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The Invasion and Impacts of Tamarisk in Tijuana Estuary Salt Marshes, and Ecosystem Recovery After Its Removal

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Background

Because its largest urban centers are on the coast, California's coastal wetlands have largely been either filled or dredged. Reflecting this, wetlands today support a disproportionately high fraction of the state's rare and endangered species. To the distress of wildlife managers, these habitats continue to face threats from a variety of human activities. Runoff, encroaching development and non-native species are a few examples.

Until recently, salt marshes in Southern California remained relatively free of invasive plants. As a result, small "patches" of wetlands could support relatively intact native plant communities. This reprieve seems to have ended.

For reasons that biologists do not yet understand, a non-native tree called tamarisk has invaded salt marshes at the Tijuana River National Estuarine Research Reserve, a 2,500 acre preserve located adjacent to the U.S.-Mexico border in southern San Diego County. The reserve is one of 26 NOAA-supported research reserves in the country and is managed by the U.S. Fish and Wildlife Service and the California Department of Parks and Recreation.

Project

This project focuses on the ecological effects of tamarisk, an Asian tree introduced for erosion control by the Spanish. Though little is known about its effects on salt marsh, biologists fear it may diminish light to ground plants, increasing sedimentation and change soil properties, and thus altering the hydrodynamics of marshlands. It may also change food webs in nearby habitats.

Led by former Sea Grant trainee Drew Talley, now a biologist at UC Davis, a team of scientists will document the extent of tamarisk at the reserve and develop techniques for monitoring its range. They will also look closely at the degree to which areas cleaned of tamarisk recover to their pre-invaded state. Ultimately what is learned will help scientists predict areas most at risk of invasion and develop cost-effective strategies for eradicating tamarisk. It will also provide managers with needed information on the processes by which native communities recover from a non-native invasion.

More specifically, Talley and collaborators will test two hypotheses:

- Tamarisk significantly alters ecosystem properties and water flows.
- Removing tamarisk returns these properties and water flows to pre-invasion conditions.

In investigating these hypotheses, scientists will document as fully as possible the history of tamarisk in the reserve by analyzing old aerial photos of the area. The most basic component of the analysis will involve mapping areas of photos that are purple, as blooming tamarisk has purple flowers. Scientists will also develop a technique for identifying tamarisk when it is not in bloom based on the way light is scattered through leaves and branches. This new remote-sensing techniques will have broad applications in monitoring non-native plant invasions.

In related work, scientists will examine the effects of tamarisk on birds. More than 370 bird species have been documented at the reserve, many of which are rare or endangered. Any effective tamarisk eradication plan must be shown to be safe to birds.

UC Davis researcher, Drew Talley.

Reserve Research Coordinator Jeff Crooks points to tamarisk growing along the Tijuana River banks. Photos: Christina Johnson, California Sea Grant

Another issue is that tamarisk can reach heights of 10 meters while native vegetation typically never grows above one meter. Some biologists fear that tamarisk provides raptors with sentry towers from which they may scout prey, including federally protected ground-nesting birds.

Tamarisk in bloom. Photo: Jil M. Swearingen, USDI National Park Service, www.invasive.org

Wetlands at NOAA's Tijuana River National Estuarine Research Reserve provide important foraging, breeding and resting areas for birds such as snowy egrets. Photo: Christina S. Johnson, California Sea Grant

Applications

Because of its potential ecological effects, the California Coastal Conservancy and the U.S. Fish and Wildlife Service have donated $500,000 to help design and implement a tamarisk control plan at the reserve. The project, which began in the summer of 2001, consists of trying different control strategies at various demonstration sites to develop an effective eradication plan. Assisting in this effort, Sea Grant research will answer fundamental questions about tamarisk's biology and its ecological impacts. A model being developed during this project will also let managers predict sites vulnerable to invasion.

The California Coastal Conservancy, the U.S. Fish and Wildlife Service and the California Department of Parks and Recreation all supported this project. In their letters of support, they cited Sea Grant's ability to facilitate collaboration between managers and researchers and to synergistically link ongoing projects.

Outreach

The results of this project will be included in an interpretive display at the reserve's visitor center. Scientists also plan to lead a workshop for resource managers on both sides of the border about their work.

Collaborating Organizations

California Coastal Conservancy
California Department of Parks and Recreation
U.S. Fish and Wildlife Service

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