



# NOAA Habitat Conservation

*Conserving Habitat for Future Generations*

## Living Shoreline Permitting Workshop



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**NOAA encourages the use of living shorelines for shoreline stabilization, habitat value and coastal resilience as appropriate on a site-specific basis.**



# Why is NOAA Fisheries Involved in Living Shoreline Projects?



- Most in-water activities including living shorelines projects require federal and state permits.
- A federal action such as a permit generally triggers our consultation requirements under the MSA and FWCA.
- Regional Habitat staff and Restoration Center staff have local knowledge and technical expertise to assist in the development of living shoreline projects



# What is a Living Shoreline?

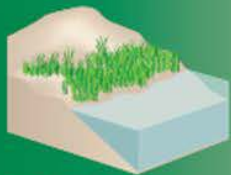


- Living shoreline is a broad term that encompasses a range of shoreline stabilization techniques along estuarine coasts, bays, sheltered coastlines, and tributaries.
- A living shoreline has a footprint that is made up mostly of native material. It incorporates vegetation or other living, natural “soft” elements alone or in combination with some type of harder shoreline structure (e.g. oyster reefs or rock sills) for added stability.
- Living shorelines maintain continuity of the natural land–water interface and reduce erosion while providing habitat value and enhancing coastal resilience.

## GREEN - SOFTER TECHNIQUES

## GRAY - HARDER TECHNIQUES

### *Living Shorelines*



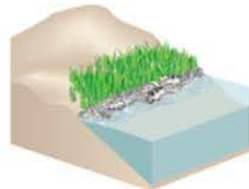
#### **VEGETATION ONLY -**

Provides a buffer to upland areas and breaks small waves. Suitable for low wave energy environments.



#### **EDGING -**

Added structure holds the toe of existing or vegetated slope in place. Suitable for most areas except high wave energy environments.



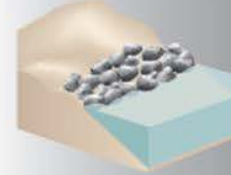
#### **SILLS -**

Parallel to vegetated shoreline, reduces wave energy, and prevents erosion. Suitable for most areas except high wave energy environments.



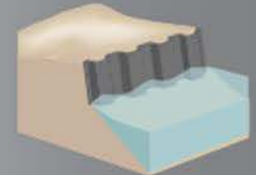
#### **BREAKWATER -**

(vegetation optional) - Offshore structures intended to break waves, reducing the force of wave action, and encourage sediment accretion. Suitable for most areas.



#### **REVETMENT -**

Lays over the slope of the shoreline and protects it from erosion and waves. Suitable for sites with existing hardened shoreline structures.



#### **BULKHEAD -**

Vertical wall parallel to the shoreline intended to hold soil in place. Suitable for high energy settings and sites with existing hard shoreline structures.

This continuum is based on the more detailed continuum in the Systems Approach to Geomorphic Engineering (SAGE) Natural and Structural Measures for Shoreline Stabilization brochure ([http://sagecoast.org/docs/SAGE\\_LivingShorelineBrochure\\_Print.pdf](http://sagecoast.org/docs/SAGE_LivingShorelineBrochure_Print.pdf)).

# NOAA's LIVING SHORELINES GUIDING PRINCIPLES



## We encourage:

- The use of living shoreline techniques to provide, maintain, or improve habitat or ecosystem function and enhance coastal resilience.
- Shoreline protection methodologies that avoid or minimize channel-ward encroachment into subtidal habitat; NOAA does not promote the use of living shorelines as a means for land reclamation.
- Shoreline stabilization using the softest approach feasible, based on site conditions.
- Carefully considering regional and site-specific differences in factors such as wave energy, habitat types, and geologic setting in planning the appropriate living shorelines.



- Early coordination across multiple government and non-governmental entities to discuss site characteristics, history of erosion at a site, and potential challenges for proposed shoreline management approaches.
- Incorporating the best available regional and local shoreline science and practices into the siting, design, construction, evaluation and adaptive management of projects.
- The consideration of ecosystem services provided by a shoreline stabilization approach (such as erosion control and habitat for fish and other living marine resources) in living shoreline project design.



# Living Shorelines Benefits



- Protect land from erosion
- Provide ecosystem functions
  - nutrient and sediment removal
  - nursery areas for fish
  - water quality improvements
  - carbon sequestration
- Provide social benefits
- Can become more stable over time
- Have outperformed hardened shorelines during storm events



# Physical and Ecological Considerations



- What are the physical site conditions?
- What types of natural habitat are present at the site and along adjacent shorelines?
- What is the extent, rate, and cause of the current erosion problem?
- What are the site's slope, orientation, bathymetry, prevailing currents, waves, and fetch?
- Are other hard shoreline stabilization structures adjacent or nearby?

# More Considerations



- Does land loss occur mostly during large storms, or year-round?
- What are the current land and water uses in the area and who owns or manages them?
- How much boat traffic occurs along the shoreline?
- Is the site suitable for planting vegetation as part of a living shoreline project?
- What would be the result if nothing was done to the site?

# Trade-offs and Balancing

- Existing habitat at the project site.
  - Is it a Special Aquatic Site, HAPC?
  - SAV, shellfish, gravel and cobble, spawning area?
- What type of habitat is being proposed?
  - What are the functions and ecological services performed by the proposed habitat?
  - Does this increase the area's value as fishery habitat?





# Are ecologically valuable aquatic habitats or animals living along the shoreline at the site?

Ecologically valuable aquatic habitats include:

- Submerged aquatic vegetation beds.
- Coral reefs, shellfish beds, and oyster reefs.
- Tidal wetland dominated by native species.
- Habitat used by federally threatened or endangered species
- Cobble, gravel, riffle and pool, sand, and mud substrate used as spawning and nursery grounds for NOAA trust resources.

# Think About:

- Sea level rise and climate change.
- Can additional functional habitats be added?
  - Oyster or clam shell bags or marine-safe concrete that encourages shellfish to attach or settle
  - Native seagrass
  - Sandy or cobble beach, mudflats, or other natural shoreline features.
  - Wetlands and/or upland riparian buffers adjacent to a structure.
  - Breaks or openings in any hard structural elements to facilitate natural water flushing and allow aquatic organisms to access nearshore and shoreline habitat (e.g., fish and turtles for upland nesting).

# Assumptions and Misnomers



**Assumption: Living Shorelines projects are all “soft” components.**

The vast majority of living shorelines have a structural component of at least some rock. Some have a lot of rock. Rock has a place in “living shorelines”, and most living shorelines won’t persist without it.

**Assumption: Shoreline Protection Structures are Permanent**

Shoreline management (and structures) is not a static endpoint. Assuming high quality materials used, typical life expectancy of a bulkhead is about 20 years. Rock can be longer, but is also subject to slumping, movement, etc. Living Shorelines projects probably won’t be either, especially in light of sea-level rise

**Assumption: These are “less engineered solutions”**

They typically require at least as much engineering or understanding of what the forcing factors are and how the project components are expected to perform



# Reeling in Expectations

These living shoreline projects are intended to be dynamic. They may accrete or erode slightly, but they are not intended to counter sea-level rise, nor are they sited or intended to migrate considerably (at present).

Living Shorelines do virtually nothing to stop flooding. They can attenuate wave energy, but storm surge is different than wave energy.



<https://www.fisheries.noaa.gov/insight/understanding-living-shorelines>

