



Monitoring and Managing Lagoon Mouths in Southern California

Project Overview

Southern California lagoons are complex environments that require informed management practices. In their natural states, many of these lagoons periodically open and close to the sea. However, watershed alterations and lagoon inlet modifications have reduced their capacity to open and close as they usually do.

In response, coastal managers have begun to manage these lagoons to remain open for water quality purposes. However, scientists and managers have recently been reconsidering this one-size-fits-all approach to lagoon management. Managing a lagoon mouth to be continually open can be expensive. It also may compromise the lagoon's unique biodiversity and ecosystem services.

This project analyzed existing lagoon mouth literature and long-term monitoring data from the Tijuana River National Estuarine Research Reserve to provide managers with the information needed to improve the health of Southern California's coastal lagoons.

Project Benefits

This project provided a greater understanding of the ecology, and informed the management, of Southern California lagoon mouths. In particular

- The project team used existing and new data on lagoon mouths and their management to support the Southern California Wetlands Recovery Project, a consortium of 14 federal and state resource agencies tasked with guiding and supporting ongoing and future restoration projects. The team's analysis suggested that trying to restore more natural mouth conditions would involve considering both watershed and marine forcing factors, as well as the integrity of estuarine systems themselves.
- During the project, the Tijuana Estuary mouth experienced an unusual closure, which produced severe water quality changes and threats to wildlife, including leopard sharks and shellfish. The project provided focused data products to the Regional Water Quality Control Board and the U.S. Fish and Wildlife Service to inform timely mouth management decisions.

Project Location

- Tijuana River National Estuarine Research Reserve, California
- San Diego Bay, California
- Los Peñasquitos Lagoon

Project Duration

September 2015 to August 2017

Project Lead

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Project Type

Science Transfer - promoting the use of science

Project Partners

- Bodega Marine Laboratory, University of California – Davis
- Southern California Wetlands Recovery Project
- Southwest Wetlands Interpretive Association
- Tijuana River National Estuarine Research Reserve

- The project team hosted a workshop for regional experts and stakeholders in lagoon mouth science and management for the first time. This advanced all users' understanding of ecosystem services associated with different mouth states, and began to identify tradeoffs associated with management actions.
- The project team and partners identified information gaps related to lagoon mouth dynamics and identified research themes to be included in the Southern California Wetland Recovery Project's Regional Strategy Update.

Project Approach

A team of collaborators from the Tijuana River National Estuarine Research Reserve, Southwest Wetlands Interpretive Association, and the University of California – Davis explored the environmental ramifications of managing the opening and closing of lagoon mouths. The project approach included the following elements:

- **Data Synthesis** – The project team analyzed long-term water quality data from estuaries in San Diego Bay, Los Peñasquitos Lagoon, and Tijuana Estuary to understand the relationship between mouth status and biotic/abiotic conditions. The team had a special focus on dissolved oxygen in Los Peñasquitos Lagoon, which experiences routine mouth closure, and the impacts of mouth closure on the Tijuana Estuary, which experiences infrequent mouth closure.
- **Literature Review** – The project team reviewed relevant scientific articles and reports on 1) the relationship between estuary conditions and different lagoon mouth states and 2) management objectives associated with mouth maintenance.
- **Collaboration with End Users** – The project team held a workshop for 46 coastal scientists and managers to facilitate a broad discussion of project findings and the implications for lagoon management. They also specifically engaged with members of the Southern California Wetlands Recovery Project, which coordinates and funds restoration projects throughout the region. The project results informed the Southern California Wetlands Recovery Project's Science Advisory Panel as they developed lagoon mouth management guidance.

Products

- Slide show libraries on 1) the relationship between dissolved oxygen and mouth condition in Los Peñasquitos Lagoon and 2) the long-term variability of the Tijuana Estuary's mouth
- [Workshop summary](#) of recommendations for regional approaches to estuary mouth management
- [K-12 lesson plan](#), "Don't Shut Your Mouth," a NOAA Estuaries 101 curriculum on conditions that can lead to estuary mouth closures
- [Website with real-time data](#) from Tijuana River Reserve's monitoring station that informs lagoon mouth management
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About the Science Collaborative

The National Estuarine Research Reserve System's Science Collaborative supports collaborative research that addresses coastal management problems important to the reserves. The Science Collaborative is managed by the University of Michigan's Water Center through a cooperative agreement with the National Oceanic and Atmospheric Administration (NOAA). Funding for the research reserves and this program comes from NOAA. Learn more at coast.noaa.gov/nerrs or graham.umich.edu/water/nerrs.