

Conserving Maryland's Wetlands in a Changing Climate using the Sea Level Affecting Marshes Model

Overview

Maryland has already experienced the loss of 13 Chesapeake Bay islands and approximately 580 acres of shoreline to erosion and sea level rise. Maryland Department of Natural Resources (MDNR) is currently working in partnership with Maryland Department of the Environment (MDE) to implement wetland restoration and conservation programs to protect the State's remaining coastal wetlands. A key tool used in this effort is the Sea Level Affecting Marshes Model (SLAMM) that targets coastal wetland areas and conservation projects that allow for the migration of wetland habitat. This effort helps maintain the indispensable ecosystem services wetlands provide and increases ecosystem resilience to climate change.

Background

With a projected relative sea level rise twice the global average, Maryland's coastal wetlands are particularly vulnerable to episodic storms and inundation. Under Maryland's *Climate Action Plan*, both MDNR and MDE were responsible for establishing procedures to address the following statewide adaptation priorities:

- To identify high priority wetland protection areas, and strategically and cost effectively direct protection and restoration actions to preserve the key ecosystem services of wetland systems.
- To develop and implement a package of appropriate regulations, financial incentives, outreach, and enforcement approaches to retain and expand forests and wetlands in areas suitable for long-term survival; and
- To promote and support sustainable shoreline and buffer area management practices.

To better understand the projected impacts of sea level rise on the State's coastal wetland system, MDNR used the [Sea Level Affecting Marshes Model \(SLAMM\)](#) to predict wetland migration and ecosystem vulnerability. SLAMM is an open-source model that uses data to simulate potential impacts of long-term sea level rise on wetlands and shorelines. Maps display the

Program Partners: Maryland Department of Natural Resources (MDNR), Maryland Department of the Environment (MDE), NOAA

State Agency Contact: Kelly Collins, MDNR, (410) 260-2912,

kelly.collins@maryland.gov

Project Date: 2012



distributions of wetlands predicted under conditions of accelerated sea level rise, and results are summarized in tabular and graphical form.

Using SLAMM to Identify Ecological Areas for Protection and Conservation

As part of the effort to determine wetland response to sea level rise, MDNR staff modeled the wetlands system across the State using SLAMM. The assessment incorporated data on wetland size and location, surrounding buffers, and ecosystem connectivity in the model. SLAMM was used to help identify:

- Wetland areas with the highest potential to aid in adaptation if sea level rises a meter per century;
- Corridors and large wetlands that are important for habitat connectivity;
- Wetland types most at risk to better preserve diversity and function;
- Potential new wetland areas and transition zones; and
- High priority wetlands based on size and ecological importance.

MDNR also used the results to develop specific criteria for identifying and maintaining high priority conservation areas in the future. MDNR looked for overlap of high priority areas across all criteria, as well as high priority areas in SLAMM that aligned with high

priority habitats identified by the Blue Infrastructure Assessment (which focuses on protecting water infrastructure across the State) and lands promoting connectivity under the Green Infrastructure Assessment. (Figure 1)

The SLAMM results helped integrate sea level rise impacts to wetlands as a key component in Maryland's overall priorities for conservation. Projected new wetland areas for the years 2050 and 2100 based on the SLAMM study provide insight into potential future wetland migration zones. These areas were included in Maryland's [GreenPrint](#) mapping system that displays lands and watersheds of high ecological value designated as conservation priorities by MDNR. Maryland's GreenPrint initiative identifies the most ecologically valuable areas in the State and defines these locations as "Targeted Ecological Areas" (TEA) for conservation. In 2011, MDNR updated the TEA designations to include coastal ecosystems, habitats for climate change adaptation and marsh migration, and areas supporting fisheries. Trainings on GreenPrint have been held with State land managers and conservation planners to share the new tools and datasets, and apply them in current land conservation targeting and review processes.

The State is also considering the identified high-priority areas in their land conservation planning and parcel-level reviews to support climate change adaptation. Information obtained from SLAMM was integrated into parcel scoring assessments by the MDNR Land Acquisition and Planning Unit to identify conservation priorities when targeting State land conservation and acquisition projects. Results and data layers from the model were also incorporated into the GIS-based [Maryland Coastal Atlas](#) (to encourage land trusts to integrate sea level rise adaptation into their coastal conservation efforts) and the Estuaries Wetland Change Tool (to show the percentage of each county classified by wetland type and how they may change by 2100 with sea level rise).

Maryland is currently working on preserving wetlands through their easement programs and now include regulations for development and mitigation within the identified wetland migration corridors. Conserving high-priority areas will enable habitats to shift inland naturally and preserve places for wildlife to seek refuge as climate conditions change.

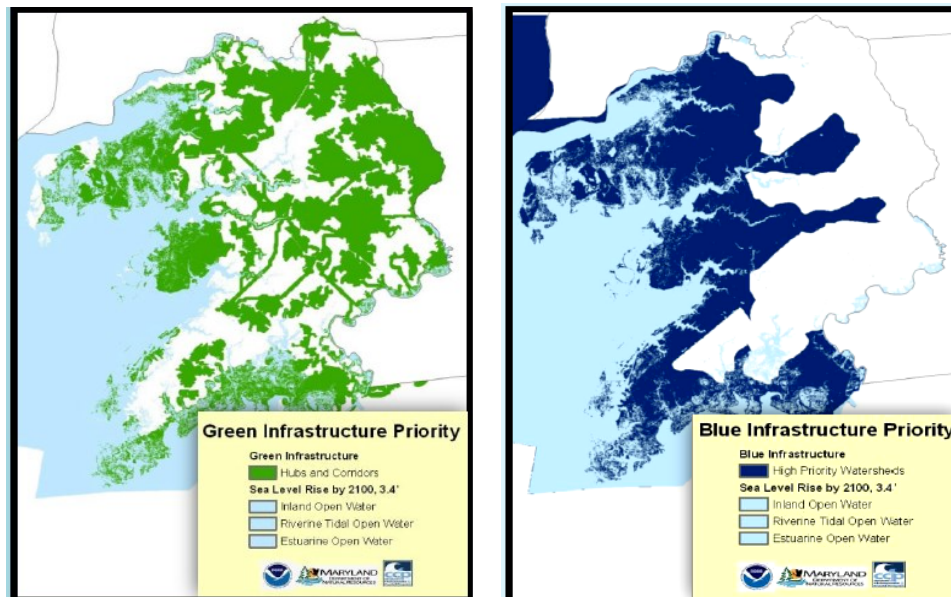


Figure 1. These maps are outputs of SLAMM that display high priority nearshore wetlands coincident with the green infrastructure network and high-priority watersheds identified in the blue infrastructure analysis, given sea level rise projected for 2100 in the Chesapeake Bay and a portion of Maryland's Eastern Shore.