Sharpening our Focus Installment II: Forests & Wetlands

Chesapeake Bay Commission meeting
Sept. 8, 2022 Charlottesville, VA

Chesapeake Conservancy
EXPLORE. CONSERVE. INNOVATE.

Joel Dunn, President and CEO

1. Opening statements being about using data for better targeting and decision making
2. LULC Data Release
3. Examples of how data like this can help with topics like forest AT SCALE
    a. Watershed
    b. County
    c. State
4. Leveraging insights for forest legislation and goals
    a. Forest tech study
    b. Tc fact sheets
5. We can do this with wetlands, but we need better data
    a. Show proof of concept
    b. Next steps needed

Precision Conservation

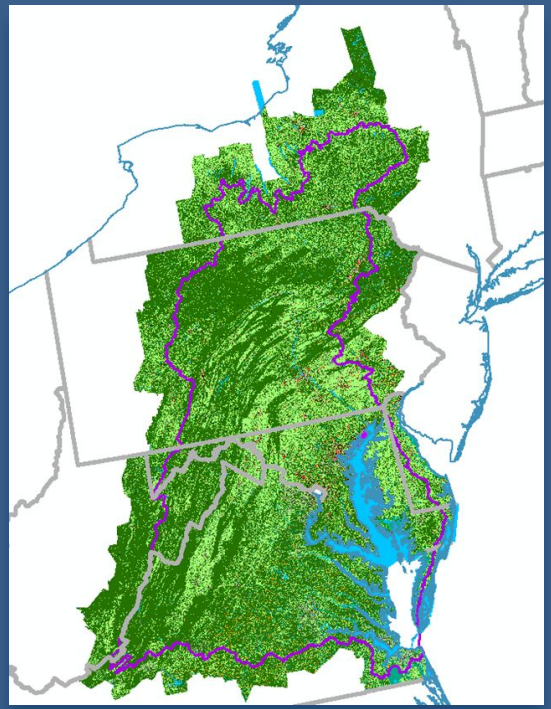
Chesapeake Bay Program Geospatial Support

Objective 1: Land Cover, Land Use and Change Mapping
Data release May 2022

Objective 2: Streamflow Mapping

Objective 3: Restoration Planning & Reporting (Opportunity Mapping, Nutrient and Sediment Reduction Modeling)

Objective 4: Cross-GIT mapping support (User-needs research on CBP Data Tools)



Chesapeake Bay Program
Science. Restoration. Partnership.

USGS
science for a changing world

The Academy of Natural Sciences of Drexel University

UMBC

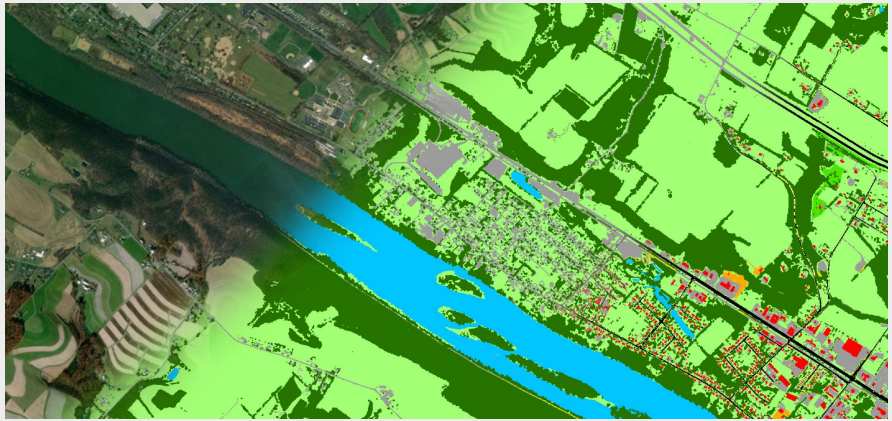
Chesapeake Conservancy
EXPLORE CONSERVE INNOVATE

University of Vermont Spatial Analysis Lab

The COMMONS

What is Land Cover?

- Land cover describes the physical land surface (e.g., tree canopy, open water, low vegetation)
- Land cover is classified using satellite/aerial imagery, digital elevation data, and building footprints. The pixels within the imagery are grouped and segmented into "objects" that get classified.
- The 2017/18 land cover data were produced by the University of Vermont team after preliminary data was reviewed by local stakeholders, Land Use Workgroup, and other Chesapeake Bay Program partners. Feedback was used to revise classification protocols and re-classify the landscape.



What is Land Use/Land Cover (“LULC”)?

- Land use indicates how people make use of the land (e.g., cropland, recreation, solar)
- Land use is derived from land cover data using ancillary data to translate physical land features into nuanced classes indicating the type of human activities on the land.
- Land use/land cover (LULC) represents a hybrid of both use and cover, e.g., cropland-barren and cropland-herbaceous.
- The 2017/18 LULC data are being produced by Chesapeake Conservancy in partnership with staff at USGS. Preliminary data were reviewed by Chesapeake Bay Program partners; feedback was used to revise the decision rules and protocols used to produce the classification.

Land Cover and Land Use Change

Frederick, Maryland

2013/14 NAIP

2017/18 NAIP

Land Cover and Land Use Change

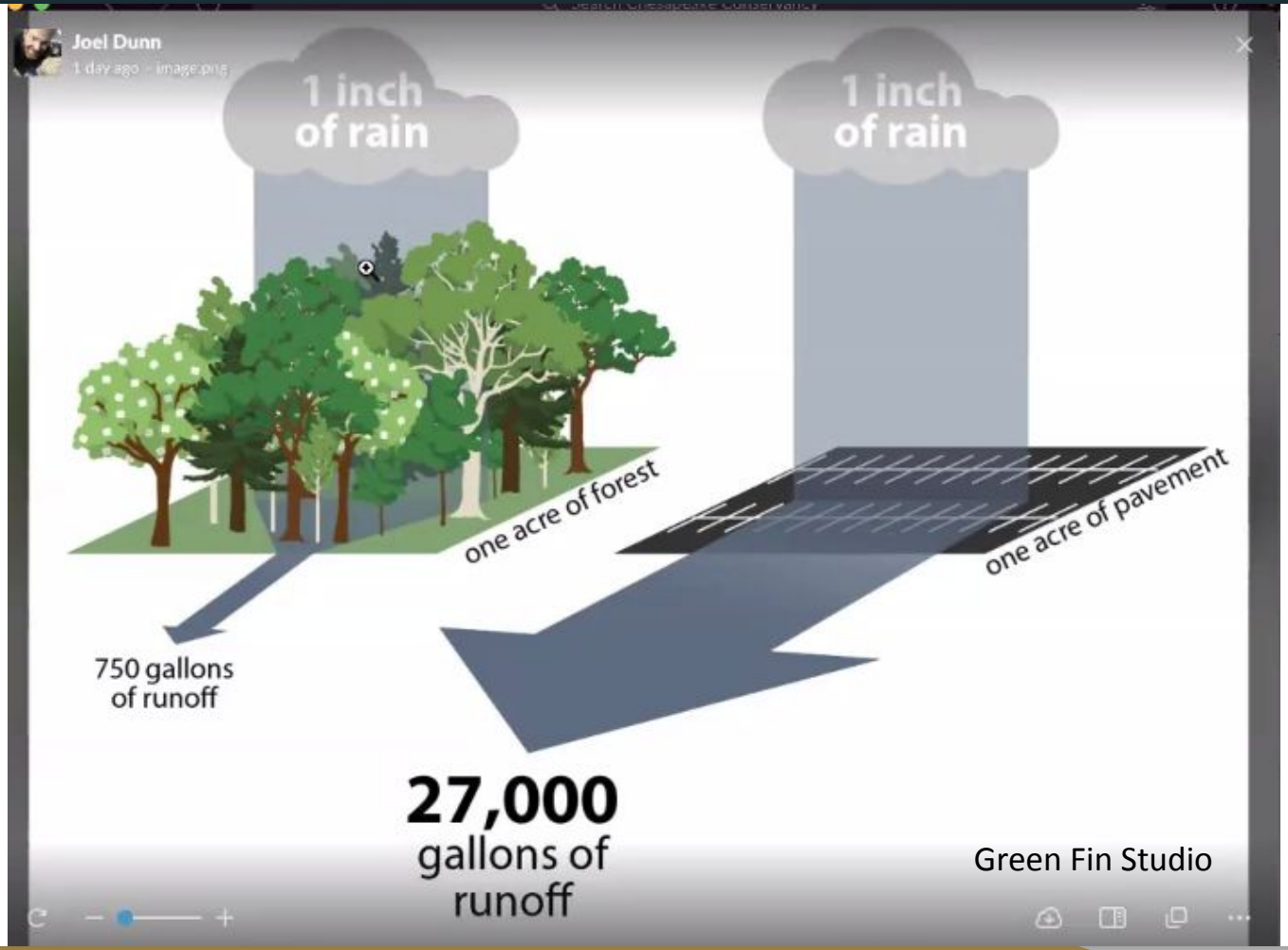
Frederick, Maryland

Land Cover Change

Land Cover no change (low vegetation)

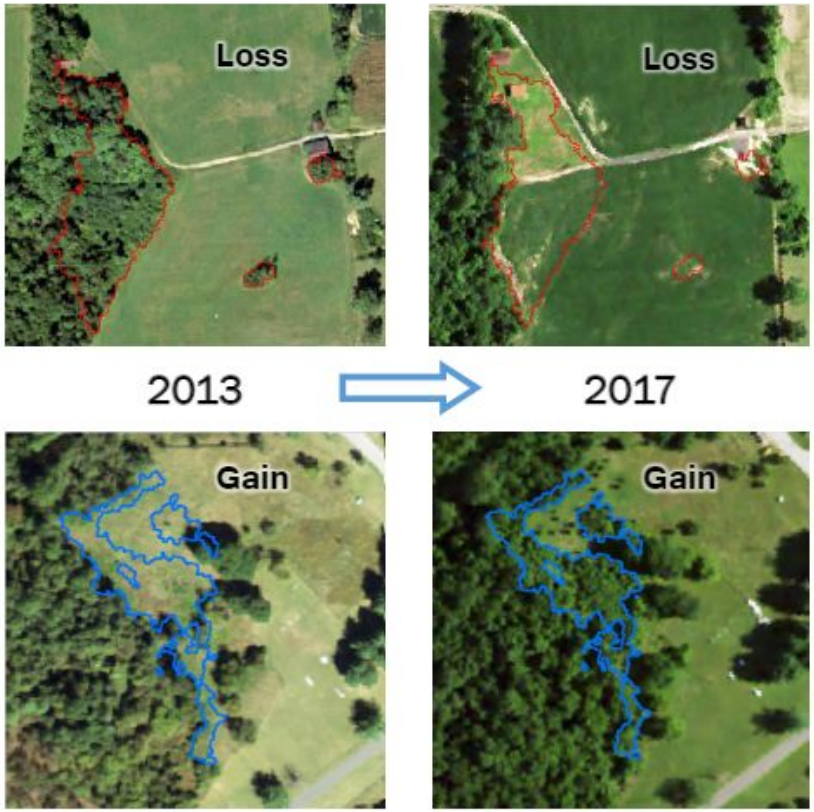
Land Use Change

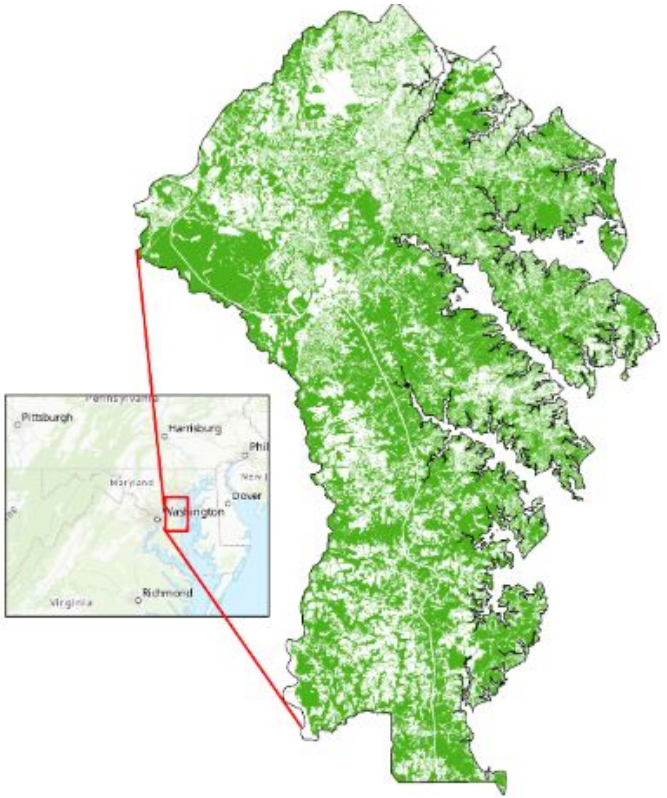
Cropland to Turf Grass



Green Fin Studio

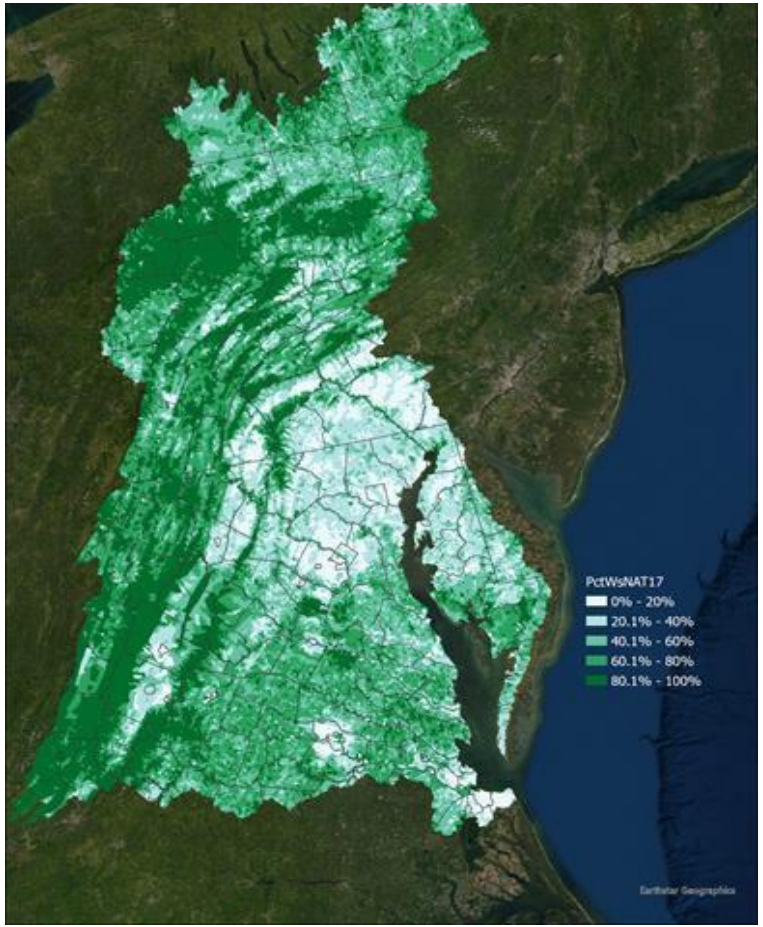
Change Detection products: Tree Canopy Change
Anne Arundel County, MD



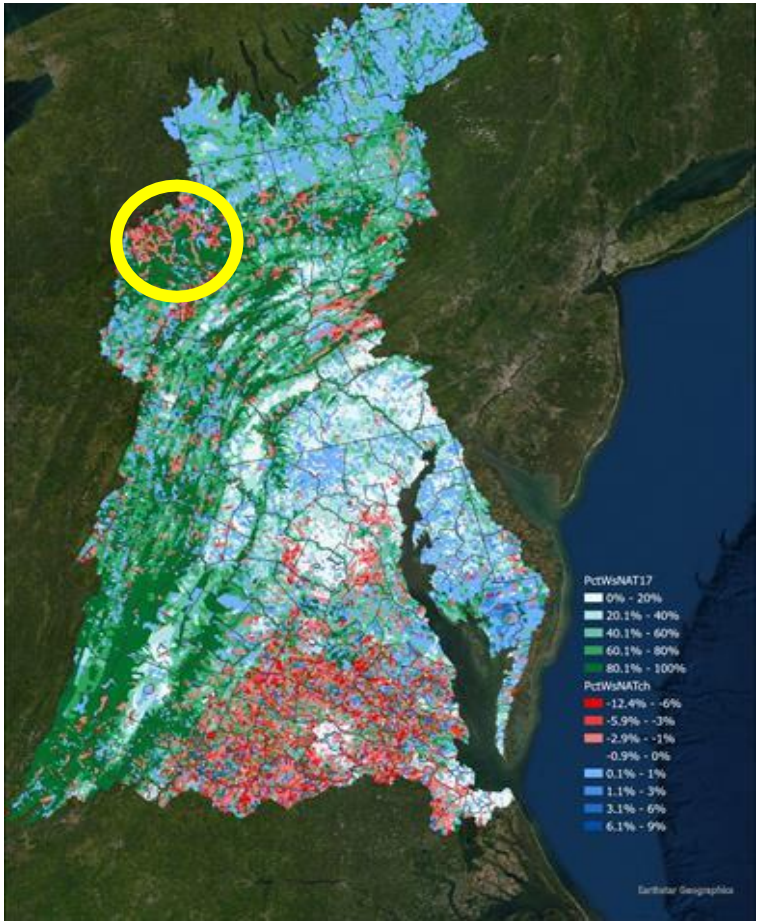


Anne Arundel County 2017 Tree Canopy

Tree Cover and Wetlands, 2017/18



Tree Cover and Wetland Change, 2013/14 - 2017/18



2013

2017

Land Use Change, 2013-17

Tree Cover Status and Change

FOR CUMBERLAND COUNTY, PA

41.6%
Total Percent of County with Tree Cover

$14+ Million
Annual Benefits provided by Tree Cover *(in reduced air pollution, stormwater, and carbon)*

433 Acres
Net Loss of Tree Cover from 2013/14 to 2017/18

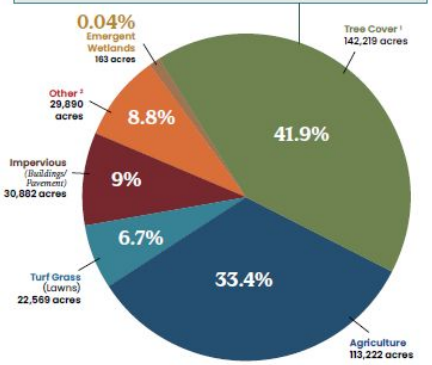
Where does tree cover occur in your county?

82% is in forest (116,180 acres)

1% is over impervious (2,128 acres)

11% is over turf grass (15,762 acres)

6% is other tree cover (8,149 acres)



341,668 ACRES OF LAND IN CUMBERLAND IN 2018

What are some benefits of tree cover in your county?

Total Air Pollution[3] Removal Value
9,665,973 lbs removed annually
$9,162,946 saved annually

[3] Total air pollution removal includes CO, NO2, O3, PM2.5, SO2, and PM10.

Gallons of Reduced Stormwater Runoff Value
560,088,604 gallons reduced annually
$5,004,953 saved annually

Carbon Sequestered Value
120,250 tons removed annually
$10,594 saved annually

Calculated based on 2018 tree cover data using: landscape.itreetools.org

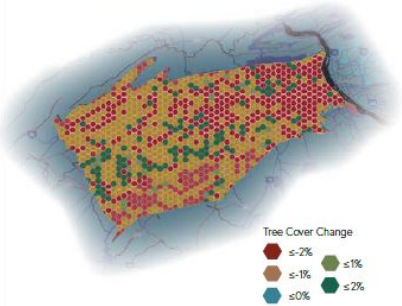
1. Tree cover includes all trees occurring on all land uses, such as individual trees found over turf, impervious, agricultural, wetlands, or other lands. It also includes areas of "forest", defined in this dataset as patches of tree cover 1 acre or greater, with a minimum patch width of 240 feet.

2. Other includes a mixture of non-treed land uses not captured in the main pie chart categories. See the user guide for detailed definitions of "other" and all the land use categories.

CHESAPEAKETREES.NET
PUBLISHED AUGUST 2022

Tree Cover Status and Change

FOR CUMBERLAND COUNTY, PA



How is tree cover changing on developed and developing lands?

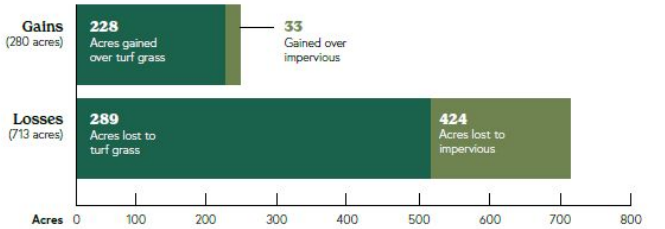
Understanding how your tree cover changes over time can inform the sustainable management of forests and community trees. The map to the left shows where your county has lost and gained tree cover from 2013/14 to 2017/18.

Tree cover can be lost quickly due to human activities (e.g. construction) or natural events (e.g., severe weather).

Tree cover can be gradually increased through tree planting and natural regrowth, but maintaining this new growth requires long-term investments.

Since mature, healthy tree provide significantly greater community benefits than newly planted tree, it is important to both preserve existing tree cover and seek opportunities to grow new trees and forests. Local land use planning, ordinances, and tree programs play a critical role!

Tree Cover Change from 2013/2014 to 2017/2018



Learn More:

Chesapeake Tree Canopy Network
Links to county fact sheets, user guides, map viewers, datasets, and more

Tree Equity Score
Explore maps of how tree benefits are distributed across communities

Capitalizing on the Benefits of Trees
A slideshow for local leaders featuring tree benefits, case studies and resources

State Urban and Community Forestry Assistance
(State contact and website)

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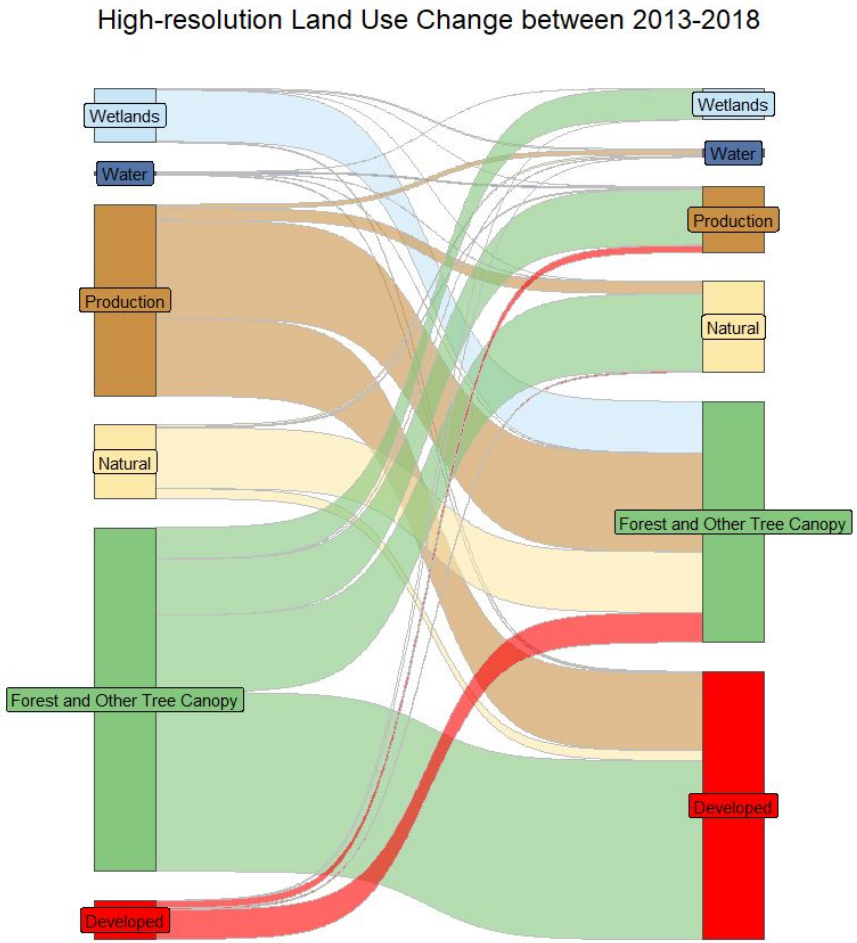
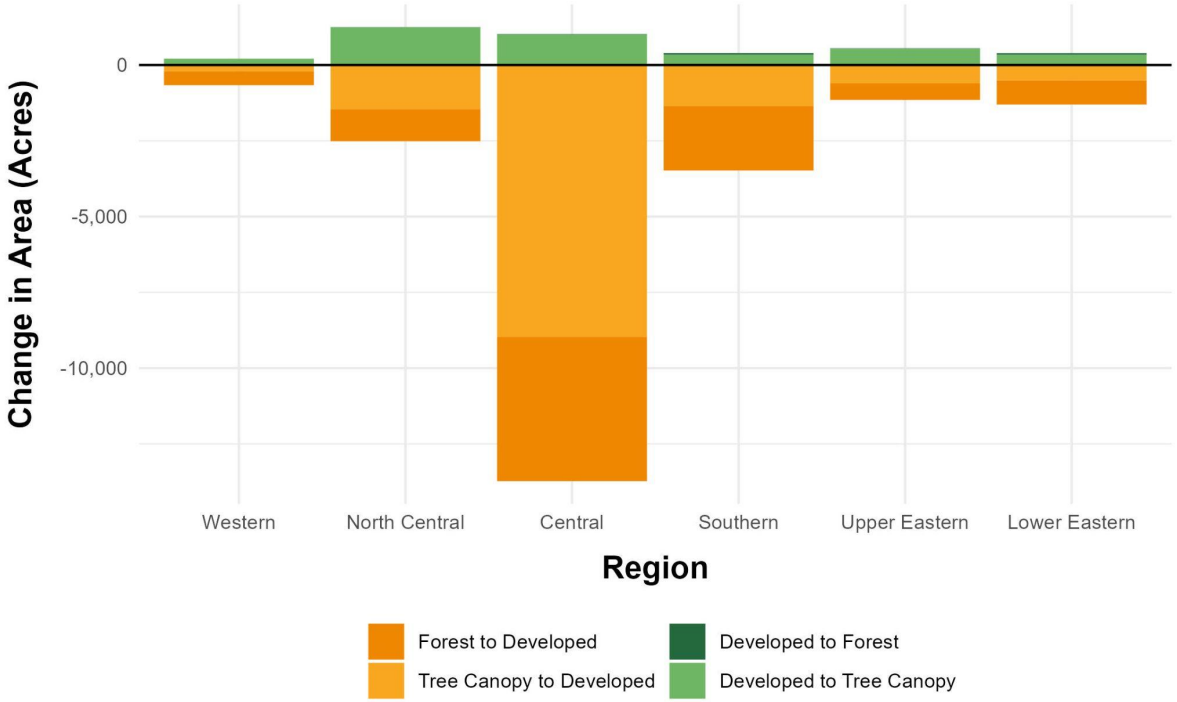


Change transitions in Maryland

Of all areas of change between 2013 and 2018, more areas transitioned into developed than any other class. Forest changes were evenly distributed between development and other changes such as natural succession and planned timber harvest.



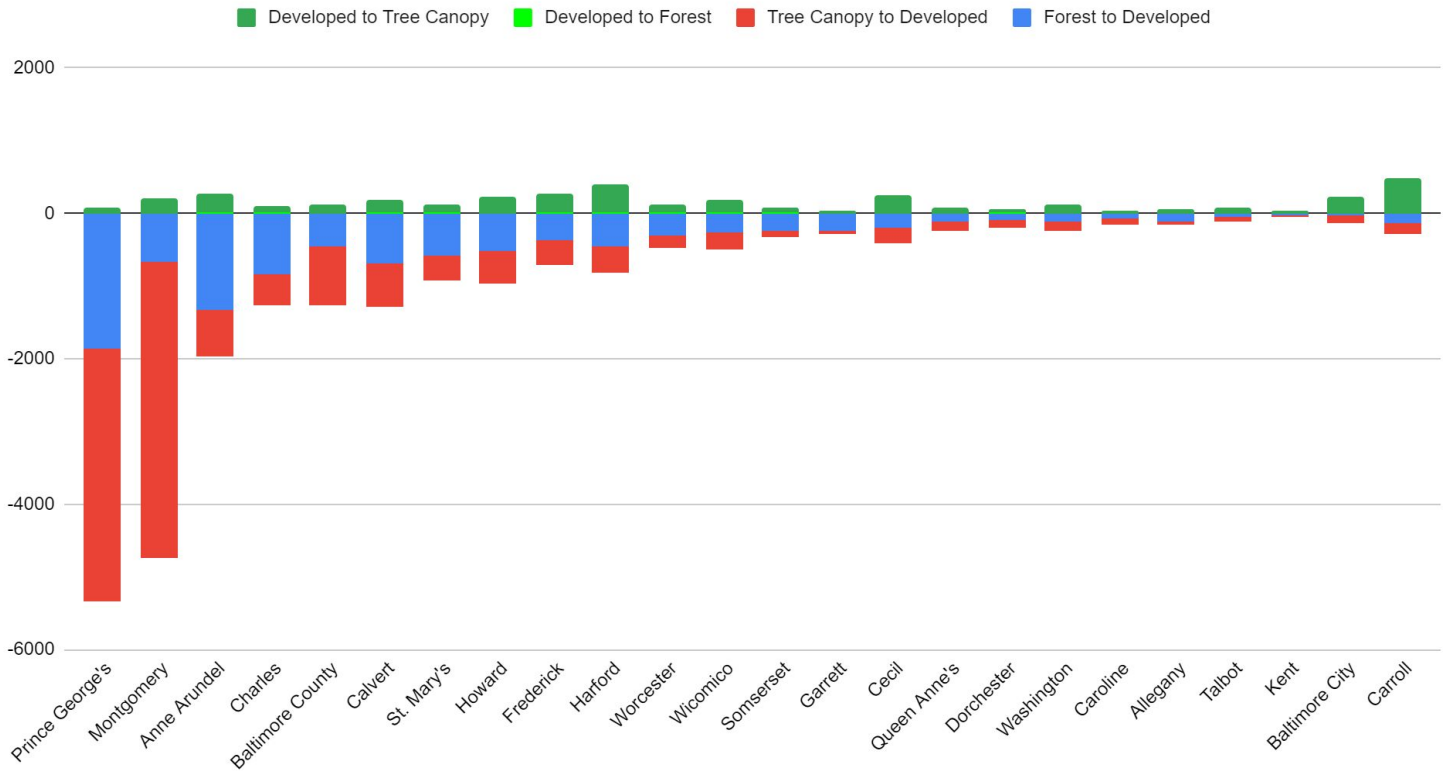
Change transitions in Maryland

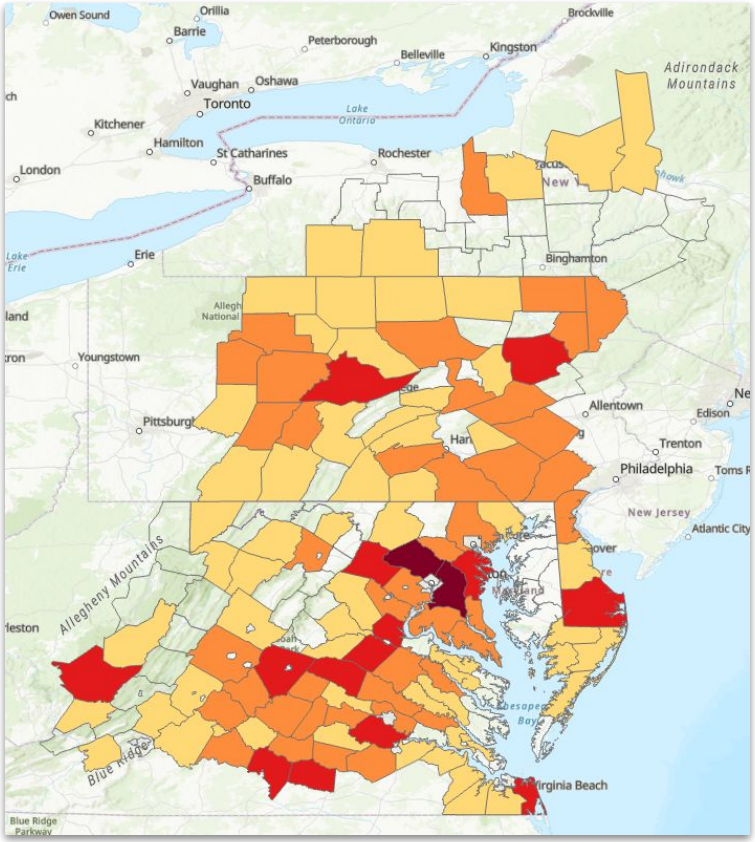
Central Maryland led the state in transitions of forest to developed classes including impervious (roads, structures) and pervious (primarily lawn/turf) classes.

Montgomery and Prince George's county had the most forest and tree canopy lost to development; Prince George's and Anne Arundel County lost the most forest to development, while Montgomery county led in tree canopy outside forest loss.

Forest and Tree Canopy Change Associated with Development

Total loss and gain to/from forest and tree canopy (acres)





Forest Insights

Net loss of total tree canopy to development

Change is concentrated in urbanizing counties

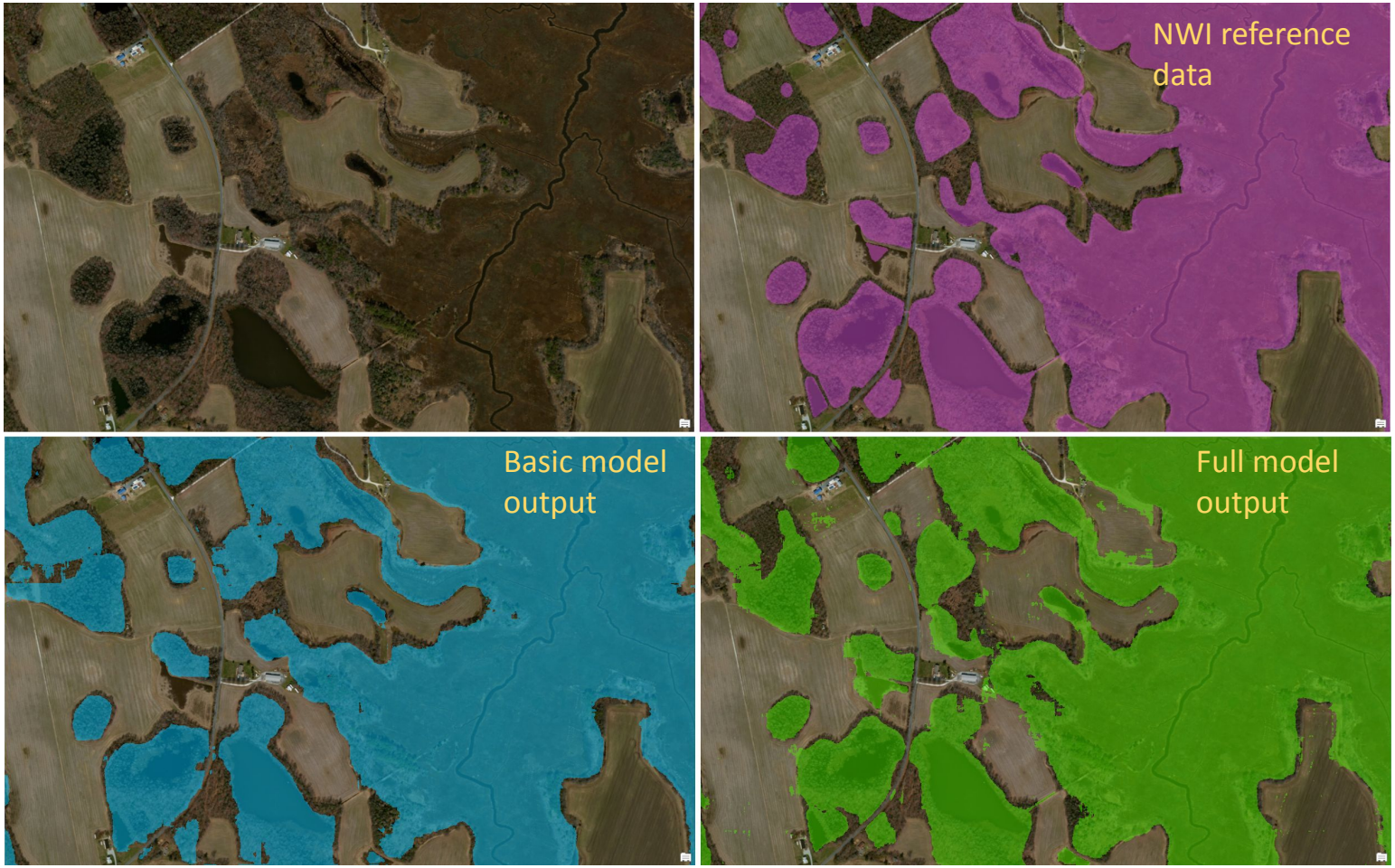
Acres

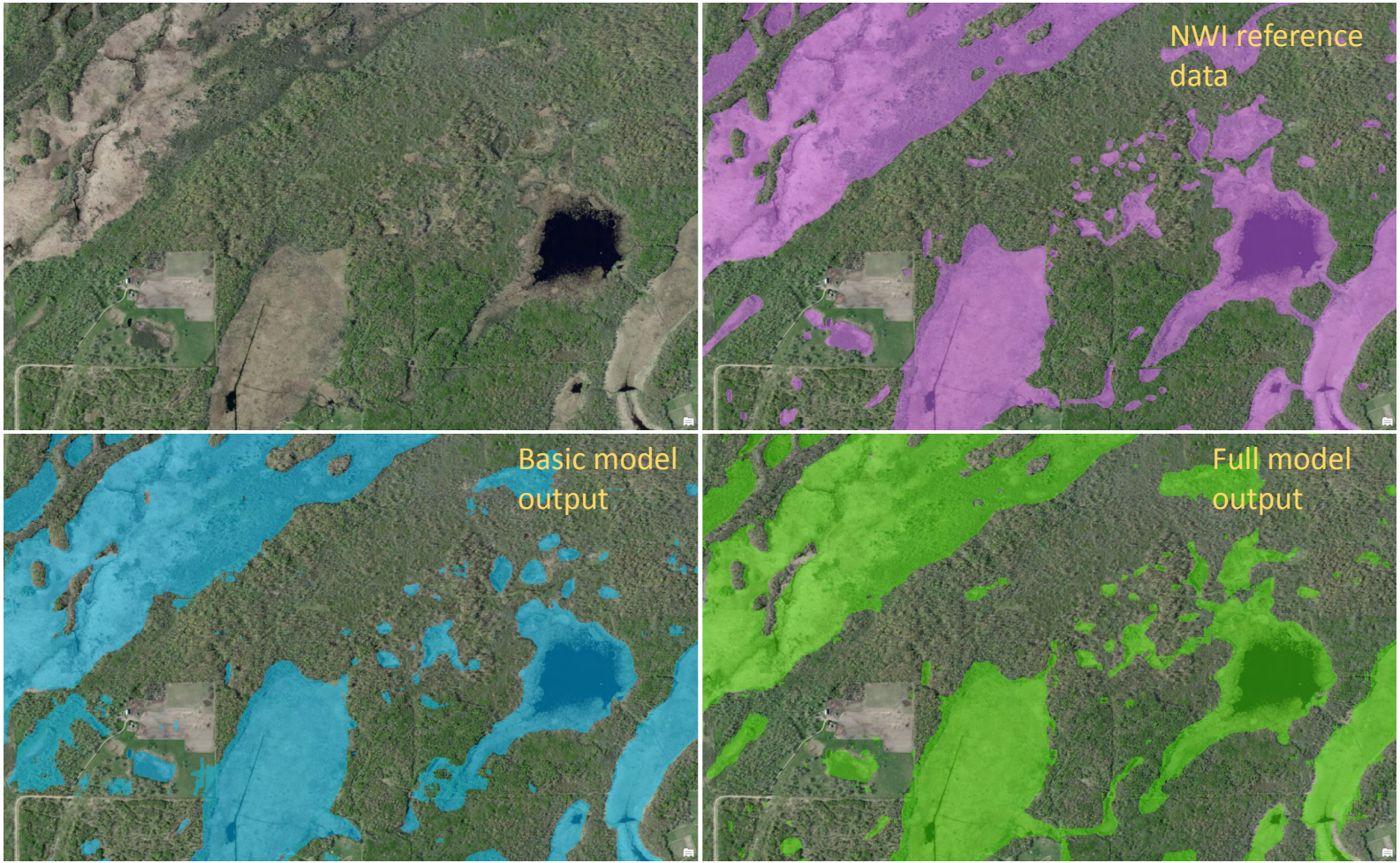
- ≤ -4,500
- ≤ -1,300
- ≤ -600
- ≤ -200
- ≤ 200

Deep Learning for Wetlands Mapping

- Identifying the footprint of wetlands based on aerial/satellite imagery and training data
- Starting place = Sentinel imagery + NWI wetlands delineation
- Goal: train a model that can use 10m data to identify wetlands, as told by NWI

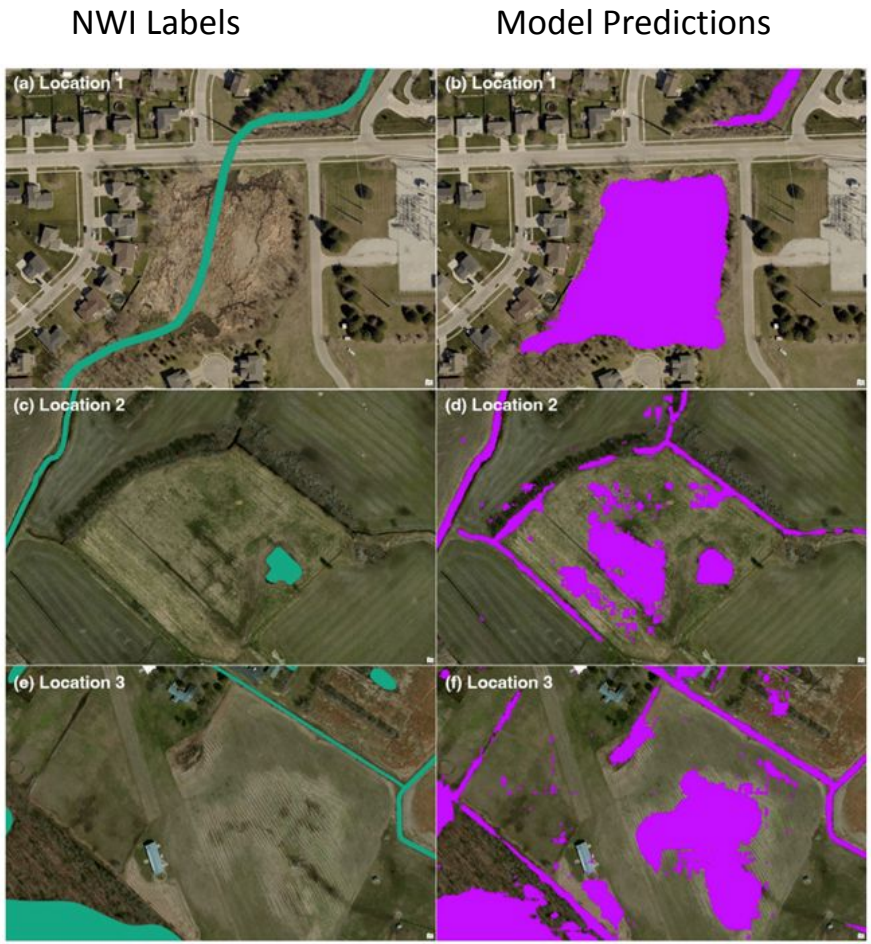
For more information, view our StoryMap!


NWI reference data
Basic model output
Full model output


NWI reference data
Basic model output
Full model output

Input Data and Accuracy Assessment

- Need for better ground-truthed input data to train an accurate model
- Hard to track and determine true accuracy of the model when the “truth” is itself inaccurate
- Our model is delineating more accurately based on underlying visual wetness



What's Next?

1. Expand the model to cover large continuous area (i.e. Chesapeake watershed)
2. Experiment with input data, labels, and reference imagery for determining most accurate model
3. Explore classification of identified wetlands
4. Explore mapping change in wetland areas over time

Next Steps for High-resolution Data Development and Applications

CBP Interaction:

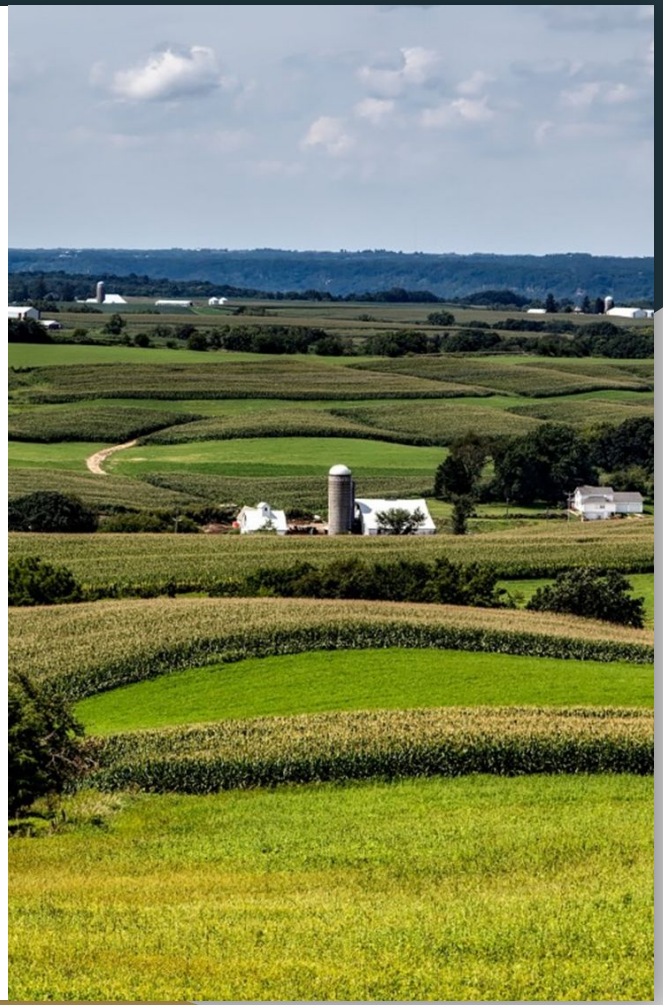
- GITs: stakeholder interaction
- BM and PSCO: Members who are involved in funding policies

Short-term actions

- Promote use of existing tools
- Ecosystem services for selected BMPs

Longer-term action

- Enhance tools with new land use data
- Connections between tools
- Provide stakeholder support
- Would require more resources



Chesapeake Conservancy

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