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Best Practices for Planting Salt Marsh and Using Recycled Oyster Shells for Living Shoreline Construction

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Best Practices for Planting Salt Marsh and Using Recycled Oyster Shells for Living Shoreline Construction

- Types of salt marsh grass
- Where to get them
- Cost
- When and where to plant them
- How to plant them

- How to use recycled oyster shells/domes for the construction of living shorelines

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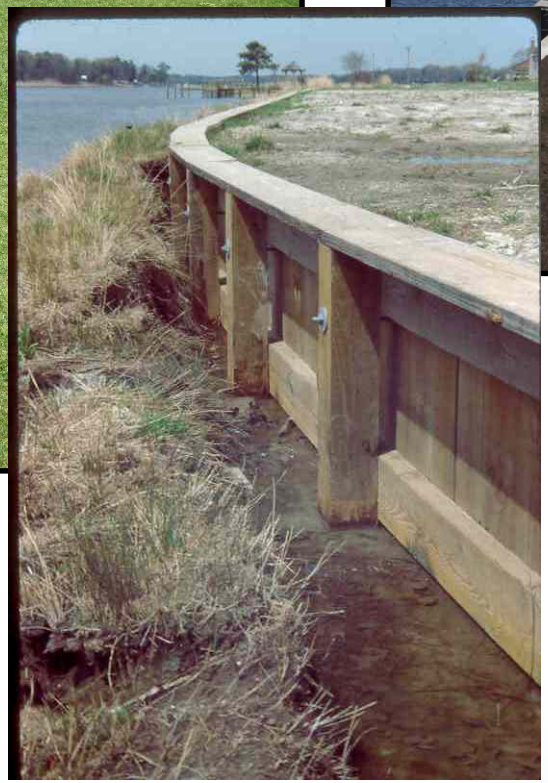
Shoreline Erosion

How Living Shorelines and Salt Marsh Stabilize Shorelines and Protect Habitat

Bulkhead Issues



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Storm Damage to Bulkheads

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Marshes with and without sills protect estuarine shorelines from erosion better than bulkheads during a Category 1 hurricane

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ABSTRACT

Acting on the perception that they perform better for longer, most property owners in the United States choose hard engineered structures, such as bulkheads or riprap revetments, to protect estuarine shorelines from erosion. Less intrusive alternatives, specifically marsh plantings with and without sills, have the potential to better sustain marsh habitat and support its ecosystem services, yet their shoreline protection capabilities during storms have not been evaluated. In this study, the performances of alternative shoreline protection approaches during Hurricane Irene (Category 1 storm) were compared by 1) classifying resultant damage to shorelines with different types of shoreline protection in three NC coastal regions after Irene; and 2) quantifying shoreline erosion at marshes with and without sills in one NC region by using repeated measurements of marsh surface elevation and marsh vegetation stem density before and after Irene. In the central Outer Banks, NC, where the strongest sustained winds blew across the longest fetch; Irene damaged 76% of bulkheads surveyed, while no damage to other shoreline protection options was detected. Across marsh sites within 25 km of its landfall, Hurricane Irene had no effect on marsh surface elevations behind sills or along marsh shorelines without sills. Although Irene temporarily reduced marsh vegetation density at sites with and without sills, vegetation recovered to pre-hurricane levels within a year. Storm responses suggest that marshes with and without sills are more durable and may protect shorelines from erosion better than the bulkheads in a Category 1 storm. This study is the first to provide data on the shoreline protection capabilities of marshes with and without sills relative to bulkheads during a substantial storm event, and to articulate a research framework to assist in the development of comprehensive policies for climate change adaptation and sustainable management of estuarine shorelines and resources in U.S. and globally.

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Marsh Grass Species Planted for Living Shorelines

Sporobolus alterniflorus
(smooth cordgrass)

Sporobulus patens
(salt meadow hay)

Juncus roemerianus
(black needlerush)

Typical Coastal Marsh Zones in NC

Ordering and Planting Times

Order in fall

Plant in April-June (Optimal)

Plant in spring for 2-3 years

Trays or boxes

Trim - “Haircut”

Grow them in a greenhouse

Nurseries that Grow Salt Marsh Plugs

- **Garner's Landscaping, Tree Farm & Plant Stand, Newport**
  - *$0.75 per plug delivered*

- **Wetland Plants Inc., Edenton**
  - *$0.75 per plug delivered, 200 min.*
- **Mellow Marsh Farm, Inc., Siler City**
- **Lumber River Native Plants, Gibson**
  - *$0.75 - $0.85 per plug plus delivery charge*

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When and Where to Plant

- Plant in spring (April- June) for 2-3 years.
- Plant after the sill is in place.
- If planting an unvegetated area:
  - Smooth cordgrass -below high tide line
  - Salt meadow hay and black needlerush- above high tide line
- If planting area with marsh grass present:
  - Plant where that species is already present
- Close together and close to existing grass

How to Plant Marsh Grass

- Dibble bar
- Six inches deep
- Six inches – 1 ft. apart
- One plug per hole
- Fertilizer is optional

Before Planting

After 1 Year

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Before Planting

After 3 years

Before

After

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Using Recycled Oyster Shells for Living Shorelines

Loose Oyster Shells

Oyster shell bags

Sill and Marsh-Toe Revetment Materials

- Recycled oyster shells (loose or bagged)



- Riprap (limestone rock/marl, granite, concrete)

- Sandbar Oyster Company's Oyster Catcher™


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Using Recycled Oyster Shells for Living Shorelines

Using Recycled Oyster Shells for Living Shorelines

- The shells of oysters that were harvested and consumed.
- Help to reduce shoreline erosion and create habitat.

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Obtaining the Recycled Oyster Shells

- Purchased from seafood companies
  - Quality Seafood, Elizabeth City ($2.85/bu)
- Purchased from trucking companies
  - Roy Rogers ($2.48/bu)
- Donated from oyster roasts
- Restaurants

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Making the Oyster Shell Bags

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Sunset Beach Waterway Park June 2018

Marl

Stockpiling/Transporting the Bags

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Permits

State (NC Coastal Area Management Act)

- Salt marsh planting alone: No permit required
- Marsh-toe revetment/Sills: CAMA General Permits
  - $200 fee
  - Project location map and designs
  - Adjacent property owner signatures
  - Valid for 120 days

Federal (Section 404, Clean Water Act) USCOE

- Regional General Permits Authorized for 5 year intervals

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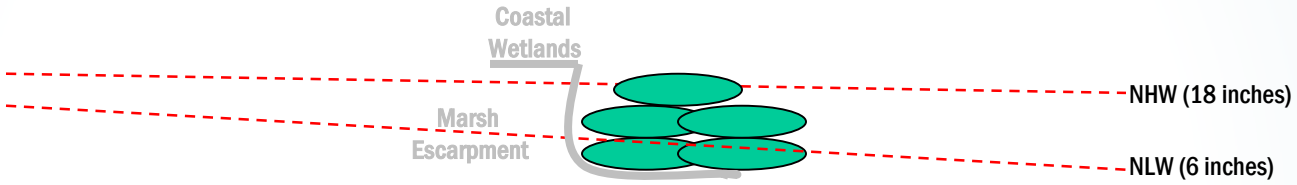
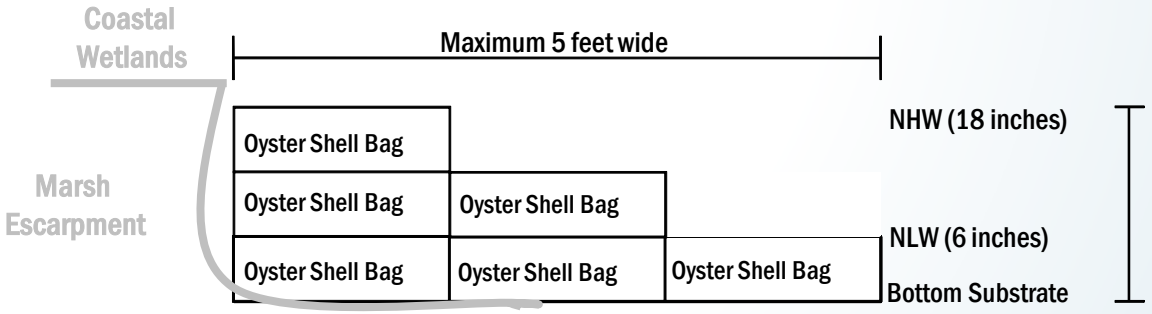
Local Fishermen

Typical Marsh Toe Revetment Schematic



Oyster Shell Bag Marsh Toe Revetment.

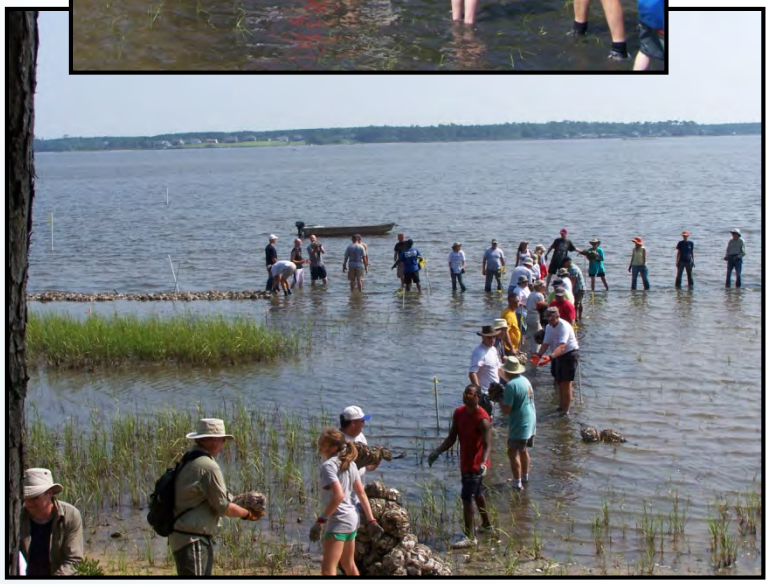
Example of Oyster Shell Bag Marsh Toe Revetment.



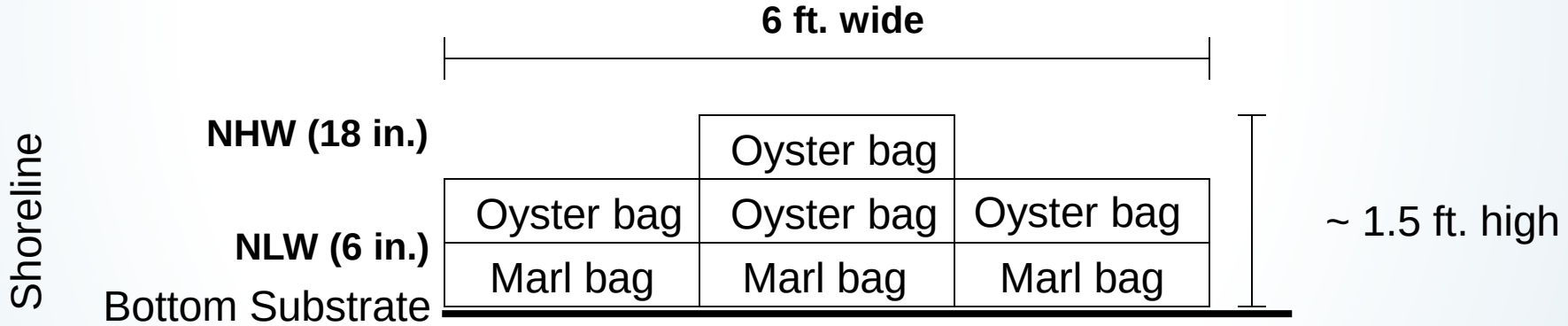
Cross-Section/Profile of Oyster Shell Bag Marsh Toe Revetment.

Oyster Shell Bag Marsh Toe Revetments

Oyster Shell Bag Sill



Oyster Shell Bag Sill Design



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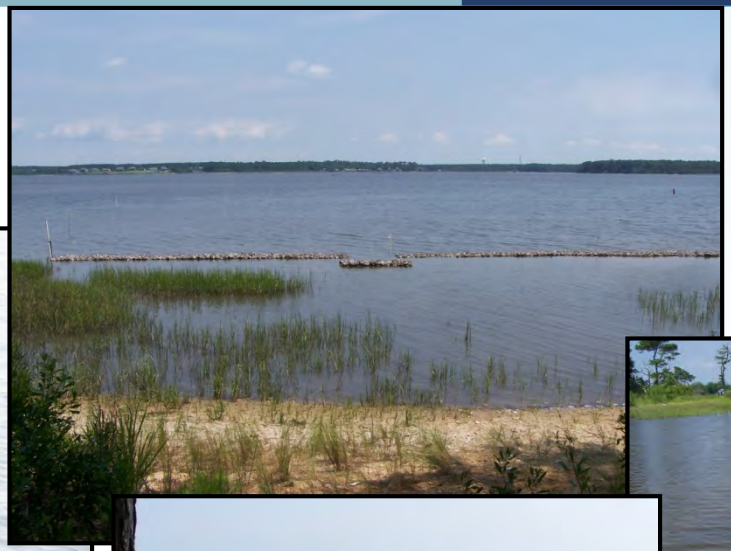
Oyster Shell Bag Sill



Sunset Beach Living Shoreline Project 2018- 2019
Oyster Bags and Oyster Domes

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Oyster Shell Bag Sills and Oyster Domes

Approximate costs for 50 linear feet:

- 700 bags, 175 bushels @ $3.00/bu = $525
- 3 rolls of mesh @ $125/roll = $375
- Bagging frame = $100
- Labor, $5.00 per bag = $3,500
- Plantings, 1,500 plants @ $1.00 = $1,500
- Total cost = $6,000 or $120/linear ft.

- Oyster domes (approx. 32 domes for 50 linear feet)
- ~$60-$120/dome ($1,920-$3,840)
- Delivery- ~$2,000 per tractor trailer (to Brunswick Co.)

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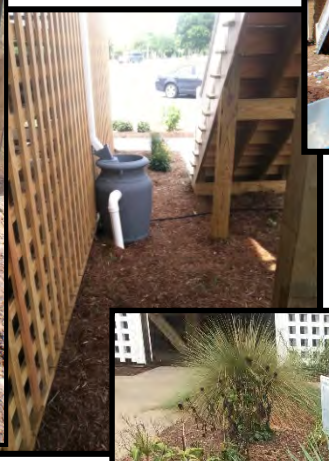


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