Forest and Community Tree Cover Data, Trends, and Interpretation for the Chesapeake Bay Watershed

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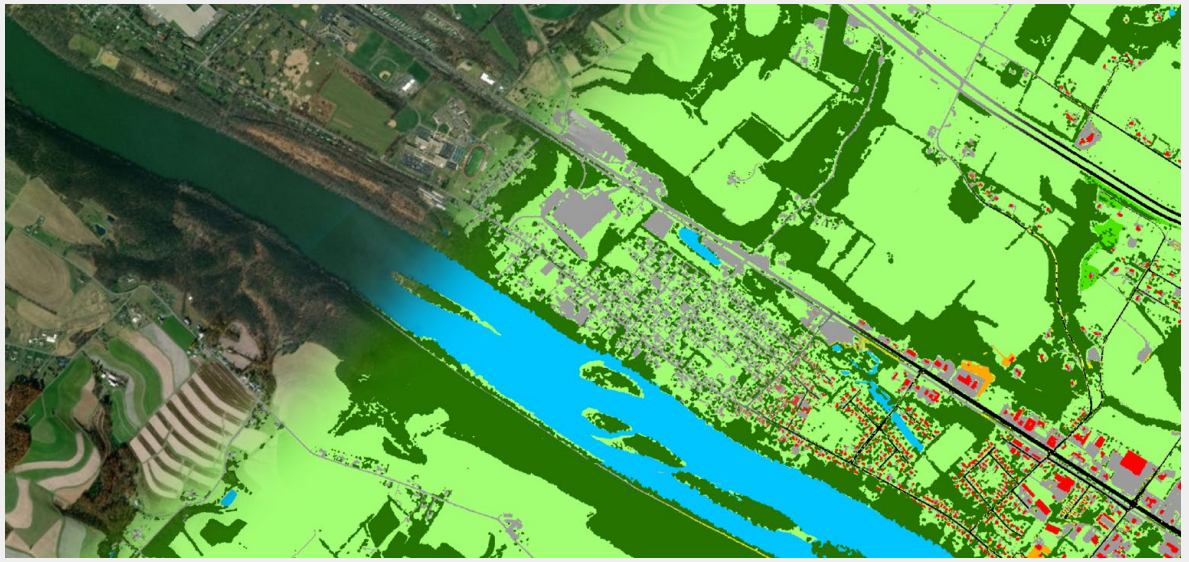
U.S. Department of the Interior
U.S. Geological Survey

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.

Translating Land Cover into Land Use

Data Preparation Ancillary
- Tax Parcels (property boundaries)
- National Land Cover Dataset (NLCD) 2016
- Cropland Data Layer (CDL 2018)
- Local Land Use and Zoning

Model Data
- Land Cover (2017/18)

Wetlands and Water Ancillary
- National Hydrography Dataset (NHD) 1:24k
- Floodplain and Channel Evaluation Toolkit (FACET) Stream Network
- Geographic Names Information System (GNIS)
- National Wetlands Inventory (NWI)
- National Oceanic and Atmospheric Administration's (NOAA) Sea Level Rise

Other Ancillary
- Census Urban Area Clusters 2010
- Digitized Extractive Mines
- Coal Mining Operation (Pennsylvania)
- Public Schools
- Solar
- State Timber Harvest (DE, ND, PA, VA, WV)
- Land Use A & B (NAVTEQ)
- Transmission Lines
- Digitized Landfills (2013/14 and 2017/18)
- Land Cover Monitoring, Assessment, and Projection (LCMAP)
- Poultry Houses
- Railways

Modules

Data Preparation → **General Land Use** (parcel-segment) → **Tree Canopy** (patch) → **Burn In / Rasterization**

Wetlands and Water → **Burn In / Rasterization**

Output Data

Land Use 2017/18 (1m raster)

Land use unit of analysis: parcel-segments

CBP Complete Land Use/Cover Classification (72 classes)

1. Water (13)
- 1.1 Estuarine/ Marine
- 1.2 Lentic (fresh)
  - 1.2.1 Lakes and reservoirs
  - 1.2.2 Riverine ponds
  - 1.2.3 Terrene ponds
- 1.3 Lotic
  - 1.3.1 Channels (24K density)
    - 1.3.1.1 Open Channel
    - 1.3.1.2 Tree Canopy over Channel
    - 1.3.1.3 Culverted
  - 1.3.2 Ditches
    - 1.3.2.1 Open Ditch
    - 1.3.2.2 Tree Canopy over Ditch
    - 1.3.2.3 Culverted
  - 1.3.3 Other Channelized Flow Features (OCFF)
    - 1.3.2.1 Open OCFF
    - 1.3.2.2 Tree Canopy over OCFF
    - 1.3.2.3 Culverted OCFF

2. Development (12)
- 2.1 Impervious
  - 2.1.1 Roads
  - 2.1.2 Structures
  - 2.1.3 Other Impervious
  - 2.1.4 Tree Canopy (TC) over Impervious
    - 2.1.4.1 TC over Roads
    - 2.1.4.2 TC over Structures
    - 2.1.4.3 TC over Other Impervious
- 2.2 Pervious
  - 2.2.1 Turf Grass
  - 2.2.2 Transitional- barren
  - 2.2.3 Suspended Succession
    - 2.2.3.1 Barren
    - 2.2.3.2 Herbaceous
    - 2.2.3.3 Scrub-shrub
  - 2.2.4 Tree Canopy over Turf Grass

3. Natural (forest-related) (9)
- 3.1 Forest (>= 1 acre, 240-ft width)
  - 3.1.1 Deciduous
  - 3.1.2 Evergreen
- 3.2 Other Tree Canopy
  - 3.1.1 Deciduous
  - 3.1.2 Evergreen
- 3.3 Harvested Forest (<= 3 years)
  - 3.3.1 Barren
  - 3.3.2 Herbaceous
- 3.4 Natural Succession (> 3 years)
  - 3.4.1 Barren
  - 3.4.2 Herbaceous
  - 3.4.3 Scrub-shrub

4. Production (16)
- 4.1 Agriculture
  - 4.1.1 Cropland
    - 4.1.1.1 Barren
    - 4.1.1.2 Herbaceous
  - 4.1.2 Pasture/Hay
    - 4.1.2.1 Barren
    - 4.1.2.2 Herbaceous
    - 4.1.2.3 Scrub-shrub
  - 4.1.3 Orchard/vineyard
    - 4.1.3.1 Barren
    - 4.1.3.2 Herbaceous
    - 4.1.3.3 Scrub-shrub
  - 4.1.4 Animal Operations
    - 4.1.4.1 Impervious
    - 4.1.4.2 Barren
    - 4.1.4.3 Herbaceous
- 4.2 Solar fields
  - 4.2.1 Impervious
  - 4.2.2 Pervious
    - 4.2.2.1 Barren
    - 4.2.2.2 Herbaceous
    - 4.2.2.3 Scrub-shrub
- 4.3 Extractive (active mines)
  - 4.3.1 Barren

5. Wetlands and Water Margins (22)
- 5.1 Tidal
  - 5.1.1 Barren
  - 5.1.2 Herbaceous
  - 5.1.3 Scrub-shrub
  - 5.1.4 Other Tree Canopy
    - 5.1.4.1 Deciduous
    - 5.1.4.2 Evergreen
  - 5.1.5 Forest
    - 5.1.5.1 Deciduous
    - 5.1.5.2 Evergreen
- 5.2 Riverine (Non-tidal)
  - 5.2.1 Barren
  - 5.2.2 Herbaceous
  - 5.2.3 Scrub-shrub
  - 5.2.4 Other Tree Canopy
    - 5.2.4.1 Deciduous
    - 5.2.4.2 Evergreen
  - 5.2.5 Forest
    - 5.2.5.1 Deciduous
    - 5.2.5.2 Evergreen
- 5.3 Terrene/Isolated (Non-tidal)
  - 5.3.1 Barren
  - 5.3.2 Herbaceous
  - 5.3.3 Scrub-shrub
  - 5.3.4 Other Tree Canopy
    - 5.3.4.1 Deciduous
    - 5.3.4.2 Evergreen
  - 5.3.5 Forest
    - 5.3.5.1 Deciduous
    - 5.3.5.1 Evergreen
- 5.4 Bare shore

1. **Impervious, Roads**
   - 2.1 Impervious
     - 2.1.1 Roads

2. **Impervious, Structures**
   - 2.1 Impervious
     - 2.1.2 Structures

3. **Impervious, Other**
   - 2.1 Impervious
     - 2.1.3 Other Impervious
   - 4.2 Solar fields
     - 4.2.1 Impervious
   - 4.3 Extractive (active mines)

4. **Tree Canopy Over Impervious**
   - 2.1 Impervious
     - 2.1.4 Tree Canopy over Impervious

5. **Turf Grass**
   - 2.2 Pervious, Developed
     - 2.2.1 Turf Grass

6. **Tree Canopy over Turf Grass**
   - 2.2 Pervious. Developed
     - 2.2.4 Tree Canopy over Turf Grass

7. **Pervious Developed, Other**
   - 2.2 Pervious. Developed
     - 2.2.2 Transitional- barren
     - 2.2.3 Suspended Succession
   - 4.2 Solar fields
     - 4.2.2 Pervious

8. **Forest (all)**
   - 3.1 Forest (non-wetland)
   - 5.1 Tidal
     - 5.1.5 Forest (>= 1 acre, 240-ft width)
   - 5.2 Riverine (Non-tidal)
     - 5.2.5 Forest (>= 1 acre, 240-ft width)
   - 5.3 Terrene/Isolated (Non-tidal)
     - 5.3.5 Forest (>= 1 acre, 240-ft width)

9. **Tree Canopy, Other**
   - 3.2 Other Tree Canopy
   - 5.1 Tidal
     - 5.1.4 Other Tree Canopy
   - 5.2 Riverine (Non-tidal)
     - 5.2.4 Other Tree Canopy
   - 5.3 Terrene/Isolated (Non-tidal)
     - 5.3.4 Other Tree Canopy

10. **Harvested Forest**
    - 3.3 Harvested Forest (<= 3 years)

11. **Natural Succession**
    - 3.4 Natural Succession (> 3 years)
    - 5.4 Bare shore, Water Margins

12. **Wetlands, Tidal non-forested**
    - 5.1 Tidal Wetlands
      - 5.1.1 Barren
      - 5.1.2 Herbaceous
      - 5.1.3 Scrub-shrub

13. **Wetlands, Riverine Non-forested**
    - 5.2 Riverine Wetlands (Non-tidal)
      - 5.1.1 Barren
      - 5.1.2 Herbaceous
      - 5.1.3 Scrub-shrub

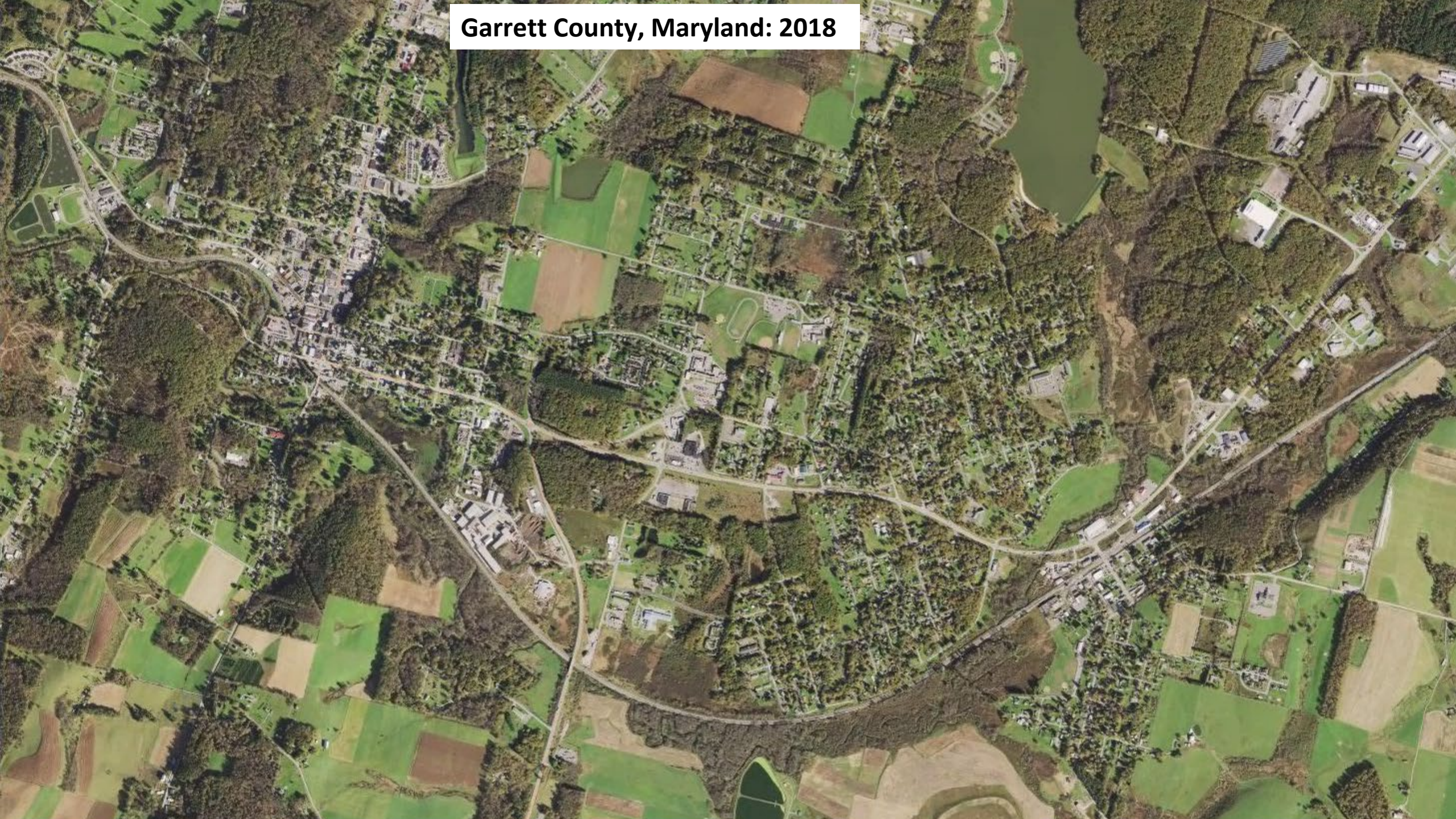
14. **Wetlands, Terrene Non-forested**
    - 5.3 Terrene/Isolated Wetlands (Non-tidal)
      - 5.1.1 Barren
      - 5.1.2 Herbaceous
      - 5.1.3 Scrub-shrub

15. **Extractive**
    - 4.3 Extractive (active mines)
      - 4.3.1 Barren
      - 4.3.2 Impervious

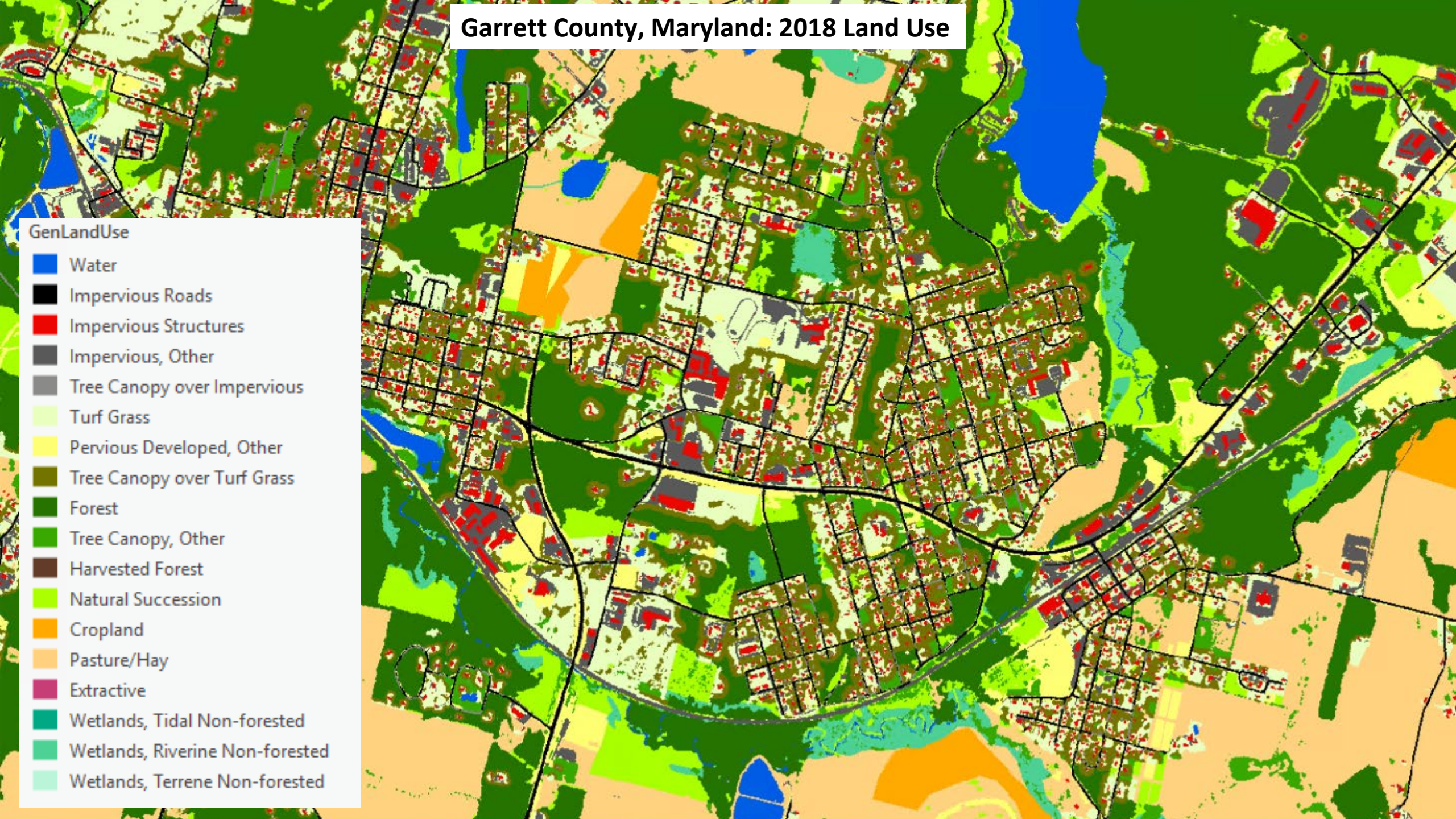
16. **Cropland**
    - 4.1 Agriculture
      - 4.1.1 Cropland
      - 4.1.3 Orchard/vineyard

17. **Pasture/Hay**
    - 4.1 Agriculture
      - 4.1.2 Pasture/Hay

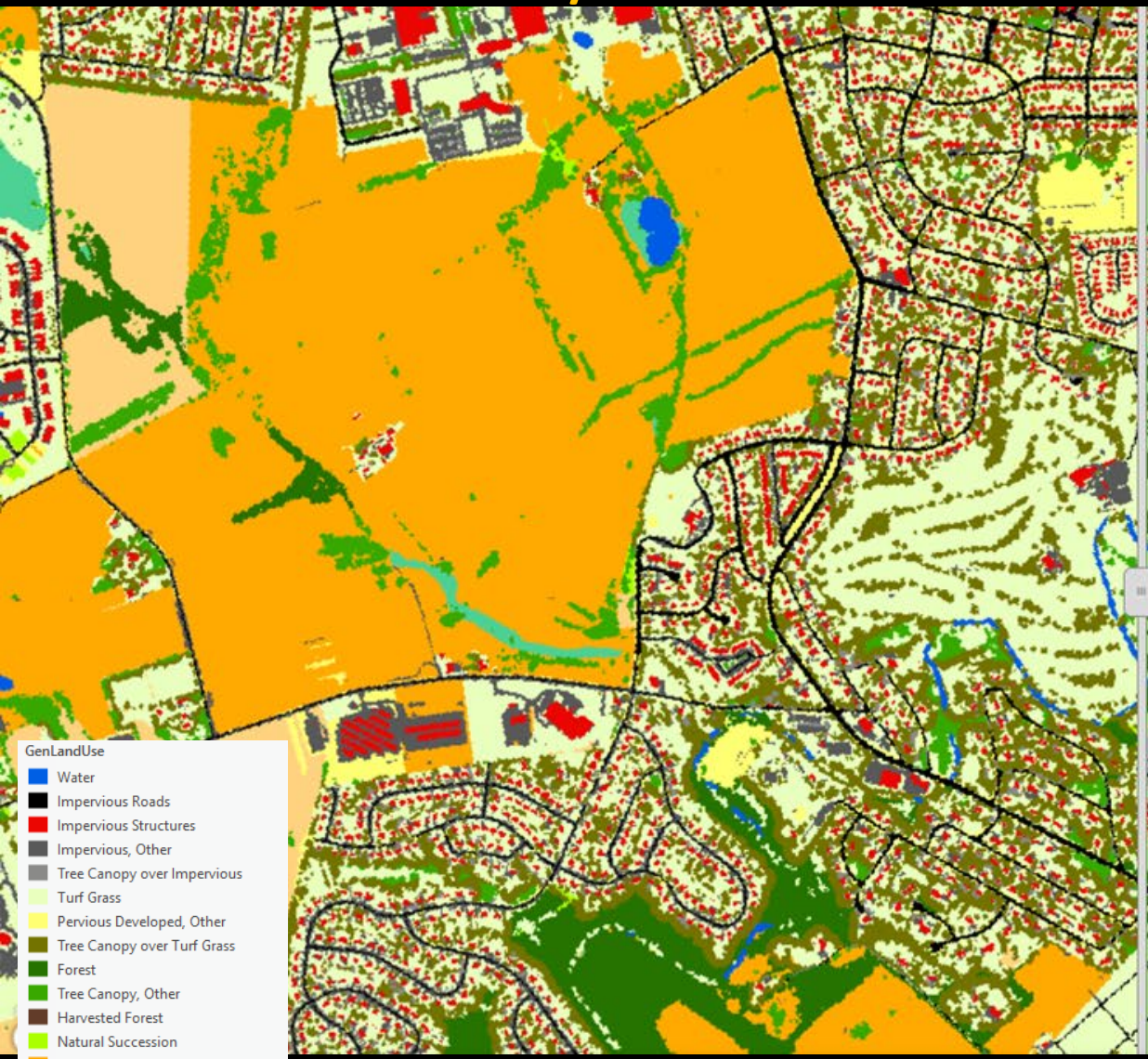
18. **Water**
    - 1.1 Estuarine/ Marine
    - 1.2 Lentic
    - 1.3 Lotic


Garrett County, Maryland: 2018

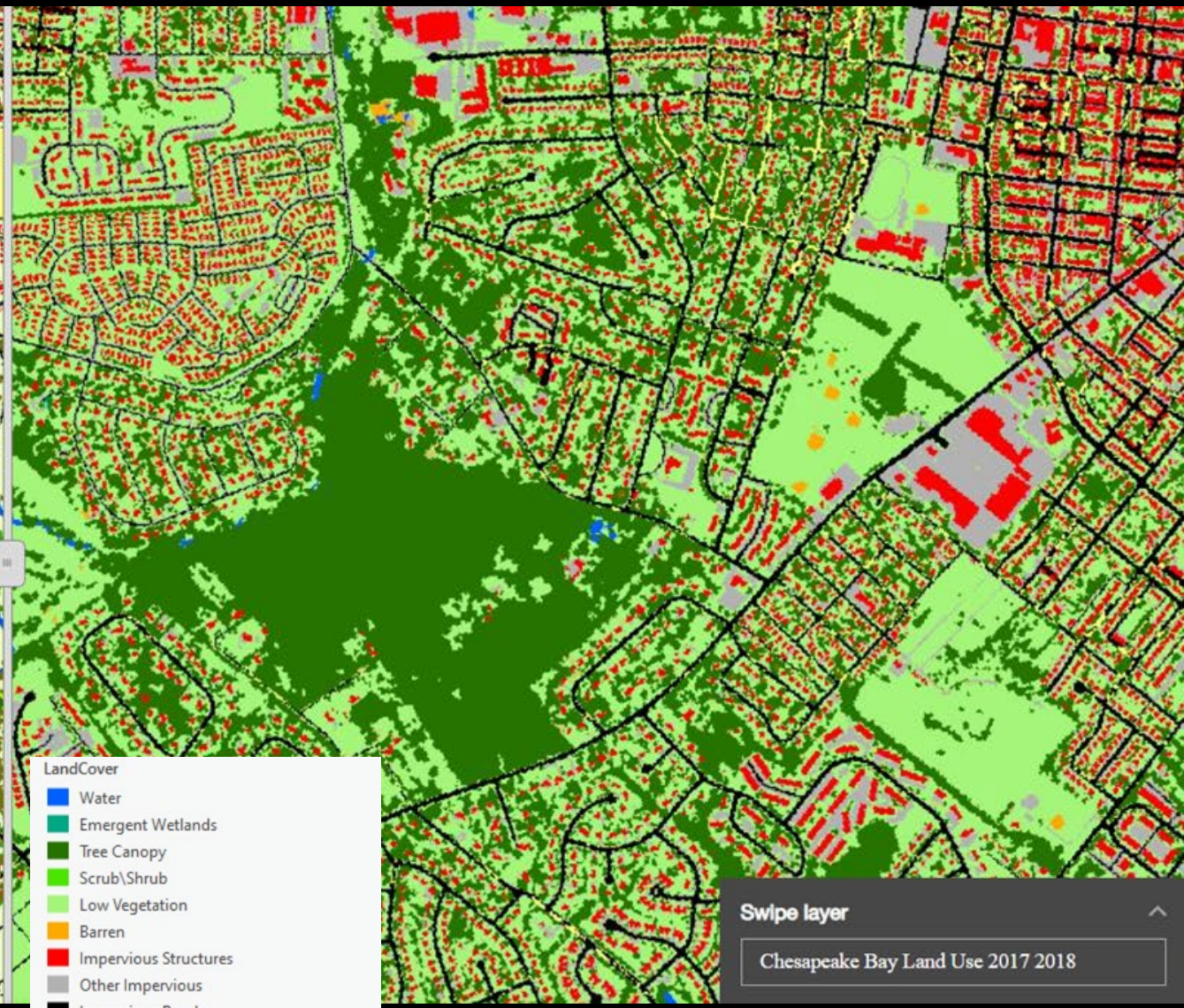
Garrett County, Maryland: 2018 Land Use



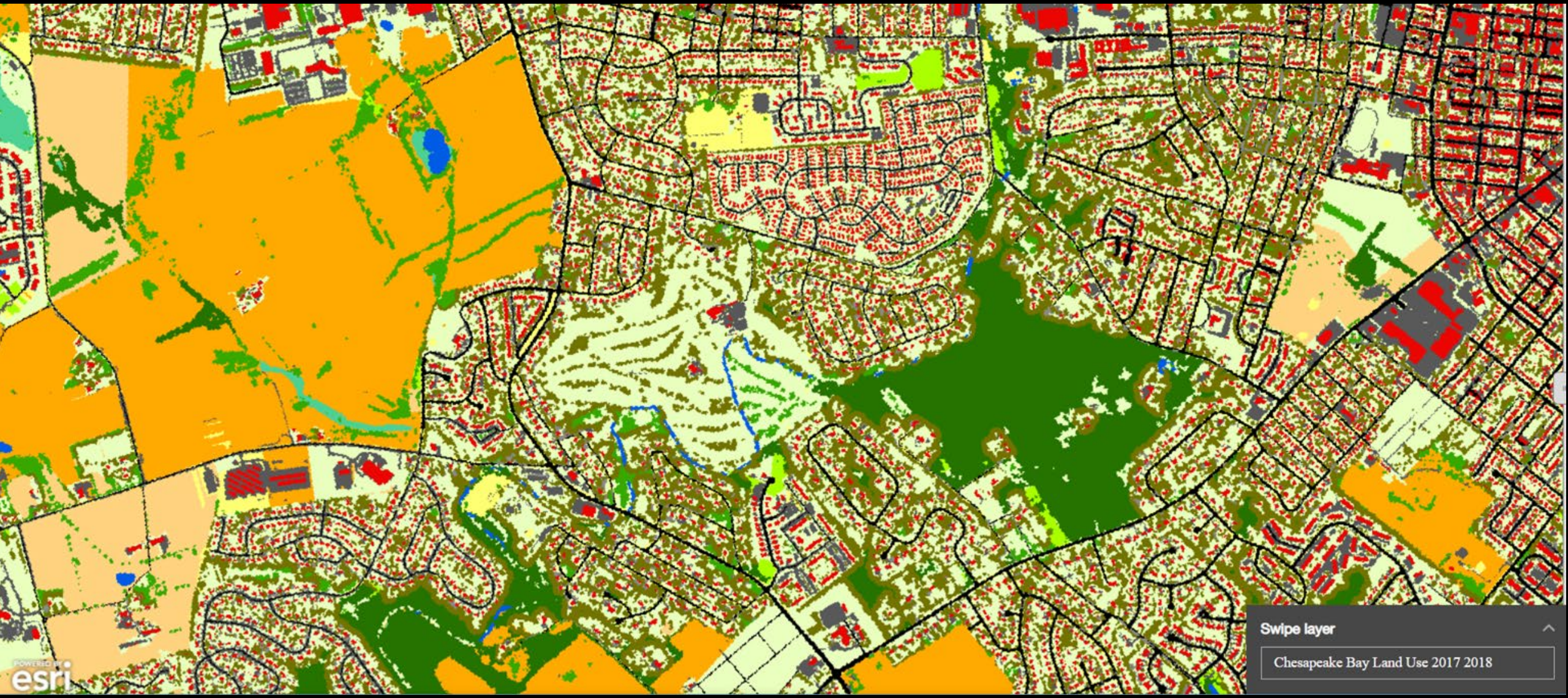
Land Use/Land Cover



Land Cover



Land Use/Land Cover



https://cicgis.org/portal/apps/webappviewer/index.html?id=bdf7ca3e249a40fd9a9d83d6e16100ea&extent=-88.252,35.0981,-62.3462,45.7489

Land Use/Land Cover Change

http://lulc-1718.cicapps.org/

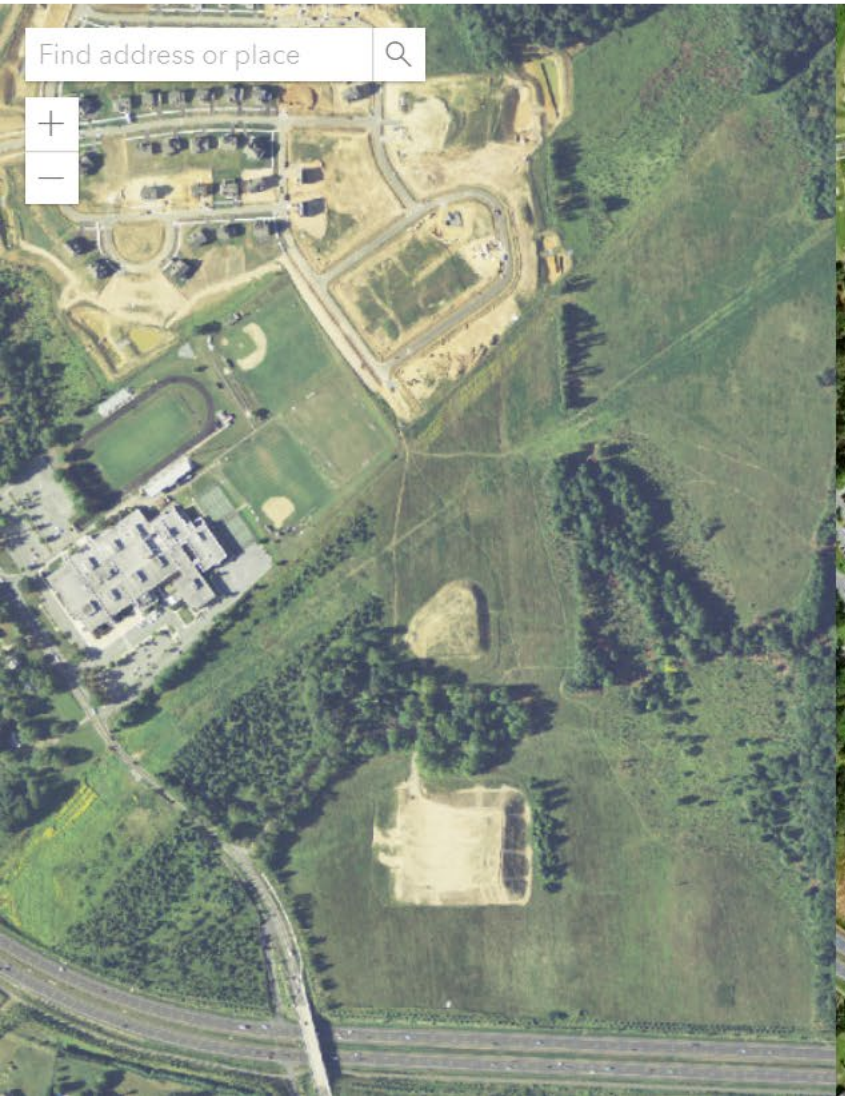
NAIP 2013/2014

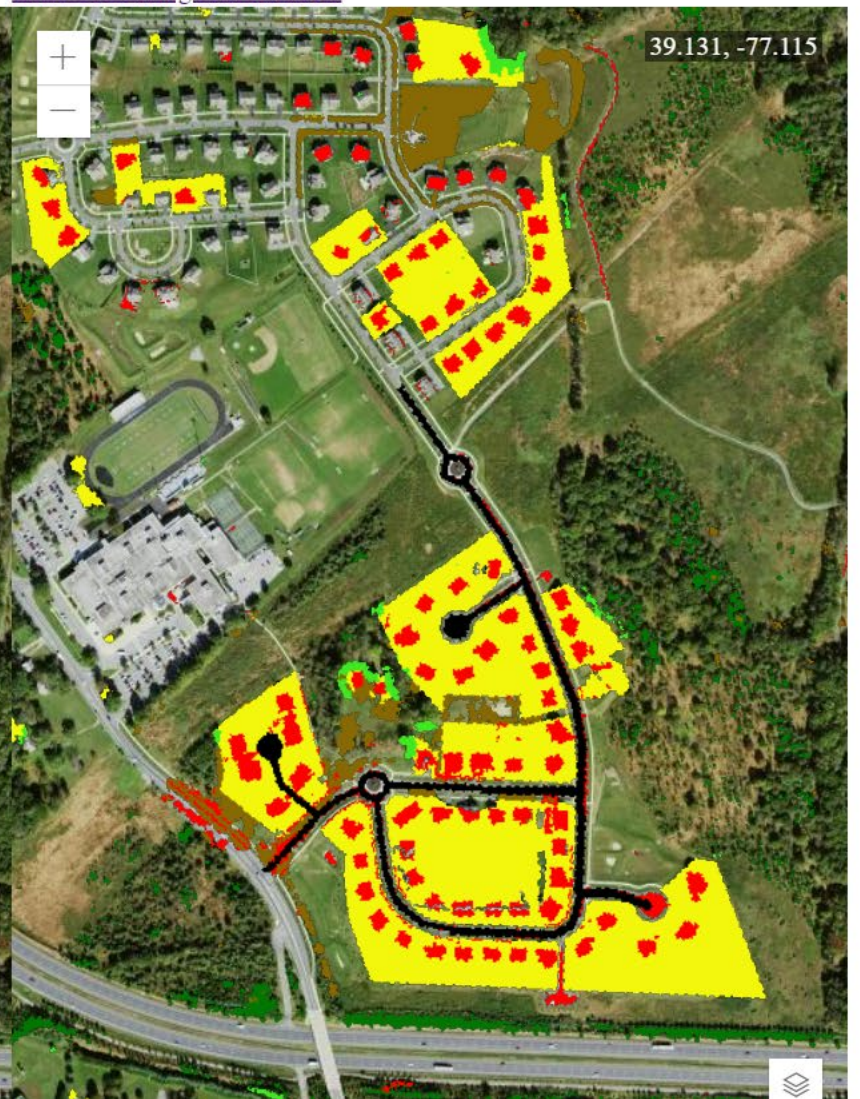
NAIP 2017/2018

Version 1 Land Use Change

NAIP 2017/2018

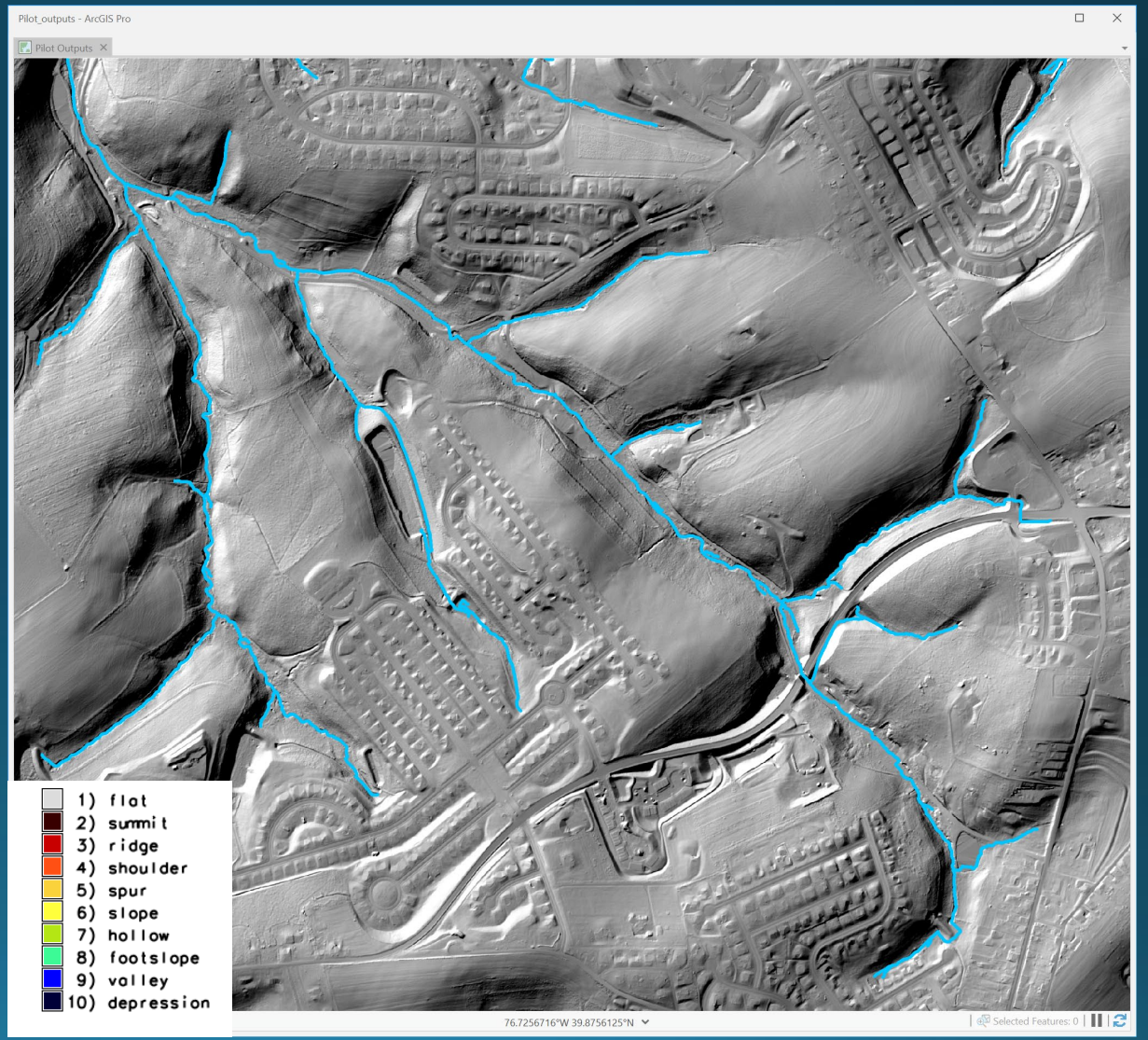
Land Use Change Pivot Tables



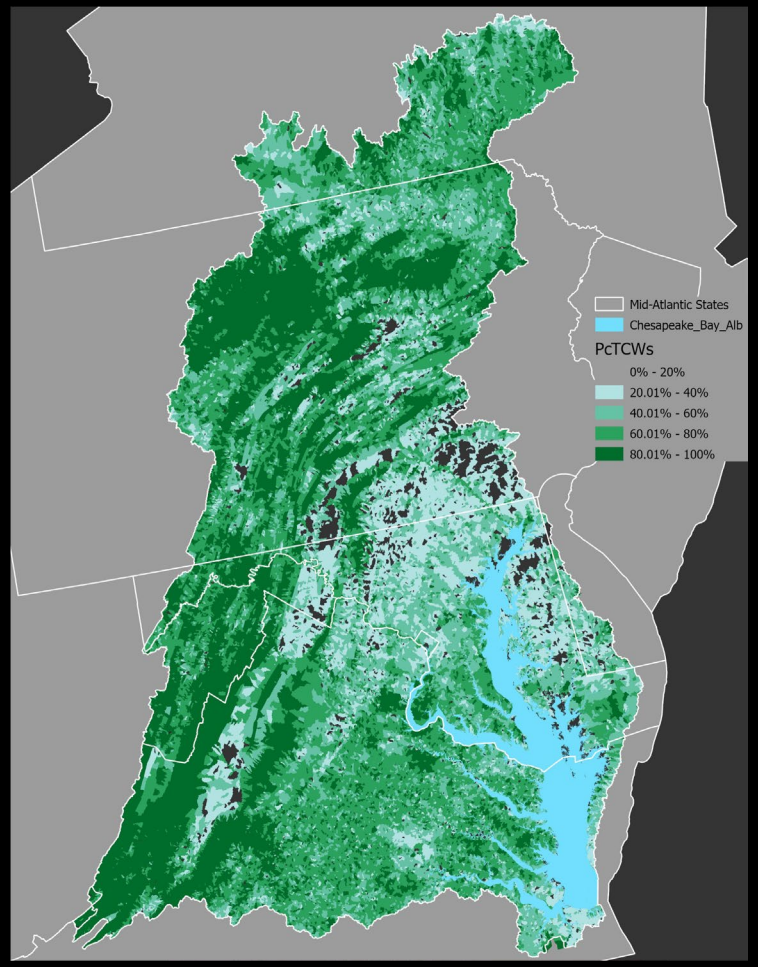


Hyper-res Streams (to be added to 2021/22 LULC)

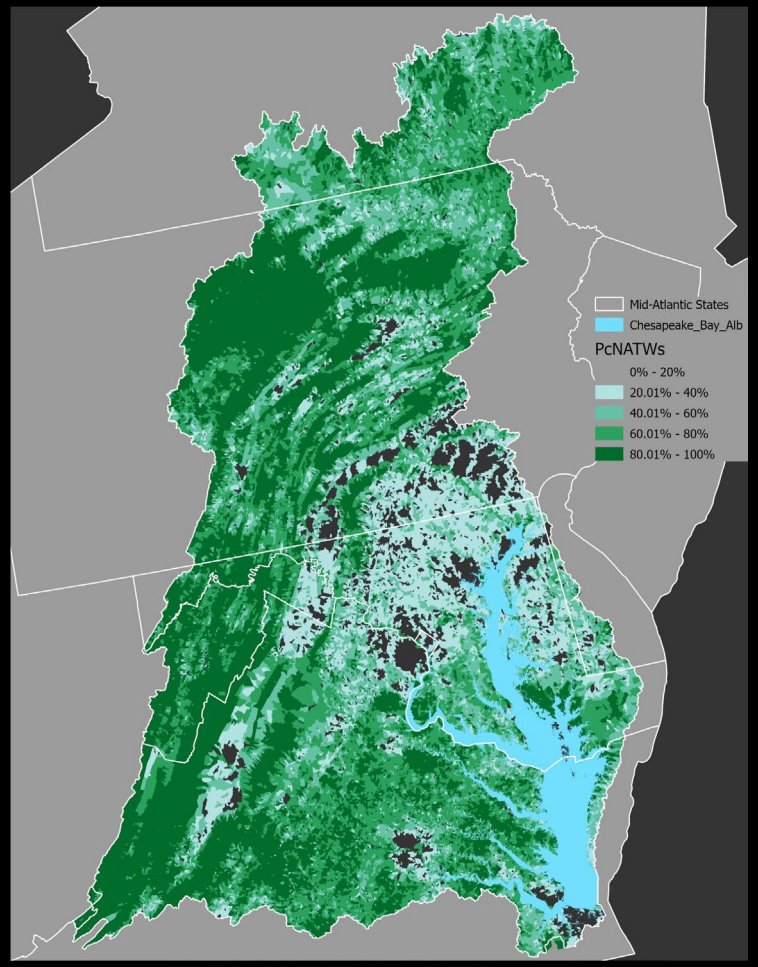
1. Lidar elevation
2. Valley-scale classification
3. Channel-scale classification
4. Extract valley network
5. Extract channels using valley network
6. QAQC channel skeleton
7. Connect stream network



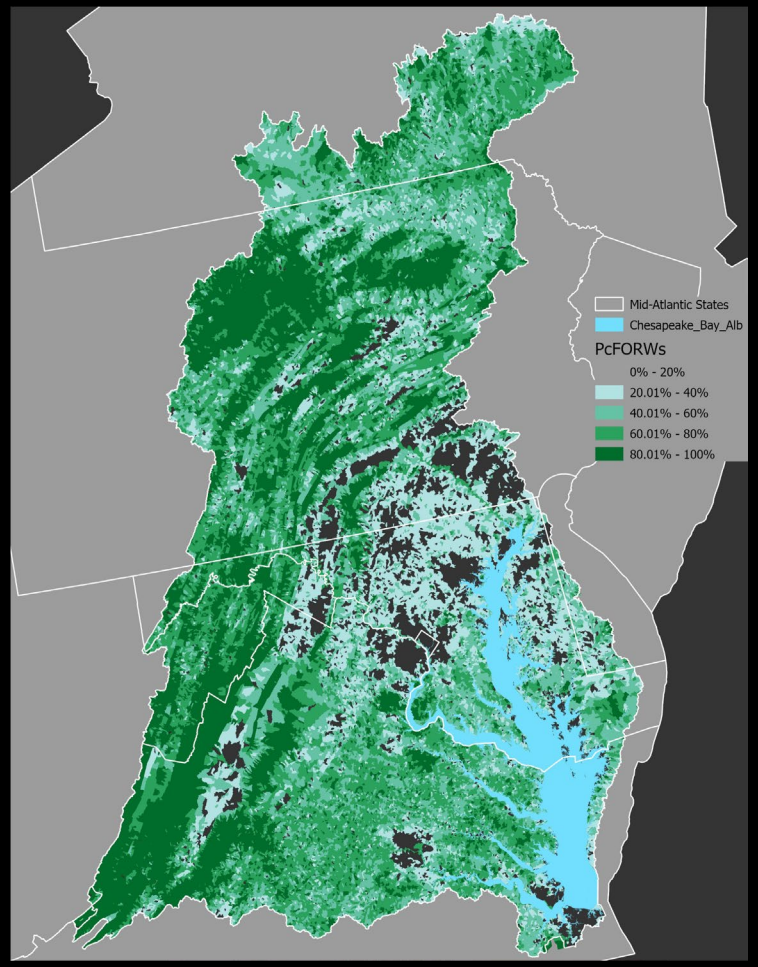
Tree Cover, Natural Land, and Forest Cover Indicators 2017/2018



Tree Cover includes all standing trees, including those in developed areas

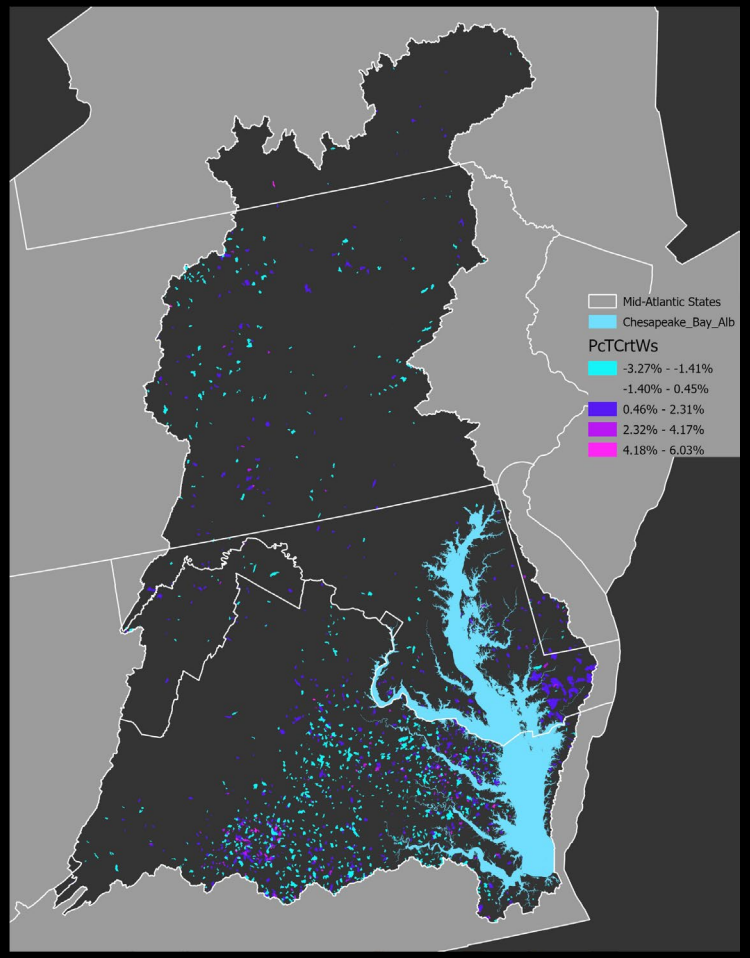


Natural lands exclude trees in developed areas but includes successional lands

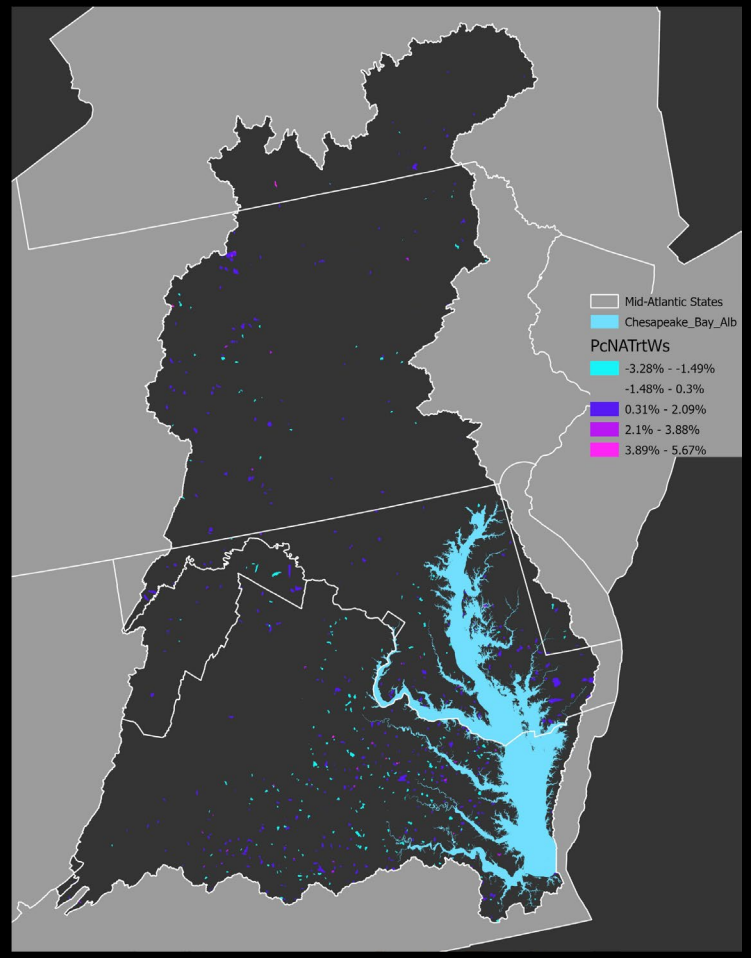


Forest cover is most restrictive, excluding timber harvests and trees in developed areas

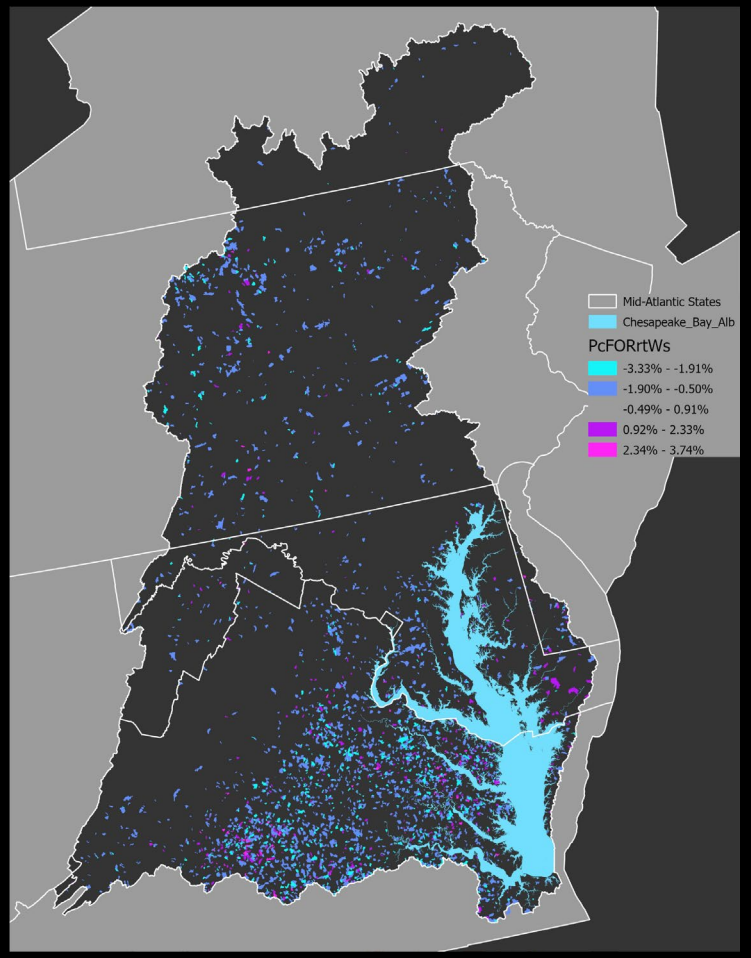
Tree Cover, Natural Land, and Forest Change Indicators 2013/14 to 2017/18



Tree cover change highlights changes due to forestry and urbanization, excluding fragmentation



Natural land change minimizes effects of forestry and urbanization but includes wetland change



Forest change highlights forestry and urbanization, including all change resulting in fragmentation

Tree Cover Net Change: - 267,345 acres (=1.1%)
Chesapeake Bay Watershed

2013/14-2017/18	ROAD	IMPS	IMPO	TCIS	TURF	TCTG	PDEV	FORE	TCOT	HARF	NATS	CROP	PAST	EXTR	TDLW	RIVW	TERW	WATR	Decrease
ROAD	-	13.6	338.5	696.1	73.6	65.6	205.6	137.8	74.6	1.2	17.2	11.2	13.6	3.9	0.2	1.7	0.0	2.3	1,656.6
IMPS	1.3	-	937.4	508.2	277.2	87.7	143.4	6.7	1.8	0.9	37.4	75.1	84.0	2.4	0.1	0.2	0.0	0.8	2,164.6
IMPO	515.9	3,173.2	-	1,587.1	4,334.1	304.6	1,288.5	165.6	60.1	102.4	784.9	652.1	1,331.0	1.5	20.6	25.0	4.6	34.6	14,385.6
TCIS	41.7	485.1	689.5	-	2,445.8	-	1,598.7	-	-	180.5	408.2	98.1	184.0	6.1	3.5	6.6	0.5	0.9	6,149.4
TURF	0.0	827.8	5,558.2	0.0	-	8,513.5	1,089.0	107.3	106.5	20.7	126.8	3.1	7.8	724.6	-	-	-	-	17,085.2
TCTG	13.5	929.8	4,143.3	10.6	11,096.1	-	783.1	-	-	92.6	421.7	245.7	538.9	9.0	-	-	-	2.1	18,286.4
PDEV	1,129.6	4,377.1	6,865.1	0.0	15,251.3	48.5	-	304.4	33.3	221.0	417.5	142.2	79.3	1,270.4	-	-	-	100.9	30,240.6
FORE	1,160.9	2,764.4	8,917.9	732.0	13,095.7	28,220.6	28,107.2	-	22,045.6	175,564.1	81,474.4	19,557.1	23,185.7	4,065.8	1,380.6	5,567.7	193.2	296.9	416,329.8
TCOT	122.7	951.7	2,338.9	0.0	2,068.1	2,031.5	2,341.2	-	-	788.2	2,277.8	3,075.5	4,566.3	386.3	108.3	250.3	26.6	42.2	21,375.5
HARF	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	-	-	-	0.2
NATS	63.1	148.9	476.6	0.4	3,481.5	370.7	825.6	76,425.3	4,388.8	4,294.5	-	545.9	356.2	500.6	-	-	-	1,089.7	92,967.7
CROP	500.4	3,018.3	8,368.9	0.2	4,030.5	165.3	2,513.9	11,299.2	3,088.3	1,367.3	2,068.6	-	125.9	1,182.5	-	-	-	779.8	38,508.9
PAST	307.3	2,252.7	9,606.9	0.1	6,561.6	184.7	3,857.2	13,162.5	8,983.8	1,631.2	4,035.2	122.6	-	1,232.2	-	-	-	401.7	52,339.8
EXTR	-	-	-	-	-	-	0.1	-	-	-	0.0	0.0	0.0	-	-	-	-	-	0.1
TDLW	2.4	4.2	91.5	0.0	1.0	-	-	1,745.6	161.6	7.6	0.0	-	-	0.2	-	-	-	72.7	2,086.8
RIVW	9.2	30.8	104.3	0.0	167.3	-	-	7,498.9	512.4	207.8	0.0	-	-	20.2	-	-	-	156.1	8,706.9
TERW	2.2	8.7	42.9	-	40.8	1.9	28.0	629.1	85.5	10.6	11.1	15.9	4.6	15.0	-	-	-	36.2	932.6
WATR	1.7	5.0	130.1	0.0	50.5	15.0	64.7	75.3	152.6	0.0	66.3	71.1	73.0	213.2	27.8	22.4	6.6	-	975.3
Increase	3,871.9	18,991.4	48,609.9	3,534.5	62,975.2	40,009.8	42,846.1	111,557.6	39,694.7	184,490.7	92,147.1	24,615.7	30,550.2	9,633.8	1,541.0	5,873.9	231.6	3,017.0	724,192.0
TotIncrease	**3,871.9**	**18,991.4**	**48,609.9**	**3,534.5**	**62,975.2**	**40,009.8**	**42,846.1**	**111,557.6**	**39,694.7**	**184,490.7**	**92,147.1**	**24,615.7**	**30,550.2**	**9,633.8**	**1,541.0**	**5,873.9**	**231.6**	**3,017.0**	
TotDecrease	**1,656.6**	**2,164.6**	**14,385.6**	**6,149.4**	**17,085.2**	**18,286.4**	**30,240.6**	**416,329.8**	**21,375.5**	**0.2**	**92,967.7**	**38,508.9**	**52,339.8**	**0.1**	**2,086.8**	**8,706.9**	**932.6**	**975.3**	
Net	**2,215.3**	**16,826.7**	**34,224.3**	**(2,614.9)**	**45,890.0**	**21,723.3**	**12,605.5**	**(304,772.2)**	**18,319.3**	**184,490.6**	**(820.6)**	**(13,893.2)**	**(21,789.6)**	**9,633.7**	**(545.8)**	**(2,833.0)**	**(701.0)**	**2,041.8**	

Natural Land Net Change: - 106,863 acres (0.4%)
Chesapeake Bay Watershed

2013/14-2017/18	ROAD	IMPS	IMPO	TCIS	TURF	TCTG	PDEV	FORE	TCOT	HARF	NATS	CROP	PAST	EXTR	TDLW	RIVW	TERW	WATR	Decrease
ROAD	-	13.6	338.5	696.1	73.6	65.6	205.6	137.8	74.6	1.2	17.2	11.2	13.6	3.9	0.2	1.7	0.0	2.3	1,656.6
IMPS	1.3	-	937.4	508.2	277.2	87.7	143.4	6.7	1.8	0.9	37.4	75.1	84.0	2.4	0.1	0.2	0.0	0.8	2,164.6
IMPO	515.9	3,173.2	-	1,587.1	4,334.1	304.6	1,288.5	165.6	60.1	102.4	784.9	652.1	1,331.0	1.5	20.6	25.0	4.6	34.6	14,385.6
TCIS	41.7	485.1	689.5	-	2,445.8	-	1,598.7	-	-	180.5	408.2	98.1	184.0	6.1	3.5	6.6	0.5	0.9	6,149.4
TURF	0.0	827.8	5,558.2	0.0	-	8,513.5	1,089.0	107.3	106.5	20.7	126.8	3.1	7.8	724.6	-	-	-	-	17,085.2
TCTG	13.5	929.8	4,143.3	10.6	11,096.1	-	783.1	-	-	92.6	421.7	245.7	538.9	9.0	-	-	-	2.1	18,286.4
PDEV	1,129.6	4,377.1	6,865.1	0.0	15,251.3	48.5	-	304.4	33.3	221.0	417.5	142.2	79.3	1,270.4	-	-	-	100.9	30,240.6
FORE	1,160.9	2,764.4	8,917.9	732.0	13,095.7	28,220.6	28,107.2	-	22,045.6	175,564.1	81,474.4	19,557.1	23,185.7	4,065.8	1,380.6	5,567.7	193.2	296.9	416,329.8
TCOT	122.7	951.7	2,338.9	0.0	2,068.1	2,031.5	2,341.2	-	-	788.2	2,277.8	3,075.5	4,566.3	386.3	108.3	250.3	26.6	42.2	21,375.5
HARF	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	-	-	-	0.2
NATS	63.1	148.9	476.6	0.4	3,481.5	370.7	825.6	76,425.3	4,388.8	4,294.5	-	545.9	356.2	500.6	-	-	-	1,089.7	92,967.7
CROP	500.4	3,018.3	8,368.9	0.2	4,030.5	165.3	2,513.9	11,299.2	3,088.3	1,367.3	2,068.6	-	125.9	1,182.5	-	-	-	779.8	38,508.9
PAST	307.3	2,252.7	9,606.9	0.1	6,561.6	184.7	3,857.2	13,162.5	8,983.8	1,631.2	4,035.2	122.6	-	1,232.2	-	-	-	401.7	52,339.8
EXTR	-	-	-	-	-	-	0.1	-	-	-	0.0	0.0	0.0	-	-	-	-	-	0.1
TDLW	2.4	4.2	91.5	0.0	1.0	-	-	1,745.6	161.6	7.6	0.0	-	-	0.2	-	-	-	72.7	2,086.8
RIVW	9.2	30.8	104.3	0.0	167.3	-	-	7,498.9	512.4	207.8	0.0	-	-	20.2	-	-	-	156.1	8,706.9
TERW	2.2	8.7	42.9	-	40.8	1.9	28.0	629.1	85.5	10.6	11.1	15.9	4.6	15.0	-	-	-	36.2	932.6
WATR	1.7	5.0	130.1	0.0	50.5	15.0	64.7	75.3	152.6	0.0	66.3	71.1	73.0	213.2	27.8	22.4	6.6	-	975.3
Increase	3,871.9	18,991.4	48,609.9	3,534.5	62,975.2	40,009.8	42,846.1	111,557.6	39,694.7	184,490.7	92,147.1	24,615.7	30,550.2	9,633.8	1,541.0	5,873.9	231.6	3,017.0	724,192.0
TotIncrease	**3,871.9**	**18,991.4**	**48,609.9**	**3,534.5**	**62,975.2**	**40,009.8**	**42,846.1**	**111,557.6**	**39,694.7**	**184,490.7**	**92,147.1**	**24,615.7**	**30,550.2**	**9,633.8**	**1,541.0**	**5,873.9**	**231.6**	**3,017.0**	
TotDecrease	**1,656.6**	**2,164.6**	**14,385.6**	**6,149.4**	**17,085.2**	**18,286.4**	**30,240.6**	**416,329.8**	**21,375.5**	**0.2**	**92,967.7**	**38,508.9**	**52,339.8**	**0.1**	**2,086.8**	**8,706.9**	**932.6**	**975.3**	
Net	**2,215.3**	**16,826.7**	**34,224.3**	**(2,614.9)**	**45,890.0**	**21,723.3**	**12,605.5**	**(304,772.2)**	**18,319.3**	**184,490.6**	**(820.6)**	**(13,893.2)**	**(21,789.6)**	**9,633.7**	**(545.8)**	**(2,833.0)**	**(701.0)**	**2,041.8**	

Forest Cover Net Change: - 304,772 acres* (-1.3%)
Chesapeake Bay Watershed

2013/14-2017/18	ROAD	IMPS	IMPO	TCIS	TURF	TCTG	PDEV	FORE	TCOT	HARF	NATS	CROP	PAST	EXTR	TDLW	RIVW	TERW	WATR	Decrease
ROAD	-	13.6	338.5	696.1	73.6	65.6	205.6	137.8	74.6	1.2	17.2	11.2	13.6	3.9	0.2	1.7	0.0	2.3	1,656.6
IMPS	1.3	-	937.4	508.2	277.2	87.7	143.4	6.7	1.8	0.9	37.4	75.1	84.0	2.4	0.1	0.2	0.0	0.8	2,164.6
IMPO	515.9	3,173.2	-	1,587.1	4,334.1	304.6	1,288.5	165.6	60.1	102.4	784.9	652.1	1,331.0	1.5	20.6	25.0	4.6	34.6	14,385.6
TCIS	41.7	485.1	689.5	-	2,445.8	-	1,598.7	-	-	180.5	408.2	98.1	184.0	6.1	3.5	6.6	0.5	0.9	6,149.4
TURF	0.0	827.8	5,558.2	0.0	-	8,513.5	1,089.0	107.3	106.5	20.7	126.8	3.1	7.8	724.6	-	-	-	-	17,085.2
TCTG	13.5	929.8	4,143.3	10.6	11,096.1	-	783.1	-	-	92.6	421.7	245.7	538.9	9.0	-	-	-	2.1	18,286.4
PDEV	1,129.6	4,377.1	6,865.1	0.0	15,251.3	48.5	-	304.4	33.3	221.0	417.5	142.2	79.3	1,270.4	-	-	-	100.9	30,240.6
FORE	1,160.9	2,764.4	8,917.9	732.0	13,095.7	28,220.6	28,107.2	-	22,045.6	175,564.1	81,474.4	19,557.1	23,185.7	4,065.8	1,380.6	5,567.7	193.2	296.9	416,329.8
TCOT	122.7	951.7	2,338.9	0.0	2,068.1	2,031.5	2,341.2	-	-	788.2	2,277.8	3,075.5	4,566.3	386.3	108.3	250.3	26.6	42.2	21,375.5
HARF	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	-	-	-	0.2
NATS	63.1	148.9	476.6	0.4	3,481.5	370.7	825.6	76,425.3	4,388.8	4,294.5	-	545.9	356.2	500.6	-	-	-	1,089.7	92,967.7
CROP	500.4	3,018.3	8,368.9	0.2	4,030.5	165.3	2,513.9	11,299.2	3,088.3	1,367.3	2,068.6	-	125.9	1,182.5	-	-	-	779.8	38,508.9
PAST	307.3	2,252.7	9,606.9	0.1	6,561.6	184.7	3,857.2	13,162.5	8,983.8	1,631.2	4,035.2	122.6	-	1,232.2	-	-	-	401.7	52,339.8
EXTR	-	-	-	-	-	-	0.1	-	-	-	0.0	0.0	0.0	-	-	-	-	-	0.1
TDLW	2.4	4.2	91.5	0.0	1.0	-	-	1,745.6	161.6	7.6	0.0	-	-	0.2	-	-	-	72.7	2,086.8
RIVW	9.2	30.8	104.3	0.0	167.3	-	-	7,498.9	512.4	207.8	0.0	-	-	20.2	-	-	-	156.1	8,706.9
TERW	2.2	8.7	42.9	-	40.8	1.9	28.0	629.1	85.5	10.6	11.1	15.9	4.6	15.0	-	-	-	36.2	932.6
WATR	1.7	5.0	130.1	0.0	50.5	15.0	64.7	75.3	152.6	0.0	66.3	71.1	73.0	213.2	27.8	22.4	6.6	-	975.3
Increase	3,871.9	18,991.4	48,609.9	3,534.5	62,975.2	40,009.8	42,846.1	111,557.6	39,694.7	184,490.7	92,147.1	24,615.7	30,550.2	9,633.8	1,541.0	5,873.9	231.6	3,017.0	724,192.0
TotIncrease	**3,871.9**	**18,991.4**	**48,609.9**	**3,534.5**	**62,975.2**	**40,009.8**	**42,846.1**	**111,557.6**	**39,694.7**	**184,490.7**	**92,147.1**	**24,615.7**	**30,550.2**	**9,633.8**	**1,541.0**	**5,873.9**	**231.6**	**3,017.0**	
TotDecrease	**1,656.6**	**2,164.6**	**14,385.6**	**6,149.4**	**17,085.2**	**18,286.4**	**30,240.6**	**416,329.8**	**21,375.5**	**0.2**	**92,967.7**	**38,508.9**	**52,339.8**	**0.1**	**2,086.8**	**8,706.9**	**932.6**	**975.3**	
Net	**2,215.3**	**16,826.7**	**34,224.3**	**(2,614.9)**	**45,890.0**	**21,723.3**	**12,605.5**	**(304,772.2)**	**18,319.3**	**184,490.6**	**(820.6)**	**(13,893.2)**	**(21,789.6)**	**9,633.7**	**(545.8)**	**(2,833.0)**	**(701.0)**	**2,041.8**	

* Most of this change (-257,039 acres) is likely associated with timber harvest activities and should not be considered a loss

Community Tree Cover and Change by County

Interpretation

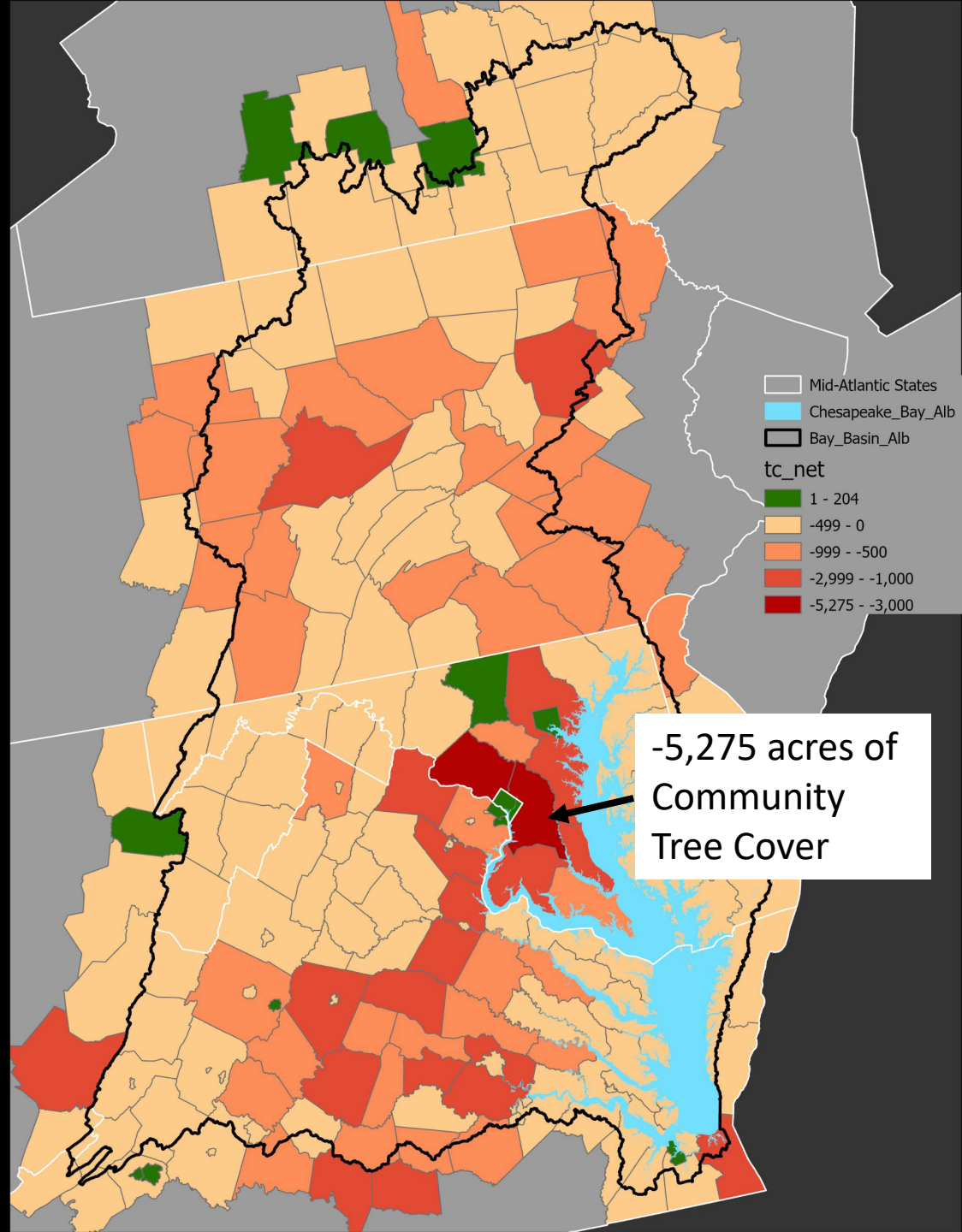
Tree Cover in communities is important to reduce runoff, provide shade and habitat, moderate temperature, and improve air quality, aesthetics, and overall quality of life and sense of place. This indicator is consistent with the indicator used for the CBP's Tree Canopy Outcome. For the Land Use Methods and Metrics Outcome, the indicator will be displayed at the NHD catchment level (not yet available).

Applies to:

Watershed health, Water Quality, and Communities

Notes

This indictor shows the overall net change in tree cover associated with development and includes all development, both outside and inside designated urban or municipal boundaries. Due to data limitations, this indicator does not yet fully account for increases in canopy due to the growth of existing trees or the planting of small trees.



Community Tree Cover Change: -71,286 acres
Chesapeake Bay Watershed

2013/14-2017/18	ROAD	IMPS	IMPO	TCIS	TURF	TCTG	PDEV	FORE	TCOT	HARF	NATS	CROP	PAST	EXTR	TDLW	RIVW	TERW	WATR	Decrease
ROAD	-	13.6	338.5	696.1	73.6	65.6	205.6	137.8	74.6	1.2	17.2	11.2	13.6	3.9	0.2	1.7	0.0	2.3	1,656.6
IMPS	1.3	-	937.4	508.2	277.2	87.7	143.4	6.7	1.8	0.9	37.4	75.1	84.0	2.4	0.1	0.2	0.0	0.8	2,164.6
IMPO	515.9	3,173.2	-	1,587.1	4,334.1	304.6	1,288.5	165.6	60.1	102.4	784.9	652.1	1,331.0	1.5	20.6	25.0	4.6	34.6	14,385.6
TCIS	41.7	485.1	689.5	-	2,445.8	-	1,598.7	-	-	180.5	408.2	98.1	184.0	6.1	3.5	6.6	0.5	0.9	6,149.4
TURF	0.0	827.8	5,558.2	0.0	-	8,513.5	1,089.0	107.3	106.5	20.7	126.8	3.1	7.8	724.6	-	-	-	-	17,085.2
TCTG	13.5	929.8	4,143.3	10.6	11,096.1	-	783.1	-	-	92.6	421.7	245.7	538.9	9.0	-	-	-	2.1	18,286.4
PDEV	1,129.6	4,377.1	6,865.1	0.0	15,251.3	48.5	-	304.4	33.3	221.0	417.5	142.2	79.3	1,270.4	-	-	-	100.9	30,240.6
FORE	1,160.9	2,764.4	8,917.9	732.0	13,095.7	28,220.6	28,107.2	-	22,045.6	175,564.1	81,474.4	19,557.1	23,185.7	4,065.8	1,380.6	5,567.7	193.2	296.9	416,329.8
TCOT	122.7	951.7	2,338.9	0.0	2,068.1	2,031.5	2,341.2	-	-	788.2	2,277.8	3,075.5	4,566.3	386.3	108.3	250.3	26.6	42.2	21,375.5
HARF	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	-	-	-	0.2
NATS	63.1	148.9	476.6	0.4	3,481.5	370.7	825.6	76,425.3	4,388.8	4,294.5	-	545.9	356.2	500.6	-	-	-	1,089.7	92,967.7
CROP	500.4	3,018.3	8,368.9	0.2	4,030.5	165.3	2,513.9	11,299.2	3,088.3	1,367.3	2,068.6	-	125.9	1,182.5	-	-	-	779.8	38,508.9
PAST	307.3	2,252.7	9,606.9	0.1	6,561.6	184.7	3,857.2	13,162.5	8,983.8	1,631.2	4,035.2	122.6	-	1,232.2	-	-	-	401.7	52,339.8
EXTR	-	-	-	-	-	-	0.1	-	-	-	0.0	0.0	0.0	-	-	-	-	-	0.1
TDLW	2.4	4.2	91.5	0.0	1.0	-	-	1,745.6	161.6	7.6	0.0	-	-	0.2	-	-	-	72.7	2,086.8
RIVW	9.2	30.8	104.3	0.0	167.3	-	-	7,498.9	512.4	207.8	0.0	-	-	20.2	-	-	-	156.1	8,706.9
TERW	2.2	8.7	42.9	-	40.8	1.9	28.0	629.1	85.5	10.6	11.1	15.9	4.6	15.0	-	-	-	36.2	932.6
WATR	1.7	5.0	130.1	0.0	50.5	15.0	64.7	75.3	152.6	0.0	66.3	71.1	73.0	213.2	27.8	22.4	6.6	-	975.3
Increase	3,871.9	18,991.4	48,609.9	3,534.5	62,975.2	40,009.8	42,846.1	111,557.6	39,694.7	184,490.7	92,147.1	24,615.7	30,550.2	9,633.8	1,541.0	5,873.9	231.6	3,017.0	724,192.0
TotIncrease	**3,871.9**	**18,991.4**	**48,609.9**	**3,534.5**	**62,975.2**	**40,009.8**	**42,846.1**	**111,557.6**	**39,694.7**	**184,490.7**	**92,147.1**	**24,615.7**	**30,550.2**	**9,633.8**	**1,541.0**	**5,873.9**	**231.6**	**3,017.0**	
TotDecrease	**1,656.6**	**2,164.6**	**14,385.6**	**6,149.4**	**17,085.2**	**18,286.4**	**30,240.6**	**416,329.8**	**21,375.5**	**0.2**	**92,967.7**	**38,508.9**	**52,339.8**	**0.1**	**2,086.8**	**8,706.9**	**932.6**	**975.3**	
Net	**2,215.3**	**16,826.7**	**34,224.3**	**(2,614.9)**	**45,890.0**	**21,723.3**	**12,605.5**	**(304,772.2)**	**18,319.3**	**184,490.6**	**(820.6)**	**(13,893.2)**	**(21,789.6)**	**9,633.7**	**(545.8)**	**(2,833.0)**	**(701.0)**	**2,041.8**	

Gain = 12,809

Loss = 84,095

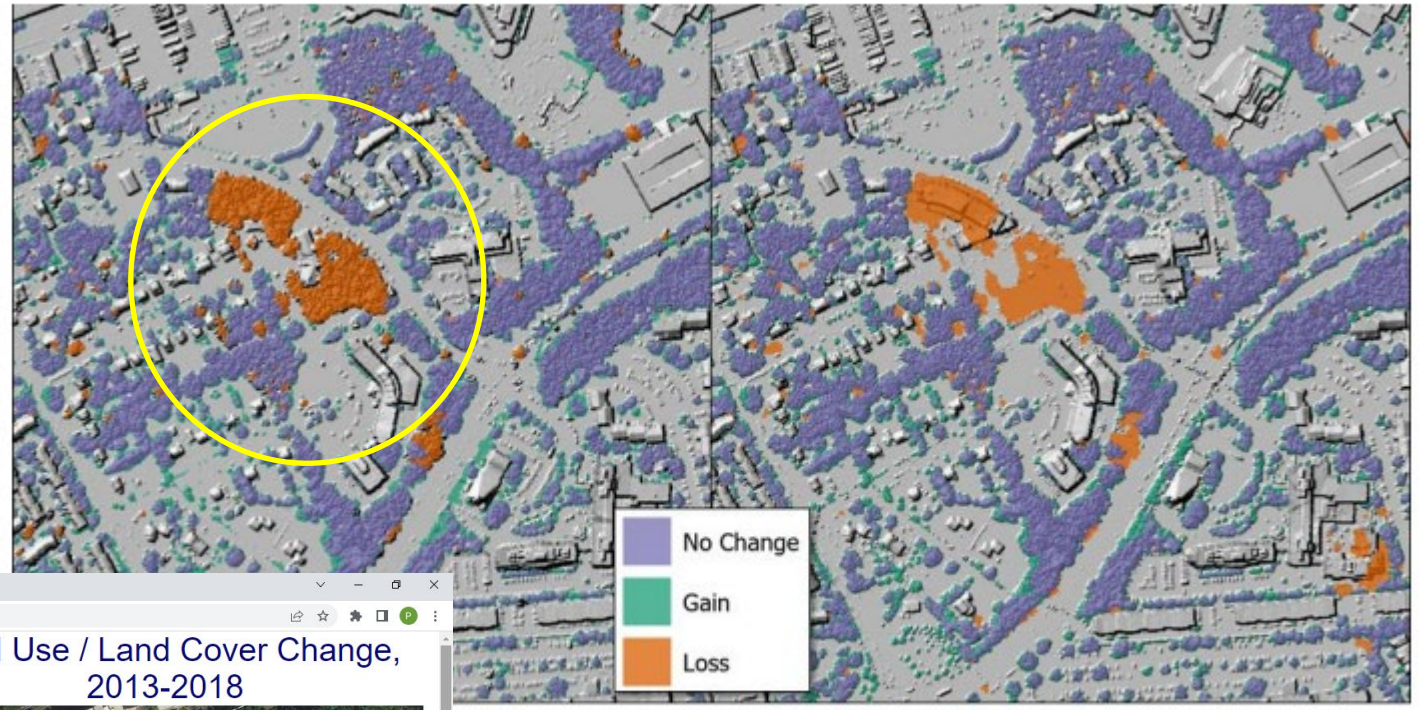
Community Tree Cover Change in Alexandria, VA

2014-2018	ROAD	IMPS	IMPO	TCIS	TURF	TCTG	PDEV	FORE	TCOT	HARF	NATS	CROP	PAST	EXTR	TDLW	RIVW	TERW	WATR	Decrease
ROAD	-	-	-	4.2	-	0.0	-	-	0.1	-	-	-	-	-	-	-	-	-	4.4
IMPS	-	-	6.5	1.6	0.4	0.0	0.0	-	-	-	-	-	-	-	-	-	-	-	8.5
IMPO	-	14.2	-	8.7	13.0	0.0	2.0	0.0	0.2	-	0.1	-	-	-	0.2	-	-	-	38.4
TCIS	-	0.1	0.0	-	0.9	-	0.3	-	-	-	0.0	-	-	-	-	0.0	-	-	1.4
TURF	-	3.0	10.1	-	-	10.8	0.2	-	0.0	-	-	-	-	-	-	-	-	-	24.1
TCTG	-	0.5	1.2	0.0	1.1	-	0.3	-	-	-	-	-	-	-	-	-	-	-	3.1
PDEV	-	2.1	7.5	-	0.7	0.0	-	-	-	-	-	-	-	-	-	-	-	-	10.3
FORE	-	-	0.1	-	0.5	1.2	0.3	-	2.7	-	-	-	-	-	2.1	-	-	-	6.9
TCOT	-	0.4	0.7	-	0.6	0.4	0.9	-	-	-	0.1	-	-	-	0.0	0.1	-	-	3.1
HARF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NATS	-	-	0.0	-	4.3	0.0	0.4	0.0	3.1	-	-	-	-	-	-	-	-	-	7.8
CROP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PAST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EXTR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TDLW	-	-	0.2	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-	-	0.2
RIVW	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-	-	0.0
TERW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WATR	-	-	0.0	-	-	0.0	-	-	0.0	-	-	-	-	-	-	-	-	-	0.1
Increase	-	20.3	26.2	14.5	21.4	12.4	4.5	0.0	6.2	-	0.2	-	-	-	2.3	0.1	-	-	108.1
TotIncrease	-	**20.3**	**26.2**	**14.5**	**21.4**	**12.4**	**4.5**	**0.0**	**6.2**	-	**0.2**	-	-	-	**2.3**	**0.1**	-	-	
TotDecreas	**4.4**	**8.5**	**38.4**	**1.4**	**24.1**	**3.1**	**10.3**	**6.9**	**3.1**	-	**7.8**	-	-	-	**0.2**	**0.0**	-	**0.1**	
Net	**(4.4)**	**11.8**	**(12.2)**	**13.2**	**(2.7)**	**9.3**	**(5.8)**	**(6.9)**	**3.2**	-	**(7.6)**	-	-	-	**2.1**	**0.1**	-	**(0.1)**	

Gain = 25.7

Loss = 7.8

UVM's Tree Canopy Assessment for Alexandria based on LiDAR: 2014-2018
Net gain of 569.2 acres of TC

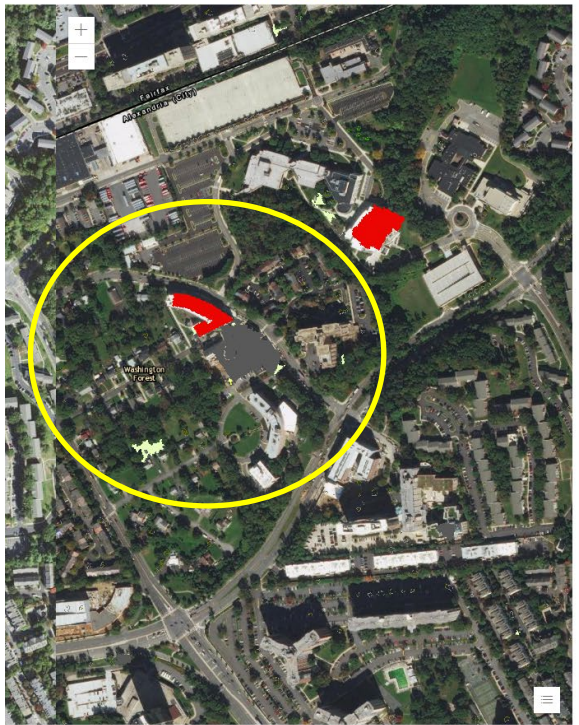


North Beauregard Street and Fillmore Ave. Two forest patches were removed for
ide important ecosystem services. Even though the city gained tree canopy the loss

Take away messages:

- Both LiDAR and aerial photos reveal same large areas of tree canopy loss.
- Tree canopy gain from small tree plantings and canopy growth of existing trees is more readily detected with two dates of LiDAR.
- Differences in the acquisition dates of LiDAR and aerial photos may contribute to differences in results.
- While two dates of LiDAR are superior for monitoring tree canopy change, the loss of ecosystem services associated with the loss of large blocks of trees detectable with both methods may not be fully replaced by canopy growth and urban tree plantings.

Land Use / Land Cover Change, 2013-2018



UVM and Chesapeake Conservancy's LULC change for Alexandria based on 4-band imagery: 2014-2018
Net gain of 17.9 acres of TC

http://lulc-1718.cicapps.org/


USGS
science for a changing world