

Marshes for Tomorrow: Responding to Maryland's Tidal Salt Marsh Crisis



Red-winged Blackbird. Photo: Sydney Walsh/National Audubon Society

About Marshes for Tomorrow

The Marshes for Tomorrow project was created in 2023 in response to the salt marsh crisis in Maryland. This initiative aims to maintain a resilient and balanced salt marsh ecosystem by slowing and, where possible, reversing the loss of the marshes.

Marshes for Tomorrow was established as a project of the Delmarva Restoration and Conservation network, a diverse coalition of conservation partners. Initial funding for the planning effort came from the U.S. Fish and Wildlife Service. A grant from the National Fish and Wildlife Foundation expanded the geographic scope of the initiative to include the Maryland Coastal Bays Program.

Audubon Mid-Atlantic is the regional office of National Audubon Society, representing Marylanders who advocate for the protection of birds, bird habitat, and policies aiming to protect both birds and human communities in the face of increasing environmental challenges, habitat loss, pollution, and climate change. We work with partner organizations, government agencies, and local communities to protect birds and the places they need to survive now, and into the future.



Maryland's tidal salt marshes are in crisis. We must respond now or risk losing them forever.

Maryland's tidal salt marshes are an iconic natural habitat that defines our state's cultural identity, but today they are in crisis. Despite their historic significance, tidal salt marshes in Maryland are being lost at an accelerated rate--only 172,000 acres remain. If significant progress is not made in the next 15 years, ***we will risk losing them forever.***

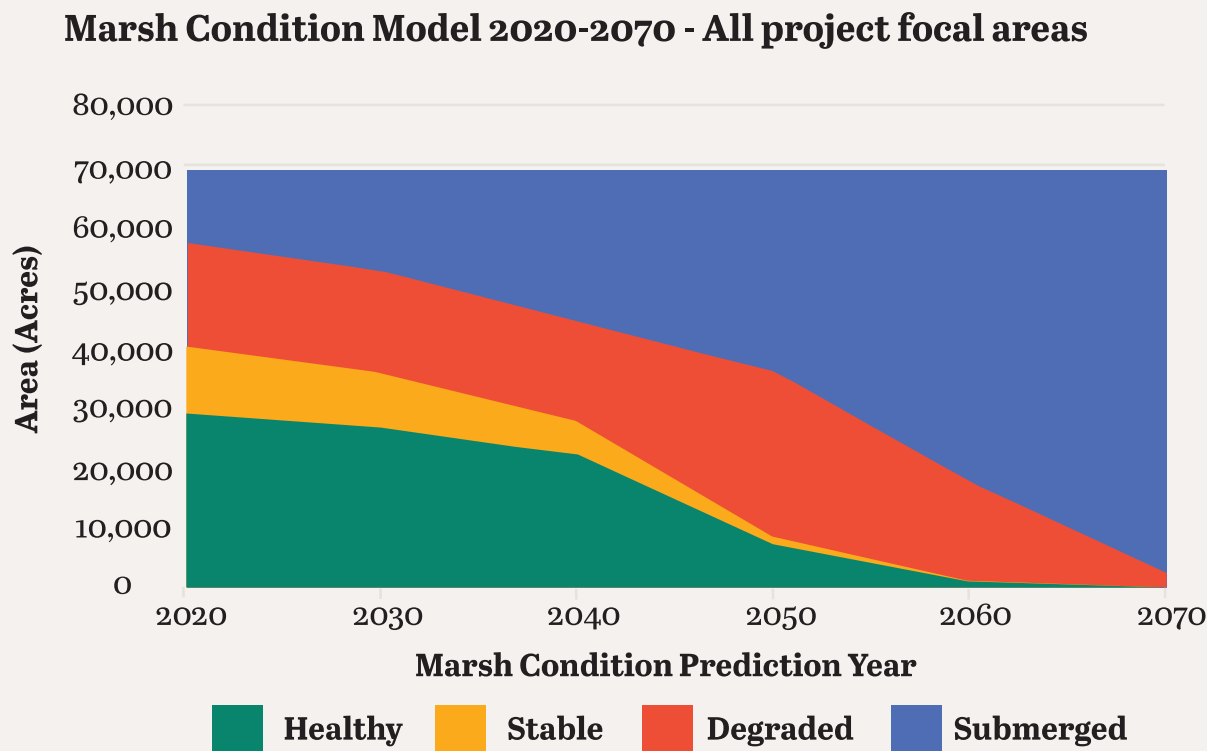
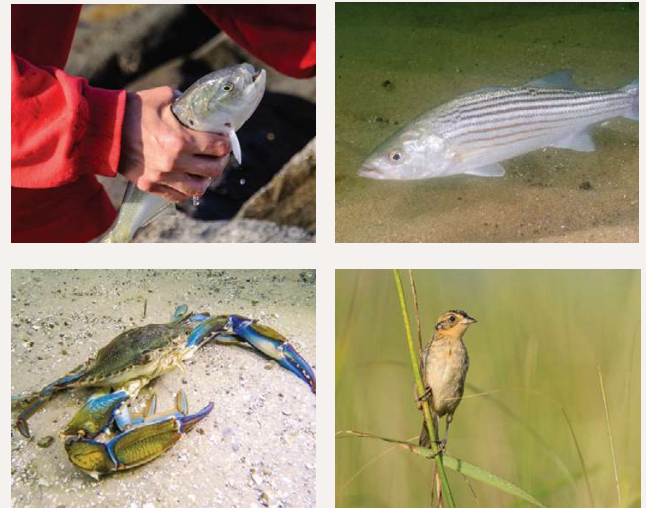


Figure 1. Future projection of marsh acreage by condition class.



Why are salt marshes so important to Maryland?

Our tidal salt marshes are as much a part of Maryland's identity as the blue crab that depends on them. Salt marshes in Maryland support an abundance and diversity of fish and shellfish, invertebrates, waterfowl, and several bird species found in no other habitat type. But the marshes are more than just beautiful wilderness. They are also among our most productive and economically significant natural habitats, supporting commercial fishing, recreation, and tourism; providing storm protection, water filtration, and carbon sequestration; and safeguarding agricultural lands from saltwater intrusion. This adds up to billions in economic impact and thousands of jobs per year.



Pictured (clockwise): menhaden, striped bass, saltmarsh sparrow, blue crab.

Strong Rural Economies. Rural economies depend on industries such as farming (both crops and livestock), forestry, trapping, and more. These industries are dependent on tidal salt marshes acting as a protective buffer from rising waters and saltwater intrusion.

Commercial Fishing. Tidal salt marshes provide nurseries for many significant fish species, supporting the continued viability of commercial fishing in Maryland.

Protection from Storm Surge and Flooding. The unique vegetation structure of salt marshes in the Chesapeake Bay region has the capacity to reduce the energy and destructiveness of storm surges that have intensified due to climate change.

Clean Water. Wetlands and forests help to absorb and store excess nutrients from stormwater runoff, thereby reducing dead zones and improving water quality.

Carbon Sequestration. Tidal salt marshes sequester carbon in the form of peat from decaying plant material. This process, and the vast resulting store of “blue carbon” locked away beneath our marshes, is a beneficial tool in the effort to lower carbon emissions.

Recreation and Tourism. Maryland's tidal salt marshes quite literally provide a protective buffer to Maryland's popular waterfront destinations. They also support a wide range of recreation activities, like trapping, hunting, fishing, birdwatching, and kayaking.



Photo: Sydney Walsh/National Audubon Society

BY THE NUMBERS
Value of Tidal Salt Marsh Ecosystem Services for Maryland (annually)



\$1.8b

Commercial Fishing
Direct Sales



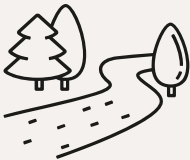
\$600m

Flood Prevention
Ecosystem Services



\$402.6m

Clean Water
Ecosystem Services



\$951m

Outdoor Recreation
State & Local Tax Revenue



\$1b

Agriculture
Economic Impact



\$2.3b

Tourism
State & Local Tax Revenue

The threat: accelerating sea level rise threatens marshes, particularly the *high marsh zone*.

Maryland's salt marshes are more vulnerable than in many other coastal regions of North America because of regional **land subsidence** - when land sinks due to natural and human causes - and patterns of ocean circulation. Additionally, the tidal range across most of the state is less than 1 meter. This is lower than other areas of the eastern seaboard and further exacerbates the impact of sea level rise.

In the past, Maryland's tidal salt marshes have been able to withstand some gradual sea level rise due to a process called **vertical accretion**, where plant matter and trapped sediment raise the level of the marsh. However, today's sea level rise is occurring much too quickly for vertical accretion to keep pace without intervention.

Of particular importance is the **high marsh zone**, which is located above the reach of the daily tides. The high marsh zone is more vulnerable to the impact of rising sea levels. Maintaining adequate high marsh as a proportion of overall marshland is of critical importance to ensuring our marshes continue to provide all of their benefits.

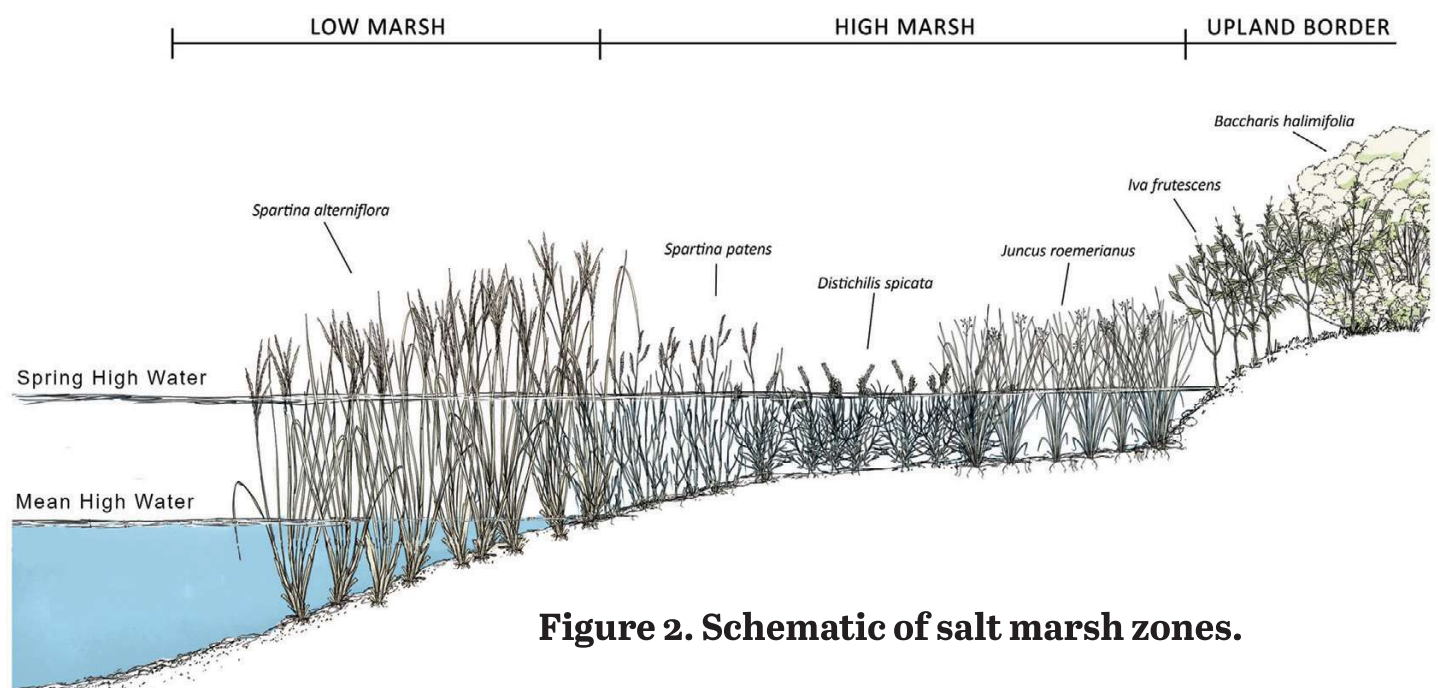


Figure 2. Schematic of salt marsh zones.

The Marshes for Tomorrow strategy aims to slow the predicted rate of marsh deterioration and to enable the use of cost-effective interventions that are only available while significant portions of marshland are still healthy.

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Maryland's **Priority Marsh Areas (PMAs)** are areas of high marsh zone located within five focal areas in Dorchester, Somerset, and Worcester counties.

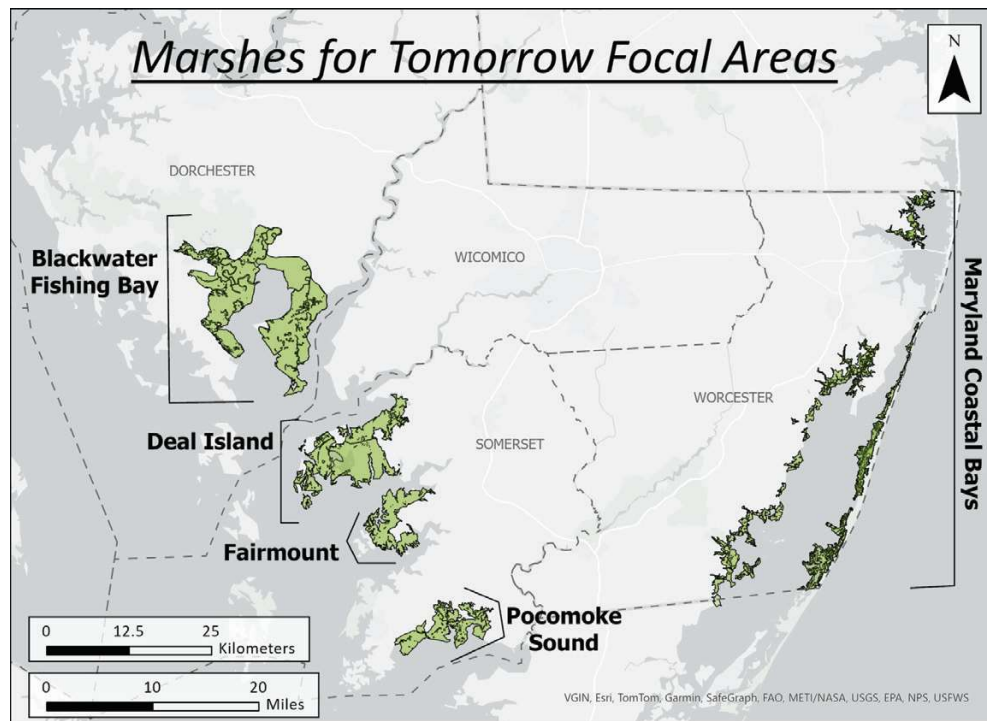


Figure 3. Map of Marshes for Tomorrow focal areas.

They represent a consensus view of environmental scientists and community stakeholders about which marsh areas are simultaneously most vulnerable and present the best opportunity for immediate, cost-effective conservation.



Saltmarsh Sparrow. Photo: Will Parson/Chesapeake Bay Program

The high marsh zone provides nesting habitat for specialized bird species like the **Saltmarsh Sparrow**. This species breeds only in this habitat and is at risk of extinction in less than 30 years due to increased flooding of its nesting site. A major portion of the Saltmarsh Sparrow's breeding population lives in Maryland's high marsh zone. The Marshes for Tomorrow goal of maintaining 30,000 acres of high marsh over the long-term is believed to be sufficient to protect this bird from extinction in Maryland.

Now is the critical time to save Maryland's tidal salt marshes.

Accelerating sea level rise means we will soon lose the rest of our marshes unless we act to conserve and restore them. Without intervention, we will see even more rapid loss of high marsh after 2040 - only 15 years from now - and, by then, there will be fewer cost-effective options available for restoration.

In other words, the longer we wait to act, ***the cost to save our marshes will increase, and our chances of success will decline.***

But if we act now, a significant percentage of priority marshes can still be conserved using lower-cost hydrological repair methods. These methods can buy precious time by maintaining the health and elevation of the marsh and extending the period before which sediment placement, a far more expensive practice, is needed to restore marsh elevation.

Restoration Options

Hydrological Repair. Hydrological repair refers to strategies that improve degraded marshes by modifying water flow patterns. When implemented early, it is a cost effective way to drain trapped flood waters, preventing vegetation dieback and marsh surface collapse. Hydrological repair strategies include runneling, ditch remediation, tidal restriction mitigation, and tidal creek extension.

Sediment Placement. Where marshes have lost elevation due to subsidence or sea level rise, the only way to restore marsh to a high marsh condition is to add sediment to raise its elevation. Sediment placement is an expensive and high-tech restoration practice and is limited by cost and availability of suitable material. Dredged material is the main source of sediment used in marsh restoration, and thus, sediment placement is usually limited to the vicinity of existing dredging operations. Additionally, replanting the applied sediment with high marsh plant species is usually necessary to establish the desired marsh vegetation, adding to restoration costs.

**\$4,657
per acre**

Estimated cost of
hydrological repair

**\$52,000-
\$182,432+
per acre**

Estimated cost of
sediment placement

Marshes for Tomorrow: Policy and Funding Toolkit

-  **Define “ecological restoration” in Maryland state law**
-  **Utilize Maryland’s Climate Implementation Plans**
-  **Increase access to dredge material**
-  **Permitting reform to streamline restoration approval**
-  **Support for community-led advocacy**

Marshes for Tomorrow: Policy and Funding Toolkit

To move quickly to save priority marsh areas (PMAs) in the high marsh zone, Maryland must move towards a coordinated, centralized approach that plans for and funds a systematic program of tidal salt marsh conservation.

Great work is already being done in Maryland including by the Maryland Department of Natural Resources (DNR), the Maryland Department of the Environment (MDE), and their stakeholder partners. Policy support moving forward will build on this work.

Defining “ecological restoration” in state law. To build the basis for a consistent, comprehensive statewide approach to tidal marshes and other ecological restoration projects, an official state definition of this term should be legislated. The definition should specify that ecological restoration includes:

Activities undertaken with the goal of recovering, re-establishing, or enhancing a degraded, damaged, or destroyed ecosystem through:

1. improvements to physical, chemical, or biological characteristics or processes;
2. returning natural or historic functions or services; or
3. protecting or improving resiliency

Utilize Maryland Climate Implementation Plans. Salt marsh restoration should be included in official Climate Implementation Plans as well as state efforts by MDE, DNR, and others involving natural climate solutions, resiliency planning, natural resource management, and watershed protection.

Increase access to dredge material. This is important given the urgency of threats to salt marshes and the limited supply of dredge material available for restoration.

- Priority Marsh Areas (PMAs) should be prioritized to receive dredged material for beneficial reuse. This requires increased coordination between the U.S. Army Corps of Engineers, DNR, MDE, and the Maryland Port Administration (MPA).
- The Maryland General Assembly should establish a **Restoration Dredging Pilot** project to develop novel sources of sediment for use in restoration. This is particularly important for restoration sites that are distant from existing navigation dredging operations. Potential sources include nearby deteriorating marshes and nearby agricultural fields. Lessons learned from this pilot project would inform recommendations for permitting reform.

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- Maryland and federal partners should remove limitations that prevent dredge material from being moved across state lines and allocate funds to transport it. In many cases, dredge sites in Virginia are the closest available sites to PMAs, so this would reduce overall transportation costs.

Permitting reform. Maryland should create a streamlined permitting track for ecological restoration projects including salt marsh restoration, and support timely and accelerated permitting of ecological restoration projects. This will require additional review capacity at MDE and DNR.

Support for community-led advocacy. Small organizations, local governments, and underserved and overburdened coastal communities are potential sponsors for ecological restoration projects.

- Alternatives to matching fund requirements for federal and other grant sources should be provided to remove barriers to their participation.
- Additionally, Local Resiliency Authorities should be established and funded to enable communities near salt marshes to identify climate threats and work with government to achieve sustainability and resiliency goals.

Funding Sources for Salt Marsh Restoration

The following sources of funding are critically important to scaling up marsh restoration efforts in Maryland. These programs will need to be fully funded with allocations for annual increases in line with inflation. In particular, the **Chesapeake and Coastal Grants Program** is a high priority program that is in turn funded by DNR's Waterway Improvement Fund (WIF) and other sources (for ex., the Atlantic Coastal Bays Trust Fund and the Shoreline Erosion Control Revolving Loan Fund).

- Maryland Port Authority - Dredged Material Management Program
- Maryland DNR - Critical Areas Commission
- Maryland DNR - Program Open Space
- Maryland DNR - Waterway Improvement Fund
- Maryland DNR - Rural Legacy Program
- Whole Watershed Act funding
- Maryland Sea Grant Wetland Reserve Program

Conclusion

As we look to ramp up efforts to save Maryland's iconic salt marshes, public sector champions at the local, state, and federal levels will be critical. Continued collaboration between federal and state agencies to help align habitat and climate goals which will, in turn set policy and funding priorities. A unified vision will ensure that disparate sources of funding can be effectively stitched together to achieve Marshes for Tomorrow's ambitious and necessary restoration goals.

By prioritizing restoration, implementing effective strategies, and fostering partnerships, we can protect these valuable resources for future generations. This comprehensive approach seeks to preserve Maryland's high marsh ecosystem, maintain biodiversity, and support community resilience against climate change.



Marsh Prioritization System

Marshes for Tomorrow developed a **Restoration Decision Model** which focuses on the role of marsh elevation in relation to tide and marsh health. The Restoration Decision Model provides a quantitative, geomorphic assessment, at the marsh unit scale, of restoration actions likely to be needed to restore and maintain high marsh as habitat for the Saltmarsh Sparrow.

Using this model, Marshes for Tomorrow identified and mapped 29,140 acres of Priority Marsh Areas (PMAs) across four Focal Areas in Dorchester, Somerset, and Worcester Counties.

The Prioritization Model assigned a score from 31-100 to each marsh unit in the Focal Area. The range of scores was divided into five equal categories to yield five prioritization tiers for mapping, with Tier 1 representing the highest priority marsh units.

The model was mapped and added to the Marshes for Tomorrow Experience Builder.

Marshes for Tomorrow Experience Builder

The Experience Builder was created to present the spatial models developed for the project in the Chesapeake and Coastal Bay regions in Maryland.

- **Marsh Condition Model:** a landscape-scale assessment of the ecological and geophysical condition of marshes and their level of resilience to sea level rise.
- **Restoration Decision Model:** an assessment of the restoration actions likely to be needed to restore and maintain high marsh as healthy habitat for Saltmarsh Sparrows.
- **Prioritization Model:** Identifies “Priority Marsh Areas” within the project focal geographies, for long-term maintenance.

The Experience Builder is available to the public online at:

<https://tinyurl.com/yuje4b3d>





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Photo: Sydney Walsh/National Audubon Society