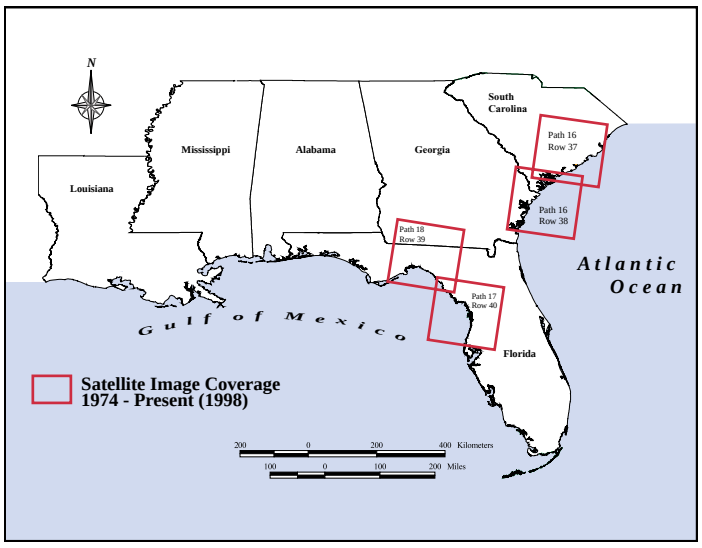
Gulf of Mexico and Southeast Tidal Wetlands Project

The coastal wetlands of the Big Bend area of Florida have been widely considered ecologically and physically stable in comparison with other coastal wetland areas of the United States. Marsh shorelines elsewhere in the Gulf of Mexico are experiencing measurable subsidence. U.S. Geological Survey (USGS) scientists of Coastal and Marine Program initiated a long-term study to examine the current conditions and environmental history of this coastal environment.



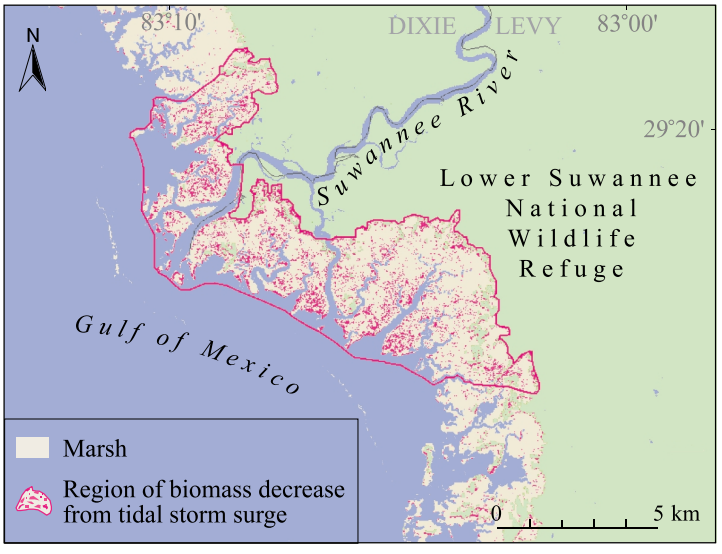
Gulf of Mexico and Southeast Tidal Wetlands Study Areas

This study sought to determine the stability of the estuarine system, to identify the processes maintaining the current configuration, and to evaluate the extent and susceptibility of the system to change. The region is relatively undisturbed compared to other coastal areas and presents an opportunity to evaluate tidal wetlands with little human alteration to hydrology and sedimentation processes. The U.S. Geological Survey's Center for Coastal and Regional Marine Geology in St. Petersburg, Florida, is evaluating the estuarine marshes of the southeast.

The study areas include the Big Bend of Florida and the Atlantic coastline of South Carolina and Georgia. A 25-year time series of Landsat satellite imagery is processed and evaluated for changes in the coastal marshes and adjoining upland features.

The time-series gives a detailed look at current fluctuations and trends in biomass from 1974 -1998. A comparison of 19th century Coast and Geodetic Survey topographic charts with the current coastal features provides an evaluation of shoreline and coastal forest change over 150 years.

High accuracy vertical Global Positioning System (GPS) surveys secure elevations of marsh, tree hammocks, and other features such as levees and salt barrens along the coastline. Detailed digital terrain mapping of tidal creeks and marsh surfaces are obtained with the Airborne Laser Swath Mapping (ALSM) system in cooperation with University of Florida, Gainesville.

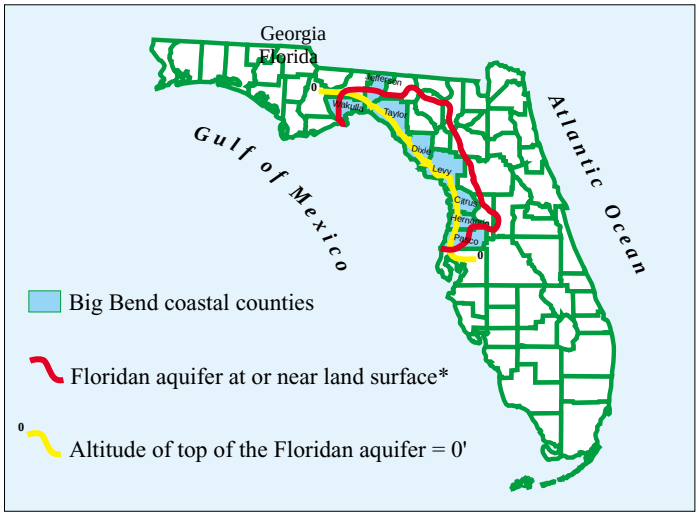


Analysis of marsh biomass from satellite imagery identifies vulnerable coastal regions. Tidal marsh biomass decreases in the vicinity of the Suwannee River plume, following high storm surge in 1993.

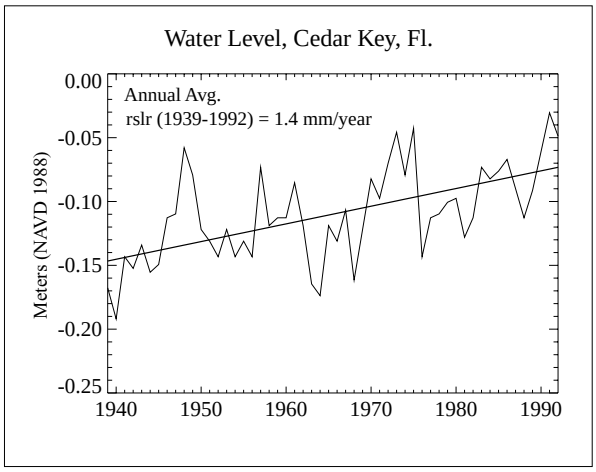
The estuarine marshes of the Big Bend occupy 160,000 acres of coastline from Tarpon Springs to Apalachee Bay. These marshes are largely high marsh on a limestone shelf. The presence of the limestone shelf contributes to the stability of the marsh shoreline despite sea level rise. This unique characteristic is not found in the rest of the Gulf of Mexico. Tree islands, or hammocks, persist on slight elevations of the limestone surface.

A remnant coastal forest persists on elevated limestone in the marsh north of the Suwannee River, Dixie County, Florida.

The Floridan Aquifer is at or near the land surface in this region where sinks, springs and artesian flow are common. Freshwater discharge plays an important role in the diversity of flora and fauna of the estuarine environment. A study of groundwater discharge using radium isotopes is evaluating the influence of the underlying geologic formations on diffuse freshwater input.



Coincidence of Floridan aquifer at land surface with the location of the Big Bend tidal marsh coast



60-year sea level trend at Cedar Key, Florida. Rate of sea level rise is 1.4 mm per year.

Marsh cores and Surface Elevation Table (SET) sites are used to evaluate sedimentation rates and environmental history. Redistribution of sediment and organic production appear to keep marsh elevations at pace with sea-level rise. Large pulses of sediment are deposited during high-impact marine storm surge events. SET data is collected cooperatively with Florida Geological Survey and National Wetlands Research Center, Louisianna.

Cores from the marsh are being analyzed for historical records. Radiocarbon dates, lead-210, pollen, and isotope analysis will highlight changes in climate and environmental conditions.

Measuring surface elevation at a Surface Elevation Table (SET) site in the high marsh

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