Coastal Wetlands - Emergent Marshes

General Description

Wetlands are broadly defined as the transitional lands that occur between the terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is covered by shallow water. There are five major systems of wetlands — marine, estuarine, riverine, lacustrine (lake), and palustrine (freshwater marsh). This paper discusses California's marine and estuarine wetland systems. However, it should be noted that all five systems occur in the state, all of which serve important roles as fish and wildlife habitat and in many ways are ecologically tied to one another.

One of the most widely used and comprehensive wetland classification system was developed for the U.S. Fish and Wildlife Service and is referred to as the Cowardin definition. This classification system defines wetlands as having one or more of the following three attributes: 1) at least periodically, the land supports predominantly hydrophytes; 2) the substrate is predominantly undrained hydric soil; and 3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year. Although this system is commonly used to classify wetlands, regulatory agencies such as the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, and other public agencies use varying definition when regulating the discharge of dredged or fill material or other alterations to wetland areas.

The term "tidal wetland" refers to areas that are covered with shallow intermittent tidal waters. Coastal tidal wetlands in the California include a number of natural communities that share the unique combination of aquatic, semi-aquatic, and terrestrial habitats that result from periodic flooding by tidal waters, rainfall, and runoff. These coastal wetlands, also referred to as salt marshes, provide a vital link between land and open sea, exporting nutrients and organic material to ocean waters. Wetlands also help to improve water quality, protect lands from flooding, provide energy to the estuarine and marine food webs, and help stabilize shorelines against erosion.

Tidal wetlands are dominated by a community of plants that are tolerant of wet, saline soils, and are generally found in low-lying coastal habitats which are periodically wet and usually saline to hypersaline. In fact, no other feature defines a salt marsh better than the plant communities that form there. The location of plant species within a salt marsh is defined by zone, with cordgrass (*Spartina foliosa*) forming the most seaward edge of the emergent marsh plant community. Of the thousands of plant species in North America, only cordgrass thrives in the lowest zone of a salt marsh. This lower marsh zone occurs from approximately mean sea level to the line of mean high tide.

The middle zone of a tidal marsh occurs from approximately the line of mean high tide to the mean higher high tide line and is characterized by the occurrence of pickleweed (*Salcornia sp.*). Pickleweed is less tolerant of tidal inundation than cordgrass, but is the most dominant plant of California tidal wetlands. Jaumea (*Jaumea carnosa*) also occurs, but to a lesser extent within the middle zone of California's coastal marshes.

The upper zone of a tidal marsh is defined by the line of mean higher high tide to extreme high tide. This upper zone of a salt marsh may only be inundated infrequently, in some locations as little as once or twice annually. Such innundation usually occurs during the spring tide cycle (highest annual tides) and during severe storm events. The upper zone of the tidal marsh is characterized by the dominance of salt grass (*Distichlis spicata*) which tolerates only occasional tidal inundation. This upper area of marshes contains the largest plant species diversity of the three zones. Species such as fat hen (*Atriplex patula*), sand spurrey *(Spergularia marina*), marsh rosemary (*Limonium californicum*), brass buttons (*Cotula cornopifolia*), can be found within the upper zone of salt marshes throughout California. In the southern portion of the state, species such as Australian salt bush (*Atriplex semibaccata*), sea-bite (*Suaeda californica* and *Suaeda fruticosa*), shoregrass (*Monanthochloe littoralis*), and salt marsh bird's beak (*Cordylanthus* sp.) can be found within the upper salt marsh zone.

The zonation of marshes in southern California is somewhat more complex than that described above. Southern California salt marshes lack expansive stands of cordgrass; instead they are dominated by succulents. Within the Mugu Lagoon, Anaheim Bay, Newport Bay, Mission Bay, San Diego Bay, and the Tijuna River estuary, zones of saltwort (*Batis maritima*) and annual pickleweed (*Salcor-*

Carpinteria Salt Marsh, Santa Barbara Co.
Credit: USEPA, 1995

nia bigelovii) integrate with cordgrass in the lower zone and perennial pickleweed (*Salcornia virginica*) and other middle zone plant species occur at higher than normal elevations in these and other southern California marshes.

In addition to the plant communities, other defining characteristics often associated with California's tidal wetlands include mudflats, tidal creeks, intertidal channels and sloughs, salt flats, and shallow pannes. Fresh water inflows are also often found in many of the state's coastal wetland areas, adding to the diversity of habitat types and associated species use.

Many of California's coastal wetlands are estuarine salt marshes. These salt marshes, associated mudflats, and eelgrass beds develop along the shores of protected estuarine bays and river mouths, as well as in more marine-dominated bays and lagoons. Overall, the state's tidal and estuarine wetland ecosystems provide some form of food, shelter, or other benefits to nearly a thousand species of fish, amphibians, reptiles, birds, mammals, and a multitude of invertebrates. During peak annual migration periods, hundreds of thousands of birds migrating along the Pacific Flyway descend upon the state's estuarine wetlands in search of refuge and food.

California's tidal wetlands also provide habitat for an array of endangered species, including the salt marsh harvest mouse, California clapper rail, certain runs of salmon, and wetlands plants such as a species of salt marsh birds peak. Wetlands produce an abundant yield of vegetation, which in turn provides the basis for a complex food chain nourishing a rich assortment of living organisms. The diversity and abundance of organisms in coastal wetlands is remarkable, given the often extreme and variable conditions that can occur. Bacteria, protozoa, algae, vascular plants, invertebrates, amphibians, fish, birds, and mammals can all be found within the state's coastal wetland ecosystems, and together comprise the biotic community of the wetland. Many of these organisms are dependent on the wetland for their existence, either spending their entire lives in the wetland, or spending a critical portion of their life cycle in the wetland.

Region	Estimated Original Acreage	Estimated Remaining Acreage	Estimated Percent Reduction
Northern Coast	unknown	31,300	unknown
Central Coast	unknown	3,800	unknown
San Francisco Bay	200,000	93,000 (tidal and mudflat)	54%
Southern Coast	53,000	13,100	75%
Statewide	**5,000,000**	**450,000**	**91%**

Historic Losses of California Coastal Wetlands
Source: Procedural Guidance for the Review of Wetland Projects in California's Coastal Zone, California Coastal Commision.

Status of Biological Knowledge

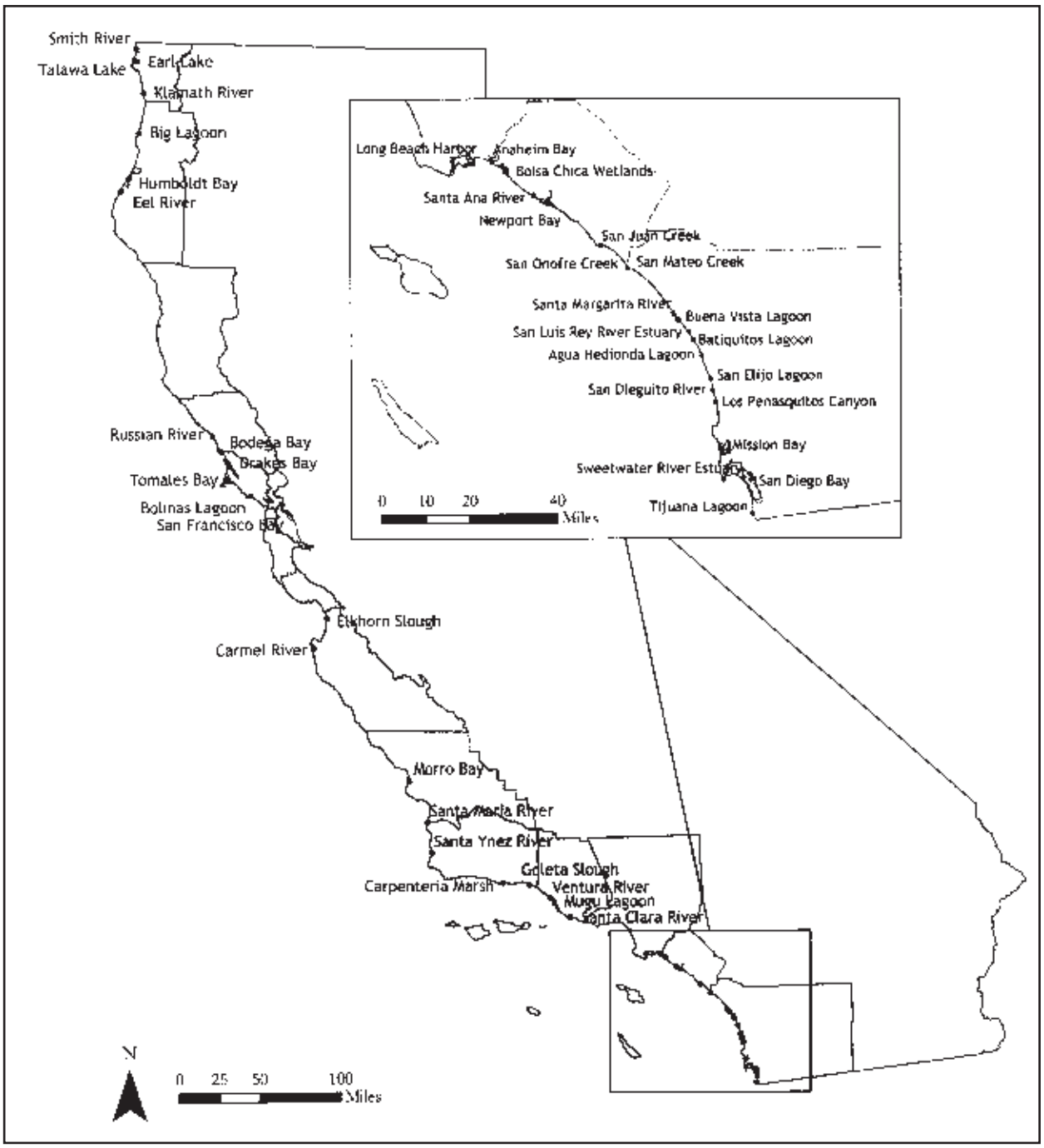
Literature on wetland science addresses a broad range of topic and setting, and much has also been written specific to California's estuarine and coastal wetlands. Programs such as the San Francisco Bay National Estuary Project, San Francisco Bay Baylands Ecosystem Habitat Goals Project, and organizations such as the Pacific Estuarine Research Laboratory, state and private universities, and numerous state and federal resource agencies have contributed extensively to the knowledge base of California's coastal wetland ecosystems. This is not to say that questions do not remain about the functions and science of the state's coastal wetlands.

Scientific study in the field of wetland science is ongoing. The role that the state's coastal wetland habitats play in the support of fish and wildlife resources is an area of extensive research, particularly in the effects of, and techniques for enhancement and restoration. Many of the coastal wetland restoration projects undertaken within the state include research and monitoring aspects within the project designs. Such analyses are vital to the overall knowledge base of wetland science and are critical to the improvement of subsequent wetland restoration activities.

Status of the Habitat

Human influence along California's coastline has a long history. The effect of this history is evidenced by the profound alteration of the natural environment, most pronounced of which are the modification of the shallow-water habitats within the state's bays and estuaries and the staggering loss of coastal wetlands. The total loss of California coastal wetlands is estimated at five million acres. This represents some 91 percent of the historic wetland acreage present before 1850. Although the entire coastline of the state has experienced losses of coastal wetland habitat, the largest losses are believed to have occurred in the San Francisco Bay estuary and along the southern coast of the state.

A variety of activities have contributed to the dramatic loss of California's wetlands. These include diking, filling, draining, and vegetation removal for agricultural uses; diking and filling for residential, commercial, and industrial development; placement of fill material for road and pad construction associated with oil and gas exploration and development; filling and other associated construction for roads, highways, and railways; dredging and filling for port and marina development; and channelization and filling for flood control purposes. Coastal wetland losses, including those historically occurring within bays and estuaries, throughout the state are primarily attributed to urban development. Although state and federal regula-



Principle Coastal Wetlands of California

tions, as well as social pressures have reduced activities that cause wetland losses, many are still occurring. Much of the current loss of wetlands is attributed to a lingering legacy of past development, such as continued use of wetland areas for agriculture, or expansion of existing urban and industrial complexes within wetland habitats. Secondary or indirect impacts also have contributed to the continued loss of coastal wetlands, including point and non-point source storm and wastewater discharges, and alteration of natural fresh and salt water inflows to the state's estuaries and wetland areas.

The Bolsa Chica wetlands in the Huntington Beach community is a site of recent controversy over wetland development and is an example of one of southern California's continuing struggles with the preservation of remnant coastal wetlands. The Bolsa Chica wetlands are the largest stretch of unprotected coastal marshland south of San Francisco, and provide 1,100 acres of wetland habitat, sup-

porting many species of plants, fish, and wildlife, including several endangered species of birds, such as the California least tern, light-footed clapper rail, Belding's Savannah sparrow, and peregrine falcon. Southern California once had over 53,000 acres of coastal wetland areas. This number is now down to approximately 13,000 acres. Such wetland losses have contributed to a decline in California's wintering bird population. Once estimated to be about 60 million, flyway populations now fluctuates between two and four million waterfowl, one and two million shorebirds. For the Pacific Flyway as a whole, there has been some improvement in recent years, partly because of the end of a multi-year drought in the northern breading areas, but also because of the efforts made at restoring California's coastal and inland wetlands.

In many ways, the degree and type of tidal wetland habitat losses within the San Francisco Bay estuary reflect what has occurred in the state. Early reclamation activities resulted in the draining and diking of tidal, freshwater, and brackish marshes in the San Francisco Delta, as well as around Suisun Bay and San Pablo Bay. Much of this reclaimed land was cultivated for agricultural purposes. Additionally, the construction of salt production facilities resulted in the conversion of thousands of acres of tidal marsh to permanent salt pond operations. At the end of World War II, urbanization of the San Francisco Bay Area resulted in the conversion of intertidal and subtidal habitats to urbanized uplands. As a result of these wetland conversion activities, it is estimated that 95 percent of the estuary's tidal marshes have been leveed or filled. Some of the converted wetland areas, such as salt ponds and diked lowlands, remain as wetland habitat, but of a different type, offering substantially altered functions than that which existed before conversion. At present, it is estimated that less than 38,000 acres of tidal wetlands remain in the San Francisco Bay estuary, with an additional mudflat habitat of approximately 65,000 acres, diked seasonal wetland habitat of approximately 58,000 acres, and salt ponds and salt crystallization facilities of approximately 36,500 acres of non-tidal wetland habitat.

Losses and alteration impacts of tidal wetland habitat associated with coastal inlets and riverine estuaries along the California coast have also been great. Many of the state's historical wetland areas of this type have been lost or reduced in size due to direct impacts such as channelization, dredging and continued breaching of outer sandbars for flood control, and marina and harbor construction. However, off-site activities including water diversion and sediment inputs associated with watershed alterations including logging and agricultural cultivation also have significantly impacted California's coastal tidal wetlands.

California's remaining coastal wetlands are highly valued as habitat for the multitude of species that depend on them, and as aesthetic, functional, environmentally necessary elements. In fact, tidal wetland protection and restoration activities have become front-page news in many areas of the state and funding sources, once unobtainable, are now becoming increasingly available. Even with such changes in the political, economical, and environmental settings, much work needs to be done to recapture and protect California's tidal wetland habitats. Additional research and continued monitoring of existing wetland restoration projects are needed to build and contribute to the database on how best to address and undertake these activities. Additionally, methods need to be developed to address problems which could lead to the further loss of coastal wetland areas due to the anticipated rising sea-level, and other factors such as invasive species. Further public education, community involvement, and political action are needed.

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