

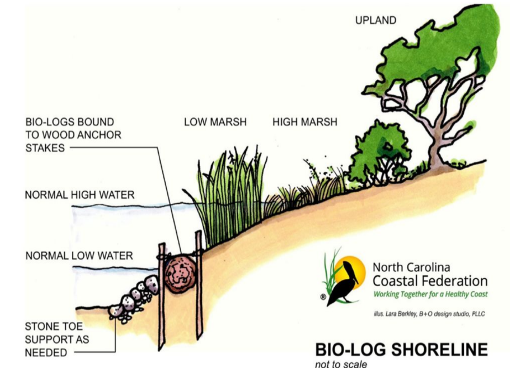
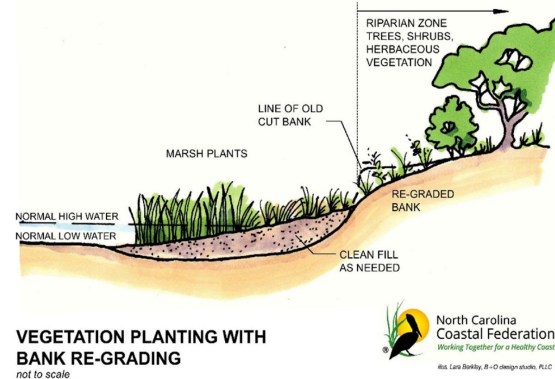
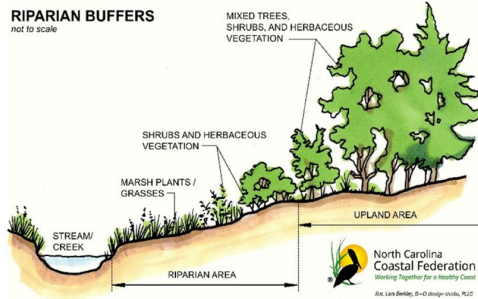


Living Shoreline Design Alternatives

Day 1: Design Options/Small Group Discussion

NON-STRUCTURAL

Riparian Buffer Restoration with Marsh Creation



- Very minor erosion
- Natural shorelines with existing, wide riparian forests, tidal marshes, and/or sand beaches
- Primary cause of erosion is from upland stormwater runoff
- Occasional storm waves cause erosion above existing revetments or bulkheads

- Active erosion at top and toe of bank
- Low cleared banks w/ lawns
- Unstable high banks with undercut or falling trees
- Unstable banks adjacent to tidal marshes
- No adjacent bulkheads, revetments, or upland improvements in close proximity
- Graded slope will receive 6+ hrs of full sun each day
- Low energy with minor wave action or boat wake traffic
- Sandy soils, no excessive muck or clay
- Previously developed or filled area that can be restored

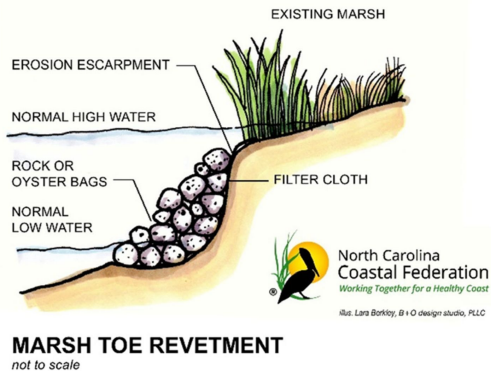
- Marsh restoration areas; planted marshes on tidal coves; very shallow tidal creeks, lakes, and ponds
- Tree removal areas
- Graded or terraced banks under landscape restoration
- Elevations higher than mid-tide level
- Minimal wave and boat wake, not designed to reduce wave energy



Living Shoreline Design Alternatives

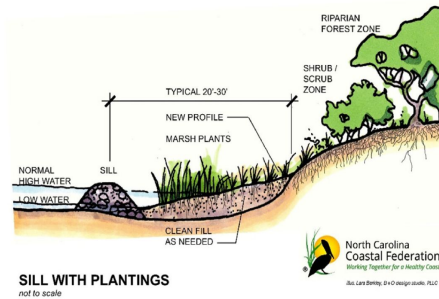
Day 1: Design Options/Small Group Discussion

STRUCTURAL



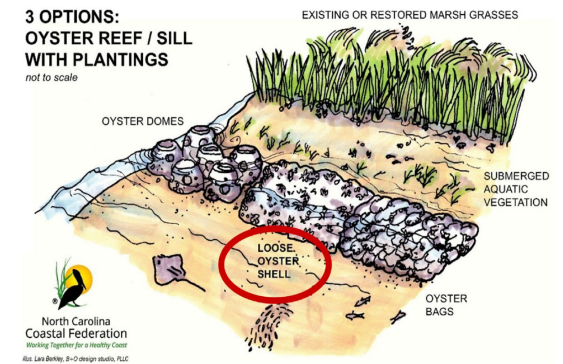
- Existing wide tidal marshes greater than 15 feet
- Marsh edge erosion or minor upland bank erosion
- Very shallow water near marsh edge with hard sand bottom
- Construction access for installation is feasible w/out excessive marsh disturbance

Living Shoreline Sills With Plantings



- Minor upland bank erosion in tidal creeks
- Failed bulkheads/revetments with lawns
- Adjacent to graded banks
- Shoreline receives 6+ hrs of full sun each day w/out removing a large number of trees
- Very shallow water extending a minimum of 30ft offshore with hard sand bottom
- Construction access is feasible and navigation will not be interrupted

SHELLFISH REEFS



- Marsh restoration areas; planted marshes on tidal coves; very shallow tidal creeks, lakes, and ponds
- Tree removal areas
- Graded or terraced banks under landscape restoration
- Elevations higher than mid-tide level
- Minimal wave and boat wake, not designed to reduce wave energy

Adapted from Virginia Institute of Marine Science's website: https://www.vims.edu/ccrm/outreach/living_shorelines/design/index.php. See VIMS website for additional guidelines on implementing each option.

Illustrations Credit: Lara Berkley, B+O design studio, PLLC; North Carolina Coastal Federation