Chesapeake Conservancy Land Cover Production

Cassandra Pallai

Geospatial Project Manager

- *We **conserve and protect*** the region's treasured landscapes and waterways, connecting people to its natural, cultural and historic treasures.

- We develop and leverage the ***latest technologies*** to maximize the effectiveness of conservation efforts.

- We ***collaborate with local communities*** to understand their visions for their Chesapeake, their rivers, and their landscapes, working with landowners, businesses, governments, and other conservation groups to accomplish our goals.

Establishing Partnerships to Advance Conservation Science

Chesapeake Conservancy
EXPLORE. CONNECT. CONSERVE.

U.S. FISH & WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

NATIONAL PARK SERVICE

Chesapeake Bay Program
A Watershed Partnership

NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

WILDLIFE MANAGEMENT INSTITUTE
ESTABLISHED IN 1911

CONSERVATION INNOVATION CENTER
CHESAPEAKE CONSERVANCY

intel

NRCS
Natural Resources Conservation Service

esri

dessc
digital energy & sustainability solutions campaign

NATIONAL GEOGRAPHIC

Saving the Chesapeake's Great Rivers and Special Places

Project Overview

Chesapeake Conservancy (primary)

- Maryland
- Washington D.C.
- New York
- West Virginia

University of Vermont

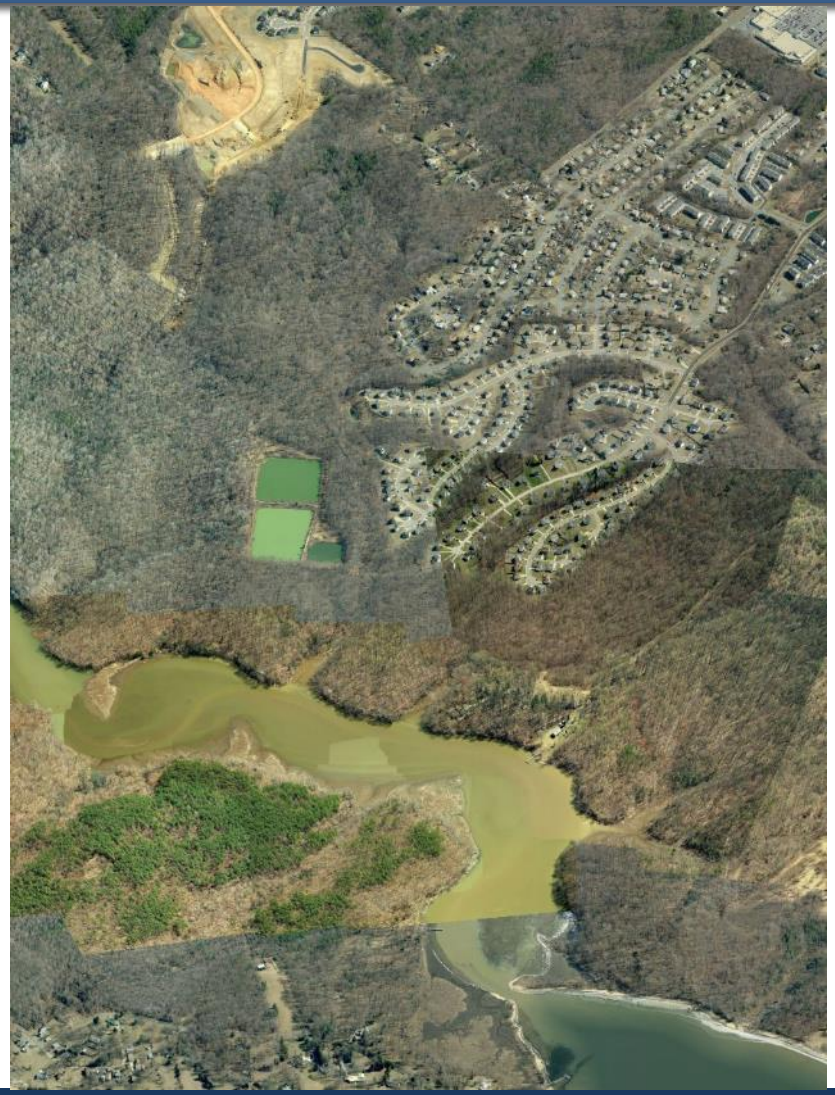
- Delaware
- Pennsylvania

Remote Sensing Data

2013 NAIP

Ortho-imagery

LiDAR



Remote Sensing Data

2013 NAIP

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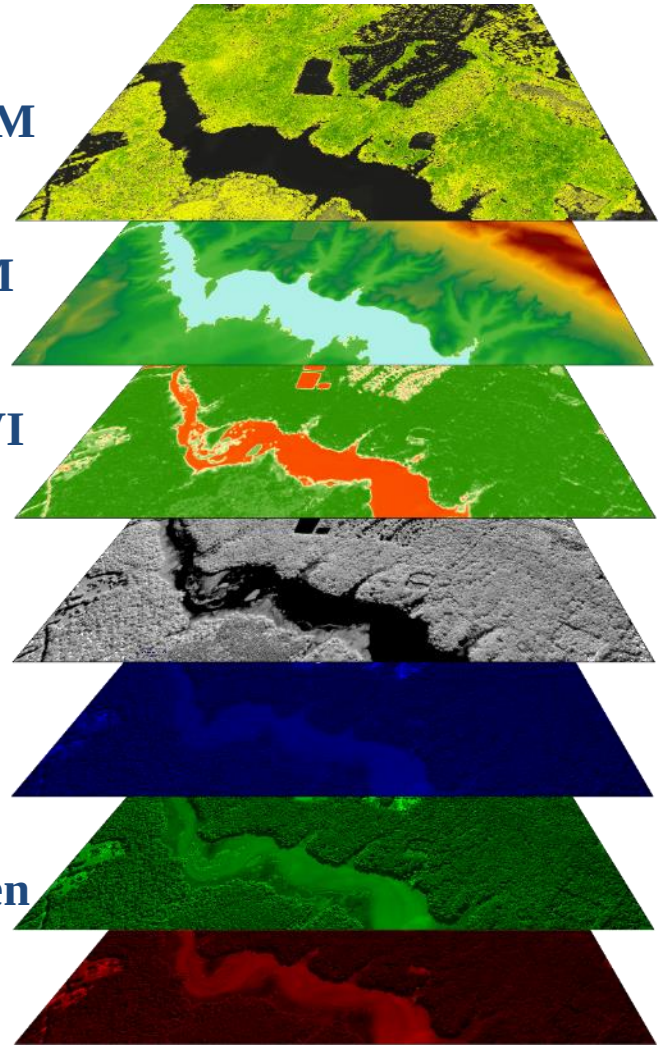
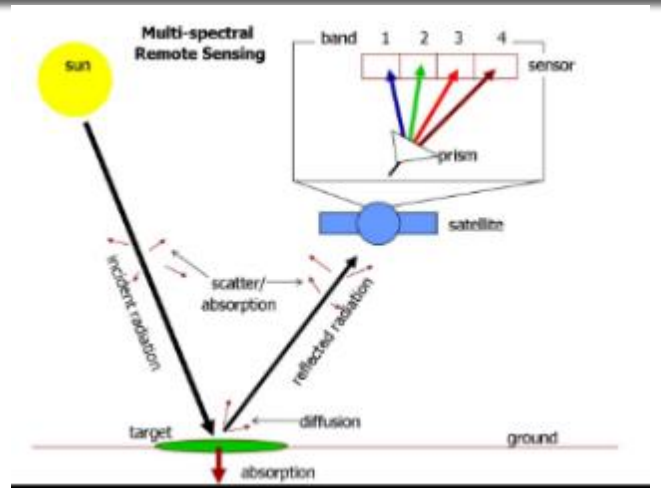
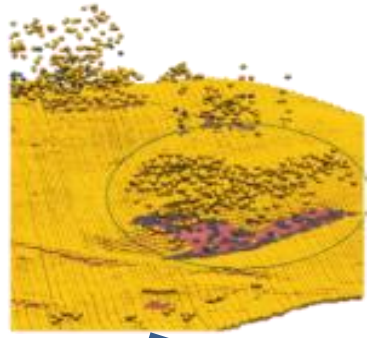


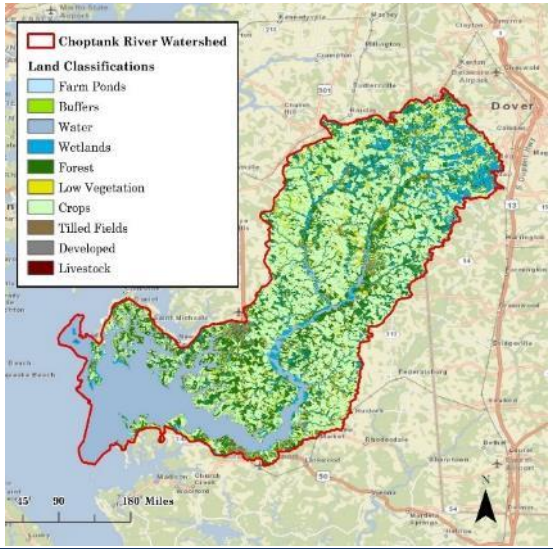
Methods

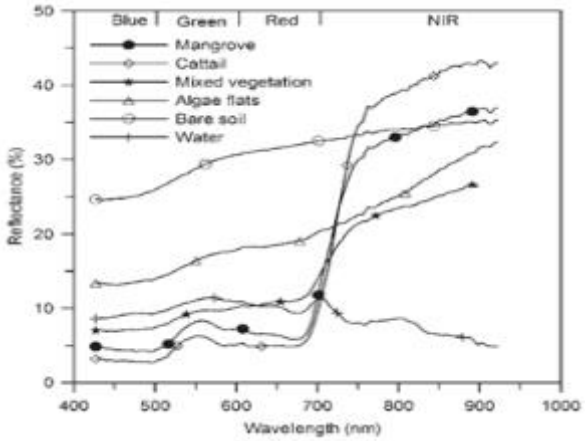
Three-stage process:

- Initial semi-automated feature extraction with 900x the resolution of NLCD









Methods

Three-stage process:

- Initial semi-automated feature extraction with 900x the resolution of NLCD
  - Rule-based, object oriented image classification

Methods

Three-stage process:

- Initial semi-automated feature extraction with 900x the resolution of NLCD
  - Rule-based, object oriented image classification
- Manual corrections

Methods

Three-stage process:

- Initial semi-automated feature extraction with 900x the resolution of NLCD
  - Rule-based, object oriented image classification
- Manual corrections
- Post-processing with planimetrics to improve data quality

Why planimetric enhancement?

Product

- Raster dataset
  - 1-meter pixel size
  - Meter linear unit
  - 4-bit unsigned pixel depth
  - GeoTiff format (.tif)
  - Projection: USA Contiguous Albers Equal Area Conic USGS version
- 11 classes in the final product
  - 0 = NoData
  - 1-11 = Land Cover classes

Product

1) Water

Definition*:* All areas of open water, generally with less than 25% of vegetation/land cover. This includes ponds, lakes, rivers, natural tidal pools in wetland areas, and boats that are not attached to docks.

Min. Mapping Unit: 25 square meters or 5 meters wide

Product

2) Wetlands

Definition: Low vegetation areas that intersect or are near to specified NWI layers (i.e. “Estuarine and Marine Wetland” and “Freshwater and Emergent Wetland”), that are visually confirmed to have wetland characteristics (i.e. a look of saturated ground surrounding the vegetation), and that are located along major waterways (i.e. large streams, rivers, estuary, ocean). Areas of low vegetation near the NWI layers are included if they are visually confirmed to be wetland ecosystems. Woody vegetation (i.e. tree canopy and shrubland) is excluded from this category, as are wetlands away from major waterbodies.

Min. Mapping Unit: 225 square meters

Product

3) Tree Canopy

Definition: Deciduous and evergreen woody vegetation of either natural succession or human planting that is over approximately 3.5-5 meters in height. Stand-alone individuals, discrete clumps, and interlocking individuals are included.

Min. Mapping Unit: 9 square meters

Product

4) Shrubland

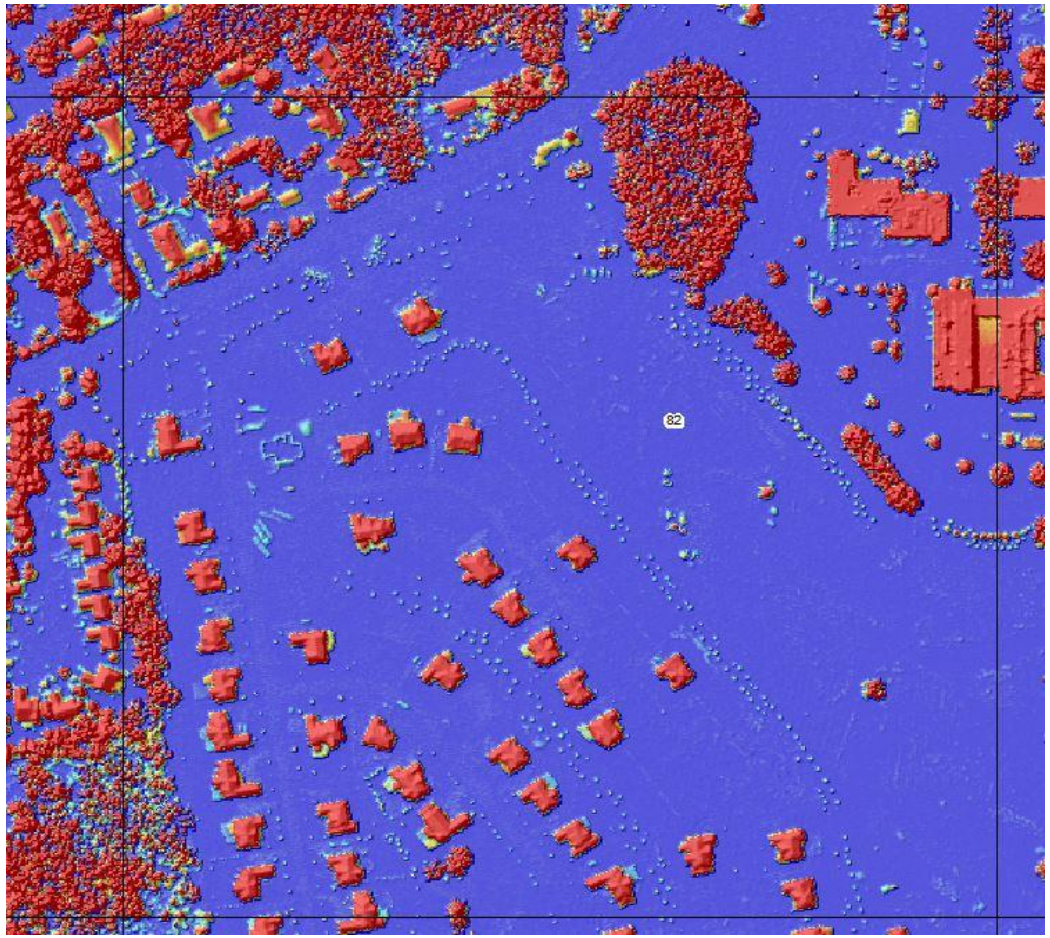
Definition: Heterogeneous area of both/either deciduous and/or evergreen woody vegetation. Characterized by variation in height of vegetation through patchy coverage of shrubs and young trees interspersed with grasses and other lower vegetation. Discrete clumps and small patches of interlocking individuals are included, as are true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions, when intermingled in a heterogeneous landscape with low vegetation.

Min. Mapping Unit:
225 square meters

Product

4) Shrubland

Definition: Heterogeneous area of both/either deciduous and/or evergreen woody vegetation. Characterized by variation in height of vegetation through patchy coverage of shrubs and young trees interspersed with grasses and other lower vegetation. Discrete clumps and small patches of interlocking individuals are included, as are true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions, when intermingled in a heterogeneous landscape with low vegetation.



Min. Mapping Unit:
225 square meters

Product

5) Low Vegetation

Definition: Plant material of natural succession or human planting that is less than ~2 meters in height. This includes visibly tilled fields (with or without vegetation), lawns, nursery plantings with or without tarp cover, and natural ground cover.

Min. Mapping Unit: 9 square meters

Product

6) Barren Land

Definition: Areas void of vegetation consisting of natural earthen material regardless of how it has been cleared. This includes beaches, mud flats, dirt roads, and bare ground in construction sites. Areas of packed dirt such as parking areas also should be classified as barren. Bare but visibly tilled fields are excluded from this class.

Min. Mapping Unit: 25 square meters

Product

7) Structures

Definition: : Human-constructed objects made of impervious materials that are greater than approximately 2 meters in height. Houses, malls, and electrical towers are examples of structures.

Min. Mapping Unit: 9 square meters

Product

8) Impervious Surfaces

Definition: Human-constructed surfaces through which water cannot penetrate, and that are below approximately 2 meters in height. This includes asphalt, concrete, gravel, pavement, treated lumber (e.g. docks and decks), backyard pools, etc.

Min. Mapping Unit: 9 square meters or 2 meters wide

Product

9) Roads

Definition: Impervious surfaces that are used and maintained for transportation. These are derived using data provided by states, counties, and/or municipalities. Gravel or dirt roads that are heavily traveled and well integrated into the transportation network are included.

Min. Mapping Unit: 9 square meters or 2 meters in width

Product

10) Tree Canopy Over Roads

Definition: Tree canopy that overhangs the Roads class.

Min. Mapping Unit: 9 square meters

Product

11) Tree Canopy Over Other Impervious

Definition: Tree canopy that overhangs the Impervious Surfaces and Structures classes.

Min. Mapping Unit: 9 square meters

Data Limitations

Sources

- Imagery
  - Shadows

Data Limitations

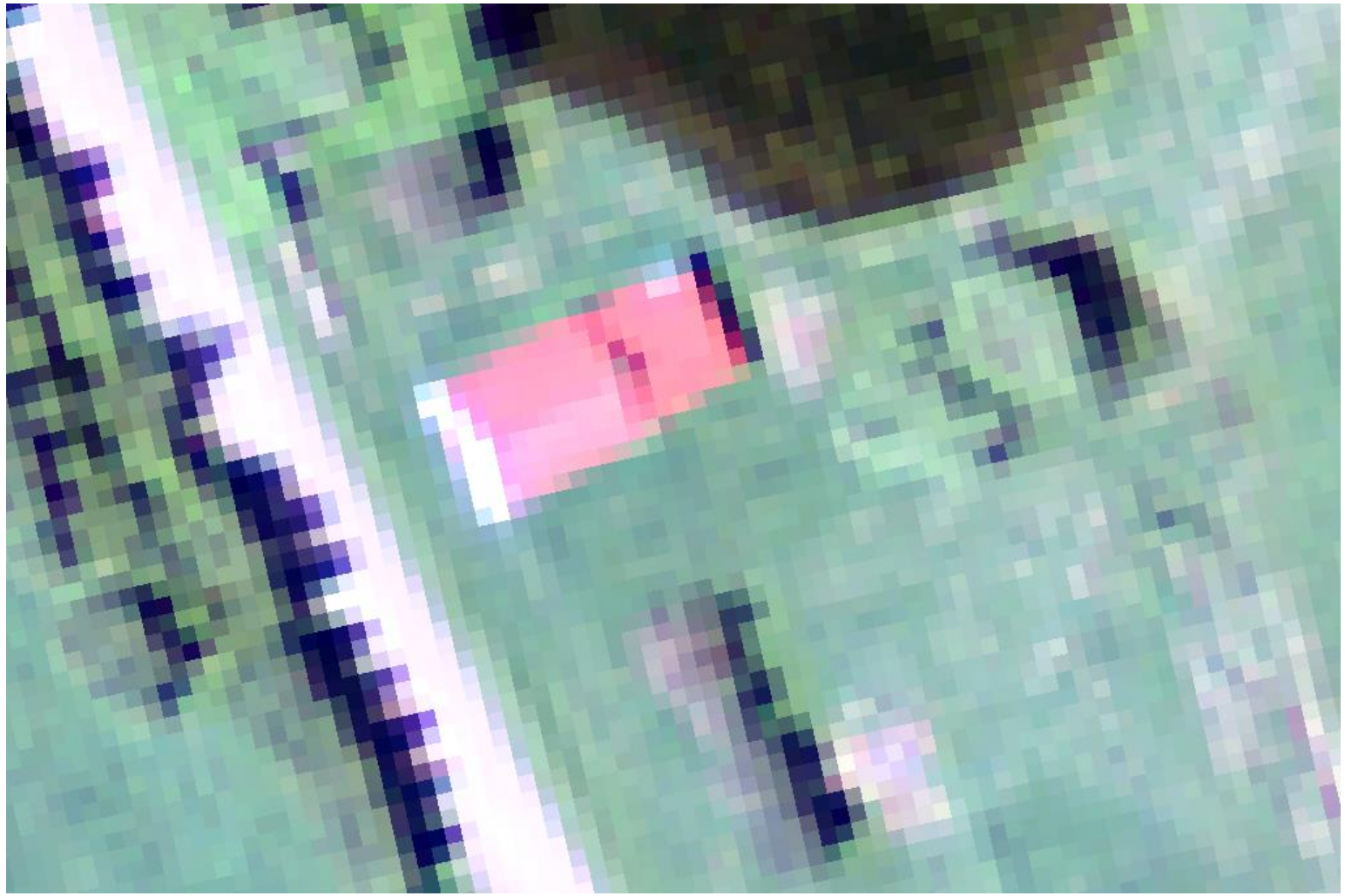
Sources

- Imagery
  - Shadows, clouds, pre- and post-collection weather conditions

Data Limitations

Sources

- Imagery
  - Shadows, clouds, pre- and post-collection weather conditions
  - Resampling



Data Limitations

Sources

- Imagery
  - Shadows, etc.
  - Resampling
- LiDAR
  - Density

Data Limitations

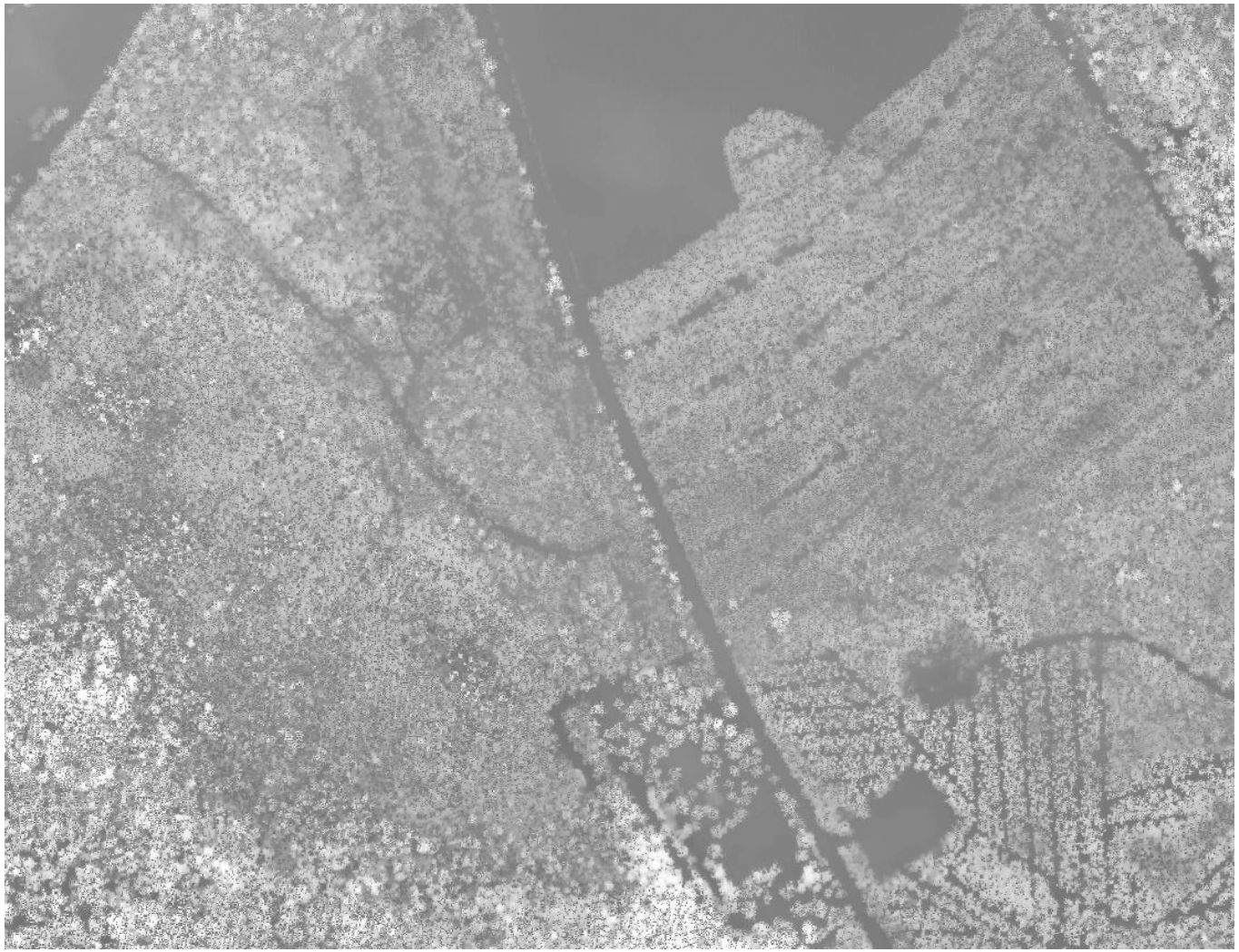
Sources

- Imagery
  - Shadows, etc.
  - Resampling
- LiDAR
  - Density
  - Vintage (2013 NAIP)

Data Limitations

Sources

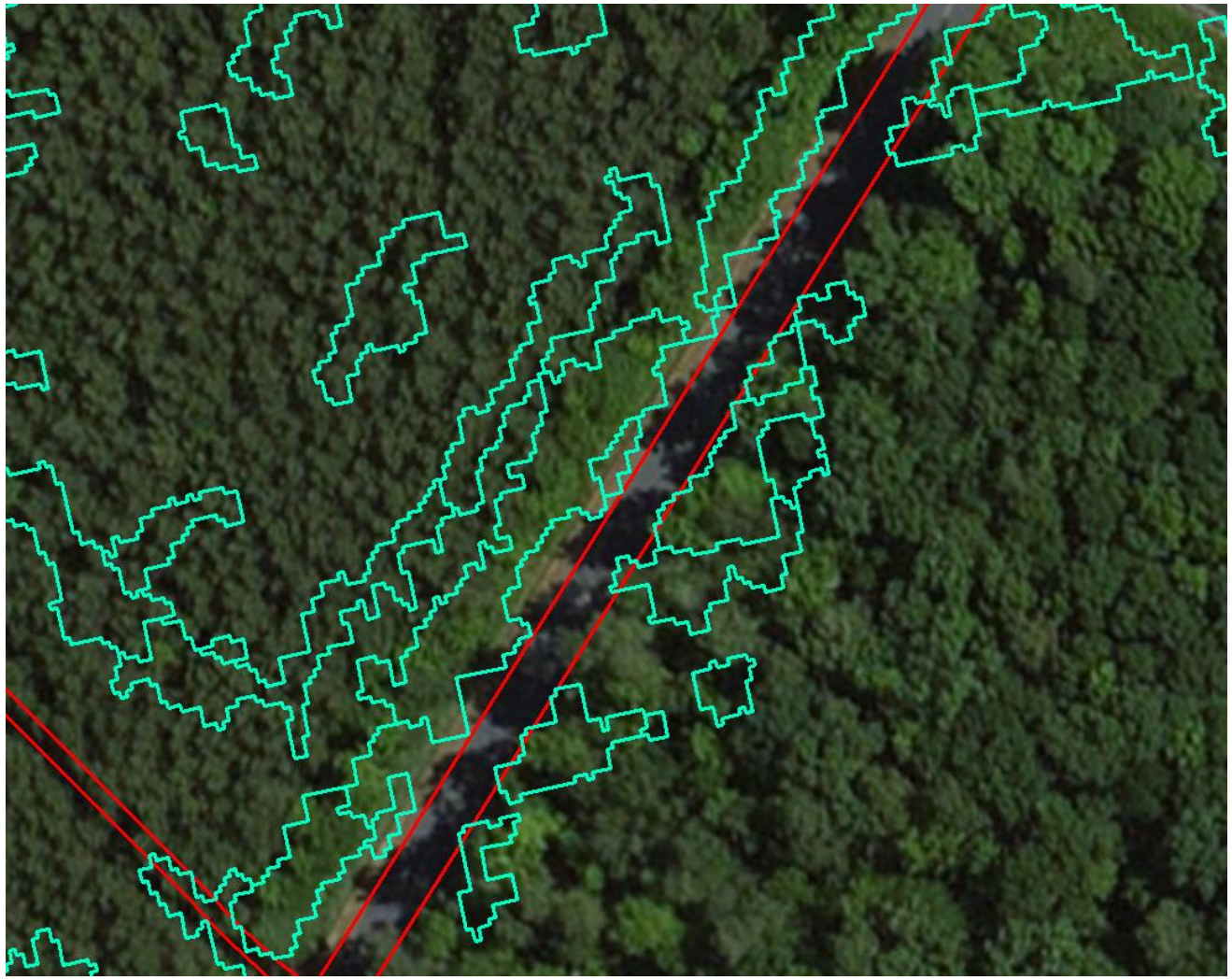
- Imagery
  - Shadows, etc.
  - Resampling
- LiDAR
  - Density
  - Vintage (Most recent LiDAR)



Errors

Sources

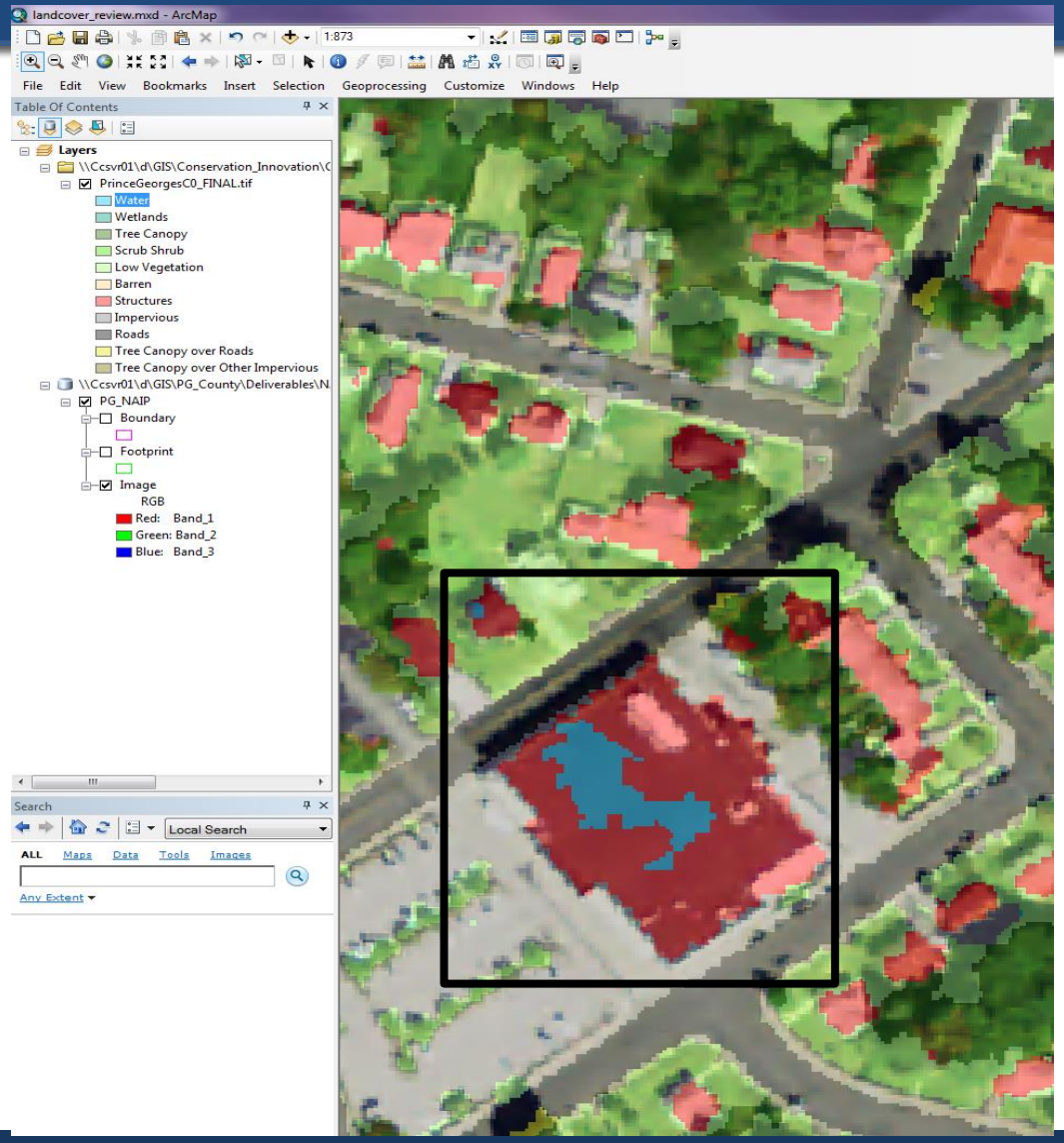
- Imagery
  - Shadows, etc.
  - Resampling
- LiDAR
  - Density
  - Vintage
- Segmentation
  - Imperfect edges



Errors

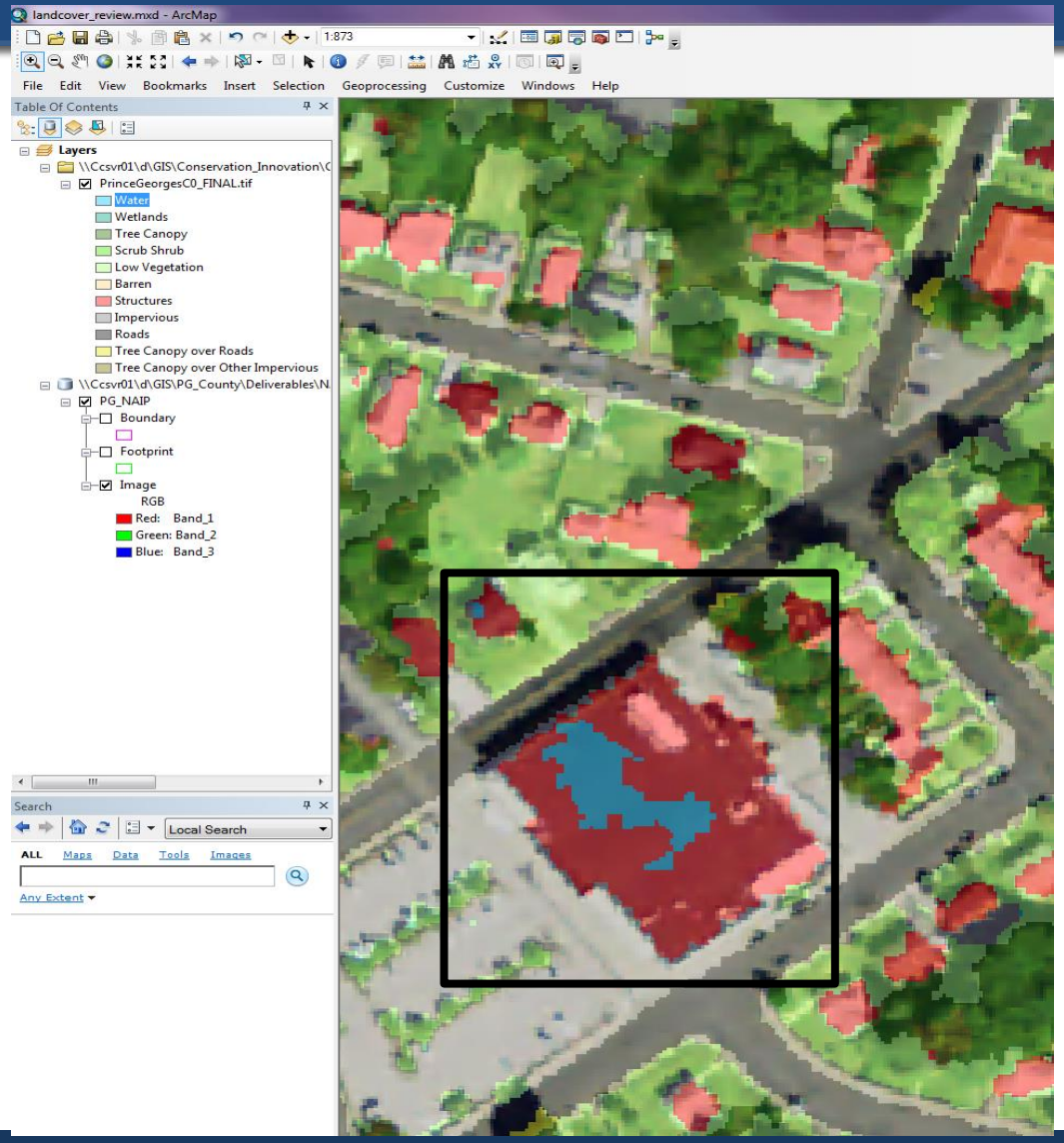
Sources

- Imagery
  - Shadows, etc.
  - Resampling
- LiDAR
  - Density
  - Vintage
- Segmentation
  - Imperfect edges
- Classification mistakes



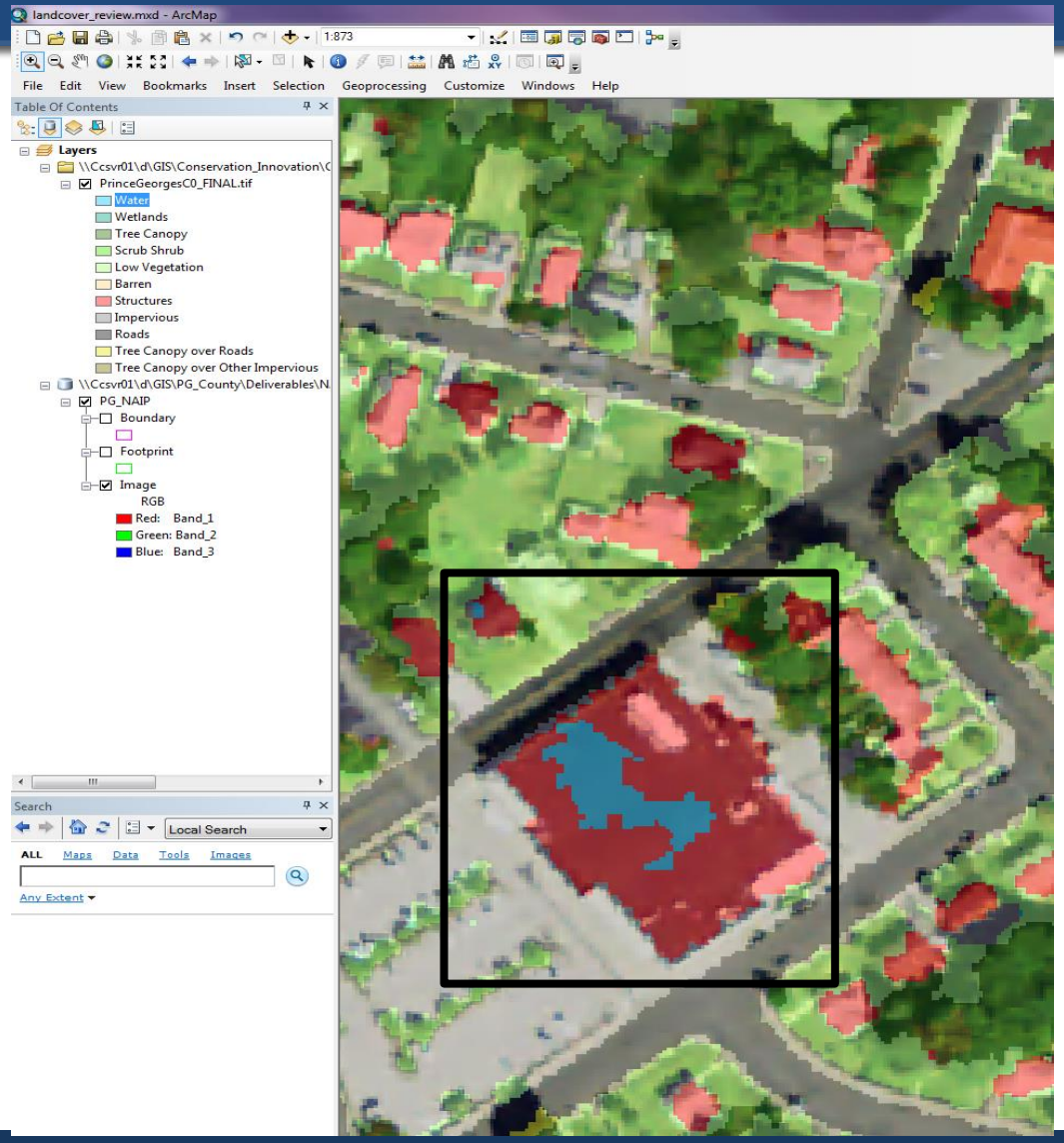
Corrections

- Classification mistakes
  - Isolated, infrequent, or very small-scale
    - Examples
      - Pools or sheds in backyards missed as Low Vegetation
      - Individual trees misclassified as Low Vegetation
      - Small algae-covered ponds classified as Low Vegetation
      - Part of a residential roof coded as Impervious Surfaces



Corrections

- Classification mistakes
  - ~~Isolated, infrequent, or very small-scale~~
  - Systematic
    - Examples:
      - Water or Barren present on many building roofs or in roads
      - Neighborhood-scale misclassification of houses as Impervious Surfaces
      - Misclassified shopping complexes or other large structures as Barren or Impervious Surfaces



Data Review

Chesapeake Conservancy
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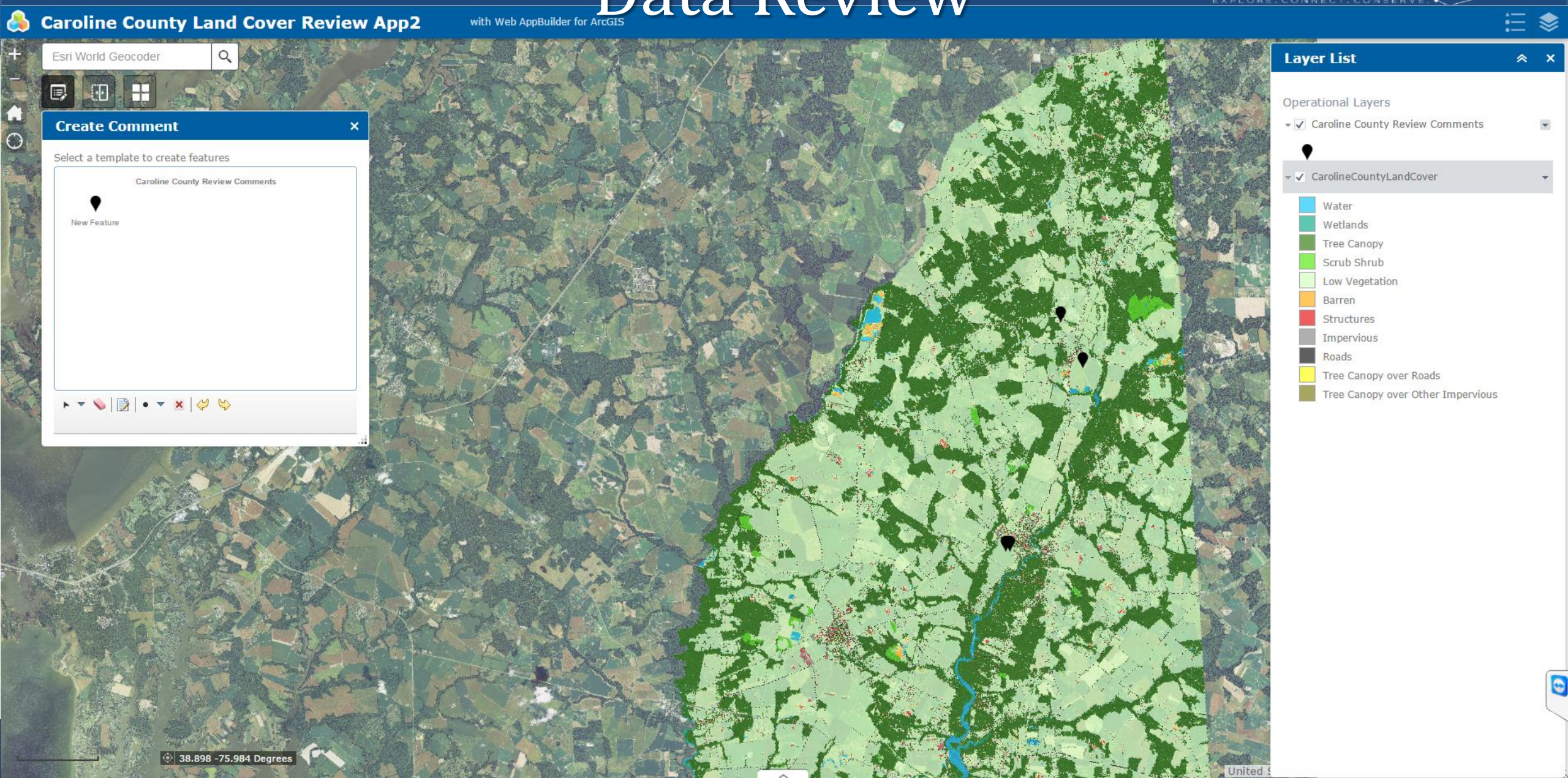
[Data Review Web App]

Data Review


Caroline County Land Cover Review App2
with Web AppBuilder for ArcGIS
Esri World Geocoder
Create Comment
Select a template to create features
Caroline County Review Comments
New Feature
Layer List
Operational Layers
Caroline County Review Comments
CarolineCountyLandCover
Water
Wetlands
Tree Canopy
Scrub Shrub
Low Vegetation
Barren
Structures
Impervious
Roads
Tree Canopy over Roads
Tree Canopy over Other Impervious
38.898 -75.984 Degrees

Contact:

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