

Wetlands of the Southern California Coast: Historical Extent and Change Over Time

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EXECUTIVE SUMMARY

Southern California's coastal wetlands are an interrelated set of resources that collectively provide a broad suite of ecological, hydrological, and biogeochemical functions. Managing and restoring these systems requires a regional perspective that can inform holistic decision making. Knowledge of historical conditions provides a baseline of the extent and condition of wetlands lost, and is important to guide regional planning. The U.S. Coast and Geodetic Survey topographic sheets (T-sheets) provide the most important single source for understanding the physical and ecological characteristics of the US shoreline prior to Euro-American modification. Their depictions of coastal wetlands and other estuarine habitat types can provide relatively consistent information about the extent and distribution of those systems along the southern California Bight (SCB) prior to substantial human alteration. Although most appropriately used in conjunction with other data sources, the T-sheets can provide a foundation for regional analysis and a platform on which future, more detailed investigations can be based.

This project builds on earlier efforts to provide comprehensive analysis of the 40 T-sheets that cover the SCB from Point Conception to the US-Mexico border. High quality scans of the original T-sheets produced between 1851 and 1889 were obtained along with the surveyor notes. T-sheets were digitized, georeferenced, and interpreted in order to provide a map of coastal estuaries (both large and small) and coastal drainage systems representing conditions along the SCB coast in the mid-late 19th Century. This analysis was used to answer the following questions:

1. How much total estuarine habitat was there historically (i.e., as mapped on the T-sheets) compared to today?
2. How many total coastal *systems* occurred historically?
3. What has happened to historical estuarine habitat types?

Extent of coastal estuarine habitats

The SCB coast supported approximately 19,591 hectares of estuarine habitats. Approximately 40% of this area was vegetated wetlands (e.g., salt marsh), 25% was unvegetated wetlands (e.g. salt flat and mudflat), and the remaining 35% was subtidal water. In addition to these habitat types, an additional 5,496 hectares of "other wetlands" were mapped on the T-sheets. These included dune and beach, woody vegetated wetlands, high marsh habitat, isolated ponds, and riverine habitat.

Over half (~57% or ~11,000 hectares) of all historical estuarine habitats were found in San Diego County, mostly associated with Mission and San Diego Bays. Both Los Angeles and

Orange Counties contained about 15% each of the total historical estuarine area. The largest expanses of historical salt flats occurred in Los Angeles County.

Number of estuarine systems

A total of 331 coastal systems occurred along the SCB coast. Approximately 2/3 of these systems consisted of small coastal drainages without any associated terminal wetlands. Individual coastal systems were relatively evenly distributed along the coast, with each county having between 60 and 90 systems. The distribution of systems by size was also relatively uniform across the counties. The exceptions were a slightly higher concentration of medium and large systems in San Diego County and slightly more channel only systems in Los Angeles County. On a regional scale, larger systems occur in three areas distributed along the SCB coastline, south San Diego, Long Beach, and Southern Ventura County. These three nodes were connected through strings of medium and smaller wetlands.

The 331 systems can be grouped in 15 distinct archetypes (or distinct compositions) representing combinations of size and dominant habitats. These archetypes tended to be spatially aggregated along the coast into loose “families” of systems.

Change over time

Since ca. 1850 there has been an overall loss of 9,317 hectares, or 48% of historical estuarine habitat types along the SCB coast. Estuarine vegetated wetlands have experienced the greatest loss in terms of absolute area (-5819 ha, 75% loss), while estuarine unvegetated wetlands have experienced the greatest proportional loss of 78% of historical extent (Figure ES-1). In contrast, the contemporary landscape represents a 5% increase in subtidal habitat from historical extent. These differential losses have shifted the proportional composition of southern California estuaries. Historically there was a relatively even split between estuarine vegetated (40%), estuarine unvegetated (25%), and subtidal water (35%). Currently the proportional composition is heavily weighted towards subtidal water (71%) while estuarine vegetated (19%) and unvegetated (10%) make up less than 1/3 of the total area combined.

Declines in estuarine area vary by county. Total losses across all counties range from 62% in Santa Barbara to 31% in San Diego. Additionally, the composition of estuaries in the counties has shifted. In the southern most counties (Los Angeles, Orange, and San Diego) there has been a significant increase in subtidal water while both intertidal and vegetated wetlands have decreased. Santa Barbara and Ventura Counties have maintained an estuarine composition similar to that seen in ca. 1850.

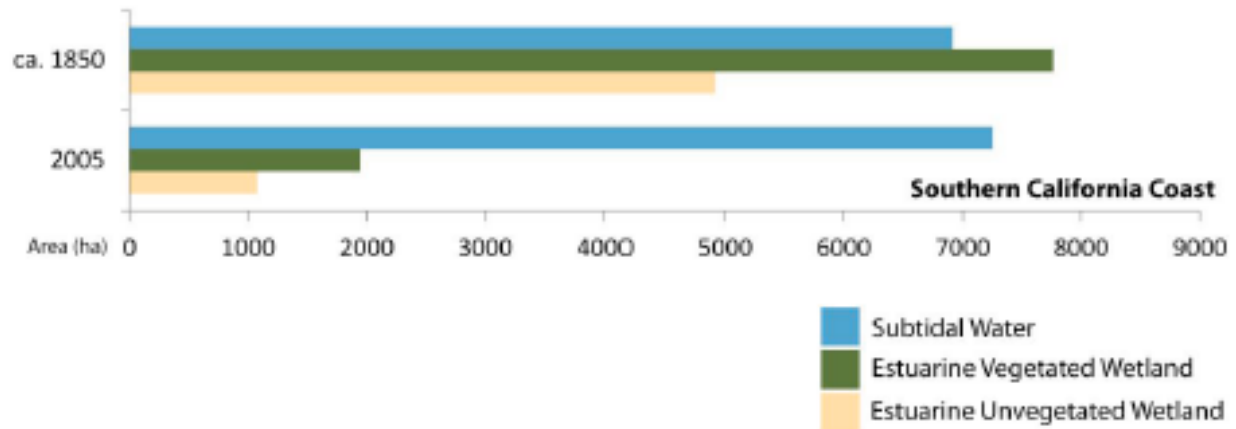


Figure ES-1. Change in overall extent and composition of estuarine habitat types between ca. 1850 and ca. 2005

Our estimated estuarine habitat losses, although substantial, are significantly lower than previously reported estimates of over 90% total wetland loss in California. Overall estuarine habitat area changes reflect and, to some extent, hide the disproportionate impacts to different estuarine habitat types. For example subtidal habitat has increased slightly while other types have decreased dramatically. Differences from other estimates may also be explained by the fact that our analysis is more precise than that used to produce previous estimates and/or that previous estimates may have included other wetland types or locations not included in this study. Lower than “expected” rates of loss may also reflect policies and programs over the last 40 years aimed at protecting and restoring coastal wetlands. Looking to the future, knowledge of historical wetland extent and patterns of loss can be used to inform future planning for diverse and resilient coastal landscapes.

This report provides a synthesis of the main results of our analysis. Scanned images of the T-sheets, GIS and Google Earth layers of the maps, and the underlying data from this project are available at www.caltsheets.org.

Full Text:

http://ftp.sccwrp.org/pub/download/DOCUMENTS/TechnicalReports/826_WetlandsHistory.pdf