watersheds dominate this portion of the County – San Diego Creek, the Santa Ana River, and the San Gabriel River. Historically, the Santa Ana and San Gabriel Rivers roamed freely over the coastal plain, periodically changing the location of their mouths. For example, the mouth of the Santa Ana River fluctuated from Anaheim Bay in the north to Newport Bay in the south. These two large, free-flowing rivers supported vast expanses of wetlands on the coastal plain. Remnants of these large coastal wetlands include Upper Newport Bay, the Santa Ana River/Huntington Beach wetlands complex, Bolsa Chica wetlands, Anaheim Bay, and the Los Cerritos wetlands complex.

Most of the watersheds and wetlands in the Los Angeles Basin, including those in northern Orange County, share several problems attributable to the extensive degree of urbanization. These include:

- Loss of riparian and floodplain habitat as a result of channelization and undergrounding of stream corridors.
- Increased storm runoff quantity and peak flows due to increased impermeable surfaces in the watershed. This has contributed to increased channel incision and bank erosion with loss of riparian habitat and increases in downstream sedimentation.
- Decreased water quality resulting from increased loads of sediments, nutrients, metals, and organic compounds, and increased water temperature.

Upper Newport Bay and San Diego River Watershed

Upper Newport Bay supports some of the highest quality tidal marsh in Southern California. The upper Bay includes more than 900 acres of wetland habitat, and supports populations of the light-footed clapper rail, Belding's savannah sparrow, and California least tern. Major concerns for the upper bay include sedimentation, bacterial contamination, toxics, and eutrophication from excessive nutrient inflows. The upper bay is managed by CDFG as an ecological reserve. The ACOE, County, Coastal Conservancy and CDFG are undertaking a project to dredge 2.1 million cubic yards of sediment form the upper Bay as part of a long-term sediment management program.

Santa Ana River/Huntington Beach Wetlands Complex and Watershed

The Santa Ana River estuary and Huntington Beach wetlands are a remnant of a 2900 acre wetland system that flourished at the mouth of the Santa Ana River. Today only approximately 300 acres remain, of which approximately 120 have been restored. The remaining lands are privately owned, and the habitat is fairly degraded. The Santa Ana River flows in a concrete flood control channel from just below Prado Dam to its mouth. This greatly limits opportunities for restoration of riparian and aquatic habitat.

Bolsa Chica Wetlands

Diking, filling, oil extraction activities, and other anthropogenic impacts have significantly degraded wetlands in this subregion. Despite land-use activities within the watershed, the Bolsa Chica wetlands complex is an incredibly diverse ecosystem. A compilation of 15 surveys from 1970 through 1993 identified 206 species, including 129 water related species and 32 special status species. A partnership of eight state and federal agencies is coordinating a project to restore approximately 880 acres of the Bolsa Chica Wetlands. Mitigation monies from the Ports of Los Angeles and Long Beach are partially funding the project.

Anaheim Bay

Anaheim Bay supports some of the healthiest wetlands in southern California, and a portion of the Bay has been designated as the Seal Beach NWR. The Bay is located within the boundaries of a U.S. Naval Weapons Station which limits opportunities for enhancement. Approximately 956 acres of wetlands remain at Anaheim Bay, and numerous species of concern use the site.

Los Cerritos Wetlands and San Gabriel River Watershed

The San Gabriel River Watershed and Los Cerritos wetlands complex straddle the boundary between Los Angeles and Orange Counties. The San Gabriel River watershed encompasses approximately 610 square miles and 828 miles of waterways. The River is channelized for much of its length, with the lower channel completely encased in concrete. The Los Cerritos wetlands lie at the mouth of the San Gabriel River; however, much of the wetlands are now hydrologically isolated from the river. Historically the Los Cerritos wetlands complex supported approximately 2400 acres of wetland habitat. Today, only a few hundred acres remain. The remnant marsh is bordered by oil production facilities, and residential, commercial, and industrial development.

California least tern and Belding's savannah sparrow are two of the listed species known to use the wetlands. Major portions of the Los Cerritos wetlands are privately owned.

Vernal Pools in Orange County

Currently, there are only a few remnant vernal pools and hints of disturbed pools in coastal Orange County. There is some evidence from old aerial photographs that vernal pool terrain similar to the mesas of northern San Diego County existed at least as far north as San Clemente and Laguna Beach.

Orange County Objectives

Two of the significant coastal wetlands in Orange County are primarily privately owned – the Santa Ana River /Huntington Beach wetlands complex, and Los Cerritos wetlands complex. Acquisition of these sites from willing sellers is a high priority for the WRP.

The WRP's objectives for coastal watersheds in Orange County differ markedly between the northern and southern portions of the county. Restoration opportunities along the lower Santa Ana and San Gabriel Rivers are limited since the rivers flow through concrete channels. In the lower watersheds of these rivers, WRP efforts will focus on restoring or recreating wetland habitat adjacent to the river channels. In southern Orange County, the WRP will focus on addressing the impacts of urban development on the stream corridors. Proactive action to preserve these creeks now will be far more cost-effective than trying to restore them after further degradation.

One goal of the Orange County Task Force is to develop a system for assessing and prioritizing wetlands projects. Due to the threat of permanent loss, preservation of remaining resources would be prioritized over restoration of degraded resources. Projects that achieve multiple benefits such as both habitat and water quality improvements or beach nourishment would also be prioritized.

More detailed objectives identified by the Wetlands Recovery Project and Orange County Task Force are outlined below.

Ecological Objectives

County-wide Objectives

- Coordinate with public works agencies to reduce impervious surfaces in road and other infrastructure projects.
- Develop recommendations/guidance for "compatible access" in a highly populated area.
- Promote projects to retain stormwater in the watersheds to increase opportunities for habitat enhancements along stream corridors and reduce need for armoring channels.
- Promote best management practices to reduce inputs of sediment, nutrients, and contaminants in the watershed. Examples include irrigation practices on agricultural, residential, and commercial lands.

Site-specific Objectives:

Aliso, San Juan and San Mateo Creeks

- Address impacts of urban development on creeks including increased storm flows, increased erosion, invasive species, and degraded water quality.
- Complete the ACOE/County watershed studies for Aliso and San Juan Creeks. Identify and implement projects consistent with WRP Regional Goals.
- Identify and implement projects that have both habitat and water quality benefits.
- Identify opportunities for re-establishing steelhead in southern Orange County creeks, particularly San Juan and San Mateo Creeks.

Upper Newport Bay and Watershed

- Complete the Upper Newport Bay Ecological Restoration Project led by the ACOE and County.
- Address impacts of watershed inputs, including sediment, nutrients and contaminants.
- Identify and prioritize additional restoration and enhancement work needed at Upper Newport Bay.
- Complete and implement the ACOE/County watershed study for San Diego Creek. Preserve and restore aquatic and riparian habitat in the San Diego Creek watershed, particularly along Serrano Creek.
- Identify opportunities for habitat preservation and restoration, particularly habitat corridors, at the El Toro base.

Santa Ana River/Huntington Beach Wetlands Complex and Watershed

- Acquire and restore wetlands and adjacent upland areas at the mouth of the Santa Ana River and along the Huntington Beach Wetlands.
- Develop the Orange Coast River Park and restore a continuum of wetland habitats from tidal salt marsh to riparian along the lower three miles of the Santa Ana River.

Bolsa Chica Wetlands

- Complete Port-funded restoration project.
- Acquire and restore contiguous wetland and transitional areas that function as part of the wetland ecosystem.

Anaheim Bay and Watershed

- Address impacts of watershed inputs, including sediment, nutrients and contaminants.
- Pursue additional restoration and enhancement opportunities with the Navy.

Los Cerritos Wetlands and San Gabriel River Watershed (see Los Angeles County for additional objectives)

- Acquire and restore wetlands and adjacent upland areas at Los Cerritos Wetlands.
- Pursue off-channel habitat restoration and re-creation along the lower reaches of the San Gabriel River, where the river is completely confined to concrete.
- Develop a watershed management plan for Coyote Creek and identify restoration opportunities.

Organizational Objectives

- Promote wetlands and watershed education.
  - Promote inclusion of environmental education elements in the statewide science curriculum. Expand on the pilot program developed by the County and Surfrider Foundation.
  - Pursue off-site education opportunities in high-use venues, such as grocery stores, possibly through use of posters.
  - Educate potential funders about value of healthy wetlands and watersheds.
- Increase available funding.
  - Secure private sector funding for projects and research. Promote participation in the WRP by the private sector, particularly the tourism industry (including financial participation).
  - Promote establishment of a dedicated funding source for projects.
  - Address need for long-term maintenance funding.
- Encourage more public/private partnerships
- Complete GIS mapping for the County, and develop comprehensive GIS mapping system for the five counties.
- Educate private landowners about best management practices for their land and promote incentives for encouraging them to preserve resources on their land.
- Increase coordination among wetlands and watershed efforts.
  - Provide information and scientific substantiation to local governments to assist in land use planning. Reach local governments through existing venues such as the League of Cities.
  - Coordinate with vector control agencies.
  - Promote integration of wetlands objectives into public works projects.
  - Promote BMPs for new developments, particularly BMPs that reduce/slow stormwater flows.
  - Identify opportunities for preserving or restoring resources on lands that are already publicly owned, and work with landowner agencies to implement projects.
  - Assist in the development of a cooperative management entity for the Orange Coast River Park.
  - Coordinate WRP efforts with NCCP and SAMP processes.
  - Coordinate WRP efforts with SWRCB Proposition 13 grants.
  - Promote better coordination among resource agencies when developing projects.
- Review existing regulations and identify ways to better streamline or coordinate regulatory processes.
- Organize a science and management conference for Upper Newport Bay.

Data and Research Needs

- Inventory lagoon and estuarine wetlands and their resources at the mouths of southern Orange County streams.

Los Angeles County

Summary of Existing Conditions

Similar to Orange County, coastal Los Angeles County is divided into two distinct the physiographic subregions – the Los Angeles Basin and the Santa Monica Mountains. The LA basin is a broad coastal plain drained by four main waterways – the San Gabriel River, Los Angeles River, Dominguez Channel[1], and Ballona Creek. Los Angeles County has lost over 90 percent of its coastal wetlands, a greater percentage than any other county in the region. Most of this loss occurred within the Los Angeles basin. Within the basin, only two significant coastal wetland areas remain: the Los Cerritos wetlands complex, and the wetlands and lagoons near the mouth of Ballona Creek. Large portions of both these sites are privately owned.

The highly urbanized watersheds of the Los Angeles Basin share the same concerns as those in Orange County, namely:

- Loss of riparian and floodplain habitat as a result of channelization and undergrounding of stream corridors.
- Increased storm runoff quantity and peak flows due to increased impermeable surfaces in the watershed. This has contributed to increased channel incision and bank erosion with loss of riparian habitat and increases in downstream sedimentation.
- Decreased water quality resulting from increased loads of sediments, nutrients, metals, and organic compounds, and increased water temperature.

In contrast to the LA basin, the Santa Monica Mountains contain many short, steep drainages, most of which are in a fairly natural state. Coastal lagoons have formed at the mouths of the larger drainages, including Malibu, Topanga and Trancas Lagoons.

San Gabriel River and Los Cerritos Wetlands

See Orange County section for description.

Los Angeles River

The Los Angeles River watershed encompasses 835 square miles. Historically, the Los Angeles River roamed freely over the coastal plain and alternated between San Pedro Bay and the area of Ballona Wetlands on Santa Monica Bay. The historic wetlands associated with the Los Angeles River included extensive marshes, streams, lakes and seeps covering much of present day downtown Los Angeles to San Pedro Bay and eastward to the San Gabriel River. The lower Los Angeles River was once part of one of the largest floodplains in the United States.

Virtually the entire river has now been channelized and paved for flood control purposes, destroying hundreds of acres of aquatic, riparian, and wetland habitat. Runoff from the highly urbanized watershed has created significant water quality problems in the river. Opportunities to

[1] Historically the Dominguez channel watershed was part of the Los Angeles River watershed. However, when Dominguez channel was created, it was hydrologically disconnected from the Los Angeles River.

restore habitat and hydrologic functions along the river are limited, but there is growing interest in the local community to realize these opportunities.

Ballona Creek and Wetlands

Ballona Creek is located on the northern end of the Los Angeles Basin and drains into Santa Monica Bay. Ballona Wetlands, Ballona Lagoon, and Del Rey Lagoon are all remnants of the large wetland complex that historically existed at this location. The Ballona wetlands complex provides habitat for several species of concern including the California least tern and the Belding's Savannah sparrow. Major portions of the Ballona wetlands are privately owned.

Santa Monica Mountains

The Santa Monica Mountains subregion differs substantially from the highly urbanized Los Angeles Basin. The mountains cover approximately 240 square miles, and are primarily open space. There are over 20 coastal drainages in the Santa Monica Mountains, which are characterized by relatively short, steep watersheds with little or no wetlands habitat at the mouth. Average rainfall in the subregion is 24 inches per year. Several creeks in this region support steelhead runs, or did so historically. In comparison to much of Southern California, the watersheds in the Santa Monica Mountains are in relatively good shape. For this reason, the focus in this subregion is on the preservation of habitat and stream functions, rather than on restoration.

Malibu Lagoon is the largest coastal wetland in the Santa Monica Mountain subregion. Approximately 92 acres of wetland habitat remain; however, the historical acreage is estimated to be several times this amount. Key issues at Malibu Lagoon include poor water quality, restricted tidal circulation within the lagoon, and increased freshwater inflows during the dry season. A task force of federal, state, and local agencies is working on a multi-year effort to restore the lagoon and lower reaches of Malibu Creek.

Santa Clara River

The Santa Clara River is the largest unchannelized riverine system in the south coast. The upper watershed is located in Los Angeles County. See Ventura County section for description.

Los Angeles County Objectives

As discussed above, only two significant coastal wetlands remain in the Los Angeles, both of which are primarily privately owned. Therefore, acquisition of Los Cerritos and Ballona wetlands ecosystems from willing sellers is a high priority for the WRP. Once acquired, restoration and enhancement of these sites would be the next step. The coastal lagoons in the Santa Monica Mountains region are primarily publicly-owned; however, acquisition of adjacent properties would enable restoration of historic wetland habitat. This is a priority, particularly at Malibu Lagoon. Another key issue for these coastal wetlands is addressing the impacts of sediment, nutrient, and contaminant inputs from the watersheds.

The lower portions of all four rivers that drain the Los Angeles Basin are largely confined to concrete channels. For this reason, restoration opportunities in the lower watersheds will focus on restoring or recreating wetland habitat adjacent to the river channels. In the upper watersheds,

there are more opportunities for preserving and enhancing existing habitat. In the Santa Monica Mountains region, the WRP will focus on: watersheds adversely impacting downstream wetlands or other coastal resources; existing or potential steelhead streams; and systems with substantial aquatic or riparian habitat.

More detailed objectives identified by the Wetlands Recovery Project and Los Angeles County Task Force are outlined below.

Ecological Objectives

County-wide Objectives

- Identify high priority projects for acquisition and restoration for each watershed in the county.
- Improve watershed health by managing levels of sediment, nutrients and contaminants in all watersheds. Identify options for disposing of road spoils other than by creating road berms that erode into streams and/or are invaded by exotic species.
- Promote projects to retain stormwater and urban runoff throughout each watershed to increase opportunities for habitat enhancements in all river and stream corridors.
- Promote alternatives to fire protection policies that prevent erosion, reduce the invasion of non-native species and do not require the removal of native vegetation. Educate landowners and agencies about appropriate vegetation removal that meets current fire protection policies.
- Protect wetlands from impacts of adjacent development.
- Assess impacts of transportation corridors on coastal wetlands and watershed ecosystems (particularly all the inter-mountain routes).
- Evaluate potential to preserve and reintroduce steelhead in streams of Los Angeles County.

Site-Specific Objectives

San Gabriel River

- Develop and implement restoration, watershed, and long-term management plan(s) for the San Gabriel River and its tributaries. These plans may address issues including, but not limited to, restoring or creating aquatic, riparian, and marsh habitat, both within soft-bottom and off-channel areas, removal and management of exotic species, and preservation of sensitive species.
- Develop high quality, multi-species habitat linkages along the river, capable of supporting sensitive species and connecting core wildlife populations in the San Gabriel Mountains and Puente Hills.
- Develop watershed management plan for Coyote Creek. Evaluate restoration of wetlands at the confluence of Coyote Creek and San Gabriel River.
- Support the creation of habitat (e.g., riparian, marsh, and grassland/scrub) in parkway and greenway projects along the river and its tributaries.

Los Cerritos Wetlands Complex

- Acquire coastal wetlands and associated upland habitat.
- Develop and implement restoration plan.

- Develop and implement long-term management plan.
- Develop and implement a restoration plan for Colorado Lagoon

Los Angeles River (including Dominguez Channel)

- Develop and implement restoration, watershed, and long-term management plan(s) for the Los Angeles River and its tributaries and Dominguez Channel. These plans may address issues including, but not limited to, restoring or creating aquatic, riparian, and marsh habitat, both within soft-bottom and off-channel areas, removal and management of exotic species, and preservation of sensitive species.
- Support the creation of habitat (e.g., riparian, marsh, or grassland/scrub) in parkway and greenway projects along the river and its tributaries.
- Restore and enhance remnants of the historic Los Angeles River estuary such as Cabrillo Salt Marsh and other saltwater marshes along the lower reaches of the Los Angeles River.
- Develop and implement restoration and enhancement plan for the Wilmington Drain and Harbor Lake.
- Evaluate potential for habitat linkages from Verdugo Hills to the San Gabriel Mountains in the Angeles National Forest.

Ballona Creek Wetlands Complex and Watershed

- Integrate planning and management for entire Ballona wetlands complex, including Ballona Lagoon, Del Rey Lagoon, Grand Lagoon, Marina del Rey Harbor, and Oxford Lagoon.
- Acquire coastal wetland and associated upland habitat.
- Develop and implement a restoration and long-term management plan for Ballona wetlands complex.

Santa Monica Mountain Watersheds

- Preserve existing resources. Develop criteria and list of acquisition priorities for the region in cooperation with all stakeholders.
- Preserve, expand, and enhance coastal wetland and lagoon habitat ecosystems. Coastal wetlands within the Santa Monica Bay and Mountains should be considered as a single, discontinuous ecosystem.
- Preserve and restore coastal stream corridors including:
  - Remove/modify fish passage barriers in perennial streams and enhance fisheries habitat, especially for southern steelhead.
  - Enhance riparian vegetation.
  - Develop comprehensive removal and management plans for invasive exotic species.
  - Enhance lagoon/wetlands ocean interface to improve tidewater goby habitat, especially at Topanga, Las Flores and Trancas Creeks.
- Address impacts of sediment, nutrients, and contaminants on coastal wetlands.
- Evaluate need and opportunity for high quality, multi-species wildlife corridors.
- Educate residents, public agencies and decision makers about their role in watershed management.

- Implement priority projects identified in the Santa Monica Bay Restoration Plan that further the WRP's Regional Goals.

Organizational Objectives

- Organize a coordinated governance structure for the County task force.
- Develop education programs and tools for decision-makers, landowners, and students.
  - Produce document showing historical and existing extent of wetlands.
  - Educate about wetland functions and potential role in improving water quality.
  - Increase visibility of wetlands and watershed efforts in local communities.
  - Promote educational forums for implementing Best Management Practices throughout the County, including things such as: reduction of impervious surfaces, interception devices, drainage retention and reduction strategies, integrated site planning.
- Evaluate options for long-term management of public resource lands in County and make recommendations.
- Improve coordination and communication on wetlands and watershed projects.
  - Coordinate with Army Corp of Engineers to improve wetlands mitigation programs.
  - Coordinate WRP project planning and implementation with the Rivers and Mountains Conservancy, the Santa Monica Bay Restoration Project, and the Santa Monica Mountains Conservancy.
  - Increase cross-jurisdictional communication and coordination between the County, Army Corp of Engineers and other jurisdictions regarding vegetation management within rivers and streams to maximize both habitat and stormwater/urban runoff management objectives.
  - Coordinate and integrate watershed planning efforts throughout the County. Develop a network that involves all wetland and watershed stakeholders in a system of communication, education and information exchange.
  - Develop list of resource experts that could help grassroots organizations.
  - Coordinate efforts to map vegetation in Los Angeles County (e.g., Los Angeles County Forestry, Cal Poly Pomona, Los Angeles and San Gabriel Rivers Watershed Council).
- Integrate WRP goals and objectives and watershed planning into local land use plans and policies.
- Identify sources and coordinate efforts to secure funding for priority acquisitions and restorations.

Data and Research Needs

- Prepare inventory of Santa Monica Mountain streams that includes riparian and aquatic habitat, wetlands- and riparian-dependent species of concern, habitat linkages and movement corridors, existing or historic steelhead runs, and fish passage barriers. The Santa Monica Mountains National Recreation Area has mapped the watersheds but some data gaps need to be filled.

Ventura County

Summary of Existing Conditions

Ventura County includes three major watersheds – Calleguas Creek, the Santa Clara River, and the Ventura River – and supports some of the region's healthiest riparian and wetland habitats. Both the Santa Clara and Ventura Rivers have suitable spawning habitat for steelhead trout. The primary coastal wetlands in the county include Mugu Lagoon, Ormond Beach, and the Santa Clara and Ventura River estuaries. As in other counties, urban and agricultural development within the watersheds has contributed to degradation of habitat and water quality. In addition, pesticides have accumulated in aquatic life and sediments.

Calleguas Creek and Mugu Lagoon

Calleguas Creek originates in the Santa Monica Mountains and drains a predominantly agricultural area in southern Ventura County. Development within the watershed has caused severe erosion from stream channels and upland areas, and has significantly increased downstream sedimentation. High levels of minerals and nitrates are common in the water column as well as in the groundwater. In addition, discharges from sewage treatment facilities contribute excess nutrients into Mugu Lagoon. DDT, PCBs, other pesticides, and some metals have been detected in both sediment and biota collected from surface water bodies of the Calleguas watershed. The aquatic habitats and species that depend on the Mugu Lagoon remain threatened by water quality concerns associated with Calleguas Creek.

Mugu Lagoon is the largest estuarine lagoon in Southern California. Despite water quality problems, Mugu Lagoon remains one of the highest quality wetlands remaining in California, and supports the greatest concentration of water-associated birds north of Anaheim Bay. In addition, Mugu Lagoon is recognized as the closest large mainland roost to the major breeding colony of California brown pelicans at Anacapa Island, and serves as a staging area for birds and seals moving to and from the island. Approximately 1,474 acres of wetland habitat are found at Mugu Lagoon.

Ormond Beach Wetlands

Historically, the Ormond Beach Wetlands and Mugu Lagoon were part of one large wetlands complex. Today, approximately 217 acres of wetland habitat remain at Ormond Beach stretched along one mile of the coast. The majority of wetlands at Ormond Beach are no longer tidally connected, but historically they probably received muted tidal influence through channels and sloughs connected to Mugu Lagoon. Although the fragmented wetlands of Ormond Beach are for the most part highly degraded, they still provide valuable wildlife habitat and have a high potential for restoration. Poor water quality in the adjacent drainage channels and possible contaminated groundwater from proximate industrial facilities contribute to the degraded status of the wetlands. The use of off-road vehicles along the beach and dunes area is a major disturbance to wildlife. Additionally, pressure to convert farmlands north of the wetlands to urban uses could increase the amount of nonpoint source contaminants entering the marsh areas.

Santa Clara River

The Santa Clara River is the largest unchannelized riverine system in the south coast. The watershed encompasses approximately 1,200 square miles. Extensive patches of high quality riparian habitat are present along the length of the river and its tributaries. These riparian habitats serve as an important stopover for migratory bird species. Sespe Creek, one of the main tributaries to the Santa Clara River, is designated as a wild trout stream by the State, and supports significant spawning and rearing habitat. Piru and Santa Paula Creeks also provide good steelhead habitat. The Santa Clara River watershed provides habitat for a wide range of threatened and endangered species. Encroaching development in the floodplain and proposed channelization and other flood control activities threaten the health and integrity of riparian habitat within the watershed.

Ventura River

The Ventura River watershed encompasses 228 square miles, and is 31 miles long from upper Matilija canyon to the Pacific Ocean. The Ventura River ecosystem supports 23 species of concern. These species include steelhead trout, the California condor, California red-legged frog, and California brown pelican. The major issue within this watershed is the dramatic historical decline of the southern steelhead, which is an indicator of the general health of the aquatic ecosystem. A planning process to remove dams and other barriers for steelhead passage within the upper watershed of the Ventura River continues. Removal of Matilija Dam would provide fish passage to historic steelhead breeding areas in the upper watershed, and would improve opportunities for restoring habitat for other species of concern.

Ventura County Objectives

Preservation and restoration of coastal wetlands in Ventura County will focus on the Ormond Beach wetlands, Mugu Lagoon, and the Santa Clara and Ventura River estuaries. Acquisition and subsequent restoration of the Ormond Beach wetlands area is a high priority for the WRP. Mugu Lagoon lies completely within the Point Mugu Naval Station, limiting opportunities to undertake enhancement projects. In order to help preserve valuable wetland resources at the lagoon, the WRP will focus on addressing upstream impacts to the lagoon, such as inputs of sediment, nutrients, and contaminants from Calleguas Creek.

All three of the main river systems in Ventura County – Calleguas Creek, the Santa Clara River, and the Ventura River – remain in a relatively natural state, providing many opportunities for preserving and restoring the stream corridors. A key objective will be to reconnect these waterways to their floodplains. This can be accomplished through acquiring adjacent property (fee title or easements) and relocating the confining levees to widen the stream corridor. Restoring steelhead habitat and removing passage barriers in historic steelhead streams is a priority for the WRP. Comprehensive programs to control and remove invasive species from the watersheds, particularly *Arundo*, are also needed.

More detailed objectives identified by the Wetlands Recovery Project and Ventura County Task Force are outlined below.

Ecological Objectives

County-wide Objectives

- Develop comprehensive programs to control and remove invasive species, particularly *Arundo*, from the watersheds.
- Address wetlands and watershed issues that have the greatest potential to improve coastal water quality.
- Develop a regional hydrogeomorphic (HGM) model to characterize wetlands functions, adapting the information that has been developed for Calleguas Creek.
- Implement demonstration projects to help local landowners protect and enhance the watershed through low-cost measures (e.g., cover crops, mulching) and share this information with other counties.

Site-Specific Objectives

Malibu Creek Watershed

- Preserve stream corridors and riparian habitat in the portions of the Malibu Creek watershed in Ventura County.

Calleguas Creek watershed and Mugu Lagoon

- Implement projects identified in the Calleguas Creek Wetlands Restoration Plan.
- Address impacts on Mugu Lagoon of watershed inputs, including inflows of sediment, nutrients, and contaminants.
- Study effects of urban stormwater runoff on wetlands.
- Preserve small streams and tributaries.

Ormond Beach Wetlands

- Acquire the Ormond Beach wetlands.
- Develop and implement a restoration plan for the area.
- Develop an interpretive program for the area.

Santa Clara River estuary and watershed

- Expand Santa Clara River Management Plan, resources studies, and GIS beyond the 500-year floodplain to include tributaries and watershed.
- Prepare and implement an enhancement plan for the lower Santa Clara River.
  - Enhance steelhead habitat in the river.
  - Enhance lower SCR as a steelhead migratory corridor by restoring aquatic and riparian habitat and removing fish passage barriers.
  - Address exotic species (plant and fish) in the watershed, especially along Sespe Creek.
- Preserve existing floodplain and reconnect river to its floodplain where feasible. Establish a continuous riparian corridor from the Santa Clara River Estuary to Santa Paula/Fillmore.

Ventura River estuary and watershed

- Develop and implement a watershed management plan for the Ventura River.

- Enhance steelhead habitat in the river, in particular by removing or modifying Matilija Dam and other fish passage barriers.
- Preserve existing floodplain and reconnect river to its floodplain where feasible.

Organizational Objectives

- Produce document showing the historical and existing extent of wetlands.
- Improve communications and coordination within the county.
  - Coordinate with existing watershed planning groups, and develop watershed councils where no watershed group already exists.
  - Create a watershed coordinator position charged with facilitating communications throughout the county.
  - Identify a County staff person to coordinate watershed activities among County agencies.
  - Inventory goals, projects, and accomplishments of agencies and organizations working in the county.
  - Address impediments to information and data sharing.
  - Promote the Ventura County Weed Management Area.
- Improve coordination with Los Angeles and Santa Barbara Counties on cross-jurisdictional watersheds.
- Secure funding for projects and positions.
- Develop a public awareness/education program.
- Promote alternatives to traditional flood control through more environmentally-sensitive techniques; that is, promote watershed management instead of flood control.

Data Needs

- Establish protocols for information collection and consolidation so that all users can easily share it.
- Inventory relevant data sources and establish a clearinghouse so that information can be readily shared.
- Develop a database of flora in Ventura county, including a list of plants that are rare within the county.

Southern Santa Barbara County

Summary of Existing Conditions

The WRP region includes the coastal wetlands and watersheds of in southern Santa Barbara County from Rincon Point northwest to the creeks of the Gaviota coast. Several creeks flow onto the narrow coastal plain between Goleta and Rincon Point, and support riparian habitat of varying size and vigor. The coastal creeks and watersheds of southern Santa Barbara County are unique in Southern California since they are located in an area where the northern and southern California biological provinces meet. The region is the northernmost boundary for many species

of southern California. Restoration plans are currently being implemented in the south county's three major wetlands – Carpinteria Salt Marsh, Devereux Slough and Goleta Slough.

The Santa Barbara Vernal Pool Region covers all of southern and western Santa Barbara County from the Santa Maria area south and east to the western portion of Ventura County adjacent to Ojai and the Ventura River drainage. Coastal vernal pools are found at More Mesa, Isla Vista, and Ellwood Mesa.

Carpinteria Salt Marsh and Watershed

The Carpinteria Salt Marsh watershed encompasses 6,600 acres, and includes the tributaries of Santa Monica and Franklin Creeks. Residential development surrounds Carpinteria Marsh. Most of the time, the marsh is tidally influenced, but in some years a sand bar barrier forms at the ocean inlet. When this occurs, the bar is mechanically breached to maintain year-round tidal flushing. At least 190 bird species, 37 fish species, 11 mammal species, 5 herpetofauna species, and over 100 invertebrate species have been observed, collected, or reported at Carpinteria Salt Marsh. Fresh water that flows into the marsh is degraded due to pesticides, siltation, nutrients, and urban run-off. Non-native predators, typical of suburbanized watersheds, continue to be a threat to nesting birds and other wildlife. In the upper watershed, there are several fish passage barriers.

Goleta Slough and Watershed

The Goleta Slough watershed encompasses 45 square miles. Tributaries to the slough include San Jose, Tecolotito, Carneros and Atascadero Creeks. Goleta Slough covers approximately 430 acres, and is almost entirely surrounded by urban development. Santa Barbara Municipal Airport is located on fill within the Slough. In 1996, 279 species were identified at Goleta Slough, including 20 special status species. In a 1994, 117 pairs of Belding's Savannah sparrows were observed nesting in the slough. Public utility and transportation corridors traverse the wetland, and airport runways, a sanitary treatment plant, a power generation station, and light industrial facilities are constructed on filled portions of the marsh. Continued sediment deposition is reducing the tidal prism. Due to limited buffer areas along the perimeter of the wetlands, wildlife are disturbed by highway traffic and activities in the developed areas. Several creeks within the watershed provide habitat suitable for southern steelhead restoration, but flood control dams, diversion dams, and culverts block fish passage.

Devereux Creek

The southern part of the Gaviota Coast includes the Devereux Creek watershed. The watershed area encompasses 2330 acres. Devereux Slough is located on the West Campus of the University of California at Santa Barbara, and supports approximately 70 acres of wetlands. Historically, the slough is estimated to have been two to three times its present size. The slough is tidally influenced only during short periods in the winter. A beach berm forms at the mouth of the slough during drier months. Biological inventories have identified 290 species associated with the slough and Coal Oil Point Reserve, including 15 special status species. Excessive sedimentation is reducing the size of the slough. Continued residential development in the watershed may increase the amount of sediment and other contaminants entering the slough. Exotic plant species are displacing native plants and altering the habitats.

Santa Barbara County Objectives

Preservation and restoration of coastal wetlands in southern Santa Barbara County will initially focus on Carpinteria Salt Marsh, Goleta Slough, Devereux Slough, and coastal vernal pool habitat. Carpinteria Salt Marsh, Goleta Slough, and Devereux Slough are primarily in public ownership. Therefore, WRP efforts will focus on restoration and enhancement of wetland habitat, as well as acquisition of contiguous upland and riparian habitat. Several coastal vernal pool sites in Santa Barbara remain in private ownership. WRP efforts will initially focus on preservation of these vernal pool sites, followed by restoration and enhancement.

In the coastal watersheds of southern Santa Barbara County, there are significant opportunities for habitat restoration and enhancement because the streams have only been moderately impacted by urban and agricultural development and few have been confined to concrete channels. WRP efforts will focus on preserving functioning stream corridors, restoring and enhancing urban streams, and promoting recovery of steelhead trout.

At the University of California at Santa Barbara, there are several resources for promoting the WRP's goal to advance the science of wetlands restoration in Southern California. First, U.C. staff manage all or portions of Goleta Slough, UCSB Campus Lagoon, Devereux Slough, and Carpinteria Salt Marsh, which will facilitate the integration of research into restoration and enhancement activities. In addition, the WRP will work with UCSB's Bren School of Environmental Science and Management to identify faculty research and student group thesis projects that respond to WRP research priorities.

More detailed objectives identified by the Wetlands Recovery Project and Ventura County Task Force are outlined below.

Ecological Objectives

County-wide Objectives

- Develop a master plan for watersheds in the South Coast Hydrologic Unit, including an inventory of existing information and identification of gaps and other planning needs.
- Improve steelhead habitat by modifying or removing passage barriers and enhancing habitat. Improve migratory access for steelhead in streams historically utilized by them to promote recolonization of those streams.
- Preserve and re-establish, to the extent possible, habitat linkages and wildlife movement corridors.
- Preserve functioning stream corridors, in part by encouraging landowners, the cities, and the County to take proactive measures to protect streams from the impacts of continued urbanization.
- Restore and enhance stream corridors.
    - Restore natural balance to transport of sediment, water and biological material.
    - Re-establish native riparian vegetation (from local genetic stock).
    - Develop comprehensive watershed programs to control and remove invasive species and treat urban and agricultural runoff.

Site-Specific Objectives:

Urban creeks

- Develop and implement watershed restoration and steelhead recovery plan in the Carpinteria Creek watershed.
- Assist the County in developing and facilitating a comprehensive watershed assessment and management plan for San Jose Creek.
- Promote development of a comprehensive management plan for the entire Mission Creek watershed, that addresses restoration, flood management, and recreation concerns. Develop and implement community- and landowner-based restoration projects along a midstream reach of Mission Creek.
- Assist the Cities of Carpinteria and Santa Barbara in developing action plans for their creeks based on the information in their city creek assessments.
- Facilitate a coordinated City-County effort to remove exotics and restore habitat in the Arroyo Burro watershed.
- Help implement high-priority steelhead recovery projects identified in Conception Coast Project's South Coast Steelhead Recovery Study.

Goleta Slough and its watershed

- Promote development of a multi-party management plan for the western arm of Goleta Slough.
- Partner with Goleta Slough Management Committee and others to address sediment transport and other watershed inputs into the Slough, and resolve FAA issues that are currently impeding restoration opportunities. Implement restoration measures found to be compatible with airport functions.
- Protect and restore surrounding upland habitat.
- Pursue steelhead recovery projects in appropriate subwatersheds.

UCSB Campus Lagoon

- Promote implementation of UCSB management plan for the Lagoon.

Carpinteria Salt Marsh and its watershed

- Develop and implement projects to enhance additional areas of the marsh.
- Address impacts on the marsh from watershed inputs, particularly nutrients.

Devereux Slough and its watershed

- Address erosion and sediment flows in the watershed, and the impacts of these on the Slough.
- Plan and implement restoration projects for the Slough.
- Identify long-term acquisition opportunities for adjacent freshwater wetlands and upland areas that are part of the wetland ecosystem.

Vernal pools

- Preserve and enhance vernal pool habitat at Isla Vista, More Mesa and Ellwood Mesa.

Organizational and Education Objectives

- Promote community-based watershed planning efforts in the county. Encourage creation of watershed councils for key creeks.
- Develop and implement demonstration projects to encourage riparian landowners to restore and maintain creek health and stability.
- Promote a more holistic approach to flood control management in the county. Encourage active participation by the County Flood Control District in the County Task Force and its projects.
- Investigate development of a master permit (or permit streamlining) system for stream and wetland restoration projects
- Improve coordination on wetlands and watershed activities.
    - o Coordinate stream restoration efforts with water quality assessment and planning processes.
    - o Coordinate steelhead recovery projects with priorities established by the Tri-County steelhead coalition.
    - o Coordinate with UCSB's Long Term Ecological Research study of the Santa Barbara Channel (Point Conception to the Santa Clara River).
    - o Promote involvement by the US Forest Service (Los Padres National Forest) in the County Task Force and watershed planning and restoration projects.
    - o Work with Ventura County Task Force to coordinate watershed planning for Rincon Creek.
    - o Cooperate with Ventura and other County Task Forces to sponsor workshops and seminars on restoration and other topics.
- Develop a system to pool, coordinate, and manage volunteer efforts for restoration projects.
- Encourage cities to adopt BMPs for streamside development.
- Public education and access
    - o Develop a *Creek Care Guide* for southern Santa Barbara watersheds.
    - o Study the potential for a nature trail from More Mesa to Ellwood Mesa as an organizing theme for resource protection and interpretation.
    - o Utilize the South Coast Watershed Resource Center to help develop public outreach and education projects and to house WRP studies, reports and data for easy access by the community.
    - o Promote understanding of wetlands and watersheds in K-12.

Data and Research Needs

- Inventory lagoon and estuarine wetlands and their resources at the mouths of all southern Santa Barbara streams.
- Initiate a water budget study for all streams that will identify estimated historic and current flow conditions, water extractions, and estimates of necessary flows to ensure long-term ecological sustainability. Evaluate potential watershed-specific Dedicated Instream Flow Requirements for fish and other wildlife.

V: Five Year Implementation Plan, 2002-2007

The Southern California Wetlands Recovery Project (WRP) is a partnership of state and federal agencies working in concert with local governments, environmental organizations, and the business community to develop and implement a regional strategy for the preservation, restoration, and enhancement of coastal wetlands and coastal watersheds. The long-term vision of the Wetlands Recovery Project is to reestablish a mosaic of fully functioning wetlands systems with a diversity of habitat types and connections to upland communities that preserves and recovers self-sustaining populations of species.

The WRP Regional Strategy defines a set of overarching goals to guide the efforts of the Wetlands Recovery Project and its partner organizations. The regional goals provide a framework for setting policies and priorities for the acquisition, restoration and enhancement of coastal wetlands and coastal watersheds. The WRP's six regional goals are:

1. Preserve and restore coastal wetland ecosystems.
2. Preserve and restore stream corridors and wetland ecosystems in coastal watersheds.
3. Recover native habitat and species diversity.
4. Integrate wetlands recovery with other public objectives.
5. Promote education and compatible access related to coastal wetlands and watersheds.
6. Advance the science of wetlands restoration and management in Southern California.

These goals are discussed in detail in Chapter 3 of the Regional Strategy.

The Five Year Implementation Plan of the WRP Regional Strategy outlines both short and medium-term steps that will be taken by the WRP to realize the six regional goals. It also identifies which unit of the WRP will take the lead on each action. The Implementation Plan will be updated periodically as program goals are refined and new projects developed. The implementation actions are summarized in Table 5.1 and described in greater detail below.

Table 5.1 Summary of Implementation Actions

Implementation	Action	WRP Lead
1. Develop and implement preservation, restoration, and enhancement projects. (Regional Goals 1-3)	1.1 Develop a decision support tool to help assess both preservation and restoration potential based on ecological objectives.	SAP
	1.2 Identify needs for each watershed in the region.	CTF
	1.3 Identify restoration priorities for steelhead trout.	SCC
	1.4 Identify preservation and restoration priorities for the Santa Monica Mountains and south Santa Barbara coastal watersheds.	SCC
	1.5 Coordinate with regional agencies on mutual priorities.	WMG, SCC
	1.6 Continue project evaluation and selection process for annual Work Plan.	WMG
	1.7 Target project development efforts to priority areas.	SCC, CTF
	1.8 Develop projects with multiple benefits.	SCC, CTF
	1.9 Build capacity and expertise of local agencies and organizations.	SCC, CTF, WMG
	1.10 Create a regional watershed network.	CTF
	1.11 Continue to implement projects.	SCC
	1.12 Secure project funding from state, federal, local, and private sources.	BOG, PAC
	1.13 Facilitate regulatory coordination for WRP projects.	WMG, BOG
2. Integrate wetlands recovery with other public objectives. (Regional Goal 4)	2.1 Coordinate with agencies working on related efforts to ensure wetlands objectives are considered.	WMG, SCC, CTF
3. Promote education and compatible access related to coastal wetlands and watersheds. (Regional Goal 5)	3.1 Develop guidelines for compatible access.	WMG, CTF
	3.2 Perform needs assessment regarding regional availability of accessible wetland areas and interpretive centers.	WMG, CTF
	3.3 Create a regional wetlands and watersheds calendar.	CTF
	3.4 Create a web-based guide describing the location, accessibility, sights, and activities at wetlands and watersheds throughout the region.	PAC, CTF
	3.5 Establish a means to track or estimate visitors to the region's wetlands and riparian areas.	PAC, CTF
	3.6 Continue to educate federal, state, and local decision-makers.	PAC
	3.7 Identify key educational themes for region's wetlands.	PAC
	3.8 Inventory wetlands materials in the five counties.	PAC
	3.9 Develop web site for sharing and disseminating education resources.	PAC, SCC

Implementation	Action	WRP Lead
	3.10 Continue to develop needed outreach materials and activities.	PAC
	3.11 Ensure that the WRP addresses the needs of the region's ethnically diverse population.	PAC
	3.12 Establish means for private sector to play more active role in the WRP.	PAC
4. Advance the science of wetlands restoration and management in Southern California. (Regional Goal 6)	4.1 Develop regional habitat objectives for the WRP.	SAP
	4.2 Develop regional monitoring program based on regional habitat objectives.	SAP
	4.3 Develop monitoring guidelines for WRP projects.	SAP
	4.4 Develop an extramurally-funded research program.	SAP
5. Promote information exchange and dissemination. (All Regional Goals)	5.1 Expand the WRP Information Station.	SCC, WMG, CTF
	5.2 Establish Watershed Contact Network.	SCF
	5.3 Expand WRP web site.	SCC
	5.4 Continue to hold WRP Symposium every one or two years.	WMG
	5.5 Coordinate with related efforts to disseminate information.	WMG, CTF
6. Partner Agencies (All Regional Goals)	6.1 Identify specific roles or actions for each of the 17 state and federal partner agencies to further the WRP's regional goals.	All agencies
7. Funding Objectives (All Regional Goals)	7.1 Secure project funding from the state each fiscal year.	BOG, PAC
	7.2 Increase proportion of federal, local, and private funding.	BOG, PAC
	7.3 Pursue long-term project funding.	BOG, WMG
	7.4 Pursue long-term funding for the County Task Forces.	PAC, CTF
	7.5 Secure funding for the Science Advisory Panel and SAP Research Program.	BOG, PAC, SAP

Key to WRP Lead:

- SCC – State Coastal Conservancy
- BOG – Board of Governors
- WMG – Wetlands Managers Group
- PAC – Public Advisory Committee
- SAP – Science Advisory Panel
- CTF – County Task Forces

1. Develop and implement preservation, restoration, and enhancement projects. (Regional Goals 1-3)

The Southern California Wetlands Recovery Project is a partnership of state and federal agencies working together to acquire, restore and enhance coastal wetlands and coastal watersheds in the region. Development and implementation of acquisition, restoration, and enhancement projects is the primary tool the WRP will use to achieve its regional goals, particularly Goals 1, 2, and 3 which define the WRP's ecological objectives. Key actions to improve and facilitate project selection, development, and implementation are outlined below. In addition, several high priority projects that will be pursued over the next five years are also identified.

Project selection

1.1 **Develop a decision support tool to help assess both preservation and restoration potential based on ecological objectives.** The WRP has begun a 2-3 year project with the NOAA Coastal Services Center to develop a GIS-based decision support tool. This tool will be based on the SWAMP model (Spatial Wetland Assessment for Management and Planning) developed by NOAA, and modified for the characteristics of Southern California coastal watersheds. The SWAMP model is a landscape level assessment tool which will help the WRP target project development efforts and funding to priority areas. The WRP will coordinate with efforts underway by the Resources Agency and CDFG to map wetland and riparian resources in the state.

WRP Lead: Science Advisory Panel, with participation from the WMG and CTF.

1.2 **Identify needs for each watershed in the region.** Environment Now has received a Proposition 13 grant from the SWRCB to develop a Regional Wetlands and Watershed Management Plan for Southern California. As part of this project, watershed coordinators in each of the five counties will review watershed plans, restoration plans, and related documents to identify priorities for each watershed. Coordinators will also discuss priorities with local agencies and watershed groups. Identified priorities may include acquisition and restoration projects, additional planning needs, and/or key issues requiring attention in the watershed.

WRP Lead: County Task Forces.

1.3 **Identify restoration priorities for steelhead trout.** Steelhead trout are an anadromous fish that swim into coastal streams to spawn, and then return to the ocean. Juvenile trout live in the stream for a few years before migrating into the ocean. Because steelhead trout use coastal streams at several stages in their lifecycle, they are an excellent indicator species for the health of coastal streams. The WRP will prioritize steelhead restoration projects not only because the species is endangered, but also because restoring steelhead habitat will help restore coastal stream corridors. Conception Coast Project is currently conducting a steelhead recovery assessment to identify and prioritize site specific restoration actions to aid steelhead recovery on the south coast of Santa Barbara County. A grant from NMFS will enable the

WRP to conduct a similar assessment and prioritize projects for Ventura, Los Angeles, and Orange Counties.

WRP Lead: Coastal Conservancy.

1.4 **Identify preservation and restoration priorities for the Santa Monica Mountains and south Santa Barbara coastal watersheds.** The Santa Monica Mountains and southern Santa Barbara County are two of the least disturbed areas of coastal Southern California, and many opportunities for preservation and restoration of coastal stream corridors remain. The WRP will prepare a study of preservation and restoration priorities in each of these regions. Key elements of these studies will include: priorities already identified by the counties, National Park Service, State Parks, Santa Monica Mountains Conservancy, and Santa Monica Bay Restoration Project; steelhead trout restoration potential; and opportunities to address watershed impacts on coastal wetlands.

WRP Lead: Coastal Conservancy, with participation from local stakeholders.

1.5 **Coordinate with regional agencies on mutual priorities.** There are many agencies and organizations working in Southern California to develop and implement wetlands and watershed projects. Most of these agencies focus on a specific geographic area and/or a specific resources issue (e.g., water quality). By coordinating with these agencies, the WRP will avoid redundancy and meet the region's resource needs in the most efficient way. The WRP will coordinate with these organizations to identify mutual priorities on which to partner, as well as to determine when the WRP or another group should take the lead on a project. Key agencies that the WRP will work with include the Santa Monica Bay Restoration Program, Rivers and Mountains Conservancy, and the Santa Monica Mountains Conservancy. The WRP will also work with the federal Coastal America effort, particularly on developing a corporate sponsorship program for wetlands restoration efforts.

WRP Lead: Wetlands Managers Group and Coastal Conservancy.

1.6 **Continue project evaluation and selection process for annual Work Plan.** The Wetlands Managers Group will continue the annual process of soliciting project proposals, evaluating potential projects, and selecting a set of candidate projects for the annual WRP Work Plan. The Wetlands Managers Group will continue to work with the Coastal Conservancy and County Task Forces to ensure that selected projects are well designed and address priorities throughout the region.

WRP Lead: Wetlands Managers Group.

Project development

1.7 **Target project development efforts to priority areas** (see project selection). Opportunities for wetlands acquisition and restoration in Southern California are limited, which requires the WRP to remain flexible and ready to act opportunistically. To some extent, however, the WRP can help to create opportunities by targeting project development efforts in specific areas. Steps 1.1-1.5 outline several steps to identify priority areas for WRP action. The

Coastal Conservancy and the County Task Forces will target project development efforts towards the identified priority areas, to the extent that staff resources allow.

WRP Lead: Coastal Conservancy and County Task Forces.

1.8 **Develop projects with multiple benefits.** The WRP will work with local partners to develop wetlands recovery projects with multiple public benefits such as recreational opportunities, education programs, stormwater treatment or storage benefits, and scientific research elements. These types of projects are particularly important in the most highly urbanized areas of the region, such as the Los Angeles basin, where open space is extremely limited and its use must be maximized for both humans and wildlife.

WRP Lead: Coastal Conservancy and County Task Forces.

1.9 **Build capacity and expertise of local agencies and organizations.** The Coastal Conservancy, as staff to the WRP, is responsible for developing and implementing projects. Typically, the Conservancy works in partnership with local government agencies and/or nonprofit organizations. In order to increase the pace and effectiveness of wetlands recovery efforts, the WRP must help to build the capacity of these local organizations to develop and implement successful projects. To this end, the WRP will sponsor trainings on relevant topics at its annual symposium and at regional meetings. The WRP will also use its email list to promote relevant trainings and conferences. The Conservancy and Task Forces will facilitate information exchange within and among the five counties regarding demonstration projects, restoration techniques, best management practices, funding sources, and other relevant topics (see also Section 5 below). Finally, the WRP will use the Small Grants Program as a way to train less experienced agencies and nonprofits on the complexities of project development and implementation.

WRP Lead: Coastal Conservancy, County Task Forces, and Wetlands Managers Group.

1.10 **Create a regional watershed network.** With funding from a SWRCB Proposition 13 grant, the County Task Forces will hire watershed coordinators in each of the five counties. These coordinators will establish a network of organizations and people engaged in watershed planning and restoration within the county. The County Task Forces will work with the watershed network to identify and develop acquisition, restoration, and enhancement projects.

WRP Lead: County Task Forces.

Project implementation

1.11 **Implement projects.** The most important action for the WRP is to continue to implement acquisition, restoration, and enhancement projects. The Coastal Conservancy will continue to develop and implement projects on its own and with local partners in order to further the Regional Goals. Projects will continue to be reviewed on an annual basis for the WRP Work Plan. In addition to projects identified on the Work Plan, there are several large, complex

projects that the WRP and its partners will continue working on over the next five years. These long-term projects include:

- Tijuana Estuary Tidal Restoration Program (TETRP) – The TETRP outlines a plan to restore 500 acres in the south arm of Tijuana Estuary. Restoration of the Model Marsh was the first phase of this effort. Planning for the second phase began in Summer 2001. The TETRP will be implemented in association with several sediment management projects, including the Goat Canyon Enhancement which should begin construction in Fall 2002.

- South San Diego Bay National Wildlife Refuge Enhancements – In 1998, the U.S. Fish and Wildlife Service acquired the South San Diego Bay salt works and created a new National Wildlife Refuge. FWS is developing an enhancement plan for the refuge. The preliminary plan should be complete within the next year, and implementation of specific projects could begin soon after.

- San Elijo State Ecological Reserve Wetlands Restoration Plan – The WRP has been working with the San Elijo Lagoon Conservancy (SELC) to systematically restore the 1000 ac reserve. A Coastal Conservancy grant funded the completion of an Action Plan, which outlined the potential restoration. The WRP has funded three components to date and now the ACOE in cooperation with SELC is completing the Feasibility Study for the Dredging components. A final EIR/EIS is due out in late 2003.

- Bolsa Chica Restoration – Planning for restoration of the Bolsa Chica wetlands has been underway for several years now and implementation may be ready to begin within the next five years. The project will be funded in large part by the Ports of Long Beach and Los Angeles; however, additional funding may be needed to complete the restoration, provide a long-term management fund, and/or acquire and restore adjacent parcels.

- Los Cerritos Acquisition and Restoration – WRP partner agencies are currently negotiating to acquire three large parcels of the Los Cerritos Wetlands. If acquired, a multi-agency restoration planning process for these parcels and adjacent publicly-owned parcels will begin.

- Ballona Wetlands Acquisition and Restoration – Acquisition and restoration of the Ballona Wetlands has been identified as a high priority by the WRP. The WRP will work with the State Controller's office to identify restoration opportunities for Area C, which is currently owned by the state. In addition, the WRP will coordinate with the Trust for Public Land which is currently negotiating for acquisition of two additional parcels at Ballona.

- Ormond Beach Wetlands Acquisition and Restoration – The Coastal Conservancy continues to negotiate for acquisition of parcels at the Ormond Beach wetlands. If acquired, the Conservancy will begin a multi-agency restoration planning effort for the wetlands.

- Santa Clara River Parkway – The Coastal Conservancy is working with local partners to restore a continuous riparian corridor along the lower 12 miles of the Santa Clara River. This project will require acquisition of fee title and conservation easements for several properties. Enhancement activities may include relocating the levees to create a broader floodplain and riparian corridor.

WRP Lead: Coastal Conservancy.

1.12 **Secure project funding from state, federal, local, and private sources.** In its first three years, the WRP has primarily been funded by the State through direct allocations to the WRP as well as through other state funding available to the Coastal Conservancy and partner agencies. The WRP will work with State agencies to continue this funding, while also attempting to diversify its funding to include more significant contributions from federal, local, and private sources. The WRP will pursue long-term funding mechanisms that help provide stability to its effort. See Funding Objectives below for more details.

WRP Lead: Board of Governors and Public Advisory Committee.

1.13 **Facilitate regulatory coordination for WRP projects.** Regulatory permitting is one of the most challenging aspects of developing wetland restoration projects. All of the key agencies with regulatory authority over wetlands and streams are represented on the WRP. The WRP will use these relationships to facilitate early regulatory coordination on restoration projects, particularly complex projects. In addition, the WRP will evaluate options for facilitating the permitting process for restoration projects; for instance, it may be feasible to develop programmatic permits for erosion control or stream revegetation projects in a specific watershed or subregion.

WRP Lead: Wetlands Managers Group and Board of Governors.

2. Integrate wetlands recovery with other public objectives. (Regional Goal 4)

As discussed in Chapter 3 of the Regional Strategy, the goal of integrating wetlands recovery with other public objectives has two facets. The first is for the WRP to integrate other public objectives such as public access, education, and flood management into its projects. This aspect will be addressed through project development and selection (see Action 1.7). The second facet is to ensure that agencies pursuing other public objectives consider benefits and/or impacts to wetlands.

2.1 **Coordinate with agencies working on related efforts to ensure wetlands objectives are considered.** Specific agencies and programs that the WRP will target over the next five years include:

- Regional Water Quality Control Boards (RWQCB) – The RWQCBs have several programs which relate to the WRPs efforts. Each RWQCB has written a chapter of the State's Watershed Management Initiative (WMI). These chapters outline for each

watershed management area in their region existing conditions, key concerns, enhancement efforts, and RWQCBs activities in the watershed. There is a great deal of variation in the extent to which these WMI chapters address wetlands concerns. The WRP will work to ensure that wetlands issues are adequately addressed in all of these chapters. Wetlands are also of concern for the RWQCBs nonpoint source pollution control programs. The WRP will work with the RWQCBs to identify opportunities to integrate both habitat and water quality objectives into wetlands projects. The RWQCBs share an interest with the WRP in finding more efficient and effective ways to monitor restoration projects and evaluate success. The WRP will coordinate and exchange information with the RWQCBs on monitoring programs and protocols. Finally, the RWQCBs Supplement Environmental Project (SEP) program is a potential source of funding for wetland and stream restoration projects. The WRP will work with each RWQCB to develop a process for matching appropriate projects to SEP funding.

- Stormwater Management Agencies – As discussed in Chapter 2, flood control activities have had a devastating effect on the Southern California's coastal rivers and streams over the past 150 years. Efforts to implement more environmentally-sensitive flood control structures and stormwater management practices are growing. Throughout the region, however, agencies responsible for stormwater management continue to channelize streams and line them with concrete. The WRP will work with stormwater management agencies to implement more environmentally-sensitive stream stabilization projects and management practices and to disseminate the results of these projects, as well as to explore opportunities to remove concrete and restore stream channels.

- The California Legacy Project (formerly CCRISP) – One goal of the California Legacy Project is to identify resource areas that are high priority for public acquisition. The WRP will work with CLP to ensure that the WRP's Regional Goals are reflected in any priority setting for coastal wetlands and watersheds in Southern California.

- Sediment Management Group –The Sediment Management Group is a Federal-State partnership focused primarily on beach nourishment. As discussed in Chapter 2, sediment delivery to beaches and nearshore waters has been reduced in most areas due to changes in the hydrologic processes. These changes have also adversely impacted wetland and stream ecosystems. The WRP will work with the Sediment Management Group to identify opportunities to restore natural sediment processes to benefit both beach nourishment and wetland habitat.

WRP Lead: Wetlands Managers Group, Coastal Conservancy, and County Task Forces.

3. Promote education and compatible access related to coastal wetlands and watersheds. (Regional Goal 5)

The shorter term success of the WRP depends on key interested parties knowing about, getting involved in, and demonstrating support for the WRP. Much of the initial education and outreach

program, therefore, has encouraged wetlands and watershed stakeholders to become involved in the WRP. Initial efforts also sought to inform potential funding sources about the importance of the region's wetlands and watersheds and about the level of stakeholder participation in the WRP process. This work is ongoing. With regard to longer term success, the WRP depends on recruiting new interests and providing tools that enable increasing regional coordination. These are the goals of the program described below.

Compatible Access

3.1 **Develop guidelines for compatible access.** Public access to coastal wetlands and streams is one of the best tools for educating local communities about the value of these resources, and it is also helps meet the great demand for recreational nature experiences in the highly urbanized landscape of Southern California. Uncontrolled public access, however, can have a detrimental effect on habitat and wildlife. To help local communities balance these public needs, the WRP will develop guidelines for compatible access to habitat areas and will promote these to counties, cities, and local park districts.

WRP Lead: Wetlands Managers Group.

3.2 **Perform needs assessment regarding regional availability of accessible wetland areas and interpretive centers.** The WRP will assess the regional availability of accessible wetland areas and interpretive centers. This information will be used in two ways. First, it will help the WRP to identify regions where additional public access or interpretive facilities are needed. It will also help the WRP to identify regions where it might be appropriate to exclude public access, if sufficient access to similar resources exists nearby.

WRP Lead: Wetlands Managers Group and County Task Forces.

3.3 **Create a regional wetlands and watersheds calendar.** Many kinds of educational and volunteer activities related to wetlands and watersheds occur throughout the region each weekend. Individual organizations promote these through newsletters and e-mail lists, but there is no central calendar that organizations can check to help avoid conflicts, and that people who are not on the mailing lists can consult to find new and rewarding activities they might explore. A web-based calendar will promote broader knowledge of and wider participation in activities occurring throughout the region.

WRP Lead: County Task Forces.

3.4 **Create a web-based guide describing the location, accessibility, sights, and activities at wetlands and watersheds throughout the region**. Wetlands and riparian areas are preferred destinations for many teachers, families, and tourists. There is no guide that people can consult which describes directions, parking, trails, interpretive facilities, available tours, species that one might see or that one must take care not to disturb, etc. This guide will set out the array of opportunities within the region so that people can better select appropriate places to visit.

WRP Lead: Public Advisory Committee and County Task Forces, with assistance from the Coastal Conservancy.

3.5 **Establish a means to track or estimate visitors to the region's wetlands and riparian areas.** Only a very few wetlands track or estimate the number of annual visitors and how their numbers break down demographically. Such information would allow organizations involved in interpretive activities to distribute more appropriate educational materials and would also provide a basis for determining demand for and economic value of these kinds of "passive" recreational experiences.

WRP Lead: Public Advisory Committee and County Task Forces.

Education

3.6 **Continue to educate federal, state, and local decision-makers.** The Public Advisory Committee will continue to conduct annual trips to Sacramento and Washington, D.C. to describe to legislators and other decision-makers the activities of the WRP and the overall progress in wetlands recovery. With the help of its local elected officials, the PAC will also continue to educate local municipalities about the value of their wetlands and opportunities to preserve or restore these resources through local action.

WRP Lead: Public Advisory Committee.

3.7 **Identify key educational themes for region's wetlands.** Building a constituency for wetlands recovery in Southern California requires that the functions and values of the region's wetlands be understood and described in an accurate and consistent way. A great deal of general information about wetlands and watersheds exists, but derives from Atlantic and Gulf Coast wetlands. This has resulted in laws and policies that fail to take account of the unusual features found in coastal Southern California. What central facts about Southern California wetlands and watersheds should be generally known and understood? How can people within the region come to see themselves as "watershed citizens"? What are the primary things they can do to help protect these resources? There is a need to clarify the central educational themes that WRP partners should promote.

WRP Lead: Public Advisory Committee.

3.8 **Inventory wetlands materials in the five counties**. An enormous amount of wetlands educational material exists throughout the region, but has never been collected, sorted into categories, and assessed in terms of quality and gaps. This inventory will highlight the best existing materials in different categories and identify key areas where additional materials should be developed, serving as a rationale for seeking funding to promote development of needed materials.

WRP Lead: Public Advisory Committee.

3.9 **Develop web site for sharing and disseminating education resources.** Despite the existence of many excellent educational materials, many organizations continue to expend

resources developing additional materials. This occurs because materials are not centrally available. The outstanding materials in different categories will be made available on a WRP web site which will serve to publicize and disseminate educational materials throughout the region.

WRP Lead: Public Advisory Committee and Coastal Conservancy.

Outreach

3.10 **Continue to develop needed outreach materials and activities**. The WRP has an ongoing responsibility to educate people about the values of the region's wetlands and waterways, to inform people about the activities of the WRP, and encourage people and organizations to get involved in protecting them. The WRP must continually assess needs and develop or adapt appropriate materials to address those needs.

WRP Lead: Public Advisory Committee.

3.11 **Ensure that the WRP addresses the needs of the region's ethnically diverse population.** The biological diversity of the region is matched only by its ethnic diversity. The WRP must make every effort to ensure that its decision-making processes are inclusive and that its resources are invested equitably. It will, therefore, conduct a review of its decision-making tools and processes related to project selection, design, and evaluation, as well as its approach to outreach, to determine how better to address the needs and interests of the region's diverse population. Exploring how to better link restoration of region's water with appropriate community development proposals is likely to be one strategy considered.

WRP Lead: Public Advisory Committee.

3.12 **Establish means for private sector to play more active role in the WRP.** On the East Coast, a program sponsored by the National Oceanographic and Atmospheric Administration, Coastal America, has proved very successful in attracting private resources to wetland acquisition and restoration. In California, the California Environmental Dialog, comprising leading corporations and others, has written influential white papers about the benefits of investments in the state's "natural infrastructure." Business leaders who serve on the PAC have been very helpful in providing some funding, writing letters, and going to Sacramento to meet with legislators. The PAC will identify those private sector interests which would find the WRP of relevance to their concerns, and recruit representatives from these sectors to play a more active role in the recovery process.

WRP Lead: Public Advisory Committee.

4. Advance the science of wetlands restoration and management in Southern California. (Regional Goal 6)

4.1 **Develop regional habitat objectives for the WRP.** The Science Advisory Panel has begun the process of developing specific regional habitat objectives that will help the WRP to

realize its Regional Goals. Several steps will be involved in this process, including: 1) create a GIS layer that characterizes existing wetlands resources by habitat type; 2) research historical wetland data, and if possible characterize historical wetland resources by habitat type; 3) develop a conceptual model and indicators of ecological health for both coastal wetlands and stream corridors; and 4) define regional habitat objectives for the WRP. The SAP will develop quantitative habitat objectives if the available data is sufficiently detailed and reliable.

WRP Lead: Science Advisory Panel, with assistance from Wetlands Managers Group.

4.2 **Develop regional monitoring program based on regional habitat objectives.** The Science Advisory Panel will develop a regional monitoring program to enable the WRP to assess both the effectiveness of its own efforts, as well as the overall ecological health of Southern California wetlands. The monitoring program will be derived from the regional habitat objectives.

WRP Lead: Science Advisory Panel.

4.3 **Develop monitoring guidelines for WRP projects.** Project monitoring is essential in helping the WRP assess the effectiveness of restoration projects and identify areas for improvement. By establishing monitoring guidelines for all WRP projects, it will facilitate comparison and analysis of data from different sites. Similar to the regional monitoring program, the project monitoring guidelines will be derived, at least in part, from the regional habitat objectives. One challenge will be to make the guidelines specific enough to be meaningful, while remaining flexible enough to be tailored to the unique elements of each individual project.

WRP Lead: Science Advisory Panel, with assistance from Wetlands Managers Group.

4.4 **Develop an extramurally-funded research program.** The Board of Governors tasked the Science Advisory Panel with developing and implementing a research program to improve the effectiveness and efficiency of WRP projects. The SAP has identified several research topics of concern for this program and outlined a procedure for administering the program. The next step is to secure funding for the program. The SAP, Board of Governors, and Public Advisory Committee will continue working to identify and secure funding for the program. High priority research topics identified by the SAP include the role of marshes in nearshore public health issues and developing and evaluating new restoration practices.

WRP Lead: Science Advisory Panel, with assistance from the Board of Governors and Public Advisory Committee.

5. Promote information exchange and dissemination.

Information exchange and dissemination is critical for achieving all six of the Regional Goals. The WRP is developing several different mechanisms for communicating with the extensive

network of federal, state, and local agencies, community groups, and interested people that makes up the WRP.

5.1 **Expand the WRP Information Station.** The Coastal Conservancy has recently completed construction of a watershed-based information system that is accessible over the internet. The WRP Information Station was designed to be a repository of watershed-based information. Now that the structure of the system is complete, the County Task Forces will work with the Coastal Conservancy to begin adding information to the system and promoting its use. Specific steps to be taken include: 1) complete the connection with CERES metadata catalog to make it watershed-specific; 2) streamline the process for adding GIS layers, databases, and text data; 3) add data to the system and create additional detailed profiles; and 4) organize trainings on use of system.

WRP Lead: Coastal Conservancy, WMG, and County Task Forces.

5.2 **Establish Watershed Contact Network.** The Watershed Coordinators funded by the Proposition 13 grant will identify points of contact for each watershed in the county. This information will be disseminated to the broader WRP network to facilitate information sharing and exchange in each watershed.

WRP Lead: County Task Forces.

5.3 **Expand WRP web site.** The WRP web site is one of the best tools for sharing information. Several improvements to the site are planned over the next five years, including: 1) add an education resources section for sharing education tools gathered and/or developed by the PAC Education Subcommittee; 2) improve links to related sites; 3) improve search capabilities; 4) develop calendar system for tracking conferences, training, and grant deadlines that allows users to add entries; 5) develop repository for monitoring data.

WRP Lead: Coastal Conservancy, with assistance from the County Task Forces and Science Advisory Panel.

5.4 **Continue to hold WRP Symposium every one or two years.** The Symposium is the only time at which all the elements of the WRP come together. It is an excellent forum for sharing and disseminating information.

WRP Lead: Wetlands Managers Group, Science Advisory Panel, and Public Advisory Committee.

5.5 **Coordinate with related efforts to disseminate information.** In order to avoid duplicative effort, the WRP will coordinate with other agencies working to disseminate wetland and watershed information. For instance, the Resources Agency has developed a database of environmental grant programs. The WRP will work with the Resources Agency to ensure that all relevant wetlands and watershed grant programs are included in this database, and will also identify mechanisms for highlighting wetland and watershed grant programs to

WRP users. Two initiatives in particular that the WRP will coordinate with are the California Legacy Project and CERES.

WRP Lead: Wetlands Managers Group and County Task Forces.

6. Partner Agencies

6.1 **Identify specific roles or actions for each of the 17 state and federal partner agencies to further the WRP's regional goals.** One of the principals of the WRP is that the state and federal partner agencies will pursue the WRP's goals both collectively and individually. The steps outlined in this chapter address how the WRP will collectively pursue the Regional Goals. An extremely important next step is for each of the partner agencies to identify steps it will take to integrate these goals into their existing programs and policies.

WRP Lead: State and Federal Partner Agencies.

7. Funding objectives

7.1 **Secure project funding from the state each fiscal year.** In its first three years, the WRP has primarily been funded by the State through direct allocations to the WRP as well as other state funding available to the Coastal Conservancy and partner agencies. The WRP will work to continue State funding, through appropriations from both the General Fund and related bond acts.

WRP Lead: Board of Governors and Public Advisory Committee.

7.2 **Increase proportion of federal, local, and private funding.** In its first three years, the WRP has primarily been funded by the State. The WRP will attempt to diversify its funding to include more significant contributions from federal, local, and private sources. This could include pursuing a regional Feasibility Study with the ACOE that would provide federal funding for several WRP projects. Federal funding may also be available through the Estuaries Act.

WRP Lead: Board of Governors and Public Advisory Committee.

7.3 **Pursue long-term project funding.** To date, the WRP has been funded on a year to year basis which creates uncertainty for undertaking long-term projects. Since many of the high priority acquisition and restoration projects are potentially multi-year efforts, the WRP would benefit significantly from having a reliable source of long-term funding. The WRP will investigate various options for achieving this.

WRP Lead: Board of Governors and Wetlands Managers Group.

7.4 **Pursue long-term funding for the County Task Forces.** Environment Now has secured a Proposition 13 grant from the SWRCB that will fund a watershed coordinator for each of the

five County Task Forces for 15 months. These funded positions will enable the Task Forces to take a much more active role in compiling and assessing data, developing projects, and facilitating information exchange. Over the past year, the Task Forces have become a vital part of the WRP engine. The WRP will work to identify and secure long-term funding for the work of the Task Forces.

WRP Lead: Public Advisory Committee and County Task Forces.

7.5 **Secure funding for the Science Advisory Panel and SAP Research Program.** As discussed under Action 4.4, the Board of Governors tasked the Science Advisory Panel with developing and implementing a research program to improve the effectiveness and efficiency of WRP projects. The SAP is ready to initiate this program once funding has been identified. The WRP will also work to secure long-term funding for staff support to the SAP.

WRP Lead: Board of Governors, Public Advisory Committee and Science Advisory Panel.

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Appendix A: Watershed Summaries

Preface

California's watersheds supply water for drinking, recreation, industry, and farming and at the same time provide critical habitat for a wide variety of animal species. Conceptually, a watershed is any sloping surface that sheds water, such as a creek, lake, slough or estuary. In southern California, rapid population growth in watersheds has led to increased conflict between human users of natural resources, dramatic loss of native diversity, and a general decline in the health of ecosystems. California ranks second in the country in the number of listed endangered and threatened aquatic species.

This Appendix is a "working" database that can be supplemented in the future. It provides a brief overview of information on the major hydrological units of the South Coast, and draws from the following primary sources:

- The California Rivers Assessment (CARA) database (http://www.ice.ucdavis.edu/newcara) provides information on large-scale watershed and river basin statistics;
- Information on the creeks and watersheds for the ESU of the endangered southern steelhead trout from the National Marine Fisheries Service (http://swr.ucsd.edu/hcd/SoCalDistrib.htm);
- Watershed Plans from the Regional Water Quality Control Boards (RWQCB) that provide summaries of existing hydrological units for each subregion of the south coast (http://www.swrcb.ca.gov/rwqcbs/index.html);
- General information on the ecology of the rivers and watersheds of the south coast described in *California's Rivers and Streams: Working Toward Solutions*. State Water Resources Control Board;
- Interviews with County resource managers and planners;
- The US Environmental Protection Agency's "Surf Your Watershed" (http://www.epa.gov/surf/hucinfo) and their index of watershed indicators (http://www.epa.gov/surf/iwi);
- The California Environmental Resources Evaluation System (CERES) (http://ceres.ca.gov);
- University of California Natural Reserve System (http://nrs.ucop.edu/reserves.html); and
- General restoration and conservation plans, materials and information for particular watersheds.

Because the presence of wild southern steelhead trout or salmon is an excellent indicator of the general health and integrity of an aquatic system and watershed, the table below also describes Creeks that contain suitable habitat for the species. The ESU for the southern steelhead includes several Gaviota creeks down to Malibu Creek in the greater Santa Monica Bay watershed.

This section does not include a profile of the wetlands of the south coast (available at CWIS) or data from the California Watershed Projects Inventory. The focus of the Appendix is on the 23 major hydrological units of the south coast, which are depicted below:

Hydrological Units and Watersheds	**Associated Wetlands**
1. Tijuana River	Tijuana Estuary
2. San Diego Bay (key tributaries: Otay River, Sweetwater River)	South San Diego Bay (including Sweetwater marsh)
3. San Diego River	Famosa Slough
4. Mission Bay (key tributaries: Rose Creek, Tecolote Creek)	Mission Bay (Kendall-Jackson marsh)
5. Los Penasquitos Creek	Los Penasquitos Lagoon
6. San Dieguito River	San Dieguito Lagoon
7. Carlsbad Hydrologic Unit Escondido Creek San Marcos Creek Agua Hedionda Creek Buena Vista Creek	 San Elijo Lagoon Batiquitos Lagoon Aqua Hedionda Lagoon Buena Vista Lagoon
8. San Luis Rey River	San Luis Rey River Estuary
9. Santa Margarita River	Santa Margarita River Estuary
10. San Juan Hydrologic Unit San Mateo Creek San Juan Creek Aliso Creek	 San Mateo Lagoon
11. Santa Ana Hydrologic Unit San Diego Creek Santa Ana River	 Upper Newport Bay, San Joaquin Marsh Santa Ana River Estuary Huntington Beach Wetlands Bolsa Chica Wetlands Anaheim Bay
12. San Gabriel River	Los Cerritos Wetlands
13. Los Angeles River	
14. Ballona Creek	Ballona Wetlands
15. Santa Monica Bay Hydrologic Unit Topanga Creek Malibu Creek Solstice Creek Trancas Creek	 Topanga Lagoon Malibu Lagoon Trancas Lagoon
16. Calleguas Creek	Mugu Lagoon
17. Oxnard Plain	Ormond Beach
18. Santa Clara River	Santa Clara River Estuary McGrath Lake
19. Ventura River	Ventura River Estuary
20. South Coast Hydrologic Unit Rincon Creek Franklin Creek 21. Goleta Slough (Atascadero, San Jose, Las Vegas, San Pedro, Carneros, Tecolotito Creeks) 22. Devereux Creek 23. Gaviota Coast Creeks	 Carpinteria Salt Marsh Goleta Slough Devereux Lagoon

Watershed	**Tijuana River**
Existing conditions	The Tijuana River Watershed is a binational watershed on the westernmost portion of the US - Mexico border. The watershed encompasses approximately 1700 square miles (1245 in Mexico and 455 in the US). The basin contains three surface water reservoirs, various flood control works, and a National Estuarine Sanctuary which is home to several endangered species and is protected by the US federal government. The major drainages include Cottonwood and Campo creeks in the US, and the Rio Las Palmas system in Mexico. Annual precipitation varies from less than 11 inches to 25 inches farther inland near the Laguna mountains. Runoff is captured by the Morena Reservoir and Barrett Lake on Cottonwood creek. There are 3 dams in the watershed controlling 78% of the area: Morena was built in 1912 and Barrett in 1922. In Mexico, Rodriguez dam was built in 1936. The watershed includes eight hydrological areas, including the Tijuana Valley, Potrero, Barrett Lake, Monument, Morena, Cottonwood, Cameron, and Campo areas. The major problem in the watershed is poor water quality. Although discharges from the Tijuana River account for only a small percentage of total gauged runoff to the Southern California coastal ocean, it contains the highest concentrations of suspended solids and cadmium (Cd), copper (Cu), nickel (Ni), lead (Pb), and zinc (Zn) among the eight largest creeks and rivers in Southern California. Surface water quality has been affected by runoff from Mexico while ground water contamination has occurred as a result of seawater intrusion and waste discharges. Many of the water quality problems in the Tijuana River watershed are due to diffuse, non-point sources of pollution which may be addressed more effectively through a watershed approach. The water quality problem has worsened in recent years with the substantial growth of Tijuana's population, along with intensive industrial development associated with the maquiladora (in-bond manufacturing and assembly plants) program in Mexico. Moreover, an industrial pretreatment program similar to one implemented in the US has not been initiated in Mexico. No program equivalent to the US EPA's National Pollutant Discharge Elimination System (NPDES) stormwater permitting program exists in Mexico, so the threat of chemical contamination of the Tijuana Estuary is high. Additionally, inadequate infrastructure for the collection, treatment, and disposal of sewage originating in Tijuana has long plagued the watershed, as wastewater flows have chronically outpaced the ability of the infrastructure to handle them. These elements yield transboundary and cross-cultural water quality management challenges. The estuary is one of the largest and most studied wetlands in the South Coast, and is part of the National Estuarine Research Reserve and National Wildlife Refuge programs. The reserve is home to eight threatened and endangered species, including the Light-footed clapper rail, California least tern, Least Bell's vireo, salt marsh bird's beak, white and brown pelicans, and numerous shorebirds.
Description of Watershed Resources	Area: 299640.87 acres Naturally Occurring Waterways: 549.59 miles Percentage of Free Flowing River Miles: 93 % Percentage of River Miles in Protected Lands: 9 % Protected Lands: 7 % Number of Dams: 5

	Number of Stream Crossings: 407 Near-Stream Roads: 181.24 miles Average Precipitation per Year: 19.08 inches Percentage Area above 15% Slope: 18.9 % Number of CalWater Units: 18 WBS TMDL Rivers 1 Number of Special Status Species: 43
Status of Watershed Planning Efforts	The Tijuana River National Estuarine Research Reserve (NERR) encompasses approximately 2,531 acres of tidally flushed wetland, riparian, and upland habitats lying immediately north of the U.S. - Mexico border. These lands are owned and managed cooperatively by the California Department of Parks and Recreation (CDPR), U.S. Fish and Wildlife Service (FWS), the City of San Diego, the County of San Diego, and the U.S. Navy. The reserve encompasses 2,500 acres of beach, dune, mudflat, saltmarsh, riparian, coastal sage and upland habitats. Three quarters of the reserve's watershed is in Mexico. Critical issues confronted by the reserve include habitat restoration, endangered species management, management of wastewater from Mexico, sediment management, and the integration of recreation and habitat conservation and restoration. Hydrological and biological inventories and assessments were conducted and a geographic information system database developed as a foundation for restoration planning. A long-range plan for restoring the estuaries tidal prism and intertidal wetlands was developed and the plan was reviewed in a programmatic EIR/EIS approved and adopted by FWS and the Coastal Conservancy. The plan calls for approximately 500 acres of intertidal wetland restoration to be undertaken in increments using an adaptive management design process, wherein the monitoring and evaluation of projects influence design decisions for subsequent phases.
Restoration Goals and Objectives Related to Wetlands	A major restoration goal for the area is to design and implement an improvement plan for the southern end of the Tijuana River National Estuarine Research Reserve, emphasizing the area of Goat Canyon, that integrates improvements in habitat restoration, resource management, public access, education, law enforcement, research, and monitoring.
List of Major Restoration Activities	In 1989, following the repeated closures at the mouth of the estuary, FWS dredged the north channel of the estuary and reopened the estuary mouth to restore tidal flow. This project improved tidal circulation and promoted the flushing of sediments out of the estuary. Through a permit with the United States Army Corps of Engineers, in conjunction with other regulatory approval, re-dredging of the channels may be performed in response to flood or storm induced closures. A phased tidal restoration program prepared in 1991 includes restoration of approximately 495 acres of tidal wetlands and riparian habitat, and tidal channel improvements. Parts of a phased project to provide secondary treatment and an ocean outfall for raw sewage are at various stages - one is under construction, another is in environmental review. A bi-national GIS mapping project for the watershed was begun in 1994, with the goal of developing basin-wide policies on resource management; data could be incorporated into a complementary effort to gain biosphere reserve status for the watershed, the long-term goal of which is a management plan for the entire watershed.

	A 1,200-foot channel connecting the northern end of Oneonta Slough and the tidal ponds southeast of the visitor center, was constructed in winter 1997. The channel is intended to improve the hydrology of Oneonta Slough, invigorating approximately 200 acres of prime saltmarsh. The Oneonta Tidal Linkage is a project coordinated by the California State Coastal Conservancy, and built by SWIA with funding from FWS and the Coastal Conservancy. The Pacific Estuarine Research Laboratory is conducting an extensive research program as part of the project.

Watershed	**San Diego Bay (key tributaries: Otay River, Sweetwater River)**
Existing conditions	The San Diego Bay constitutes the largest estuary along the San Diego coastline, and has been extensively developed as a port. The watershed includes the Sweetwater River and Otay River drainages, small urban creeks (such as the Chollas), stormwater drains flowing directly into the Bay, and portions of Silver Strand and Point Loma. From the Cuyamaca Mountains in the east, traveling to the San Diego Bay in the west, the Sweetwater River watershed encompasses an area of roughly 230 square miles. The Otay River watershed is 160 square miles. Both rivers meander thru rural, suburban, and urban lands. The annual precipitation in the Sweetwater watershed varies from 11 inches along the coast to 35 inches inland. The annual precipitation in the Otay watershed varies from 11 to 19 inches. The lower Otay Reservoir is the terminus of the second San Diego Aqueduct. The San Diego Bay covers 10,532 acres of water and 4,419 acres of tidelands. Only 17 to 18% of the original Bay floor remains undisturbed by dredge or fill. Akin to other major bays of the region, ninety percent of the original salt marshes and 50% of the original mudflats have been filled or dredged for port and urban development. Freshwater contributions to the San Diego Bay come primarily from the Otay and Sweetwater Rivers, but also Telegraph Canyon (south of Sweetwater River Basin), Chollas (north end of Naval Depot south of NASSCO), Switzer (Tenth Ave. Marine Terminal [north end]), Paleta (7th Street Channel, south of Naval Repair Base), and Paradise (south of Paleta) Creeks, as well as some minor drainage groups. Construction of dams and extensive groundwater use in the Sweetwater and Otay drainages reduced the already ephemeral input from those rivers by 76%. Freshwater input is now limited to surface drainage from urban areas and intermittent flows from several rivers and creeks after storms. For about nine months of the year, the Bay receives no significant amount of fresh water. Over 200 storm drain outfalls are located in San Diego Bay. Two rivers and five creeks provide natural drainages into the Bay in addition to the artificial storm drainage system. Stormwater outfalls provide some flows and nutrients to the Bay, but not with natural seasonality, timing, frequency, or content. Sedimentary organic matter is no longer provided to the system except what is available from below the dams on each stream system. How this has affected functioning of the Bay ecosystem has not been examined.
Description of Watershed Resources	Area: 888406.04 acres Naturally Occurring Waterways: 1736.44 miles Percentage of Free Flowing River Miles: 82 % Percentage of River Miles in Protected Lands: 2 % Protected Lands: 3 % Number of Dams: 28 Number of Stream Crossings: 2312 Near-Stream Roads: 970.42 miles Average Precipitation per Year: 17.56 inches Percentage Area above 15% Slope: 14.59 % Number of CalWater Units: 71 WBS TMDL Rivers 4 Number of Special Status Species: 79
Status of Watershed	The San Diego Bay Integrated Natural Resources Management Plan (US Navy 2000) was completed to address priority management actions for the Bay.

Planning Efforts	A plan is being developed for an Otay River Valley Regional Parkway to provide recreation and protect environmentally sensitive areas as well as cultural and compatible agricultural resources; the area extends 13 miles inland and includes side canyons. The purpose of the comprehensive Sweetwater River Watershed Management Program (http://www.sweetwater.org/habitat/bio resource_mgmt.html) is to develop a long-term strategy to preserve and protect from further degradation the high quality source waters in the Sweetwater River watershed. To establish habitat, Sweetwater Authority Habitat Management Program: • Transplants fully-grown willow trees to riparian areas; • Plants thousands of native plants; • Removes invasive plants from the area. • Monitors the vireo population and its habitat (By 2010, the Authority will provide and maintain 123 acres of habitat), and • Restores managed habitat areas as needed. The eastern shores of the south Bay include the Sweetwater Marsh National Wildlife Refuge (SMNWR). The Sweetwater Marsh NWR is comprised of 4,224 acres of mainly coastal sage scrub, chaparral, riparian woodland, oak woodland, native grasslands, and vernal pools. It supports a rich diversity of native habitats and wildlife. The refuge comprises the Vernal Pools Unit and the Otay-Sweetwater Unit. The Sweetwater Marsh NWR has 316 acres of salt marsh and coastal uplands. The refuge includes the largest emergent wetlands area remaining in San Diego Bay. The Vernal Pools Unit of the NWR provides habitat for six federally listed endangered species (San Diego mesa mint, San Diego button celery, California Orcutt grass, Otay mesa mint, Riverside fairy shrimp, and San Diego fairy shrimp). The endangered Del Mar manzanita, Orcutt's spineflower, and Quino checkerspot butterfly may also occur in the upland habitats surrounding vernal pools. The Otay-Sweetwater Unit provides habitat for the threatened coastal California gnatcatcher, endangered least Bell's vireo, endangered southwestern willow flycatcher, endangered Quino checkerspot butterfly, endangered arroyo southwestern toad, endangered California red-legged frog, and listed species found in vernal pools. The refuge protects tidal marsh and adjacent upland habitat for more than 215 bird species. Two federally endangered species of bird (California tern and light-footed clapper rail), the State endangered Belding's savannah sparrow, and one threatened species of bird (western snowy plover), as well as one endangered species of plant (salt marsh bird's beak) are found here. It is the only place in the United States where yerba reuma (*Frankenia palmeri*), a member of the heath family common in some coastal marshes of Baja California, grows naturally. There are also a number of other watershed-related restoration efforts, including Caltrans: Carmel Valley Restoration and Enhancement, Caltrans: Del Mar Vernal Pools, Caltrans: I-5 / 54 D Street Marsh, Caltrans: Sweetwater Marsh Restoration, Famosa Slough NPS Treatment Using Constructed Wetlands, San Diego County Russian Thistle Biological Control Project, San Diego County Spotted Knapweed Control, San Dieguito River Valley Regional Open Space Park, Sweetwater River Watershed Management Program.

Restoration Goals and Objectives Related to Wetlands	• Preserve wetland and riparian habitats to protect native species diversity • Remove non-native species • Water quality management
List of Major Restoration Activities	In addition to the Sweetwater Marsh National Wildlife Refuge, the USFWS is interested in expanding the level of protection in the southern part of the Bay. For southern San Diego Bay, the Draft Environmental Assessment and Land Protection Plan (USFWS 1998) evaluates various alternatives and potential environmental effects of establishing an approved Refuge boundary, and acquiring and managing the refuge as wildlife habitat. From October 1999 to March 2000, the San Diego BayKeeper worked in conjunction with the neighborhood group of Paradise Creek, Incorporated to restore the wetland area of Paradise Creek, part of the San Diego Bay watershed.

Watershed	**San Diego River**
Existing conditions	The San Diego River drains approximately 440 square miles. There are 4 dams within the San Diego River watershed: El Capitan on the main river; San Vicente, Lake Jennings, and Cuyamaca on tributaries. The reservoirs along the river are major water storage facilities for the San Diego metropolitan area. These reservoirs store water that is primarily from the Colorado River. El Capitan stores local water while Cuyamaca Reservoir stores only local runoff. The annual precipitation ranges from less than 11 inches along the coast to 35 inches around Cuyamaca and El Capitan reservoir. The Famosa Slough is a tidal salt water marsh, located on West Point Loma Boulevard between Nimitz and Sports Arena Boulevards. It receives water via the San Diego River Flood Control Channel. Two pairs of breeding light-footed clapper rails were documented in 1995. Special status species found at the slough include the common loon, western grebe, American white pelican, California Brown Pelican, double-crested cormorant, western least bittern, reddish egret, osprey, northern harrier, Cooper's hawk, merlin, American peregrine falcon, Prairie falcon, West snowy plover, elegant tern, California least tern, black skimmer, loggerhead shrike, Belding's Savannah sparrow, large-billed Savannah sparrow, and tricolored blackbird.
Description of Watershed Resources	**The following characterization is for the entire San Diego Basin:** Area: 888406.04 acres Naturally Occurring Waterways: 1736.44 miles Percentage of Free Flowing River Miles: 82 % Percentage of River Miles in Protected Lands: 2 % Protected Lands: 3 % Number of Dams: 28 Number of Selected Watershed Projects: 20 Number of Stream Crossings: 2312 Near-Stream Roads: 970.42 miles Average Precipitation per Year: 17.56 inches Percentage Area above 15% Slope: 14.59 % Number of CalWater Units: 71 WBS TMDL Rivers 4 Number of Special Status Species: 79 Number of Holland Communities: 33
Status of Watershed Planning Efforts	There is no watershed-based plan for the entire hydrological unit.
Restoration Goals and Objectives Related to Wetlands	• Exotic vegetation removal • Water quality control
List of Major Restoration Activities	Data not available.

Watershed	**Mission Bay (key tributaries: Rose Creek, Tecolote Creek)**
Existing conditions	Mission Bay is an intensively used multi-use area with hotels, marinas, theme parks, and beaches, among other attractions. A rip-rapped channel connects the Bay and the Ocean. The Bay is irregularly shaped, with 2 large islands and depths ranging from 7-20 feet. Circulation in the bay is poor in the eastern portion. The Northern and Southern Wildlife Preserves found in the Bay are tidally influenced. Runoff from approximately 10 square miles of the watershed is conveyed to the bay over the shoreline and through storm drains. There are 69 storm drains that enter the bay, and 3 of those enter into the Northern Wildlife Preserve. A 1994 report characterized the bay's primary water quality problem as contamination from urban runoff combined with poor tidal flushing. The bay was listed in 1994 as an impaired water body.
Description of Watershed Resources	The bay contains three types of aquatic habitats – sandy bottom shallow water, eelgrass beds and rocky shoreline, and two types of intertidal habitats – mudflat and marsh. The aquatic habitat supports over 25 species of marine fish and numerous invertebrates (California Coastal Conservancy 1989). Biological surveys in 1988 found 92 species of which 70 were water-associated and 7 special status species, including nesting California least tern, light-footed clapper rail, Belding's Savannah sparrow, western snowy plover, California brown pelican, peregrine falcon, California gull, and California horned lark. A great blue heron rookery was also found. Twenty species were identified in eelgrass beds in a 1990 report, with arrow gobies, topsmelt, and California halibut dominant.
Status of Watershed Planning Efforts	There is no current watershed-based plan for the entire hydrological unit of the Bay.
Restoration Goals and Objectives Related to Wetlands	Adopted in 1994, the Mission Bay Park Master Plan includes restoration of: • Approximately 80 acres of salt marsh adjacent to the Preserve and Rose Creek outfall; • 12 acres of salt marsh at the Tecolote Creek outfall; and • 5 acres of salt marsh on the northeastern side of the north Pacific Passage. Ten acres of salt pan have been created and six least tern nesting sites are protected and actively managed. There is also an active removal program for selected introduced plants at the Preserve. In addition, the City is implementing a number of programs to limit nonpoint source pollution and the San Diego River east of I-5 is the subject of a Habitat Conservation Plan for least Bell's vireo habitat.
List of Major Restoration Activities	See Above.

Watershed	**Los Penasquitos Creek**
Existing conditions	The watershed encompasses 170 square miles, and extends from Poway (inland) to La Jolla. The tributaries of the watershed, Los Penasquitos Creek and Carmel Creek, flow year-round due to development in the watershed. Miramar Reservoir is the major water storage facility within the watershed, and contains Colorado River water. Annual precipitation ranges from less than 8 inches along the coast to 18 inches inland.
Description of Watershed Resources	Biological inventories in 1994 found 183 species of which 64 were water-associated, including breeding Belding's Savannah sparrows (156 pairs) and one pair of light-footed clapper rails. Special status species include Salt marsh daisy, common loon, western grebe, brown pelican, white-faced ibis, western snowy plover, long-billed curlew, California gull, elegant tern, California gnatcatcher, Cooper's hawk, and peregrine falcon.
Status of Watershed Planning Efforts	There is no watershed plan for the entire hydrological unit.
Restoration Goals and Objectives Related to Wetlands	• Restore wetland habitat • Enhance tidal interface
List of Major Restoration Activities	In 1985, an enhancement plan was prepared for the creek (with an update in 1995). The plan requires the City to provide for enhancement of tidal flow at the mouth of the Lagoon by mechanical means (up to 4 times/year). The City is also preparing restoration plans for approximately 24 acres on 2 parcels. In the upper part of the watershed, approximately 3650 acres of Los Penasquitos and Lopez canyons are in the Los Penasquitos Canyon Preserve. The goals for the Preserve are preservation and enhancement of natural and cultural resources.

Watershed	**San Dieguito River (including Santa Ysabel and Santa Maria creeks)**
Existing conditions	The watershed encompasses 350 square miles, 302 of which are behind dams. Lake Hodges (completed in 1919) and Lake Sutherland (completed in 1954) are the two major dams that block the river. Three tributaries join the San Dieguito River below the dam while 2 other small drainages empty directly into the lagoon basin. San Dieguito River flow is intermittent and the riverbed upstream of tidal influence is often dry. The channel is substantially unarmored except for a concrete block revetment along the upper bank.
Description of Watershed Resources	Special species identified include San Diego horned lizard, orange-throated whiptail, common loon, brown pelican, white-faced ibis, osprey, north harrier, sharp-shinned hawk, Western snowy plover, long-billed curlew, California gull, elegant tern, California least tern, black skimmer, tricolored blackbird, Belding's Savannah sparrow, and California gnatcatcher.
Status of Watershed Planning Efforts	There is no watershed-based plan for the entire hydrological unit.
Restoration Goals and Objectives Related to Wetlands	• Restoring tidal interface • Habitat restoration
List of Major Restoration Activities	The Conservancy began an enhancement project in the San Dieguito Slough in 1978, and an enhancement plan was prepared in 1979. During 1983-1984, a 70-acre tidal basin was excavated, Crest Canyon gully was repaired, and the mouth was opened. A conceptual plan for enhancement within the context of a regional river parkway was prepared in 1989, and the lagoon is the intended site for a mitigation project that would involve restoration of 150 acres of tidal wetland and maintenance of the tidal inlet. In 1994, the San Dieguito River Park Joint Powers Authority prepared a conceptual plan for a regional open space park for 55 miles of the river corridor with the goal of preserving and restoring land to protect natural, cultural resources, and provide compatible recreation (1/3 of the land within the planning area is publicly owned). The City of San Diego drafted the San Pasqual Valley Plan (completed in 1994) to resolve issues regarding endangered species habitat, flood control, mining, agriculture, and water quality in the valley. The San Dieguito Wetland Restoration Project is a proposal to implement a tidal wetland restoration project at the San Dieguito Lagoon. This project would restore the aquatic functions of the lagoon through permanent inlet maintenance and expansion of the tidal basin and create subtidal and intertidal habitats on both the east and west sides of Interstate 5 (I-5). This proposal is part of a Park Master Plan being developed that would also provide for non-tidal wetland and upland habitat restoration and public access.

Watershed	Carlsbad Hydrologic Unit (Escondido Creek, San Marcos Creek, Agua Hedionda Creek, Buena Vista Creek)
Existing conditions	The watershed encompasses 210 square miles, and extends from Lake Wohlford to the ocean. The watershed is drained by Buena Vista, Agua Hedionda, San Marcos, and Escondido creeks. The watershed includes the Encinas and Loma Alta hydrological areas. The Buena Vista watershed encompasses 19 square miles while the Escondido creek watershed encompasses 77 square miles and includes the major tributaries of Escondido and La Orilla creeks. The Agua Hedionda creek watershed encompasses 29 square miles. The Loma Alta creek watershed encompasses 20 square miles. The San Marcos creek watershed encompasses 52 square miles. San Marcos Dam, constructed in 1952, controls approximately 53% of the watershed. Urban development (and associated flood control activities), sedimentation from agriculture, erosion, eutrophication of lagoon systems, the presence of exotic species in the watershed, water pollution, and general habitat degradation are major threats to the area. The watershed includes four major coastal lagoons: Buena Vista, Agua Hedionda, Batiguitos (at the mouth of San Marcos creek), and San Elijo (at the mouth of Escondido Creek).
Description of Watershed Resources	There are a number of special status species within the watershed: light-footed clapper rail, California least tern, western snowy plover, Belding's Savannah sparrow, San Diego marsh elder, Common loon, American white and California brown pelicans, double-crested cormorant, white-faced ibis, long-billed curlew, elegant tern, Northern harrier, sharp-shinned hawk, Cooper's hawk, Osprey, and 12 other sensitive bird species nesting in upland areas, including the California gnatcatcher and the Salt Marsh wandering skipper.
Status of Watershed Planning Efforts	A draft Enhancement Plan was prepared by San Diego County in 1995 to recommend methods to preserve and augment a gradient of self-sustaining habitats that range from salt marsh to freshwater marsh. In 1987, the Coastal Conservancy prepared the Batiquitos lagoon watershed sediment control plan. This plan recommended construction of sediment traps but was not implemented.
Restoration Goals and Objectives Related to Wetlands	In 1984, the Coastal Conservancy prepared the Batiquitos lagoon enhancement plan. To mitigate impacts at the Port of Los Angeles, the Port is currently implementing the Batiquitos Lagoon Enhancement Project, which was developed cooperatively with resource agencies and includes some recommendations from the Conservancy plan. The project includes 10 years of monitoring for biota and water quality. Goals and objectives related to the Batiquitos lagoon include: • Dredging the lagoon; • Constructing new inlet jetties to keep the mouth open and permanently restoring tidal flows, and • Creating nesting areas for colonial nesting birds including the California least tern and western snowy plover. In 1993, the Soil Conservation Service prepared the Escondido Creek Hydrologic Area

	report, which presented four alternative management schemes for reducing erosion and sedimentation. A draft Enhancement Plan was prepared by the County in 1995 to recommend methods to preserve and augment a gradient of self-sustaining habitats that range from salt marsh to freshwater marsh. San Diego County manages the lagoon and, when funding is available, coordinates the opening of the mouth. There have been 16 artificial openings between 1986-90. The mouth was manually opened again in June 1995. Biological monitoring is carried out before and after mouth openings. In 1983, the Conservancy began working with local cities to lower peak flows and reduce erosion in the Buena Vista Creek and sedimentation of the lagoon. In 1983, 160,000 cubic yards of sediment were dredged from the east basin and 2 least tern nesting islands were created.
List of Major Restoration Activities	The San Elijo Lagoon Tidal Flushing Project restores continuous tidal action to 415 acres of degraded salt marsh through ongoing removal of sand and cobble from the mouth of the lagoon. The project also includes annual monitoring of biological and hydrological conditions.

Watershed	**San Luis Rey River**
Existing conditions	The watershed encompasses 565 square miles. The San Luis Rey River is the major stream system, and is interrupted by Lake Henshaw, which is one of the subregion's largest water storage areas. Annual precipitation ranges from 12 inches near the coast to approximately 45 inches near the headwaters on Palomar mountain. The watershed is comprised of three hydrological areas: the Lower San Luis, Monserate and Warner Valley areas. Henshaw Dam, built in 1922, controls 36% of the watershed, and three small reservoirs. The mouth of the San Luis Rey River is not listed as an impaired water body.
Description of Watershed Resources	Area: 495650.48 acres Naturally Occurring Waterways: 961.86 miles Percentage of Free Flowing River Miles: 86 % Percentage of River Miles in Protected Lands: 2 % Protected Lands: 3 % Number of Dams: 18 Number of Stream Crossings: 1311 Near-Stream Roads: 509.14 miles Average Precipitation per Year: 18.82 inches Percentage Area above 15% Slope: 14.64 % Number of CalWater Units: 23 WBS TMDL Rivers 0 Number of Special Status Species: 44
Status of Watershed Planning Efforts	The development of a General Resources Plan for the San Luis Rey Watershed began in 1997. In the Fall 1999, the Watershed Status Report was produced by the Resource Conservation District - Upper San Luis Rey Watershed Planning Division. The watershed-based planning effort was funded by the US EPA and the Coastal Conservancy. The goals of this program are to set up a stakeholder- based Watershed Council in the San Luis Rey Watershed, develop a status report for the Watershed (in cooperation with the NRCS Watershed Planning division), prepare a general resources management plan for the Watershed, and begin implementation of the plan.
Restoration Goals and Objectives Related to Wetlands	• Removal of exotic species; • Reduce and control water quality problems, nutrient enrichment, and sedimentation; • Management of aquatic habitats, and • Protection of endangered species and plants.
List of Major Restoration Activities	There are also a number of smaller-scale plans underway, including the Carlsbad Highlands - Artichoke Thistle and Tree Tobacco Control, Carlsbad Watershed Network, Development of a General Resources Plan for the San Luis Rey Watershed, Guajome Lake Water Pollution Control and Management Plan, San Elijo Lagoon Water Quality Study, and the San Luis Rey River Water Quality Assessment. The County of San Diego Department of Parks and Recreation is sponsoring the preparation of a management plan for the control and reduction of water quality

	problems, nutrient enrichment problems, and sedimentation along the reach of the San Luis Rey River below Henshaw Dam to Oceanside. A Habitat Conservation Plan was developed for the river's least Bell's vireo population and is currently being implemented. The plan designates 12 acres of riparian habitat west of I-5 as Conserved Habitat.

Watershed	**Santa Margarita River**
Existing conditions	The watershed encompasses 750 square miles. The watershed is comprised of the following nine hydrologic areas: the Ysidora, Deluz, Murrieta, Auld, Pechanga, Wilson, Cave Rocks, Aguanga, and Oak Groves. This watershed is drained largely by the Santa Margarita River, Murrieta Creek and Temecula River. The precipitation within the watershed ranges from 12 inches on the coast to 45 inches at the headwaters on Palomar Mountain. Twenty-seven miles of free-flowing river exist. Lake O'Neill is out of the River channel but receives much of its water from seasonal river diversions. Two dams are located in the upper watershed along the two streams that join to form the Santa Margarita River. The river is included in the list of impaired water bodies. It is the least disturbed river system south of the Santa Ynez River in Santa Barbara County, and contains some of the largest remaining populations of several bird species, including the Least Bell's vireo and the largest concentration of least terns in the world (State Coastal Conservancy 1989). Unlike most of the rivers of the South Coast, the riparian habitat is of particularly high quality, and are essential for the protection of waterfowl and a number of endangered plants and animals. As late as 1958, steelhead trout were reported near the mouth of the estuary.
Description of Watershed Resources	Area: 473562.21 acres Naturally Occurring Waterways: 1033.46 miles Percentage of Free Flowing River Miles: 92 % Percentage of River Miles in Protected Lands: 5 % Protected Lands: 6 % Number of Dams: 9 Number of Selected Watershed Projects: 4 Number of Stream Crossings: 1488 Near-Stream Roads: 497.6 miles Average Precipitation per Year: 16.07 inches Percentage Area above 15% Slope: 9.38 % Number of CalWater Units: 33 WBS TMDL Rivers 0 Number of Special Status Species: 45
Status of Watershed Planning Efforts	The Santa Margarita River Watershed Management Program was formed in 1989 to protect stream related resources of the watershed. The Program includes 50 federal and state resource agencies and a number of private and nongovernment interest groups. Various sensitive lands in the watershed have been preserved as open space and as an ecological reserve by both private and public landowners (http://www.scec.sdsu.edu/BFS/main/SMER/SMER.html). Working with the US Fish and Wildlife Service, the Marine Corps has developed an ecosystem management plan to ensure that Base training activities are compatible with endangered species habitat needs. Numerous studies and management projects include a cooperative effort among San Diego and Riverside counties, and federal and state agencies and community groups to develop a watershed plan focusing on land uses, such as flood control, erosion, sedimentation and the long-term effects of urbanization on the river's habitats; other enhancement and education efforts are also underway in

	sub-watersheds.
Restoration Goals and Objectives Related to Wetlands	With respect to the watershed management program, the primary areas of interest include: • Maintenance of water quality and quantity; • Protection of wildlife and sensitive species, and • Management of stream corridors for multiple uses.
List of Major Restoration Activities	The Conservancy has funded 3 enhancement efforts that focus on integrated watershed planning and management for the three primary subbasins of the watershed (Temecula, Murrieta and the main stem of the Santa Margarita River). The Santa Margarita River Exotics Control Program is attempting to eliminate giant reed and salt cedar in the river.

Watershed	San Juan Hydrologic Unit (, San Juan Creek, Aliso Creek, San Mateo Creek)
Existing conditions	The San Juan hydrological unit encompasses about 500 square miles. The three major creeks are Aliso, San Juan and San Mateo Creeks. Precipitation in the watershed ranges from 12 to 14 inches/year. The sub-watershed of Aliso creek is an area approximately 36 square miles. The watershed includes important habitat for the California gnatcatcher (coastal sage scrub), least Bell's vireo (marsh). San Juan creek is the longest creek in the hydrological unit. The mouth of the creek is located at Doheny Beach State Park. The San Juan Creek watershed encompasses a drainage area of 176 square miles extending from the Cleveland National Forest in the Santa Ana Mountains to the Pacific Ocean at Doheny State Beach near Dana Point Harbor. San Juan Creek is approximately 27 miles long with a peak elevation of 5,700 feet. Major tributaries of the watershed include Trabuco Creek, Horno Creek, Canada Gobernadora, Canada Chiquita, Verdugo Wash, Lucan Canyon, Cold Spring Canyon, and Hot Spring Canyon. Oso Creek, Hickey Canyon Creek, Live Oak Canyon Creek are major tributaries to Trabuco Creek. There are two major dams, Oso Reservoir and Mission Viejo Lake on Oso Creek. The Oso Creek and Trabuco Creek watersheds have been most affected by development. Watershed concerns include channelization, poor surface water quality from discharge of non-point sources, loss of habitat in the floodplain, loss of riparian habitat, paving of the flood plain, decline of water supply and flows, biodiversity loss, invasive species, surface erosion, and over use of existing resources. The Aliso Creek watershed is located in Southern Orange County, and encompasses a drainage area of approximately 36 square miles. The watershed extends 19 miles from the foothills of the Santa Ana Mountains to the Pacific Ocean south of Laguna Beach, and includes the tributaries of Wood Canyon, Sulphur Creek, Aliso Hills Channel, Dairy Fork, Munger Creek, and English Canyon. Residential developments within the watershed include portions of Lake Forest, Laguna Beach, Foothill Ranch, Porola Hills, Mission Viejo, Laguna Hills, Aliso Viejo, and Laguna Niguel. The majority of the watershed is urbanized with residential development of up to 18 units per acre. Watershed concerns are similar to those described above for Oso and Trabuco Creeks. The San Mateo Creek watershed encompasses 132 square miles. Portions of the creek and marsh are managed by the State Department of Parks and Recreation, and are located on Camp Pendleton.
Description of Watershed Resources	The watershed is identified by the USGS as the Aliso Creek Watershed, and is described as follows: Area: 317666.82 acres Naturally Occurring Waterways: 771.11 miles Percentage of Free Flowing River Miles: 96 % Percentage of River Miles in Protected Lands: 13 % Protected Lands: 13 % Number of Dams: 12 Number of Stream Crossings: 934 Near-Stream Roads: 411.71 miles

	Average Precipitation per Year: 16.42 inches Percentage Area above 15% Slope: 16.26 % Number of CalWater Units: 10 WBS TMDL Rivers 1 Number of Special Status Species: 36
Status of Watershed Planning Efforts	There is no watershed-based plan for the entire Aliso Creek watershed. The Aliso Creek Watershed Management Study (COE 1998a) provides a trend and analysis of the ecology of the watershed. The feasibility study also identifies opportunities to address watershed management from a basin-wide perspective. Issues investigated in the study are land use, hydrology, hydraulics, flooding, river geomorphology, erosion, sedimentation, geology, soils, water quality, groundwater, vegetation, endangered species, and cultural resources. The San Juan Creek Watershed Management Study (COE 1998b) reviews and assesses past and current activities, and trends in the watershed. The feasibility study also identifies opportunities to address watershed management from a basin-wide perspective. Issues investigated in the study are land use, hydrology, hydraulics, flooding, river geomorphology, erosion, sedimentation, geology, soils, water quality, groundwater, vegetation, endangered species, and cultural resources.
Restoration Goals and Objectives Related to Wetlands	See below.
List of Major Restoration Activities	A population of approximately 8 acres of German Ivy has become established within the Trestles Wetlands Natural Preserve at San Onofre State Beach. This infestation threatens to overtake known least Bell's vireo breeding habitat. The spraying of herbicide occurred in March 1997 and is being repeated this year to ensure eradication. The San Juan Creek Mining Reclamation Project aims to provide visual screening of mined lands, restore the character and appearance of affected streambanks, and maintain opportunities for future extraction as the alluvium in the flood plain is replenished. The Mission Viejo Materials Incorporated Restoration Project will create 10 acres of coastal sage scrub and riparian habitat for the California gnatcatcher and least Bell's vireo.

Watershed	Santa Ana Hydrologic Unit (San Diego Creek, Santa Ana River)
Existing conditions	This hydrologic unit includes the San Diego Creek watershed that flows to Newport Bay, and the Santa Ana River watershed. Both are described below as distinct hydrological units. The San Diego River Watershed encompasses about 154 square miles. San Diego creek is the largest drainage system in the watershed, draining roughly 118 square miles, including a number of cities and unincorporated areas. San Diego Creek and the Upper Newport Bay Ecological Reserve are two major waterbodies in the watershed listed as impaired due to water quality impacts from nutrients. Nutrient loads from the agricultural, residential, and commercial land uses as well as from point source discharges flow from upper San Diego Creek into the lower Creek and Upper Newport Bay. The nutrient-laden loads cause algal blooms and eutrophic conditions in the poorly flushed areas of the watershed. NEWPORT BAY. The watershed encompasses 154 square miles. The two tributaries to the watershed are San Diego Creek and Bonita Creek. San Diego Creek accounts for about 80% of the Newport Bay watershed area. The other drainage areas include the Santa Ana-Delhi Channel, Big Canyon and some additional small tributaries. All of the channels empty into the Newport Bay, a coastal estuary of ecological significance known as the Upper Newport Bay Ecological Reserve. San Diego Creek accounts for over 90 percent of the sediment delivered to the Bay.
Description of Watershed Resources	NEWPORT BAY. Area: 101142.97 acres Naturally Occurring Waterways: 146.34 miles Percentage of Free Flowing River Miles: 60 % Percentage of River Miles in Protected Lands: 0 % Protected Lands: 0 % Number of Dams: 19 Number of Stream Crossings: 288 Near-Stream Roads: 117.63 miles Average Precipitation per Year: 13.18 inches Percentage Area above 15% Slope: 1.9 % Number of CalWater Units: N/A WBS TMDL Rivers 0 Number of Special Status Species: 15
Status of Watershed Planning Efforts	There are a number of watershed-related plans for the Newport Bay Basin, including Crystal Cove Coastal Sage Scrub Revegetation Project, Crystal Cove State Park Coastal Sage Scrub Restoration, Newport Bay Watershed, Siphon Reservoir Coastal Sage Scrub Revegetation Project , Upper Newport Bay / San Diego Creek Watershed Nutrient Total Maximum Daily Load, Upper Newport Bay Watershed Water Quality Enhancement Project. Several federal, state, regional and local programs (described briefly below) identify and prioritize water quality problems in the Newport Bay watershed and develop implementation strategies to address those problems on a watershed basis, especially for "non-point" sources. The Upper Newport Bay / San Diego Creek Watershed Nutrient Total Maximum Daily

	Load focuses on water quality/beneficial use impacts caused by the nutrients and will attempt to alleviate these impacts by: 1) the development of a Newport Bay/San Diego Creek Watershed phased nutrient total maximum daily load (TMDL) 2) the evaluation and recommendation of possible revision of nutrient water quality objectives specified for San Diego Creek in the Basin Plan, and 3) a determination for the need for nutrient water quality objectives specific to Upper Newport Bay. A Newport Bay Strategy (developed in 1989) identified nutrients that needed to be controlled as part of the Regional Board's approved comprehensive management strategy of implementation for the Newport Bay Watershed. The Upper Newport Bay Ecosystem Restoration Feasibility Study (May 2000) addresses the issues related to continued sedimentation problems within the Bay, and the direct effects of sedimentation on the habitats and species that make up the ecological reserve. The study does not identify any alternative measures for the watershed. The Corps and the County of Orange have initiated a separate watershed feasibility study to develop a watershed management plan for the Bay, and to investigate site-specific restoration opportunities within the watershed (County of Orange 2000).
Restoration Goals and Objectives Related to Wetlands	The Upper Newport Bay Watershed Water Quality Enhancement Project addresses problems related to sedimentation and eutrophication. The goals of the project are: • To identify and reduce or eliminate sources of aquatic life toxicity in the watershed; • To identify and reduce or eliminate sources of excessive bioaccumulative chemicals in the watershed; • To contain and reduce or eliminate sources of excessive vegetative debris in the watershed; • To contain and reduce or eliminate sources of excessive urban trash in the watershed, and • To develop educational tools related to the project that are broadly applicable to watersheds with similar impairments.
List of Major Restoration Activities	San Joaquin Marsh Enhancement - Phase I Enhance approximately 50 acres of existing freshwater marsh habitat on the San Joaquin Freshwater Marsh Reserve as part of an effort to restore the natural gradient found historically at Southern California coastal wetlands. One of the main features of the project site is a series of former duck ponds, which have become filled with sediment and vegetation over the years, due in part to the lack of a consistent water supply that can be managed to sustain a variety of marsh habitats. The project focuses on restoring these ponds, developing a water intake and distribution system, and re-establishing native vegetation. Construction was completed in January 2000, and coastal sage scrub planting will follow construction. Huntington Beach Acquisition of Edison Property A 20 acre parcel of the Huntington Beach wetlands adjacent to the power plant will be acquired via a purchase agreement with Edison. The Coastal Conservancy will give funds to the Huntington Beach Wetlands Conservancy to complete the acquisition.

Watershed	**Santa Ana River**
Existing conditions	The Santa Ana River watershed encompasses 2,800 square miles. The Santa Ana River is one of the largest rivers in southern California. Channelization with high levee banks and other flood control measures upstream have greatly reduced the river as a source of seasonal flood-waters to the marshes. A second tributary, the Greenville-Banning Channel, joins the Santa Ana River. Flows are composed of storm water discharge and urban run-off. The two major dams are Prado Dam (1941) and Seven Oaks Dam (completed in 1998).
Description of Watershed Resources	SANTA ANA BASIN Area: 1082540.16 acres Naturally Occurring Waterways: 2033.44 miles Percentage of Free Flowing River Miles: 75 % Percentage of River Miles in Protected Lands: 3 % Protected Lands: 4 % Number of Dams: 52 Number of Selected Watershed Projects: 36 Number of Stream Crossings: 2916 Near-Stream Roads: 1096.1 miles Average Precipitation per Year: 20.45 inches Percentage Area above 15% Slope: 25.68 % Number of CalWater Units: 43 WBS TMDL Rivers 17 Number of Special Status Species: 73
Status of Watershed Planning Efforts	There is no watershed plan for the entire hydrological area. The Santa Ana Watershed Project Authority (SAWPA) was formed in 1971 to develop a long-term plan to manage the area's water supply, and finance and build multi-agency water projects. SAWPA historically focused on water quality and ground water. In 1994, the Authority broadened its focus and participation to include issues of flood control, wildlife resources and interaction with other water agencies.
Restoration Goals and Objectives Related to Wetlands	• Wetland enhancement; • Permanently restoring tidal flows, and • Protection of species of concern.
List of Major Restoration Activities	As part of the Santa Ana River flood control project, the COE began restoration of 92 acres of marsh in 1989 as mitigation for biological impacts. In 1991, Orange County adopted an Enhancement Plan for South Talbert and Fairview/North Talbert parks, (renamed Talbert Nature Preserve in 1995) which included wetland enhancement. Restoration work on the northern portion of the Preserve and around Victoria Pond were completed in 1996. The Talbert Nature Preserve is impacted from the adjoining developed recreation areas to the north, limited flooding events, and poor water quality from the mesa urban run-off. The loss of salt marsh flora and fauna continues at the Mobil Oil site due to the absence of tidal waters. A sample of planning efforts in this area include the Lake Mathews Multi-Species

	Habitat Conservation Plan / NCCP, Prado Wetlands, Rathbun Creek Watershed Restoration Project, Santa Ana River Use Attainability Analysis, and the Southwestern Riverside County Multi-Species Habitat Conservation Plan. The Santa Ana Regional Interceptor (SARI) Program will construct a pipeline to convey 30 million gallons of wastewater daily from the upper reaches of the watershed in San Bernardino to Fountain Valley near the ocean. The purpose of the project is to transport non-reclaimable wastewater (high saline wastewater) from the Upper Santa Ana River Basin to the ocean for disposal, after treatment, and to recover and protect water resources in the watershed.

Watershed	**San Gabriel River**
Existing conditions	The San Gabriel River watershed encompasses 661 square miles acres and 828 miles of waterways. There are 26 dams in this watershed. Most of these dams were built in the after the 1930s, such as the Cogswell Dam (1934), San Gabriel Dam (1939), and Morris Dam (1934), among others. Six additional dams are located on tributaries to the San Gabriel River. The lower part of the River (the area generally below Santa Fe Dam) is channelized and developed for much of its length except for at recharge basins where the bottom is gravelly and in the tidal prism where the bottom is muddy and some habitat subsists. Many tributaries to the river originate in the San Gabriel Mountains and often have year-round flow in the foothills due to springs and support high quality habitat. **(Los Cerritos is actually in its own watershed separate from the San Gabriel River, except for a minor cross-connection due to the powerplants on the San Gabriel River pulling in water from Long Beach Marina. It drains Paramount, and parts of Long Beach, Signal Hill, Bellflower, Lakewood, and other areas to Los Cerritos Channel and thence to Marine Stadium and Alamitos Bay (including Long Beach marina) before reaching the ocean. A jetty separates the mouth of the San Gabriel from the mouth of Alamitos Bay)** Historically the watershed of the Los Cerritos Channel was part of the San Gabriel River watershed. It is not almost completely hydrologically disconnected from the San Gabriel River. The Los Cerritos Channel watershed is 28 square miles.
Description of Watershed Resources	Area: 453,960 acres Naturally Occurring Waterways: 827.52 miles Percentage of Free Flowing River Miles: 79 % Percentage of River Miles in Protected Lands: 19 % Protected Lands: 17 % Number of Dams: 26 Number of Selected Watershed Projects: 5 Number of Stream Crossings: 1405 Near-Stream Roads: 692.17 miles Average Precipitation per Year: 22.2 inches Number of Special Status Species: 20
Status of Watershed Planning Efforts	There are a number of watershed planning efforts in various stages of development. Proposition 13 funds are going toward subwatershed plan development in Coyote Creek, and the upper part of the watershed including Walnut and San Jose Creeks. These efforts have just begun. A San Gabriel River Master Plan is currently being developed that will be a consensus-based document recognizing and addressing River issues and concerns of the stakeholders. It will include areas within existing rights-of-way from Morris Dam in the mountains to the River's outlet. The Plan will identify project opportunities for: enhancements for recreation, open space and habitat areas; restoration; preservation of the River's natural resources; maintaining flood protection and existing water rights. The Plan is expected to be ready for Board of Supervisor approval by 2003. It will be coordinated with the activities of the San Gabriel and Lower Los Angeles Rivers and Mountains Conservancy. Information on the Master Plan may be found at

	http://ladpw.org/pln/sgrmp. The San Gabriel and Lower Los Angeles Rivers and Mountains Conservancy has produced a draft Guiding Principles Watershed and Open Space Plan which may be viewed at http://www.rmc.ca.gov/. The Conservancy was established in 1999 as an independent State agency to preserve urban open space and habitats in order to provide for low-impact recreation and educational uses, wildlife and habitat restoration and protection, and watershed improvements within its jurisdiction. The Los Angeles and San Gabriel Rivers Watershed Feasibility Study Advisory Task Force has recently developed recommendations for consideration by the Board of Supervisors for restoration opportunities in the two watersheds. The Task Force was formed in 1998 to identify opportunities to improve recreation, land use and habitat management, watershed conservation, water quality and flood control and to develop a framework for a future integrated basin management plan for the two watersheds.
Restoration Goals and Objectives Related to Wetlands	An amendment to the Specific Plan proposed in 1996 includes a reconfiguration of the wetlands (filling in some areas, restoration and creation in others) that would result in an overall increase of 3 acres of wetlands. A permanent tidal connection would also be created and urban runoff would be rerouted to avoid the salt marsh. The amendment also includes a 90% reduction in allowable housing units in the area.
List of Major Restoration Activities	A number of small land conservancies have formed to prevent the development of the San Gabriel Mountains just below the Angeles National Forest. The Los Angeles and San Gabriel Rivers Watershed Feasibility Study Advisory Task Force the Board of Supervisors request the Army Corps of Engineers begin startup work for the top three sites (by the defined criteria) recommended by the Task Force; two of those sites are in the San Gabriel River Watershed: Lakewood/Cerritos and Cal Polytechnic University Pomona. The Lakewood/Cerritos site is a 15 acre vacant parcel along the river. The site offers potential linkages with other adjacent habitat and park areas and the adjacent river channel could provide water for a potential project. The Cal Poly Pomona site is a 67 acre site on the campus currently cultivated with experimental plots for agricultural production. The site is adjacent to South San Jose Creek and a potential multi-objective project could involve opening off-channel wetlands or riparian habitat adjacent to the currently channelized creek.

Watershed	**Los Angeles River**
Existing conditions	The watershed encompasses 53,4420 acres and 801 square miles of waterways. There are 51 dams in this watershed. The Los Angeles River enters San Pedro Bay at Queensway Bay in the southeastern corner of the City of Long Beach. Virtually the entire main channel of the river has been channelized and paved except for the tidal prism where soft bottom persists with some remaining wetlands habitat and in a stretch of the river near downtown Los Angeles where a high water table precludes use of concrete. Many tributaries originate in either the Santa Monica or San Gabriel Mountains where they have year-round flow due to springs and support high quality habitat.
Description of Watershed Resources	Area: 534420.47 acres Naturally Occurring Waterways: 801.28 miles Percentage of Free Flowing River Miles: 84 % Percentage of River Miles in Protected Lands: 0 % Protected Lands: 0 % Number of Dams: 51 Number of Selected Watershed Projects: 8 Number of Stream Crossings: 1446 Near-Stream Roads: 563.37 miles Average Precipitation per Year: 20.09 inches Number of Special Status Species: 20
Status of Watershed Planning Efforts	There are a number of watershed planning efforts in various stages of development. Proposition 13 funds are going toward subwatershed plan development in Compton Creek, the Arroyo Seco, and the Rio Hondo. These efforts have just begun. An ongoing subwatershed planning effort is taking place in the Sun Valley part of the watershed. A Los Angeles River Master Plan was developed in 1996 that plans for a network of parks, trails, natural areas, and community spaces along the river's length. The San Gabriel and Lower Los Angeles Rivers and Mountains Conservancy has produced a draft Guiding Principles Watershed and Open Space Plan which may be viewed at http://www.rmc.ca.gov/. The Conservancy was established in 1999 as an independent State agency to preserve urban open space and habitats in order to provide for low-impact recreation and educational uses, wildlife and habitat restoration and protection, and watershed improvements within its jurisdiction. The Los Angeles and San Gabriel Rivers Watershed Feasibility Study Advisory Task Force has recently developed recommendations for consideration by the Board of Supervisors for restoration opportunities in the two watersheds. The Task Force was formed in 1998 to identify opportunities to improve recreation, land use and habitat management, watershed conservation, water quality and flood control and to develop a framework for a future integrated basin management plan for the two watersheds.
Restoration Goals and Objectives	The Coastal Conservancy, Los Angeles Regional Water Quality Control Board, and Los Angeles Department of Public Works are conducting a comprehensive assessment of the wetland resources of the Los Angeles River and its watershed. The assessment

Related to Wetlands	will provide the basis for planning habitat enhancement and restoration, and recreational projects along the river. Several agencies and community groups have proposed alternatives for watershed and flood control measures to deal with a 100 year flood. The Los Angeles River Flood Control Strategy Task Force was established in 1996 to investigate and make recommendations on these various methods and options. In 1997, the RWQCB began a Watershed Management Initiative for the Region which is primarily a volunteer monitoring program for the watershed. A sample of restoration and conservation efforts in the greater watersheds of the LA River include: • Taylor Yard. Taylor Yard is an old railroad marshaling yard across from Elysian Park, north of downtown Los Angeles. It is approximately 190 acres with over a two mile frontage on the river. Most of it is being abandoned by Union Pacific Railroad Company. There are existing plans and community support for using much of the property as a combination storm water detention basin and park with soccer fields, wetlands, and riparian habitat. Taylor Yard could protect parts of downtown Los Angeles from flooding during a 100-year storm. However, some of it is being sold for industrial development. At least 61 acres will be reserved for the above uses. The California Coastal Conservancy is funding a feasibility study and master plan with a $250,000 grant. Money is needed to purchase the 61 acres and develop it as described above. • Chinatown Yards. The Midway and the Cornfields railroad yards are known as the Chinatown yards. They are located near downtown LA along the LA River. These railroad yards have also been abandoned. FoLAR's charette "The River through Downtown", suggested an extensive mixed use for this project and a way to restore the original Zanja Madre, the irrigation ditch that brought water from the Los Angeles River to the Pueblo de Los Angeles, and to flood the Cornfields. The restored habitat, open space, and water features could help to stimulate redevelopment of the hills surrounding the Cornfields much like the San Antonio River Walk. Midway could provide opportunities for riparian habitat restoration. Both yards are needed for the bike path that will connect the river to Union Station, downtown, and to provide additional flood protection for downtown. • Arroyo Seco/Los Angeles River Area. A large triangle of land is located where the Arroyo Seco (a major tributary of the LA River) meets the Los Angeles River. The land is needed to fulfill several functions: to mark the confluence where the original pueblo was located, to reconfigure the confluence itself to a more naturalized delta shape, restore it to an appropriate prominence in the landscape, and to provide much needed park and open space in a highly industrialized and park deprived area of the city. FoLAR has created a design for a cultural/historic confluence park to memorialize the birthplace of Los Angeles. The proposed blue line light rail to Pasadena will have a station stop at 26th Avenue, which can be linked with a pedestrian path to the park. The bike path from Pasadena to Union station will pass through the park. • Hazard Park Wetland. The Hazard Park wetland is located on an old abandoned

	railroad spur, which bisects Hazard Park in east Los Angeles near the County USC Medical Center. The entire 1.4 miles long spur ends at a Macy's distribution center that no longer uses the rail spur. The park is bisected by an abandoned railroad spur line. A small perennial source of water is present, most likely a spring. It supports a cattail-dominated marsh. Vegetation across most of the corridor outside the wetland is composed of exotic species and pavement. Native bird diversity is very high. The wetland already serves as an outdoor classroom since it adjoins a medical magnet high school with an involved science department. The trail or bike path could connect Hazard Park to Lincoln Park to the Ascott Hills. These hills are surrounded by public schools with environmental magnets, who are using the hills as an outdoor classroom. The City of Los Angeles has expressed interest in developing the trailway. A Preliminary Hydrologic Evaluation, Baseline Biological Analysis, and Conceptual Wetland Restoration plan have already been prepared by the LASG Rivers Watershed Council funded through a grant by the California Coastal Conservancy. Land acquisition and Final Restoration plans and construction are pending.
List of Major Restoration Activities	Vision 2025 of the Los Angeles-San Gabriel Watershed Council focuses on the following long-term restoration goals: Managing the watershed for economic vitality and environmental health; Using all water resources efficiently; Managing the forest for water supply and quality; Creating greenways and educational facilities; Restoring habitat for fish, birds and wildife, and Improving water quality. The Los Angeles and San Gabriel Rivers Watershed Feasibility Study Advisory Task Force the Board of Supervisors request the Army Corps of Engineers begin startup work for the top three sites (by the defined criteria) recommended by the Task Force; one of these sites is in the Los Angeles River Watershed. The Headworks site is a 46 acres parcel along the river owned by the Los Angeles Department of Recreation and Parks with an easement held by the Department of Water and power. The site, which is currently unused, is largely open, is adjacent to the channel, and is relatively low in elevation.

Watershed	**Ballona Creek**
Existing conditions	Ballona Creek is one of the largest drainages of the greater Santa Monica Bay watershed at 128 square miles. The creek drains the west central area of Los Angeles, and the eastern portion of the Santa Monica Mountains. A large majority of the creek is channelized and paved. There is little riparian habitat remaining in the creek. The Ballona wetlands are connected to the creek by four concrete and metal culverts. As a consequence, there is no tidal flow into the wetlands.
Description of Watershed Resources	The Belding's savannah sparrow breeds in the wetlands. Fish and invertebrate communities are common species.
Status of Watershed Planning Efforts	A Proposition 13-funded subwatershed plan effort has just begun.
Restoration Goals and Objectives Related to Wetlands	A comprehensive restoration plan for the Ballona wetlands is one focus of the Santa Monica Bay Restoration Project (1993). Other objectives are to: • Enhance water quality; • Improve tidal action within wetlands; • Expansion of tidal channels; • Increasing the size and number of culvert connections that separate wetland areas; • Re-establish wetland and transition zone vegetation; • Creation of habitat diversity; • Protect nesting habitats within wetland complex, and • Control public access.
List of Major Restoration Activities	In order to improve water quality, a 50 acre riparian and freshwater marsh system has been authorized by the CCC and COE.

Watershed	**Santa Monica Bay Hydrologic Unit (Topanga Creek, Malibu Creek, Solstice Creek, Trancas Creek)**
Existing conditions	The watershed encompasses approximately 400 square miles that is subdivided by 28 separate drainages. The watershed includes the topographic features of the Santa Monica Mountains and the LA coastal plain. These topographic features affect the distribution of wetlands and the historical changes that have occurred with the watershed, e.g., land-use and industrial development activities. The Bay watershed is one of the nation's most highly urbanized areas. The two largest watershed are Malibu Creek within the Santa Monica Mountains and Ballona Creek within the Los Angeles coastal plain. The landscape of the watershed includes rugged coastal mountains and broad alluvial valleys and coastal dunes. The Santa Monica Mountains include a number of deep and narrow canyons, which flow through 19 major watersheds to the Pacific Ocean. Topanga, Malibu, Solstice, and Trancas Creeks are the major watersheds of the Mountains. Many of these sub-watersheds include relatively healthy riparian habitats, due to the fact that most of the canyons of the Mountains remain as open space and are undeveloped. There are 400 miles of riverine wetlands with the Santa Monica Bay watershed. Thousand Oaks, Malibu Beach, and Point Dume have the majority of the watershed's wetlands because of the extensive riparian habitats associated with the intermittent creeks and streams. Riparian and floodplain forests are located in the Malibu, Calabasas, Topanga and Point Dume areas.
Description of Watershed Resources	Area: 364554.04 acres Naturally Occurring Waterways: 438.18 miles Percentage of Free Flowing River Miles: 78 % Percentage of River Miles in Protected Lands: 20 % Protected Lands: 12 % Number of Dams: 22 Number of Selected Watershed Projects: 17 Number of Stream Crossings: 848 Near-Stream Roads: 349.38 miles Average Precipitation per Year: 16.73 inches Number of Special Status Species: 28
Status of Watershed Planning Efforts	Santa Monica Bay Restoration Plan (1993). A watershed group in Topanga has prepared a draft Topanga Watershed Management Plan. A Natural Resources Plan was prepared for the Malibu Creek Watershed in 1995 by the Natural Resources Conservation Service.
Restoration Goals and Objectives Related to Wetlands	As described in the SMBRP's Wetland Inventory Restoration Potential (1993), the following goals and objectives related to wetlands are described: • Enhance water quality; • Improve tidal action within wetlands; • Expansion of tidal channels; • Increasing the size and number of culvert connections that separate wetland areas; • Re-establish wetland and transition zone vegetation; • Creation of habitat diversity;

	• Protect nesting habitats within wetland complex, and • Control public access.
Anadromous Fish	Big Sycamore Canyon Creek: Relatively low restoration potential exists due to lack of perennial stream flows. Arroyo Sequit Creek: Juvenile and adult steelhead were observed most years from 1993. Steelhead juveniles were found ~2 miles (3.2km) upstream from Leo Carrillo State Beach Park in 1980. Larger fish were rescued from 1- 3 miles in 1998 and relocated within the drainage. Excellent native riparian vegetation with a remnant lagoon exists. Solstice Creek: A spring fed perennial creek, with good riparian and large portion of federal ownership. Water quality and quantity in the creek appears capable of supporting small numbers of juvenile steelhead in the most suitable habitat. Fish passage projects are proposed. Malibu Creek: Juvenile steelhead abundance is highest in the upper gorge reach 0.5 mi., directly below Rindge Dam. Fish passage at the dam would allow access to 4.8 mi. of potential steelhead habitat (23% of useable rearing and 56% of useable spawning habitats estimated to be good to excellent). Summer stream flows have been supplemented from the late1960's up to 1999 by discharges of the Tapia Water Reclamation Facility. A 10 foot natural bedrock waterfall exists beneath the deposited sediments behind Ringe Dam, but most biologists do not believe it will be a barrier to fish passage. Topanga Creek: A few adult fish have been observed in the lower part of the creek in recent years.
List of Major Restoration Activities	Santa Monica Bay Restoration Project major goals include the protection, restoration and creation of wetlands within the Bay watershed. The Bay Restoration Project (1993) also focuses on the protection and restoration of Topanga Creek, Malibu Creek, Solstice Creek, and Trancas Creek (as well as the Ballona wetlands). As followup to those major goals, the potential restoration of Topanga Lagoon is being investigated through a Topanga Lagoon Restoration Feasibility Study being headed up by the SM Mountains RCD. Also, the Malibu Lagoon Task Force, a group within the Malibu Creek Watershed Council, underwent a facilitated process to finalize prioritization of potential wetlands restoration sites in the lower watershed previously identified by UCLA. Funding is being pursued to begin such work.

Watershed	**Calleguas Creek**
Existing conditions	The Calleguas Creek Watershed area is 30 miles long, 14 miles wide and has an area of approximately 343 square miles (approximately 224,000 acres). It extends from the Los Angeles County line in the east to Mugu Lagoon and the Pacific Ocean to the south. The watershed includes Calleguas Creek, Conejo Creek, Arroyo Los Posas, Arroyo Conejo, Arroyo Santa Rosa and Arroyo Simi, along with Revolon Slough and Mugu Lagoon. The northern boundary of the watershed is formed by the Santa Susana Mountains, South Mountain and Oak Ridge; the southern boundary is formed by the Simi Hills and Santa Monica Mountains. Discharges of municipal, agricultural, and urban wastewaters have increased surface flow in the watershed, which has resulted in increased sedimentation and water pollution in the Mugu Lagoon as well as contaminated sediments in the lower part of the watershed. A naval facility is located at the lagoon.
Anadromous Fish	No fish passage impediments noted in lower reach of the Calleguas Creek have been identified for steelhead. The farthest upstream limit is due to 15 ft. drop structures located at Simi Valley (Madera Rd.). There is low quality adult resting habitat and poor quality juvenile rearing habitat (sediment).
Description of Watershed Resources	Area: 242578.07 acres Naturally Occurring Waterways: 483.15 miles Percentage of Free Flowing River Miles: 77 % Percentage of River Miles in Protected Lands: 0 % Protected Lands: 0 % Number of Dams: 6 Number of Selected Watershed Projects: 6 Number of Stream Crossings: 832 Near-Stream Roads: 353.18 miles Average Precipitation per Year: 15.06 inches Percentage Area above 15% Slope: 7.77 % Number of CalWater Units: 11 WBS TMDL Rivers 18 Number of Special Status Species: 22
Status of Watershed Planning Efforts	The Calleguas Creek Draft Watershed Management Plan, with its broad stakeholder participation and support, has an opportunity to address long range comprehensive water resource issues; land use; economic development; open space preservation, enhancement and management issues; and public facility provision strategies. The Plan will examine existing data, and develop a characterization of the watershed. The Plan will give balanced consideration to habitat conservation, hydrology, land use, regulatory processes, agriculture, flood control, soil conservation, water quality and quantity, water conservation, habitat preservation, species endangerment, recreation, private property rights, economics and overall community objectives.
Restoration Goals and Objectives Related to Wetlands	The Navy has undertaken 3 wetland restoration projects since 1995, resulting in a total of 23.5 acres of tidal mudflat, sandflat, channels, ponds, salt marsh and sand islands; mitigation plans were being developed in early 1997 for restoration of a 37-acre site to predominantly salt marsh. Several studies focused on reducing flooding and sedimentation have led to installation of sediment control structures, stream bank stabilization projects, on-farm sediment basins, and adoption of range management practices. Local communities have also instituted grading and hillside erosion control

	ordinances. The Habitat Subcommittee of the Calleguas Creek Management Plan Committee contracted out development of a Wetlands Restoration Plan for the watershed. This Plan is available at http://www.calleguas.com/ccwrp.PDF.
List of Major Restoration Activities	Additional watershed-related planning efforts underway, include Calleguas Creek Watershed Treatment, , and Ventura County Punagrass Control. Calleguas Creek Watershed Treatment Phase I-II is a comprehensive effort to protect resources within the Calleaguas Creek watershed and at the outlet, Mugu Lagoon. This project will demonstrate subwatershed channel stabilization through the use of grade stabilization and streambank restoration. Phase I of the project addresses priority subwatersheds of the Calleguas Creek Watershed. Selected conservation practices and technical assistance will improve water quality by reducing erosion, runoff and sediment transport to downstream water bodies. Phase 2 will focus on subwatershed channel stabilization through the use of grade stabilization and streambank restoration.

Watershed	The Oxnard Plain between Calleguas Creek and Santa Clara River Watersheds
Existing conditions	The Oxnard Plain is the lower drainage area of the greater Santa Clara-Calleguas Hydrological Unit. Much of it lies between the two major watersheds in the area and drains separately to the ocean through highly modified lagoon or wetlands. The Oxnard Plain is predominantly agricultural and residential lands. Large reserves of ground water exist in alluvial aquifers underlying the Oxnard Plain. Residential development is threatened the major wetland complex of the area at Ormond Beach.
Description of Watershed Resources	See watershed statistics under Calleguas Creek and the Santa Clara River Basin.
Status of Watershed Planning Efforts	The Ormond Beach Task Force and Ormond Beach Observers meet on an irregular basis but otherwise no wider spread watershed planning activities are occurring.
Restoration Goals and Objectives Related to Wetlands	Acquire 610-acres of wetlands and dunes parcels at Ormond Beach owned by Southern California Edison.
List of Major Restoration Activities	Ormond Beach Edison Acquisition The Ormond Beach Edison site is approximately 600 acres on the coast south of the City of Oxnard located between Edison Drive and Arnold Road. Approximately 300 acres of the site are in agricultural use, 140 acres are in wetlands and dunes, and a tank farm covers 55 acres. Acquisition would allow for enhancing the existing degraded wetlands and potentially tripling the extent of wetlands and associated habitat on site. Anticipated restoration would include modifications of the site hydrology to reintroduce tidal action and bring back freshwater flows that had formerly drained across the Oxnard Plain to the coastal wetlands. McGrath Lake Oil Spill Restoration Project

Watershed	**Santa Clara River**
Existing conditions	The Santa Clara River Watershed (approximately 1,200 square miles) contributes water to the Santa Clara River Estuary. Dams in the watershed of the Santa Clara River include Bouquet Reservoir (built in 1934), Lake Piru (built in 1955), and Pyramid and Castaic Lakes, which control about 37% of the watershed. The Santa Clara River is the last unchannelized riparian and wildlife corridor in the region. Extensive patches of high quality riparian habitat are present along the length of the river and its tributaries. The endangered fish, the unarmored threespine stickleback, is resident in the river. One of the largest of the Santa Clara River's tributaries, Sespe Creek, is designated a wild trout stream by the state of California and supports significant spawning and rearing habitat. The Sespe Creek is also designated a wild and scenic river. Piru and Santa Paula Creeks, which are tributaries to the Santa Clara River, also support good habitats for steelhead. The Vern Freeman Diversion Dam may impede the upstream migration of endangered southern steelhead trout. River flows below the dam may not be adequate to keep endangered southern steelhead trout in good condition at all times.
Description of Watershed Resources	Area: 1032302.26 acres Naturally Occurring Waterways: 2623.92 miles Percentage of Free Flowing River Miles: 94 % Percentage of River Miles in Protected Lands: 21 % Protected Lands: 20 % Number of Dams: 8 Number of Selected Watershed Projects: 8 Number of Stream Crossings: 2649 Near-Stream Roads: 1022.48 miles Average Precipitation per Year: 19.42 inches Percentage Area above 15% Slope: 35.58 % Number of CalWater Units: 14 WBS TMDL Rivers 9 Number of Special Status Species: 26
Anadromous Fish	Access to the upper river is limited by sandy substrate and low flows. The lower mainstem is primarily a migration corridor for steelhead and is less used as a spawning and rearing area, with the exception of the estuary. The Vern Freeman Diversion was equipped with a fish ladder and intake screens in 1989 and became operational in March 1991. A downstream migrant trap at the Diversion collects steelhead smolt data.
Status of Watershed Planning Efforts	The purpose of the Santa Clara River Enhancement and Management Plan is to resolve conflicts among competing uses in the Santa Clara River while protecting the natural resources of the river. The key issues and concerns under negotiation include: Agriculture, Erosion / Sedimentation, Fisheries, Fisheries-Freshwater, Flood Control, Mining, Recreation, Riparian Enhancement , Stream Bank Protection, Vegetation, Water Quality, Water-Surface Water, Water Quantity/Supply, Wetlands, and Habitat.
Restoration Goals and	To protect and restore Least Bell's Vireo (Vireo bellii ssp. Pusillus), Steelhead Trout (Oncorhynchus mykiss gairdneri) and Unarmored 3-spine Stickleback (Gasterosteus

Objectives Related to Wetlands	aculeatus williamsoni).
List of Major Restoration Activities	Friends of the Santa Clara River will be doing a restoration project on 220 acres of river terrace property 3 miles upstream of Santa Paula, a portion of the Valley View Ranch, starting in 2002. The Coastal Conservancy is purchasing the property and Friends of the Santa Clara River will manage it.

Watershed	Ventura River
Existing conditions	The Ventura River watershed encompasses 228 square miles, and is 31 miles long. Its two principal tributaries are San Antonio Creek from the east and Coyote Creek from the west. The annual average flow of the Ventura River is 13,600 acre-feet. The river is highly fluctuating and intermittent in some stretches, running usually only in the winter month's "wet season" while flowing year-round in other stretches fed by rising groundwater. The area averages 14 inches of precipitation per year, with ranges varying from 5 to 40 inches. The Ventura River ecosystem supports 23 species of special concern. Completed in 1959, Casitas Dam is the key component of the Ventura River Project. Casitas Dam is located on Coyote Creek about 2 miles above the junction of the creek and the Ventura River. Robles Diversion Dam is located on the Ventura River about 1.5 miles downstream from the confluence of Matilija Creek and North Fork Matilija Creek. The structure is rockfilled with a timber cutoff wall and a rolled earth core. The dam diverts water into the headworks of the Robles-Casitas Canal. Robles-Casitas Canal carries water from Robles Diversion Dam to Lake Casitas. The canal is about 4.5 miles long with a capacity of 500 cubic feet per second. There are 4.5 miles of concrete canal and 0.9 mile of 78-inch reinforced concrete pipe, called the Robles-Casitas Diversion Conduit. In addition to the steelhead, species found along the river include the California condor, California red-legged frog, and California Brown pelican. The major issue within this watershed is the dramatic historical decline of the southern steelhead, which is an indication of the general health of the aquatic ecosystem. More than 5,000 steelhead formerly migrated up the river and Matilija Creek before the dam was built in 1948. Now, less than 100 fish make their way up the river. The dam blocks access to more than 20 miles of some of the best remaining steelhead habitat in southern California. Much of the upper parts of the watershed are protected as part of the Matilija Wilderness. Removal of Matilija Dam would provide fish passage to historic breeding waters in the upper watershed, and greatly enhance the opportunities for restored habitat for many other species of concern.

Description of Watershed Resources	Area: 173629.76 acres Naturally Occurring Waterways: 461.12 miles Percentage of Free Flowing River Miles: 92 % Percentage of River Miles in Protected Lands: 11 % Protected Lands: 12 % Number of Dams: 6 Number of Selected Watershed Projects: 4 Number of Stream Crossings: 559 Near-Stream Roads: 254.02 miles Average Precipitation per Year: 25.68 inches Percentage Area above 15% Slope: 41.43 % Number of CalWater Units: 21 WBS TMDL Rivers 7 Number of Special Status Species: 6
Anadromous Fish	Small numbers of adult steelhead have been reported in most years. Robles Diversion Dam (1958) diverts water to Casitas Reservoir on Coyote Creek, and causes de-watering of the lower river and blocks steelhead migration. Above the Diversion Dam, riparian vegetation is abundant with good spawning and rearing habitat. Habitat just below the Diversion Dam is generally poor. Further downstream at Casitas Springs ("The Narrows") is very good habitat with thick riparian cover, abundant spawning areas and perennial flows present. The Matilija Dam (constructed in 1948) is located 16.2 miles upstream. Access to almost all of Matilija Creek is blocked by Matilija Dam (1948). Below the dam, spawning habitat is scoured and poor but rearing habitat is fair due to constant surface flow. This creek is considered the key to restoring steelhead in Ventura system. Many of the tributaries of the Matilija Creek would provide suitable habitat if the dam is removed (e.g, Murrieta Creek, Old Man Canyon Creek, Upper North Fork Matilija Creek).
Status of Watershed Planning Efforts	The Ventura River Watershed Planning effort started in 1996 and has received funding from the Coastal Conservancy. The project targets the creation of a watershed management plan for the Ventura River watershed that can provide a framework for dealing with a wide range of issues on public and private lands. The plan will also tie together a number of on-going, separate resource management programs (e.g., estuary restoration, steelhead management, recreation trail, among others). The purpose of the effort is to develop a comprehensive watershed management plan for the Ventura River watershed. Ventura River Steelhead Restoration and Recovery Plan Group A Plan was developed in response to the listing of steelhead trout as an endangered species by the National Marine Fisheries Service (NMFS) in August 1997. The plan was developed 1) to identify measures to mitigate impacts of ongoing operations and maintenance activities, 2) to identify future projects and, 3) identify and evaluate opportunities to promote recovery and restoration of the steelhead trout in the watershed. One staff person will continue to remain involved with the group, as needed. Ventura River Habitat Conservation Plan (HCP) Group: The group, mostly comprised of resource agencies, cities, and water districts, began meeting in 2000. The cities and water districts involved all operate and maintain facilities that may affect sensitive

	resources or their habitats in the river. In order to comply with the Endangered Species Act they are engaging in consultation with the National marine Fisheries Service and US Fish and Wildlife Service and are in the process of developing a HCP that, with monitoring program and implementation agreements, would serve as the basis for an Incidental Take Permit. Matilija Dam Steering and Executive Committees: The USACE, Ventura County Flood Control District, US Bureau of Reclamation, and other agencies and entities began convening in 2000 to begin discussions on the possible removal of Matilija Dam as part of an ecosystem restoration. An USACE and VCFCD sponsored feasibility study will begin shortly to consider the benefit to the ecosystem from various alternatives.
Restoration Goals and Objectives Related to Wetlands	• Erosion and sedimentation control; • Riparian enhancement, and • Habitat restoration.
List of Major Restoration Activities	Restoration activities involve the planning for the removal of dams, erosion / sedimentation control, the restoration of southern steelhead trout, riparian enhancement, stream bank protection, water quality management, and wetland restoration. As part of the dam removal planning, consideration will be given to providing access and day-use recreational facilities, extension of the coast-to-mountain bicycle trail, outdoor educational facilities, and acquisition of non-federal inholdings in the Los Padres National Forest. The Bureau of Reclamation has initiated an appraisal study to be completed in the spring of 2000. Congress allocated $100,000 to study the dam's removal. A demonstration project to commence decommissioning of the dam occurred in the fall of 2000, before the Secretary Babbitt left office.

Watershed	South Coast Hydrologic Unit (Rincon Creek, Franklin Creek)
Existing conditions	The South Coast Hydrologic Unit contains the watersheds of Rincon, Gobernador, Carpinteria, Franklin, and Santa Monica creeks, and streams in Arroyo Paridon and Toro Canyon. These streams are relatively short; all but two have separate drainage basins. They generally have perennial flows in the headwater areas. The upper reaches of these creeks contain foothills, with the exception of Santa Monica Creek, which has the Santa Ynez Mountains to the north. The slopes of the foothills and the Santa Ynez Mountains are covered by chaparral vegetation that grades into avocado orchards, open agricultural fields, and urban development in the foothills and coastal plain. There are many types of impairments to the southern end of these creeks, which exist in an urban setting of the watershed, and are located on private property. These impairments include channelization, concrete lining, poor and ineffective bank protection, excessive sedimentation, poor water quality, lack of in-channel vegetation, invasive non-native species, reduced canopy cover and excessive use by human beings. The watershed of the Carpinteria Marsh is one important feature of this hydrological unit. The sub-watershed encompasses 6,600 acres, and includes the tributaries of Santa Monica and Franklin Creeks (and a smaller unnamed drainage to the west of Santa Monica Creek). The Carpinteria Salt Marsh is one of the most important wetlands in this subregion. The marsh is the northwestern geographic limit for many species, Shoregrass, Belding's Savannah Sparrow, and Light-footed Clapper Rail. A synopsis of the findings (Ferren 1985) has shown that at least 55 vascular plants families containing 153 genera and 252 species are know to occur or have occurred at Carpinteria Salt Marsh, including the estuary's historical limits and adjacent sand dunes. Of those plants, 104 species (45%) are native. Eleven species listed for Carpinteria Salt Marsh and vicinity are possibly extirpated, representing 17% of the 64 native wetland species. Eleven species growing presently at the estuary are regionally rare plants, and two species (Salt Marsh Bird's-beak and Salt Marsh Goldfields) are considered endangered. Due to the disturbance of the upper watersheds (channelization, degradation of riparian habitats, and culverts) that lead to the marsh, Ferren (personal correspondence, 2001) believes the watershed can no longer serve the needs of southern steelhead trout. At least 190 bird species, 37 fish species, 11 mammal species, 5 herpetofauna species, and over 100 invertebrate species have been observed, collected, or reported from Carpinteria Salt Marsh.

Description of Watershed Resources	Area: 240719.88 acres Naturally Occurring Waterways: 632.83 miles Percentage of Free Flowing River Miles: 87 % Percentage of River Miles in Protected Lands: 1 % Protected Lands: 1 % Number of Dams: 11 Number of Selected Watershed Projects: 10 Number of Stream Crossings: 951 Near-Stream Roads: 400.36 miles Average Precipitation per Year: 22.78 inches Percentage Area above 15% Slope: 29.26 % Number of CalWater Units: 31 WBS TMDL Rivers 4 Number of Special Status Species: 23
Anadromous Fish	Within the watershed, several creeks provide suitable riparian and/or spawning habitat that could support southern steelhead runs, including: • Arroyo Burro Creek (supports good riparian habitat but there are many barriers (culverts) and poor water quality; • Mission Creek (several migration barriers exist) • Rattlesnake Creek (a debris dam is located 800' upstream) • Sycamore Canyon Creek (suitable habitat, riparian canopy and deep channel) • Montecito Creek (but ten partial barriers are present) • Cold Springs Creek • Hot Spring Creek • San Ysidro Creek Other creeks of the area may provide suitable habitat but also include various major barriers to passage. Carpinteria creek, for example, includes excellent habitat in the foothills. Juveniles have been seen every year since the 1980s. Rincon creek has good instream habitat and the creek bed is natural with the exception of the culvert at Highway 101.
Status of Watershed Planning Efforts	The Management Plan for Carpinteria Salt Marsh Reserve is a comprehensive, ecosystem-wide planning document that has been funded by the University of California and by the California State Coastal Conservancy through a grant to the UCSB Marine Science Institute and the UCSB Museum of Systematics and Ecology within the Department of Ecology, Evolution, and Marine Biology. The general purpose of the Management Plan is to provide a mechanism for the integration, under one management structure, of the protection, management, and use of Carpinteria Salt Marsh and its biological and physical resources at an ecosystem level rather than a parcel level. There are also a number of smaller-scale efforts, such as the Atascadero Creek Sedimentation Study, Carpinteria Valley Watershed Project, and the San Jose Creek Restoration Project. The purpose of the San Jose Creek Restoration Project is to enhance native riparian vegetation along the creek, improve the area's aesthetics, and facilitate passive recreation within the riparian corridor.
Restoration Goals and	The Management Plan for the Carpinteria Salt Marsh Reserve includes the following goals and objectives:

Objectives Related to Wetlands	• Protect and maintain the estuarine ecosystem at CSMR and its physical, biological, and cultural resources, diversity, and functions. • Extend CSMR boundaries to bring sensitive lands under Reserve management, Acquisition and Easements. • Pursue acquisition, conservation easements, and/or cooperative agreements to ensure the preservation and appropriate management of Carpinteria Salt Marsh parcels and resources. • Protect the resources and functions of the Carpinteria Salt Marsh through careful implementation of the Management Plan and Coordination Program. • To the maximum extent feasible, the mouth of Carpinteria Salt Marsh should remain open to maintain optimal tidal Circulation. • To the maximum extent feasible, enhance and restore the estuary's natural diversity of resources, habitats, physical processes, and functions through the enhancement and restoration of natural self-sustaining processes. • Identify sites throughout the estuary and develop plans where restoration, enhancement, or other beneficial activities should be implemented to improve the quality of the ecosystem. • Implement plans designed to restore or enhance the quality of the estuarine ecosystem at CSMR. • Evaluate the need for increasing circulation and improving water quality in the north marsh area and, if appropriate, implement the recommendations of the study. • Coordinate restoration and enhancement activities for endangered species. • Coordinate restoration and enhancement activities for the removal of exotic species • Channel Enhancements (Franklin and Santa Monica Creeks and Basin III) • South Marsh Enhancements • Estuary Mouth Enhancements, Reconfiguration and Dune Restoration North Marsh Enhancements
List of Major Restoration Activities	See above and http://nrs.ucop.edu/CSMR_Management_Plan/Web_Pages/CSMR-Title.html for additional information.

Watershed	Goleta Slough (Atascadero, San Jose, Las Vegas, San Pedro, Carneros, Tecolotito Creeks)
Existing conditions	The Goleta watershed encompasses 45 square miles. The tributaries of the watershed include Tecolotito Creek, Carneros Creek and Atascadero Creek. The upper reaches of these creeks include foothills and the Santa Ynez Mountains to the north. The slopes of the foothills and the Santa Ynez Mountains are covered by chaparral vegetation that grades into avocado orchards, open agricultural fields, and urban development in the foothills and coastal plain. There are many types of impairments to the southern end of these creeks, which exist in an urban setting of the watershed and are located on private property. These impairments include channelization, concrete lining, poor and ineffective bank protection, excessive sedimentation, poor water quality, lack of in-channel vegetation, invasive non-native species, reduced canopy cover and excessive use by humans.
Description of Watershed Resources	A report (1996) synthesized a variety of biological surveys (dates not specified). In this report, 279 species were identified at Goleta Slough of which 121 species were water associated, including 20 species of special status. In a 1994, 117 pairs of Belding's Savannah sparrows were observed nesting in the slough. In a 1995 survey, a California horned lark was observed. A 1996 report identified 20 special status species, including California brown pelican, southern bald eagle, peregrine falcon, snowy plover, sandhill crane, common loon, American white pelican, double-crested cormorant, white-faced ibis, fulvous duck, harlequin duck, northern harrier, golden eagle, osprey, long-billed curlew, California gull, elegant tern, and black skimmer.
Anadromous Fish	Within the Goleta Slough watershed, several drainages with potential for southern steelhead restoration include: • Tecolote Canyon Creek (however, flood control dams, diversion dams, and culverts prevent passage); • Glen Annie Creek (upper portion includes suitable habitat, but culverts act as major barriers) and Tecolotito Creek (lower portion of same system that includes good habitat but also major barriers to passage); • Carneros Creek (good habitat in the Santa Ynez mountains but barriers prevent passage); • San Pedro Creek (includes well-developed riparian canopy with intermittent flow); • San Jose Creek (however, the lower portion of the creek is channelized with no pools for fish); • Atascadero Creek; • Maria Ygnacio Creek (with debris basins that prevent passage), and • San Antonio Creek (with debris basins that prevent passage). There remain several barriers caused by roads and other small dams and culverts (primarily under Highway 101) that prevent passage of steelhead within these streams. In addition, water diversions, small berms at the mouth of most creeks, and excess sediment have been noted in several creeks that could support a steelhead run. A summary of these barriers is found at http://swr.ucsd.edu/hcd/SoCalDistrib.htm.

Status of Watershed Planning Efforts	Several enhancement and maintenance plans have been put forth for the slough since the late 1980's, although none have been fully implemented. Many of the enhancement plans were driven by the proposed expansion of the Santa Barbara Municipal Airport and by flood control activities. The mitigation plan (1996) for the 'safety area grading project' at the airport proposes to: create transitional middle and high marsh habitats along the northern margin of the slough, remove selected berms, and establish native plants in the project area. The Goleta Slough Management Committee (GSMC) has been meeting since 1991 with the overall goal of resource protection and enhancement of Goleta Slough (http://www.audubon.org/chapter/ca/santabarbara/agency.htm). In 1996, the Committee prepared a draft Goleta Slough Ecosystem a Management Plan.
Restoration Goals and Objectives Related to Wetlands	Goleta Slough Restoration Project: Members of the GSMC have been strong proponents of a major restoration project that would reestablish tidal circulation to parts of the historic Goleta Slough, where berms or tide gates have inhibited tidal action. The Coastal Conservancy has been awarded $940,000 by the US Fish and Wildlife Service, from the National Coastal Wetlands Conservation Grant Program, for restoration of the upper Slough, on California Department of Fish and Game property, and the Storke Campus Wetlands of the University of California at Santa Barbara. Matching funds from a state program have been secured. Before implementation of the project, a study to address the wetland/bird strike safety issues with the Federal Aviation Administration is required. Pampas grass removal on the California Department of Fish and Game parcel was initiated in fall 1998 by Santa Barbara Audubon (SBAS). In September 2000, the EIR for the Goleta Slough Dredging Project was approved by the Board of Supervisors, which will provide beach nourishment and shore protection. The City of Santa Barbara's Creek Inventory and Assessment Study (URS Corporation 2000) describes the physical characteristics of the creeks within the watershed, and recommends several restoration activities to improve the general health and integrity of the Goleta Sough watershed.
List of Major Restoration Activities	Goleta Slough Estuarine Restoration. The Conservancy has funded a restoration project to restore tidal circulation and estuarine wetland functions to 38 acres of the Goleta Slough. This restoration will benefit the Federally endangered light- footed clapper rail, as well as steelhead trout.

Watershed	**Devereux Creek [included in the greater hydrological unit for South Coast noted above]**
Existing conditions	The southern part of the Gaviota Coast includes the Devereux Creek watershed. The watershed area encompasses 2330 acres. Devereux Slough is located on the West Campus of the University of California at Santa Barbara. The approximate wetland habitat acreage is 70. Historically, the slough is estimated to have been approximately 2 to 3 times its present size.
Description of Watershed Resources	290 species were documented at the slough and Coal Oil Point Reserve of which 118 are water-associated, including 15 species of special status. The white-faced ibis was recorded as nesting. Species status species identified include the common loon, American white pelican, brown pelican, double-crested cormorant, white-faced ibis, osprey, bald eagle, northern harrier, peregrine falcon, snowy plover, California gull, elegant tern, black tern, Belding's Savannah sparrow, and tricolored blackbird.
Status of Watershed Planning Efforts	The UC Santa Barbara 1990 Long Range Development Plan (LRDP) designates the Coal Oil Point Natural Reserve as an Environmentally Sensitive Habitat Area (ESHA) and along the northern edge of Devereux Slough as Open Space. As a part of the UC National Reserve System (NRS), the area is reserved for habitat and wildlife preservation, public education, and academic research. In 1995 a 'Natural Areas Plan' was completed which identifies management opportunities for restoration and preservation of the habitats and species of slough. In accordance with the LRDP, restoration and enhancement of the South Finger of the slough began in 2000. The LRDP is currently under revision, with a focus on water quality concerns, future restoration activities, and the protection of the endangered Western snowy plover.
Restoration Goals and Objectives Related to Wetlands	• Remove fill and re-contour the site; • Increase tidal action; • Control erosion; • Protect roosting areas for the least tern near dune habitats; • Remove exotic plants, such as ice plant, and • Plant native species, such as wild flowers, to attract pollinators.
List of Major Restoration Activities	See above.

Watershed	**Gaviota Coast Creeks [included in South Coast Watershed above]**
Existing conditions	There are a total of 38 watersheds in the Gaviota coast. The importance of this coastal stretch of southern California is reflected in the fact that the area between Coal Oil Point and Point Sal comprises only 15% of Southern California's coast yet holds approximately 50% of its remaining rural coastline. This area includes relatively healthy coastal watersheds and wetlands because of the general lack of urban and suburban development. Within the Gaviota Coast watershed, several creeks have suitable spawning and rearing habitat for southern steelhead, including: • Gaviota Creek; • San Onofre Creek; • Arroyo Hondo Creek (which may represent the best steelhead run in the southern part of Santa Barbara County); • Arroyo Quemado (with good habitat in the foothills; • Refugio Creek; • Gato Canyon Creek (but lower portions of the stream are dewatered), and • Dos Pueblos Canyon Creek (with excellent riparian habitat available). There remain several barriers caused by roads and other small dams and culverts (under primarily Highway 101) that prevent passage of steelhead within these streams. In addition, water diversions, small berms at the mouth of most creeks, and excess sediment have been noted in several creeks that could support a steelhead run. A summary of these barriers is found at http://swr.ucsd.edu/hcd/SoCalDistrib.htm.
Description of Watershed Resources	The Gaviota coast is located in a transitional ecological region that lies at the northern and southern distributional limits of many plant and animal species. The watersheds of the area provides habitat for many special-status species, including federal- and state-listed threatened and endangered, proposed listed, and candidate plant and animal species as well as species of special concern. Recently, 14 major vegetation and habitat types were described on the Gaviota coast. More than 850 plant species, 53 mammal species, 315 bird species (115 breeding), 17 reptile species, and 10 amphibian species are found in these habitat types.
Status of Watershed Planning Efforts	There is no watershed plan for the entire hydrological unit. The major coastal watershed-based planning effort is associated with Vandenberg Air Force Base's Final Integrated Natural Resource Management Plan (October 1996).
Restoration Goals and Objectives Related to Wetlands	Data unavailable.
List of Major Restoration Activities	Data unavailable.

Appendix B: Wetlands Conservation Planning

Several existing federal, state, and local regional planning documents address issues related to wetlands recovery efforts in Southern California. In general, these documents focus on a specific species or group of species, geographic area, or issue. The Wetlands Recovery Project is integrating all of these related plans and policies into a coordinated strategy for Southern California. Key plans and policies for developing the WRP's regional strategy include:

- U.S. Shorebird Conservation Plan
- North American Waterfowl Management Plan
- Riparian Bird Conservation Plan
- Threatened and Endangered Species Recovery Plans (light-footed clapper rail, California least tern, Brown pelican, Steelhead trout)
- California Nonpoint Source Pollution Control Plan
- Ocean Resources Management Program
- California Continuing Resource Investment Strategy Project
- State Coastal Sediment Management Program
- Santa Monica Bay Restoration Plan
- Regional Water Quality Control Board Plans and Policies
- Multiple Species Conservation Planning in San Diego and Orange Counties

This chapter provides a brief review of these plans and highlights goals and priorities related to WRP activities.

United States Shorebird Conservation Plan

The United States Shorebird Conservation Plan (USSCP) was developed by a partnership of federal and state agencies, non-governmental conservation organizations and individual researchers to create national and international partnerships committed to the conservation of shorebirds that depend on wetland habitats. The USSCP calls for the creation of regional planning efforts to identify conservation actions, and to develop integrated management practices to protect shorebirds. The plan identifies international, national, and regional goals, along with recommended management activities. The overarching international goals of the USSCP are to:

- Develop monitoring programs related to shorebird declines;
- Conduct research on the factors limiting populations of declining shorebirds, and
- Focus international conservation efforts on reducing limiting factors and developing coordinated shorebird conservation efforts.

Management activities recommended for the Southern Pacific region, including the Southern California coast, include:

- Increase the area and quality of tidal wetlands along the coast.
- Protect coastal wetlands from development.

The Plan also recommends focusing on experimentation with management of human-built habitats such as salt ponds and rice fields.

North American Waterfowl Management Plan

The North American Waterfowl Management Plan (NAWMP) develops a strategy to restore waterfowl populations through habitat protection, restoration, and enhancement. The Plan was originally developed by the U.S. and Canadian governments, and Mexico subsequently became a participant. Specific goals identified in the plan include:

- Develop measurable, scale-specific management objectives;
- Expand monitoring and assessment capabilities;
- Design and carry out evaluations related to conservation strategies;
- Define and implement waterfowl conservation in a landscape context;
- Implement community-based projects within a landscape context;
- Broaden partnerships with other migratory bird conservation initiatives; and
- Support and encourage conservation partnerships with communities.

The success of the Plan depends on partnerships and "joint ventures" that involve federal, state, tribal and local governments, businesses, conservation groups, and individual citizens. Joint ventures are designed to develop implementation plans focusing on areas of concern identified in the Plan. The WRP functions as the equivalent of a joint venture in Southern California, but it does not have official "joint venture" status under the NAWMP. There are no specific areas of concern mentioned in the NAWMP associated with coastal Southern California.

Riparian Bird Conservation Plan

The Riparian Bird Conservation Plan guides conservation, policy, and actions on behalf of California's riparian habitats and associated land birds. The Plan was developed by the California Riparian Habitat Joint Venture (RHJV) a partnership among several federal, state, and local agencies, and non-governmental organizations. The Plan provides the foundation for adaptive conservation planning in California's riparian habitats. It outlines objectives for habitat protection, restoration, cultivated restoration, management, monitoring and research, and public policies. Key objectives related to WRP efforts include:

- Prioritize riparian sites for restoration and protection based on: 1) current indicators of avian population health; 2) proximity to existing high quality sites; 3) areas with

intact adjacent upland habitats; 4) intact natural hydrology or the potential to restore natural hydrologic processes; and 5) surrounding land uses.
- Promote self-sustaining functioning riparian ecosystems.
- Restore and manage riparian forest to promote structural diversity and volume of the understory.
- Restore the width of the riparian corridor.
- Protect, enhance and recreate natural riparian processes, particularly hydrology and associated high-water events.
- Control and eradicate non-native plant species. This is best planned and implemented on a watershed scale.

The Plan identifies "Portfolio Sites" throughout the state which have been recognized by the RHJV for their active programs of restoration and protection that consider birds. The Santa Clara River is the only portfolio site identified to date from the south coast.

Threatened and Endangered Species Recovery Plans

In 1973, Congress passed the federal Endangered Species Act (ESA) with the ultimate goal to "recover" threatened and endangered species so they no longer need protection under the Act. The Act stipulates that recovery plans be developed for listed species that describe the steps needed to restore a species to health. The U.S. Fish and Wildlife Service is responsible for preparing most recovery plans, with the exception of those for marine and anadromous fishes which are prepared by the National Marine Fisheries Service. Recovery plans applicable to Southern California's coastal wetlands and watersheds include:

a. Light-footed Clapper Rail
b. California Least Tern
c. California Brown Pelican
d. Western Snowy Plover
e. Vernal Pools of Southern California
f. Southwestern Willow Flycatcher (draft)
g. California Red-legged Frog (draft)
h. Least Bell's Vireo (draft)
i. Arroyo Southwestern Toad

The State of California has also developed a recovery plan for the southern steelhead trout. A federal Recovery Plan for this species has not yet been drafted.

(a) Light-footed clapper rail recovery plan

The light-footed clapper rail (*Rallus longirostris levipes*) is one of three clapper rail subspecies in California. The light-footed clapper rail is found in coastal salt marshes from Santa Barbara County, California to San Quintin Bay in Baja California, Mexico. Clapper rails frequent coastal marshes where tidally influenced habitats are bordered by upper estuarine vegetation (e.g.,

cattails, tules) that result from fresh-water inputs. Upper estuarine habitats are important for nesting and foraging, and for birds dispersing or wandering after breeding. Small populations of the bird remain primarily in Ventura County (Mugu Lagoon) and Orange County (Anaheim Bay and Newport Bay).

The dredging and filling of marshes in southern California is the primary cause of the decline in the abundance and distribution of the clapper rail. In the 1800s, the bird was also hunted. Excessive runoff, poor water quality, habitat destruction, and severe storms adversely affect the marsh community and hinder reproduction success rates. The bird was added to the federal list in October 1970.

The primary objective of the light-footed clapper rail recovery plan (USFWS 1985) is to increase the rail breeding population to at least 800 pairs within 10,000 acres of adequately protected, suitably managed, secure wetland habitat, consisting of at least 50% appropriate marsh vegetation in at least 20 complexes. The USFW Service states that this objective could be achieved by preserving, restoring, and/or creating approximately 10,000 acres of habitat. The Recovery Plan recommends:

- Protecting existing habitat;
- Increasing the carrying capacity and stability of existing habitat;
- Increasing the size of particular population units;
- Creating and stocking new habitat; and
- Protecting and managing the population of the birds south of the US-Mexico border.

The Recovery Plan identifies the several Southern Californian wetlands as critical habitat for the clapper rail, including Goleta Slough, Kendall-Frost Ecological Reserve, upper Newport Bay, Anaheim Bay, Santa Margarita River Estuary, and the Tijuana Marsh. In addition, the plan identifies degraded marshes, such as Carpinteria Marsh, San Joaquin Marsh, and Sweetwater Marsh as potential restoration areas for the endangered bird. With respect to these coastal wetlands, the following restoration activities are recommended in the plan:

- Improve/restore tidal action;
- Create/expand fringing freshwater marsh;
- Create low and high marsh;
- Create nesting hummocks;
- Enhance the vigor of cordgrass;
- Improve network of tidal channels;
- Remove exotic vegetation;
- Control sedimentation, human disturbance, pollutants, debris, and predators; and
- Identify water quality concerns.

(b) California least tern recovery plan

The California least tern (*Sterna albifrons browni*) is one of 12 recognized subspecies of the least tern. Least terns nest and roost on sandy beaches and feed over the nearshore ocean. They also use estuaries, sloughs, lagoons, and river mouths for feeding and roosting. From mid-April to mid-May, the migratory California least tern colonies arrive to feed and roost in southern California's coastal wetlands. Their historic breeding range stretched along the Pacific coast from the San Francisco Bay to San Jose del Cabo, Baja California, Mexico. The decline in the abundance and diversity of the least tern has followed development of south coast wetlands, heavy recreational use of beaches, and the introduction of non-native predators (e.g., rats, cats, dogs, and red foxes).

The recovery plan for the species (USFWS 1985) recommends the following with respect to SCWRP wetlands:

- Protect existing habitat (such as the Santa Margarita Estuary);
- Preserve feeding areas (such as Devereux and Goleta Sloughs);
- Create or restore habitat (e.g., at San Dieguito Lagoon and the mouth of Santa Ana River);
- Identify special site protection problems of certain insecure colonies and implement corrective action as needed (at Playa del Rey, San Gabriel River and Santa Clara River Mouths);
- Provide adequate nesting habitat in former or potential breeding areas (such as Anaheim Bay, Bolsa Bay Ecological Reserve, Upper Newport Bay Ecological Reserve);
- Protect nesting areas for existing colonies (located at San Elijo Lagoon, Mugu Lagoon, Santa Margarita River Mouth, Huntington State Beach Least Tern Natural Area, Upper Newport Bay Ecological Reserve, and Los Peñasquitos Lagoon); and
- Restore tidal flow in wetlands to enhance feeding grounds (for sites located on Mugu lagoon, Bolsa Bay, Anaheim Bay and Los Peñasquitos Lagoon).

(c) Brown pelican recovery plan

The California brown pelican (*Pelecanus occidentalis californicus*) is one of six recognized subspecies of the brown pelican. The brown pelican is strictly a coastal-dependent bird, frequenting open nearshore waters, bays, harbors, river mouths and lagoons. The breeding range of the brown pelican begins at the Channel Islands (in the Southern California Bight), and continues southward to Isla Ixtapa off Acapulco, Mexico. The primary reason for the endangerment of the pelican is pollution, such as DDT and PCB concentrations found in the marine environment. In 1970, the California brown pelican was classified by the USFWS as an endangered species.

The Recovery Plan (USFWS 1983) focuses on the Southern California Bight population, with a particular emphasis on the need to protect nesting sites on Anacapa Island, which is the last major nesting area for the bird. The goals of the Recovery Plan address the basic habitat needs of the California brown pelican, and include:

- Disturbance- and predator-free nesting areas;
- Offshore habitat with an adequate food supply, and
- Appropriate roosting sites (located in Southern Californian wetlands) for both resident and migrant pelicans.

The Recovery Plan calls for the preservation of marsh habitats of the south coast (including river mouths), which are important roost areas for the brown pelican. Mugu Lagoon, is the major roost area for the pelican due to its proximity to Anacapa Island, which is 14 miles offshore. The Recovery Plan notes that the destruction of major roost areas may have adverse population effects.

(d) Western Snowy Plover Draft Recovery Plan

The Pacific coast population of the western snowy plover (*Charadrius alexandrinus nivosus*) breed primarily on coastal beaches from southern Washington to southern Baja California, Mexico. Western snowy plovers breed primarily above the high tide line on coastal beaches, sand spits, dune-baked beaches, sparsely-vegetated dunes, beaches at creek and river mouths, and slat pans at lagoons and estuaries. Habitat degradation caused by human disturbance, urban development, introduced beachgrass, and expanding predator populations have resulted in a decline in active nesting areas and in the size of the breeding and wintering populations. The Pacific Coast population of the western snowy plover was listed as threatened in 1993.

The Draft Recovery Plan (USFWS 2001) focuses on achieving well-distributed increases in numbers and productivity of breeding adult birds and providing for long-term protection of breeding and wintering plovers and their habitat. Recommended actions include:

- Maintain natural coastal processes that perpetuate high quality breeding habitat, including inlet formation, migration and closure.
- Remediate and compensate the disruption of natural processes by creating and enhancing existing and potential breeding habitat.
- Create, manage, and enhance coastal ponds and playas for breeding habitat. Significant opportunities for management of nesting plovers currently exist at Bolsa Chica wetlands and south San Diego Bay salt ponds.
- Prevent disturbance of breeding snowy plovers by people and domestic animals.

(e) Vernal Pools of Southern California Recovery Plan

Vernal pools are seasonal depressional wetlands with a rich endemic flora and micro fauna. Numerous plant species are dependent upon southern California vernal pools. Pools are utilized by birds and various mammals for food, water, and nesting. Fairy shrimp and other invertebrates provide food for waterfowl, especially ducks. The Southern California Vernal Pool Recovery Plan (USFWS 1998) addresses six species that are listed as endangered and one that is proposed for threatened status: San Diego button-celery (*Eryngium aristulatum parishii*), California Orcutt grass (*Orcuttia californica*), San Diego mesa mint (*Pogogyne abramsii*), Otay mesa mint (*Pogogyne nudiuscula*), Riverside fairy shrimp (*Streptocepahlus woottoni*), San Diego fairy

shrimp (*Branchinecta sandiegonensis*), and spreading navarretia (*Navarretia fossalis*). It is estimated that as much as 97 percent of vernal pool habitat in Southern California has been lost, primarily due to urban development.

The Recovery Plan outlines several actions for conserving and enhancing Southern California vernal pool habitat, with specific emphasis on stabilizing and protecting existing populations for the six endangered species. Key recommendations include:

- Secure remaining vernal pools and their watersheds through fee acquisition or conservation agreements.
- Rehabilitate and enhance vernal pool habitats and their constituent species.
- Reestablish vernal pool habitat to historic structure and composition to increase genetic diversity and population stability.

Key locations identified in the Recovery Plan, include three mesa-top complexes in Goleta, the Otay and Kearny mesas in San Diego, and scattered sites in northern San Diego and southern Orange counties.

(f) Southwestern Willow Flycatcher Draft Recovery Plan

The southwestern willow flycatcher (*Empidonax traillii extimus*) breeds in dense riparian habitats in southwestern North America, and winters in southern Mexico, Central America, and northern South America. The southwestern willow flycatcher breeds in relatively dense riparian tree and shrub communities associated with rivers, swamps, and other wetlands. Habitat requirements include brushy savanna edges, second growth, shrubby clearings and pastures, and woodlands near water. Destruction and modification of riparian habitats has greatly reduced available breeding habitat for the southwestern willow flycatcher. Concurrent with habitat loss have been increases in brood parasitism by the brown-headed cowbird.

The southwestern willow flycatcher was listed as endangered in 1995. Designated critical habitat in Southern California includes portions of the Santa Ana, Santa Margarita, San Luis Rey, San Dieguito, San Diego, and Tijuana Rivers. The Draft Recovery Plan (USFWS 2001) recommends increasing and improving breeding habitat, by restoring, mimicking and/or recreating natural physical and biotic processes that influence riparian ecosystems, and reducing other stresses on the flycatcher. Specific actions include:

- Restoring the diversity of fluvial processes that allow a diverse assemblage of native plants to develop.
- Restore adequate hydrogeomorphic elements.
- Manage exotic plant species.
- Conserve and protect all existing breeding sites.
- Secure, maintain, and enhance largest populations, in particular the Upper San Luis Rey River and the Santa Margarita River on Camp Pendleton.
- Develop new habitat near extant populations.
- Manage brown-headed cowbird parasitism.

(h) Least Bell's Vireo Draft Recovery Plan

The least Bell's vireo (*Vireo bellii pusillus*) is an obligate riparian species during the breeding season and typically inhabits structurally diverse woodlands along watercourses, including cottonwood-willow forests, oak woodlands, and mulefat scrub. The breeding distribution of the least Bell's vireo is currently restricted to eight counties in southern California and portions of Baja California, Mexico. Least Bell's vireo winter in southern Baja California. Extensive breeding habitat loss and degradation and brood parasitism by the brown-headed cowbird have resulted in a rangewide decline of the least Bell's vireo.

The least Bell's vireo was listed as endangered in 1986. One objective of the Draft Recovery Plan (USFWS 1998) is to establish stable or increasing populations, each consisting of several hundred or more breeding pairs, at several sites including: Tijuana River, Dulzura Creek/Jamul Creek/Otay River, Sweetwater River, San Diego River, San Luis Rey River, Camp Pendleton/Santa Margarita River, Santa Ana River, Orange County/Los Angeles County, and Santa Clara River. The plan identifies key threats and recommended actions for each of these sites.

Additional actions recommended in the plan include:

- Continue cowbird removal to increase breeding success.
- Develop alternative means of controlling cowbird parasitism.
- Control nonnative plant species.
- Establish perpetual endowments for cowbird control and/or exotic plant control in least Bell's vireo habitat.

(g) California Red-legged Frog Draft Recovery Plan

The California red-legged frog (*Rana aurora draytonii*) is endemic to California and Baja California, and is typically found from sea level to elevations of about 1,500 meters. The California red-legged frog requires a variety of habitat elements with aquatic breeding areas embedded within a matrix of riparian and upland dispersal habitats. Breeding sites of the California red-legged frog are in aquatic habitats including pools and backwaters within streams and creeks, ponds, marshes, sag ponds, dune ponds and lagoons.

The California red-legged frog has been extirpated from 70 percent of its former range and now is found in coastal drainages from Marin County south to northern Baja California. The frog is no longer found in San Diego or Orange counties. In 1996, the frog was federally listed as threatened. Potential threats to the species include elimination or degradation of habitat from land development and land use activities and habitat invasion by non-native aquatic species.

The first priority identified by the California Red-Legged Frog Draft Recovery Plan (USFWS 2000) is to develop and implement watershed management and protection plans for every watershed within the current and historic range of the California red-legged frog. The Recovery Plan identifies these watersheds, and ranks development of a management plan for each

watershed as priority one, two or three. The plan also provides extensive guidance on preparation of the watershed management and protection plans, including:

- Protect suitable habitats and buffers in perpetuity, in part through acquisition of parcels and conservation easements.
- Develop and implement guidelines for maintaining adequate water flow regimes.
- Control/eliminate non-native species/predators.
- Decrease the exposure of California red-legged frogs and their habitats to contaminants.

(i) Arroyo Southwestern Toad Recovery Plan

The arroyo southwestern toad (*Bufo microscaphus californicus*) is endemic to primarily the coastal plain and mountains of central and southern California and Baja California. These toads breed in stream channels and use stream terraces and surrounding uplands for foraging and wintering. Direct habitat loss due to urbanization, agriculture and dam construction is the main cause for the decline of the arroyo toads. The arroyo toad was listed as endangered in 1994.

The Recovery Plan for the Southwestern Arroyo Toad (USFWS 1999) identifies eight watersheds in Southern California that are critical to the arroyo toad's recovery. These are: 1) San Juan Creek; 2) Santa Margarita River; 3) San Luis Rey River; 4) San Dieguito River/Santa Ysabel Creek; 5) San Diego River; 6) Sweetwater River; 7) Otay River/Dulzura Creek; and 8) Tijuana River-Cottonwood Creek basins.

The recovery strategy consists of five parts:

- Stabilize and maintain populations throughout the range of the arroyo toad in California by protecting sufficient breeding and nonbreeding habitat.
- Monitor the status of existing populations to ensure recovery actions are successful.
- Identify and secure, by appropriate management and monitoring, additional suitable arroyo toad habitat and populations.
- Conduct research to determine the population dynamics and ecology of the species to guide management efforts and determine the best methods for reducing threats.
- Develop and implement an outreach program to reduce negative human-related effects on arroyo toad habitats and populations.

(j) Steelhead Recovery Plan

The southern steelhead (*Oncorhynchus mykiss*) is an indicator species for the general health and integrity of coastal watersheds. The southern steelhead was listed as an endangered species in August 1997. With respect to the south coast, the evolutionarily significant unit (ESU) includes all naturally spawned populations of steelhead (and their progeny) in streams from the Santa Maria River to Malibu Creek. This has been the observed range of the species in most recent years. However, in years of substantial rainfall, spawning steelhead can be found as far south as the Santa Margarita River in northern San Diego County. NMFS is considering extending the ESU down to San Mateo Creek.

In 1996, the California Department of Fish and Game developed a *Steelhead Restoration and Management Plan for California*. Goals for steelhead restoration and management within the state were identified as: 1) increase natural production so that steelhead populations are self-sustaining and maintained in good condition, and 2) enhance angling opportunities and non-consumptive uses. Strategies to accomplish these goals include:

- Restore degraded habitat.
- Restore access to historic habitat that is presently blocked.
- Develop and facilitate research to address deficiencies in information on fresh water and ocean life history, behavior, habitat requirements, and other aspects of steelhead biology.

The DFG Steelhead Plan identifies key issues for steelhead recovery and recommends next steps for several watersheds in Southern California. These are summarized below.

- Santa Barbara County Coastal Streams
    - Removal of passage barriers on Gaviota Creek and Rincon Creek
- Ventura River
    - Increase instream flows
    - Remove or modify Matilija Dam
    - Undertake comprehensive watershed planning for the river
    - Assess habitat in San Antonio and Coyote creeks
- Santa Clara River
    - Increase instream flows
    - Assess habitat on Santa Paula Creek
- Malibu Creek
    - Remove or modify Rindge Dam
    - Remove or modify passage barriers upstream of Rindge Dam
    - Maintain instream flows
- Coastal Streams South of Malibu
    - Assess habitat and potential for restoration of steelhead runs in coastal streams south of Malibu, including San Mateo Creek, the Santa Margarita River, and the San Luis Rey River

California Nonpoint Source Pollution Control Plan

The California Nonpoint Source Pollution Control Plan is the first significant upgrade of California's Nonpoint Source Pollution Control Program (NPS Program) since its inception in 1988. The State Water Resources Control Board and the Coastal Commission developed the plan in partnership with all of the State agencies within the California Resources Agency and the California Environmental Protection Agency. The Plan provides a single, unified, and coordinated approach to deal with NPS pollution structured around 61 management measures (MMs). MMs serve as general goals for the control and prevention of polluted runoff. Site-specific management practices (MPs) are then used to achieve the goals of each management measure.

Several of the management measures directly relate to the WRP's efforts, including:

- Instream and riparian habitat restoration
- Erosion and sediment control
- Protection of surface water quality and instream and riparian habitat
- Protection of wetlands and riparian areas
- Restoration of wetlands and riparian areas
- Vegetated treatment systems -- Promote the installation of vegetated treatment systems (e.g., artificial or constructed wetlands)
- Promote the establishment of programs to develop and disseminate scientific information on wetlands and riparian areas and to develop greater public and agency staff understanding

The Plan specifically recommends that agencies coordinate with the WRP for management measures related to hydromodification or wetlands.

Ocean Resources Management Program

The goal of the California Ocean Resources Management Program (CORMP) is to ensure comprehensive and coordinated management, conservation, and enhancement of California's ocean resources for their intrinsic value and for the benefit of current and future generations. The CORMP focuses on four areas: stewardship; economic sustainability; research, education, and technology; and jurisdiction and ownership. *California's Ocean Resources: An Agenda for the Future* was prepared by the California Resources Agency and outlines an implementation strategy for the CORMP. One chapter of the Ocean Agenda addresses Habitats and Living Resources and provides several recommendations relevant to the WRP's efforts:

- Complete resource inventories within bays, estuaries, and coastal lagoons along the California coast, as well as within the waters offshore the California coastline, and make this data accessible through the California Environmental Resources Evaluation System (CERES).
- Establish additional comprehensive long-term approaches for sustainably managing California's ocean and coastal fishery stocks, with an emphasis on re-building stocks in decline.
- Support state, national, and international efforts to reduce the importation and establishment of non-native species and study the current effects of these species on California and other West Coast states.

California Legacy Project

The California Legacy Project (CLP; formerly CCRISP) is an initiative by the California Resources Agency to help state agencies and the state's conservation partners make better decisions about how to conserve the state's natural resources. CLP is a new program and is just

beginning its planning and data collection efforts. CLP will build on and support regional planning efforts that are already underway. But it will approach conservation from a broad, statewide perspective that focuses on whole ecosystems and promotes conservation of five key sets of natural resources:

(a) High priority aquatic and terrestrial biodiversity resources.
(b) Working landscapes such as agricultural lands, ranch lands, and forest lands.
(c) Watershed values.
(d) Natural lands for recreation and education.
(e) Existing and restorable natural open space in and around urban areas.

The WRP will coordinate closely with the Resources Agency in developing resource data and evaluating priorities for Southern California.

In a related effort, the Resources Agency commissioned a study, based on a simple methodology, assigning conservation priorities for biodiversity preservation and urban open space. The results of the Resource Assessment Project (RAP) and its recommendations provided many lessons that helped to make CLP's draft conservation priorities methodology better. A major contribution was the development of a set of improved and updated data layers, including a map showing all lands currently in state and federal ownership. All natural areas within fifty miles of the major metropolitan areas were also mapped.

State Coastal Sediment Management Program

The California Resources Agency is spearheading a program to develop a comprehensive coastal sediment management program for the state. As one element of this, the Resources Agency has released a Draft Policy on Coastal Erosion, that advocates the need for restoring sediment transport functions in the coastal watersheds:

- The Resources Agency and its constituent departments should be proactive in protecting and enhancing natural coastal landforms and processes, such as increasing sediment transported through coastal watersheds to the coastline.

Efforts to restore sediment transport to reduce coastal erosion will also benefit the WRP's watershed enhancement and restoration efforts. In addition, sediment removed from coastal wetlands as part of restoration activities may be a source of additional sand for Southern California's beaches.

Santa Monica Bay Restoration Plan

In 1988, Santa Monica Bay was accepted into the National Estuary Program, and the Santa Monica Bay Restoration Project was tasked with assessing problems in the Bay and producing a restoration plan. The SMB Restoration Project includes over 50 federal, state, and local partners. The Santa Monica Bay Restoration Plan contains over 200 recommendations that address the need for pollution prevention, public health protection, habitat restoration, and comprehensive

resource management of the Bay. The plan has a specific section addressing the Bay's wetlands, which outlines the following goal and strategies:

- Goal: To improve wetland quality, increase wetland quantity, and to ensure long-term, comprehensive management and protection.
- Strategies:
    - Restore and enhance ecological diversity and productivity of degraded wetlands (function and value).
    - Protect existing wetlands through improved regulation, local land use plans, special ordinances, and/or other measures (at all levels of government).
    - Acquire privately-owned wetlands.
    - Coordinate funding for restoration and creation projects.
    - Ensure long-term management and monitoring for wetlands.
    - Develop and implement a long-term education program focusing on wetlands.
    - Create new wetlands, where feasible.

The plan specifically identifies Ballona Wetlands, Ballona Lagoon, and Malibu Lagoon for restoration. Other potential restoration sites identified include Trancas Lagoon, Upper Medea Creek, Lower Topanga Canyon, Zuma Canyon, Arroyo Sequit Canyon, and La Sierra Canyon.

The Santa Monica Bay Plan also outlines a program for watershed planning and management with the goal "to protect the beneficial uses of the Bay by applying a coordinated and comprehensive watershed planning and management approach.

Regional Water Quality Control Board Policies and Plans

The Southern California Wetlands Recovery Project area is falls within the jurisdiction of four of the State's Regional Water Quality Control Boards (San Diego, Santa Ana, Los Angeles, and Central Coast). Each of these Regional Boards are represented on the WRP Governing Board and Managers Group. The Boards' participation ensures that the WRP's policies and programs will be consistent with Regional Board objectives, and facilitates cooperation among the Regional Boards and the federal, state, and local partners of the WRP.

Each Regional Boards has prepared a Basin Plan and a Watershed Management Initiative (WMI) Chapter for their region; together, these two documents provide a framework for each Board's activities. The Basin Plans are designed to preserve and enhance water quality and protect the beneficial uses of all waters. Specifically, the Basin Plans (1) designate beneficial uses for surface and ground waters, (2) set narrative and numerical objectives that must be attained or maintained to protect the designated beneficial uses and conform to the state's anti-degradation policy, and (3) describe implementation programs to protect waters in the region. Designated beneficial uses include supporting aquatic and wetland habitats in general, as well as specifically habitat for rare and endangered species, migratory species, and fish spawning habitat. The State Water Board determines which waterbodies in the state are "impaired" as defined by Section 303(d) of the federal Clean Water Act based on the beneficial uses and water quality objectives

defined in the Basin Plans. The State Water Board ranks each of the impaired waterbodies as high, medium, and low priority.

The Watershed Management Initiative is a relatively new effort of the State and Regional Water Boards to provide water resource protection, enhancement, and restoration while balancing economic and environmental impacts through an integrated planning approach. Through the WMI, water quality monitoring, assessment, planning, standards, permit writing, nonpoint source management, ground water protection, and other programs at the State and Regional Boards are integrated to promote a more coordinated and efficient use of personnel and fiscal resources while ensuring maximum water quality protection benefits. Each Regional Board has drafted a WMI Chapter that provides an overview of the watershed management areas (WMAs) in its region, discusses current and potential Regional Board activities in relation to these WMAs, identifies impaired waterbodies, and outlines an expected schedule for development of TMDL[1] regulations for impaired waterbodies within each WMA.

The WMI Chapter of the San Diego RWQCB outlines several principles and guidelines related to wetlands including:

- Protect and preserve existing wetlands.
- Restore historical salt and brackish marsh habitats wherever possible.
- Protect existing salt and brackish marsh habitats from conversion to freshwater marsh habitats.
- Restore and enhance freshwater wetland habitats, except in areas where such habitats would encroach into salt and brackish water marsh habitats.
- Protect vernal pool complexes as unique wetland habitats which are extremely difficult to recreate.
- Preserve high quality ephemeral stream habitats in those areas (such as on military bases and in large rural parks) which can be protected from the hydrological changes which accompany urban development.
- Preserve wildlife corridors and connectivity functions along riverine systems.
- Protect wetlands from the invasion of non-native species.
- Provide sufficient vegetated buffer around wetlands to protect wetland habitat functions.
- Promote public awareness of the important habitat and water quality functions of wetlands.
- Expand the acreage of wetlands in developing areas to treat urban runoff, recognizing that wetlands provide water quality protection functions.
- Encourage the use of constructed wetlands to improve water quality and enhance beneficial uses throughout the region.
- Promote management measures that preserve the natural hydrology of the floodway and do not require clearing or other maintenance of native riparian and wetland vegetation in order to maintain flow capacities needed to reduce damage from flooding along riverine systems.

[1] Total Maximum Daily Load

The Los Angeles RWQCB has incorporated priorities identified by the Southern California Wetlands Recovery Project into the "Wetlands Protection and Management" section of its WMI Chapter. The WMI identifies additional priorities that relate to the WRP's work, including:

- Watershed monitoring and assessment – coordination of existing resources and participation in regional and statewide efforts to fund this program at an appropriate level.
- Habitat loss/restoration – even with strides in improving instream water quality, unless habitat is restored, in many cases beneficial uses can not be restored. Efforts which address this need are 401 certification, the Southern California Wetlands Recovery Project, and various watershed efforts. Removal of exotic species is also included in these efforts.
- Priority nonpoint source efforts – several areas have been targeted for accelerated efforts including development of regional strategies to address agriculture, septic tanks, urban runoff, and marinas as contributors of nonpoint source pollution.

Multiple Species Conservation Planning

Both the federal and state governments have legislation related to multiple species conservation planning. The 1982 amendments to the federal Endangered Species Act included the addition of Section 10. Section 10 authorized Habitat Conservation Plans (HCPs) to give states, local governments, and private landowners a means by which they could "incidentally take" listed species or their habitats only after the landowners have identified what will be done to "minimize and mitigate" the impact of the permitted take on the listed species. In 1991, the State passed the Natural Community Conservation Planning Act with the primary objective of conserving natural communities at the ecosystem scale while accommodating compatible land use. The focus of the initial NCCP effort has been the coastal sage scrub habitat of Southern California, home to the California gnatcatcher and approximately 100 other potentially threatened or endangered species. HCPs and NCCPs only address endangered species regulations. Areas with approved HCPs or NCCPs plans are still subject to wetlands regulation under the Section 404 of the Federal Clean Water Act and Section 1600 et seq. of the State Fish and Game code.

There are several multiple species conservation planning efforts underway in San Diego and Orange Counties. These programs and their policies and priorities related to wetlands are discussed below.

1. San Diego Multiple Species Conservation Program

The San Diego Multiple Species Conservation Program (MSCP) is a comprehensive habitat conservation planning program for southwestern San Diego County. The program has been approved by both the U.S. Fish and Wildlife Service and the California Department of Fish and Game. The goal of the MSCP is to create a preserve network that consists of multiple habitat patches and wildlife "corridors" to protect selected sensitive plant and animal species within the boundaries. The MSCP study area covers approximately 900 square miles and includes the City of San Diego, unincorporated County land, and portions of 10 other city jurisdictions.

Within the MSCP study area, a Multi-Habitat Planning Area (MHPA) has been identified in which a permanent preserve will be assembled and managed for its biological resources. The MSCP plan assumes that all wetland and riparian habitat within the MHPA will be completely conserved. A significant amount of wetland and riparian habitat within the MSCP study area is not included in the MHPA, making it susceptible to future development. This includes:

- Southern Coastal Saltmarsh – 151 acres
- Freshwater Marsh – 318 acres
- Riparian Forest – 250 acres
- Oak Riparian Forest – 2,307 acres
- Riparian Woodland – 143 acres
- Riparian Scrub – 1,088 acres
- Disturbed Wetlands – 190 acres

The MSCP will be implemented through subarea plans adopted by each local jurisdictions. Subarea plans contain criteria, such as conservation targets, mitigation standards and/or development encroachment limits, to ensure that habitat preservation proceeds in step with development, and mechanisms to avoid or minimize project impacts to the preserve. A preserve management plan, or a schedule for its preparation, is also contained in the subarea plan. Subarea plans for the cities of San Diego, Chula Vista, Santee, Del Mar, and Coronado, the County of San Diego and Otay Water District are included in the MSCP Plan (Volume II). Subarea area plans have also been completed and approved for the cities of La Mesa and Poway.

2. SANDAG Multiple Habitat Conservation Plan

The San Diego Association of Government (SANDAG) led the preparation of a multiple species conservation plan for northern San Diego County called the Multiple Habitat Conservation Plan (MHCP). The MHCP planning area covers 183 square miles and includes the cities of Carlsbad, Encinitas, Escondido, Oceanside, San Marcos, Solana Beach and Vista. A draft of the MHCP was released by the SANDAG Board on June 22, 2001, and has not yet been approved by federal, state, or local agencies. Subarea plans have been completed and released for review for the cities of Carlsbad, Encinitas, Escondido, Oceanside, and San Marcos. Each City's subarea plan identifies focused planning areas (FPAs) within which some lands will be dedicated for open space and habitat conservation.

The MHCP includes a "no net loss" policy for wetlands, including riparian habitat. Key objectives of the MHCP related to the WRP's efforts include:

- Conserve and manage the majority of remaining biological core and linkage areas;
- Help conserve a large core area contiguous with but outside the study area boundary in a regionally significant location;
- Conserve most east-west movement corridors between upland areas and coastal lagoon systems;

- Conserve a regionally significant north-south stepping stone corridor for bird species, especially the California gnatcatcher;
- Preserve significant landscape linkages between the study area and adjoining jurisdictions
- Restore and enhance linkage function in some critical locations.

3. Orange County Natural Community Conservation Planning

The NCCP program within Orange County encompasses approximately 340,000 acres divided into two main subareas: Central/Coastal and Southern. In 1996, the Orange County Central/Coastal NCCP/HCP was approved by the USFW and the CDFG. The result of the NCCP/HCP is a preserve of 39,000 acres of coastal sage scrub, chaparral, grasslands, and other habitat. The Orange County NCCP focuses primarily on coastal sage scrub habitat, and only addresses a few riparian species. In the Southern subarea, the County, cities, and major landowners are preparing a NCCP/HCP subarea plan, and the ACOE and CDFG are preparing a Special Area Management Plan (SAMP) for wetlands planning. Together, these plans will integrate wetlands and endangered species planning. These programs will need to be approved by the USFWS, USACOE, and CDFG.