

Panel 4: Larger Perspectives Than Just Dollars: Larger-Scale Restoration Efforts, Other Approaches and Potential Regional Efforts



*Loren D. Coen, HBOI, FAU
NC Oyster Reef Workshop
March 2014*



Building and Sustaining Effective Collaborations

- Avoiding re-inventing the wheel
- Paradigms may not apply to some let alone all areas, need to test them. Try several approaches on small scales and sample intensively (in addition to the min. from Handbook).
- Enhancing communication and sharing of knowledge among scientists, managers, decision-makers, public, etc.?
- Existing partnership models (i.e. Oyster Recovery Partnership, NOAA Partnerships, etc.) to emulate?
- Existing websites and tools for restoration, Living Shorelines, etc.

Approaches, Methods, and Protocols for Monitoring Oyster Reefs and Living Shoreline Restoration and Natural Populations

OneTonBag LLC



See <http://www.oyster-restoration.org/oyster-restoration-research-reports/>
<http://www.oyster-restoration.org/> for updates regularly

Shell Accounting For Shell in MD



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CSX will transport approximately 50 train cars of fossil shell (Quaternary) from Carrabelle, FL to Curtis Bay, MD every 10-14 days between 12/13 and 9/14 (or 112,500 tons); and then transport by barge to the MD Eastern Shore sanctuaries. Over 50,000 yds³ of granite from MD quarry will also be used as base substrate. CSX transporting fossilized shell at cost.



Governor O'Malley Announces Innovative Oyster Restoration Partnership with CSX

12/13/2013 | Posted by [kking](#)



186



Ye

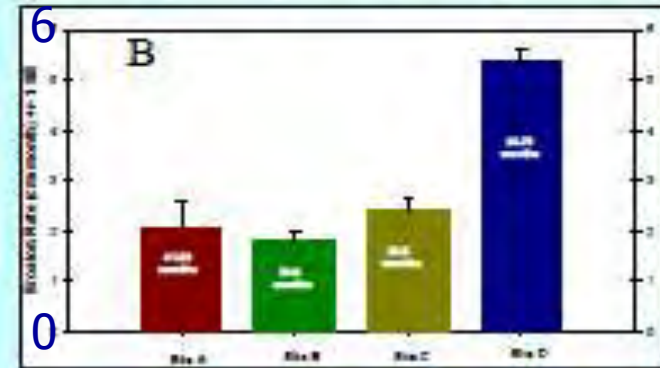
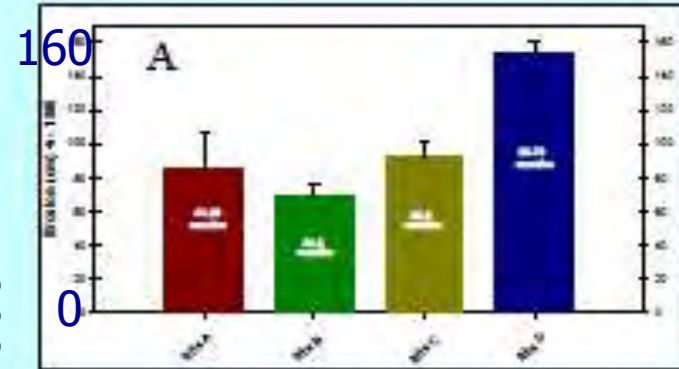
From: Waldbusser et al. 2013, Ecology



Planted Shell Loss in Intertidal Experiments & Measured Marsh Shoreline Erosion

Boat Wakes and Shell Planting

Shoreline Erosion (several scales)



Mean overall erosion (A) and mean monthly erosion (B) at Inlet Creek: Numbers within columns indicate length of deployment.

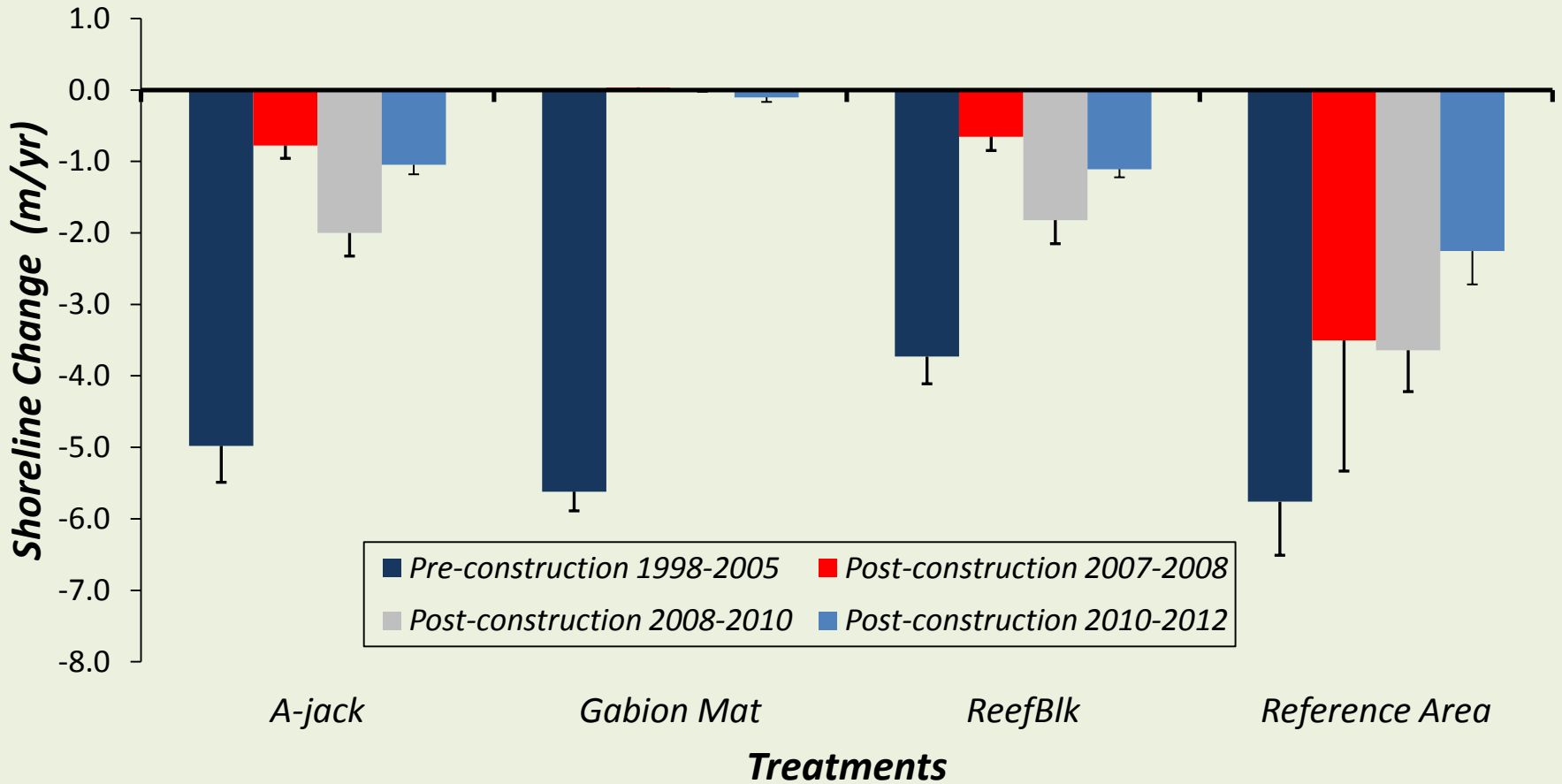
In cm

Assessed over 29-41 months, at four stations in Inlet Creek, overall shoreline losses: (A) ranged from 69-154 cm; (B) mean monthly erosion (loss) rates ranged from 0-23 cm /mo.



1998 – 2012

Shoreline Change by Treatment

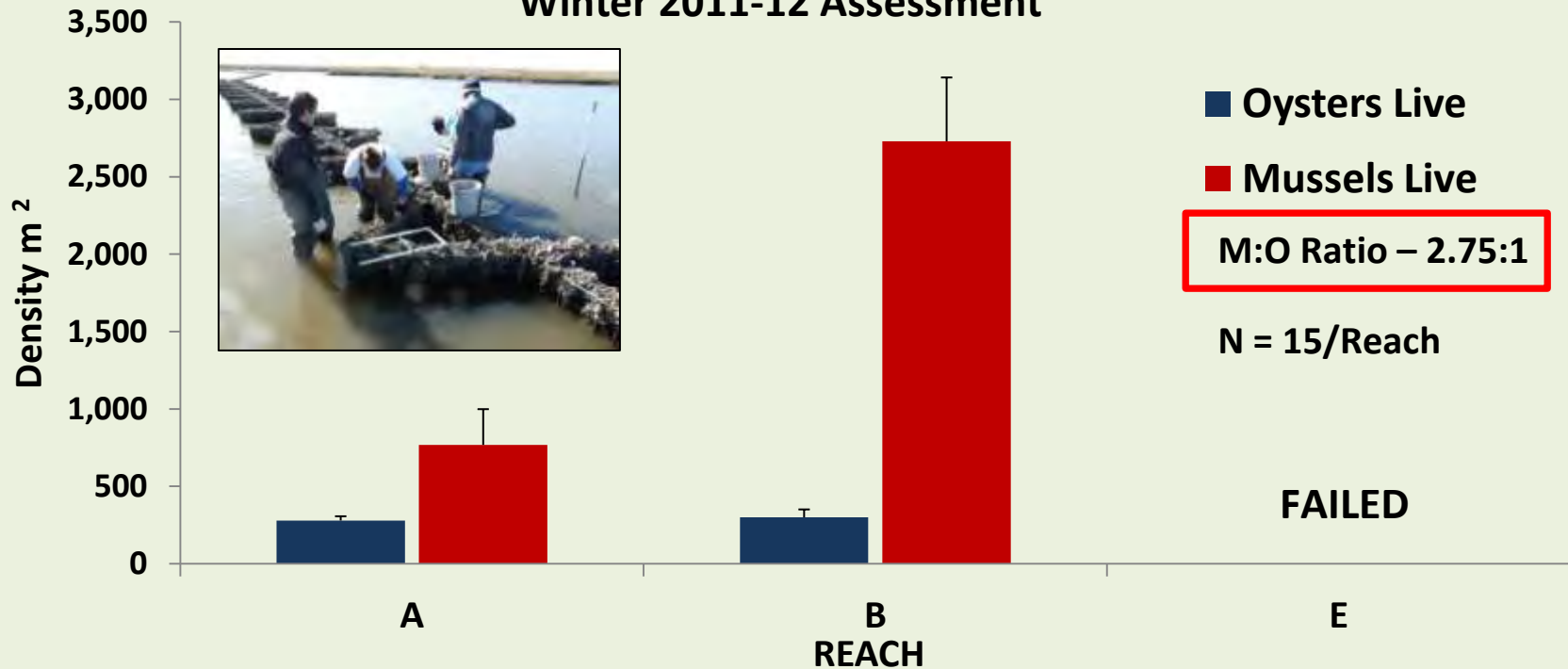


From: Melancon & Curole, CWPPRA Project TE-45, Mid-term Assessment, LA

Mussel to Oyster Ratios: LS

ReefBlks Densities of Oysters & Mussels

Winter 2011-12 Assessment *



* Assessment of ReefBlks using only those with minimum-to-no void (gap) spaces.

From: *Melancon & Curole, CWPPRA Project TE-45, Mid-term Assessment, LA*

MITIGATING SHORE EROSION ALONG SHELTERED COASTS

NATIONAL RESEARCH COUNCIL
OF THE NATIONAL ACADEMIES

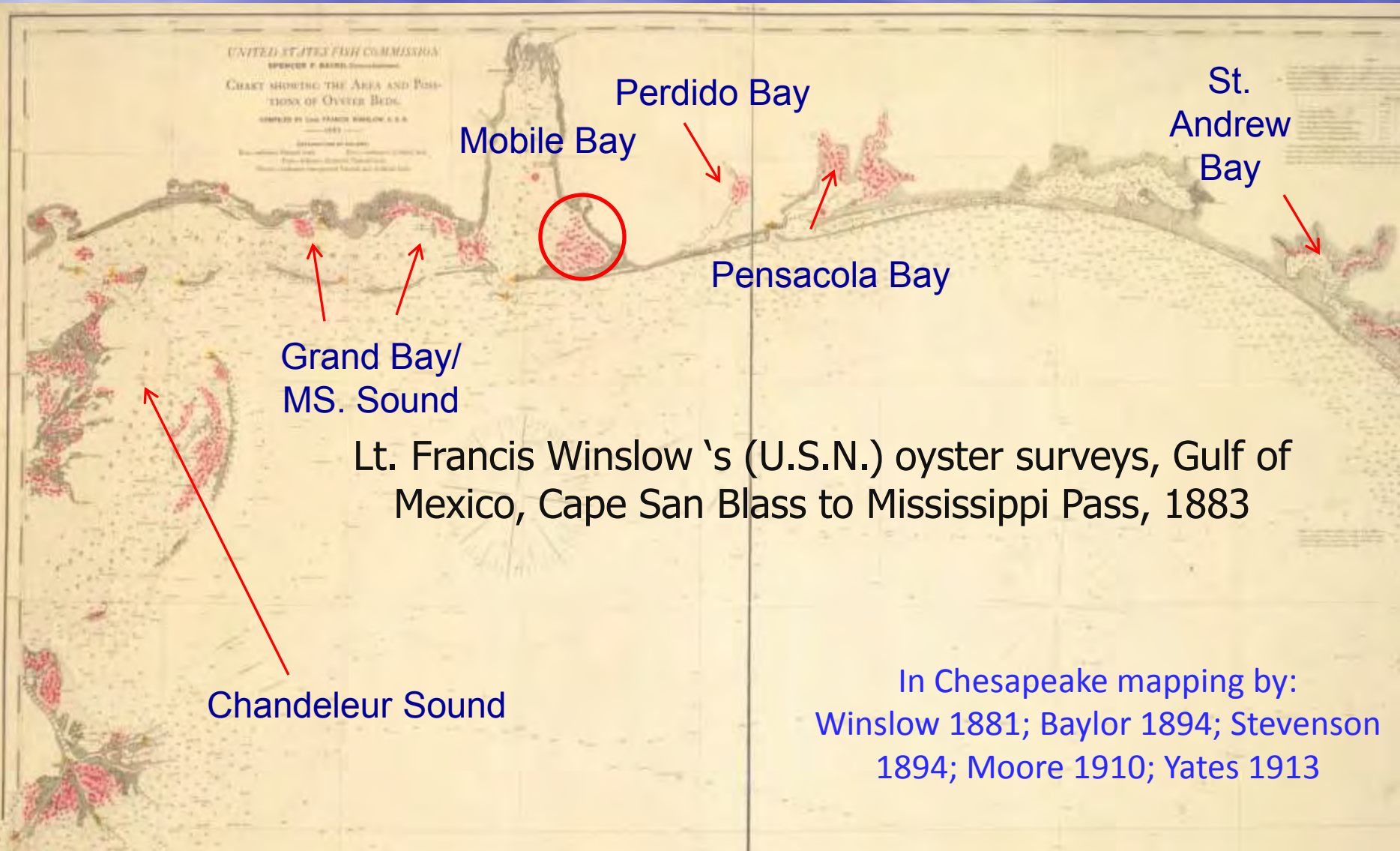
NRC,
2007

Problem with this NRC (2007) effort:

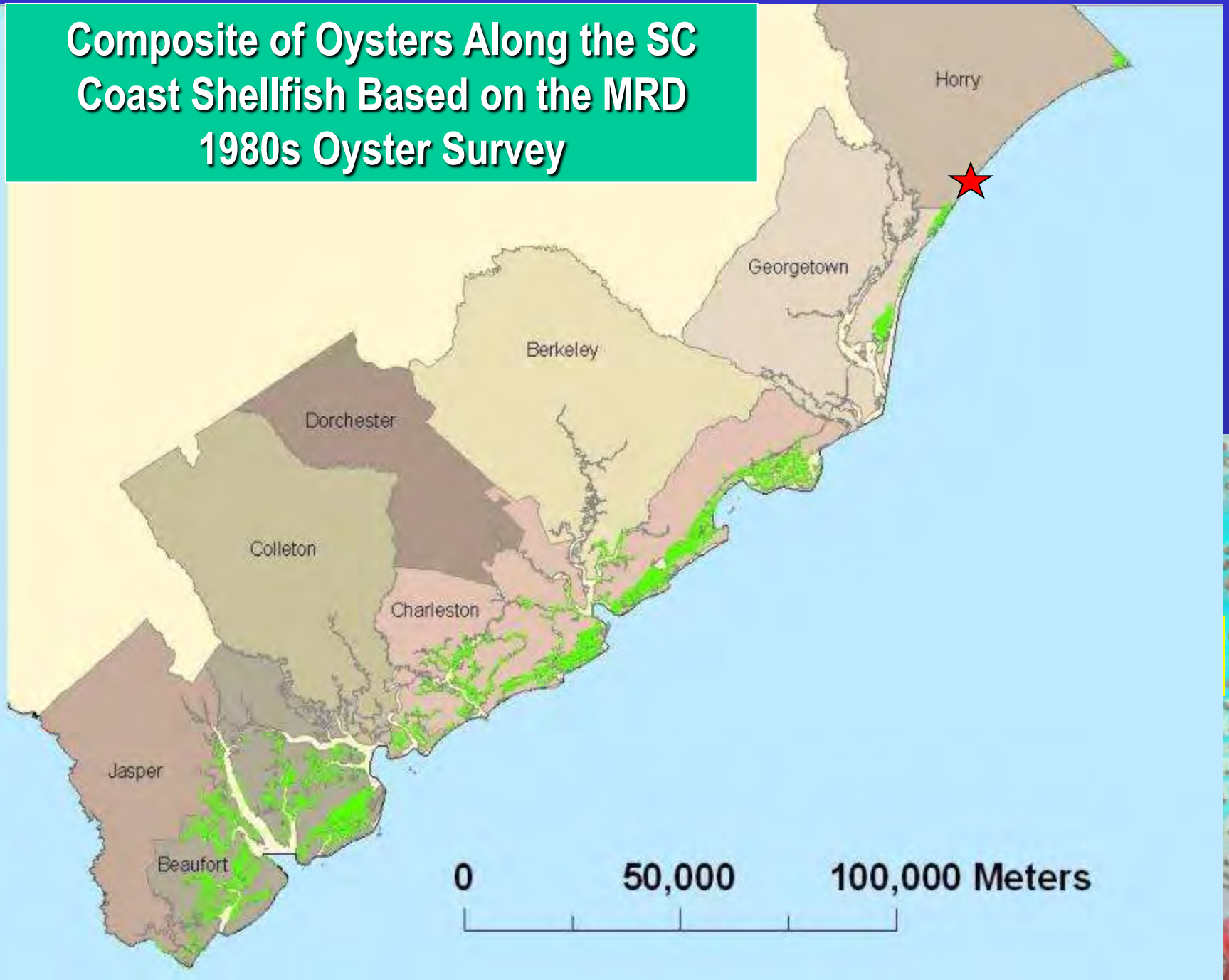
1. Is that it included much more exposed coasts and not the much smaller tidal creeks or even small rivers in SE.
2. Did not address areas where a lot of erosion occurs from small boats and also where a lot of the intertidal fringing oyster reef habitats occur.



Historical Baseline for Oyster Reefs Often Better Than Current Understanding



Composite of Oysters Along the SC Coast Shellfish Based on the MRD 1980s Oyster Survey



Leadwenwah Creek Post-Construction Footprint Area Changes (m²), 2003-04

R181

Initial Footprint – 438.5 m²
Footprint 5/12/04 – 343.7 m²

(-22%)

R174



Initial Footprint – 125.3 m²
Footprint 5/12/04 – 144.2 m²

(+15%)

Initial Footprint – 317.9 m²
Footprint 5/12/04 – 252.2 m²

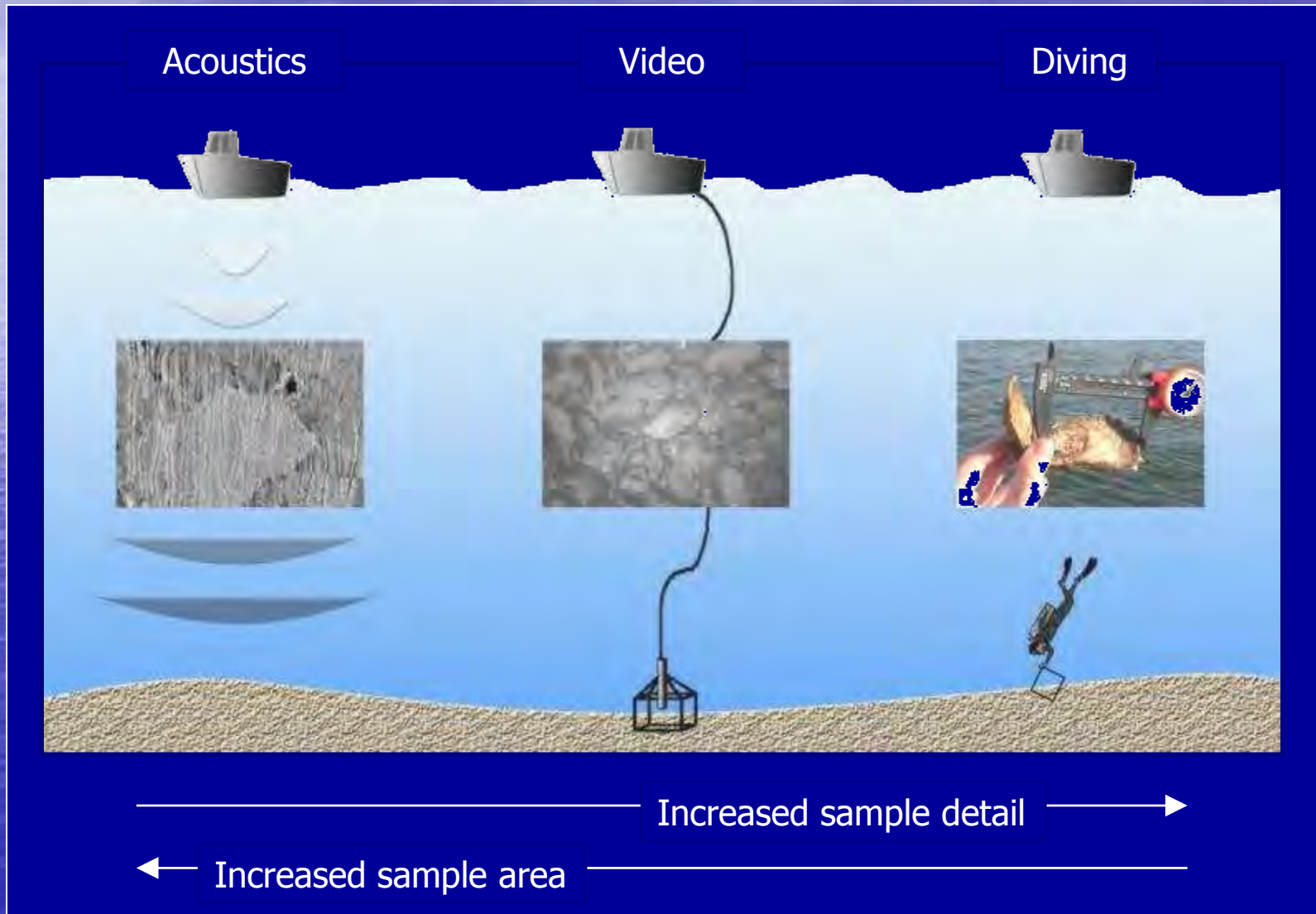
R175

(-21%)

 Initial Planting 7/02/03
 Planting Footprint 5/12/04



Comparison of Subtidal Sampling Techniques



Optimal Shell Planting for LA using Integrated Approaches

Highest priority areas using high resolution acoustic techniques

Shallow Water Research Vessel



GPS

Side-Scan Sonar



CHIRP 3d Sub-bottom



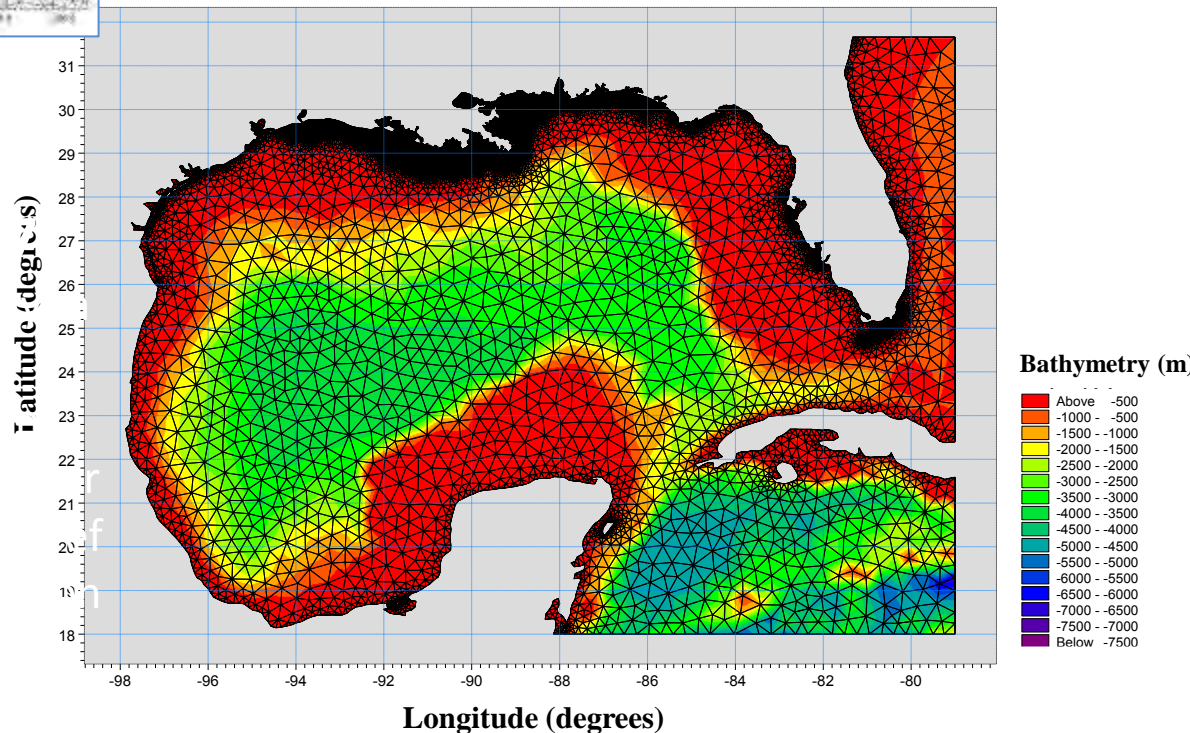
Echo Sounder

- Combined datasets to understand sedimentological and biological processes
- Informed decisions on how best to identify optimal areas for habitat restoration

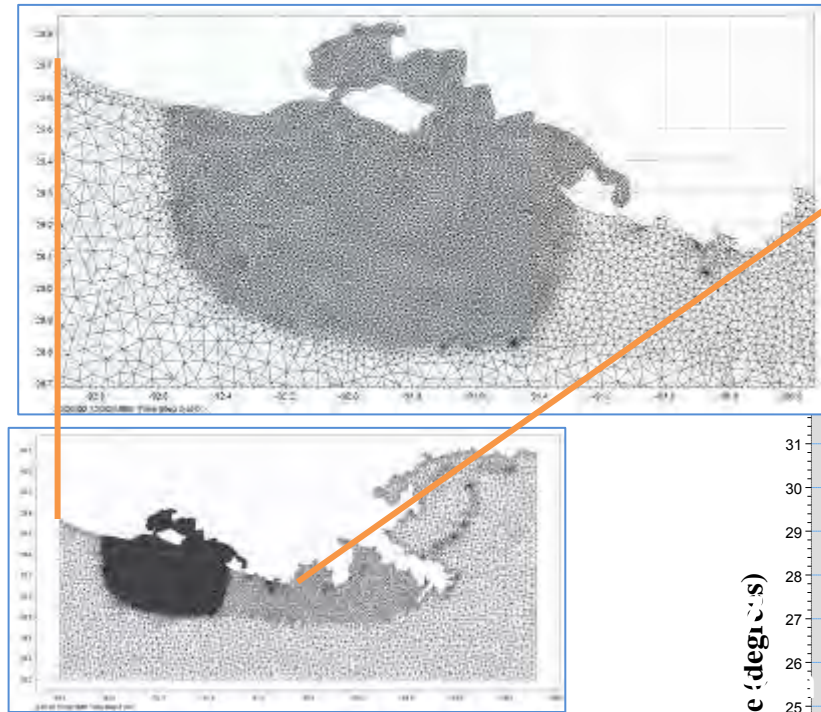
Identify and Evaluate Optimal Habitat Areas in Project Area

Then: numerical modeling to predict optimal oyster hydrodynamic and salinity conditions, and shoreline stabilization

Bathymetry



From: Freeman (EDF) and Roberts (LSU)

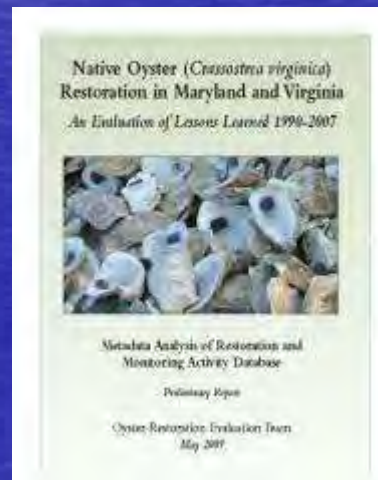


Governmental/NGO Partnerships Span Regional or National Footprints (e.g., NOAA, NFWF, EPA, USFWS)

- Nine years, 95 projects, 48 involving shellfish restoration
- Many in unapproved waters
- Would like to be working with ISSC to ensure compatibility



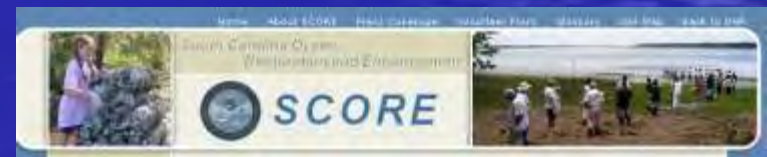
Many Excellent Examples: Wealth of Ideas



<http://www.oysterrecovery.org/>

Please select your volunteer interests: *

- Public Outreach with ORP at Fairs, Events, Festivals
- Education and Advocacy
- Hands-On Projects and Restoration
- Providing Pro-Bono Assistance
- Helping at ORP Office



LS TOOLS AVAILABLE

Figure 4: Low-energy systems and failed shore protection structures



WHICH PROJECT IS RIGHT FOR MY SITE?				
<i>(source: MD Department of Natural Resources)</i>				
Site Conditions	Low Energy (Nonstructural)	Medium Energy (Hybrid)		High Energy (Structural)
Shoreline Location	creek or cove	minor river	major tributary	mainstem Bay
Water Depth (ft/near shore)	-1.0	-1.0 to -2.0	2.0 to -4.0	-4.0 to -15.0
Fetch (mi/distance to nearest opposite shore)	0.5	1.0 to 1.5	2.0 or more	2.0 or more
Erosion Rate (ft/yr)	2 or less	2 to 4	4 to 8	8 to 20
Erosion Control Treatment Options	Nonstructural projects	Hybrid Project		Structural Projects
	beach replenishment	marsh fringe w/ groins		bulkheads
	marsh fringe	marsh fringe w/ sills		revetments
	marshy islands	marsh fringe w/ breakwaters		stone reinforcing
	biologs, groins	beach replenishment w/ breakwaters		groins and jetties
Cost per foot	\$50-100	\$150-300	\$350-500	\$500-1,200

From: **Living Shorelines for the Chesapeake Bay Watershed**, Chesapeake Bay Foundation

Table 2. Pricing guidelines: Shoreline armoring



Type	Unit	Installed Cost - \$/Unit (Labor and materials included)
Vinyl bulkhead*	Linear Foot	\$125.00 - \$200.00
Vinyl bulkhead* w/ toe protection	Linear Foot	\$210.00 - \$285.00
Wooden bulkhead	Linear Foot	\$115.00 - \$180.00
Wooden bulkhead w/ toe protection	Linear Foot	\$200.00 - \$265.00
Concrete bulkhead	Linear Foot	\$100.00 - \$200.00
Revetment	Cubic yard (yd ³)	\$25.00 - \$45.00 base cost \$120.00 - \$180.00 installed

*(based on 4-8' height)

Table 3. Pricing guidelines: Offshore/nearshore breakwater materials

Material	Unit	Base Cost \$/Unit	Installed Cost \$/Unit
Oyster shell	Yd ³ (loose shell)	\$50.00 - \$60.00/yd ³	Varies
	Bag	\$5.00 without spat \$30.00 with spat	
Concrete bags	Bag	\$4.00 - \$6.00/bag	\$12.00 - \$16.00/LF
Limestone rock	Linear Foot	Varies	~\$125.00 - \$200.00
Reef domes	Linear foot	--	\$44.00 (incl. delivery)*
Erosion control ("snow") fence	100 feet	\$45.00	Varies
Coir logs	10' lengths	\$57.25 (incl. delivery)	Varies

*Delivery charges can be impacted by number of domes ordered, distance driven, fuel prices and other factors and can vary greatly.

MD-DNR LS Website: Wealth of Information & Tools

Maryland.gov | Phone Directory | State Agencies | Online Services



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Living Shorelines

Restoring the Chesapeake Bay through Innovation

Shorelines are the interface between land and water. Natural shorelines are dynamic, constantly changing features that are influenced by what occurs both on the land and in the water. For this reason, shorelines can experience either erosion (the loss of sediment) or accretion (the addition of sediment). Standard erosion control practices generally involve placing rock or concrete to "harden" the shoreline. This approach is often effective at controlling erosion, but can increase nutrient and sediment run-off, and reduce habitat for fish and wildlife. One way to reverse the trend is to change the way we control shoreline erosion.

Living shorelines are the result of applying erosion control measures that include a suite of techniques which can be used to minimize coastal erosion and maintain coastal process. Techniques may include the use of fiber coir logs, sills, groins, breakwaters or other natural components used in combination with sand, other natural materials and/or marsh plantings. These techniques are used to protect, restore, enhance or create natural shoreline habitat.

Contact Information

Chesapeake & Coastal Service

Maryland Department of Natural
Resources

Tawes State Office Building E-2

580 Taylor Avenue

Annapolis, Maryland 21401

Phone 410-260-8732

Fax 410-260-8739

customerservice@dnr.state.md.us



Coastal Atlas

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<http://dnr.maryland.gov/ccs/livingshorelines.asp>

shoreline erosion WHAT ARE MY OPTIONS?

ST. MARY'S COUNTY

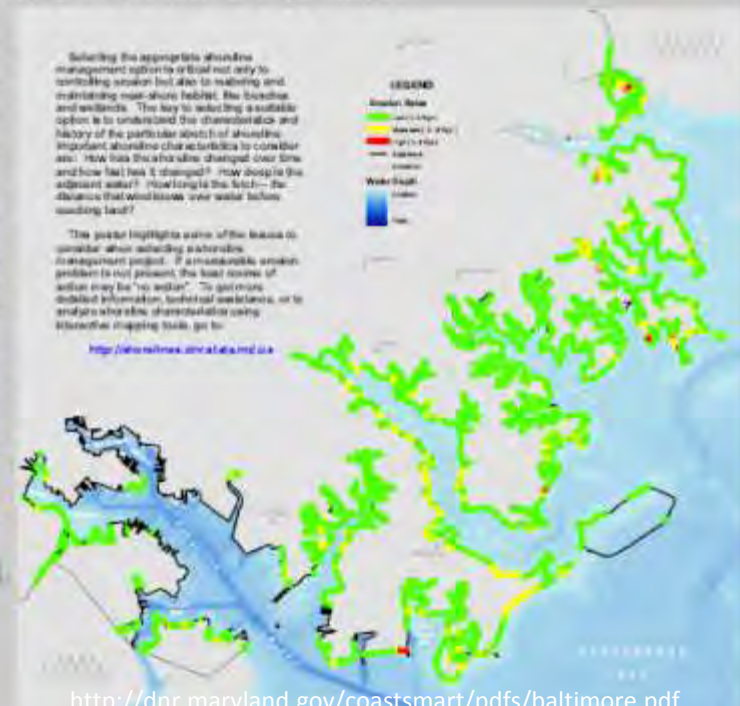


Selecting the appropriate shoreline management option is critical not only to controlling erosion but also to restoring and maintaining near-shore habitat, the beaches and wetlands. The key to selecting a suitable option is to understand the characteristics and history of the particular stretch of shoreline. Important shoreline characteristics to consider are: How has the shoreline changed over the years? How fast has it changed? How deep is the adjacent water? How long is the fetch—the distance that wind blows over water before reaching land?

This poster highlights some of the issues to consider when selecting a shoreline management project. If a measurable erosion problem is not present, the best course of action may be "no action". To gain more detailed information, technical assistance, or to analyze shoreline characteristics using sensitive mapping tools, go to: <http://dnr.baltimorecountymd.us>

shoreline erosion WHAT ARE MY OPTIONS?

BALTIMORE COUNTY & CITY



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<http://dnr.maryland.gov/coastsmart/pdfs/baltimore.pdf>

LOW EROSION RATES

APPROPRIATE MANAGEMENT STRATEGIES

Address erosion where it occurs by providing riparian vegetation that will slow and prevent soil erosion and build up the bank with natural and artificial structures.

NO OTHER STRATEGIES

- Riparian vegetation
- Bank stabilization
- Bank revegetation
- Bank reinforcement
- Bank stabilization
- Bank reinforcement
- Bank stabilization
- Bank reinforcement

MEDIUM EROSION RATES

APPROPRIATE MANAGEMENT STRATEGIES

Long-term erosion control strategies should be implemented to prevent erosion and stabilize the bank with natural and artificial structures.

NO OTHER STRATEGIES

- Riparian vegetation
- Bank stabilization
- Bank revegetation
- Bank reinforcement
- Bank stabilization
- Bank reinforcement
- Bank stabilization
- Bank reinforcement

HIGH EROSION RATES

APPROPRIATE MANAGEMENT STRATEGIES

Address erosion where it occurs by providing riparian vegetation that will slow and prevent soil erosion and build up the bank with natural and artificial structures.

NO OTHER STRATEGIES

- Riparian vegetation
- Bank stabilization
- Bank revegetation
- Bank reinforcement
- Bank stabilization
- Bank reinforcement
- Bank stabilization
- Bank reinforcement

FL DEP-Coastal Program, USFWS Living Shoreline Efforts

Current LS sites identified through the FDEP NWD Permit Applications for Hardened Stabilization Structures and Alternative Promoted Approaches



- Completed/Current LSI Sites
- 🚩 Future LSI Sites



Bayou Texar, Pensacola FL prior to LS installation -2001



Restored Living Shoreline Bayou Texar, Pensacola FL-2008

Coasts, Oceans, Ports and Rivers Institute (COPRI)'s LS Database: All of FL

Living Shorelines Database

As Chairman of COPRI's Living Shorelines Task Committee, I want to welcome you to this database of existing "living shoreline" projects around the United States.

Read more

Map Satellite

Additional FL Projects

Alberca Cile Oyster Reef Habitat Site

Tampa Bay Watch

Sarasota NEP

Pelican Island NWR

Port St Lucie FOS

Gulf of Mexico

Ernest Coe Visitor Center, Everglades National Park

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http://www.mangroverestoration.com/LES-Pelican_Island_Phase_III_Time_Zero_Plus_3_Months_Final_Report..pdf



<http://www.tampabaywatch.org/index.cfm?fuseaction=content.home&pageID=23>



<http://www.floridaocean.org/p/160/restoration-days-at-fos>



<http://sarasotabay.org/habitat-restoration/habitat-restoration->

Project FAQs

Most of the projects have little or no data on web

Many have little or no monitoring or sampling designs addressing clear goals

Approaches, Methods, and Protocols for Monitoring Oyster Reefs and Living Shoreline Restoration and Natural Populations

OneTonBag LLC



See <http://www.oyster-restoration.org/oyster-restoration-research-reports/>
<http://www.oyster-restoration.org/> for updates regularly