North Carolina Coastal Federation
Working Together for a Healthy Coast

Tracy Skrabal- Coastal Scientist
Hierarchy of Erosion Control Options

- No Action
- Relocation of Threatened Structures
- Non-Structural Stabilization Measures (Slope Grading, Marsh Creation, Bio-Engineering, beach nourishment)
- Combination Approaches (Sills, Stone containment cells, breakwaters with plantings)
- Hardening Structures (Groins, Revetments, Gabions, Bulkheads)
Beach Fill- Cape Lookout Lighthouse
Bank Grading, Riparian Buffer/Marsh Creation/Restoration/Preservation

Vegetation planting with bank re-grading

Riparian buffers

Not to scale

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Not to scale

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Biologs

BIO-LOGS BOUND TO WOOD ANCHOR STAKES

LOW MARSH

NORMAL HIGH WATER

NORMAL LOW WATER

STONE TOE SUPPORT AS NEEDED

HIGH MARSH

UPLAND

BIO-LOG SHORELINE

illus. Lara Berkley, B+O design studio, PLLC

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not to scale
Combination/Hybrid Projects
Containment Structures with Plantings

MARSH PLANTS
CONTAINEMT STRUCTURE (I.E. OYSTER BAGS, STONE, LOGS)
NORMAL HIGH WATER
NORMAL HIGH WATER
NORMAL LOW WATER

CONTAINMENT STRUCTURES WITH PLANTINGS
not to scale

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Illustration by Lara Bork, B+O design studio, PLLC
Vertical Sill with Marsh Plantings

From Spencer M. Rogers, Jr., N.C. Sea Grant
Stone Sill with Marsh Plantings
Oyster Shell Patch Reefs/ Domes/ Sills
Marsh Toe Revetments

- Erosion Escarpment
- Normal High Water
- Rock or Oyster Bags
- Normal Low Water

MARSH TOE REVETMENT
not to scale

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Coastal erosion and protection through revetments.
Offshore Breakwaters

Bogue Sound

Reef Balls

Oyster Shell Bag Sill

Stone Sill

Stormwater Wetland

After Restoration
The North Carolina Estuarine Biological and Physical Processes Work Group’s

Recommendations for Appropriate Shoreline Stabilization Methods for the Different North Carolina Estuarine Shorelines Types

North Carolina Division of Coastal Management
August 2006

Table 8-1: Summary of ranking of stabilization methods.

<table>
<thead>
<tr>
<th></th>
<th>Swamp Forest</th>
<th>Marsh</th>
<th>Marsh with Oysters</th>
<th>Marsh with Mudflats</th>
<th>Low Sediment Bank with Marsh</th>
<th>Low Sediment Bank with Swamp Forest</th>
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<tbody>
<tr>
<td>Land Planning</td>
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<td>NR</td>
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<td>Groins</td>
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<td>6</td>
<td>NR</td>
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<tr>
<td>Sloped Structures</td>
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<td>Vertical Structures</td>
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Table 8-2: Summary of ranking of stabilization methods continued.

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<thead>
<tr>
<th></th>
<th>Low Sediment Bank with Sand</th>
<th>Low Sediment Bank with Woody Debris</th>
<th>Low Sediment Bank with Oysters/SAV</th>
<th>High Sediment Bank</th>
<th>Overwash Barrier/Inlet Areas</th>
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<tbody>
<tr>
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<table>
<thead>
<tr>
<th>Shoreline Approach</th>
<th>State of North Carolina (CAMA permit)</th>
<th>US Army Corps of Engineers (federal permit)</th>
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</thead>
<tbody>
<tr>
<td>Bulkheads/Revetments</td>
<td>General Permit</td>
<td>Regional General Permit (RGP80)</td>
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<tr>
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<td>No app/plans, no agency coord., 2 day-1 week approvals</td>
<td>No app/plans, no agency coord., auto approved with state GP.</td>
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<tr>
<td>Living Shorelines (Bank grading/sills)</td>
<td>General permit</td>
<td>Individual Permit- public notice, multi-agency review 90-120 days?</td>
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<tr>
<td>(Option 1)</td>
<td>App/plans, APO notice, 60-90 days</td>
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<tr>
<td>Living Shorelines (Bank grading/sills)</td>
<td>Major CAMA permit- app/plans, multi-agency review 90-180 days</td>
<td>RGP 291 (possible) App/plans, multi-agency review- 60 days?</td>
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<td>(Option 2)</td>
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