Impacts to Wetlands and Submerged Aquatic Vegetation (SAV)

Marshes in the Chesapeake Bay are currently threatened by slow, continual erosion, periodic storm event erosion, human development and sea level rise.

Sea level rise is a significant pressure, and where human development impacts the shoreline, marshes are being squeezed between shoreline development and rising tides. This is predicted to result in a loss of approximately 40% of marshes by 2100[1].

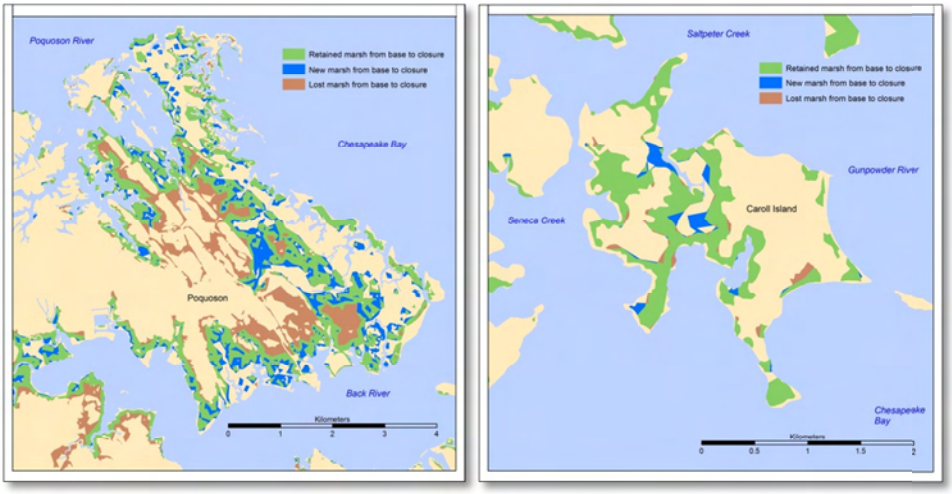
Given the number of narrow, fringing marshes in the Chesapeake Bay, the loss of even a linear meter of shoreline through erosion or sea level rise can significantly impact total marsh acreage, and the resulting, narrower marshes are less resistant to periodic erosion.

The Chesapeake Bay and its tributaries (MD and VA) have approximately:

- 27,438 ha of Salt Marsh
- 123,651 ha of Brackish Marsh
- 26,345 ha of Tidal Freshwater Marsh

Marsh communities are controlled by both inundation and salinity level. Marshes typically grow between mid-tide and spring tide elevations, with an expanse of mudflat occupying the low to mid-tide elevations. Extensive marshes are found throughout the Bay; however, marshes have been lost over the past century to shoreline erosion and shoreline protection efforts.

Closing the mouth of the bay affects tide range, which then shifts the appropriate habitat to new areas. The model shows a loss of approximately 10% of total marsh area.



Marsh locations are shown before and after changes in water level due to closure of the mouth of the Bay at a site in Virginia (left) and Maryland (right).

Prepared by SEES Research team

1. DM Bilkovic, C Hershner, T Rudnicky, K Nunez, D Schatt, S Killeen and M Berman. 2009. Vulnerability of shallow tidal water habitats in Virginia to climate change. Report. http://ccrm.vims.edu/research/climate_change/index.html

Impacts to Wetlands and Submerged Aquatic Vegetation (SAV), cont'd

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There are many species of SAV in the Bay; however, there are only two species capable of living in the higher salinity zones: eelgrass and wigeongrass.

Eelgrass (*Zostera marinia*) distribution has declined over time in the Bay; beginning with a wasting disease in the 1930's and then followed by impacts from large storm events and increased turbidity and pollution in the middle of the 20th century. Despite restoration efforts, the eelgrass population has never recovered in many areas of the Bay and its tributaries.

Eelgrass is particularly sensitive to low light and high nutrient conditions. In turbid waters, eelgrass cannot photosynthesize sufficiently to thrive. In areas with high nutrients, excess epiphytic algal growth coats the eelgrass, also reducing photosynthesis. Where the two conditions occur in concert, the impacts to eelgrass are multiplied.

Eelgrass can help stabilize sediments, reduce turbidity, and serves as a nursery habitat to many prey and fishery species (including blue crabs). Loss of eelgrass beds are expected to resonate up the food chain.

Stresses related to climate change that affect eelgrass survival include:

- Increased frequency and duration of high summer water temps, > 30°C (86°F)
- Increased rainfall = Increased runoff of sediments and nutrients = Decreased light availability
- Light requirements of eelgrass increase with increasing temps
- Increased storm intensity and frequency
- Increased water level or shoreline hardening = declines in habitat area

A massive bay-wide decline in SAV populations was observed during 2005 due to high summer temperatures (>30°C)