

# LIVING SHORELINES

## *Managing Coastal Erosion and Habitat Enhancement*



### COASTAL MARSHES, RIVERS AND SHORELINES

are among Georgia's most beloved and iconic, yet vulnerable landscapes.

These natural coastal areas provide a wealth of environmental and economic benefits to marine ecosystems and coastal communities. Salt marshes and oyster reefs help filter pollutants from waterways and serve as habitat for birds, marine animals and other wildlife. They also protect properties from erosion and support recreational activities and tourism.

Stormwater runoff, tidal flooding, storm surge, boat wakes and sea level rise threaten these habitats by contributing to shoreline erosion along the coast. Armoring shorelines with hardened structures for erosion control, such as bulkheads and revetments, can further exacerbate erosion and reduce habitat for marine life.

Living shorelines are a natural approach to shoreline stabilization that provide an alternative to traditional armored shorelines. Living shorelines use bioengineering in combination with native vegetation to stabilize or enhance coastal habitats and protect properties from erosion.

The use of living shorelines as nature-based solutions to shoreline erosion was first explored in Georgia in 2006. Since that time, several have been constructed on the coast with guidance from the Georgia Living Shoreline Working Group, a team of partners working together to plan, design, construct and evaluate living shorelines.



## LIVING SHORELINES IN GEORGIA

- 1 Burton 4-H Center, Tybee Island
- 2 Skidaway Island State Park
- 3 Long Tabby, Sapelo Island
- 4 Ashantilly, Sapelo Island
- 5 Cannon's Point, St. Simons Island
- 6 Mosquito Creek, Little St. Simons Island
- 7 Beach Road, Little St. Simons Island
- 8 Shell Creek, Little Cumberland Island

## Design and function of living shorelines

Living shorelines intersect the worlds of biology and engineering by decreasing erosion through the strategic placement of natural materials. In Georgia, living shorelines are comprised mostly of recycled oyster shell that is placed on the bank. Bags filled with the oyster shell attract oyster larvae, which settle and create a living oyster reef that helps stabilize the shoreline. These reefs are used by other bottom dwelling (benthic) organisms, like crabs, oyster toadfish and polychaetes (marine worms).

The upper portion of living shorelines are planted with smooth cordgrass (*Spartina alterniflora* or *Sporobolus alterniflorus*), the dominant salt marsh species in Georgia. Smooth cordgrass has extensive roots that help stabilize the shoreline by holding sediment in place.

Various site characteristics are incorporated in the design, construction, evaluation and maintenance of shoreline stabilization projects. Site-specific characteristics such as wave energy, wind direction, tidal range and shoreline slope influence the type of stabilization method that will be successful in a certain area.



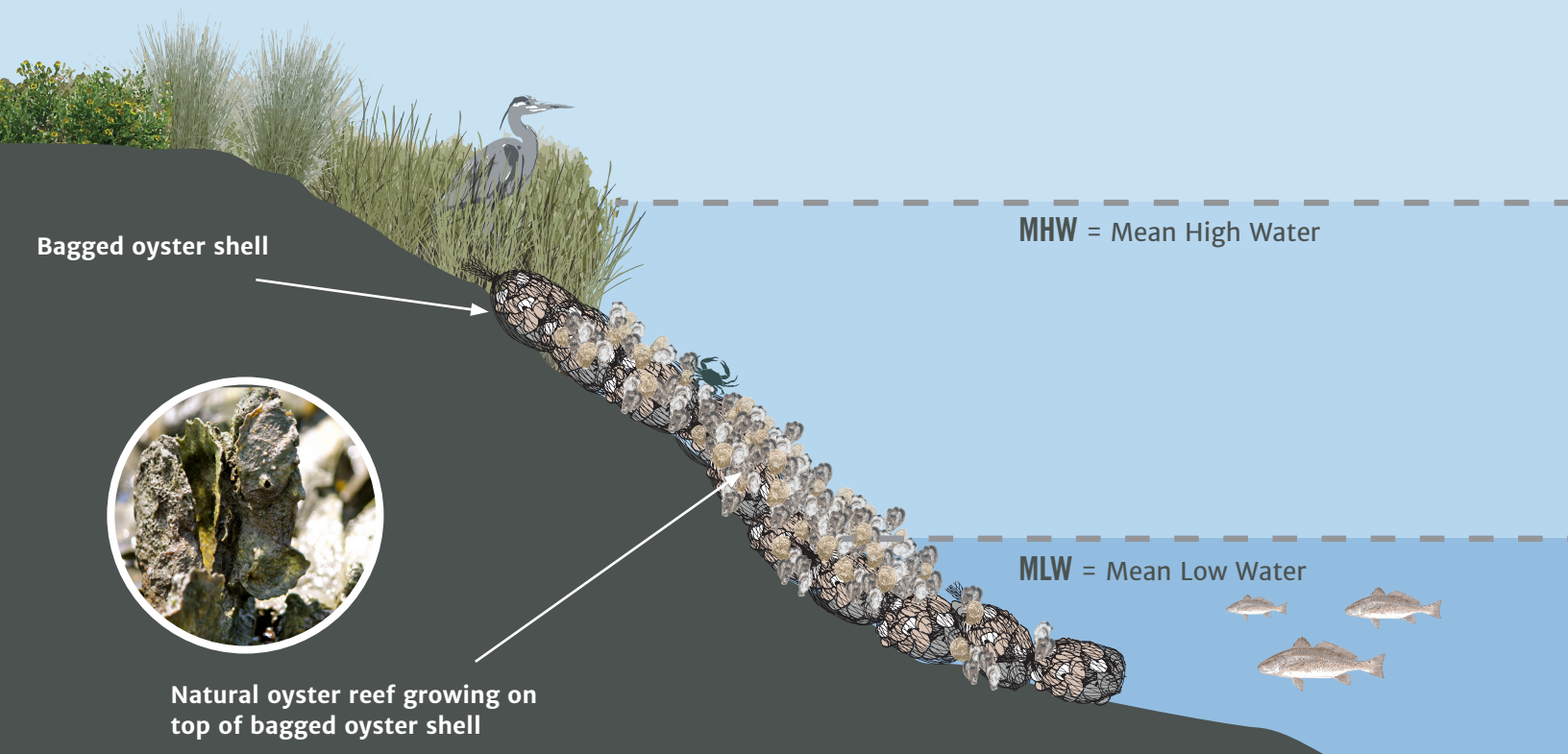
Muhly Grass



Smooth Cordgrass



Oyster Reef



This graphic shows a cross section of a living shoreline constructed with bagged oyster shell and planted with smooth cordgrass, muhly grass and other types of upland vegetation.



**BEFORE**



**AFTER**

The living shoreline site on Little St. Simons Island once contained a failing bulkhead. Instead of replacing it, a living shoreline was constructed to protect the eroding shoreline and restore habitat. Removal and installation began in February 2013. A large portion of the bank was sloped after removing the bulkhead and rubble concrete was placed at the base of the living shoreline to provide support for the recycled oyster shell. Eighteen native species of marsh grasses and upland plants were planted in the area above the recycled oyster shell.

### Habitat benefits of living shorelines

In 2015, The Nature Conservancy received funding from Boeing to launch a collaborative project with UGA Marine Extension and Georgia Sea Grant focused on monitoring and documenting the habitat benefits of living shorelines.

Researchers sampled fish, crabs and shrimp at the living shoreline site on Little St. Simons and the Ashantilly site on Sapelo Island National Estuarine Research Reserve. Sampling involved the use of bottomless lift nets that allowed researchers to capture and identify marine life using the living shoreline at high tide.

Results from the study showed an increase in species abundance and diversity at living shoreline sites. The most abundant species observed were grass shrimp (*Palaemonetes pugio* and *vulgaris*) and bay anchovies (*Anchoa mitchilli*) that feed on plankton. These smaller fish are prey for larger fish, such as spotted seatrout (*Cynoscion nebulosus*) and spot (*Leiostomus xanthurus*), that are popular among recreational anglers.

**43** different species of fish, including popular recreational fish, were observed.



sheephead



spotted seatrout



bay anchovy



spot

**7** species of crustaceans were observed at the living shorelines over the course of the project.



blue crab



white shrimp



A bottomless lift net was used to sample the living shorelines at low tide and high tide. This photo was taken at low tide.

## Increasing the use of living shorelines through collaboration

Developing methods to study the design, function and success of living shorelines in Georgia is a long-term partnership between public, private and non-governmental entities along the coast. Collaboration has been, and will continue to be, key to learning more about living shorelines as an effective nature-based form of shoreline stabilization in coastal Georgia. Partners include The Nature Conservancy, Marine Extension and Georgia Sea Grant, the Georgia Department of Natural Resources Coastal Resources Division, Coastal WildScapes, Little St. Simons Island, Sapelo Island National Estuarine Research Reserve, St. Simons Land Trust and many others.

### Benefits of living shorelines



- ◇ Enhance water quality by filtering out pollutants from runoff
- ◇ Mimic natural shoreline dynamics



- ◇ Provide an effective and relatively inexpensive approach to long-term shoreline stabilization
- ◇ Often cost less to install than bulkheads or revetments
- ◇ Enhance the aesthetic values of developed shorelines



- ◇ Restore nursery and foraging habitat for birds, fish and other marine life
- ◇ Maintain the land-sea connection for animal access



- ◇ Increase coastal resilience to flooding
- ◇ Buffer wave energy and trap sediments, which increases shoreline elevation
- ◇ Promote the natural migration of salt marshes and oyster reefs

### More information

Living shorelines are a natural solution that help build a more resilient coast while also supporting Georgia's growing population and the critical ecosystem services provided by coastal habitats. The following resources provide information for those who are interested in learning more about living shorelines or considering the use of a living shoreline for erosion control.

- ◇ **The Nature Conservancy - Georgia:** [nature.org/georgia](https://nature.org/georgia)
- ◇ **Marine Extension and Georgia Sea Grant:** [gacoast.uga.edu/living-shoreline](https://gacoast.uga.edu/living-shoreline)
- ◇ **Georgia Department of Natural Resources Coastal Resources Division:** <https://coastalgadnr.org/LivingShorelines>