


Chesapeake Bay Program
A Watershed Partnership

GIS and Chesapeake Bay Watershed Agreement Management Strategies

John Wolf
(and GIS and Land Data Teams)

STAR Meeting

December 4, 2014

Overview

- GIS Team - Staff Knowledge Areas
- CBPO Commonly Used Geospatial Data
- Other Sources of Geospatial Data
- Multi-Goal/Multi-Outcome/Multi-Agency Issues
- Geospatial Communication Products

- … Discussion …

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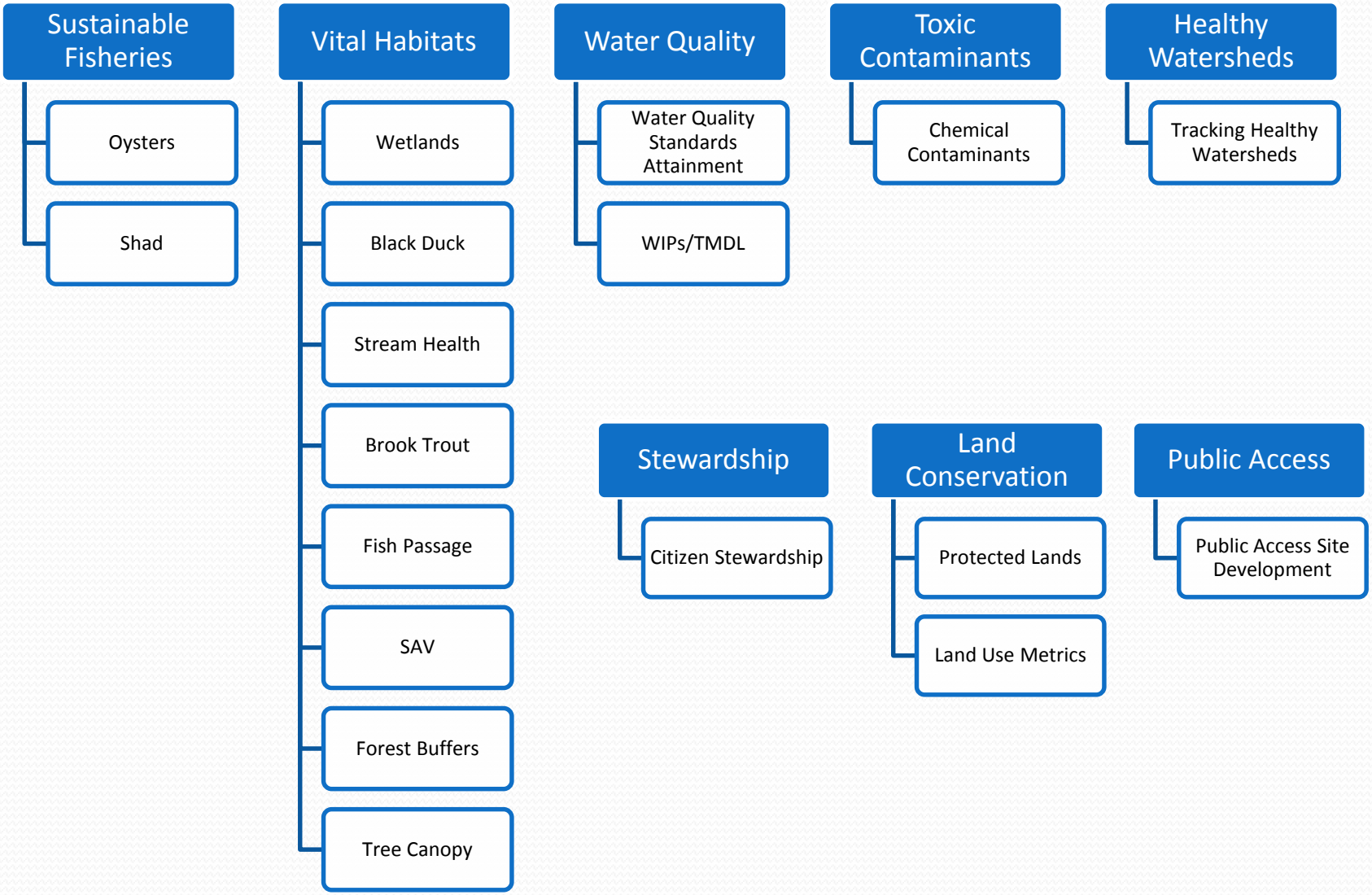
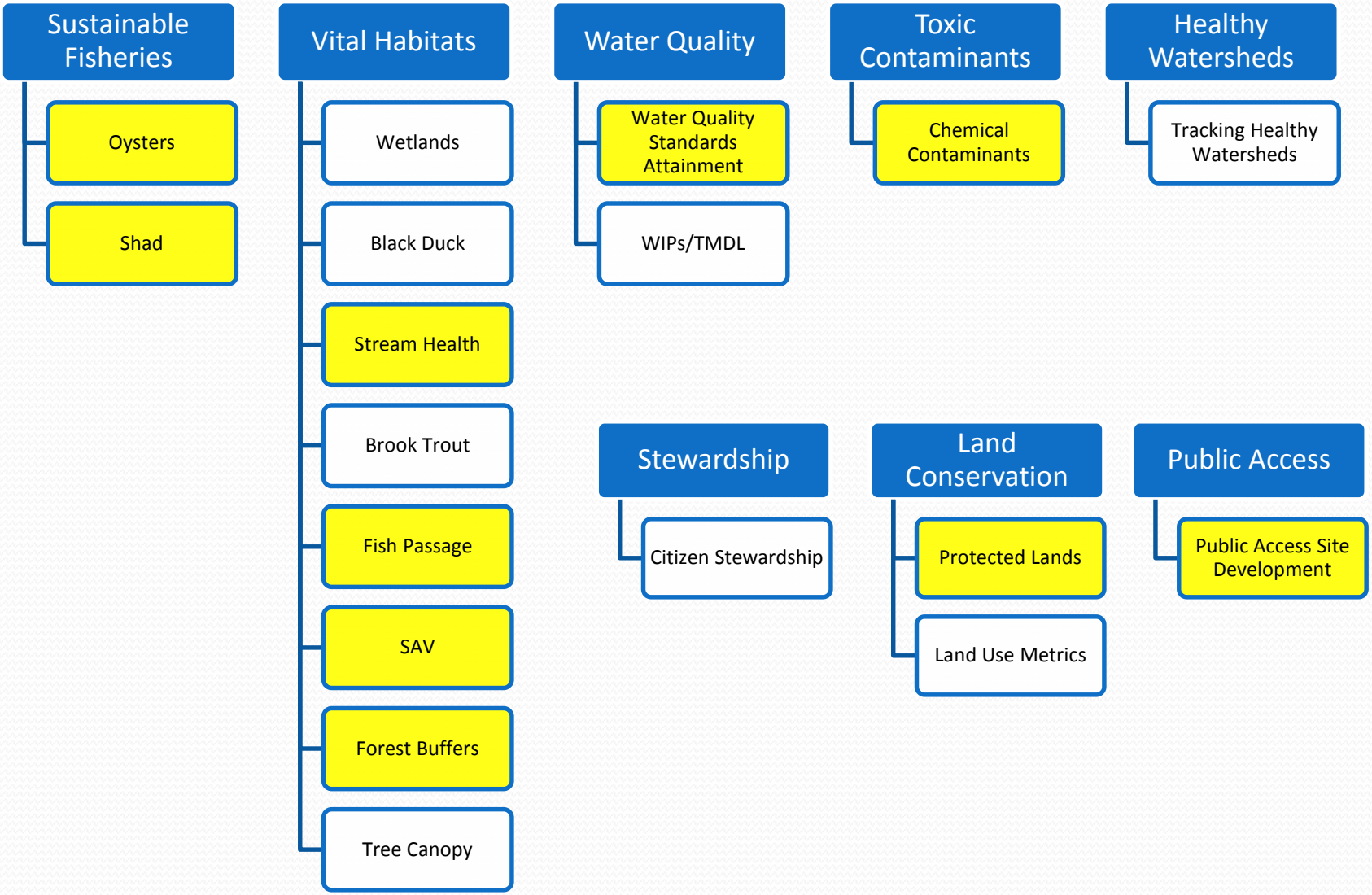
Outcomes –
Existing CBPO Geospatial Activity



Outcomes – Existing Geospatial Indicators



Where to go for more information?

- **Sustainable Fisheries**
  - Oysters — **John/Howard**
  - Shad — **Howard/John**
- **Vital Habitats**
  - Wetlands — **Quentin**
  - Black Duck — **Howard**
  - Stream Health — **Fred**
  - Brook Trout — **Howard**
  - Fish Passage — **Howard**
  - SAV — **Howard**
  - Forest Buffers — **Howard**
  - Tree Canopy — **Fred/Renee/Adam**
- **Water Quality**
  - Water Quality Standards Attainment — **Howard**
  - WIPs/TMDL — **John (to start)**
- **Toxic Contaminants**
  - Chemical Contaminants — **Adam**
- **Healthy Watersheds**
  - Tracking Healthy Watersheds — **Renee/John**
- **Stewardship**
  - Citizen Stewardship — **Howard (NFWF)**
- **Land Conservation**
  - Protected Lands — **Renee**
  - Land Use Metrics — **Peter**
- **Public Access**
  - Public Access Site Development — **Andy**
- **Outcomes Not Listed** — **John (to start)**

GIS and Land Data Teams


Fred Irani


Andy Fitch


Renee Thompson


Peter Claggett


Howard Weinberg


Adam Ridley


Quentin Stubbs


John Wolf

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Sustainable Fisheries

- American Shad
  - Abundance for James, Potomac, York, Rappahannock, Susquehanna (indicator)
- Oysters
  - Restoring Oyster Reefs (priority tributaries)
  - Harris Creek – miscellaneous Oyster Blueprint data
  - Historic Oyster bars
- Other
  - Various habitat layers from HR2 (Habitat Requirements for Chesapeake Bay Living Resources)
  - Priority Living Resource Areas

Vital Habitats

- Fish Passage
  - State blockage data
  - FEMA dams
  - TNC Prioritization Tool
  - Potential future culvert database
- Brook Trout (mostly from M. Hudy)
  - Allopatric and sympatric populations, restoration opportunities, vulnerability to climate change
  - Gas wells
  - Fish passage
- SAV
  - Annual VIMS Survey data
  - Bay grass goal attainment
  - Restoration project locations
- Forest Buffers
  - Annual project data from states
- Black Duck
  - Energetics capacity (based on NWI)
  - Abundance (soon)

Vital Habitats (cont.)

- Wetlands
  - National Wetlands Inventory
  - CCAP
  - NLCD
  - CBLCD (1984, 1992, 2001, 2006)
- Streams
  - Non-tidal Benthic IBI
  - Average Stream Health (indicator)

Water Quality

- Standards Attainment
  - Segment attainment for
    - Shallow water/bay grass
    - Anadromous fish spawning
    - Open water
    - Deep Water
    - Deep Channel
    - Chlorophyll a
- Other tidal
  - Benthic (indicator)
  - Water clarity (indicator)
  - Phytoplankton (indicator)
  - DO (indicator)
- Tidal and Nontidal Monitoring Networks
- Monitoring Segmentation
- Watershed Model Segmentation
- Estuarine Model Cell Segmentation
- SPARROW (N & P)
- SPARROW (Sediment)

TMDL

- Segmentsheds
- N and P Transport Effectiveness
- Significant/ Non-significant Municipal WWTP
- Significant/ Non-significant industrial wastewater facilities
- CSO Communities
- MS4 (Phase I and II)
- Community Multi-scale Air Quality Model 12 km grid
- P 5.3 Reach Simulation
- Monitoring Calibration Stations
- BayTAS

Toxics

- Chesapeake Bay (tidal) impairments by contaminant
- Bay Watershed PCBs

Stewardship

- NFWF Grant funding

Healthy Watersheds

- State Designations/ delineations
- Landscape Context
  - Ecoregions
  - Watershed Classification (urban/rural gradient)
  - Hydrogeomorphic regions
- Vulnerability
  - Projected loss of farmland
  - Projected loss of forest land
  - Projected urban gain
- Protection
  - Protected lands

Land Conservation & Public Access

- Protected Lands
  - State
  - Local
  - Federal
  - Conservation Easements
  - Private Conservation Lands
- Public Access
  - Existing sites (fishing, boating, swimming, trails)
  - Potential Sites
  - Fifth Order Streams
  - Captain John Smith Chesapeake NHT
  - Star-Spangled Banner NHT
  - Potomac Heritage NHT
  - River stretches lacking access

Land Use Methods and Metrics

- Land Use
- Transportation
  - Streets/Major vs. Minor Roads
  - Road Density
- Housing
  - Total Housing Units
  - Single/detached
  - Multi-family
- Demographics/migration
- Population
  - Existing/historical
  - Projections
- Sewer Service Areas
- Zoning
- Institutional properties
- Elevation
  - Slops
  - Topographic wetness index

Other Base Layers

- Hydrogeomorphic regions
- Land Cover 1984, 1992, 2001, 2006, 2011 (soon)
- US Census products
- AG Census products
- Impervious Surfaces
- Chesapeake Bay Watershed
- Chesapeake Bay Airshed
- Stream Order
- Watershed Boundaries (up to HUC 12)
- Congressional Boundaries
- Various elevation products
- Bay Bathymetry
- Federal Lands

Derived Prioritization Products

- Federal
  - EPA Priority Ag Watersheds
  - US Fish and Wildlife Service
  - US Forest Service (Forest Legacy Areas)
  - NOAA CELCP
  - USDA 2010 CBWI Priorities
- State
  - Maryland GreenPrint/ AgPrint (and related products)
  - Virginia Conservation Lands Needs Assessment
  - Delaware Ecological Network
- Other
  - Showcase Watersheds
  - Oyster Priority Tributaries
  - Resource Lands Assessment
  - Priority Forests (Forest Conservation Directive)
  - Priority Living Resource Areas

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State GIS Data Resources

- DC – DC GIS Data Clearinghouse (http://dcatlas.dcgis.dc.gov/catalog/)
- DE – Delaware Geospatial Data Exchange (https://dataexchange.gis.delaware.gov)
- MD – Maryland Open Data Portal (https://data.maryland.gov/)
- NY – New York State GIS Clearinghouse (https://gis.ny.gov/)
- PA – Pennsylvania Spatial Data Access (PASDA) (http://www.pasda.psu.edu/)
- VA
- WV – Map West Virginia (http://www.mapwv.gov/)

Federal/Other GIS Data Resources

- Geoplatform.gov (including data.gov)
- ArcGIS Online (www.arcgis.com/home)
- LandScope Chesapeake

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Watershed Restoration Collaboration Example

Watershed Conservation Collaboration Example

Cleaner Air, Cleaner Bay Story Map Example

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Story Maps to Communicate Management Strategies

- General, non-technical audience
- A specific trend, issue, or topic in geographic context (e.g., - Chesapeake Watershed Agreement Outcome and Management Strategy)
- Combining interactive maps with other content (photos, videos, text)
- Summarizing issues for managers and decision-makers
- Focus on results of analyses/messaging as opposed to data and methods

Brook Trout Outcome -- Vital Habitats Goal

Restore naturally reproducing brook trout populations in Chesapeake headwater streams with an 8% increase in occupied habitat by 2025.

Distribution | Vulnerability | Protection | Restoration

Catchments Occupied by Brook Trout

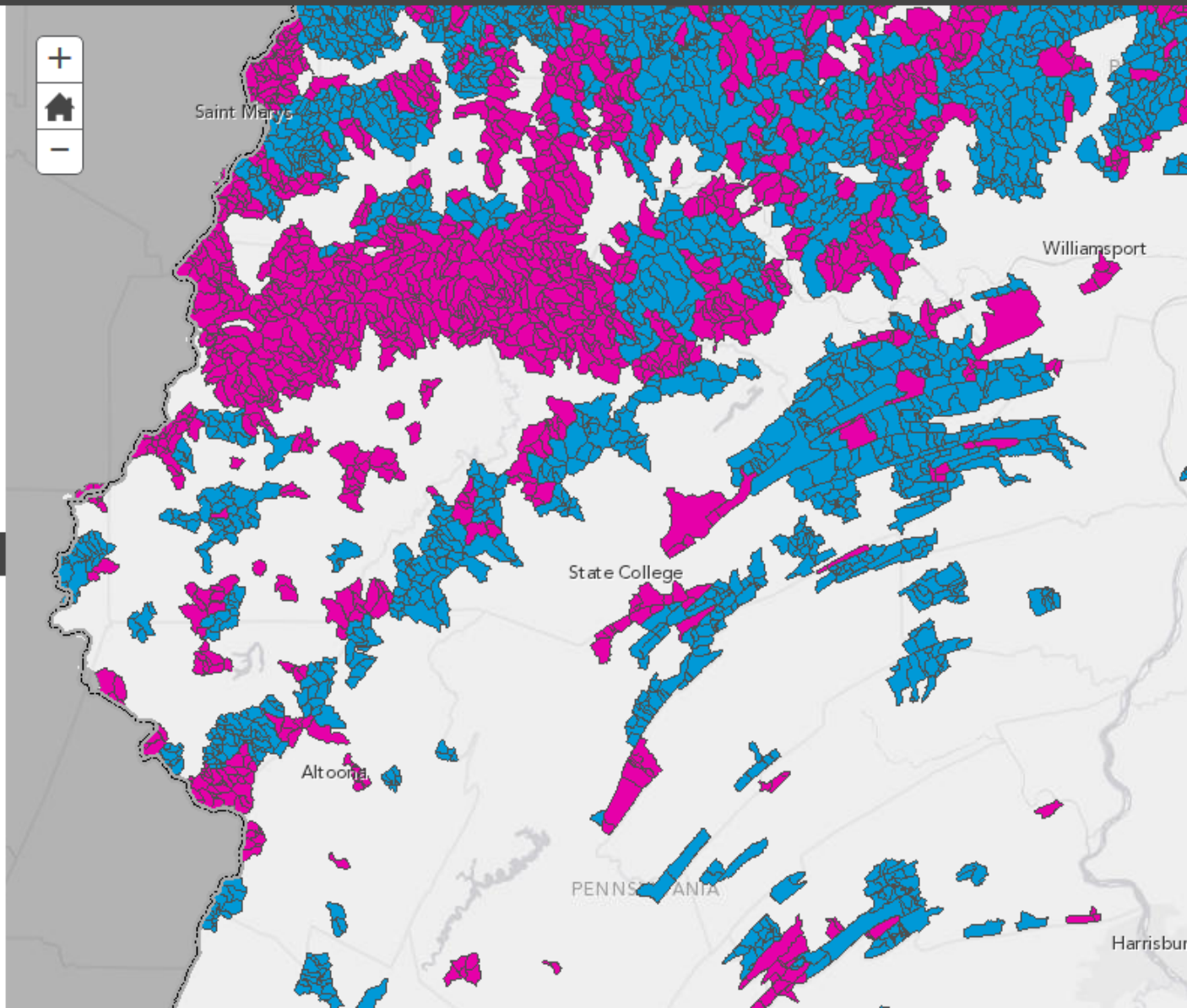
The wild brook trout resource in the Chesapeake Bay has been significantly reduced over the last 150 years and faces ongoing and future threats from climate change, land use changes, invasive species and loss of genetic integrity. Monitoring both short and long term trends on individual brook trout (*Salvelinus fontinalis*) populations and the resource as a whole are important needs of managers. (Hudy et al, 2008).

LEGEND

Catchments Occupied by Brook Trout

Catchments occupied by brook trout

- Allopatric brook trout
- Sympatric brook trout



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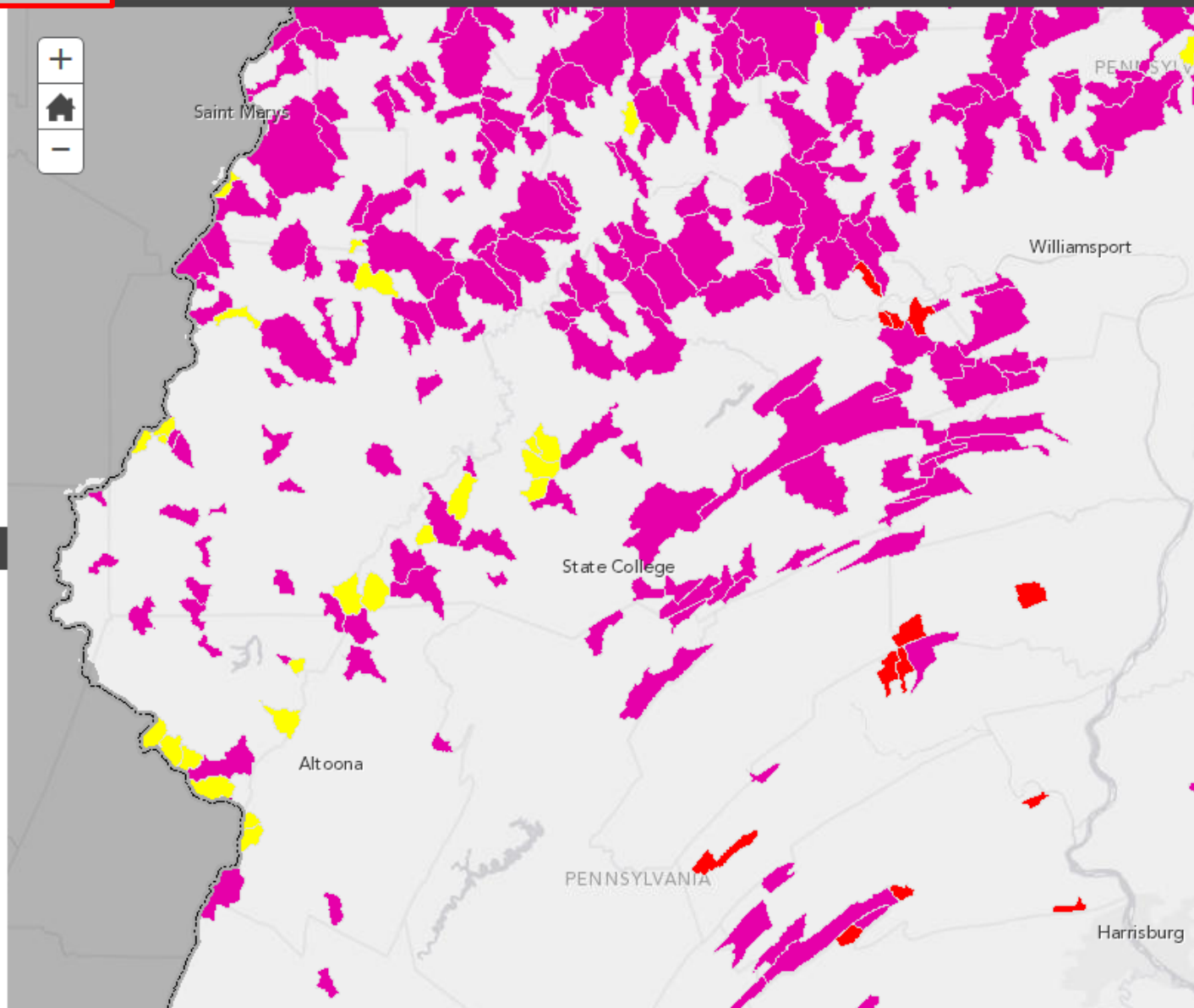
Vulnerability of Brook Trout Patches to Climate Change

Vulnerability to climate change is assessed in terms of both sensitivity and exposure. It is based on a model that incorporates catchment data for temperature, solar radiation, elevation, and forest cover.



LEGEND

Vulnerability of Brook Trout Patches to Climate Change

Brook Trout Patch Vulnerability

- LE/LS
- LE/HS
- HE/LS
- HE/HS

Brook Trout Outcome -- Vital Habitats Goal

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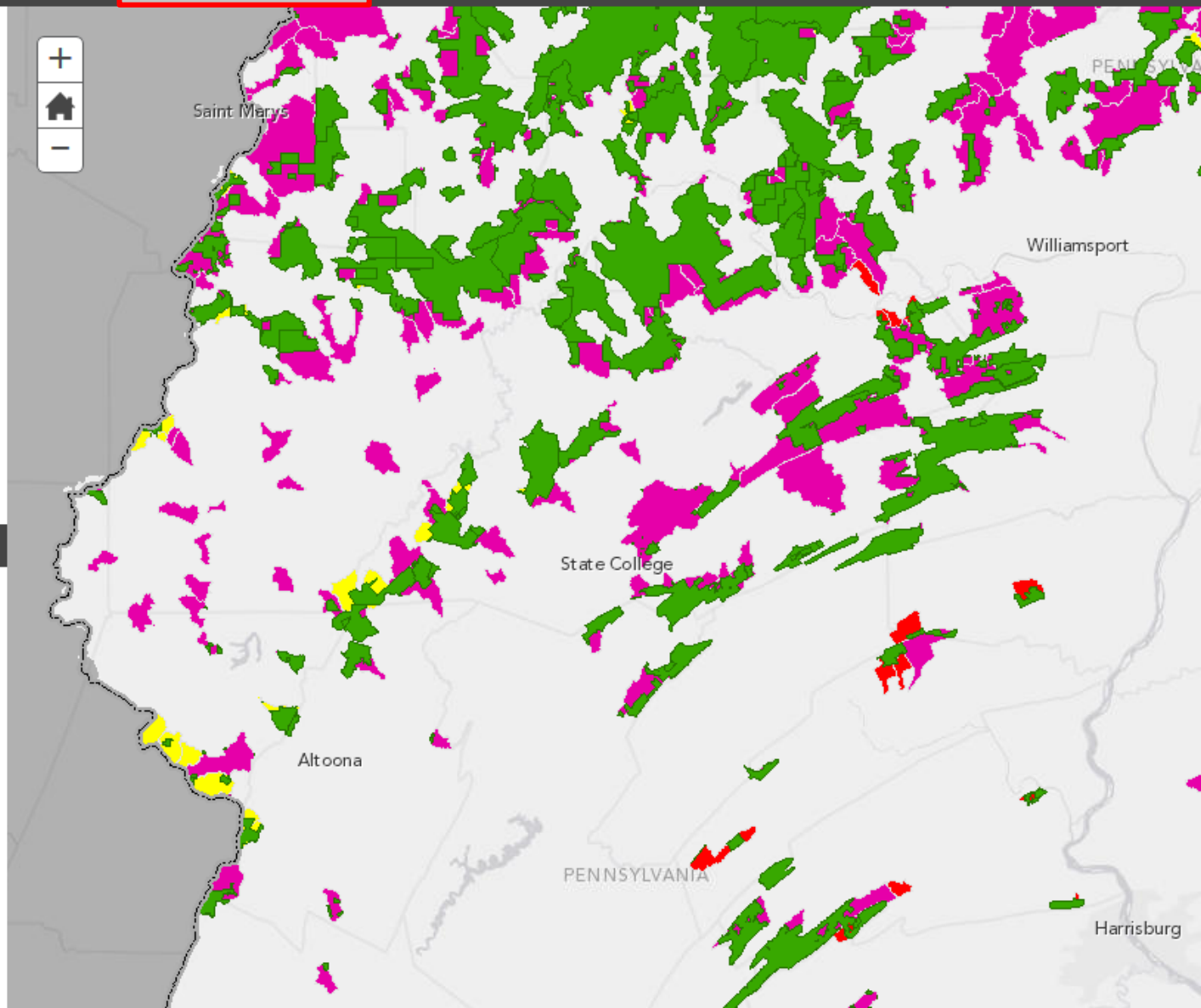
Existing Protection of Brook Trout Patches

Protection includes fee or easements owned by local, state, or federal agencies. Protected lands data is periodically updated by the Chesapeake Bay Program.



LEGEND

Protected Lands within Patches Occupied by Brook Trout

Protected Brook Trout Patches

Vulnerability of Brook Trout Patches to Climate Change

Brook Trout Patch Vulnerability

- LE/LS
- LE/HS
- HE/LS
- HE/HS

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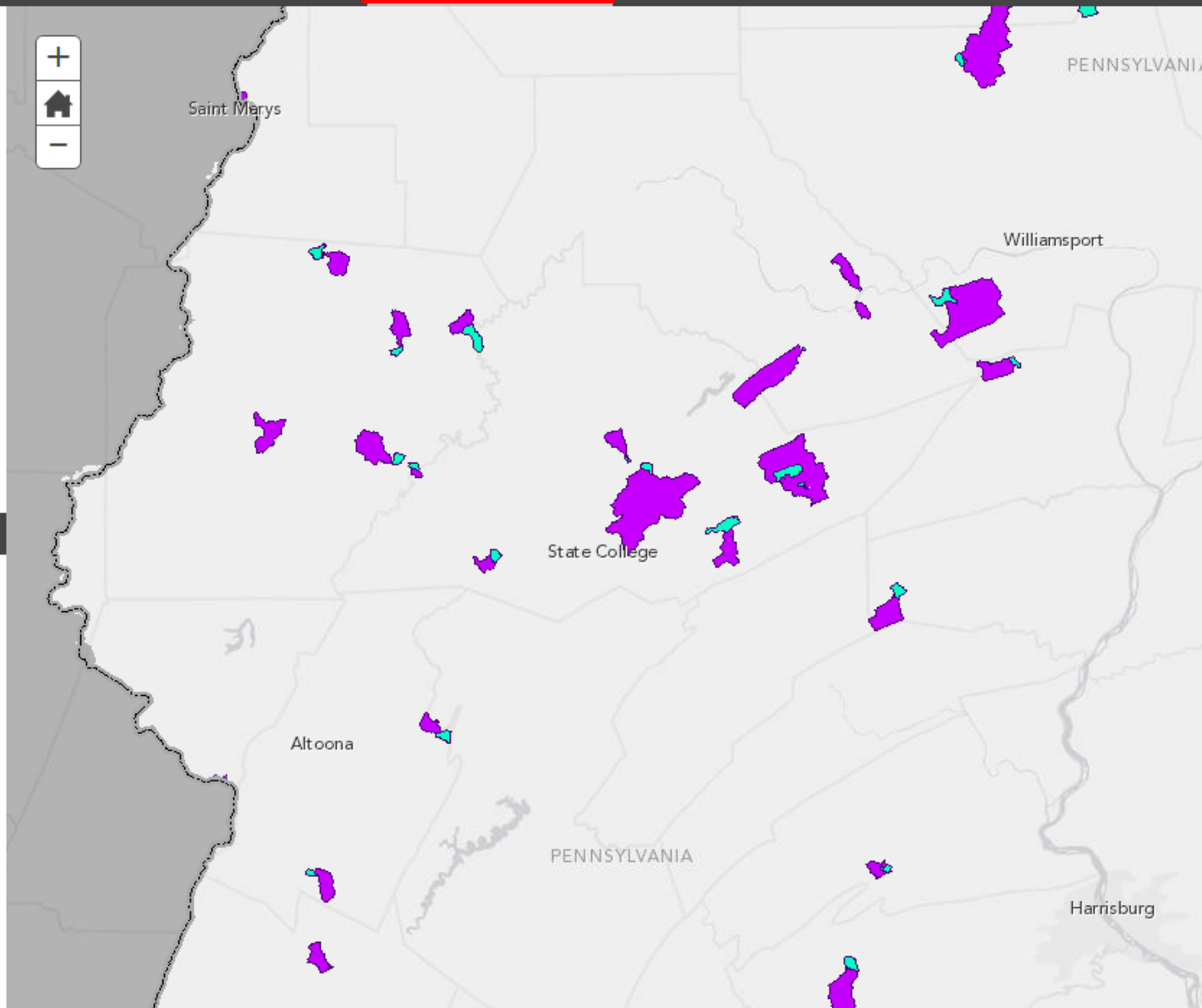
Priority Areas for Brook Trout Restoration

Restoration potential generally focuses on reforestation efforts within riparian corridors. Occupied patches with less than 70% riparian forest cover have been identified as areas where the population could be better protected. In addition, adjacent hydrologically connected catchments with less than 70% riparian forest cover have been identified where patches could potentially be expanded.



LEGEND

Priority Areas for Downstream Expansion (less than 70% riparian forest) of Brook Trout Patches

Priority Areas for Downstream Expansion (<70% riparian forest cover)

Brook Trout Patches with less than 70% Riparian Forest Cover

Existing Brook Trout (<70% riparian forest)

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