Image credit: , UGA Marine Extension and Georgia Sea Grant

Synching with Policies – Required Efforts and Partnerships to Scale Up

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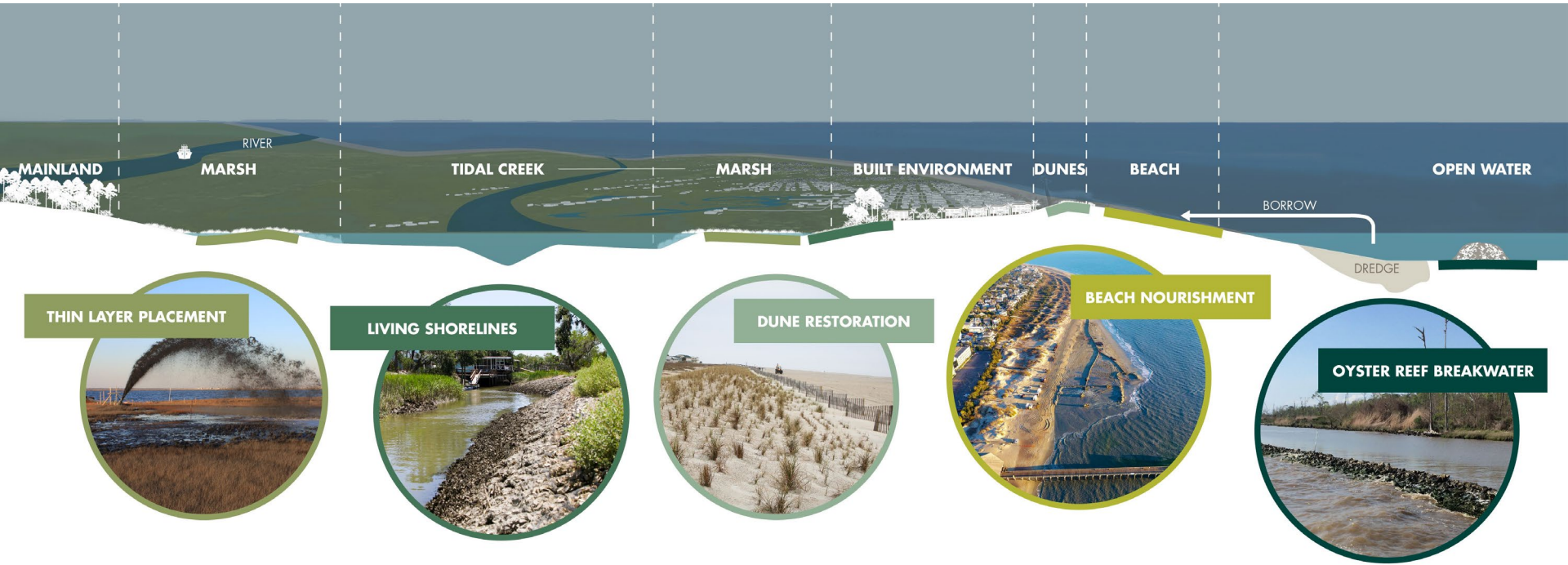
Carl Vinson Institute of Government

Sea Grant

What are we going to do?



Graphic developed by Rhett Jackson and Kelsey Broich, Network for Engineering with Nature, University of Georgia. Thin layer placement image by Tim Welp, USACE. Living shoreline and dune restoration images by UGA Marine Extension and Georgia Sea Grant. Beach nourishment image by Alan Robertson, City of Tybee. Oyster Reef Breakwater, Bon Secour National Wildlife Refuge in Alabama photo used with permission and provided to the University of Georgia by USACE, Engineering With Nature.

Policy Alignment: Some Framing

Structure of U.S. Government: Federalism

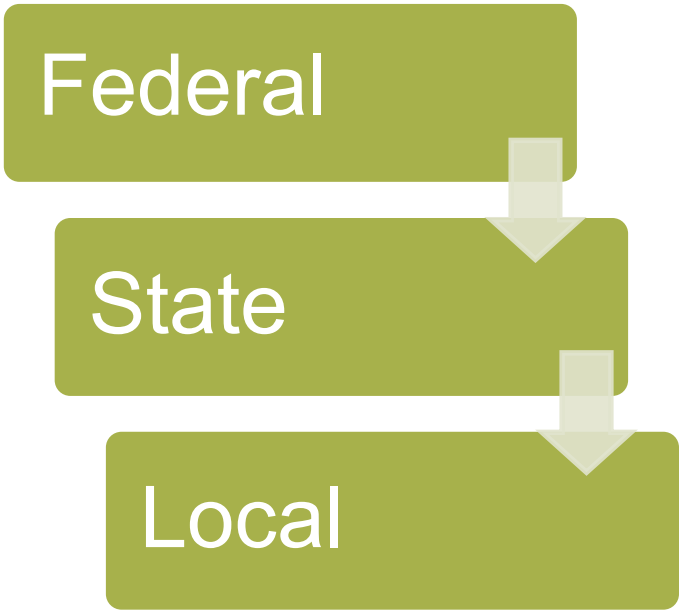
State Law: Findings from Stabilization Law Analysis

Legacy Institutions and Laws: USACE, CWA, ESA, etc.

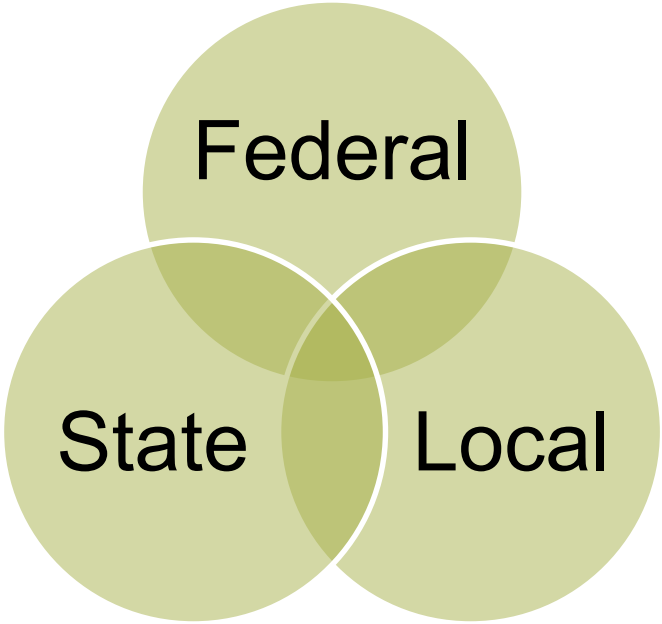
- ***Regulate***
- ***Fund Infrastructure and Water Resource Projects***
- ***Incentivize***

Ecosystem of Interests: Gov't, Industry, Private Property Owners, NGOs, etc.

The Structure of Government



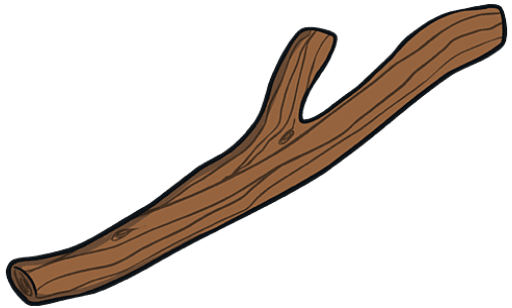
Modern Enviro Law = "Cooperative Federalism"



Congress

Congress Passes Law

Clean Water Act



Executive

Federal Agency Administers and Issues Rules

EPA/USACE

States agree to administer the federal NPDES program; issue permits/concur on 404 permits.

Local governments often tasked for permitting, inspections and enforcement

Cites, Counties, Authorities

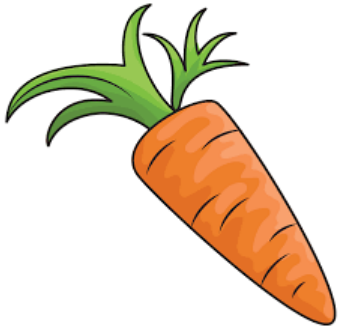
DELEGATION

Judiciary

The Courts

Feds, states, and locals have "concurrent jurisdiction" for enforcement.

And citizens can also sue (sometimes).



Congress Passes Law
CZMA

Federal Agency Administers
NOAA

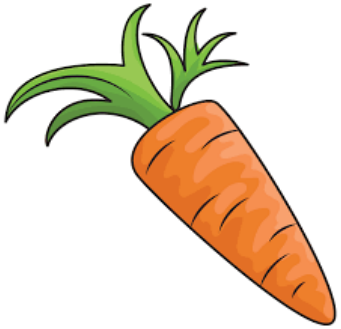
General Assembly Passes Law.
Coastal Marshlands Protection Act

States agree to establish Coastal Zone Management Programs; administer state programs

Local Government Passes Law: Ordinance

States often delegate authority to local governments for permitting, inspections and enforcement
Cites, Counties, Authorities

NOAA sends funding to states that agree to adopt CZMA programs. No citizen suit or enforcement provisions like the CWA.



Congress Passes Law
NFIP

Federal Agency Administers
FEMA

EPD develops Model Flood Ordinance

States encourage adoption of FEMA's Flood Requirements

Local Government Passes Law: Flood Control Ordinance

States often delegate authority to local governments for permitting, inspections and enforcement
Cites, Counties, Authorities

FEMA provides subsidized flood insurance for communities that adopt FEMA flood maps and minimum development standards. Communities that go above-and-beyond these standards earn flood insurance discounts.

Agency	Law	
National Oceanic and Atmospheric Administration **(NOAA),** which, in turn, funds state coastal zone management programs.	**Coastal Zone Management Act (CZMA).** The CZMA's National Coastal Zone Management Program directs state and local coastal management measures. The program provides federal funding assistance when states develop coastal management plans approved by NOAA that control uses impacting the state's coastal zone. State programs also have a coordinating function involving local, area-wide, and interstate plans and agencies with responsibilities for the coastal zone. States also currently address, to varying extents, coastal nonpoint source pollution, sea level rise, and ocean planning.	□ PLANNING □ INCENTIVIZING ENFORCEABLE POLICIES □ INCENTIVIZING CONSERVATION □ COASTAL MANAGEMENT □ PROJECT FUNDING SUPPORT
EPA	**Clean Water Act (CWA).** The CWA requires stormwater permitting and provides funding through its Section 319 for implementation, including green infrastructure projects.	□ REGULATION □ STORMWATER MANAGEMENT □ PROJECT FUNDING SUPPORT

U.S. Army Corps of Engineers (USACE).	**Rivers and Harbors Act and Section 404, Clean Water Act (CWA), Wetlands Mitigation.** **Water Resources Development Act (WRDA)** legislation is key part of the USACE's civil works project development process. WRDAs generally authorize new activities, tasks, and responsibilities allocated to the USACE or other federal agencies responsible for water resource infrastructure or activities. Generally, the authorizations consist of project studies, construction projects, and project modifications. As the authorizing step in project development, the WRDA is also the primary source for Congressional oversight and direction of Corps' project planning and development processes.	☐ ENFORCEABLE POLICIES ☐ PLANNING ☐ PROJECT FUNDING SUPPORT
Department of Defense (DoD).	Readiness and Environmental Protection Integration (REPI). DoD's REPI Program enhances military readiness by combating encroachment that limits or restricts military training, testing, and operations through land acquisition and conservation efforts. The John S. McCain National Defense Authorization Act for Fiscal Year 2019, amended 10 U.S.C. 101 by adding the definition of military installation resilience and expanded REPI to allow agreements that use or develop "real property in the vicinity of, or ecologically related to, a military installation…for the purposes of…preserving off base habitat on the property in a manner that…maintains or improves military installation resilience."	☐ PLANNING ☐ CONSERVATION ☐ PROJECT FUNDING SUPPORT

Federal Emergency Management Agency/ State Emergency Management.	**Stafford Act, Hazard Mitigation Program.** FEMA provides a number of grant funding opportunities for pre and post emergency or disaster-related projects, including, for example: • Hazard Mitigation Grants. • Building Resilient Infrastructure and Communities (BRIC). **National Flood Insurance Act (NFIA), National Flood Insurance Program (NFIP).** The NFIP provides flood insurance to homeowners, renters, and business owners in communities that participate the program and adopt a set of enforceable minimum standards (usually found in a floodplain ordinance). Communities participating in the NFIP must adopt and enforce ordinances that meet or exceed requirements set forth by FEMA to reduce flooding risks. The NFIP's Community Rating System (CRS) rates communities on a ten-point scale for exceeding NFIP requirements.	☐ PLANNING ☐ HAZARD MITIGATION ☐ INCENTIVIZING ENFORCEABLE POLICIES ☐ INCENTIVIZING MANAGEMENT ☐ INCENTIVIZING CONSERVATION ☐ PROJECT FUNDING SUPPORT

USDA	**The Conservation Reserve Enhancement Program (CREP).** **The Agricultural Conservation Easement Program** through NRCS provides financial assistance for purchasing Agricultural Land Easements, with NRCS contributing up to 50% fair market value, and Wetlands Reserve Easements. Under the **Working Lands for Wildlife** program, NRCS provides technical and financial assistance to participants who voluntarily make improvements to their working lands while the US Fish and Wildlife Service (FWS) provides participants with regulatory predictability for the Endangered Species Act (ESA). **The Emergency Watershed Protection** program provides financial and technical assistance for activities such as removing debris from stream channels, road culverts and bridges, reshaping and protect eroded streambanks, vegetative cover, etc. The **Watershed Protection and Flood Prevention Program** helps units of federal, state, local and tribal of government (project sponsors) protect and restore watersheds up to 250,000 acres.	☐ CONSERVATION ☐ INCENTIVIZING TAX AND OTHER FINANCIAL CREDITS ☐ PROJECT FUNDING SUPPORT

NSF Research Project

Examined shore protection laws and policies in seven states, with an emphasis on setbacks (areas designating where structures such as homes may or may not be built) and shoreline stabilization approaches (e.g., seawalls, bulkheads, and living shorelines).

Analysis included both ocean-facing and estuarine areas from Florida to Delaware.

PREMISE:

1. Adaptation will require a comprehensive understanding of these jurisdictional frameworks if they are to be updated and/or better informed.
2. Outlining these frameworks sets the stage for integrating the jurisdictional boundaries with science-based modeling efforts.
3. Outlining these frameworks allows us to characterize sets of law and policy options.
4. Law is notoriously path dependent, building upon past decisions and approaches -- the regulations to come will build from existing frameworks.

Big Picture Findings: Ocean-Facing

The majority of ocean-facing shore protection laws have established jurisdictional lines designed to control the location of structures based on **erosion rates**, allowing for a more adaptive management approach driven by scientific data as sea-levels rise.

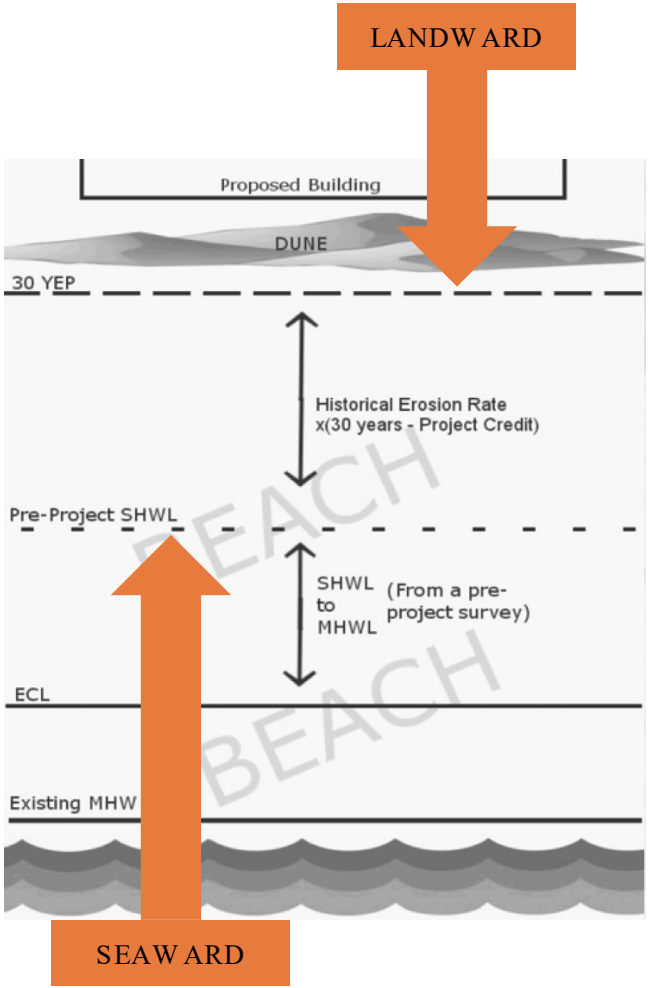
A more explicit acknowledgement and accounting for sea-level rise will be necessary in many areas, however.

A trend towards "freezing" the most oceanward jurisdictional baselines is occurring, suggesting that **rising sea-levels and increased flooding may create pressure to "hold the line" when more dynamic and adaptive responses are needed** .

OCEAN-FACING BOUNDARIES:

Erosion Rates

STATE	SEAWARD BOUNDARY	+	EROSION RATE =	LANDWARD BOUNDARY
FL	Spring tide	+	30-year erosion rate	Coastal Construction Control Line
SC	Three possible baselines	+	40-year erosion rate	Setback Line
NC Ocean Erodible Areas	Mean low water line	+	Recession line -- multiplying the long -term annual erosion rate times 90 or at 120 feet landward of the first line of stable and natural vegetation, if there has been no long-term erosion or the rate is less than two feet per year. The building size also determines the final setback, with smaller structures allowed closer to the ocean than larger ones.	Setback Line
VA Barrier Islands Only	Dune crest	+	20 times the local 100 -year long-term annual shoreline recession rate, which is average shoreline recession over fixed one-mile intervals averaged over the period between surveys of 100 years or more.	Setback Line

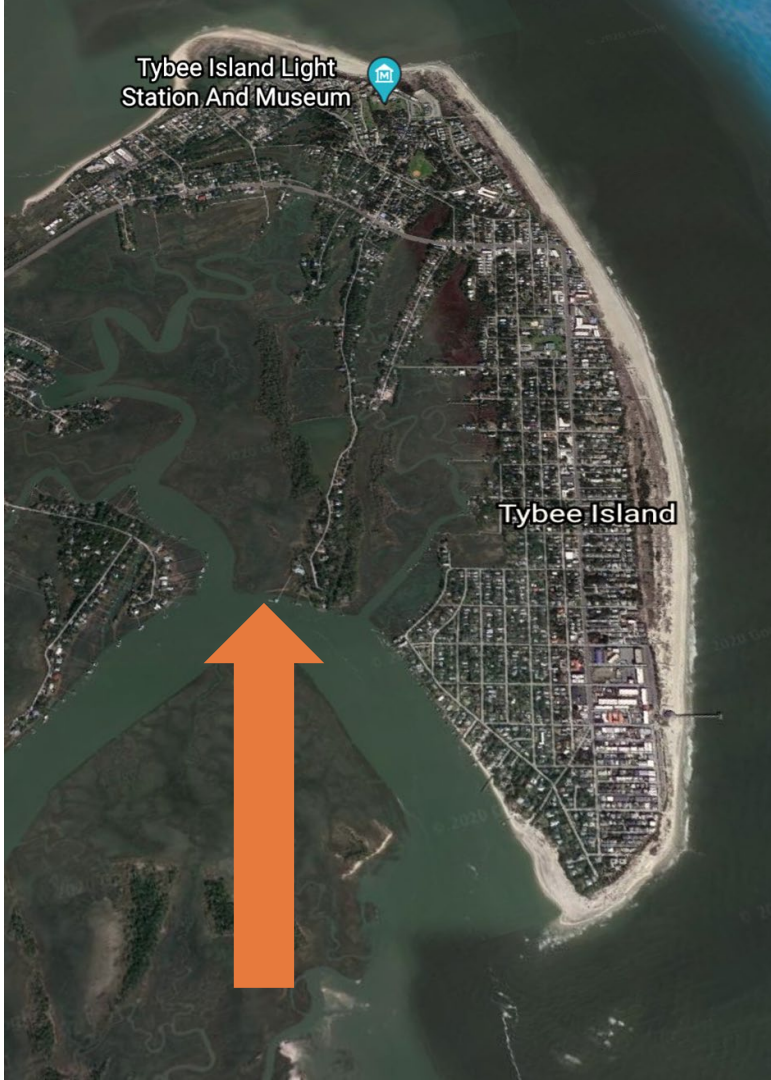


Example Patchwork: Overview of Current Laws and Policies Protecting March in NC, SC, Ga, and NE FL

	SETBACK/BUFFER & PERMITTING PROGRAM	TIDAL WETLANDS JURISDICTIONAL AREA/PERMITTING PROGRAM
FLORIDA	No statewide setback. Comprehensive state wetlands permitting program through its Environmental Resource Permits.	Florida requires a "unified statewide methodology for the delineation of the extent of wetlands," working from a statutory baseline that defines wetlands as "areas that are inundated or saturated by surface water or groundwater at a frequency and a duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soils."
GEORGIA	Coastal marsh buffer of 25 feet, which is measured "horizontally from the coastal marshland-upland interface," commonly referred as the "vegetated buffer." Permitting program for tidal wetlands; a "Revocable License" required for activities disturbing tidally-influenced waters.	Coastal marshlands are defined as "any marshland intertidal area, mud flat, tidal water bottom, or salt marsh . . . within the estuarine area of the state, whether or not the tidewaters reach the littoral areas through natural or artificial watercourses." "Vegetated marshlands" have at least one of fourteen marsh plant species. If salt marsh peat exists at the undisturbed surface of an area, this is deemed "conclusive evidence" of salt marsh.
SOUTH CAROLINA	No statewide setback or buffer. Regulates tideland critical areas through a permitting process.	"Tidelands" encompass "all areas which are at or below mean high tide and coastal wetlands, mudflats, and similar areas that are contiguous and adjacent to coastal waters and are an integral part of the estuarine systems involved." Coastal wetlands include areas "periodically inundated by saline waters" either by natural or artificial water courses and that are "normally characterized by the prevalence of saline water vegetation" as long as they are an integral part of an estuarine system."
NORTH CAROLINA	"Buffer rule" requires new development 30 feet landward of high normal water or normal water level. Permitting required in coastal areas of "environmental concern" and include estuarine waters and coastal wetlands.	Coastal wetlands are marsh areas that have regular or occasional flooding by tides -- including wind tides, but not hurricanes or tropical storm tides -- and one or more of ten designated marsh plant species present.

Big Picture: Estuarine

- Sea-level rise, in the meantime, will affect estuarine areas as much as – and, at times, even more than – ocean-facing areas.
- Erosion rates and/or sea-level rates are not incorporated into the jurisdictional determinations even for shoreline armoring projects that are intended to address erosion or flooding.
- Climate change and sea-level rise will likely make the changes in marsh and wetland boundaries much more dynamic than in the past.
- In contrast to many of the ocean-facing setbacks and permitting approaches, no requirements exist for states to reevaluate jurisdictional boundaries in estuarine areas. Using more local data that is regularly updated should allow for more nuanced management and produce better results.



Lots of interesting details!

Trends, Norms, and Frames

1. Multiple Values, Many Conflicts, and “Balance”

A wide variety of values and interests are revealed across our study area: habitat protection, dune preservation, beach access, hazard mitigation, recreation, economic development, property protection, public health, and aesthetics.

Beach protection acts -- the connection with tourism, recreation, and hazard protection is particularly strong.

Estuarine areas, while at times also celebrated for their aesthetic contribution, are generally protected primarily for their conservation values, often in order to prevent “despoliation.”

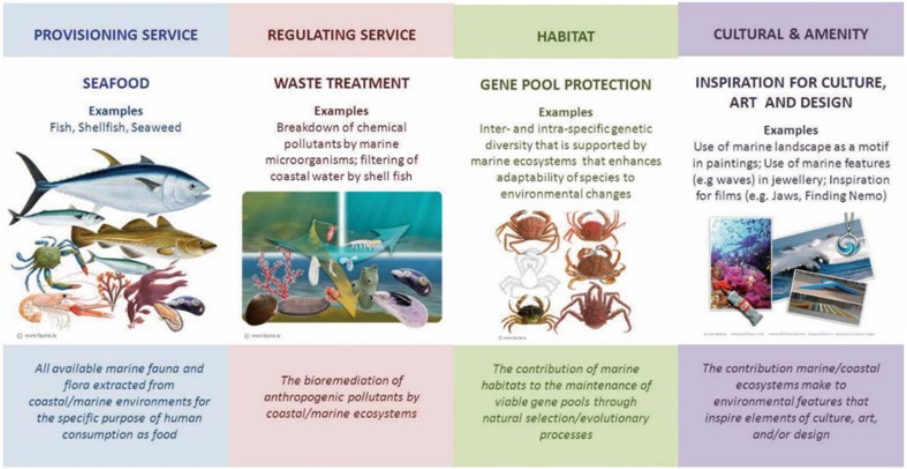
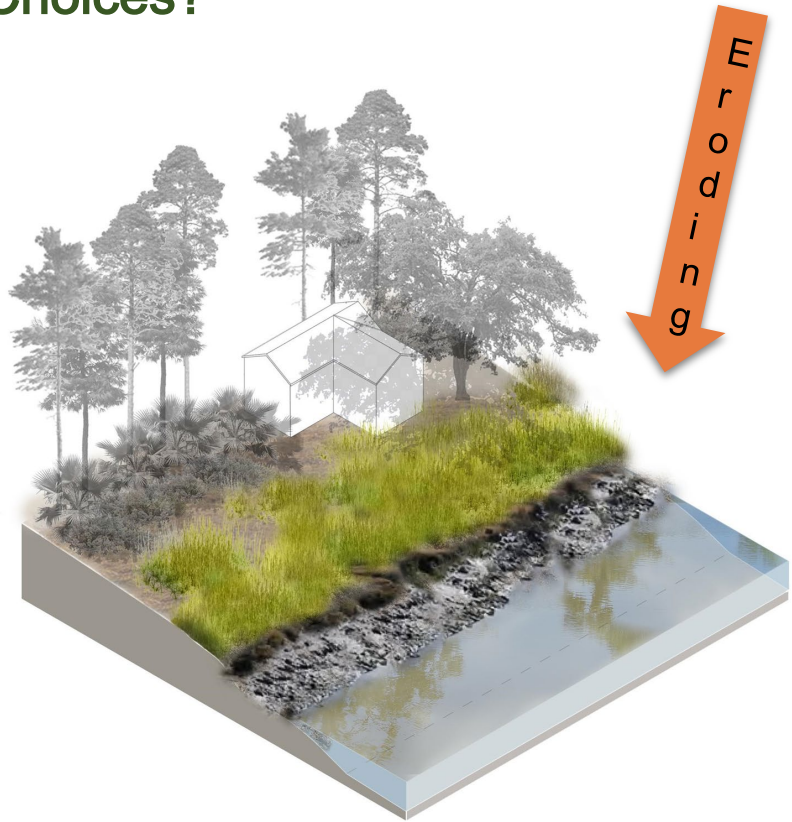


Image credit: Sousa, L., Sousa, A., Alves, F. *et al.* Ecosystem services provided by a complex coastal region: challenges of classification and mapping. *Sci Rep* 6, 22782 (2016).

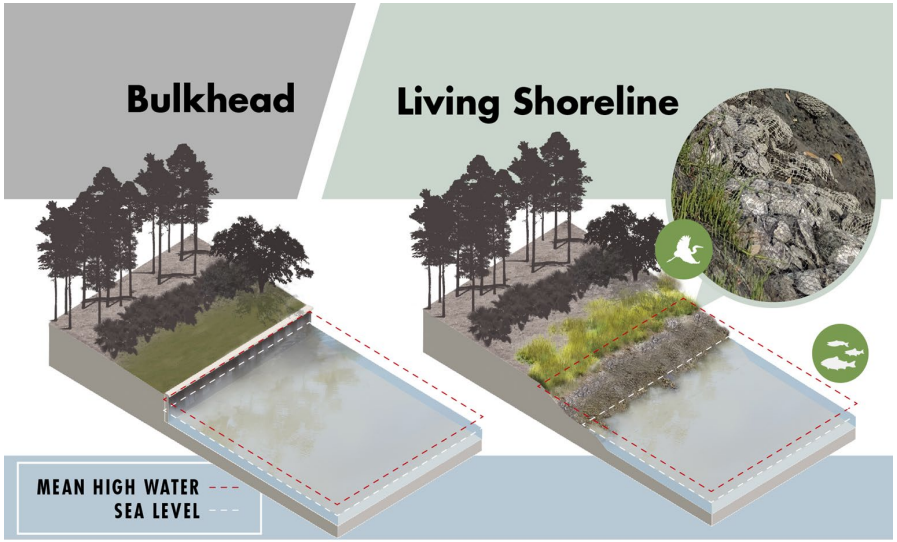
2. Static Erosion Control: A Hardened Value for Stabilization Choices?

- Rooted within shoreline stabilization approaches is a fixed understanding of stability -- **presumption that erosion, in and of itself, is the primary factor guiding stabilization structure choice.**
- On the ocean-facing side, erosion control very much at the forefront. More subtle on the estuarine side but strong when stabilization choices are discussed.



2. Static Erosion Control: A Hardened Value for Stabilization Choices?

- Armored shorelines are almost always held to a lesser standard throughout our study area than nature-based living shorelines.
- Living shoreline projects often must justify that the location is appropriate based on structural suitability and scientific considerations such as fetch, bank elevation, erosion, and tides, which are not required for armoring.
- **A question for policy-makers going forward is why "hard" armoring approaches such as bulkheads are not subject to the more comprehensive and specific science-based requirements applied to living shorelines.**



The illustration above represents Georgia's coastal ecology. The water level is based an actual site at sea level. At sea level, the water covers roughly 1 ft of oysters at the bottom of the living shoreline.

3. Minding the Gaps: Fragmentation, Alignment, and the Neighbor Effect

Connectivity in armored areas, rather than in ecological connectivity, is a key value embedded within many of regulatory frameworks in our study area.

The importance of **neighbors for shoreline management** law and policy is woven throughout our study area. These fall into four categories:

1. Policies designed to inform neighbors about proposed shoreline stabilization activities;
2. Policies designed to protect adverse impacts on adjacent properties;
3. Policies designed to protect against structures interfering with the adjacent property owner's riparian rights; and
4. "Gap-filling" and "shoreline alignment" policies designed to promote contiguous hardened shorelines.

Reveal concerns about nuisance, trespass, and invasion of property rights.

In addition to the above, reveal concerns about standardized erosion control, fairness, and even aesthetics.

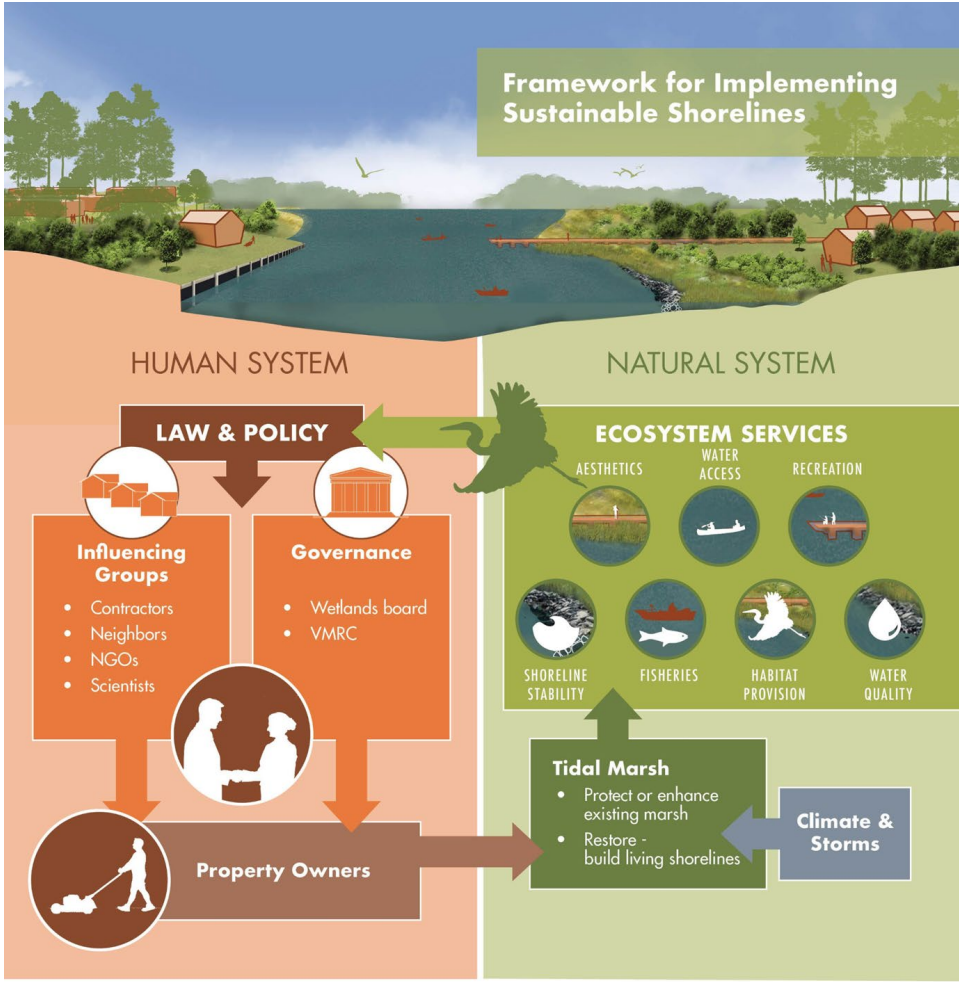
Big Picture

Property owners and some decision-makers tend to operate from a **parcel-scale perspective**.

Influencing stabilization decisions BEFORE the project and permitting stage is needed. People listen to neighbors and contractors. It's hard to change minds once an approach is decided upon. The permitting stage is too late.

Most of the statutes and many of the regulations used to manage these areas are decades old in their design and conception. **They largely come from an era when environmental protection focused on a single resource or individual threat.**

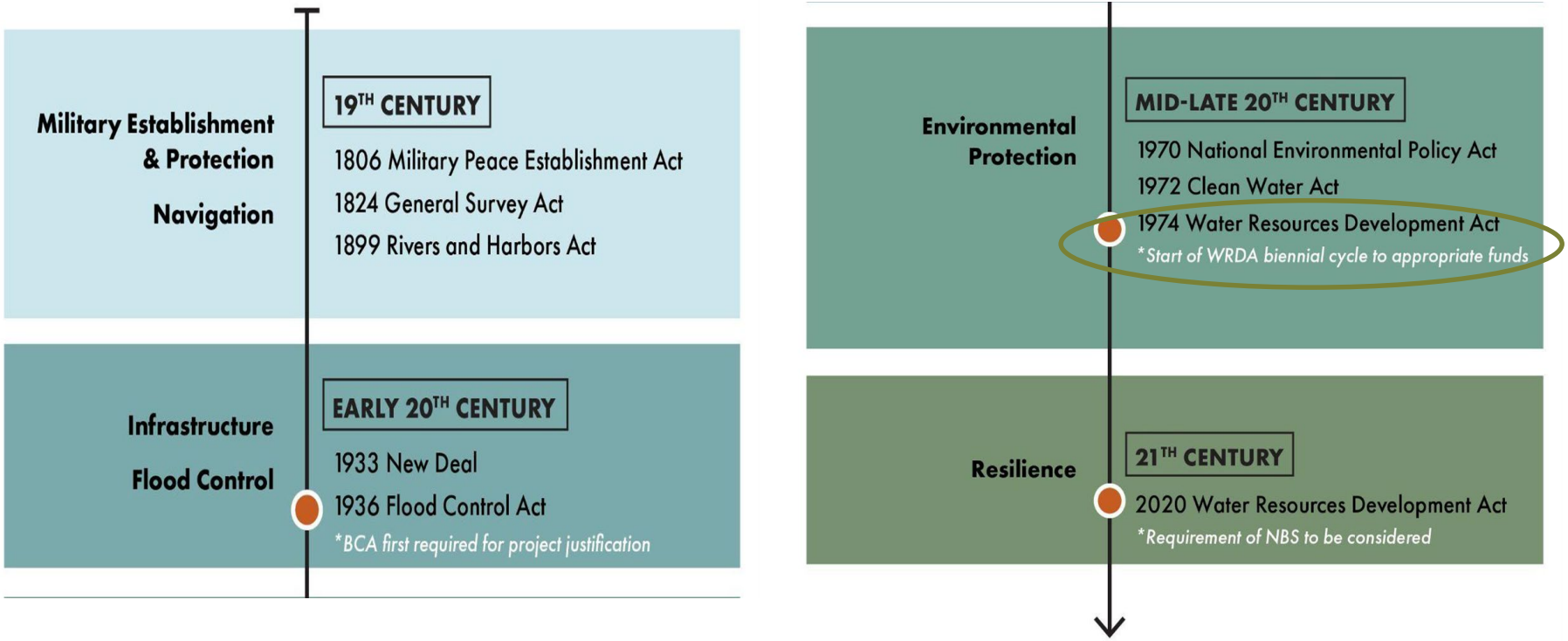
We need a system that recognizes the varied dynamics of natural systems and the complexities of human demands on them, a system that relies on multiple scales of both temporal and spatial data. We should reevaluate jurisdictional boundaries in estuarine areas periodically.



Developed by the Virginia Institute of Marine Science at William and Mary for the National Science Foundation (NSF) Coastal Science, Engineering, and Education for Sustainability (SEES) Initiative.Image designed by Kelsey Broich, Network for Engineering with Nature, University of Georgia. (2021).

Policy Alignment: Some Framing
Structure of U.S. Government: Federalism
State Law: Findings from Stabilization Law Analysis
Legacy Institutions and Laws: USACE, CWA, ESA, etc.
Ecosystem of Interests: Gov't, Industry, Private Property Owners, NGOs, etc.

Timeline of Events and Missions Evolution



Policy Flowchart
BCA Evolution

1925 | 308 REPORTS
Set the stage for the BCA

1950 | GREEN BOOK
Recommended BCA principles, guidelines, and methods (all quantifiable)

1962 | SENATE DOCUMENT 97
Formalized multi-objective analytical standards

1973 | P&S
Reformed multi-objective analysis

Incorporated NEPA and FCA into water resources planning

1983 | P&G
Re-established NED as primary purpose

Retained four accounts for BCA

2013 | PR&G
Switched to an Ecosystem Services Model

Allows for more flexibility in project selection

Six accounts for BCA

2021 | MMR MEMORANDUM
Modernization of regulatory review process to reflect economic and scientific development

Key Features of the 1973 P&S:
FOUR OBJECTIVES
FOR WATER RESOURCES PLANNING AND EVALUATION

System of Accounts

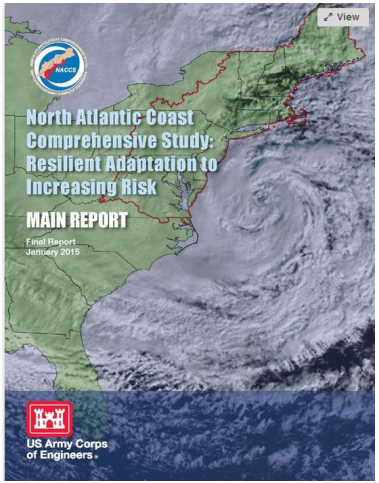
REQUIRED ***"Design" Objectives*** *Central to "society's preferences" for "promot [ing] the quality of life."*	1. National Economic Development (NED)	2. Environmental Quality (EQ)
OPTIONAL ***"Display" Objectives*** *to be considered "display" objectives that would provide a basis for comparing alternative plans.*	3. Regional Economic Development	4. Social Well -being

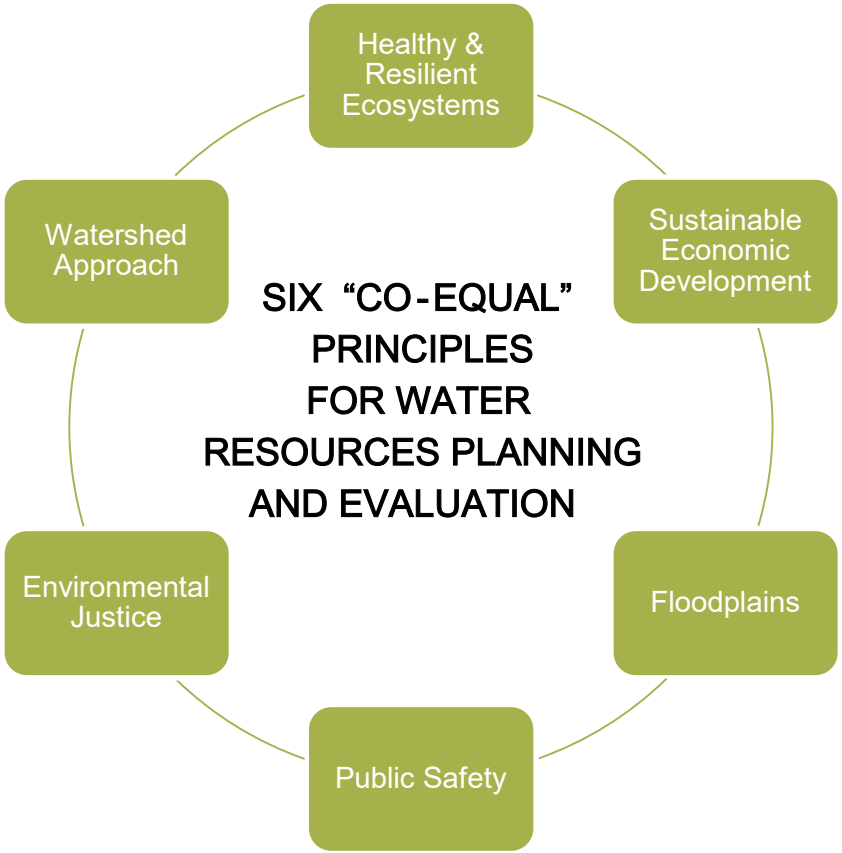
1983 P&G:
FOUR OBJECTIVES
FOR WATER RESOURCES PLANNING AND EVALUATION

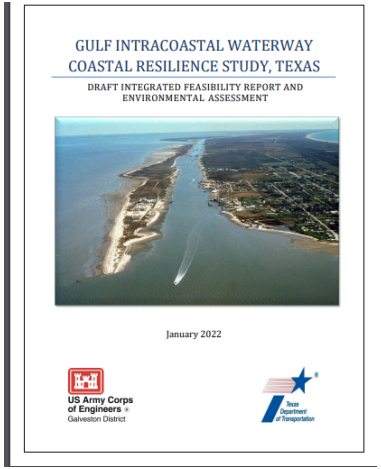
System of Accounts

REQUIRED	1. National Economic Development (NED)		
OPTIONAL	2. Environmental Quality (EQ)	3. Regional Economic Development (RED)	4. Other Social Effects (OSE)

Key Features of the Principles, Requirements, & Guidelines (PR&G)







Recent Executive Action: Jan 2021

- Executive Order 13990, "Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis" (86 Fed. Reg. 7037, 2021). **An emphasis on multiple benefits.**

- Executive Memorandum titled "Modernizing Regulatory Review" ("MRR"; 86 Fed. Reg. 7223, 2021). MRR then directs the Director of OMB, in consultation with other agencies, to develop a set of recommendations for improving and modernizing regulatory review. "These recommendations should provide specific suggestions on how the regulatory review process can promote public health and safety, economic growth, social welfare, racial justice, environmental stewardship, human dignity, equity, and the interests of future generations" (86 Fed. Reg. 7223, Sec. 2, 2021). **Addressing the disconnects between USACE's and OMB's discount rates as well as the differing benefit -cost analyses could be consistent with the overall objectives of the MRR.**

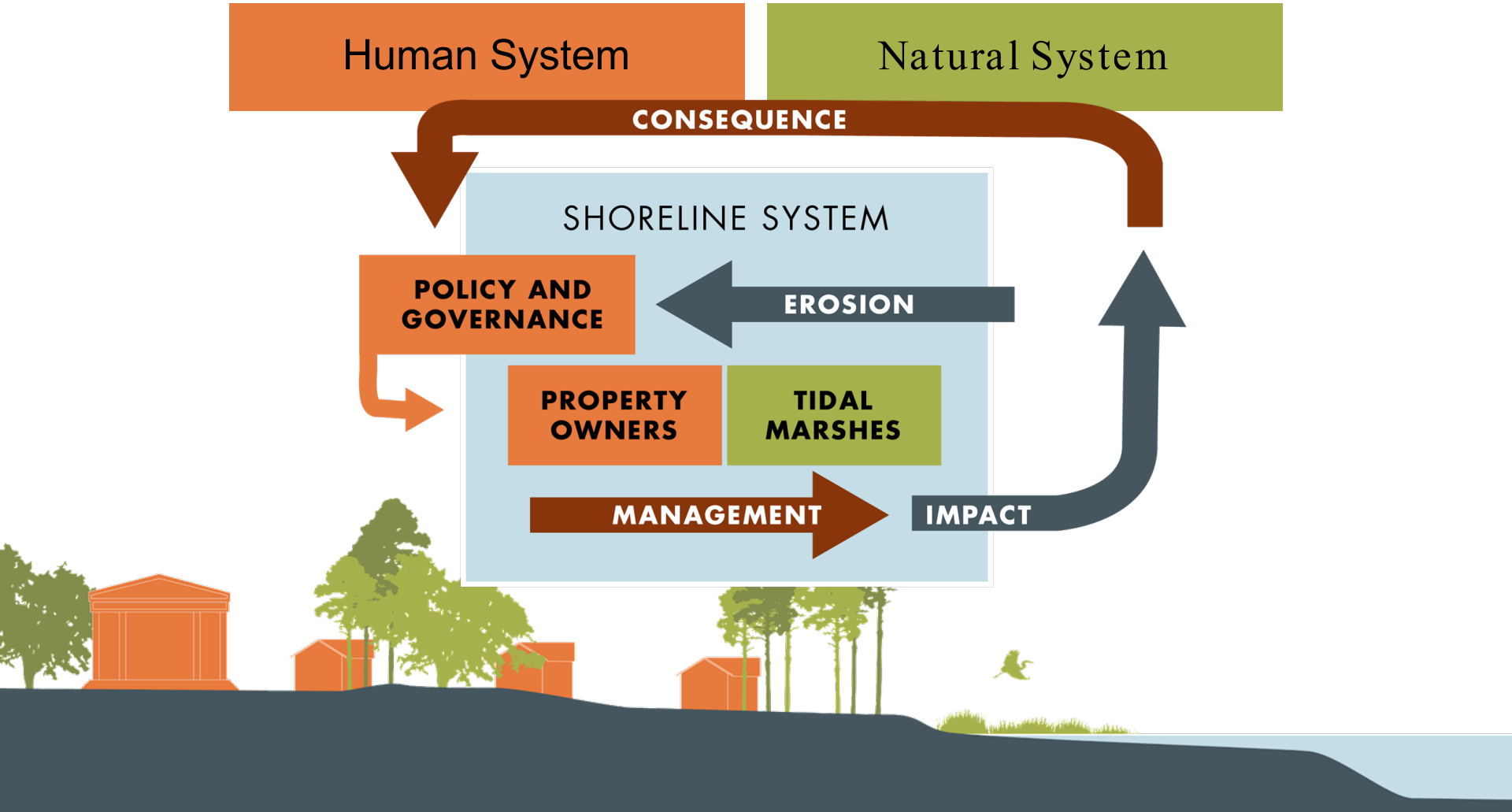
- Executive Order 14008 entitled, "Tackling the Climate Crisis at Home and Abroad," which seeks to "put the climate crisis at the center of United States foreign policy and national security" and take a "government-wide approach to the climate crisis" (*Executive Order No. 14008*, 2021). **DoD.**

To Do's/Considerations

- Update relevant policies (Engineering Regulations (ERs), Engineering Circulars (ECs), Engineering Manuals (EMs), Engineering Pamphlets (EPs), Economic Guidance Memoranda (EGMs), etc.) because *at the project -level, NI is still not being implemented at scale.*

- Consider the Miami-Dade Back Bay Coastal Storm Risk Management Feasibility Study (2021). Relies on floodwalls to limit risk of storm damage but local environmentalists, developers, and community advocates want more NI.

Policy Alignment: Some Framing
Structure of U.S. Government: Federalism
State Law: Findings from Stabilization Law Analysis
Legacy Institutions and Laws: USACE, CWA, ESA, etc.
Ecosystem of Interests: Gov't, Industry, Private Property Owners, NGOs, etc.


Human System
Natural System
CONSEQUENCE
SHORELINE SYSTEM
POLICY AND GOVERNANCE
EROSION
PROPERTY OWNERS
TIDAL MARSHES
MANAGEMENT
IMPACT

Shorescape Decision-Making

ECOSYSTEM SERVICES OF SUSTAINABLE SHORELINES

Image credit: Developed by the Virginia Institute of Marine Science at William and Mary for the National Science Foundation (NSF) Coastal S cie nce, Engineering, and Education for Sustainability (SEES) Initiative. Image designed by Kelsey Broich, Network for Engineering with Nature, Univers ity of Georgia. (2021).

Landscape Scale

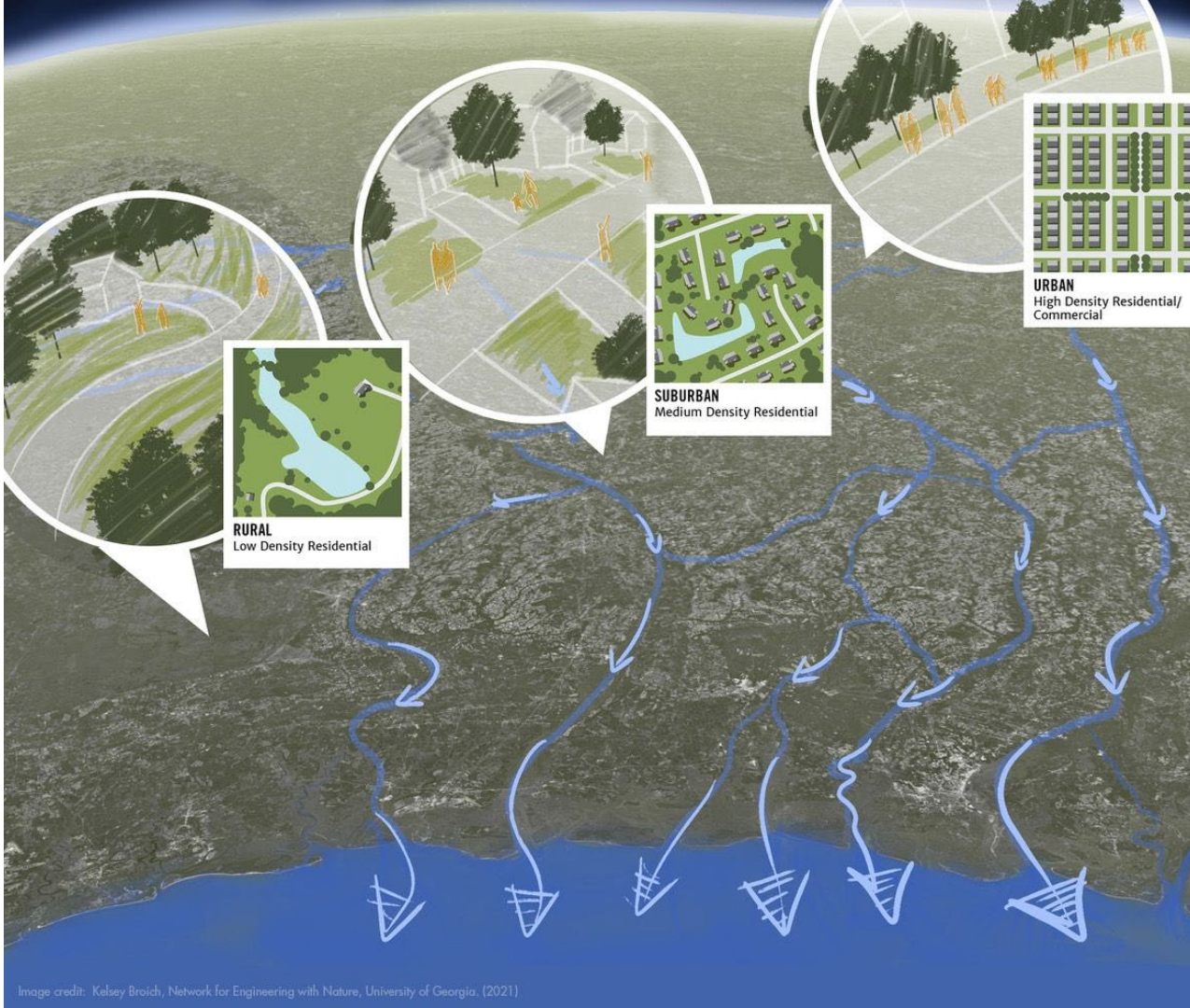


Image credit: Kelsey Broich, Network for Engineering with Nature, University of Georgia. (2021)

Emerging Partnerships and Opportunities with Military Installations

SERPPAS

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Carl Vinson Institute of Government

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This partnership was funded by the National Sea Grant Law Center as part of its Small Grants Competition under NA18OAR4170079, with support from SERPPAS.

SOUTH ATLANTIC SALT MARSH INITIATIVE

The South Atlantic coast is home to an expansive network of salt marsh and tidal creeks covering over a million acres. Filling and draining with saltwater as the tides ebb and flow, the salt marsh safeguards coastal communities and military installations from storm energy and floodwaters and serves as vital habitat for the fish and wildlife that support coastal businesses, state economies, and a unique way of life. The Southeast Regional Partnership for Planning and Sustainability (SERPPAS) is working together with diverse partners from North Carolina, South Carolina, Georgia, and Florida and beyond to conserve this great expanse of salt marsh, helping it move with rising waters and ensuring its benefits for future generations.

Why Are Salt Marshes Important?

Salt marshes are the ecological guardians of the coast, providing natural protection and resilience benefits valued at about $1.8 million/km2 per year. Marshes also reduce erosion, stabilize shorelines, filter upland runoff, and, along with other coastal wetlands, moderate the climate by absorbing almost 8.1 million tons of carbon dioxide in the U.S. each year. Salt marshes support popular species, such as redfish, blue crab, and black duck that are crucial to recreational and commercial fishing, hunting, birding, and related coastal businesses.

The salt marsh that protects South Atlantic communities and military installations faces increasing pressures from rising seas and poorly planned developments. For example, without proper planning to allow for its natural movement inland to higher ground as sea level rises, salt marsh will drown and its benefits to coastal populations will be lost. Preserving the connectedness of this ecosystem is vital. Regional, interstate collaboration is needed to conserve the 1-million acre stretch of economically and ecologically valuable salt marsh.

WHAT IS SERPPAS?

The Southeast Regional Partnership for Planning and Sustainability (SERPPAS) is a voluntary collaboration among leaders from natural resources, working lands and environmental protection agencies from the Southeastern states of NC, SC, GA, FL, AL and MS; regional leaders from their federal agency counterparts; and leaders from the Department of Defense and the military services in the Southeast. Formed in 2005, SERPPAS is an unconventional partnership that harnesses strategic planning and collaborative decision-making between public and private partners to support the military mission, conserve key habitats and species, sustain rural economies and industries, and foster better coordination among local, state, and federal stakeholders in the region.

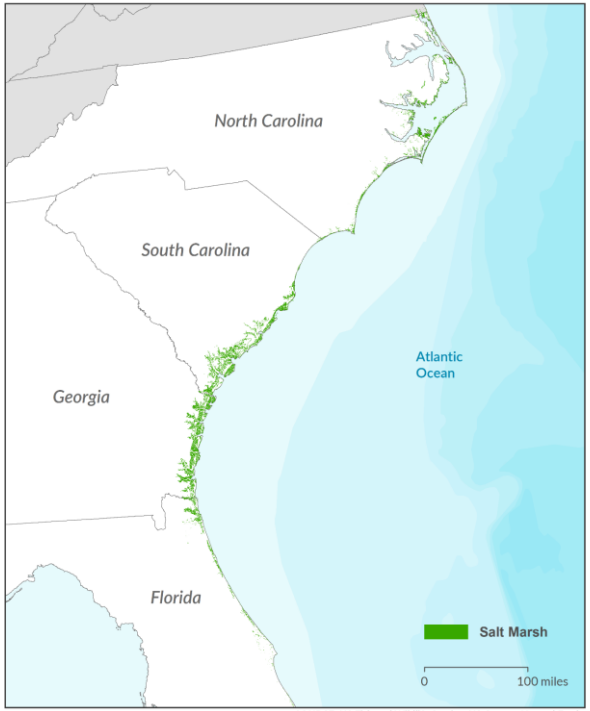
How the Initiative Works

The South Atlantic Salt Marsh Initiative (SASMI) uses a voluntary, collaborative, and non-regulatory approach that complements each state's existing programs to conserve the South Atlantic salt marsh. The initiative is inspired by the successful regional conservation effort known as America's Longleaf Restoration Initiative. Using that approach, SERPPAS will bring together additional local, state, and federal interests, scientists, non-governmental organizations, coastal communities, public and private landowners, and other interested stakeholders to develop and implement an integrated, coordinated, and focused regional conservation plan. A diverse Steering Committee will oversee the conservation plan development. A larger Salt Marsh Coalition of regional salt marsh experts and relevant stakeholders will be involved through the plan's development, including attending a collaborative, cross-discipline workshop. The workshop will be held in early 2022 and will build the framework for the conservation plan. The initiative will add value to ongoing efforts and help achieve landscape-scale conservation of one of the last vast areas of salt marsh in the United States, nearly the size of Grand Canyon National Park.

SOUTH ATLANTIC SALT MARSH INITIATIVE

How to Get Involved:

To learn more about the SERPPAS South Atlantic Salt Marsh Initiative and potential opportunities to get involved, please contact the SERPPAS South Atlantic Salt Marsh Initiative Coordinator, Mallory Eastland, located in Greenville, NC. Phone: 936-788-3548 and email: mallory.eastland@ag.tamu.edu

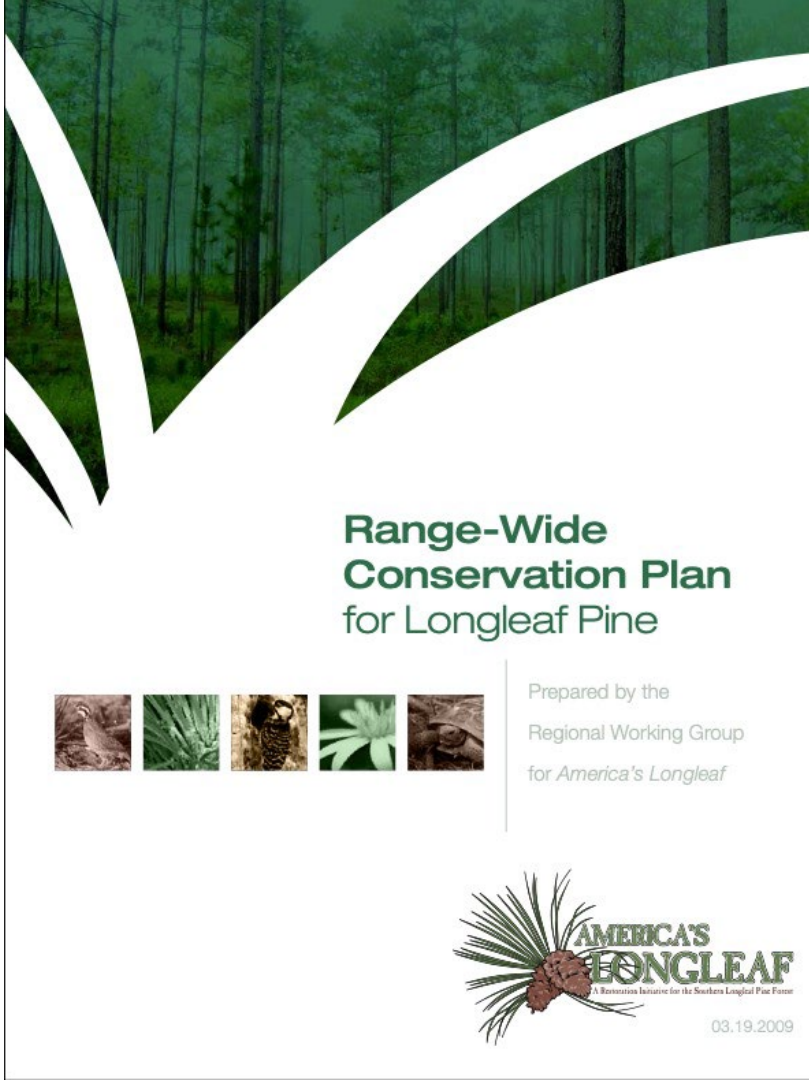


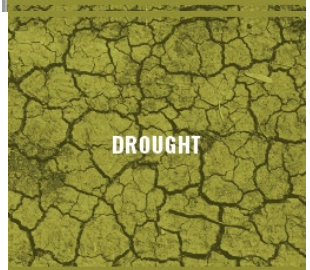
SOURCE: US Fish and Wildlife Service; US Census; Natural Earth.

Key Background

Modeled on the America's Longleaf Restoration Initiative. Guiding principles:

- **Partnerships and collaboration on a regional scale.** Build on current efforts such as State Wildlife Action Plans, Species Recovery Plans, coastal resilience plans, military installation programs, etc.
- **Involvement by Public and Private Sectors.** Seek participation from public and private groups managing and using marsh and adjacent upland areas.
- **Strategic, science-based approach.**
- **Conservation Plan as Framework and Catalyst.** The development of a Conservation Plan by the end of 2022 is intended to provide a regional framework for salt marsh conservation, identify the most significant actions needed to conserve this habitat, and serve as a catalyst to advance conservation and restoration.





Engineering With Nature® for Climate Resilience on Military Installations

THE UNIVERSITY OF GEORGIA–FORT BENNING PARTNERSHIP

CURRENT PROJECTS OF THIS PARTNERSHIP INCLUDE:

- Assessing opportunities for EWN projects both inside the installation and across adjacent communities;
- Assessing opportunities to reduce wildfire risk and drought vulnerability;
- Supporting Fort Benning in applying the Army Climate Assessment Tool (ACAT);
- Building improved models of stormwater systems and other infrastructure;
- Evaluating potential operational efficiencies that can improve resilience planning and EWN project implementation; and
- Conducting additional inventories and assessments to understand the root causes of vulnerabilities on the installation and across adjacent communities.

With a focus on community engagement and interconnections with essential communities, the UGA/Fort Benning partnership is building a replicable model to increase the long-term capacity at Fort Benning for system level resilience planning that fully leverages opportunities for Engineering With Nature.

Image credit: , UGA Marine Extension and Georgia Sea Grant

Thank you!

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