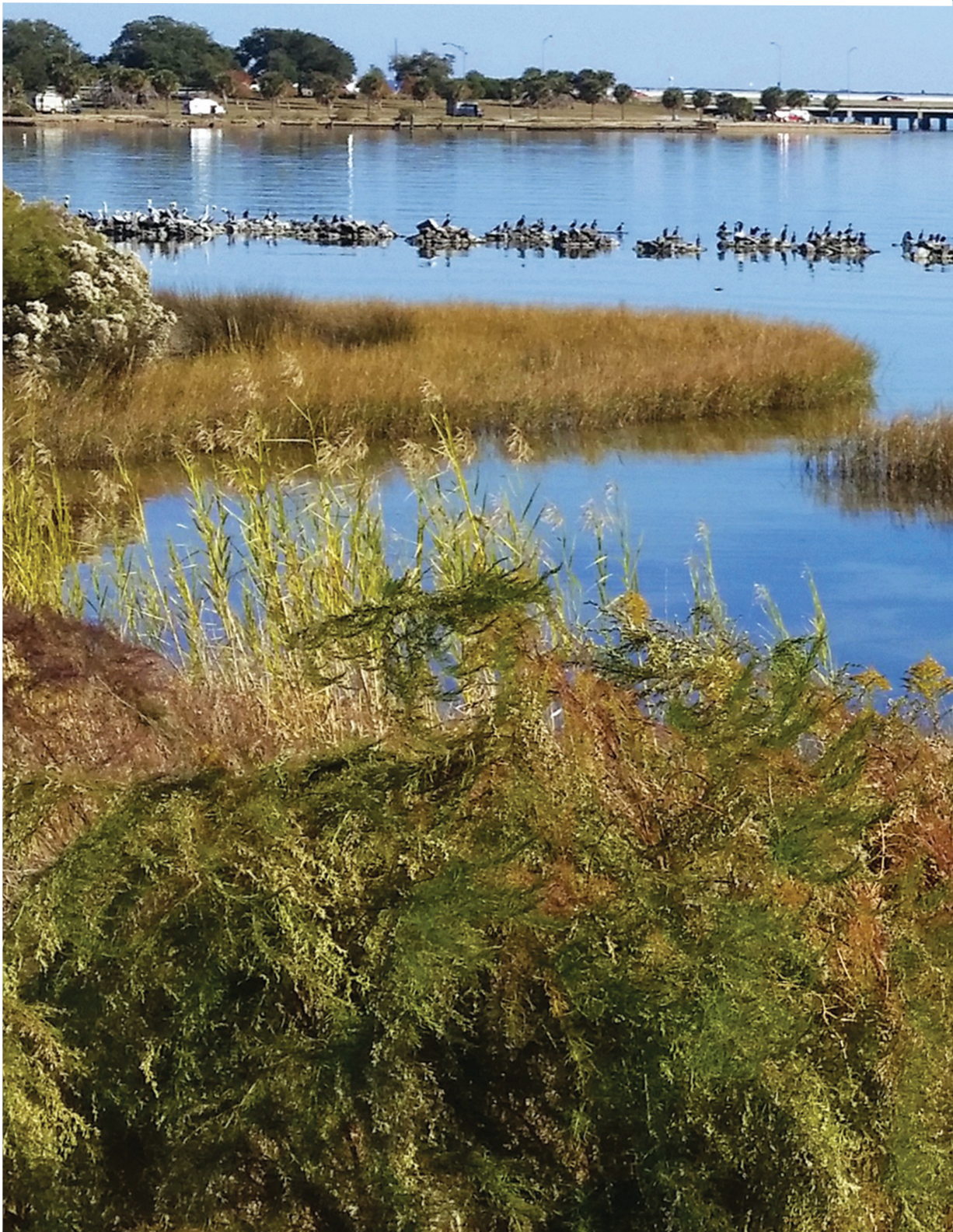
Living Shorelines

IN GULF COAST STATES: FLORIDA RESOURCE CATALOG



Purpose of this Resource Catalog

Living shorelines, or natural approaches to shoreline stabilization, have been increasingly recognized as an effective way to not only stabilize shorelines, but also provide numerous other benefits, including improvements in recreational fishing and birdwatching. This catalog was created to highlight resources that have been developed to inform coastal living shoreline project implementation in U.S. Gulf States. By compiling these available resources, we aim to help direct different key audiences to the most helpful and relevant resources. Target audiences include:

- **Environmental Consultants, Engineers, and Landscape Architects**
- **Installation contractors and suppliers**
- **Realtors and property developers**
- **Researchers**
- **Resource Managers and Local Land Use Planners**
- **Property Owners**
- **All** – *For resources relevant to all target audiences*

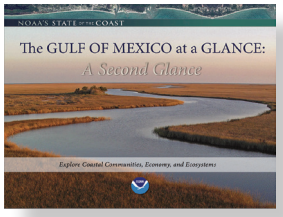
This catalog is organized into three primary sections highlighting resources relevant to the (1) design and construction considerations, (2) permitting, and (3) costs of living shoreline projects. The focus of this catalog (and thus the resources included) is coastal environments, those impacted by tidal waters. A brief description of each resource is included, along with information about the type of resource, topics covered, and target audiences. When you identify a resource of interest, follow the link provided to view the original resource. While this catalog was compiled for Florida, resources developed for other states have been included when the information is highly applicable to Florida. Some resources are included in more than one section when they contain information relevant to multiple sections.

Table of Contents

Introduction

The Gulf Coast: Ecological, Economic, and Social Importance

The tidal shoreline of the U.S. Gulf Coast stretches over 17,000 miles from the Florida Keys to South Texas. The region is home to some of the most diverse and productive ecosystems, valuable natural resource economies, and culturally rich communities in the U.S.



Title: **The Gulf of Mexico at a Glance: A Second Glance**

Resource Type: Technical Report

By: National Oceanic and Atmospheric Administration (2011)

Audience(s): **All**

Description: This report provides highlights about the U.S. Gulf of Mexico coastal region, including coastal ecosystems, economies, and communities. In addition to regional information, many data are broken down by state. This is a great starting resource for general information regarding the Gulf States.

Credit: Apalachicola National Estuarine Research Reserve

Florida's Gulf Coast: Key Facts and Figures

TOTAL SHORELINE[a]

16,393
MILES

HARDENED SHORELINE[a]

17%

LIVING SHORELINE[b]

100
PROJECTS

COASTAL POPULATION (2010)[c]

7,769,956
PEOPLE*

POPULATION LIVING WITHIN SPECIAL FLOOD HAZARD AREAS[c]

21%

OCEAN ECONOMY GDP (2015)[d]

$11.5
BILLION

LARGEST ECONOMIC SECTOR (% of TOTAL)[d]

75%
TOURISM AND RECREATION

[a] Gittman, RK, FJ Fodrie, AM Popowich, DA Keller, JF Bruno, CA Currin, CH Peterson, and MF Piehler (2015) Engineering away our natural defenses: an analysis of shoreline hardening in the US. Frontiers in Ecology and the Environment 13: 301-307.

[b] Arkema, KK, SB Scyphers, and C Shepard (2017) Living shorelines for people and nature, In: Bilkovic, DM, MM Mitchell, MK La Peyre, JD Toft, Eds. Living Shorelines: The science and management of nature-based coastal protection. CRC Press.

[c] National Oceanic and Atmospheric Administration (2011) The Gulf of Mexico at a Glance: A Second Glance. Washington, DC: U.S. Department of Commerce

*Coastal population includes those residing within Coastal Watershed Counties, as defined by the National Oceanic and Atmospheric Administration. Definitions and maps are included in: National Oceanic and Atmospheric Administration (2013) National Coastal Population Report: Population trends from 1970 to 2020. https://coast.noaa.gov/digitalcoast/training/population-report.html

[e] Economics: National Ocean Watch (ENOW) Explorer: https://coast.noaa.gov/digitalcoast/tools/enow

Living Shorelines: Guiding Principles and Definitions

"Living shoreline" is a broad term used to describe a range of nature-based approaches to stabilize a shoreline. In suitable environments, living shorelines can be used instead of seawalls or bulkheads to reduce erosion and protect property. Living shoreline projects are made up of mostly natural materials, such as native wetland vegetation, natural fiber logs, or oyster reef breakwaters, thus maintaining natural shoreline features.

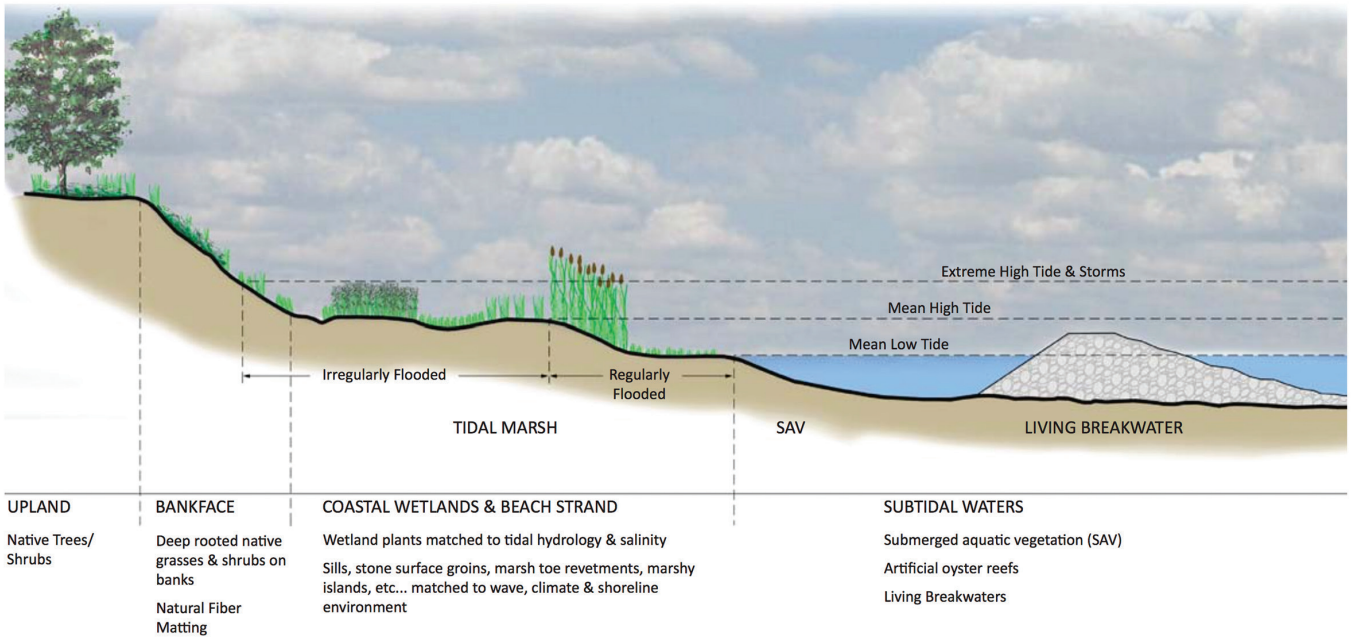


Figure: Coastal shoreline continuum and typical living shoreline treatments.
Credit: Allen Engineering and Science, Adapted from NOAA Habitat Conservation
[in: Mississippi Department of Marine Resources, Allen Engineering and Science. (2013) Alternative Shoreline Management Guidebook. (p. 4)]

The following resources provide general information on living shorelines in Florida and elsewhere. Descriptions of common living shoreline techniques are outlined below, as well as training modules and links to additional resources and databases.

Title: **Florida Living Shorelines**

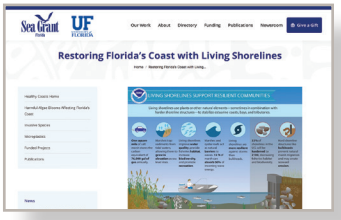
Resource Type: Website

By: Florida Living Shorelines

Audience(s): **All**

Description: This website was developed to help property owners understand alternative, softer approaches to shoreline stabilization. **Living shorelines are explained, and examples of different methods are described. Case studies can be explored by region**. The website also includes a **resource library, a brief section about permitting living shorelines, and lists of helpful contacts by region**.

Title: **Restoring Florida's Coast with Living Shorelines**



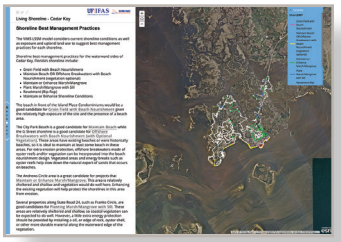
Resource Type: Website

By: Florida Sea Grant

Audience(s): **Property owners**

Description: This webpage briefly describes living shorelines, steps in the planning and implementation process, key components of Florida living shorelines.

Title: **Living Shoreline – Cedar Key**



Resource Type: Website

By: UF/IFAS, Nature Coast Biological Station

Audience(s): **Property owners**

Description: A living shorelines suitability model has been applied to the coastal areas of Cedar Key. Property owners in the area can examine the map to determine best practices for shoreline management for their specific property. Upland and waterward areas are included in the model.

Title: **Ecosphere Restoration Institute, Inc**

Resource Type: Website

By: Ecosphere Restoration Institute, Inc.

Audience(s): **Property owners; Resource managers and local land use planners**

Description: Ecosphere Restoration Institute is a **non-profit organization in the Tampa Bay region**. The organization was created in 2007 to foster public and private partnerships for environmental restoration. They have worked on numerous living shoreline projects, and **case studies** are listed on the website.

Title: **Natural and Structural Measures for Shoreline Stabilization**

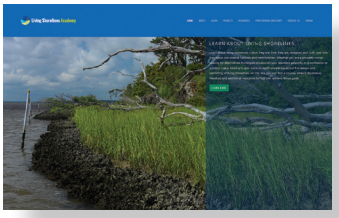
Resource Type: Guidance Handbook

By: Systems Approach to Geomorphic Engineering (2015)

Audience(s): **All**

Description: The majority of the brief document is comprised of a table illustrating a **continuum of shoreline management approaches, ranging from "green" or "soft" techniques (e.g., vegetation planting, edging) through "gray" or "hard" techniques (e.g., bulkhead, seawall)**. Each technique example is accompanied by a brief outline of shoreline suitability, material options, benefits, disadvantages, as well as **cost range estimates for initial construction and operations and maintenance**.

Title: **Living Shorelines Academy**



Resource Type: Website

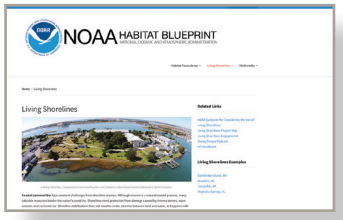
By: Restore America's Estuaries and North Carolina Coastal Federation

Audience(s): **All**

Description: The Academy website seeks to elevate the understanding, importance, and practice of using living shorelines to enhance storm resiliency and create new wetlands. The site includes

- **Living shorelines training modules aimed at both homeowners and contractors**
- A database of papers and reports on the subject of living shorelines
- A database of existing living shorelines project databases
- A map of highlighted living shorelines projects across the US
- A library of living shoreline resources, including trainings, websites, print materials, videos, and more
- **A directory of living shorelines professionals**

Title: **NOAA Habitat Blueprint: Living Shorelines**



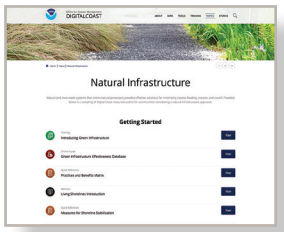
Resource Type: Website

By: National Oceanic and Atmospheric Administration

Audience(s): **All**

Description: Coastal communities face constant challenges from shoreline erosion. Although erosion is a natural process, shorelines need protection from damage caused by intense storms, wave erosion, and sea level rise. New stabilization options that do not create a barrier between land and water, like living shorelines, are gaining attention as an alternative to seawalls and bulkheads. Living shorelines can reduce damage and erosion while providing ecosystem services to society, including food production and improved water quality.

Title: **Natural Infrastructure**



Resource Type: Website

By: National Oceanic and Atmospheric Administration

Audience(s): **All**

Description: This website hosts links to various resources, including online databases, publications, videos, quick reference guides, and other tools.

Title: **Green Infrastructure Effectiveness Database**

Resource Type: Website

By: National Oceanic and Atmospheric Administration

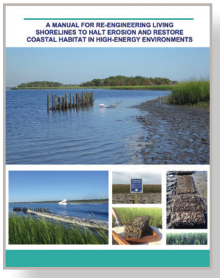
Audience(s): **All**

Description: This database contains records from a wide range of literature sources, such as peer-reviewed journals, online tools, and gray literature. The **database includes information on 32 different coastal green infrastructure types and techniques**, including living shorelines. Users have the ability to filter by coastal hazard type, green infrastructure approach, literature type, or geography.

Design and Construction

Resources found in this section provide information related to the design and construction of living shoreline projects in Florida. Local considerations regarding the design, planning, and installation are reviewed, as well as guidance on the maintenance of living shoreline projects. The roles of various groups involved in living shoreline projects are also examined.

Local Considerations



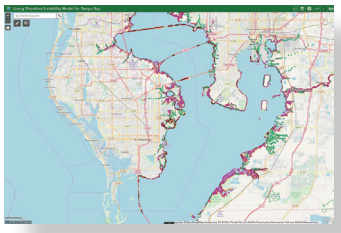
Title: **A Manual for Re-Engineering Living Shorelines to Halt Erosion and Restore Coastal Habitat in High-Energy Environments**

Resource Type: Technical Report

By: Bersoza et al. (2018)

Audience(s): **All**

Description: The Guana Tolomato Matanzas Research Reserve, Northeast Florida Aquatic Preserves and the University of Florida recently completed a project that will test the effectiveness of new methods for preserving and restoring shoreline to protect coastal habitat in high-energy environments and integrate engineering and ecological approaches by developing "gabion-breaks," a hybrid method for building living shorelines to protect and restore coastlines. This new experimental study tests the potential for Biodegradable Element for Starting Ecosystems (BESE), a potato waste-based, mass-manufactured product that can be clipped together with complex 3-dimensional scaffolds and used in restoration of oysters, salt marsh grasses, mangroves, submerged aquatic vegetation, sponges and corals.



Title: **Living Shoreline Suitability Model for Tampa Bay: A GIS Approach**

Resource Type: Website

By: Boland and O'Keife (2018)

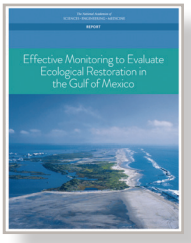
Audience(s): **All**

Description: A Living Shoreline Suitability Model was applied to the **Tampa Bay** region in Florida. The **model considers environmental variables, such as fetch, bank height, existing shoreline conditions, and human installed structures, before recommending shoreline and upland best management practices**. The model's recommended best management practices can be further generalized into 3 categories: suitable for living shoreline stabilization, suitable for a hybrid shoreline stabilization technique, and not suitable for a living shoreline. The model can be viewed here: https://www.arcgis.com/apps/webappviewer/index.html?id=e4d76fa267dc4bac97d407d20566ae42

Maintenance and Troubleshooting

Monitoring of a living shoreline project is important in order to understand whether the project has resulted in the desired effect(s). This will also help inform potential maintenance needs, and identify any adaptive management that might be necessary. Depending on the type of project, monitoring a living shoreline can be very similar to monitoring a coastal habitat restoration project. The following resources provide general information on important metrics, monitoring methods, and critical timelines related to monitoring common coastal habitats (e.g., salt marsh, oyster reef, beach).

Title: **Effective Monitoring to Evaluate Ecological Restoration in the Gulf of Mexico**



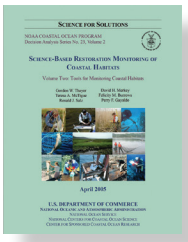
Resource Type: Guidance Handbook

By: National Academy of Sciences (2017)

Audience(s): **Property owners; Resource managers and local land use planners; Environmental consultants, engineers, and landscape architects; Researchers**

Description: Part I of this handbook reviews Gulf restoration programs and outlines general principles of effective monitoring and evaluation. Part II summarizes good practices for monitoring restoration of selected habitats and species of concern, including those commonly involved in living shoreline projects: oyster reef, tidal wetland, and seagrass habitats.

Title: **Science-Based Restoration Monitoring of Coastal Habitats, Volume Two: Tools for Monitoring Coastal Habitats**



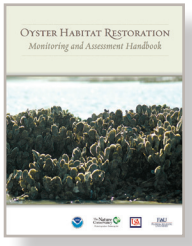
Resource Type: Guidance Handbook

By: Thayer et al. (2005)

Audience(s): **Property owners; Resource managers and local land use planners; Environmental consultants, engineers, and landscape architects; Researchers**

Description: This handbook explains what can be measured during restoration monitoring, why it is important, and what information it provides about the progress of a restoration effort. The handbook contains 12 chapters specific to various coastal habitats, including those commonly involved in living shoreline projects in Florida, such as oyster reefs (chapter 4), soft shoreline habitats (chapter 8), submerged aquatic vegetation (chapter 9), and coastal marshes (chapter 10). Additionally, human dimensions of restoration are reviewed (chapter 14), and cost estimates for monitoring are provided (chapter 16).

Title: **Oyster Habitat Restoration: Monitoring and Assessment Handbook**



Resource Type: Guidance Handbook

By: Baggett et al. (2014)

Audience(s): **Property owners; Resource managers and local land use planners; Environmental consultants, engineers, and landscape architects; Researchers**

Description: This handbook outlines a set of Universal Metrics and Universal Environmental Variables to be monitored for all oyster restoration projects. Additionally, guidelines were developed for Restoration Goal-Based Metrics. The Universal Metrics allow for the assessment of the basic project performance of restoration projects (e.g., reef area, height and persistence, abundance, recruitment and size frequency of oysters), whereas the Restoration Goal-based Metrics allow practitioners to assess the performance of the restored reefs in meeting the ecosystem service-based restoration goal(s) associated with their project.

Title: **Long-term Monitoring of Estuarine Vegetation Communities: NERRS SWMP Vegetation Monitoring Protocol**

Resource Type: Technical Report

By: National Estuarine Research Reserve System (2013)

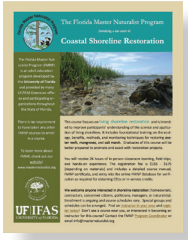
Audience(s): **Property owners; Resource managers and local land use planners; Environmental consultants, engineers, and landscape architects; Researchers**

Description: This report provides guidance for implementing vegetation monitoring according to the National Estuarine Research Reserve System System-Wide Monitoring Program. Monitoring protocols for emergent and submersed vegetation communities are provided, including sampling design and methods. Appendix 4 provides guidance on monitoring ecotone boundaries, which may be especially useful for living shoreline projects.

Credit: Amy Baldwin Moss

Guidance for Target Audiences

Title: **Coastal Shoreline Restoration Course**



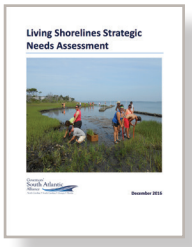
Resource Type: Brochure

By: Florida Master Naturalist Program

Audience(s): **Property owners; Resource managers and local land use planners; Environmental consultants, engineers, and landscape architects; Installation contractors and suppliers**

Description: The brochure briefly describes a **course offered by the Florida Master Naturalist Program**. The Coastal Shoreline Restoration course focuses on living shorelines and **includes foundational training on the ecology, benefits, methods, and monitoring techniques for restoring oyster reefs, mangroves, and salt marsh**. Participants will receive 24 hours of **in-person classroom learning, field trips, and hands-on experience**.

Title: **Living Shorelines Strategic Needs Assessment**



Resource Type: Technical Report

By: Governors' South Atlantic Alliance (2016)

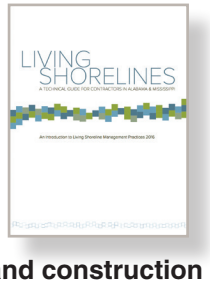
Audience(s): **Environmental consultants, engineers, and landscape architects; Researchers; Resource managers and local land use planners**

Description: This assessment is intended to assist those partners that address education and outreach needs and implement policies that promote wider use of living shorelines, including:

- State and federal agencies involved in shoreline management, whether that agency's focus is on regulation, research, or conservation
- Local land use planners and resource managers
- Academic institutions
- Non-government organizations
- Funders of conservation projects and research
- Legislators, and other public officials involved with shoreline policy
- Public landowners of shoreline (including the Department of Defense)
- Land trusts with shoreline interests

For each audience, information related to that group's role and needs are outlined.

Title: **Living Shorelines: A Technical Guide for Contractors in Alabama and Mississippi**



Resource Type: Guidance Handbook

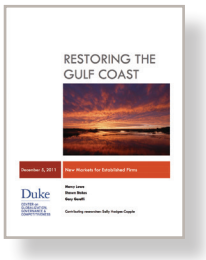
By: Bryars et al. (2016)

Audience(s): **Installation contractors and suppliers; Environmental consultants, engineers, and landscape architects**

Description: This document was **designed to be used by contractors during the design and construction of living shorelines** in Alabama and Mississippi. The authors include an important reminder that contractors should understand that project sites will differ, and principles outlined in this document need to be adapted to the conditions of each specific project site.

See also: More information in Cost section

Title: **Restoring the Gulf Coast: New Markets for Established Firms**



Resource Type: Technical Report

By: Lowe et al. (2011)

Audience(s): **Environmental consultants, engineers, and landscape architects; Installation contractors and suppliers**

Description: Habitat restoration in the Gulf, including the construction of living shorelines, can be an important part of the economy. Many currently established firms (e.g., materials suppliers, engineering and construction contractors) working in other sectors can often apply the same skills and equipment to coastal restoration. Thus, restoration provides an opportunity for firms to diversify and find new markets. This report describes in detail what coastal restoration comprises and what kinds of jobs it can save and create. The analysis provides the following:

- Overview of specific equipment and services that perform coastal restoration
- Value chain analysis of the firms involved
- Firm-level analysis of lead firms in the 13 most significant categories of the value chain
- Case study of two Gulf Coast firms that traditionally served the oil and gas industry but have found an additional market in coastal restoration
- Discussion of the types of jobs and geography of jobs in the coastal restoration value chain

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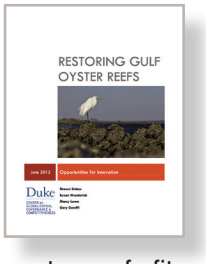
Title: **Restoring Gulf Oyster Reefs: Opportunities for Innovation**



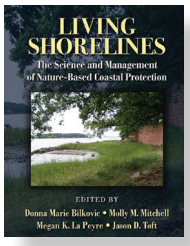
Resource Type: Technical Report

By: Stokes et al. (2012)

Audience(s): **Environmental consultants, engineers, and landscape architects; Installation contractors and suppliers**

Description: As a follow-up report to "Restoring the Gulf Coast: New Markets for Established Firms" (Lowe et al., 2011), this study examines how several approaches to restore oyster reefs fit into conventional coastal restoration strategies. Artificial oyster reefs are often incorporated into living shoreline projects. Three types of oyster reef projects were examined: 1) high-relief planted cultch, 2) contained cultch, and 3) precast concrete reefs.

Title: **Living Shorelines: The Science and Management of Nature-based Coastal Protection**



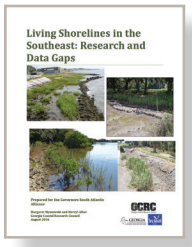
Resource Type: Book

By: Bilkovic et al., Eds. (2017)

Audience(s): **All**

Description: This book provides a recent and thorough compilation of living shorelines knowledge and research. The book is comprised of five sections: (1) Background: History and Evolution; (2) Management, Policy, and Design; (3) Synthesis of Living Shoreline Science: Physical Aspects; (4) Synthesis of Living Shoreline Science: Biological Aspects; and (5) Summary and Future Guidance. The regions, ecosystems, scales, and perspectives represented across the 24 chapters capture much of the variability in approaches to and results from living shorelines around the world.

Title: **Living Shorelines in the Southeast: Research and Data Gaps**



Resource Type: Technical Report

By: Myszewski and Alber (2016)

Audience(s): **All**

Description: While focus of this report is on the Southeastern U.S., the information is very relevant to all Gulf States. Part One of the report provides a brief overview of the types of approaches that have been used in the region. Parts Two, Three, and Four describe research on the physical, biological, and chemical characteristics, respectively, of living shorelines in salt marshes, while Part Five summarizes what little information is available regarding living shoreline projects in mangroves. Part Six is a summary and discussion of data gaps. It also includes appendices cataloging living shoreline projects in the southeast and documenting relevant case studies.

Credit: Florida Department of Environmental Protection

Permitting

All living shoreline projects require permits prior to implementation. Regulations and permit requirements exist at federal and state levels, with local municipalities sometimes imposing additional rules. Visit the following agency websites to learn more about permitting requirements in Florida.

Federal, State, and Local Permitting

The primary federal entity involved in shoreline management is the **U.S. Army Corps of Engineers**. Information about federal regulations and permits can be found on their website: https://www.usace.army.mil/Missions/Civil-Works/Regulatory-Program-and-Permits/.

In Florida, permits are reviewed and issued by the **U.S. Army Corps of Engineers Jacksonville District**. More information about the Jacksonville District of the U.S. Army Corps of Engineers, including regional rules and regulations, can be found on their website: https://www.saj.usace.army.mil/.

In Florida, the Department of Environmental Protection is the primary state entity involved in permitting living shoreline projects. Your permit application will also have to be reviewed and approved by your local Water Management District. Information about state and local regulations can be found, along with permit applications, on these websites:

- **Florida Department of Environmental Protection**
  https://tinyurl.com/y6pxdr46
- **Florida Water Management Districts**
  https://tinyurl.com/y66m6bvv

Utilize the resources below to navigate the necessary steps to successfully permitting a living shoreline project.

Title: **Florida Living Shorelines**

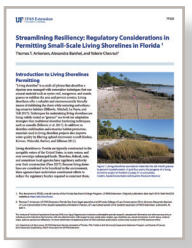
Resource Type: Website

By: Florida Living Shorelines

Audience(s): **Property owners;**
Installation contractors and suppliers;
Resource managers and local land use planners

Description: Any work that is done below the Mean High Water (MHW) line will require a permit from the Florida Department of Environmental Protection and the US Army Corps of Engineers. To get an idea of where MHW is at your site, take note of where high tide usually hits along your property. If you are addressing erosion below that mark, you will need a permit.

Title: **Streamlining Resiliency: Regulatory Considerations in Permitting Small-scale Living Shorelines in Florida**



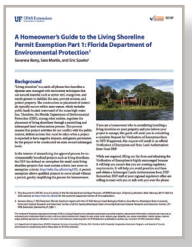
Resource Type: Guidance Handbook

By: Ankersen, Barshel, and Chesnut (2018)

Audience(s): **All**

Description: This resource **outlines the various permit options available** for constructing living shorelines in Florida. Focus is on the relatively new, small-scale living shorelines permit exemption. **Figure 3 provides a conceptual path for determining permit needs for your project**.

Title: **A Homeowner's Guide to the Living Shoreline Permit Exemption, Part 1: Florida Department of Environmental Protection**



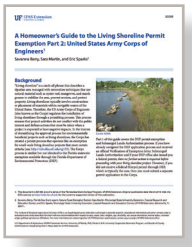
Resource Type: Guidance Handbook

By: Barry, Martin, and Sparks (2019)

Audience(s): **Property owners**

Description: This resource **outlines step-by-step how to apply for living shorelines permit exemption through the Florida Department of Environmental Protection** online portal. Each step includes explanatory text followed by a screenshot of the online permit exemption portal to illustrate the important points of each step.

Title: **A Homeowner's Guide to the Living Shoreline Permit Exemption, Part 2: United States Army Corps of Engineers**



Resource Type: Guidance Handbook

By: Barry, Martin, and Sparks (2019)

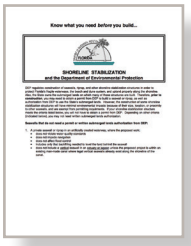
Audience(s): **Property owners**

Description: This resource **outlines step-by-step how to apply for a permit application managed by the Army Corps of Engineers**. This guide **includes example text and drawings, helpful tips, and useful links** for each page of the permit application.

Credit: Florida Department of Environmental Protection

Credit: Florida Department of Environmental Protection

Title: **Shoreline Stabilization and the Department of Environmental Protection**



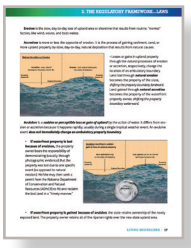
Resource Type: Guidance Handbook

By: Florida Department of Environmental Protection

Audience(s): **Property owners**

Description: This handout **discusses criteria to help property owners determine if they need a permit from the Department of Environmental Protection** for seawalls or other stabilization projects. Contact information for each Department of Environmental Protection District Office is provided.

Title: **Living Shorelines: A Guide for Alabama Property Owners**



Resource Type: Guidance Handbook

By: Herder (2014)

Audience(s): **All**

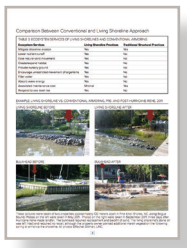
Description: Though developed for Alabama, Section 3 of this resource provides an overview of the regulatory framework that is of general use. **Definitions of state-owned submerged lands, riparian rights, and ambulatory property lines** are provided, as well as **descriptions of erosion, accretion, and avulsion and how these processes affect property lines**.

Cost $

Cost is an important factor to consider before planning a living shoreline project. Costs can vary based on project size, location, and technique(s). Resources outlined in this section provide information related to the cost (and potential benefits) of living shoreline projects in Florida.

Costs and Benefits of Living Shorelines Compared to Traditional Armoring

Title: **Living Shorelines: A Technical Guide for Contractors in Alabama and Mississippi**



Resource Type: Guidance Handbook

By: Bryars et al. (2016)

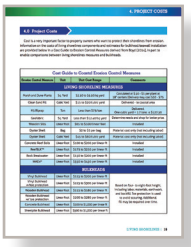
Audience(s): **Installation contractors and suppliers; Environmental consultants, engineers, and landscape architects**

Description: A **comparison between conventional armoring and living shoreline** approaches is provided on page 8. Table 3 lists the various ecosystem services, or benefits, provided by living shoreline and traditional structural techniques. On the same page, before and after photos of two properties impacted by Hurricane Irene are shown, one protected with a living shoreline and the other protected with a bulkhead.

See also: More information in Design and Construction section

Implementation Costs (design, permitting, material, construction, & maintenance)

Title: **Living Shorelines: A Guide for Alabama Property Owners**



Resource Type: Guidance Handbook

By: Herder (2014)

Audience(s): **All**

Description: Though developed for Alabama, Section 7 of this resource provides a general case study for determining a living shoreline project cost. **Using a hypothetical living shoreline project, readers can follow along as they determine the material cost of riprap breakwaters, sand fill, and plants**.

See also: More information in Design and Construction and Permitting sections

For estimates of design cost, contact a local environmental consultant, engineer, or landscape architect. Local coastal contractors can help you determine the construction cost of a project and state agencies can help you determine permitting costs.

Incentives and Grant Opportunities

At the time this guide was assembled, no statewide financial incentives or grant opportunities were identified. However, local governments may offer financial incentives so check with your local jurisdiction before beginning a project.

The following websites discuss options for funding and financing a variety of green infrastructure projects. Some of this information may be helpful for living shoreline projects.

- **Green Infrastructure Funding Opportunities**
  https://www.epa.gov/green-infrastructure/green-infrastructure-funding-opportunities
  Maintained by: U.S. Environmental Protection Agency
- **Green Infrastructure Toolkit**
  https://www.georgetownclimate.org/adaptation/toolkits/green-infrastructure-toolkit/how-to-pay-for-green-infrastructure-funding-and-financing.html
  Maintained by: Georgetown Climate Center

There is an incentive program operating in the Pacific Northwest called **Green Shores for Homes™**. This program rewards residents for implementing living shoreline projects, among other actions aimed at conserving natural shorelines. It is a voluntary, incentive-based program similar to green building rating programs such as Built Green™ and LEED™. A residential shoreline project receives points for design features from four categories of credits. More information about this program can be found on their website: http://greenshoresforhomes.org/.

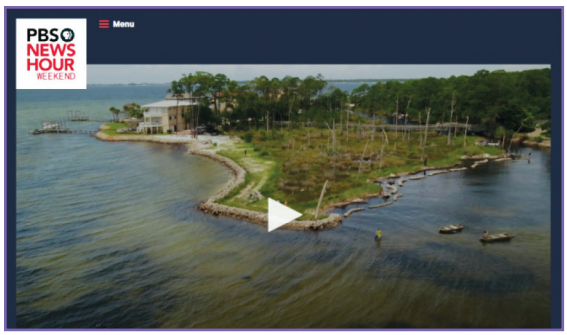
Credit: Florida Department of Environmental Protection

Case Studies

Learn more about the following projects in this Climate Central article and PBS video:

As Seas Rise, Americans Use Nature to Fight Worsening Erosion
John Upton, Climate Central (2018)
https://www.climatecentral.org/news/americans-use-nature-to-fight-erosion-sea-level-rise-21884

'Living shorelines' use oyster shells and marsh grass to reverse coastal erosion
PBS (2018)
https://www.pbs.org/newshour/science/as-seas-rise-americans-use-nature-to-fight-worsening-erosion



McPeak Property, Destin, FL

"We were watching our biggest investment fall into the ocean." – Homeowner Jennifer McPeak

After learning about living shorelines, McPeak opted for a softer solution to her erosion problems. A local nonprofit environmental organization, the Choctawhatchee Basin Alliance, helped construct a living shoreline on the McPeak property using oyster shells and marsh grass.

Before (top) and after (bottom) photos of the McPeak shoreline show the transformation that has occurred over the past two and a half years (tree stump highlighted for reference).

With the money she saved on a seawall, she built a boathouse on her dock. And now she enjoys keeping track of the wildlife that visits her yard where the seawall would have been.

Other property owners are optimistic about seeing the benefits from their living shoreline projects.

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"Fishing is going to get good out here…"
– Homeowner Butch Richard

Credit: Choctawhatchee Basin Alliance

Project GreenShores, Pensacola, FL

The first phase, completed in 2003, involved the restoration of eight acres of salt marsh and seagrass and seven acres of oyster reef. One year later, it protected a section of roadway from the effects of Hurricane Ivan. Since then, the project has expanded to include over 30 acres of living shoreline in downtown Pensacola.

More than five times as many species of birds have been observed at the site since the project was built.

Visit the site:
500 Bayfront Pkwy, Pensacola, FL 32502

Credit: Darryl Boudreau, The Nature Conservancy

The following databases contain case studies of living shoreline projects.

Restoration Center Funded Living Shorelines Projects
https://www.habitatblueprint.noaa.gov/storymap/ls/index.html
Maintained by: U.S. National Oceanic and Atmospheric Administration

Green Infrastructure Effectiveness Database
https://coast.noaa.gov/gisearch/#/search
Maintained by: U.S. National Oceanic and Atmospheric Administration

SAGE Project Database
http://sagecoast.org/info/sagesearch.html
Maintained by: Systems Approach to Geomorphic Engineering

TNC's Natural Infrastructure + Restoration Projects Database
http://www.projects.tnc.org/coastal/
Maintained by: The Nature Conservancy

Credit: Florida Department of Environmental Protection

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Barry S, Martin S, Sparks E. (2019) A Homeowner's Guide to the Living Shoreline Permit Exemption Part 2: United States Army Corps of Engineers. http://edis.ifas.ufl.edu/sg189

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Florida Master Naturalist Program. Coastal Shoreline Restoration course. http://tinyurl.com/yxau5oft

Florida Sea Grant. Restoring Florida's coast with living shorelines. Website. http://tinyurl.com/yxarvq9a

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Back Cover: *Credit: Apalachicola National Estuarine Research Reserve*

Contributing Organizations

Apalachicola National Estuarine Research Reserve
Baldwin County Soil and Water Conservation District
Choctawhatchee Basin Alliance
Climate and Resilience Community of Practice
Dauphin Island Sea Lab
Florida Department of Environmental Protection
Florida Fish and Wildlife Conservation Commission
Gulf of Mexico Alliance
Louisiana Sea Grant
Mississippi-Alabama Sea Grant Consortium
Mission Aransas National Estuarine Research Reserve
Mississippi Department of Marine Resources
Mississippi State University Extension
National Academies of Sciences, Engineering, and Medicine Gulf Research Program
National Oceanic and Atmospheric Administration
National Wildlife Federation
Northern Gulf of Mexico Sentinel Site Cooperative
Nueces County
Tampa Bay Estuary Program
Texas A&M University Corpus Christi Harte Research Institute
The Nature Conservancy
The University of Texas at Austin Marine Science Institute
The University of Southern Mississippi
U.S. Fish and Wildlife Service
Weeks Bay National Estuarine Research Reserve

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