Evaluating Living Shorelines To Inform Regulatory Decision-Making in South Carolina

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SCDNR Living Shoreline Sites

• 200+ oyster-based living shorelines constructed in 2001-2016.
• Primary purposes: oyster restoration, habitat value, and education.
• More recently, evaluating shoreline protection value.
S.C. Oyster Restoration and Enhancement (SCORE) Program reef, on Hunting Island.
Additional Approaches:

- Creating reefs from salvaged crab traps

Bears Bluff National Fish Hatchery
Collaboration between SCDNR & USFWS
Reef installed on May 2\textsuperscript{nd}, 2011
Photo taken on July 3\textsuperscript{rd}, 2012 (Ben Stone, SCDNR)
Additional Approaches, cont.:

- Oyster Castles (USACE & TNC): Interlocking blocks of concrete, limestone, crushed shell, and silica.

Sara Corbett (USACE)
When the homeowner asked to place oyster shell along the marsh edge, DHEC-OCRM determined that his upland property is not threatened by erosion.
Project Goals:

- Provide SCDHEC-OCRM with science-based information on the relative effectiveness of different LS approaches under a range of regional site conditions.

- Support the creation of new LS-friendly regulations appropriate for coastal SC’s physical conditions, removing a critical barrier to living shoreline implementation.

- Thereby: Foster an increase in the footprint of living shorelines, protecting SC’s marshes from erosion and habitat loss, while increasing biodiversity and coastal resiliency.
Project Components:

- Construct several reef types at each of 16 experimental sites, representing a range of habitat conditions.

- Monitor: Our project reefs & previously constructed (‘historic’) reefs.

- Prepare living shorelines guidance document for state coastal regulatory agency (SCDHEC OCRM).
Treatment: Bagged oyster shell ("bags")

Boy Scout Camp, July 21st 2016
Treatment: Modified crab traps

Big Bay Creek, July 26th 2016
Treatment: Coir log (coconut fiber)

Coosaw Cut, June 22nd 2016
Treatment: Curlex® (aspen)

Combahee #2, September 21st 2016
Site Type characteristics:

- **Type A**: Successful SCORE program sites (happy oysters); gentle slope; low sinkability.

- **Type B**: Oyster-friendly areas where SCORE reefs have not been successful; steep slope or high sinkability.

- **Type C**: Non-oyster-friendly areas; salinity is too low or too variable.
Site Types x Treatments (experimental design)
<table>
<thead>
<tr>
<th>Site information</th>
<th>Living shoreline treatments</th>
<th>Installation Date</th>
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<tbody>
<tr>
<td><strong>Type</strong></td>
<td>Bags</td>
<td>Bags + pallets</td>
</tr>
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<td><strong>A</strong></td>
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<td><strong>C</strong></td>
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Monitoring

- Monitoring of ‘historic’ reefs will provide data on living shoreline performance over longer-term periods, and on site characteristics that are associated with reef successes/failures.
- Monitoring of project-installed reefs occurs at installation (baseline), and 1- & 2-yrs later.
- All ‘historic’ and ‘project’ reef areas will be compared to adjacent, unaltered control areas.
Monitoring, cont.

- Parameters include:
  - Pre-install: Bank slope & sediment “sinkability”
  - Repeated fixed-point photos
  - Elevation of sediment surface (& sed. comp.)
  - Elevation of mid-reef surface
  - Escarpment position
  - Marsh edge position
  - Stem density transects (perpendicular to shore)
  - % cover of live oysters (for a subset of reef types)
  - Additional data (GIS, salinity, boat traffic, etc.) will also be incorporated.
Hurricane Matthew: Landfall Oct. 8th in SC

Image courtesy of NOAA
Behind Edisto Island, post-Matthew:
Immediately after installation...
Immediately after installation…

Boy Scout Camp, July 26th 2016
... and less than 3 months later.
Post-Matthew:

Curlex treatment:
Both blocs = gone

Morgan Island, Nov 14th 2016
Post-Matthew:

Total loss of Curlex treatment

“Relocation” of coir log

Coosaw Cut, Oct. 17th 2016
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<th>Type</th>
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<th>Crab traps</th>
<th>Coir Logs</th>
<th>Curlex Blocs</th>
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Post-Matthew:

Curlex treatment: “Sock” is gone

Bohicket, Oct 26th 2016
Next steps...

- **Currently:**
  - Monitoring 30 ‘historic’ reefs + data analysis.

- **Spring-Summer 2017:**
  - Install 5 new sites.

- **Fall 2017 - Summer 2018:**
  - Monitor reefs: 16 new sites + 30 more ‘historic’ reefs.

- **Summer-Fall 2018:**
  - Complete data analyses.

- **Fall 2018:**
  - Prepare living shorelines guidance document for state coastal regulatory agency (SCDHEC-OCRM).
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Project team:

SCDNR Field team members:
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- Al Segars

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