



## 2024 ed. LULC Data Project Overview:

"Everything is related to everything else, but near things are more related than distant things." W. Tobler

Steven Guinn, Chesapeake Conservancy  
Land Use Workgroup | 18 September 2024

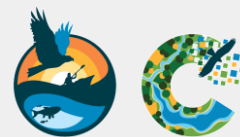
# Architecture Changes in the 2024 Edition



The major changes to the 2024 Edition of the LULC model architecture involved improvements to the pre-processing of input data, modernizing existing coding paradigms, and better communication and validation across the separate sub-modules. These changes resulted in:

- Improved input data validation
- Increases in performance and stability of the model
- Reduction in processing time during and after development
- Consistency in output

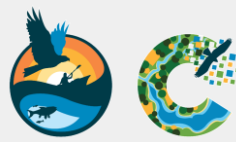
# Methodology Changes in the 2024 Edition



Changes to the methodology in the current model version were based on the extensive feedback the Chesapeake Conservancy received both from the 2022 Edition release, and that from the current version during its development phase. The significant changes can be classed as changes to:

- Tree Canopy
- Agriculture
- General Land Use
- Waters and Wetlands

# Methodology Changes in the Tree Canopy



Changes to the TC module affected both how understory was mapped and how the Forest class was assigned. They included:

- Reduced Trees over Turf Buffer (20-meter to 10-meter)
- Limit Trees over Turf Buffer to parcel boundaries
- No buffer for turf in large parcels (over an acre) for trees over turf
- Forests diameter decreased from 72-meters to 36-meters
- Forests patch is  $\geq 36$ -meters in diameter throughout the entire patch
- Successional areas (natural succession and harvested forest) with  $\geq 10\%$  canopy are included as forested area

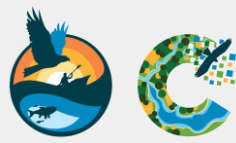
# Methodology Changes in the Tree Canopy



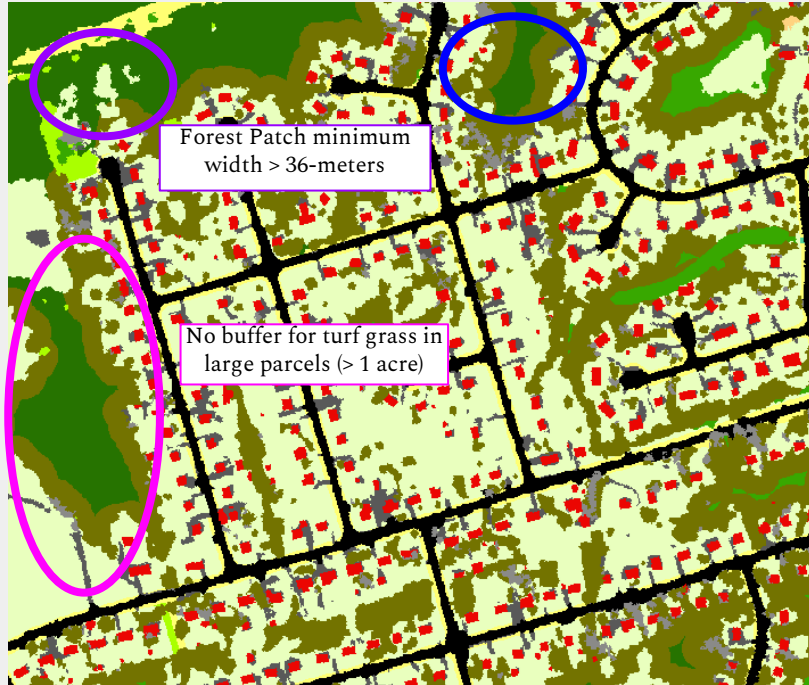
These changes resulted in:

- Moderate increases in Forest class (FORE)
- Large increases in Tree Canopy over Other (TCOT)
- Similar decrease in Tree Canopy over Turf Grass (TCTG)
- An updated description for Forest class:
  - Tree canopy with an unmanaged understory that is part of a large patch. Large patches are at least 1-acre in size with a minimum patch diameter of 36-meters (~120 feet) and may include areas of early successional forest (natural succession and harvested forest). Smaller patches of tree canopy are classed as forest if they are part of a large early-successional forest patch and comprise at least 10% of the patch area. Forests that are also wetlands are included in this class.

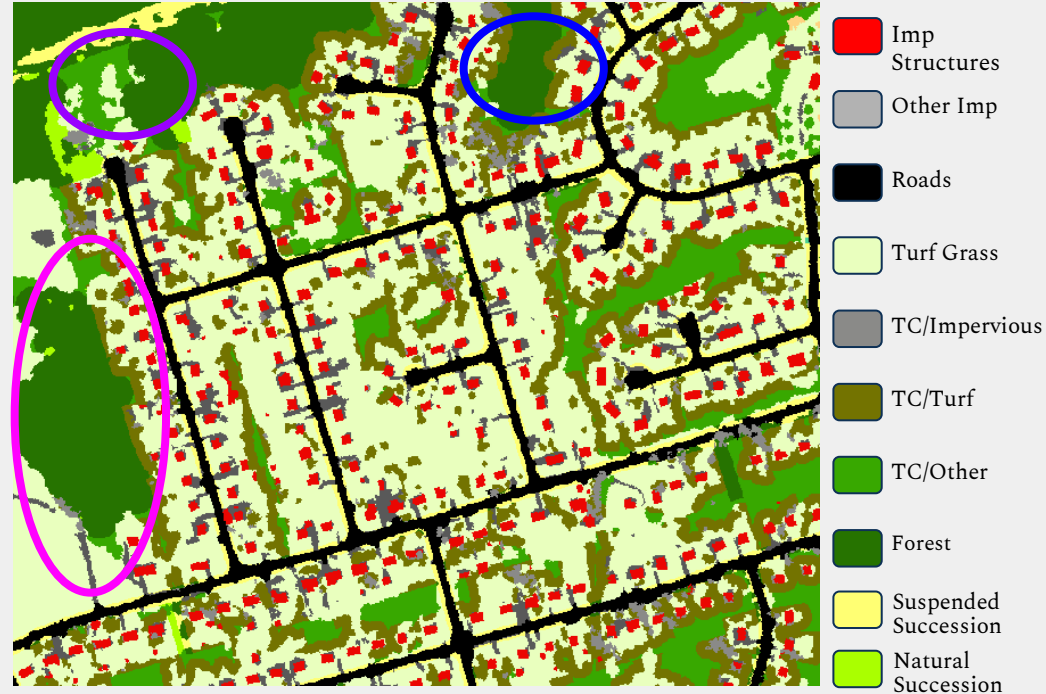
# Tree Canopy in Developed Areas



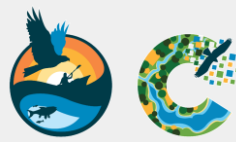
2022 Edition



2024 Edition



# Methodology Changes in the 2024 Edition

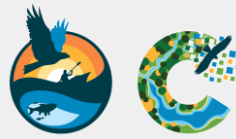


Changes to Agriculture involved primarily relying on the Cropland Dataset Layer (CDL) as the primary data input to classify the Land Use of low vegetation.

Rules that homogenized and reduced the over classification of cropland in suburban and institutional parcels

Agricultural lands converting to development are no longer considered agriculture during the development phase, but as the appropriate developed Land Use

# Methodology Changes in the 2024 Edition



Where the non agriculture low vegetation, shrublands, and barren Land Uses are assigned, changes were made to best reflect the feedback received from stakeholders and partners, while maintaining overall model performance.

- Small parcels with structures have all low vegetation classed as Turf Grass
- Larger parcels were allowed to grow turf away from buildings
- Low vegetation and shrubland surrounded by Tree Canopy, Harvested Forest, or Natural Succession are now always classed as Natural Succession Land Use
- Adjacency information assigns the most likely Land Use based on the amount and type of land cover and land use, resulting in a more homogenized landscape



# Methodology Changes in the 2024 Edition



The water and wetland layer processing was modified so that the water footprint was stabilized through time. This was done in order to reduce the false Land use change that arises from the seasonality of data collection in respect to water features.

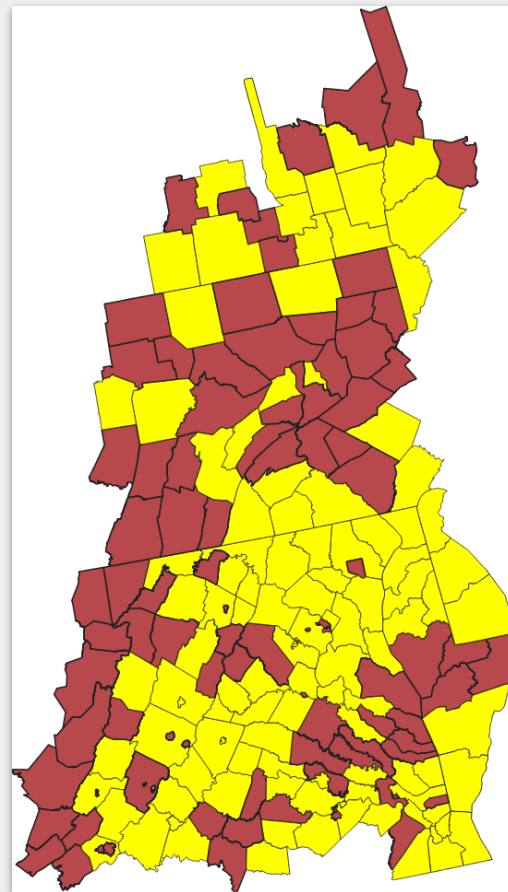
# Local Review Results



State	Occurrence
VA	795
MD	387
PA	329
NY	128
WV	100
DC	48
DE	47

111 out of 205 Counties (54%)  
Submitted Feedback

Total submitted:  
1995  
Valid Feedback:  
1834



# Local Review Results



## Top 10 proposed corrections

Proposed Correction	Occurrence
Turf Grass	552
Natural Succession	258
Cropland	251
Pervious Developed, Other	217
Pasture and Hay	97
Forest	82
Water	66
Tree Canopy, Other	63
Impervious Structures	62
Impervious, Other	59

## Errors by Type

Error Type	Occurrence
LU	1338
LC	493
Unidentified	3

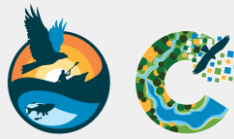
# Local Review Results



## Top 10 observed errors

Current LU to Proposed Correction	Occurrence
Turf Grass mistaken as Pasture and Hay Herbaceous	239
Turf Grass mistaken as Suspended Succession Herbaceous	165
Cropland Herbaceous mistaken as Pasture and Hay Herbaceous	154
Natural Succession Herbaceous mistaken as Harvested Forest Herbaceous	106
Pervious Developed, Other Herbaceous mistaken as Pasture and Hay Herbaceous	82
Natural Succession Herbaceous mistaken as Pasture and Hay Herbaceous	54
Pasture and Hay Herbaceous mistaken as Harvested Forest Herbaceous	44
Turf Grass mistaken as Cropland Herbaceous	40
Turf Grass mistaken as Natural Succession Herbaceous	37
Cropland Herbaceous mistaken as Suspended Succession Herbaceous	34

# Initial Local Review Results



For the top 3 proposed corrections:

- Accurate Turf Grass (TG) assignment was greatly improved where small residential parcels adjoining agricultural land and around institutional areas
- Natural Succession (NATS) assignment improved where large parcels having structures present
- Confusion between Pasture and Hay (PAST) and Cropland (CROP) remains problematic, small improvements were seen, but they might be statistically insignificant.
- Crop rotation and inherent issues in the CDL are part of the issue. Additionally, aerial imagery of alfalfa can easily be mistaken for row crops in the early stages of production. Alfalfa is considered “Hay” in our classification schema

# Data Release Products



## Land Use Land Cover (LULC)

- <co\_fips>\_lulc\_2013\_2024-Edition.tif
- <co\_fips>\_lulc\_2017\_2024-Edition.tif
- <co\_fips>\_lulc\_2022\_2024-Edition.tif

## Land Use Land Cover Change (LULCC)

- <co\_fips>\_lulc-change\_2013\_2017\_2024-Edition.tif
- <co\_fips>\_lulc-change\_2013\_2022\_2024-Edition.tif
- <co\_fips>\_lulc-change\_2017\_2022\_2024-Edition.tif

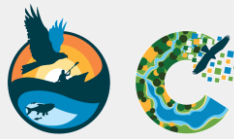
## Land Use Land Cover Change (LULCC) Matrices

- <co\_fips>\_lulcc\_matrices\_2013\_2024-Edition.xlsx
- <co\_fips>\_lulcc\_matrices\_2017\_2024-Edition.xlsx
- <co\_fips>\_lulcc\_matrices\_2022\_2024-Edition.xlsx

## Metadata for all products

Science Base documentation with the project data dictionary

# Data Availability



Once the data is ready for release, it will be available for viewing and downloading.

The official location of all the data and documentation for both the state and county level will be through the Science Base webpage and available for download.

Similar to the last data LULC data release, the Chesapeake Conservancy will be hosting a data viewing application. Additionally the viewer will be able to provide the links to the data hosted by Science Base, but not actually providing the data directly in order to reduce overhead and redundancy.

The new viewer is now actually three in one! A LULC viewer, LULC change viewer, and the hi-res hydrography viewer.

- The LULC viewer will have the ability to turn on the new hydro layer.
- The LULC will have three panes for simultaneous viewing of all three time periods at once



# Land Use/Land Cover Data Project 2024 edition

## Current Production and Review Timeline





# Chesapeake Bay Land Use/Cover Classification (2024 edition, 56 classes)

## Water and Water Margins

	10 Tidal Waters
Lentic	11 Lakes & Reservoirs
	12 Riverine Ponds
	13 Terrene Ponds
Lotic	14 Streams and Rivers
Water Margins	15 Bare Shore

## Forest

Tree Canopy	40 Forest
	41 Tree Canopy Other
Open Space (temporary)	42 Natural Succession Barren
	43 Natural Succession Herbaceous
	44 Natural Succession Shrubland
	45 Harvested Forest Barren
	46 Harvested Forest Herbaceous

## Agriculture

Productive Lands	80 Cropland Barren
	81 Cropland Herbaceous
	82 Orchards and Vineyards Barren
	83 Orchards and Vineyards Herbaceous
	84 Orchards and Vineyards Shrubland
	85 Pasture and Hay Barren
	86 Pasture and Hay Herbaceous

## Development

Impervious	20 Roads	Barren
	21 Structures	
	22 Other Impervious (Parking lots, driveways)	
	23 TC over Roads	
	24 TC over Structures	
	25 TC over Other Impervious	
	31 Extractive Impervious	
	32 Solar Field Panel Arrays (impervious)	Barren
Pervious	26 Tree Canopy over Turf	
Grass	27 Turf Grass	
	28 Bare Developed	
	30 Extractive Barren	
	33 Solar Field Barren	
	34 Solar Field Herbaceous	
	35 Solar Field Shrubland	Barren
	36 Suspended Succession	
Barren	37 Suspended Succession	

## Wetlands

Riverine	50 Riverine Wetlands
	51 Riverine Wetlands Herbaceous
	52 Riverine Wetlands Shrubland
	53 Riverine Wetlands Tree Canopy
	54 Riverine Wetlands Forest
	55 Riverine Wetlands Harvested Forest
Terrene	60 Terrene Wetlands
	61 Terrene Wetlands Herbaceous
	62 Terrene Wetlands Shrubland
	63 Terrene Wetlands Tree Canopy
	64 Terrene Wetlands Forest
	65 Terrene Wetlands Harvested Forest
Tidal	70 Tidal Wetlands
	71 Tidal Wetlands Herbaceous
	72 Tidal Wetlands Shrubland
	73 Tidal Wetlands Tree Canopy
	74 Tidal Wetlands Forest



Thanks for your time and valuable feedback!

In addition to the amazing USGS team, none of this work is possible without the tireless efforts of the Chesapeake Conservancy's CIC team, with special thanks to:

- Alicia Sabatino, GIS Web Developer/Cartographer
- Elliot Kurtz, Geospatial Data Engineer
- Patrick McCabe, Senior Geospatial Analyst

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# Questions? Feedback?