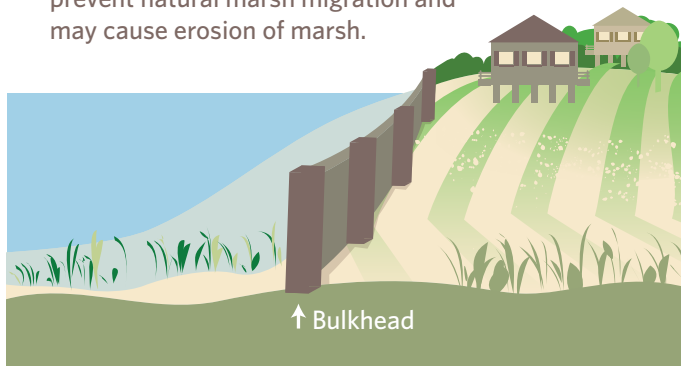


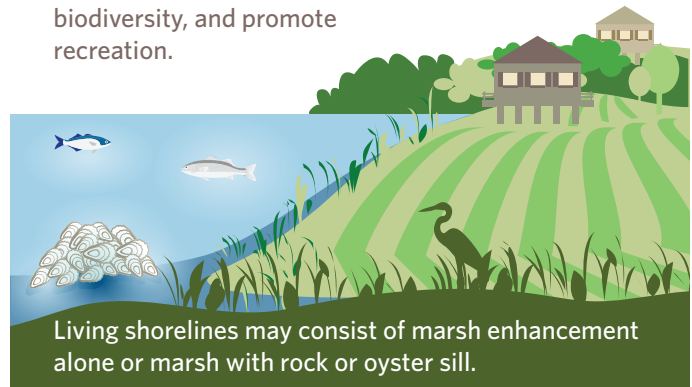
# Living Shoreline Explorer App Fact Sheet

VIRGINIA EASTERN SHORE COASTAL RESILIENCE TOOL

Hard shoreline structures like bulkheads prevent natural marsh migration and may cause erosion of marsh.



Living shorelines improve water quality, provide fisheries habitat, increase biodiversity, and promote recreation.



## What is the Living Shoreline Explorer app?

The Living Shoreline Explorer app in the Coastal Resilience tool shows recommendations for nature-based shoreline stabilization solutions on the Virginia Eastern Shore. Living shorelines seek to control erosion while maintaining ecosystem functions by buffering waves and preserving the connection between marine and terrestrial environments. Field study in Virginia's coastal bays suggests that marsh vegetation and constructed oyster reefs may offer effective and sustainable long-term shoreline stabilization. Measurements show that constructed oyster reefs are effective at dampening waves at low to moderate water levels while marsh vegetation dampens waves at higher water levels by as much as 91%.

Successful implementation of living shorelines depends on site-specific factors; thus, the Living Shoreline Explorer app also includes a marsh vulnerability assessment that illustrates shoreline risk to erosion and inundation based on several factors including wind wave and boat wake exposure, the elevation and shape of the marsh edge, marsh vegetation characteristics, current rate of sea level rise, and moderate intensity storm surge. This assessment illustrates which bio-geophysical variables are most influential and where physical change is most likely to occur.

## Who should use it?

Planners, managers, and property owners can use this app to visualize erosion and inundation risk to shorelines and recommendations for nature-based shoreline stabilization. This information helps support shoreline management, hazard mitigation planning, and restoration plans. However, this app is not appropriate for local siting or permitting decisions without first conducting an in-depth site visit.

## How does it work?

The app displays results generated from the Living Shoreline Explorer Model (LSEM) and the Marsh Vulnerability Index (MVI) model. The LSEM is a spatial modeling tool that considers conditions suitable for the use of soft and hybrid shoreline stabilization methods. The model also considers areas where nature-based solutions are not suitable and traditional hardened structures would be more appropriate. Soft stabilization involves treatments like marsh plantings (i.e., marsh enhancement); hybrid stabilization involves treatments like marsh enhancement with rock or oyster sill (i.e., marsh with structures). The LSEM considers five variables: wind wave and boat wake exposure, the elevation and shape of the marsh edge, and marsh vegetation characteristics.

Illustrations: © Vin Reed/Vin Design

The MVI is a spatial modeling tool which determines the vulnerability of tidal salt marshes to erosion and inundation on the Virginia Eastern Shore. The MVI incorporates high resolution spatial data on eight tidal salt marsh erosion variables: wind wave and boat wake exposure, the elevation and shape of the marsh edge, marsh vegetation characteristics, current rate of sea level rise, and moderate intensity storm surge. Variables are assigned a risk value in the range of 1 to 5 in order of increasing vulnerability and combined via a simple spatial computation to reveal erosion and inundation vulnerability (Equation 1). High-risk shorelines have one, or a combination, of the following characteristics: high exposure to wind waves or boat activity, steep and high marsh platform, short or non-existent vegetation, narrow vegetation buffers, high storm surge impacts and rate of sea level rise.

$$MVI = \left[ \frac{1}{8} (a * b * c * d * e * f * g * h) \right]^{\frac{1}{2}}$$

Equation 1. MVI equation, where, a = wave exposure, b = marsh elevation, c = marsh edge morphology (i.e., slope), d = vegetation height, e = vegetation buffer width, f = boat wake, g = storm surge, and h = relative sea level rise rate.

## What are the strengths and limitations?

Any geospatial computation is dependent on the quality and type of data used. The Living Shoreline Explorer app uses high-resolution spatial data from a variety of sources at different resolutions. The results represent a simplified approach that can be used as a screening tool to assist planners, managers, and property owners in considering nature-based shoreline stabilization options, with the understanding that living shoreline design and placement is complex and requires a site visit for a final determination.

In addition, the MVI and LSEM are designed to predict vulnerability and offer solutions for tidal salt marshes in shallow estuarine environments; therefore, the Living Shoreline Explorer app cannot reliably model the deeper estuarine environment of the Chesapeake Bay or the ocean-facing shoreline of the barrier islands. Consequently, the Chesapeake Bay and Atlantic Ocean-facing shorelines are not represented.

## How is the app being used?

The Living Shoreline Explorer app is being used by natural resource managers on the Eastern Shore to target areas for nature-based shoreline stabilization activities.

## Who helped developed it?

The Living Shoreline Explorer app was developed through a partnership between The Nature Conservancy and the Virginia Coast Reserve Long-Term Ecological Research Program.

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For general info about the Virginia Eastern Shore *Coastal Resilience* project: [coastalresilience.org/virginia](https://coastalresilience.org/virginia)

To access the Virginia Eastern Shore *Coastal Resilience* mapping portal: [maps.coastalresilience.org/virginia/](https://maps.coastalresilience.org/virginia/)

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