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Gulf of Mexico Integrated Science - Tampa Bay Study
Characterization of Tidal Wetlands

Introduction

Tidal wetlands in Tampa Bay, Florida, consist of mangrove forests and salt marshes. Wetlands buffer storm surges, provide fish and wildlife habitat, and enhance water quality through the removal of water-borne nutrients and contaminants. Substantial areas of both mangroves and salt marshes have been lost to agricultural, residential, and industrial development in this urban estuary. Wetlands researchers are characterizing the biological components of tidal wetlands and examining the physical factors such as salinity, tidal flushing, and sediment deposition that control the composition of tidal wetland habitats. Wetlands restoration is a priority of resource managers in Tampa Bay. Baseline studies such as these are needed for successful restoration planning and evaluation.

Normal propagules of the red mangrove are green. Those propagules lacking normal pigments are termed albino and are pink or yellow in color.

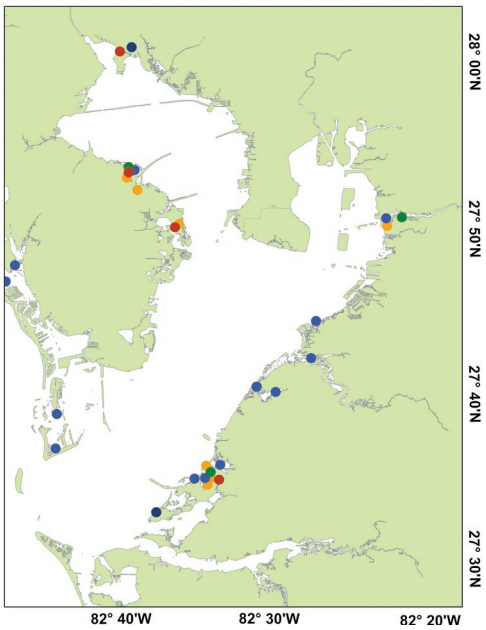
Approach

Mangrove health

Mangroves are trees that are adapted to grow in salt water, and are the dominant feature of the intertidal landscape in Tampa Bay. Mangroves are sensitive to sediments contaminated by oil and oil by-products. Red mangroves affected by such contaminants show changes in their physical appearance in the form of albinism in their propagules, i.e., seedlings that germinate while still on the tree. Albinism is an easily observed characteristic because affected propagules are pink or yellow instead of their normal green color. Thus, a high percentage of albino propagules can be used as an indicator of contaminants in red mangrove-dominated wetlands.

Mangrove vegetation and fishes

Tampa Bay tidal wetlands are flooded and drained by both natural tidal creeks and by man-made mosquito control ditches constructed primarily between 1940 and 1970. These ditches were built to control salt marsh mosquitoes by promoting access by small fishes that eat mosquito larvae throughout the tidally inundated forests. More advanced means of mosquito control, including larvicides that solely target mosquito species, are now available. Therefore, resource managers need data on the biological effects and ecological functions of mosquito ditches to plan and access restoration of ditched wetlands.



Map of Tampa Bay study area showing locations of sampling sites (red - fish sampling sites, green - landscape history and ecology, blue - mangrove genetic survey, gold - vegetation study).

U.S. Geological Survey (USGS) scientists have permanently tagged mangrove trees to measure their growth and survival rates in a variety of hydrological and ecological settings, both natural and altered. At ditched sites, sediments were side cast during ditch construction, thereby forming raised areas, termed berms, along ditches. These berms tend to act as dams, thereby changing the timing and duration of flooding of adjacent forests as well as the composition of streamside vegetation. For example,

Researchers sample fish and crustaceans (shrimp, crabs) in a manmade mosquito control ditch in a modified wetland.

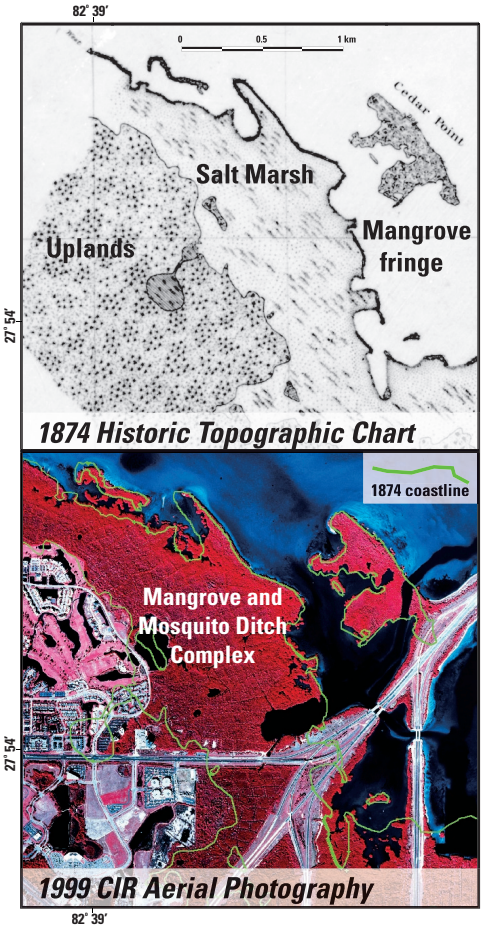
elevated berms favor undesirable invasive species like Brazilian pepper over native mangroves. USGS scientists are also characterizing the species composition of fish, shrimp, and crabs that use natural creeks and man-made mosquito ditches. Wetland ditches with good tidal flushing support a wide variety of commercial and recreational species, including red drum, snook, spotted seatrout, sheepshead, mullet, black drum, pink shrimp, and blue crab.

Coastal landscape

USGS scientists are incorporating data from modern and historic sources to identify changes in coastal vegetation communities. Cartographic and photographic analyses strongly suggest that mangroves have been replacing salt marsh and low-salinity coastal wetlands in a gradual northerly and landward direction in Tampa Bay since 1874. Factors favoring mangroves over salt marsh vegetation include a warming climate, freshwater diversions, and altered wetland hydrology such as mosquito ditches. Rising sea levels mean that mangroves will also expand inland and upriver where there are no barriers such as berms or seawalls. Apparent mangrove expansion has implications for restoration. Long-term, freshwater wetlands and low-elevation coastal forests will need relatively greater protection as they receive simultaneous pressures from mangrove expansion from seaward, and urban expansion from inland. USGS scientists are working with resource managers from state and county agencies to define the hydrological and physical conditions that favor the dominance of a particular intertidal species over another. They are examining conditions under which engineering actions such as plugging mosquito control ditches and excluding tidal waters might promote long-term development of freshwater wetlands in selected locations.

Links to Other Project Research

Wetlands scientists use core data collected by geologists to understand the past history and longevity of tidal wetlands in their present locations. On a different timescale, remote sensing experts supply high-resolution mapping data that give a current view of bay wetlands and their elevations. Data from the water quality team on sediment contaminants adjacent to tidal wetlands supply information on past and ongoing stressors.



USGS scientists track changes in Tampa Bay tidal wetlands by comparing historic shoreline and wetland features at Feather Sound.

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