Managing the Garden: Agriculture, Reclamation, and Restoration in the Sacramento-San Joaquin Delta

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"Managing the Garden" provides a broad environmental history of the Delta, exploring land and water use in the region from before European contact in 1769 to the beginning of the twenty-first century. The bulk of the emphasis lies, first, on the physical and ecological transformation of the Delta during the late eighteenth and early nineteenth century from a tidal wetland partially protected by natural levees and rich in natural resources to a reclaimed, intensively cultivated, highly engineered agricultural landscape, and, second, on more recent environmental conditions in the Delta, including water quality issues and the restoration of wetlands around the region's margins.

From Geological Origins to Statehood: Geologically, the Delta is a relatively recent creation. Warming temperatures at the beginning of the Holocene Epoch (11,700 B.P. to the present) caused glaciers to melt and sea levels to rise, creating over thousands of years the historical Delta. Native Americans—primarily the Nisenan, Plains Miwok, Northern Valley Yokuts, Bay Miwok, and Patwin—lived in the Delta, harvested its resources, and altered its environment for at least the past 6,000 years. The world of the indigenous people of California was altered by Spanish exploration, which began with the 1769 expedition of Gaspar de Portolá and Franciscan priest Junípero Serra. Increasingly belligerent relations with the Indians of the Delta ultimately precluded the establishment of Spanish missions in the region. Nevertheless, the Mexican government tried to stabilize the interior, under the 1824 General Law of Colonization, through a series of land grants, including several around the periphery of the Delta, although not in the frequently flooded lands of its interior. Malaria reached the Central Valley, including the Delta, in late 1832, following in the wake of British fur trappers entering California from Oregon. At least 20,000 Native Americans died on the river systems of the Central Valley, from Red Bluff in the north to Tulare Lake in the south, in 1833 alone, and the Native American population in the affected parts of the valley may have been reduced by as much as 75 percent between 1833 and 1846, following successive outbreaks. In addition to the toll it took on Native Americans, the introduction of malaria into the Central Valley was important because it provided an additional incentive to drain and reclaim the wetlands of the Delta and lower Sacramento and San Joaquin rivers, and thus to begin the transformation of the Delta from a wetland region rich in plant and animal resources to an agricultural garden in the new Golden State.

Reclamation: On September 28, 1850, Congress passed the Swamp and Overflowed Lands Act to allow for the transfer of much of the public domain that was swamp land to the states, and hence expedite its reclamation. Under the Act, 2,193,965 acres of swamp land would ultimately be deeded to California, including nearly 500,000 acres within the Delta. In 1861 California initiated a short-lived experiment with coordinated reclamation, providing for the organization of reclamation districts (called "swamp land districts" at that time) and creating the State Board of Swamp Land Commissioners to oversee them. The abolition of the Board of Swamp Land Commissioners in April 1866—after mixed success—and the removal in 1868 of acreage restrictions on swampland purchases marked the triumph of localism over centralized planning for both reclamation and flood control. Between 1868 and 1871, nearly 800,000 acres of California's swamp lands—virtually all of the state's remaining tracts—passed into private hands, with the five Delta counties of Contra Costa, Sacramento, San Joaquin, Solano, and Yolo accounting for almost 300,000 acres of that total. Most of the initial work of reclaiming the Delta islands and low-lying tracts was carried out by Chinese laborers, who were often recruited from Chinatown boarding houses in Sacramento, Stockton, and San Francisco. Sherman Island and Twitchell Island were the sites of the earliest large-scale reclamation in the central Delta, and the early 1870s witnessed reclamation projects throughout much of the Delta's peat lands. However, the fragile peat levee systems constructed in

the central Delta during the 1860s and 1870s were largely destroyed or replaced by new and stronger levees formed from clays and alluvial material dredged from the channels by long-boom clamshell dredges, which evolved from early floating mechanical dredges that had been developed for harbor work in San Francisco Bay. Between 1860 and 1930, more than 440,000 acres were reclaimed in the Delta. There were ecological consequences to this transformation. Wetland vegetation in the Delta all but disappeared and the dense concentrations of wildlife that had thrived in and around the tules vanished with them. The Delta's wetlands, which had once provided sustenance for Native Americans and habitat for millions of waterfowl, were converted into agricultural fields, orchards, and pastures.

Agriculture: Potatoes, beans, orchard crops (especially pears), asparagus, sugar beets, wheat, barley, corn, and alfalfa hay were each important components of the Delta's agricultural economy for at least some portion of the main reclamation period from approximately 1860 to 1930. By about 1880, Delta agriculture had divided roughly across ethnic lines. Grains, orchards, and livestock were tended by American-born settlers, while garden or truck farming remained largely in the hands of Chinese, Italian, and Portuguese tenant farmers. Potatoes, often grown in rotation with beans, were usually the first crop planted on newly reclaimed peat soils; during the late nineteenth century, asparagus became the most profitable vegetable in the Delta, and acreage expanded rapidly. The development and proliferation of asparagus canneries in and around the Delta beginning in 1892 dramatically increased demand and accelerated the expansion of the crop. By the mid-1920s canning companies were located at Isleton, Walnut Grove, Rio Vista, Ryde, Sacramento, Antioch, and Pittsburg, as well as Oakland and San Francisco. Filipino laborers carried out much of the work of harvesting the asparagus, which required considerable skill and precision in cutting. Sugar beets became commercially important during the WWI era, when sugar shortages encouraged greater production. Acreages would increase dramatically in the 1920s, especially on the mineral soils along the Sacramento River and in the Yolo Basin. Other crops were ascendant at the end of the reclamation period, including tomatoes, which became increasingly important for the cannery industry.

Salmon Fishery: The Delta's water resources, especially its chinook salmon (*Oncorhynchus tshawytscha*), were exploited during the reclamation era on an increasingly industrial scale. The presence of four salmon runs—spring, fall, late fall, and winter—gave rise during the last third of the nineteenth century to a thriving fishery and a cannery industry. Much of the labor of harvesting the fish was carried out by Italian, Greek, Portuguese, and Spanish immigrants. Rio Vista emerged as the main landing station, and the salmon fishery brought significant wealth to the town through the 1880s. Overharvesting and siltation of the rivers, resulting from hydraulic mining, led to the decline of the fishery, and the last Sacramento River cannery closed in 1919.

Water Quality Issues: The entire Delta ecosystem has been affected by California's two most massive water projects, the federal Central Valley Project (CVP), the construction of which began in the 1930s, and the State Water Project (SWP), begun a generation later, in the 1960s. Part of the rationale for the CVP was to regulate flows of the Sacramento River to protect the Delta from salinity intrusion during droughts and periods of low flow, but both projects also created an infrastructure to transport fresh water from the Sacramento Valley through the Delta to the San Joaquin Valley to enable irrigation. Diversions south of the Delta have led to prolonged problems with declining water quality and fish populations and led in part to the passage of the Delta Protection Act 1992, which created the Delta Protection Commission. The following year, the U.S. Fish and Wildlife Service and the California Fish and Game Commission declared the Delta smelt (*Hypomesus transpacificus*), a native fish endemic to the San Francisco Bay-Delta Estuary, an endangered species. The listing heightened federal and state responsibility for Delta water quality and led to the signing of the Bay-Delta Accord in 1994, prompting the creation of CALFED, an interagency program designed to address four issues crucial to the long-term restoration and management of the Bay-Delta estuary: ecosystem restoration, water supply reliability, water

quality, and levee rehabilitation. CALFED's shortcomings led to a new approach. In 2009, the state legislature passed the Delta Reform Act, which created a Delta Stewardship Council and charged it with achieving the co-equal goals of protecting, restoring, and enhancing the Delta ecosystem and creating a more reliable water supply for the state. The Bay Delta Conservation Plan (BDCP) aimed to create a comprehensive habitat conservation and management plan to protect the Delta ecosystem while also maintaining export of water by the CVP and SWP, but became mired in acrimonious debate over its proposed "Water Conveyance Facility," otherwise known as the Delta Tunnels. In April 2015, the state proposed dividing the conveyance facility and habitat restoration measures into two separate efforts: California WaterFix and California EcoRestore.

Restoration Successes: The creation, during the last decades of the twentieth century, of the Cosumnes River Preserve (1987), Stone Lakes National Wildlife Refuge (1994), and Yolo Bypass Wildlife Area (1997) marks the culmination of a century of changing attitudes toward wetlands and the wildlife they support, including the migratory waterfowl of the Pacific Flyway. Costly crop depredations by waterfowl had provided the incentive for the Delta region's first refuges—Joice Island (1932) and Grizzly Island (1950), near Suisun Marsh—which were designed primarily as feeding grounds to keep hungry birds away from the Central Valley's rice fields. In more recent years, the goals of conservation and restoration have expanded to include more species and a variety of ecosystems. Since the Nature Conservancy formally dedicated the Cosumnes River Preserve, the preserve has grown to more than 50,000 acres of permanent and seasonal wetlands as well as private agricultural and grazing lands that are managed in wildlife-compatible ways to attract wintering waterfowl. Over the years the mission as well as the size of the preserve has expanded and now includes floodplain restoration, which is of particular importance for native fish species, including the Chinook salmon and Sacramento splittail. The Stone Lakes National Wildlife Refuge protects a rich mosaic of habitats in the Stone Lakes Basin from the pressures of urban development sprawling south of Sacramento. The Yolo Bypass Wildlife Area is managed by the California Department of Fish and Wildlife to be completely compatible with the bypass's flood control function, even as it is restored to the wetland habitat for Pacific Flyway ducks, geese, and shorebirds that it had been prior to reclamation. Other Delta area refuges include the White Slough and Hill Slough wildlife areas and the Woodbridge Ecological Reserve, also known as the Isenberg Sandhill Crane Reserve, which provides habitat for greater and lesser sandhill cranes, the former of which are listed as a threatened species in California. Together, these various refuges, created through efforts of nonprofit conservation organizations and the state and federal governments, have restored relatively small but ecologically important parts of the Delta, and although these refuges are managed landscapes, they offer a glimpse of the Delta and its abundance of wildlife in a time before reclamation.

Conclusion: Today, after more than a century and a half of reclamation and development, the Delta remains a "garden," supporting over one hundred crops on some 500,000 acres of agricultural land. But, despite its tremendous agricultural bounty, the Delta is also much more than a garden. Among its many land uses, the Delta now includes a variety of types of protected lands, including some on which agriculture is managed to be compatible with wildlife. At the same time, the Delta lies at the epicenter of disputes over water allocation and distribution, and suffers from a prolonged decline in the quality of the water in its channels and in the ability of its aquatic ecosystem to support life. All of these accomplishments and challenges point to a robust, yet still fragile, contemporary Delta.