

Planning the Future by Exploring the Past in Mississippi's Grand Bay

Project Location

Grand Bay National Estuarine Research Reserve, Mississippi

Project Lead

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Targeted End Users and Products

- Final report
- Gong, C. and W. Wu. Effects of shadow, atmospheric correction and seasonal factors on the extraction of subpixel imperviousness using regression tree modeling. Submitted to Photogrammetric Engineering and Remote Sensing.

Project Partners

- [Grand Bay Reserve](#)
- [Auburn University Shellfish Laboratory](#)
- [Dauphin Island Sea Lab](#)
- [United States Food and Drug Administration Office of Food Safety](#)
- [University of Southern Mississippi Gulf Coast Research Laboratory](#)

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. Learn more at www.nerrs.noaa.gov.

Overview

People have harvested oysters in Mississippi's Grand Bay for more than 4,000 years. Today, that legacy is at a crossroads. Increased pollution from residential and industrial development and overtaxed wastewater treatment systems is flowing into the Bay with potentially far-reaching effects on ecosystems, human health, and local economies. To protect human health and identify areas at risk for habitat degradation and fisheries loss, local decision-makers need more information about the extent of these impacts on local ecosystems. In response to this need, the Grand Bay reserve worked with Dauphin Island Sea Lab to use Grand Bay as a benchmark estuary to define the legacy effects of land use change on water quality, historic and modern oyster populations, shifts in nitrogen sources, and pathogen accumulation.

Project Benefits

- The project helped local and regional stakeholders understand the impacts of land use on environmental and human health, identify areas at risk for habitat degradation and fisheries loss, and reduce the risk of harvesting contaminated shellfish.
- Project data has been used to make decisions about operations at a wastewater treatment plant and demonstrated the efficacy of the plant at reducing fecal indicator microbes. Mississippi's Utility Authority and the U.S. Food and Drug Administration used project data to evaluate the effects effluent from the plant on local shellfish beds.
- The team identified a phosphate spill, and team members shared project data with the Alabama Department of Environmental Management to address the spill's environmental implications and identify future sampling and monitoring actions to minimize spill effects..

Project Approach

The Weeks Bay reserve and the University of Alabama led a team of decision-makers, researchers, and municipal officials to explore how sea level rise will impact marsh structure, its ecosystem functions, and its capacity to filter nitrogen pollution from runoff.

- **Stakeholder Engagement:** To ensure that scientific outputs met the needs of decision-makers, the team engaged stakeholders in the project's design and held workshops to integrate stakeholder perspectives throughout the project.
- **Data Analysis:** Team members sampled and analyzed water quality and local shellfish populations to determine the impact of wastewater treatment plant discharge. In addition they analyzed historic oyster shell deposits for nitrogen content and sediment cores for carbon and nitrogen content, stable isotope ratios, and bacterial indicators of potential human health risk.
- **Modeling:** The team modeled historic land use change in Grand Bay to define time scales of change and provide context for the evaluation of ecosystem and human health data. The Team was able to combine the data from land use models, sediment cores, modern sediment and water samples, and historic and living oyster shells to define the legacy effects of land-use change through time.

