SOUTH BAY LANDSCAPE THROUGH TIME

History and the South Bay. Prior to Euro-American modification, the South Bay landscape reflected a combination of natural processes — tides and currents, rainfall and weather, erosion and sedimentation — and the influences of indigenous peoples. The native Ohlone used the bay and its marshlands extensively, hunting fish and waterfowl, harvesting salt, and collecting shellfish — the dominant component of the massive shellmounds built along the bay and creeks. Remnants of the shellmounds, representing habitation for hundreds or thousands of years, are still encountered today. The map at left shows general locations of some of the larger sites.

When the Spanish colonized the region in the late 1700s, ranching replaced native land management practices. Intensive sheep and cattle grazing continued as Mission lands were converted to privately owned ranchos in the 1830s, establishing many of the persistent place names shown in the map background. After the defeat of Mexico by the United States in 1848, one of the important tasks was to accurately map potential routes of navigation and commerce in the burgeoning Bay Area cities, particularly through the vast marshlands.

Between 1854 and 1857, the United States Coast Survey (USCS) mapped the 100 square miles of tidal marshland shown here. The major part of the task fell to a 22-year-old aid named David Kerr, who led a surveying team through the marshes, recording angles and distances with cumbersome but accurate plane-table equipment. Kerr's efforts captured a remarkable level of detail, which, after almost 150 years in federal archives, has been scanned and registered to modern coordinates as part of making this map.

Natural Form and Function. Kerr's work and other historical sources leave a record of the South Bay landscape prior to most Euro-American alterations, which we compiled into a composite map of conditions circa 1850. This map shows the deep waters of the bay (deeper than 18 feet below mean lower low water) and the large area of shallow bay waters (less than 18 feet deep). Adjacent to these open water habitats, tidal mudflats formed an almost continuous band that was flooded at high tide but exposed when the tide was low. An even more extensive habitat, the tidal marshlands, bordered the tidal mudflats.

The broad, contiguous tidal marshlands were shaped by intricate patterns of sloughs and *pannes*, shallow tidally-filled ponds. Twice a day, the tides pumped bay water into the marshes through branching, sinuous sloughs. In the South Bay, the combined length of these channels totaled over 3000 miles. Away from the channels, thousands of pannes were scattered across the marsh plain (many of the smaller ones are only visible by looking closely at the map). Filled by the highest tides, the pannes held water in the summer when most freshwater wetlands dried out. At the landward edge of the marsh, wide elongated ponds — called *salinas* by the Spanish *rancheros* — dried up in the late summer to produce salt. Together, these habitats contributed to the remarkable numbers of waterfowl, shorebirds, fish, and other native species reported in early accounts.

Along most of the South Bay, the tidal marshlands intergraded into very gently sloping alluvial valleys and plains. The largest creeks, such as Coyote Creek, Guadalupe River, San Francisquito Creek, San Mateo Creek, and Alameda Creek, maintained distinct channels across the lower valley floor and met large tidal sloughs.

Between these larger creeks were many smaller creeks that did not extend all the way to the marshland. Instead, they spread out and disappeared in the lowlands. Near the bay's edge, seasonal wetlands and *sausals* (willow groves) dominated areas of winter flooding and limited drainage.

Sloughs Link Land to Water. The bay's tidal marshes played an early and lasting role in the development of local infrastructure. Prior to railroads and automobiles, the bay was the primary means of transport, with tidal sloughs providing the links between land and deep water. Tidal flows into and out of the marshes maintained natural deepwater channels extending through the tidal flats. Where the channels came close to land, or where the band of marshland was particularly narrow, entrepreneurs established landings. From these sites at the bay's edge, grain, fruit, vegetables, animal products, redwood timber, and other materials were shipped to San Francisco and beyond. While the importance of these natural access points declined rapidly following the arrival of the transcontinental railroad in 1869, many of the roadways to the landings became major roads in our current transportation network.

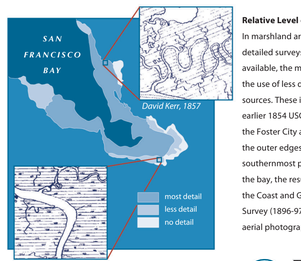
Reshaping the Marshes. The South Bay marshes proved to be surprisingly resistant to development. Miles of levees were constructed and abandoned, new ports failed, and celebrated agricultural schemes went bust because of the salty soils — all before 1900. Only limited areas near Alvarado and Mt. Eden Landing were reclaimed for early salt production. At the turn of the last century, when nearly all the tidal marshlands of the North Bay, Suisun, and the Delta had been diked and were subject to intensive management, most of the South Bay marshes persisted relatively untouched (see *Conversion to Salt Ponds* map, lower left). Waterfowl hunting, as recorded in numerous historical newspaper articles, remained the main human activity in the marshes. During the twentieth century, salt ponds gradually replaced marshes, while mining and over-use of groundwater created today's restoration challenges of mercury contamination and land subsidence.

When the South Bay marshlands were finally developed, it was for their natural ability to retain and evaporate saltwater. The relatively small-scale salt production that had developed around Crystal Salt Pond and the natural *salinas* expanded into large-scale industrial production. Today, only 17% of the original marshland acreage remains, but a relatively high proportion is now diked habitats (~60%, mostly as salt ponds) as opposed to bay fill (~23%, e.g. Foster City). Consequently, despite the dramatic historical changes to the region, much of the former marshland remains accessible for restoration. The intricate marsh patterns recorded by early surveyors now link the past to the future, providing a design template for wetlands of the 21st century.

Credits. Thomas Burns of GIS Mapping and Analysis contributed to the digital development of the historical USCS marshland data. Additional research contributions are from the Santa Clara University Environmental Studies Institute, and work funded by both the Watershed Stewardship Project of the Santa Clara Valley Water District and the California State Coastal Conservancy for the South Bay Salt Pond Restoration Project. Shellmound research by Chuck Striplen of SFEI was sponsored by the U.S. Fish and Wildlife Service San Francisco Bay Program. SFEI work is in progress on the historical US Coast Survey marshland data (including web access to the digitized maps, a user's guide, and additional data development), funded by the Santa Clara Valley Water District, the City of San Jose, the Alameda County Flood Control and Water Conservation District, and the Santa Clara Valley Urban Runoff Pollution Prevention Program. Historical creeks from SFEI's EcoAtlas are registered to a base map of U.S. Geological Survey quadrangles from the turn of the twentieth century. Tribal regions courtesy of Randall Milliken. Pacific Aerial Survey generously provided access to historical aerial photography archives. Special thanks to Trish Mulvey, without whom this project would not have happened.

Notes. 1. Landings exhibited shifting names and importance; those shown here are among the most persistent. 2. Shellmound locations are deliberately generalized from Nels Nelson, *Shellmounds of the San Francisco Bay Region*, 1909. These represent a small subset of indigenous sites.

Relative Level of Detail. In marshland areas where detailed surveys are not available, the map reflects the use of less detailed sources. These include the earlier 1854 USCS map of the Foster City area and, at the outer edges of the southernmost portion of the bay, the resurveys of the Coast and Geodetic Survey (1896-97) and aerial photography (1939).



Ferdinand Westdahl, 1897

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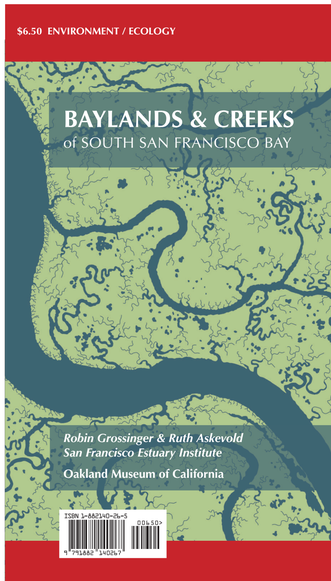


SOUTH BAY CIRCA 1850

- Deep bay / channel
- Shallow bay / channel
- Tidal flat / intertidal channel
- Beach
- Tidal marshland with channels and pannes
- Tidal marshland (mapped in less detail)
- Willow grove (*sausal*)
- USGS topographic maps, circa 1900
- 19th-century landing
- Creek
- Ohlone shellmounds (approximate locations)
- Tribal regions

1 ½ 0 1 MILE

1000 0 2000 4000 6000 FEET

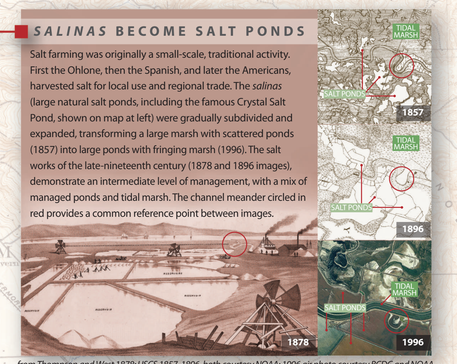
1 0 1 KILOMETER

1 : 62,500 SCALE

approximately 1 inch per mile

SALINAS BECOME SALT PONDS

Salt farming was originally a small-scale, traditional activity. First the Ohlone, then the Spanish, and later the Americans, harvested salt for local use and regional trade. The *salinas* (large natural salt ponds, including the famous Crystal Salt Pond, shown on map at left) were gradually subdivided and expanded, transforming a large marsh with scattered ponds (1857) into large ponds with fringing marsh (1996). The salt works of the late-nineteenth century (1878 and 1896 images), demonstrate an intermediate level of management, with a mix of managed ponds and tidal marsh. The channel meander circled in red provides a common reference point between images.



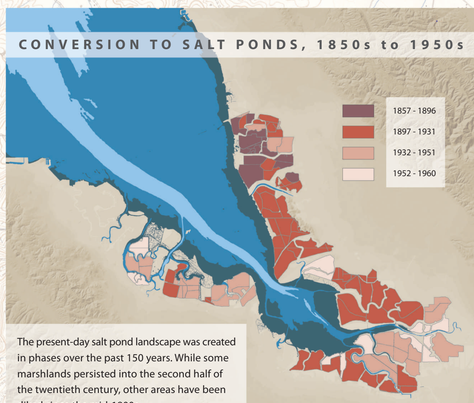
from Thompson and West 1878; USCS 1857, 1896, both courtesy NOAA; 1996 air photo courtesy BCDC and NOAA

LIFE BETWEEN TWO SLOUGHS

When the South Pacific Coast Railroad crossed Coyote and Mud Sloughs in 1877, the railroad built bridges across the sloughs. The bridges swung open to allow the passage of schooners carrying produce and goods to San Francisco. A small community called Drawbridge developed on 80 acres, straddling both sides of the railroad tracks. By 1906 there were two hotels and almost 100 cabins built on pilings, connected by wooden walkways. Besides the full-time residents, Drawbridge attracted weekend duck hunters, fishermen, and boaters. The area is now part of the Don Edwards San Francisco Bay National Wildlife Refuge.

Photographs courtesy of the U.S. Fish and Wildlife Service

CONVERSION TO SALT PONDS, 1850s to 1950s



The present-day salt pond landscape was created in phases over the past 150 years. While some marshlands persisted into the second half of the twentieth century, other areas have been diked since the mid-1800s.