

The Delaware Estuary Living Shoreline Initiative (DELSI):

Shoreline protection that enhances habitat and prevents erosion at the same time



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Tidal Wetlands

Important resource in the DE Estuary

Acreage

- <5% left
- losses continue

Condition

- most are moderately or severely stressed
- degradation continues

Tidal Wetlands



INDICATOR DESCRIPTION: Coastal wetlands are one of the Delaware Estuary's most important and characteristic habitats, and they are a premier environmental indicator for the area's ecosystem. The Estuary has one of the largest freshwater tidal prisms in the world running from Trenton, New Jersey, to approximately Wilmington, Delaware. The gradual transition from fresh to salt water allows for abundant and rare freshwater tidal wetlands in the Upper Estuary, brackish marshes in the Middle Estuary, and salt marshes surrounding Delaware Bay. Together, these marshes form a nearly continuous perimeter fringing the tidal system. Tidal wetlands furnish essential spawning, foraging, and nesting habitat for fish, birds, and other wildlife. These wetlands are considered by many scientists to function like the ecosystem's "kidneys," absorbing contaminants, nutrients, and suspended sediments. Other scientists regard them as "fish factories" that are crucial to the success of important finfisheries. They also provide a first line of defense against storm surge and flooding. Acre for acre, tidal wetlands likely provide more ecosystem services than any other habitat type in the region.

STATUS: A 1992 to 2001 land cover data comparison (for both tidal and non-tidal wetlands combined) showed wetland loss throughout the Estuary, except along the New Jersey side of Delaware Bay where extensive marsh restoration may have offset this trend (see map). During the preceding decade, a more in-depth analysis showed that Delaware's tidal marshes dropped by 12 percent and the proportion of marshes with degraded conditions almost doubled.

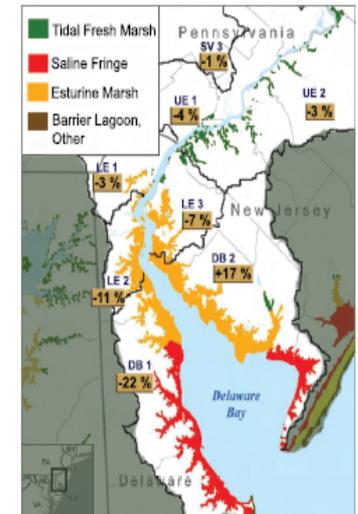
TRENDS: For over 300 years, the extent and integrity of tidal wetlands has been under assault across the Estuary. Perhaps 50 percent of the natural marshes have been lost to development, conversion, or degradation associated with human activities. Losses have been most severe in the urban corridor where perhaps only five percent of pre-settlement acreage of the nationally rare freshwater tidal marsh remains. Despite proactive laws protecting marshes, a growing awareness of their ecological value, and mounting restoration attention, marsh acreage and condition are still lost from human-caused impairments, land uses, and sea level rise.

ACTIONS AND NEEDS: Tidal wetlands are a hallmark feature of our watershed that suffer continued losses of both area and condition. Coordinated monitoring and assessment programs are urgently needed to regularly and carefully track tidal marsh extent and condition across the three Estuary states. A better scientific understanding is also needed of the factors that govern wetland well-being, such as sediment supply, water quality, and ecology. Studies of their ecosystem services and natural capital value would benefit land-use and regional-restoration planning.



A coconut fiber log is deployed along the edge of a tidal marsh in Bivalve, New Jersey, in an effort to establish a "living-shoreline" reef that may soon protect against erosion.

Relative Change in Wetland Acreage 1992-2001



Please refer to the map on page 31 to view the full range of each region.

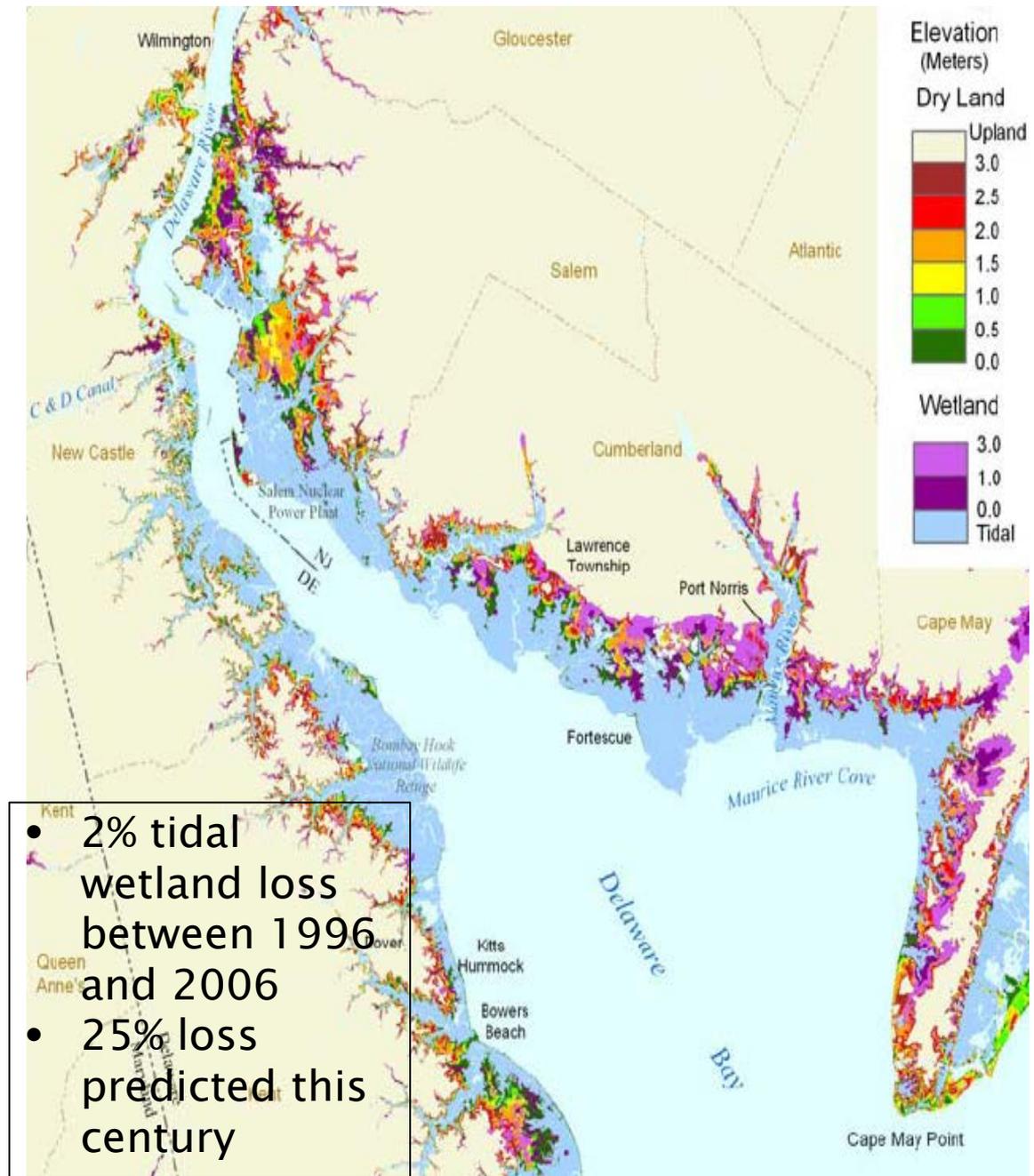
Why Living Shorelines?

Tidal marshes need to move:

Horizontally

and/or

Vertically



Living

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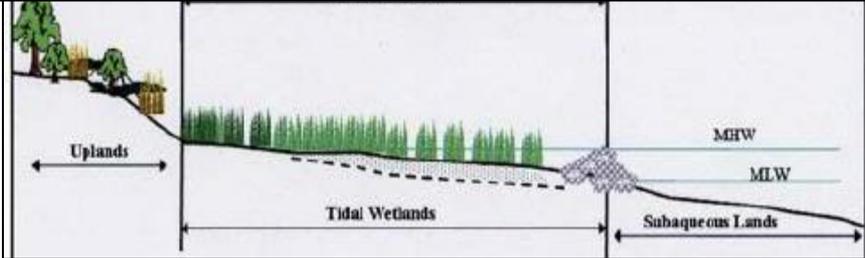
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SCIENCE

Research on mussel/plant living shoreline tactic

PLANNING

Delaware Estuary Living Shoreline Planning & Assessment

OUTREACH

Outreach

Living Shoreline R&D in NJ

Mussel Powered Living Shorelines for Salt Marsh Erosion Control



Install Natural Materials



Trap sediment



Spartina alterniflora seeding

Salvaged clumps



Nursery plugs





Apply Mussels

Three sizes

< 1 cm

< 2 cm

> 2 cm

Two densities

high

low

Mussels applied in August 2010,
moved into logs by November.

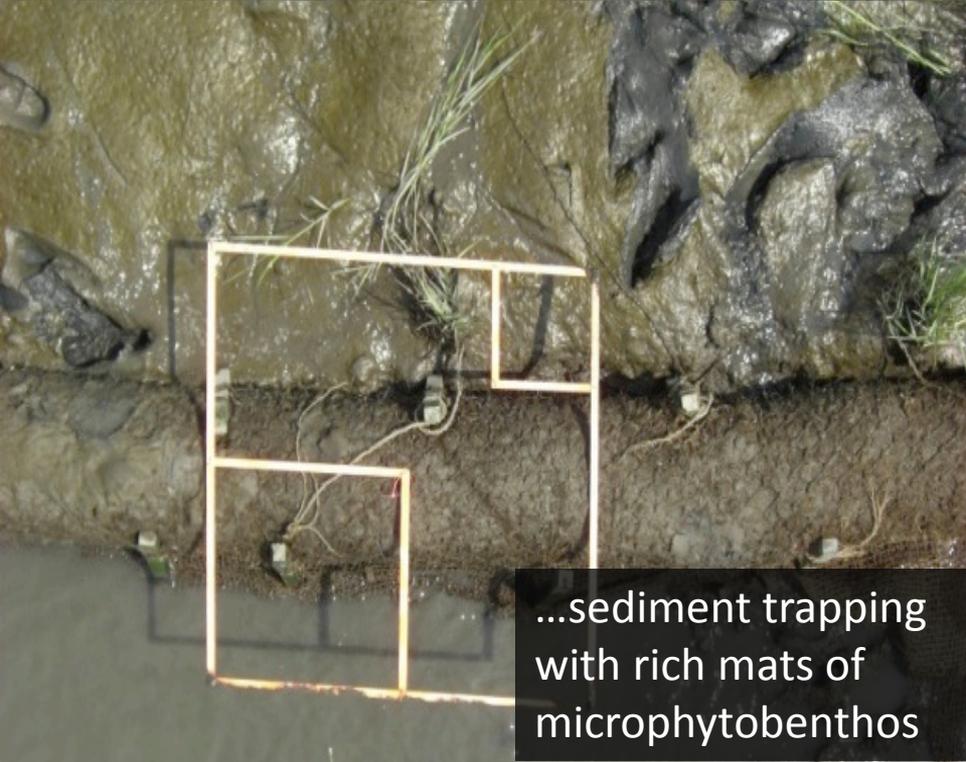




Initial monitoring provided exciting results....



Grass and mussels survived when planted in logs



...sediment trapping with rich mats of microphytobenthos



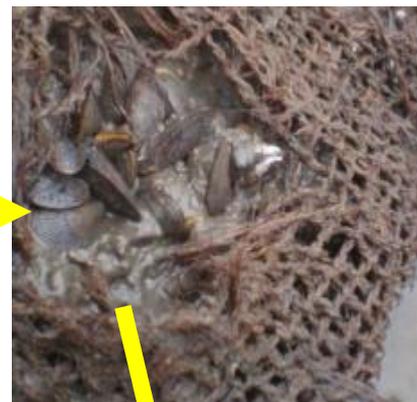
Juvenile mussels recruited to coir logs...

... sweet success

Elevation is key



Next Generation Living Shorelines



May 2010

June 2010

June 2011

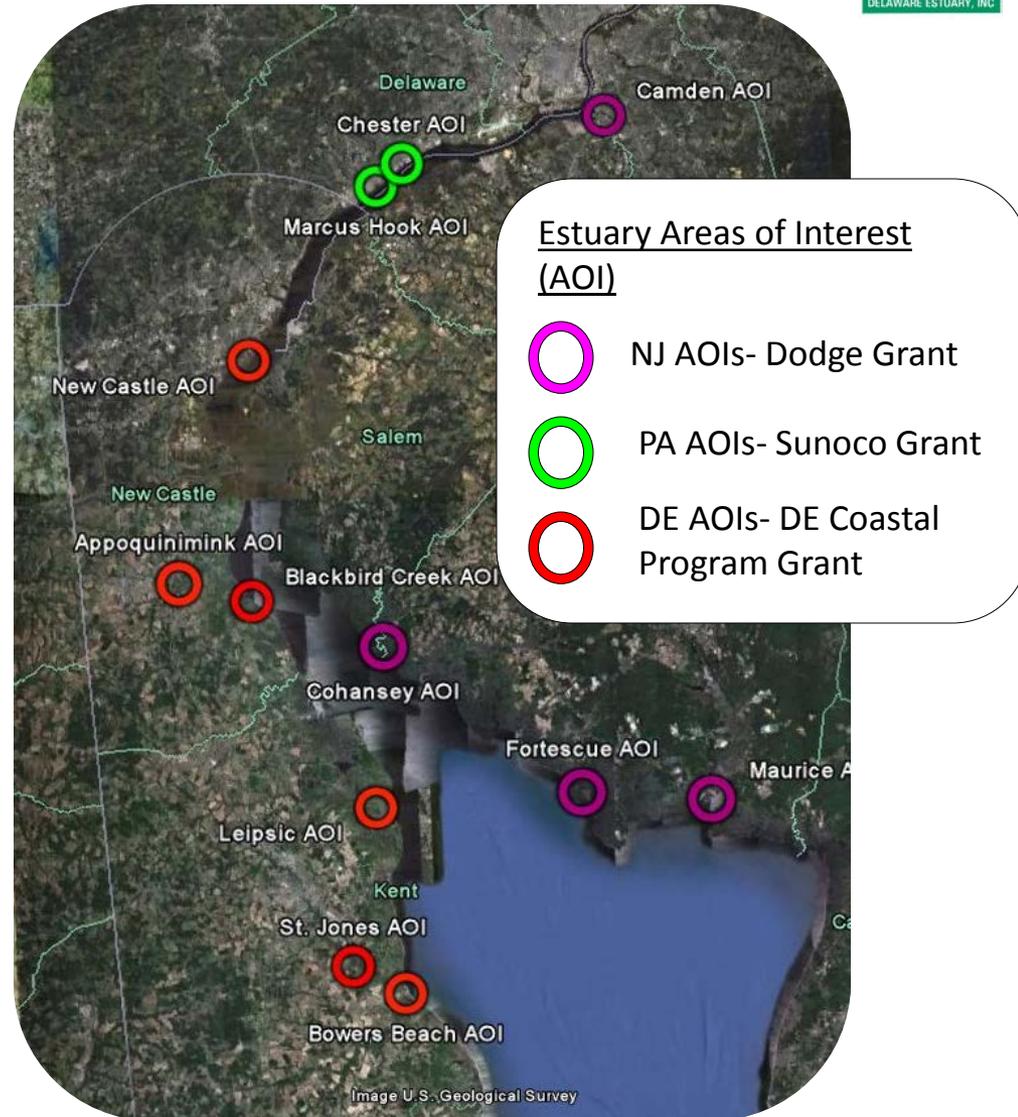
September 2011 (after hurricane)



Living Shorelines Planning Project



- ▶ Inventory of Types
- ▶ GIS Analysis in Areas of Interest
- ▶ Selection of Potential Project Sites
- ▶ Field Reconnaissance
- ▶ Conceptual Plans



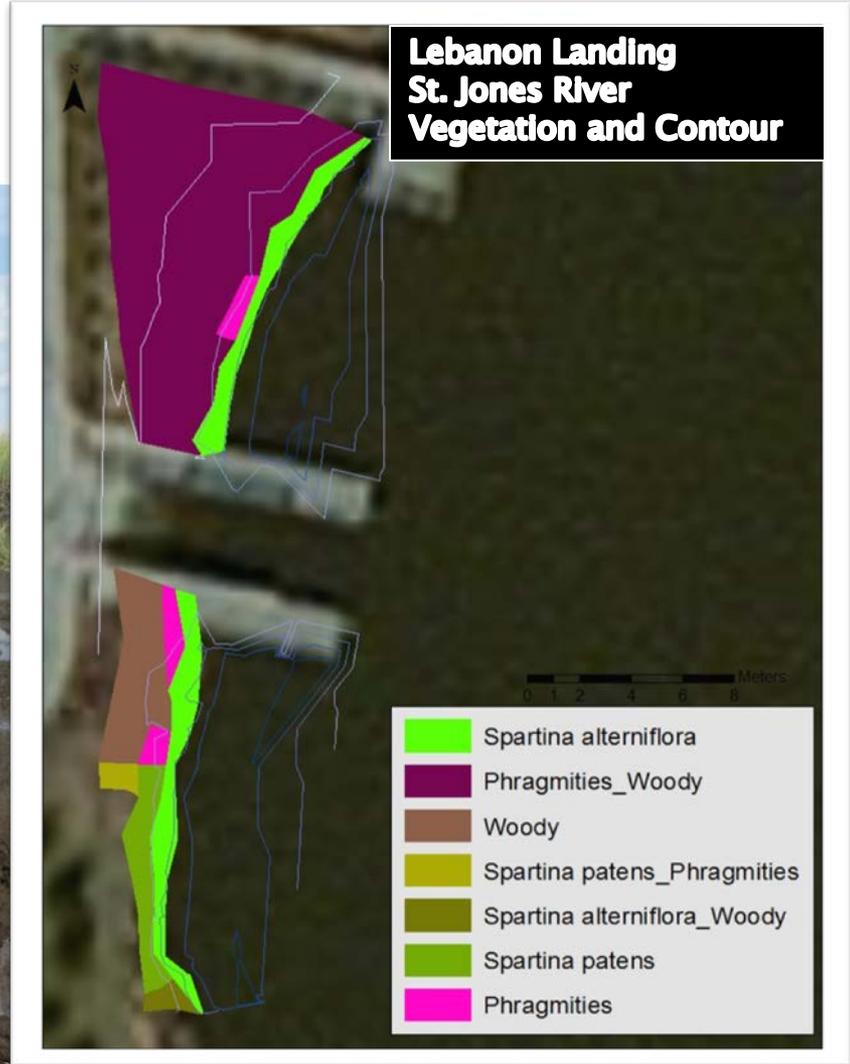
GIS Analysis Complete

- ▶ Combined data layers contain information in order critical to design
- ▶ Physical and biological metrics within AOI
 - Fetch and wind traffic as energy
 - Shore morphology
 - Substrate
 - Salinity re



Site Reconnaissance

Underway in 3 States

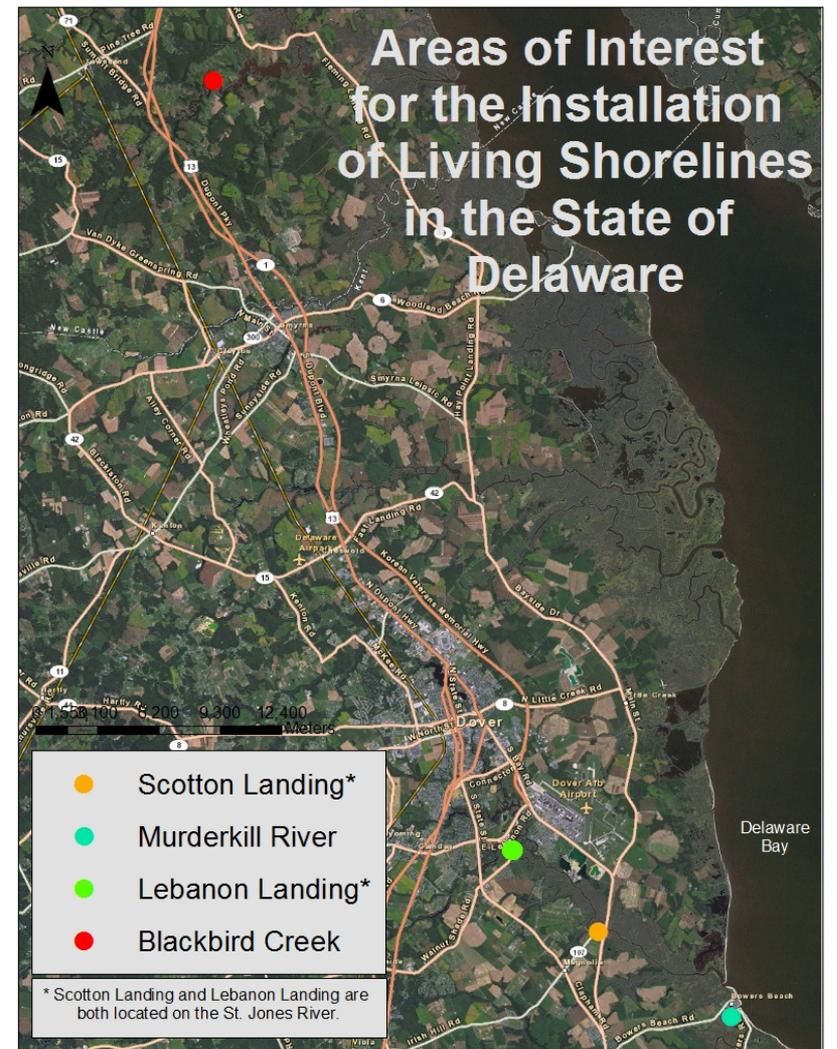


Site Assessment Report

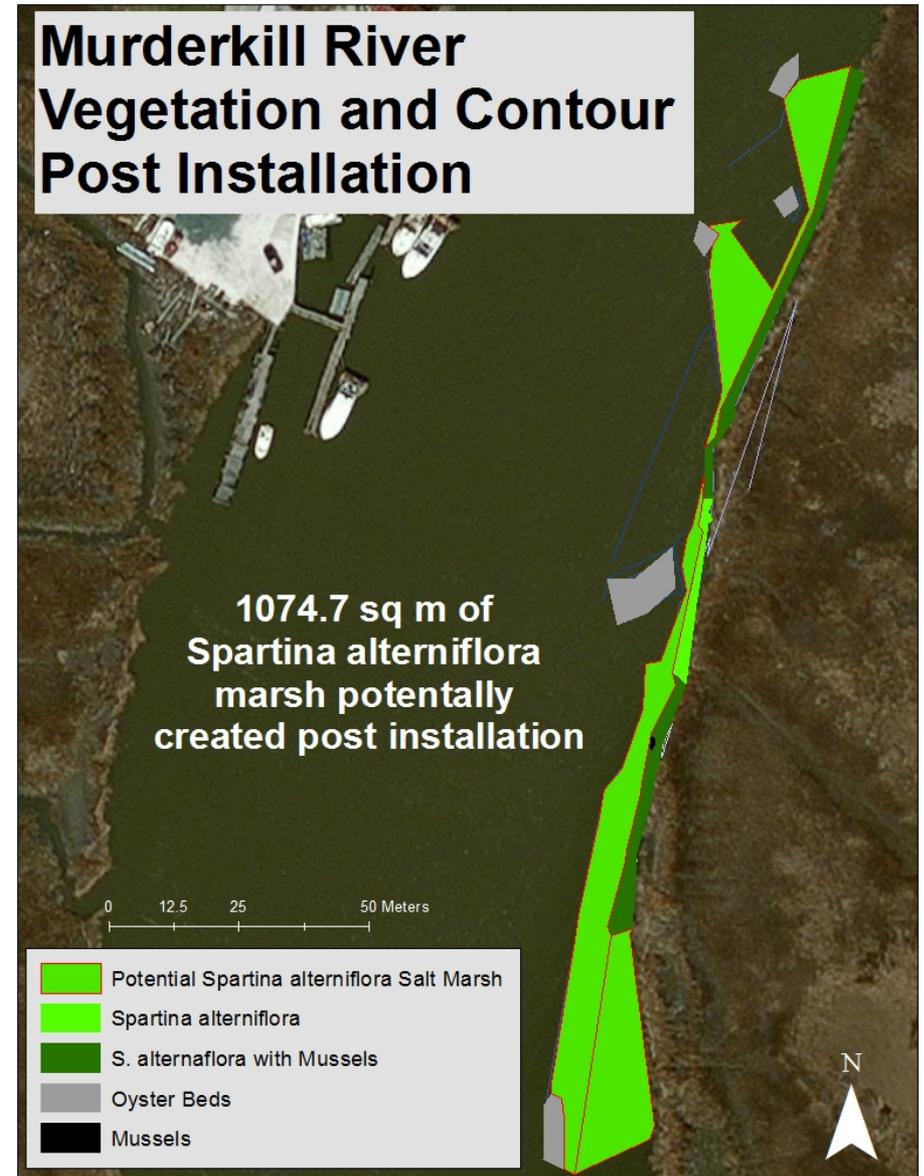
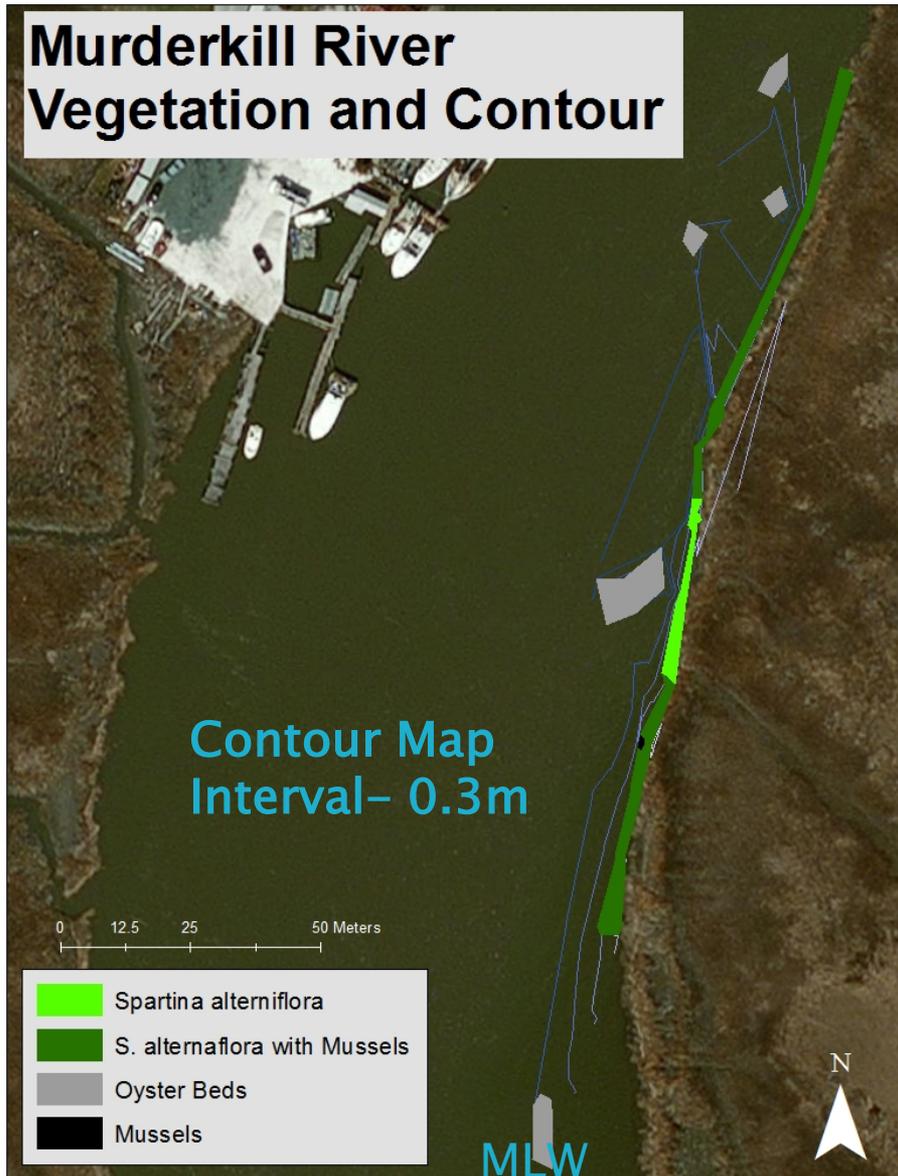
Narrowed down to 4 sites:

Includes:

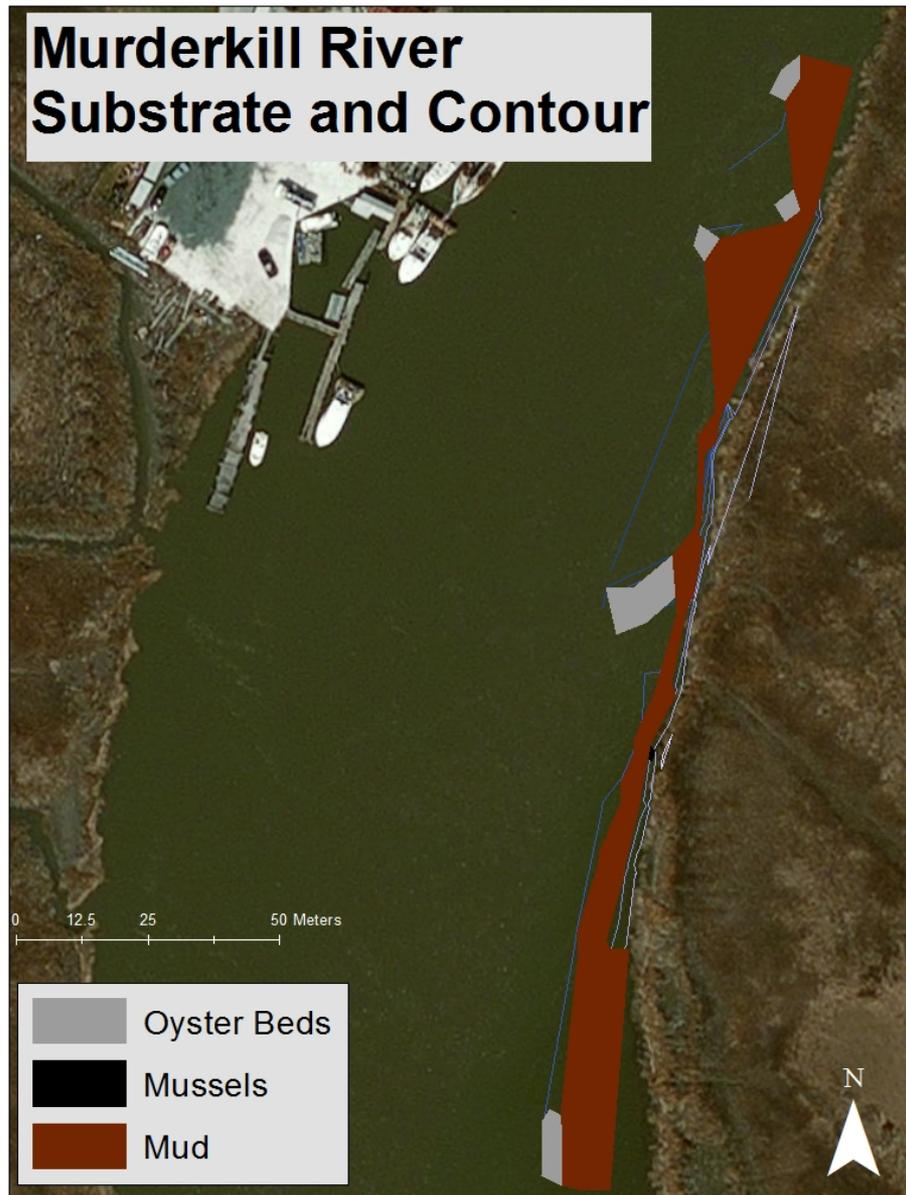
- Most suitable sites ranked
- Contour maps
- Vegetation and substrate maps
- Energy analysis– fetch, boat wake, etc.
- Shoreline erosion/stability



Murderkill: Vegetation and Contour



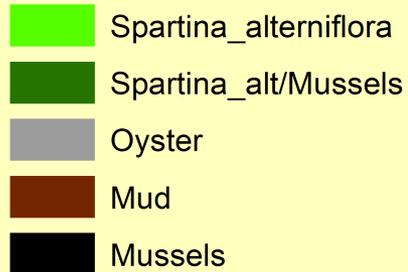
Murderkill: Substrate



Prevailing physical and biological conditions

Murderkill Sites	Landscape Condition					
	Vegetation	Substrate	Surrounding Development	Slope	Shoreline Features/ Alterations	Mussels/ Oysters Present
Site 1	<i>Spartina alterniflora</i>	Soft Mud-walkable	Several marinas behind and on both sides	25%	Docks/ Marina	Mussels
Site 2	<i>Spartina alterniflora</i>	Soft Mud-walkable	Marina to east	29%	Near dock	Mussels
Site 3	<i>Spartina alterniflora</i>	Soft Mud-walkable	None	20%	None	Mussel/ Oysters

Murderkill River Site:



Initial Living Shoreline Ideas:

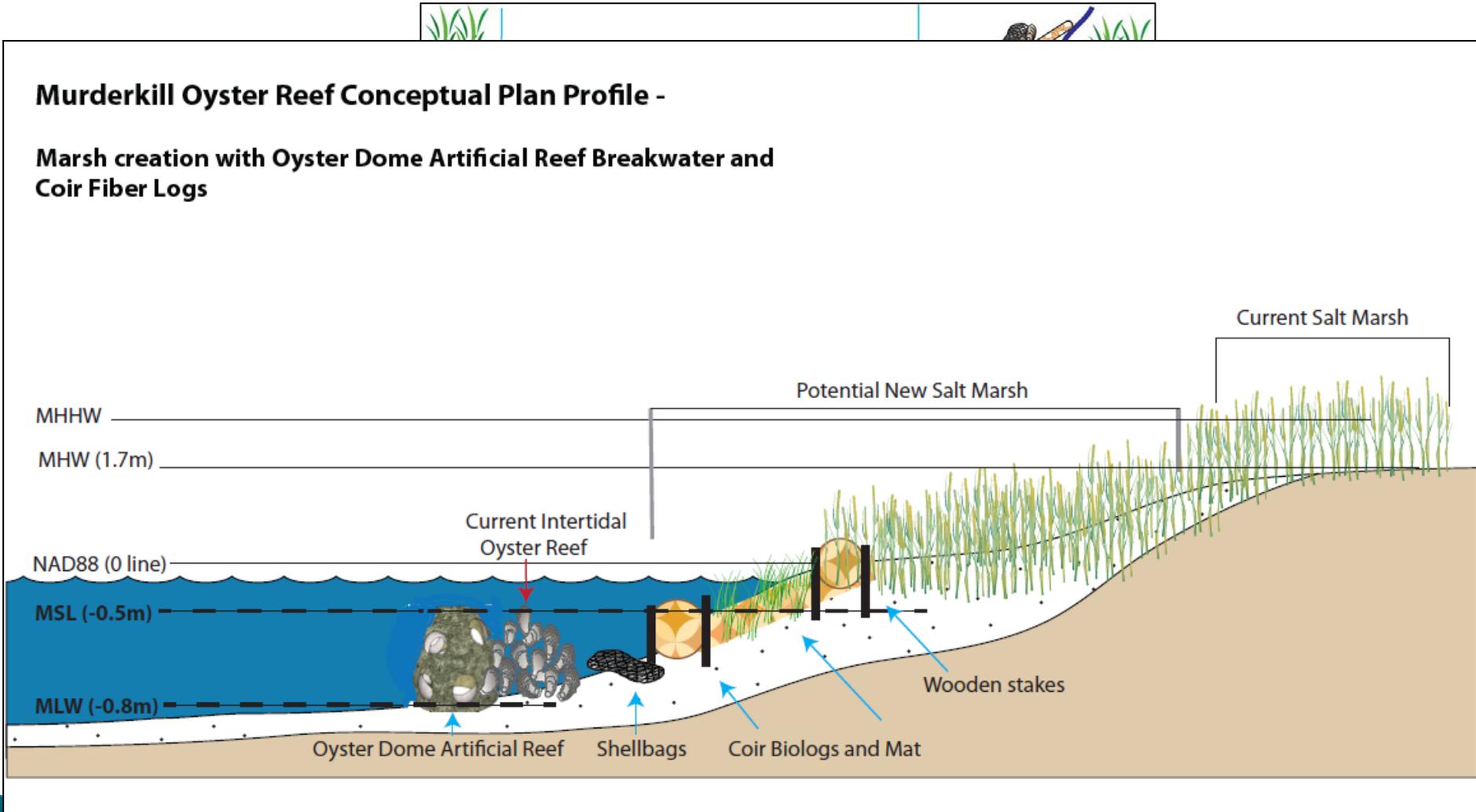
- Hybrid living shoreline
- Expanded oyster reefs (subtidal)
- Mussel plant augmentation (intertidal)



Conceptual Plans

Murderkill Oyster Reef Conceptual Plan Profile -

Marsh creation with Oyster Dome Artificial Reef Breakwater and Coir Fiber Logs



St. Jones



Lebanon Landing St. Jones River



● Lebanon Landing AOI

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Lebanon Landing: Vegetation and Contour



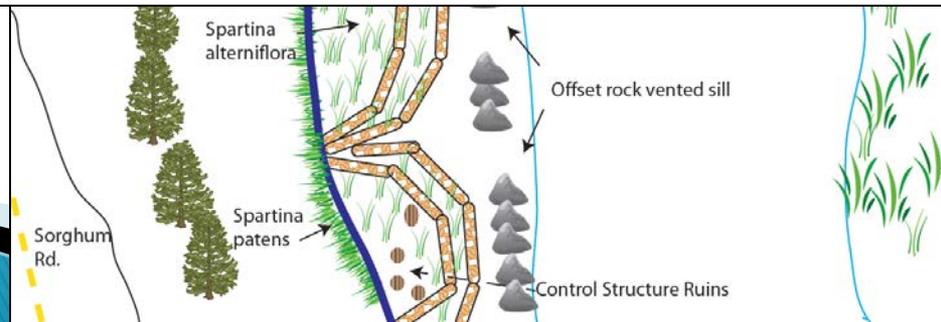
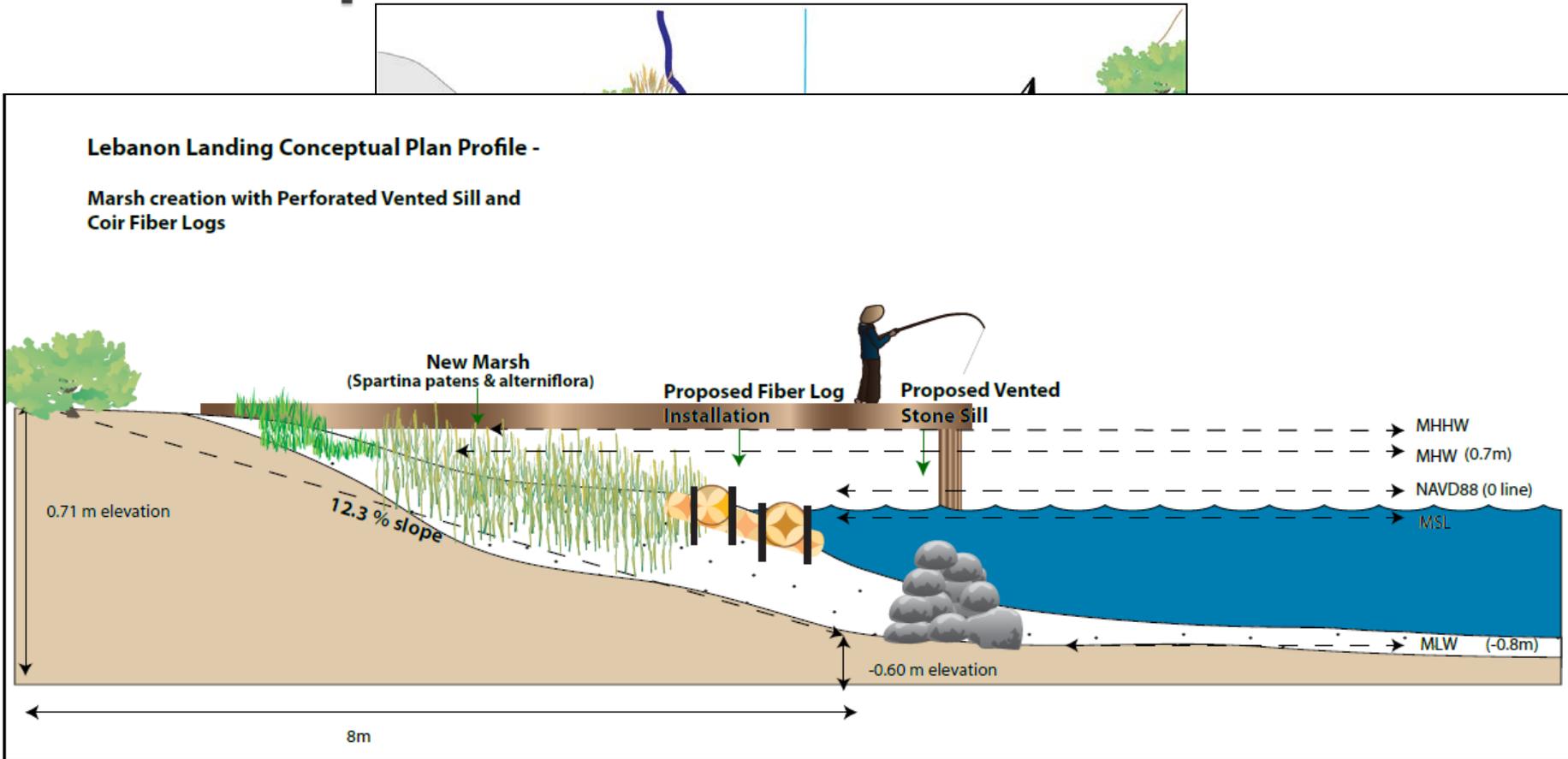
Lebanon Landing- Substrate



Conceptual Plans

Lebanon Landing Conceptual Plan Profile -

Marsh creation with Perforated Vented Sill and Coir Fiber Logs



SCIENCE

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OUTREACH



Picture from Kevin Smith: Maryland DNR

Outreach:

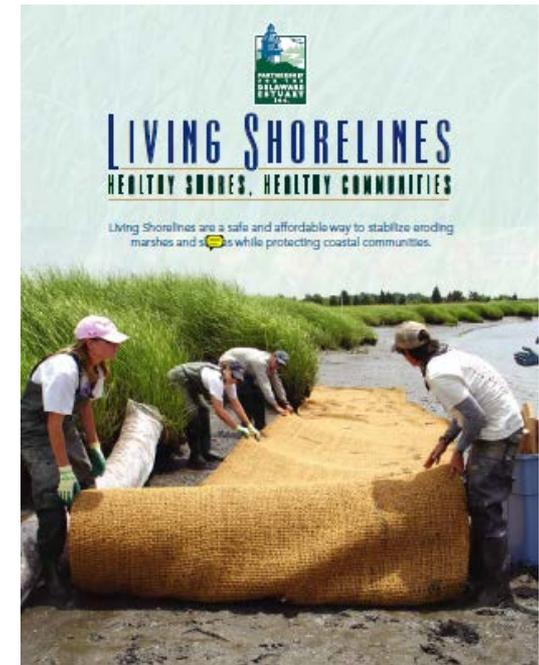
See Sari Rothrock's Poster

- Living Shoreline Introductory Brochure

- Handbook on Living Shorelines for NEPs and other Practitioners

- Community Workshops

- Weathering Change Conference
Summer 2012



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Thank you to all the funders, Josh Moody for GIS, and Mike Messinger for boating us around!

