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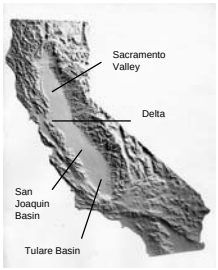
The History and Ecology of the Wetlands of California's Great Central Valley

Abstract

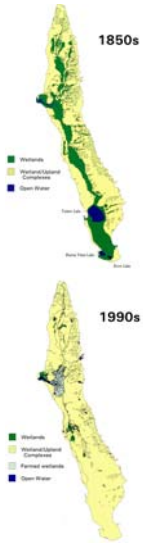
The destruction of wetlands and the loss of the ecological benefits they provide represents a grave loss to our national heritage. California has lost 91% of its wetlands, a percentage higher than that of any other state. In the Central Valley, less than 400,000 of the 4 million acres of permanent, seasonal, and tidal wetlands present at statehood in 1850 remain, most having been drained for conversion to agricultural use. During the mid-20th century, scientists discovered the critical importance of the remaining wetlands of the Central Valley as wintering habitat for waterfowl of the Pacific Flyway, a migratory route that stretches from the Arctic to the tropics. Efforts by concerned scientists, policymakers, and the general public have begun to reverse the long-term trend of wetland decline. Yet, decisions made in California's past continue to have ecological repercussions on the Valley's wetlands.



The geomorphic provinces of the Central Valley.

Historical Loss of Wetlands

•**Sacramento Valley:** The Sacramento Flood Control Project, designed to contain the seasonal floodwaters of the Sacramento River, led to the reclamation for agriculture of 4 of the valley's 5 enormous wetland basins by the 1920s. Only Butte Basin retains significant natural wetland habitat.
•**Delta:** The low-lying islands of this inland estuary were leveed and reclaimed for agriculture between 1870 and 1930, destroying almost all of the region's ancestral wetlands. Oxidation of the Delta's farmed peat soils has resulted in subsidence of the islands, threatening levees and water quality.
•**San Joaquin Basin:** Largely preserved until the early 20th century, the overflow wetlands along the historic flood plain of the San Joaquin River were threatened first during the 1940s by the Central Valley Project, California's vast water engineering enterprise, and again during the 1980s by releases of toxic selenium-laden irrigation drainwater. The basin holds the largest block of contiguous wetland habitat remaining in the Central Valley.
•**Tulare Basin:** The expansion of irrigated agriculture throughout the late 19th and early 20th centuries dried up the basin's lakes and surrounding wetlands, including Tulare Lake, which once covered 760 square miles. The basin ancestrally was the most important wintering area for waterfowl in California.



Wetlands of the Central Valley.
Source: U.S. Fish & Wildlife Service.

Ecological Consequences

•Loss of essential wintering and breeding habitat for waterfowl and shorebirds of the Pacific Flyway, resulting in dramatic declines of species populations
•Degradation of remaining wetland habitat, resulting in loss of native plant and animal species, and risk to endemic threatened and endangered species
•Loss of wetland ecosystem services, including absorption and storage of floodwaters, recharge of aquifers, and filtering of sediments and pollutants
•Spread of avian diseases, including cholera and botulism, resulting from overcrowding of birds on limited habitat
•Death and deformity of waterbirds from exposure to toxic levels of selenium, leached from soils and delivered to wetlands as irrigation drainwater

American Coot (*Fulica americana*) hatchling deformed by exposure to elevated levels of selenium, Kesterson National Wildlife Refuge, San Joaquin Basin, June 7, 1983. Photo by Harry Ohlendorf.

Solutions

White-faced Ibis (*Plegadis chihi*) in flight at Kern National Wildlife Refuge, one of the few remaining wetlands in the Tulare Basin. Photo by author.

•The creation of national wildlife refuges and state wildlife areas throughout the Central Valley since the 1930s
•Legislative initiatives and private-sector/public-sector joint ventures to protect wetlands
•Contributions by non-profit organizations to the restoration and enhancement of wetlands
•The purchase of conservation easements from private landowners willing to protect wetland habitat
•The development of methods and practices to manage and reduce toxic elements in agricultural drainage water

Research Goals and Impact

Snow geese (*Chen caerulescens*) at the Sacramento National Wildlife Refuge, Sacramento Valley. Photo by author.

•This study provides scientists and policymakers with a long-term perspective of the ecological consequences of land use decisions and water development projects that impact wetlands.
•This study is intended to reach a broad audience, and it is therefore hoped that it will increase public interest in wetlands and their protection.

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