



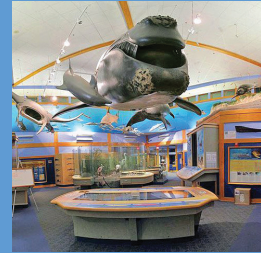
Florida's National Estuarine Research Reserves and Coastal Resilience



Apalachicola Research Reserve, Eastpoint



Guana Tolomato Matanzas Research Reserve, Ponte Vedra Beach



Rookery Bay Research Reserve, Naples

The National Estuarine Research Reserve (NERR) System is a network of 29 coastal sites designated to protect and study estuarine systems, where rivers meet the sea. NERRs offer local, science-based training and education programs as well as unique recreational opportunities. In Florida, the NERRs are managed by the Florida Department of Environmental Protection's Office of Resilience and Coastal Protection in cooperation with the National Oceanic and Atmospheric Administration's (NOAA) Office of Coastal Management.

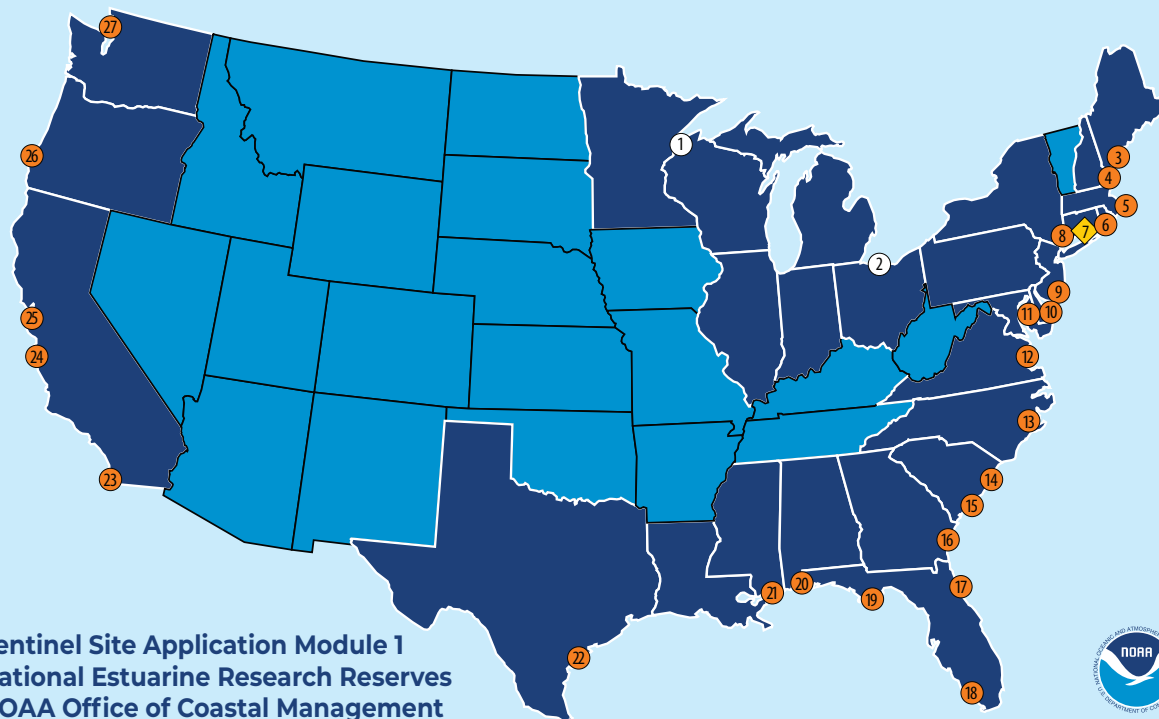
Florida is home to three national estuarine research reserves: Apalachicola NERR (Apalachicola National Estuarine Research Reserve) in Eastpoint; Guana Tolomato Matanzas NERR (Guana Tolomato Matanzas National Estuarine Research Reserve) in Ponte Vedra Beach; and Rookery Bay NERR (Rookery Bay National Estuarine Research Reserve) in Naples. Research at Florida's NERRS includes issues such as sea level rise, climate change and coastal resilience. Coastal resilience means building the ability of a community to quickly recover from hazardous events such as hurricanes, coastal storms and flooding and to adapt to future conditions such as sea level rise.



Sentinel Site Application Module 1 - Coastal Habitat Response to Changing Water Levels (NOAA)

Sentinel Site Application Module 1 (SSAM-1)

SSAM-1 is a national program with standardized protocols established for each NERR to observe the interactions among water level, elevation and plant communities relevant to local, regional and national scales made useful for decision-makers. The goal is to complement the already existing System-Wide Monitoring Program, which monitors water quality, weather occurrences and vegetation cover. The information contained in the SSAM-1 of the Florida NERRs will be applied to other sites as NERRs across the United States integrate SSAM-1 into their national syntheses of coastal wetland resilience strategies.



Sentinel Site Application Module 1
National Estuarine Research Reserves
NOAA Office of Coastal Management



LIST OF RESERVES

Great Lakes

1. Lake Superior, Wisconsin
2. Old Woman Creek, Ohio

Northeast

3. Wells, Maine
4. Great Bay, New Hampshire
5. Waquoit Bay, Massachusetts

6. Narragansett Bay, Rhode Island
7. Connecticut (Proposed)

Mid-Atlantic

8. Hudson River, New York
9. Jacques Cousteau, New Jersey
10. Delaware
11. Chesapeake Bay, Maryland
12. Chesapeake Bay, Virginia

Southeast

13. North Carolina
14. North Inlet-Winyah Bay, South Carolina
15. ACE Basin, South Carolina
16. Sapelo Island, Georgia
17. Guana Tolomato Matanzas, Florida

Gulf of Mexico

18. Rookery Bay, Florida

19. Apalachicola, Florida

20. Weeks Bay, Alabama
21. Grand Bay, Mississippi
22. Mission-Aransas, Texas

West

23. Tijuana River, California
24. Elkhorn Slough, California
25. San Francisco Bay, California

26. South Slough, Oregon
27. Padilla Bay, Washington
28. Kachemak Bay, Alaska

Pacific

29. Hawaii (Pending)

Caribbean

30. Jobos Bay, Puerto Rico



GTM Research Reserve - oyster reef bags for living shorelines (gabion-break design)

Re-engineering Living Shorelines

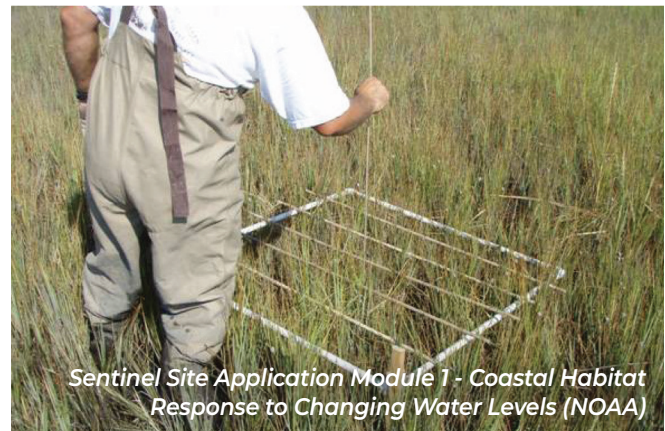
High-energy shorelines are those affected by considerable boat wake and wave activity. In estuaries, high-energy shorelines with salt marshes and oyster reefs are degrading at accelerated rates globally. Living shorelines act as a natural stabilizing approach to mitigate erosion, diminish boat/wave activity and restore coastal habitat.

Each NERR has contributed to restoration practices to reinforce living shoreline habitats. GTM Research Reserve has implemented and tested a gabion-break design to stabilize shoreline habitats from high-energy wake erosion. Rookery Bay Research Reserve has implemented the Fruit Farm Creek Restoration Program, which will re-establish hydrological connections to restore degraded mangrove habitats. The Apalachicola Research Reserve has been involved in an Oyster Integrated Mapping and Monitoring Program to understand oyster mortality and the decline of oyster reefs.

Coastal Habitat Integrated Mapping and Monitoring Program (CHIMMP)

Coastal wetlands provide ecosystem services such as filtration of surface water runoff, sequestration of organic carbon, fish nurseries/habitat and much more. All these ecosystem services are essential to the resilience of coastal communities. There is a growing focus on preserving critical coastal wetland areas as new studies are finding a habitat statewide shift. Future sea level rise is anticipated to cause salt marsh fragmentation and acreage loss when obstacles such as coastal development prevent landward migration of marsh vegetation. Mangrove forest distribution is changing in response to sea level rise as they migrate into salt marsh habitat.

In response to understanding and protecting these vulnerable and valuable coastal ecosystems, a statewide mapping/monitoring program was established: CHIMMP. The program's goal is to bring together mapping/monitoring representatives from across Florida to increase communication, decrease duplicate efforts and recognize gaps in collected data. CHIMMP has been implemented in Florida's three research reserves.



Sentinel Site Application Module 1 - Coastal Habitat Response to Changing Water Levels (NOAA)



GTM Research Reserve, Ponte Vedra Beach

Florida's National Estuarine Research Reserves and Coastal Resilience

Each NERR has many ongoing projects designed to help with coastal resilience. Here are a few examples of completed or ongoing projects at Florida's research reserves.

Apalachicola Research Reserve

Monitoring Submerged Aquatic Vegetation and System-Wide Monitoring Program (SWMP):

In 2014, the Apalachicola Research Reserve began semiannual monitoring to measure the quantity and quality of emergent marsh vegetation at two sentinel stations.



The reserve's long-term monitoring of vegetation communities follows the NERRS-SWMP Bio-Monitoring Protocol. The objectives of the vegetation monitoring sampling are to evaluate reserve-specific questions and support regional and national sentinel site and climate change objectives.

Detecting Impacts from Sea Level Rise: Due to a unique decade-long monitoring effort focused on the impacts to coastal habitats, the Apalachicola NERR has played a key role in detecting the accelerated rates of sea level rise and marsh vegetation shifts. Using NERR datasets, researchers are quantifying the shifts in marsh resilience at local/national scales to document marsh ecological responses for future management practices. This work provides: 1) insight on how climate change is affecting marshes; 2) NERRs-specific templates/tools for data analysis and visualization; 3) transferable utility to other coastal habitats/other organizations with marsh monitoring; and 4) guidance for national-level research.

FloridaDEP.gov/ANERR and ApalachicolaReserve.com

Guana Tolomato Matanzas Research Reserve

Regional Marsh Productivity: Researchers at GTM studied six salt marsh sites to analyze the spatial productivity of salt marsh cordgrass – a grass found in salt marshes that can be used to control shoreline erosion. A hydro-marsh equilibrium model was used to identify the potential land zones



for marsh migration and areas where existing marshes decreased. A comparison in a post-analysis of the final model output to land use/zonation was completed and provided a 50-year projection of marsh productivity in regions that have development and freshwater and are generally insufficient for salt marsh ecology.

Communicating Hurricane Impacts: Using the NERRS SWMP data, which continuously captures water quality and meteorological data, GTM is working with a team of NERRs to develop post-hurricane communications templates that illustrate storm impacts and connect communities to science.

FloridaDEP.gov/GTMNERR and GTMNERR.org

Rookery Bay Research Reserve

Natural Mitigation Efforts: Southwest Florida's vulnerability to flooding has increased due to a growing coastal urban population, frequent hurricanes, aquifer saltwater intrusions and sea level rise. Although there are natural buffers to these impacts – such as mangrove forests/marshes – these features are deteriorating because of climate change. To test the effectiveness of natural buffers against climate impacts and understand future habitat changes, a project began in 2019 to simulate future sea level rise and rainfall scenarios. The project will be completed in 2022 to show the effects and mitigation efforts in mangroves/marshes in Southwest Florida.



Local Coastal Planning

Tool: Rookery Bay Research Reserve supported researchers from the University of Florida and Florida Gulf Coast University in designing a web-based tool to support local needs for decision-making in restoration practices and coastal planning. The tool displays detailed visual models of what areas of Collier County are likely to flood or change under various sea level rise and hurricane scenarios. These models allow users to identify areas of high vulnerability and can assist with coastal resilience and urban development planning.

FloridaDEP.gov/RookeryBayNERR and RookeryBay.org