Chesapeake Bay Habitat Tool

Assessing protection and restoration opportunities

Michelle Canick, The Nature Conservancy, mcanick@tnc.org; Erik Martin, The Nature Conservancy, emartin@tnc.org
Dave Jasinski, Chesapeake Environmental Communications, dave@chesapeakedata.com

Introduction

The Chesapeake Bay Habitat Tool is a collaborative effort among NOAA, The Nature Conservancy (TNC), and Chesapeake Environmental Communications (CEC). It provides a Bay-wide framework to guide conservation of in-water and nearshore habitats. Features include:

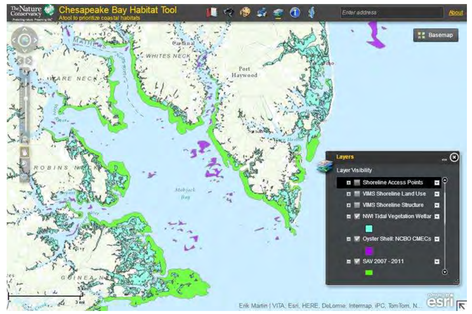
- Web-based map
- New benthic data layers
- Custom analyses tool

The Habitat Tool provides spatial context for Chesapeake Bay conservation. Potential applications include:

- Developing place-based habitat conservation plans to meet multiple objectives.
- Identifying places where natural infrastructure can support resiliency.

Web Map Layers

Data Layer	Source	Short Description
Fish Passage	TNC	Prioritized based on potential benefit to diadromous fish
Shoreline Inventories	VIMS	Shoreline access points, land use, and hard structures
Tidal Vegetated Wetlands	USFWS	Subset of National Wetland Inventory data
Oyster Shell	NOAA, NCBO	Biogenic or anthropogenic shell representing potential oyster habitat
SAV 2007-2011	VIMS	Submerged aquatic vegetation from 2007-2011 annual surveys
Wetland Restoration Default Prioritization	TNC	Based on migration potential, fetch, land use, adjacent oyster bars & SAV, % impervious
Wetland Restoration Input Cells	TNC	250 m x 250 m grid cells within 2 meters above or below mean sea level
Watersheds	USGS	HUC12 and HUC8 watersheds from NHD
Fish persistence	CEC	How consistently a species is present
Water Quality	CEC	Temperature, pH, salinity, dissolved oxygen
Ecological Marine Units	CEC	Combinations of DO, % mud, depth, and salinity, with thresholds defined by benthos
Percent mud	TNC	Percent mud in surficial sediments
Bedforms	CEC	Combinations of seabed topographic position and slope
Bathymetry	CEC	Refined 30 meter bathymetric DEM

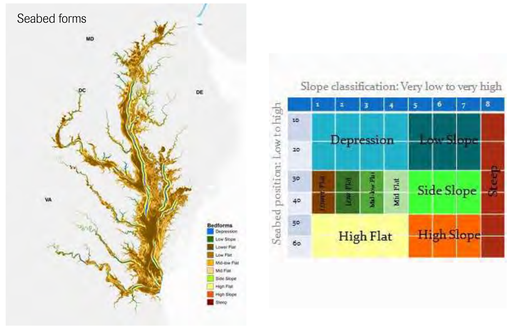


Screen shot of web map

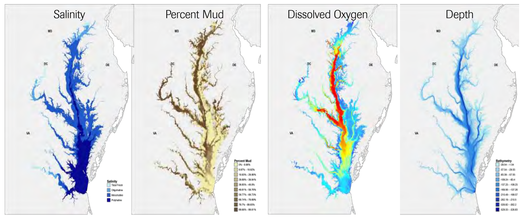
Benthic Classification

New datasets were developed to describe the heterogeneity of benthic conditions and habitats. Layers include:

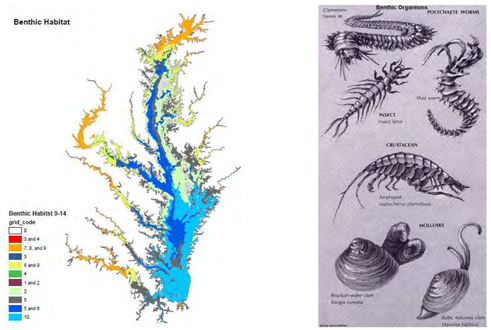
- Improved bathymetry
- Seabed forms
- Ecological Marine Units (EMUs)
- Benthic habitats



Seabed forms are combinations of slope and relative position calculated from bathymetry.



Chesapeake Bay EMUs are unique 4-way combinations of salinity, % mud, dissolved oxygen, and depth. Class breaks are derived from the distribution of benthic communities [1].



Benthic habitats group EMUs that share close affiliations with the same benthic communities.

Prioritizing Wetland Restoration

Potential tidal wetland restoration opportunities are represented by a grid of 250 m^2 cells located within 2 meters above or below mean sea level. The default scenario prioritizes opportunities based on:

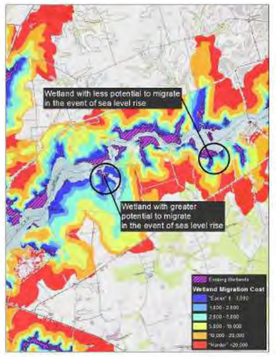
- Shoreline condition
  - Percent natural land cover within 100 meter buffer
  - Dominant land cover/land use within 100 meter buffer
- Proximity to other priority habitats
  - Area of submerged aquatic vegetation within 500 meters
  - Area of potential oyster habitat within 500 meters
- Sea level rise considerations
  - Wetland migration potential (see details below)
- Landscape context
  - Percent impervious surface in HUC 12 watershed

Screen shot of wetland restoration default prioritization

Wetland migration potential

Chesapeake Bay waters are predicted to rise 1.3 to 5.2 feet over the next 100 years[2]. The ecological benefits of wetland restoration will persist longer in areas where marshes can migrate inland or upstream as needed. Migration potential was modeled as a cost surface based on:

- Elevation (lower elevation = lower cost)
- Land cover/land use (more natural = lower cost)
- Distance to existing wetlands (closer = lower cost)



Custom Analyses

Users can create custom wetland prioritizations by choosing metrics, weights, and sort orders specific to their goals. The Habitat Tool provides:

- Ecologically relevant metrics
- User-friendly analysis interface
- Analysis results as map layers
- Separate tabs for wetland restoration and protection

Conclusions

- Opportunities exist to coordinate the conservation of multiple habitats in key areas.
- Conservation opportunities vary in potential and depend on specific conservation objectives.
- The bottom of the Bay is not homogeneous, but it is difficult to quantify benthic habitat quality with available data.

Literature Cited

1. Anderson M, Greene J, Morse D, Shumway C, Clark M. 2010. Chapter 3: Benthic Habitats from Greene JK, Anderson MG, Odell J, Steinberg N, eds. 2010. The Northwest Atlantic Marine Ecoregional Assessment: Species, Habitats and Ecosystems. Phase One. The Nature Conservancy, Eastern U.S. Division, Boston, MA.
2. Climate Change FAQs. Retrieved October 22, 2014, from http://www.chesapeakebay.net/issues/issue/climate_change#inline

Acknowledgments

This tool was prepared by The Nature Conservancy under award NA10NMF4630081 from National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce. The statements, findings, conclusions, and recommendations are those of the author(s) and do not necessarily reflect the views of the NOAA or the U.S. Department of Commerce.