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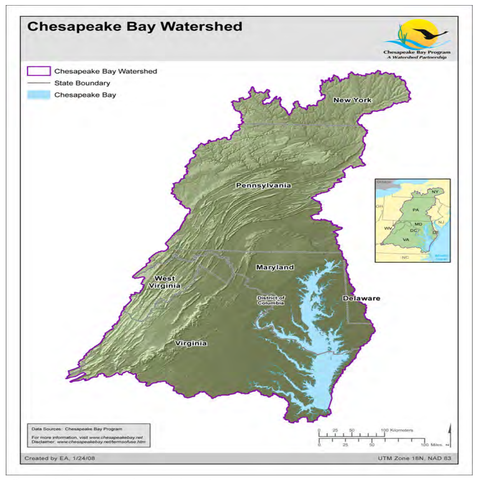
Anthropogenic and Climate Change Impacts on Tidal Wetlands and Fisheries in the Chesapeake Bay

Chesapeake Bay Program

The Chesapeake Bay Program (CBP) is a partnership composed of state and federal agencies, nonprofit organizations, local governments, and academic institutions that work together to lead Chesapeake Bay Watershed restoration and protection efforts.

The CBP's work is driven by the 2014 Watershed Agreement which targets specific outcomes to progress watershed restoration and protection of people, fish, and wildlife.



Chesapeake Bay Program, chesapeakebay.net

Tidal Wetlands

Tidal wetlands are extremely valuable resources, providing a wealth of economic and ecological services. However, they are disappearing due to a number of anthropogenic and climatic change impacts.

Conversion and development threaten tidal wetlands from the land while sea level rise, changes in water salinity, and changes in storm frequency and intensity all threaten tidal wetlands from the water, essentially squeezing this habitat from both sides and reducing its capacity to migrate.

Current Efforts

A number of agencies and organizations in the region are currently addressing the loss of this habitat through research, monitoring, restoration, and conservation efforts.

To help make the best use of these efforts and ensure a sustainable approach to tidal wetland management in the Chesapeake Bay watershed, members of the CBP are designing a project to **conduct a synthesis** of tidal wetland research performed by organizations within the watershed in order to **identify important trends** and **form recommendations** to provide to targeted audiences in the watershed.

Emerging Wetlands and Shorelines Research

Our initial synthesis of relevant research begins with a NOAA-funded multiple year study conducted by eight institutions. The study evaluated the impacts of shoreline hardening and land use on nearshore habitats in the Chesapeake Bay watershed, by comparing shoreline types (natural, beach, hardened) in bays and sub-estuaries with differing land use types (forested, agricultural, and developed).

The results of these studies, detailed in the following sections, in conjunction with other relevant studies will serve to provide the basis for our project and outreach efforts.

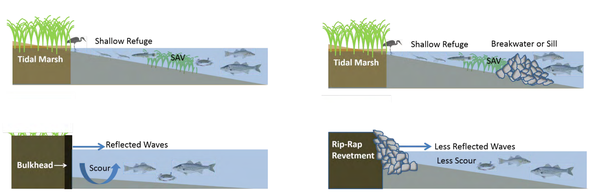



Photo Credit: CBP, Will Parson

Benthic Study

Benthic survey sampling occurred in 14 sub-estuaries throughout the Chesapeake Bay, adjacent to hardened (bulkhead/riprap) shorelines and natural (beach, marsh) shorelines. Sampling results found natural habitats had higher abundance, biomass and diversity than developed sites. Benthic monitoring before and after living shoreline construction found living shorelines mimic marsh 2 and 3 years following construction with higher benthic biomass than control sites.

SAV

The study found that submerged aquatic vegetation (SAV) abundance, diversity, and density are less in watersheds dominated by agriculture and developed land. SAV recovery and abundance seem to be both stronger in sub-estuaries with little shoreline armoring (<5%). SAV abundance is greater near forested shorelines and is less near marshy shorelines. SAV in the polyhaline region of the Bay are affected by shoreline and watershed land use stressors more strongly than SAV in areas with lower salinities.

Fish and Crab Study

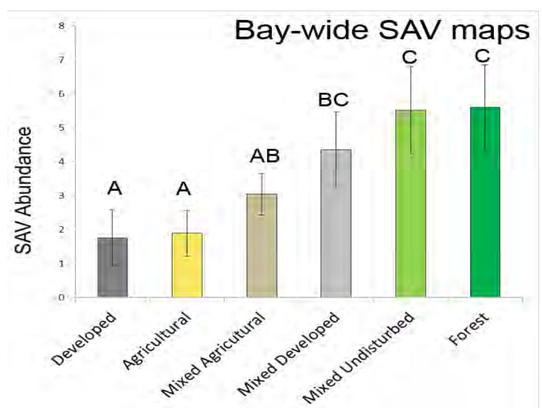
Abundance patterns for 16 species were examined in areas adjacent to the shore. 9 of the 16 species tested had a positive relation to wetlands, and a negative relation to hardened shorelines. Bulkhead and riprap shorelines were found to have fewer small demersal species. High percentages of cropland were correlated with declines in blue crab, spot and Atlantic croaker.

Phragmites

Invasive phragmites abundance in wetlands were found to be highest in developed and agricultural watersheds. Modified shorelines, such as those with agricultural land use and shoreline hardening had a greater number of phragmites genotypes, thus fueling the spread and increasing phragmites abundance.

Water Quality

The study found that total Nitrogen and Chlorophyll increases with an increase in watershed crop and urban developed land use and that total Phosphorus increases with an increase in watershed crop land use.



Impacts of Shoreline Hardening and Watershed Land Use on Nearshore Habitats

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