

Edges of Our Estuaries



CHALLENGES AND OPPORTUNITIES FOR MANAGING DYNAMIC SHORELINES

The GTM Research Reserve was a part of a National Estuarine Research Reserve System (NERRS) Science Collaborative grant-funded project with the University of Florida from 2015 to 2018. Shorelines and salt marsh habitats within the GTM Research Reserve have been retreating at rates of 1 meter per year (Silliman et al. in review) which has led to a loss of intertidal oysters, a loss of habitat, and a loss of ecosystem services. A potential stressor of this is boat wake energy, which like oceanic boat traffic is also increasing within our estuaries. Surveys from estuarine practitioners throughout the southeast and assessments of transponder data on tracked boats indicate that locally, the Intracoastal Waterway has high boat traffic- often over 100 vessels per day. With the increased boat traffic, the wakes that are produced for 90% of boats are less than 0.3 m, however the remaining 10% are greater than 0.3 m and can erode the fine marsh sediments.

This project, *Ecologically Engineering Living Shorelines for High Energy Coastlines*, with Christine Angelini, Ph.D, et al. from the University of Florida, designed a hybrid structure that acted as a double barrier to dissipate wave energy along the Intracoastal Waterway in Ponte Vedra Beach, Florida. The team's approach consisted of two lines of defense to protect the salt marsh. The first structure was a set of semi-permeable breakwalls filled with crepe myrtle branches. Landward side of those structures were alternating oyster restoration structures of 1) oyster shell filled gabions and 2) Biodegradable EcoSystem Engineering Elements (BESE-elements).



Above: breakwalls with crepe myrtle branches and oyster restoration structures

In October 2018, restoration practitioners from across the southeast United States gathered at the GTM Research Reserve to discuss the results of this project and where to direct research and management efforts in the future. The project team hosted a regional workshop "Edges of Our Estuaries" to share and synthesize trends in shoreline change, identify common challenges and key research gaps for managing dynamic shorelines, and teach attendees about the project's new technique for reducing erosion along high-energy shorelines. Attendees included representatives from coastal management, coastal restoration, universities, state agencies (e.g., Florida Fish and Wildlife Conservation Commission, Florida Department of Environmental Protection), and federal agencies (e.g., U.S. Fish and Wildlife Service, National Park Service, National Marine Fisheries Service).



Top: Installation of breakwalls; Bottom Left: Oyster gabions; Right: BESE-elements



The workshop kicked off with presentations from attendees from across the southeastern United States. Each presenter explained the threats, current management efforts, and research needs for their region or state. Attendees also took a boat tour of the Tolomato River to visit restoration sites and participated in a social science mapping exercise with researchers from the University of North Carolina Chapel Hill and East Carolina University. Prior to the workshop, attendees completed a questionnaire about their opinions on the causes of coastal erosion. Survey results showed that wind waves and boat wakes were considered important drivers of coastal erosion across the southeast region.

Attendees discussed the most significant threats to coastal wetlands and oyster reefs, the major management challenges, and the most important research needs for understanding shoreline dynamics within their region or state. Each region discussed management strategies that have been successful as well as management actions that have been attempted but unsuccessful. The attendees compiled each region's lists and found that development and boat wakes are some of the major threats to coastal environments. Scientific uncertainty and water management priorities are the main management challenges. The primary research need identified was the need for long-term data and trends.

Region	Threats	Challenges	Needs
North Carolina	Coastal development	Public opinion, scientific uncertainty, balancing stakeholder priorities	Long-term trends in shoreline dynamics, interdisciplinary evaluation
South Carolina/Georgia	Boat wakes, climate change, hardened shorelines	Shoreline management, education	Impacts from boats, value of recreation
Northeast Florida	Boat wakes, shoreline armoring, development	Rules and regulations, staff and funding	Baseline data, funding
North Central Florida	Sea level rise, developmental pressure	Lack of trend data, regionally low priority for regulation	Resource trend data, boat traffic and wake data
South Central Florida	Boat wakes, development, climate change	Political will, enforcement, public outreach/ education	Wave energy/boat wakes, social science
Southeast Florida	Development, wake/wave energy, sea level rise	Political will/ leadership, permitting process	Wave/wake energy dynamics; understanding long-term success
South/West Florida	Urban development, climate change and storm events	Funding, political will, conflicting interests,	Long-term monitoring of restoration, best management practices

Summary table of the main threats, major challenges, and most important research needs identified by workshop attendees for the southeast by region.

The goal of this workshop was to facilitate a discussion that would be developed into a peer-reviewed manuscript that describes current variation in estuary structure, condition, and stressors across the southeastern United States. This manuscript, now in development, will summarize how management is responding to stressors, will identify critical gaps in knowledge, and will highlight the need for collaborative science where research is tailored to management needs and managers are engaged in the science. In addition to the project manual, regional coastal management practitioners hope the manuscript will serve as a resource to motivate future management and research initiatives and funding.

Special thank you to our partners:

