

Bay and Estuary Ecosystems

The bays and estuaries dotting California's coastline are truly the jewels in the crown of the state's marine environment. These partially enclosed bodies of water are protected from the full force of ocean waves, winds, and storms. Bays are wide inlets or indentations of the ocean, whereas estuaries are inlets containing the terminus of a river or stream. Many of the organisms described in this report spend part of their life in bays or estuaries. However, this section of the report focuses primarily on the plant and animal species that utilize the state's estuarine areas as their principal habitat.

California estuaries vary widely in shape and size, and are often referred to as lagoons, harbors, inlets, esteros, and sounds. The defining feature of an estuary is the mixing of fresh water from upland and riverine sources with oceanic salt water. The estuary ecosystem forms a zone of transition from land to sea and from fresh to salt water. The sheltered waters of California's estuaries support unique assemblages of plant and animal communities, varying by environmental conditions and location. Estuarine habitat types include shallow open waters, fresh and saltwater marshes, sandy beaches, tidal mud and sand flats, rocky shorelines, oyster-shell beds, river deltas, eelgrass meadows, and kelp beds.

California's estuarine environment sustains remarkably high levels of productivity. Often referred to as the "ocean's nursery," these waters support early life-history stages of such important organisms as California halibut, Dungeness crab, Pacific herring, starry flounder, and numerous surfperch species. Representative organisms typifying California estuaries include rails and stilts, harbor seal, Dungeness crab, surfperches, leopard shark, starry flounder, and clams and oysters. These animals are linked to one another and to an assortment of specialized plants and microscopic organisms through a complex food web, unique to estuarine environments. Tens of thousands of birds, mammals, fish, and other wildlife depend on estuarine habitats as places to live, feed, and reproduce. Additionally, the state's estuaries provide ideal locations for migratory birds in the Pacific Flyway to rest and forage during their journey. Due to their critical importance, the U.S. Environmental Protection Agency's National Estuary Project has identified San Francisco Bay, Morro Bay, and Santa Monica Bay as nationally significant estuaries, thus affording federal funding for research, management, and restoration efforts. This designation of three of the state's estuaries in no way diminishes the ecological importance of the other bay and estuarine ecosystems that dot the California coastline.

Besides serving as critical habitat for wildlife, the wetlands that fringe many of the state's bays and estuaries also provide other important ecological and human benefits. Wetland plants and soils act as natural buffers between land and ocean, absorbing flood waters, dissipating storm surge, and filtering sediments, nutrients, and other pollutants. The state's bays and estuaries are also cultural centers of coastal communities, serving as the focal point for local commerce, recreation, and cultural activities. The protected waters of California's bays and estuaries support important public infrastructure uses, serving as harbors and ports vital for the state's shipping, maritime, and industrial related economy.

Because of the complexity and fragility of estuarine ecosystems, they are imperiled by their proximity to intensive human activity and development. Sewage, industrial waste, dredging, filling of marshes and tidal flats, and oil development and spills typify the long-term degradation of many of California estuaries. As a result, 40 animal and 10 plant species that occur in or depend on the state's estuarine ecosystems, currently are listed by the federal government as threatened, endangered, or protected status. Additionally, environmental harm from non-indigenous, or invasive, species has increased exponentially in recent years. San Francisco Bay is considered by experts to be "the most invaded estuary in the world." Notable examples of deleterious nonindigenous species are the Chinese mitten crab, the Asian clam, and the European green crab. Such invaders are capable of wreaking extensive ecological and economic harm. As California's population grows, these impacts can be expected to increase. So too does the importance of protecting the state's estuarine resources for all of their natural, economic, and aesthetic values.

Eric J. Larson

California Department of Fish and Game

