Mapping Ecosystem Services: Examples from Chesapeake Tools and Projects

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Chesapeake STAC Ecosystem Services Workshop
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U.S. Department of the Interior
U.S. Geological Survey

From the workshop purpose…

- *… gain insights into the specific Ecosystem Services and use cases that are most important and provide recommendations for a strategic plan to more effectively use Ecosystem Services to address multiple CBP outcomes through 2025 and beyond.*

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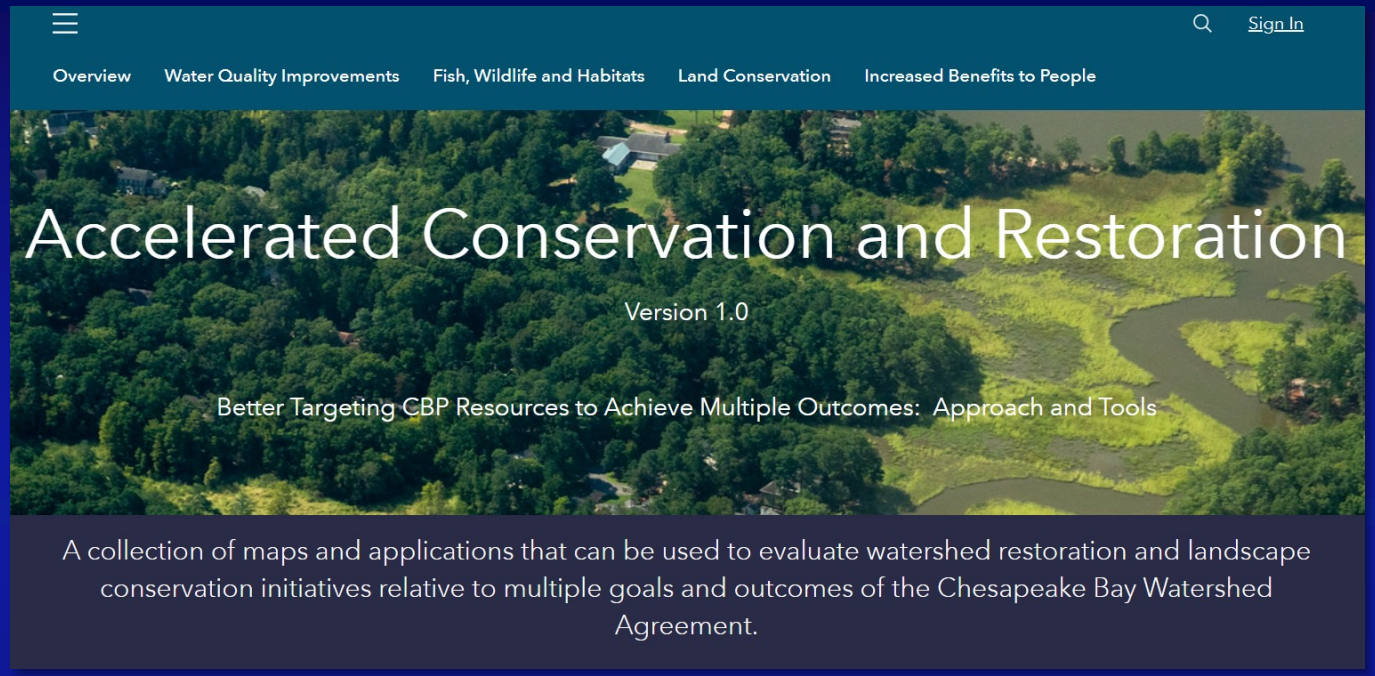
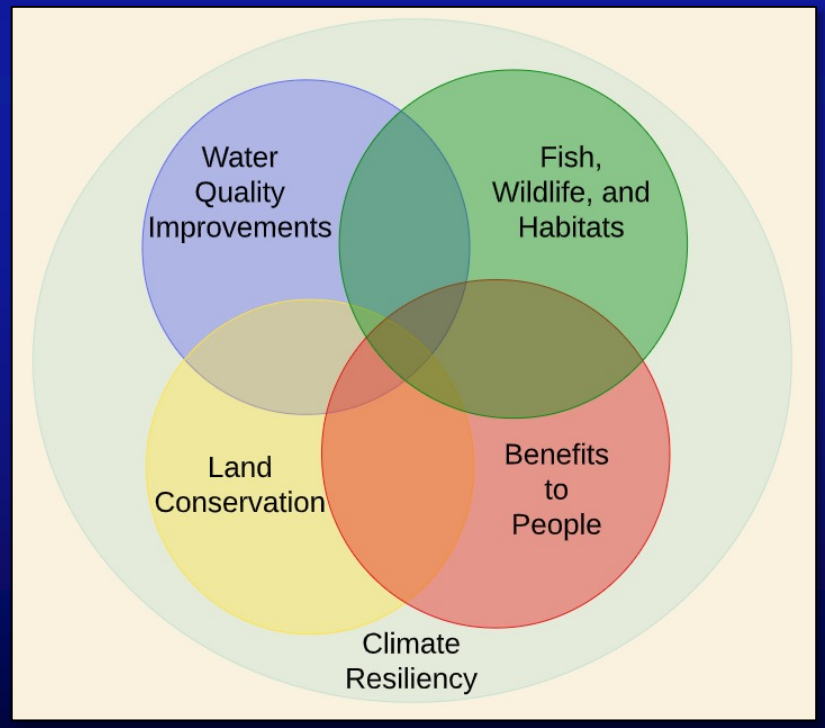
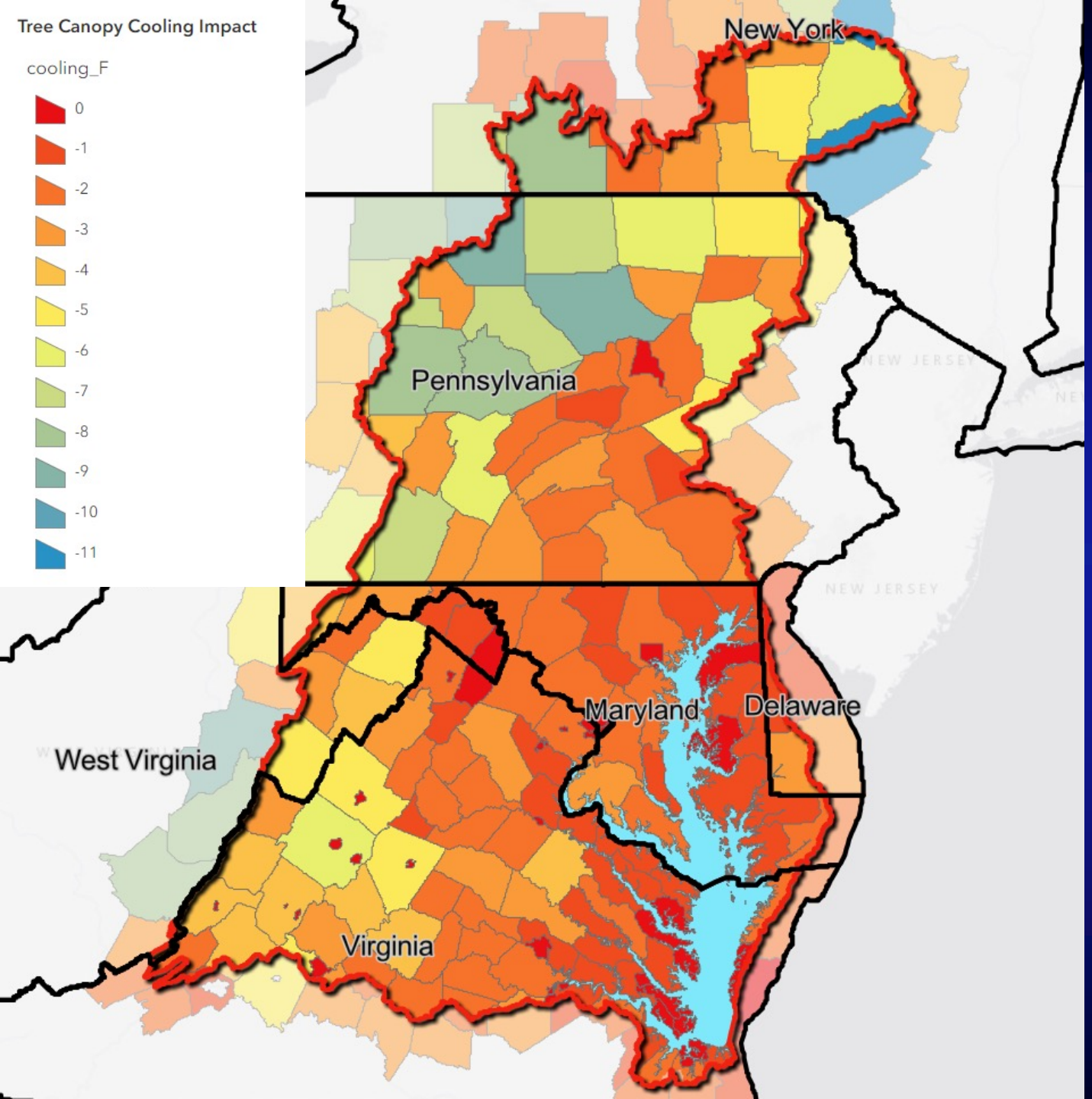
Conservation and Restoration Targeting



- Targeting Tools Portal launched in Summer 2022



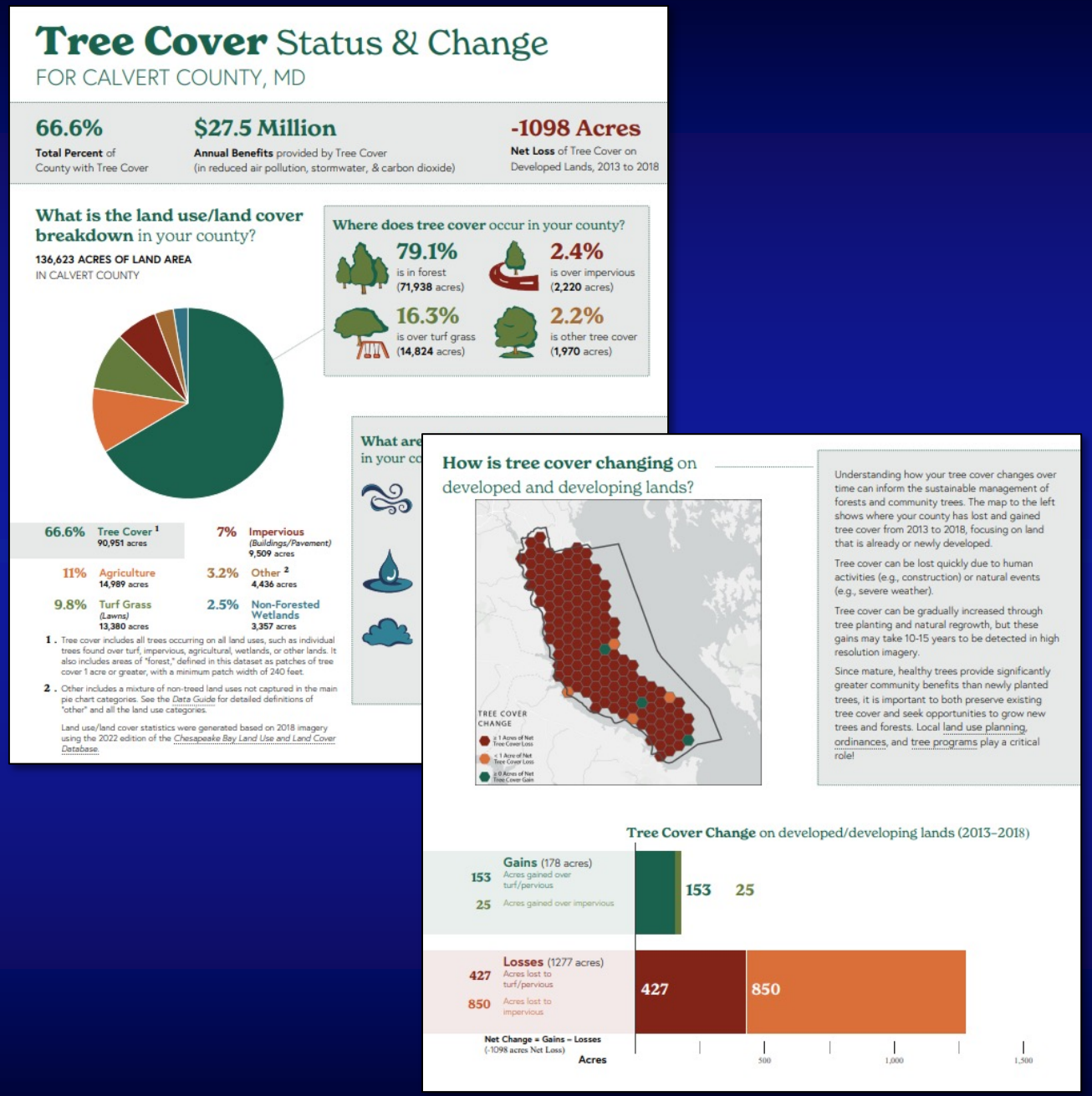
- Identify opportunities to incorporate ecosystem services into geographic targeting



County

- **Outcome: Tree Canopy**
- Management Question: Where does tree canopy lead to the greatest reduction in temperature?
- Tool/Data: Final Ecosystem Goods and Service Mapper
- Metric: Tree Canopy Cooling Impact

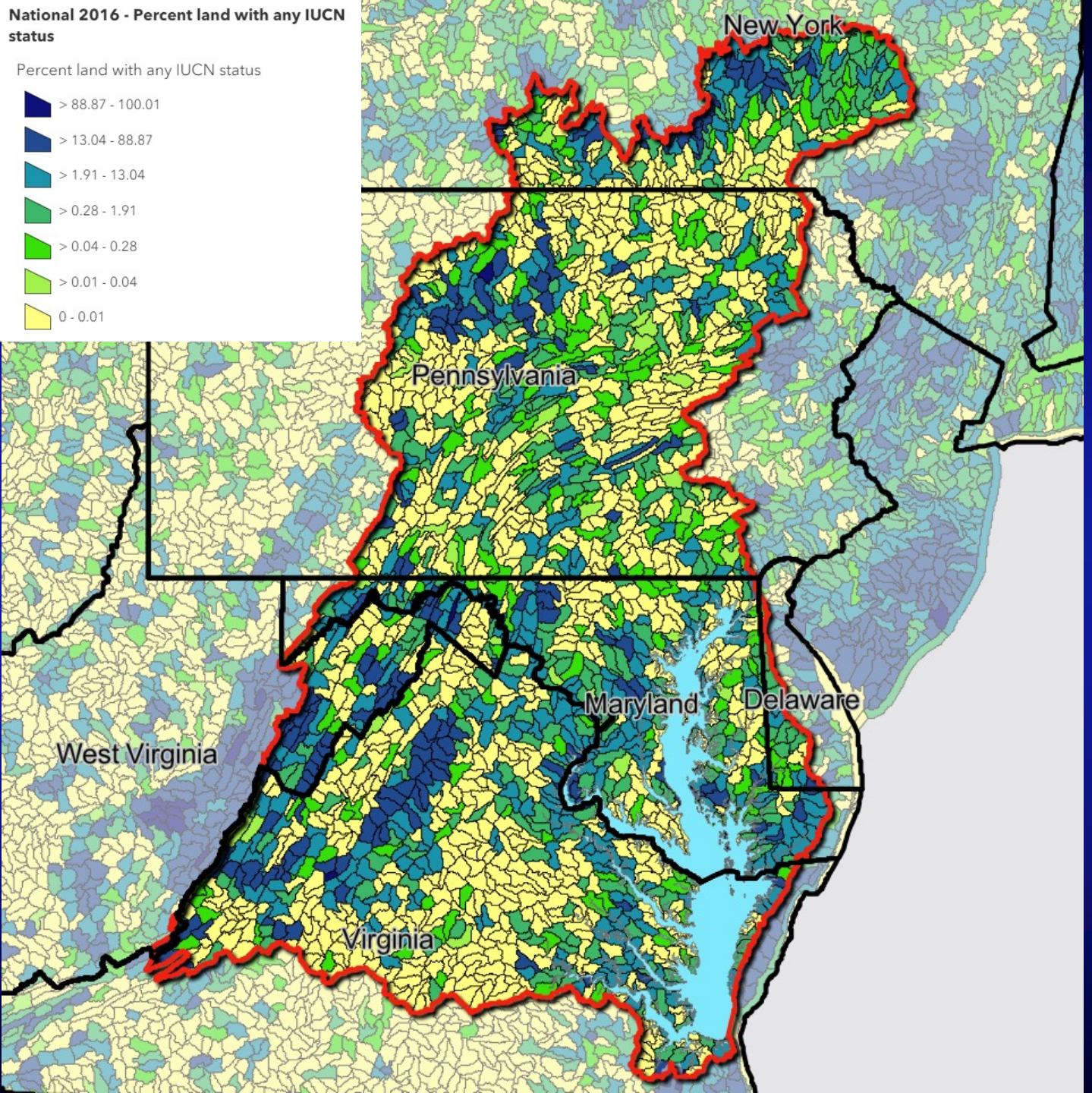
Rossi et al. 2022. Identifying and Aligning Ecosystem Services and Beneficiaries Associated with Best Management Practices in Chesapeake Bay Watershed



County

- **Outcome: Tree Canopy**
- Management Question: What are the economic benefits of tree cover?
- Tool/Data: Chesapeake Tree Canopy Network
- Metric:
  - Air Pollution removal
  - Reduced stormwater
  - Carbon sequestration

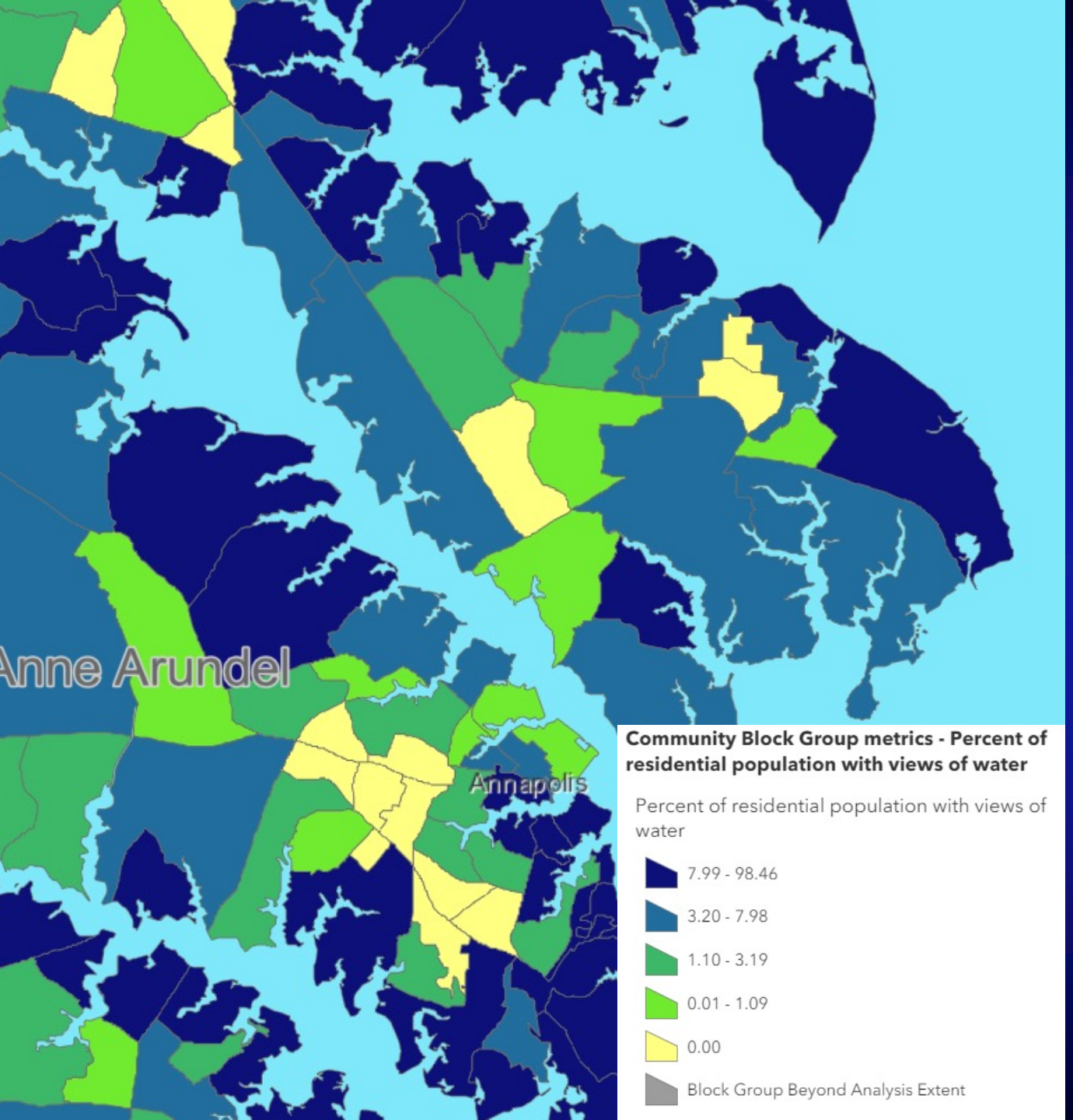
Chesapeake Tree Canopy Network. 2023. https://chesapeaketrees.net/understand-your-canopy/



HUC 12

- **Outcome: Protected Lands**
- Management Question: Where are existing protected lands relative to a goal of 30% by 2030?
- Tool/Data: EnviroAtlas - National
- Metric: Percent protected Land (% with any IUCN status)

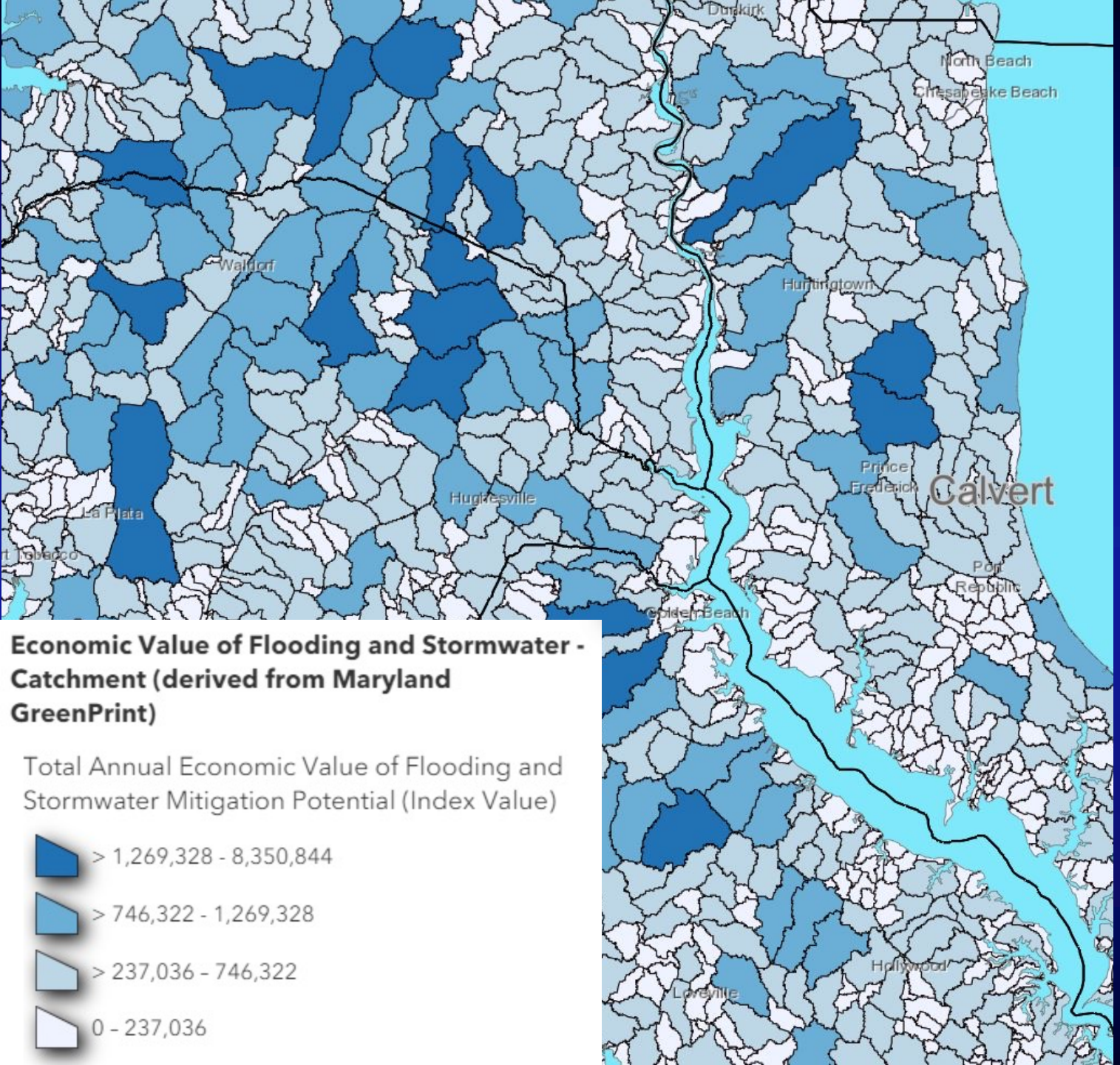
United States Environmental Protection Agency. EnviroAtlas. Percent Protected Land. Retrieved: March 14, 2023, from epa.gov/enviroatlas



Census Block Group

- **Outcome: Public Access**
- Management Question: Where are there limited opportunities to view water resources?
- Tool/Data: EnviroAtlas - Community
- Metric: Percent of residential population with views of the water

United States Environmental Protection Agency. EnviroAtlas. Percent of residential population with views of the water. Retrieved: March 14, 2023, from epa.gov/enviroatlas



Economic Value of Flooding and Stormwater - Catchment (derived from Maryland GreenPrint)

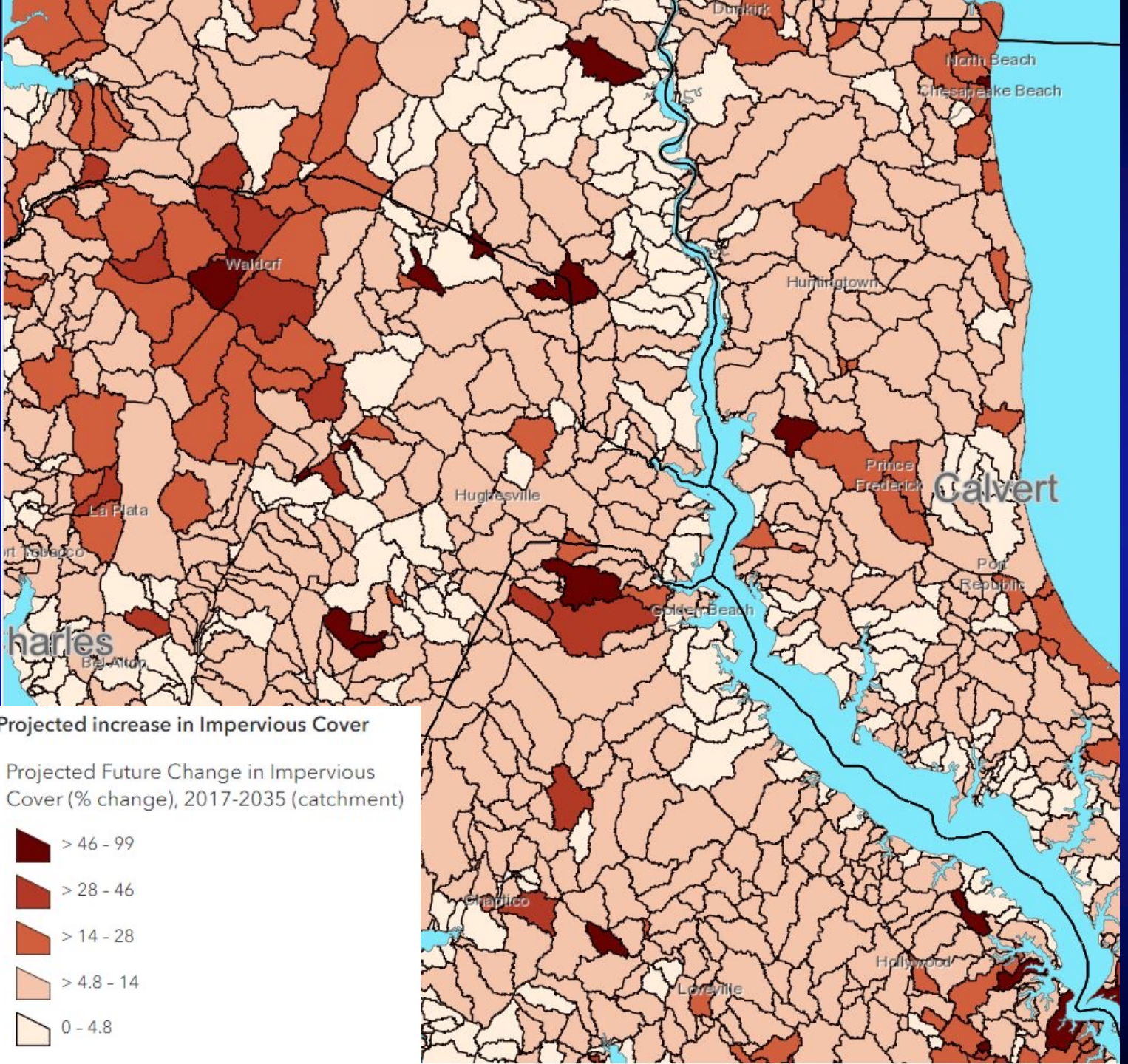
Total Annual Economic Value of Flooding and Stormwater Mitigation Potential (Index Value)

- > 1,269,328 - 8,350,844
- > 746,322 - 1,269,328
- > 237,036 - 746,322
- 0 - 237,036

NHD Catchment

- **Outcome: Watershed Implementation Plans/ Stormwater**
- Management Question: Where does the natural stormwater infrastructure provide protection from flooding?
- Tool/Data: Maryland Healthy Watershed Assessment*
- Metric: Economic value of flooding and stormwater

* Catchment metric derived from Maryland GreenPrint aggregated to catchments



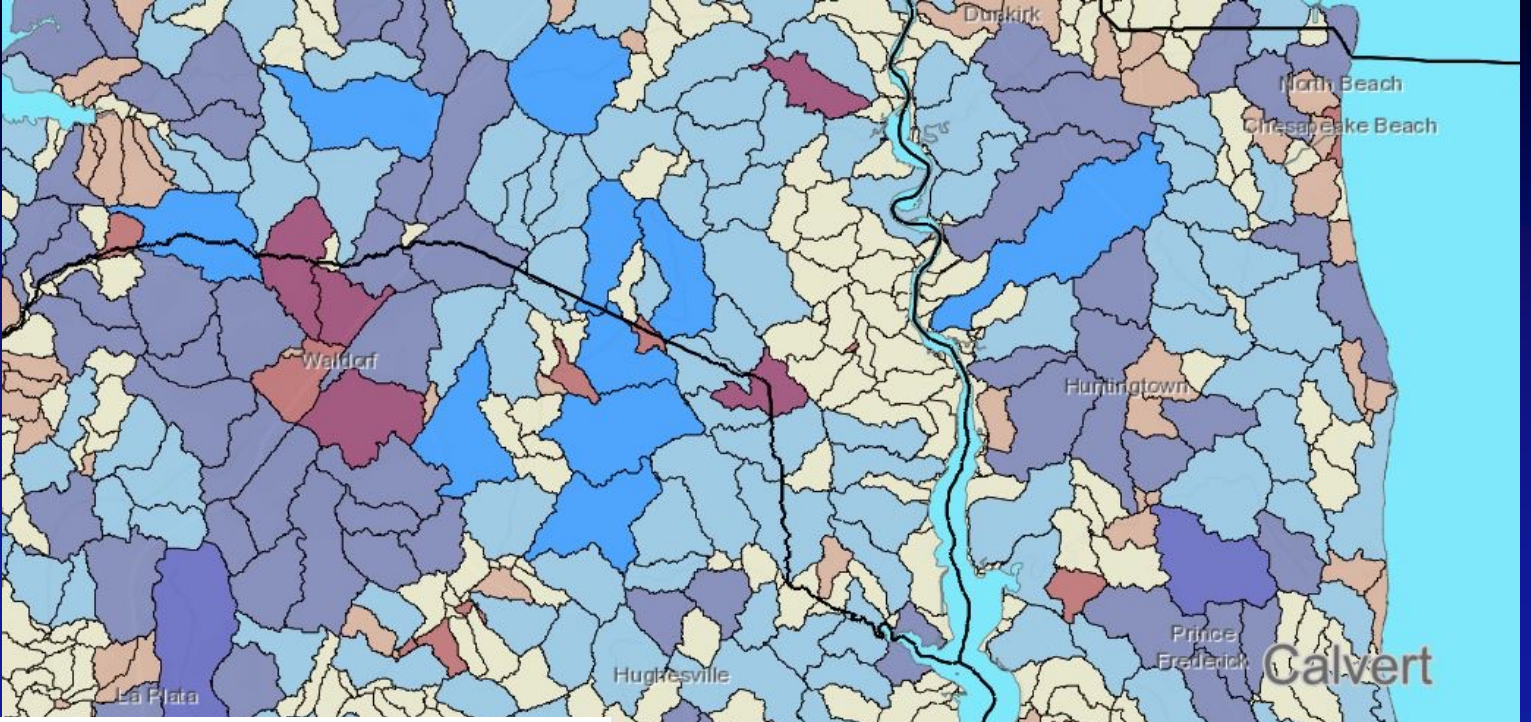
NHD Catchment

- **Outcome: Land Use Methods and Metrics**
- Management Question: Where are impervious surfaces expected to increase?
- Tool/Data: Maryland Healthy Watershed Assessment
- Metric: Projected increase in impervious cover

Chesapeake Bay Program. 2022. Maryland Healthy Watersheds Assessment. Tetra Tech

NHD Catchment

- **Outcome: WIP/Stormwater & Land Use Methods and Metrics**
- Management Question: Where is natural stormwater infrastructure threatened by increases in impervious surface?
- Tool/Data: Maryland Healthy Watershed Assessment
- Metric: Economic value of flooding and stormwater x projected increase in impervious cover

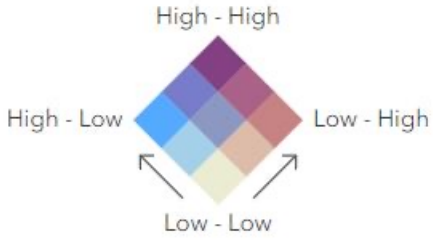


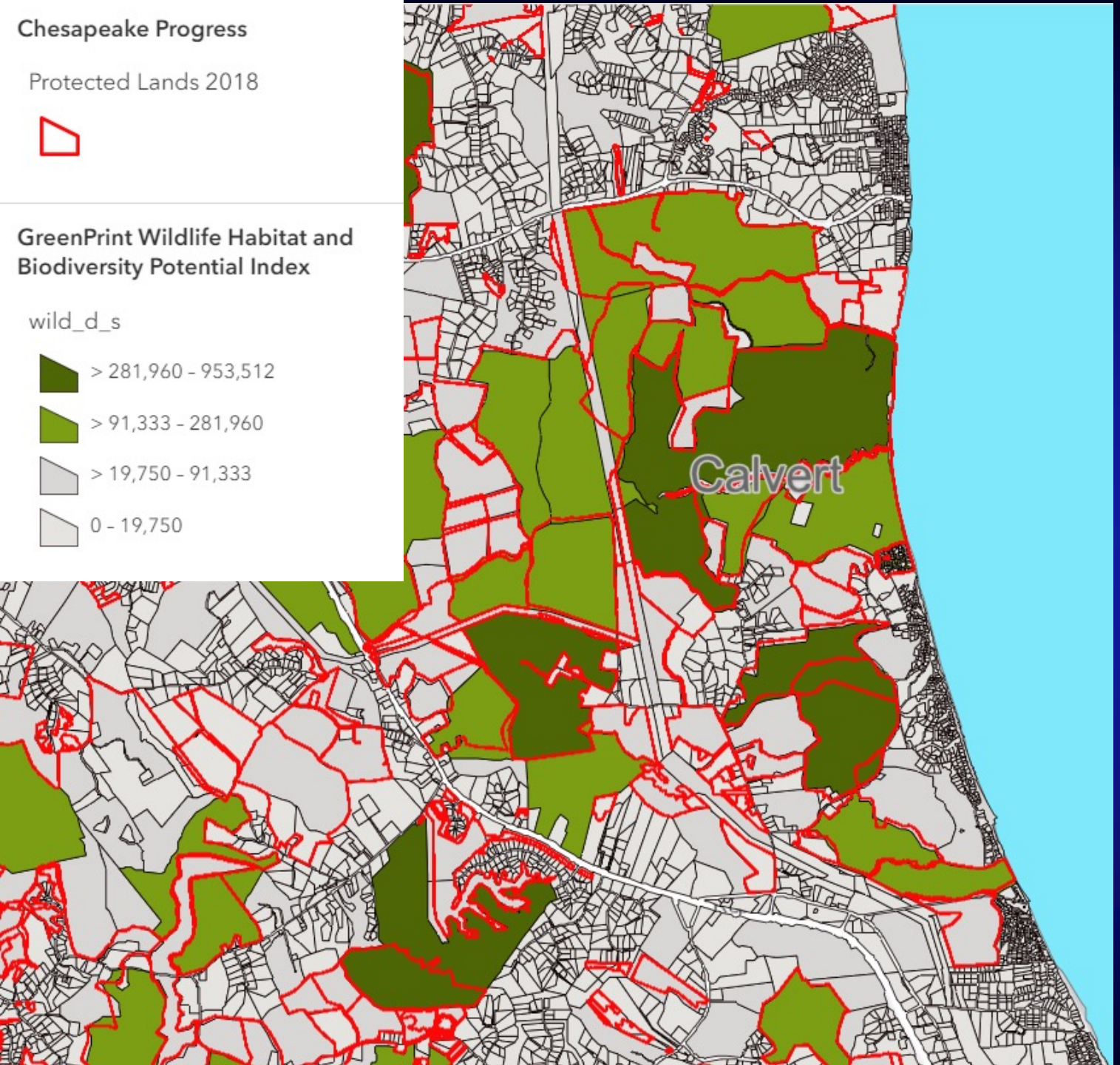
Economic Value of Flooding and Stormwater VS. Projected increase in Impervious Cover

Relationship

↖ Total Annual Economic Value of Flooding and Stormwater Mitigation Potential (Index Value)

↗ Projected Future Change in Impervious Cover (% change), 2017-2035 (catchment)

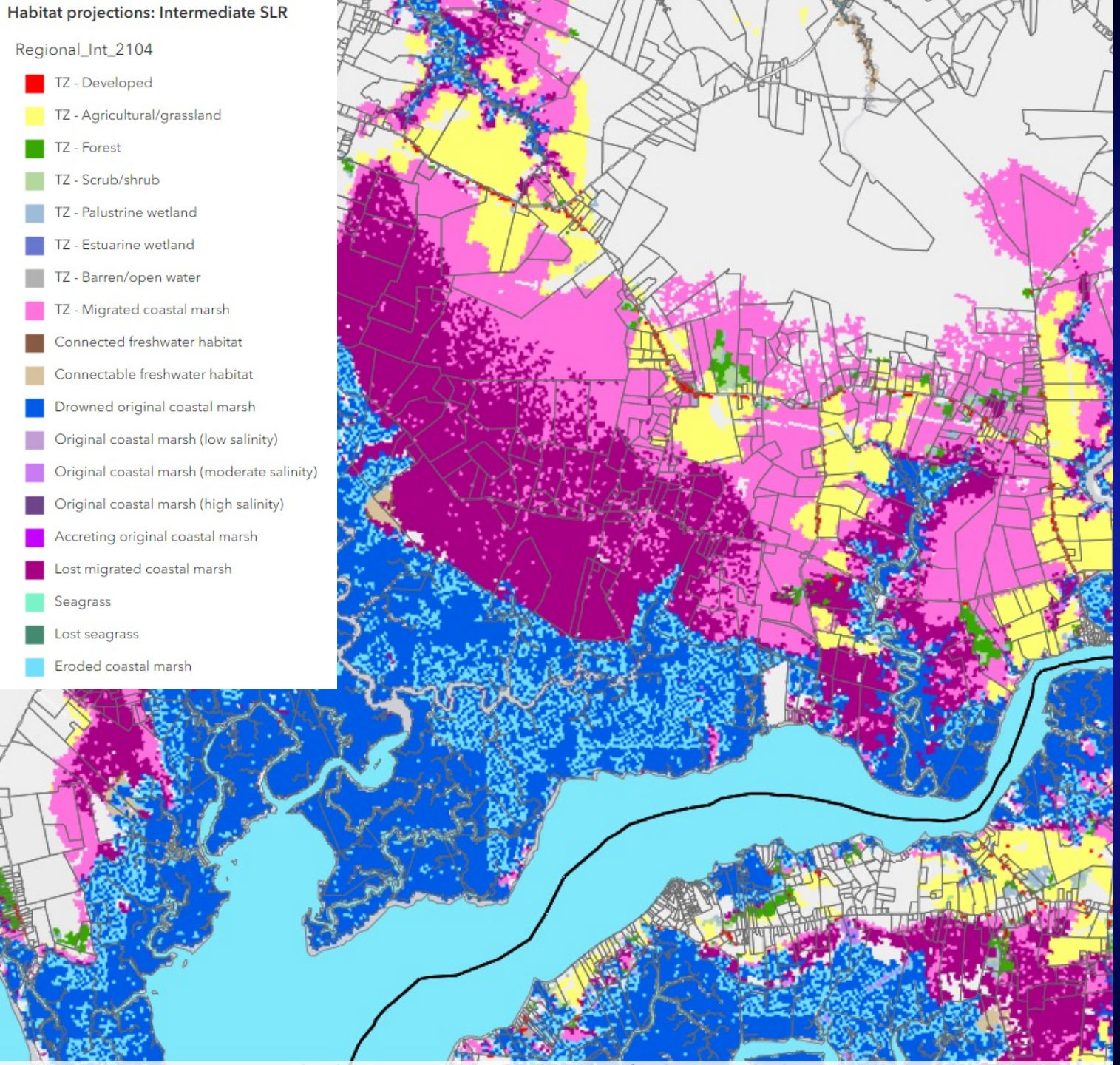




Parcel

- **Outcome: Vital Habitats, Protected Lands**
- Management Question: Are land conservation efforts protecting the best habitats?
- Tool/Data: GreenPrint Parcel Evaluation Tool
- Metric: Wildlife Habitat and Biodiversity Index Potential

Maryland Department of Natural Resources. 2018. Accounting for Maryland's Ecosystem Services



Parcel/Local

- **Outcome: Climate Resiliency, Wetlands, Black Duck**
- Management Question: Where should we plan for future habitat migration?
- Tool/Data: InVEST Coastal Ecosystem Services for Mid-Atlantic States
- Metric/Data: Projected coastal habitat changes

Warnell, K., Olander, L., & Currin, C. (2022). Sea level rise drives carbon and habitat loss in the US mid-Atlantic coastal zone. *PLOS Climate*, *1*(6), e0000044.

Planning for 2025 and Beyond

Potential CBP GIS Team strategic directions

- Develop conservation and restoration data relevant at a parcel scale.
- “Operationalize” ecosystem services at multiple map scales.
- Incorporate ecosystem services into geographic targeting efforts.

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