SCCWRP #831

Northern San Diego County Lagoons: Historical Ecology Investigation

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PROJECT SUMMARY

Driving between Oceanside and San Diego on Interstate 5, one can't help but notice the scenic expanses of water and marsh crossed by the freeway. These six estuaries – Buena Vista, Agua Hedionda, Batiquitos, San Elijo, San Dieguito, and Los Peñasquitos lagoons, each occupying a valley cut into the marine terraces of San Diego County – are an extremely important coastal wetland resource for the southern California region. They are valuable ecosystems both for native wildlife and for the people who live and recreate in and around their edges. Compared to the extensive loss of coastal wetlands in neighboring areas, northern San Diego County ("North County") estuaries have remained remarkably protected over the past decades. This study finds that North County lagoons have lost only about 15% of their former estuarine area since the 19th century, a significant but relatively modest decline in the context of estimated regional losses of about half of total estuarine area across Southern California coastal systems (Stein et al. 2014).

At the same time, however, North County lagoons have experienced profound and widespread transformations as a result of impacts from a variety of land uses. Habitat loss and conversion have in many cases dramatically altered the ecosystem and social services provided by these estuaries. In addition, lagoon ecosystems have been degraded by an array of activities, including dredging and filling, the construction of transportation infrastructure, discharge of sewage effluent and other pollutants, dam construction and groundwater pumping, and urbanization. These and other anthropogenic modifications have heavily impacted the lagoons' character, including ecological patterns, water quality, tidal exchange, and freshwater inputs.

Today, these estuaries are the focus of numerous restoration and management efforts that aim to enhance lagoon function by reducing flooding, increasing tidal circulation, and increasing the acreage and quality of wildlife habitat, among many other objectives. As the region's scientists and managers take advantage of the significant opportunities presented by these systems, they face challenging decisions about what the goals of restoration should be. The study of the past can help inform these decisions by providing valuable knowledge about system characteristics under more natural conditions, as well as an understanding of how these characteristics have changed over time in response to human alterations to the landscape. Understanding the interaction between the ecological mosaic and underlying topographic, climatic, and hydrologic gradients, how these habitats supported native species, and how elements of the landscape have persisted or changed is key to designing and managing locally appropriate future systems that are flexible, adaptive, and resilient to dynamic environmental conditions.

Though the study of these systems' past characteristics is a key component of determining appropriate restoration objectives, to date there has been no consensus about the natural

structure and function of northern San Diego County lagoons as they existed in the recent past. While previous studies have addressed some aspects of the region's paleoecology (e.g., Cole and Wahl 2000, Scott et al. 2011) and historical ecology (e.g., Mudie et al. 1974 and 1976, Phillips et al. 1978, Hubbs et al. 2008, Grossinger et al. 2011), there has been no integrative and spatially explicit assessment of regional historical ecological and hydrogeomorphic patterns and processes. Further, the natural hydrology and ecology of estuaries in small southern California watersheds in general has not been well studied (Grewell et al. 2007).

Full Text:
http://ftp.sccwrp.org/pub/download/DOCUMENTS/TechnicalReports/831_SanDiegoLagoons.pdf