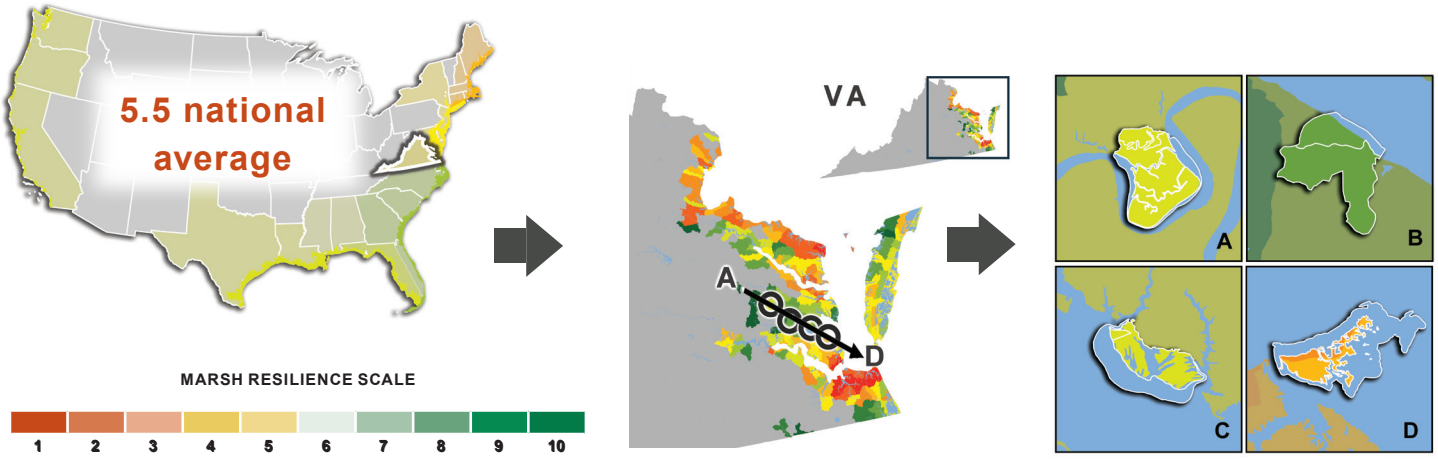

5.2 state average

5.4 reserve average

MARSH RESILIENCE AT THE LANDSCAPE SCALE

How does the Chesapeake Bay VA Research Reserve compare?

The four components of the Chesapeake Bay Research Reserve have resiliency scores ranging from 4 to 8. Their combined average is about equal to the national average and very slightly higher than the Virginia and Mid-Atlantic region averages.

Management recommendations: Taskinas Creek is the most resilient component of the Reserve so lends itself to land protection in undeveloped areas of the watershed. The Goodwin Islands, in particular, provide opportunities for restoration or adaptation projects that plan to improve marsh resiliency.

Current conditions

Marsh resilience depends largely on current composition and exposure to stressors such as development and agriculture.

The Mid-Atlantic ranks lower than the national average due to a large amount of hardened shoreline and high amount of agriculture surrounding marshes. The current condition of tidal marshes in and around the Reserve appear to be on par with the rest of Virginia and the nation, and slightly better than the Mid-Atlantic region. Positively, this area exhibits a relatively high amount of marsh core to edge which is offset by high amounts of surrounding agriculture.

	TOTAL (1 TO 10)
National average	5.65
Mid-Atlantic	4.44
State of Virginia	5.43
Chesapeake Bay VA Reserve	5.60

Vulnerability

Marshes are more vulnerable to sea level rise when more of their vegetation is lower in the tidal frame and they have soils that are likely to erode.

Tidal marshes in and around the Reserve are as vulnerable as marshes throughout the nation, but slightly less vulnerable than marshes elsewhere in Virginia and the Mid-Atlantic. While soils are more erodible than the national average, the amounts of marsh vegetation above the mean tide and mean higher high water levels are relatively large compared to other marshes in the region.

	TOTAL (-10 TO -1)
National average	-5.21
Mid-Atlantic	-6.18
State of Virginia	-6.33
Chesapeake Bay VA Reserve	-5.20

Adaptive capacity

Marshes with more space and fewer barriers to migration have a greater capacity to survive sea level rise.

The capacity for tidal marshes in and around the Chesapeake Bay (VA) Reserve to adapt to future sea level rise is on par with marshes throughout the Mid-Atlantic and the nation, though not quite as good as marshes in the rest of Virginia. Despite less potential migration space, future wetland connectedness is good and the shorelines are slightly more complex than other areas which is also positive.

	TOTAL (1 TO 10)
National average	5.65
Mid-Atlantic	5.16
State of Virginia	6.04
Chesapeake Bay VA Reserve	5.20

CURRENT CONDITIONS | VULNERABILITY | ADAPTIVE CAPACITY

LESS RESILIENT — MORE RESILIENT

ABOUT THIS PROJECT

What do we mean by tidal marsh resilience?

Tidal marshes buffer against storm surge, reduce erosion, fortify upland property, and—together with other wetlands—provide an estimated $23.2 billion in storm protection annually. Marshes also improve water quality, create habitat for fish and wildlife, provide opportunities for outdoor recreation, and boost local economies.

These coastal ecosystems are characterized by hypoxic and saline soil conditions with plant communities that are largely driven by precipitation and flooding regimes. Small changes in these regimes—for example, in inundation duration—can have large impacts on marsh composition. The ability of marshes to resist or recover from such changes is an indication of their resilience. Sea level rise is a significant, long-term disruption that affects most tidal marshes. In this assessment, resilience is an integrative measure of a marsh's capacity to persist as rates of sea level rise accelerate into the future.

Where do the scores and maps come from?

Rankings for tidal marsh resilience to sea level rise at the landscape scale were calculated using GIS-based metrics of current marsh condition, vulnerability to sea level rise, and potential for adaptation. The assessment protocol used standardized comparisons over consistent watershed areas (HUC 12) along all coastal areas that contained salt marshes.

- Current marsh conditions included measures of a marsh's core area compared to its exposed and unvegetated edges and the surrounding impervious, agricultural, and natural land cover. More edges, especially if not vegetated, expose more of the marsh to potential erosion. Impervious and agricultural cover can contribute to runoff and pollutants that degrade marsh conditions, while increased natural cover mitigates those effects. Based on NOAA's Coastal Change Analysis Program (C-CAP) 2011 land cover data.
- Vulnerability included soil erodibility, total tidal range, and the percentage of marsh below mean high water and mean sea level. Marshes are more vulnerable to sea level rise when more of their vegetation is lower in the tidal frame, especially when that frame is not large. Erosion of marsh soils could increase with more frequent inundation. Based on NOAA Sea Level Rise viewer elevation data and NRCS SSURGO soils.
- Adaptive capacity included shoreline sinuosity and armoring (hardening), available space for migration, and future marsh connectedness. The more complex, (sinuous) a shoreline, the more protection it provides, while a hardened shoreline impedes migration. The more connected a marsh is, the higher its adaptive capacity. By combining elevation with projected sea level rise scenarios, we estimate available space for migration. Based on NOAA C-CAP and elevation data combined with Environmental Sensitivity Index (ESI) shoreline data.

NOAA | NATIONAL ESTUARINE RESEARCH RESERVE SYSTEM

SCIENCE & TOOLS FOR COASTAL COMMUNITIES NATIONWIDE

How can I use this information?

To find the detailed scores and supporting data for the marshes in your Reserve or state, visit the Digital Coast. Being able to compare the vulnerability, current condition, and adaptation potential of individual marshes across the country allows users to conduct comparative studies, analyze how watershed and marsh level conditions impact vulnerability, and develop consistent approaches to ensuring tidal wetlands can adapt to sea level rise. The scores are derived from consistent data over broad geographies, making them useful for screening large areas for marshes with particular characteristics, targeting fieldwork and monitoring, and strengthening experimental design. Because they take future conditions into consideration, they can be used to identify marsh restoration and migration pathway conservation opportunities that are cost effective and sustainable for the long term. The results can be used to assess the degree to which site-specific data represents other marshes in the state or region and to prioritize sites for new Reserves or new components of existing Reserves. Used in tandem with other NERRS-based marsh assessment tools, these rankings provide an integrated continuum of assessment to inform efforts to study, restore, or protect tidal marshes at the local, state, regional, and national scales.

What should I keep in mind?

This assessment is based on data from the coastal areas of the lower 48 United States. It does not include the Great Lakes. The results are regional in scope and should be used as screening level information at the local scale. The team has created a framework to perform similar assessments using more detailed local data and information. With high resolution data, the same protocol can be implemented at the local level to inform site specific decision making and support long term marsh resilience strategies.

WHERE CAN I LEARN MORE?

This user-friendly report includes more information about this assessment, its methods, and its results. Project partners include the National Estuarine Research Reserve System, National Oceanic and Atmospheric Administration's Office for Coastal Management, the University of New Hampshire, and the National Estuarine Research Reserve Association.

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