Mapping Phase 6 Land Uses
Wetlands
Delaware

February 26, 2015

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Phase 6 Land Use Classification

WETLANDS

Outline

- Review of Wetland Types and Source Data
- Preliminary Analysis
- Methods
- Results
- Limitations and Challenges
- Discussion

Preliminary Analysis

- Goals
  - Map wetland coverage using 4 wetland land use classes:
    - Tidal (fresh and saline)
    - Floodplain
    - Headwater
    - Depressional
- Study Area

  (4 Counties)
  - Charles County, MD
  - Wicomico County, MD
  - Lancaster County, PA
  - Fairfax County, VA

Data and Methods

Proposed Wetland Type	Primary Data	Ancillary Data
Tidal	NWI Attribute Code	
Floodplain	FEMA Flood Hazard Layer	SSURGO
Headwater	NWI Attribute Code	NHD 24K Stream Layer and Area/Waterbody Layer
Depressional	DEM	SSURGO

Methods

- Tidal
  - Query all polygons with Attribute Code beginning with the letter “E” (Estuarine)
- Floodplain
  - Option1: Create polygons representing the floodplain boundaries by querying polygons in the FEMA flood hazard layer by flood frequency (e.g. 100 year floods)
  - Option 2: Define floodplain boundaries for counties without a FEMA hazard layer using SSURGO data (e.g. flood frequency, fluvial soil origin, fluvial geomporphology, and waterbodies) and methods (Source: Sangwan, Nikhil, Floodplain mapping using soil survey geographic (SSURGO) database, Purdue University (2014)
  - Overlay the NWI layer to see which wetlands fall inside or intersect the floodplain layer

Methods (Cont'd)

- Headwater
  - Option 1: Classify the remaining wetlands as headwater by process of elimination
  - Option 2 (QA/QC): Compare the location of the wetlands with the location of 1st and 2nd order streams created from 10m DEM
  - Source: Hershner, Carl et al., Wetlands of Virginia: total, isolated and headwater, Virginia Institute of Marine Science (VIMS) Special Report No. 03-1 (2003)
- Depressional
  - Attempted to identify depressions using DEM and SSURGO
  - Experimented with "Isolated" wetlands as a potential substitute

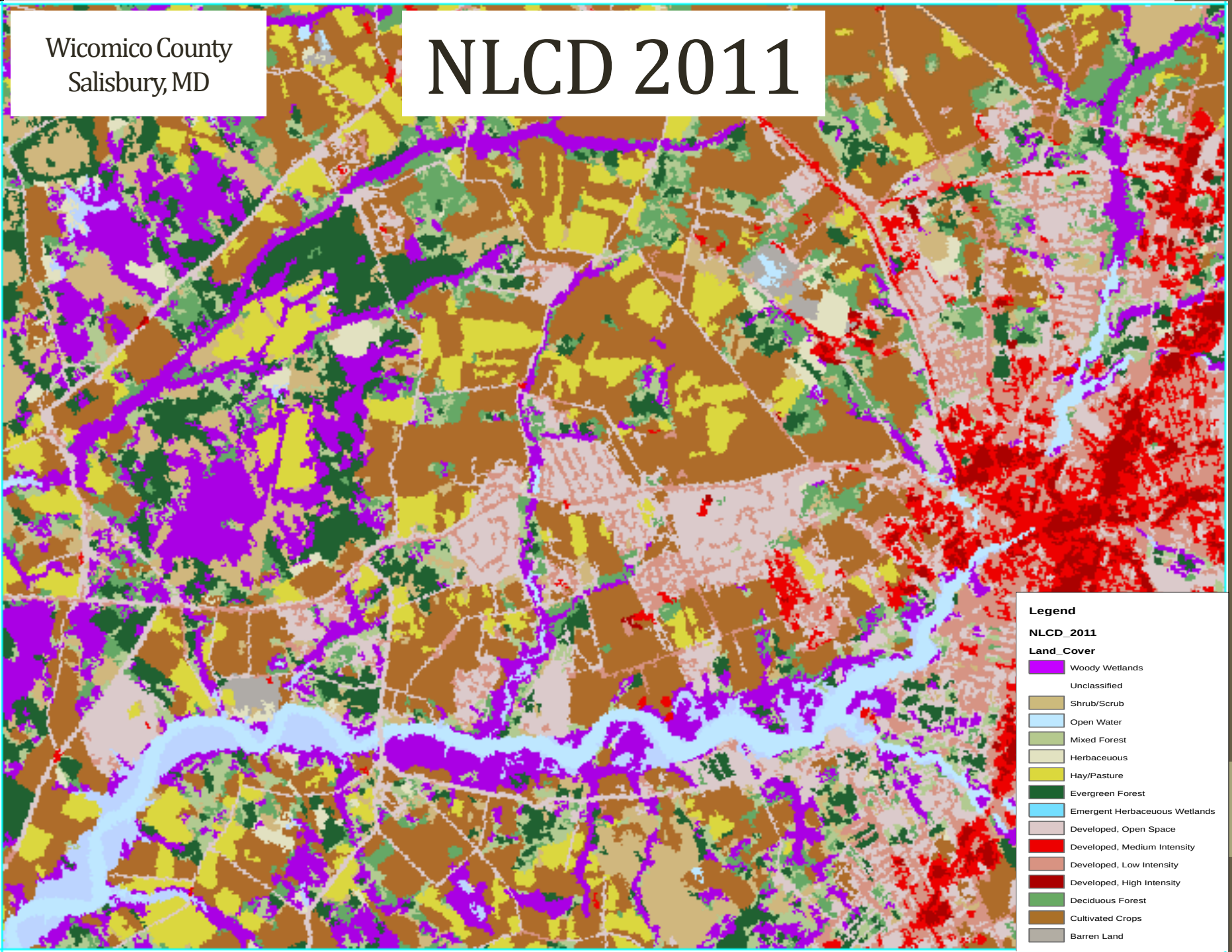
Preliminary Results

- Tidal and Floodplain wetlands were easily identifiable and appeared to have good connectivity
- Headwater and Isolated wetlands met the basic criteria (e.g. 1st and 2nd order stream systems) but were difficult to visually interpret and differentiate due to forest cover
- Isolated wetlands increased in size (area) as the distance to the coastal plain landscape decreased
- The use of SSURGO to identify the floodplain boundaries often extended farther upstream than NHD 24k polylines, raising the question, “Are wetlands or landscapes that function like wetlands being omitted?”
- Decrease in Headwater wetlands in Fairfax County – omission?
- Wetlands in Lancaster County, PA were more speckled and less frequent than in the other pilot counties. Why? Geology?

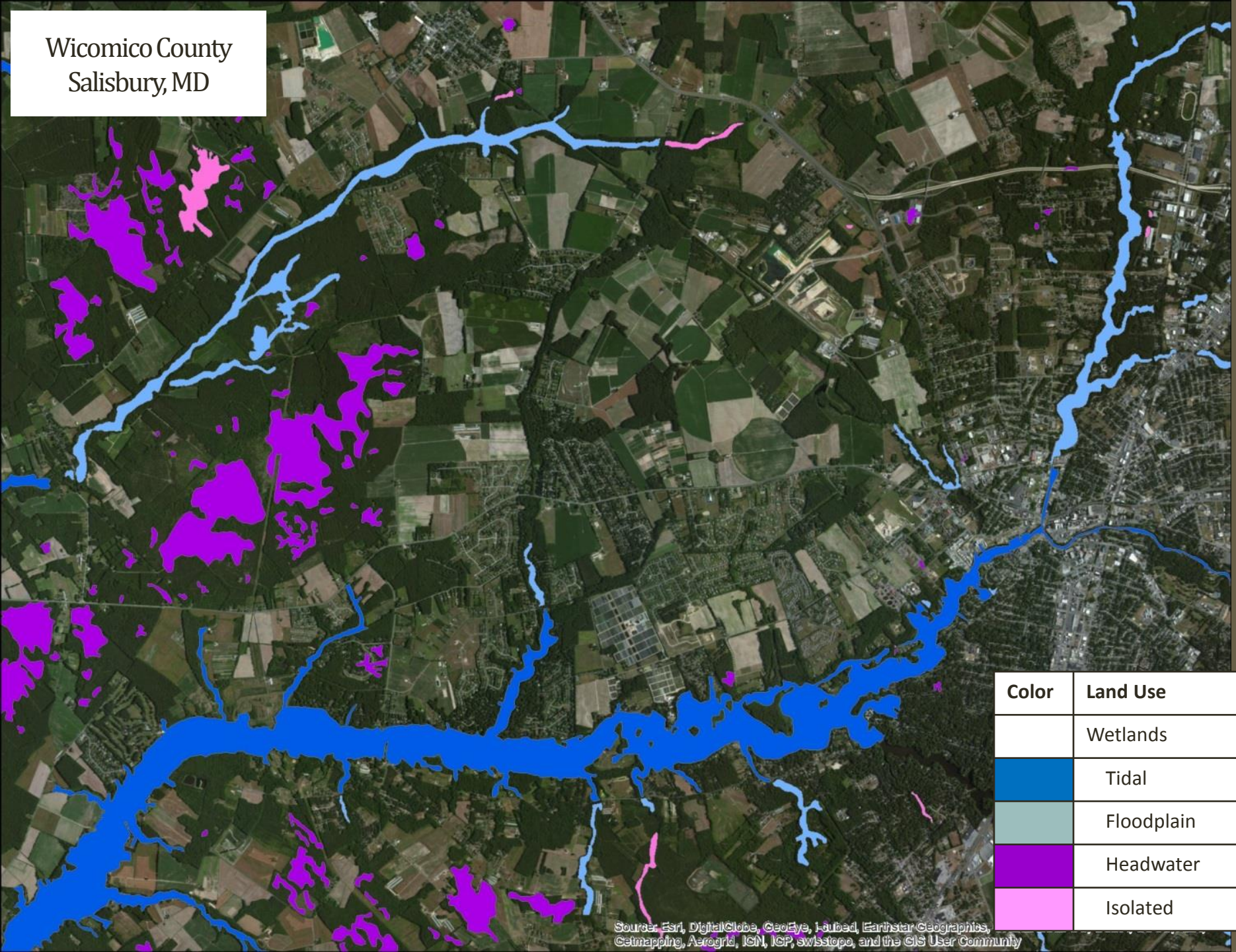
Wicomico County
Salisbury, MD

Wicomico County
Salisbury, MD

NLCD 2011

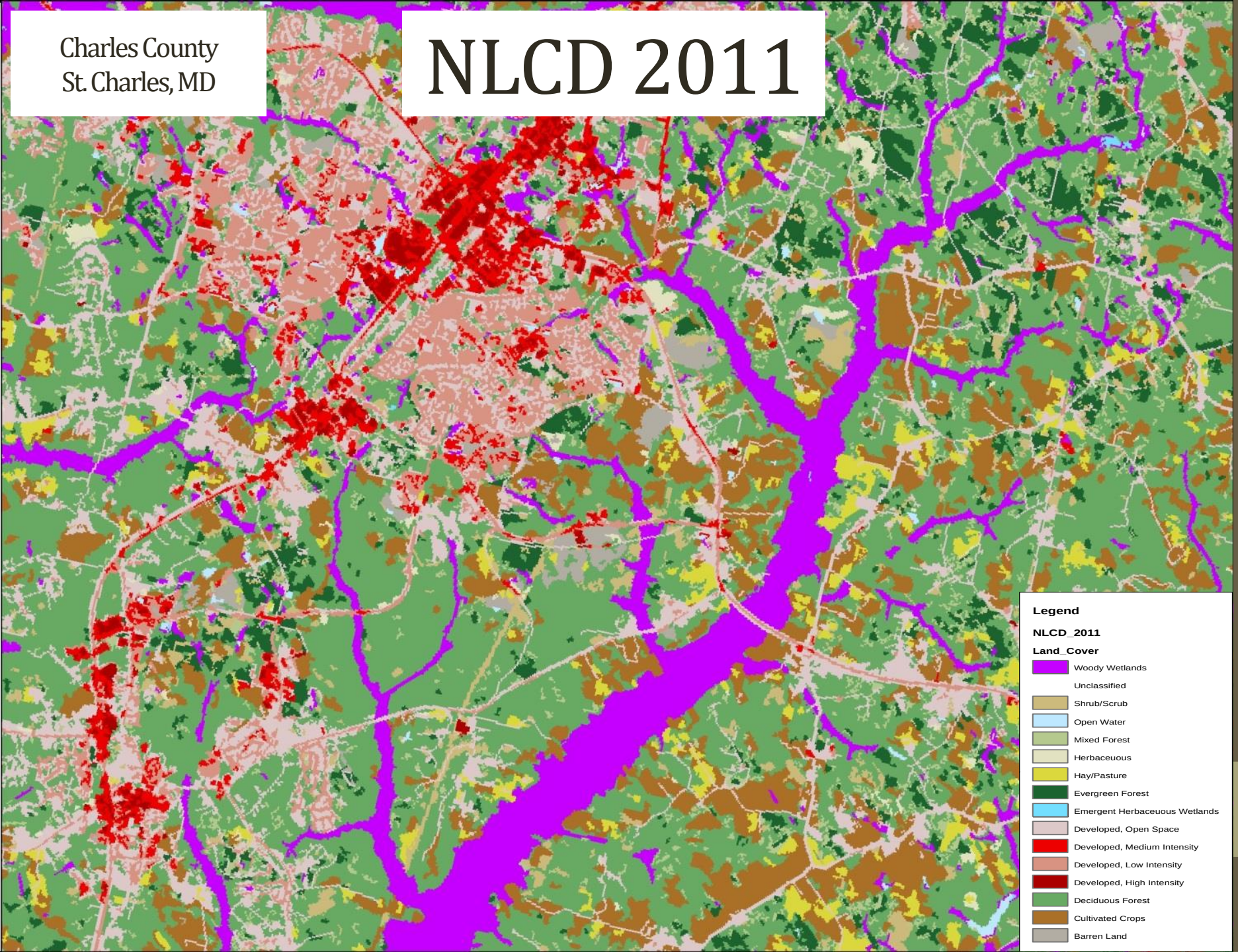


Wicomico County
Salisbury, MD

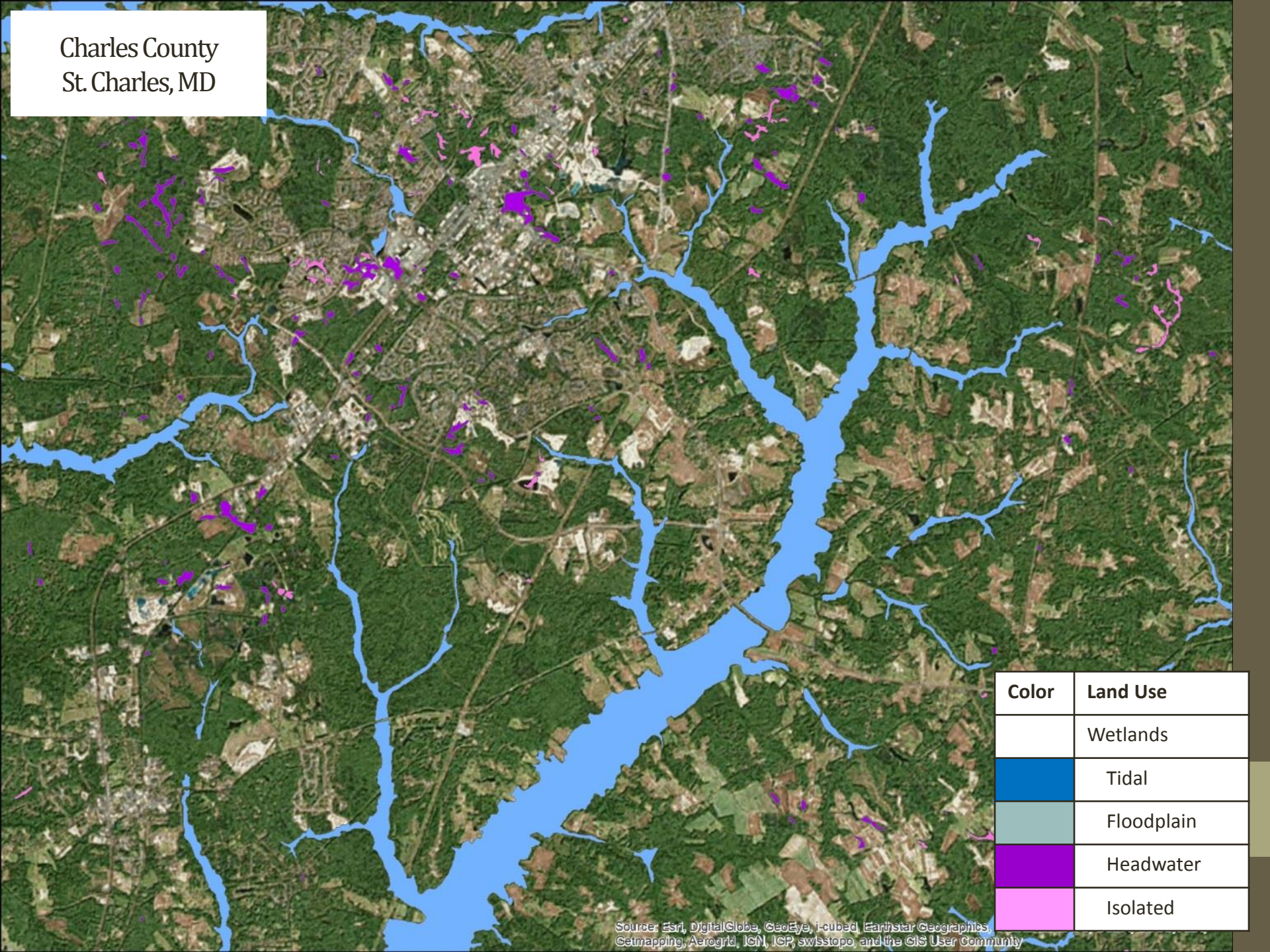


Charles County
St. Charles, MD

NLCD 2011

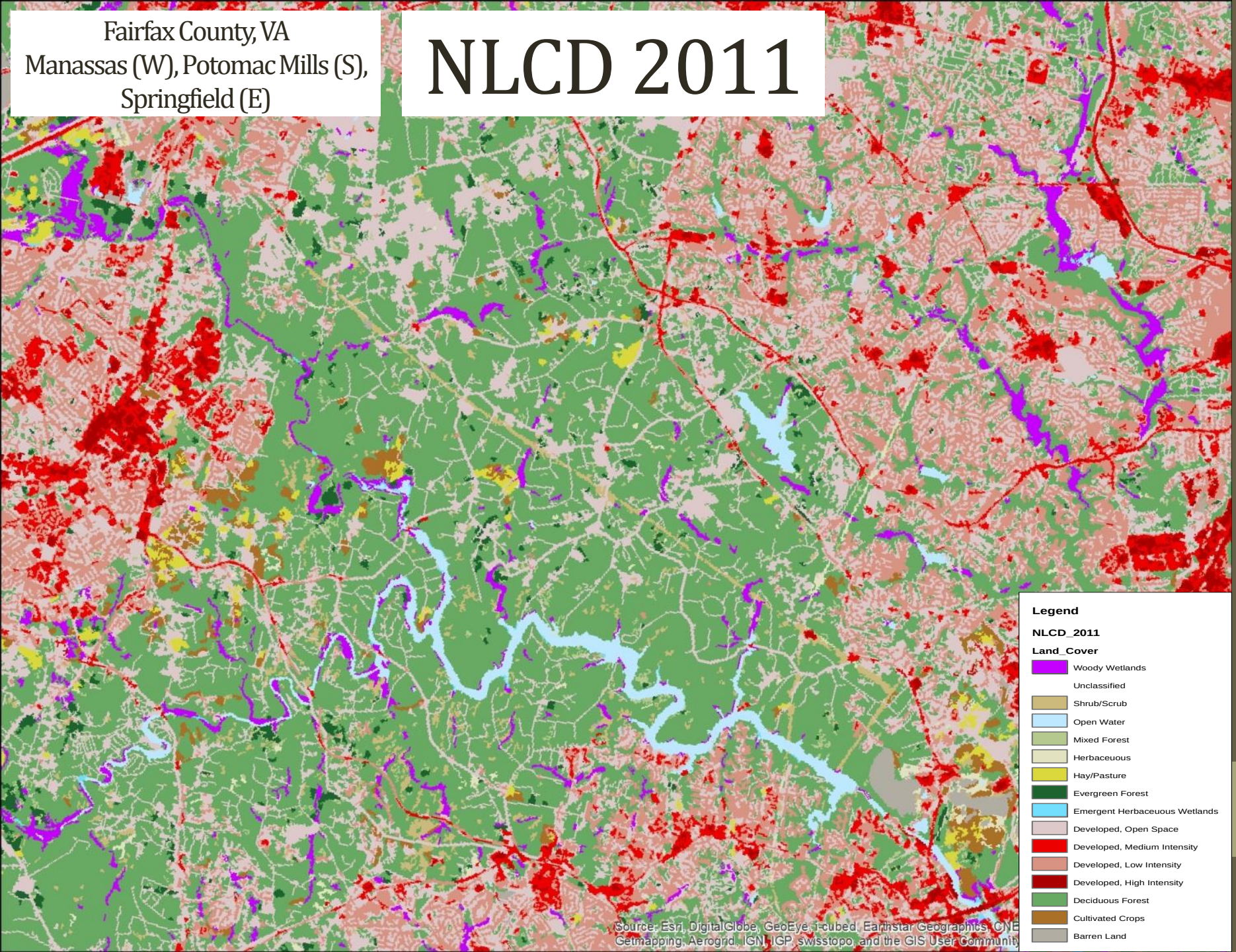


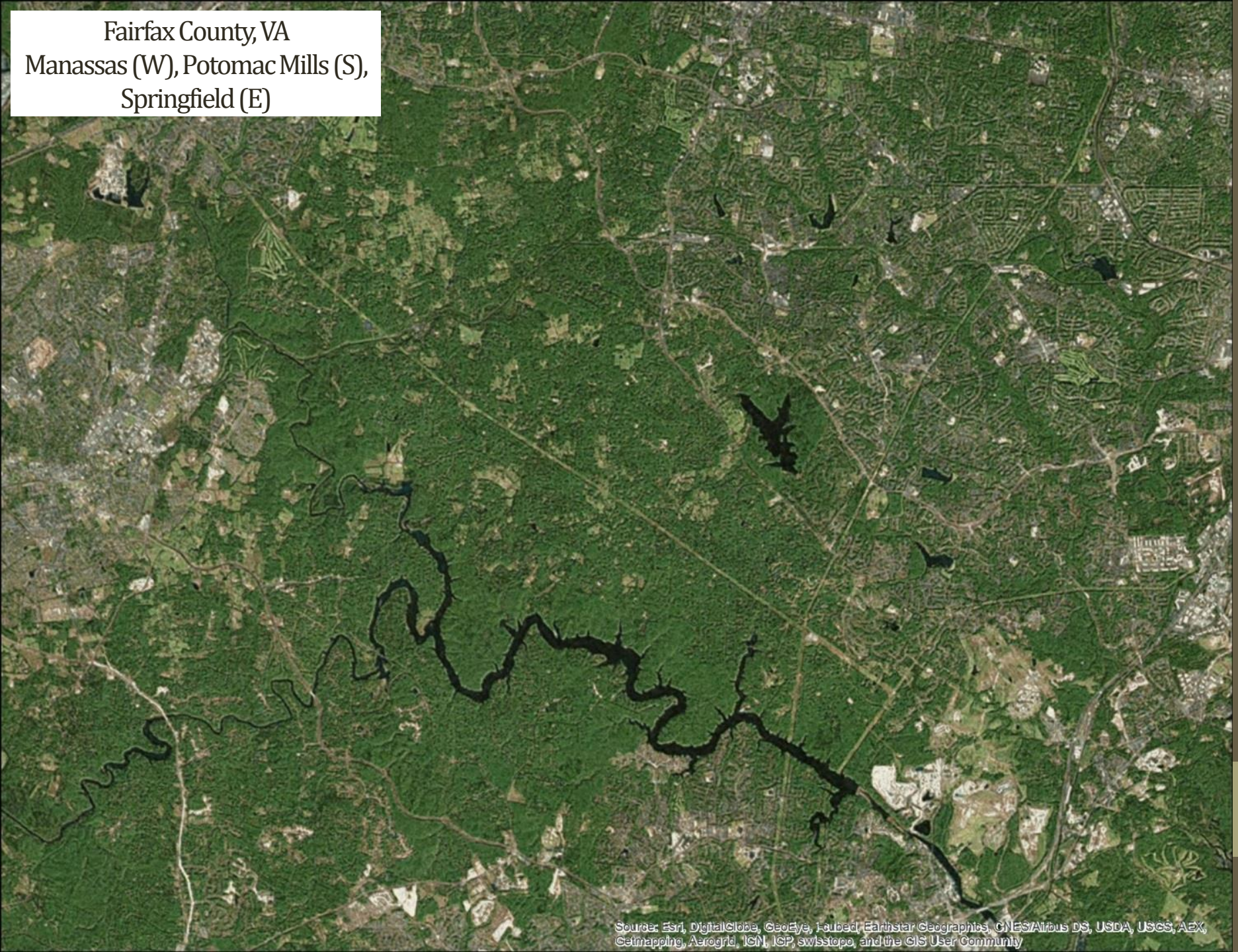

Charles County
St. Charles, MD
Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

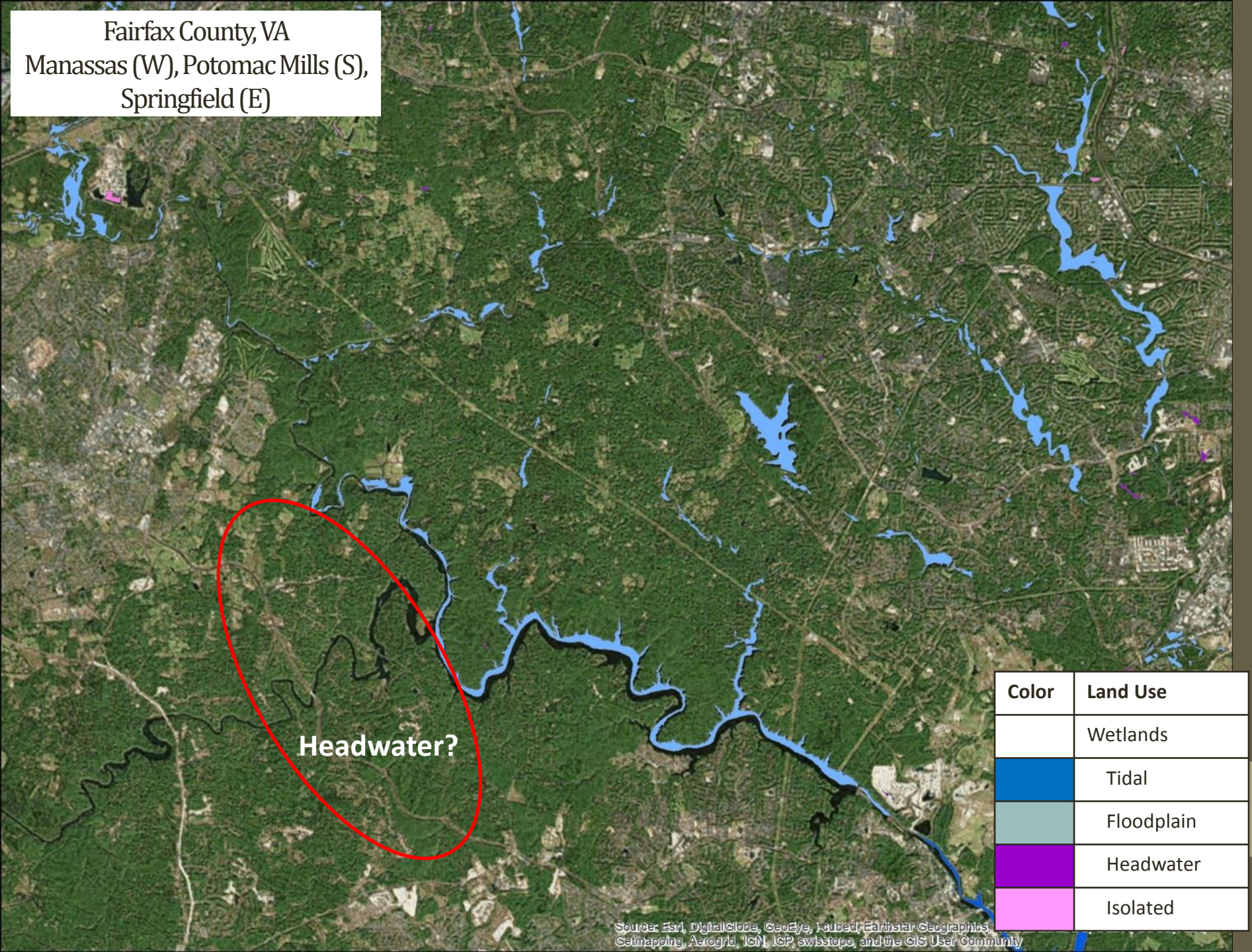

Charles County
St. Charles, MD
Color
Land Use
Wetlands
Tidal
Floodplain
Headwater
Isolated
Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Fairfax County, VA
Manassas (W), Potomac Mills (S), Springfield (E)

NLCD 2011




Fairfax County, VA
Manassas (W), Potomac Mills (S),
Springfield (E)
Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community


Fairfax County, VA
Manassas (W), Potomac Mills (S), Springfield (E)
Headwater?
Color
Land Use
Wetlands
Tidal
Floodplain
Headwater
Isolated
Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Limitations and Challenges

- Defining topographical and geomorphological signatures of "depressional" wetlands, which can vary across different landscapes
- Accuracy of floodplain boundaries according to SSURGO
  - Should more attributes be incorporated into the query (e.g. frequency of ponding, slopes, etc.)
- Determining the best way to interpret the relationship between the location of "headwater" wetlands to the 1st and 2nd order streams (e.g. by distance from the stream or if the wetland inside or adjacent to the stream(s) catchment)

Phase 6 Land Use Classification using local data

DELAWARE

Data Sets

Local Data Sets	Data Type/ Resolution	Year
Land Use Land Cover	Polygon	2012
Impervious Surface Layer	Raster	2007
Zoning	Polygon	2012 - 2014
Regional Data Sets		
NLCD	Raster / 30m	2011
NLCD - Tree Canopy	Raster / 30m	2011
NLCD - Impervious	Raster / 30m	2011

Ongoing Tasks

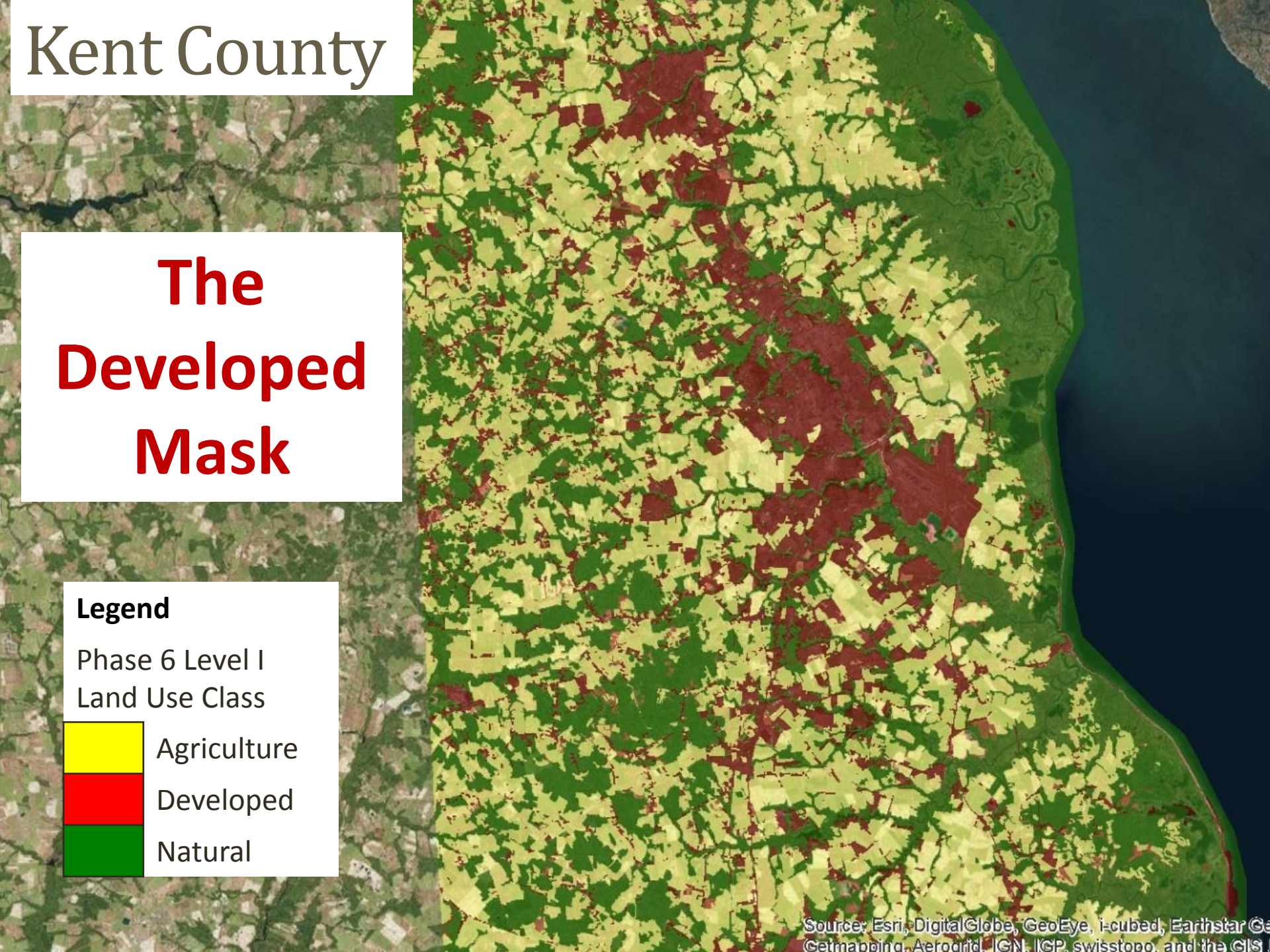
- Create a crosswalk of land use classes
- Identify the Developed Mask
  - Extract agricultural, wetland, and water land cover
  - Identify impervious road and non-road cover
- Differentiate developed/urban tree canopy from forest cover by applying a threshold to the area of patches of forest cover
- Determine the coverage of turf grass by subtracting the impervious, tree canopy and open space land use layers from the developed mask
- Maximize impervious and forest/tree canopy coverage by adding supplemental data sets
  - Additional local data on urban tree canopy (by jurisdiction)
  - Updated versions of the impervious and forest layers

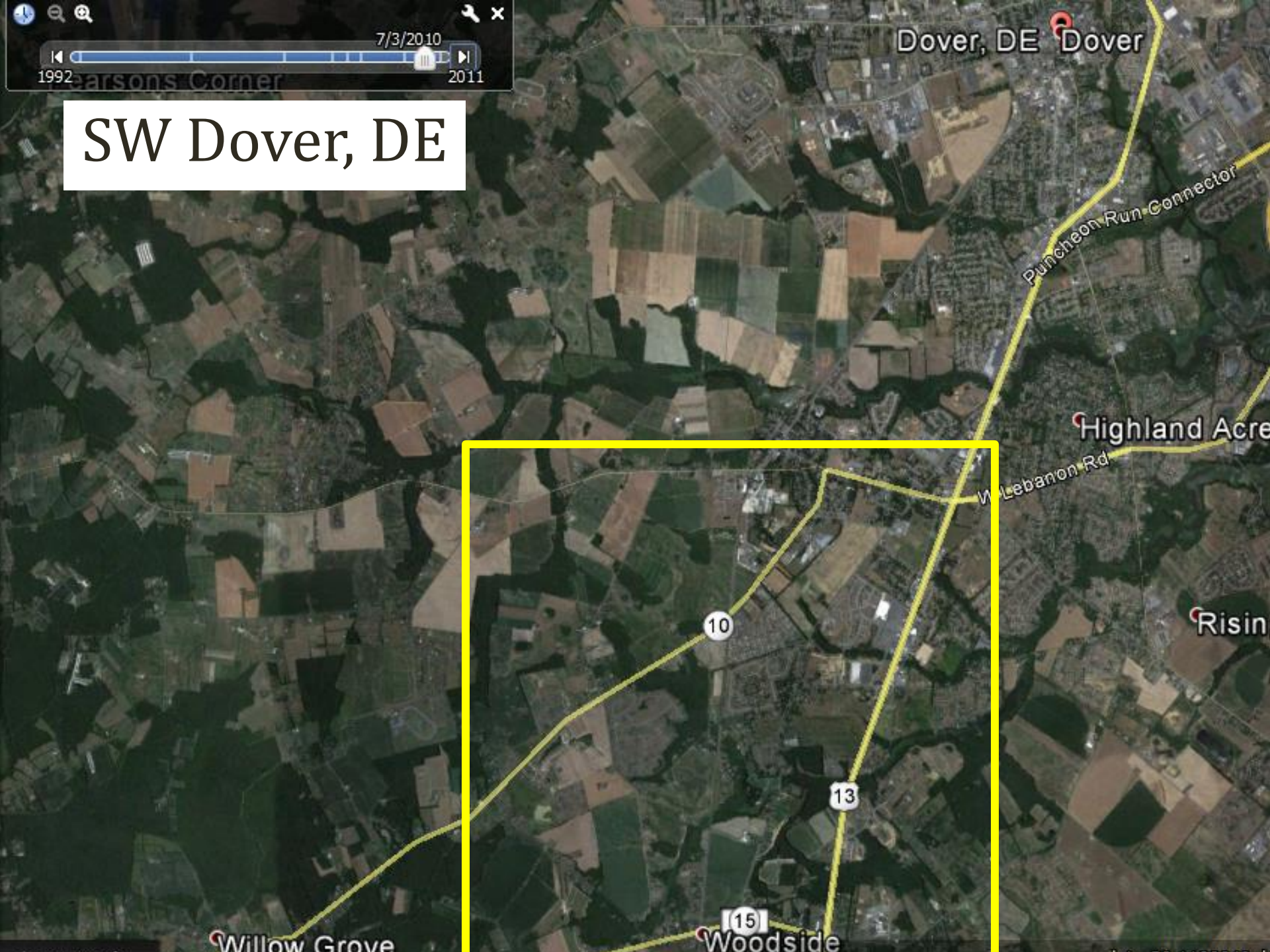
Key Decisions

- Classifying the “Transitional” land cover class (DE LULC) as developed/impervious and picking up the same spatial coverage in the 2007 impervious layer
- Adding the 2011 NLCD impervious data to the 2012 DE LULC data set to account for temporal changes and omission errors
- Adding the 2011 NLCD tree canopy and individual urban tree canopy data sets to improve the differentiation between forest cover and tree canopy
- Deciding how to distinguish open space from turf grass in areas that fall in or on the edge of the developed mask and adjacent to Ag

Kent County

The Developed Mask




7/3/2010
1992
2011
Dover, DE
Dover
Puncheon Run Connector
Highland Acre
Lebanon Rd
10
13
15
Woodside
Willow Grove

SW Dover, DE

DE 2012 LULC Developed Mask

Developed impervious versus pervious?

DE 2012 LULC


Legend
Phase 6 Level I
Land Use Class
Agriculture
Developed
Natural
Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

DE 2012 LULC


Legend
Phase 6 Land Use Class
Level I
Agriculture
Developed
Natural
Level II
Impervious Roads
Impervious Non roads
Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

DE 2012 LULC


Legend
Phase 6 Land Use Class
Level I
Agriculture
Developed
Natural
Level II
Impervious Roads
Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

DE 2012 LULC
DE 2007 Impervious Layer

DE 2012 LULC
DE 2007 Impervious Layer

Where is the Open Space and Turf Grass?

OPEN SPACE VS. TURF GRASS

DE 2012 LULC
DE 2007 Impervious Layer

DE 2012 LULC
DE 2007 Impervious Layer

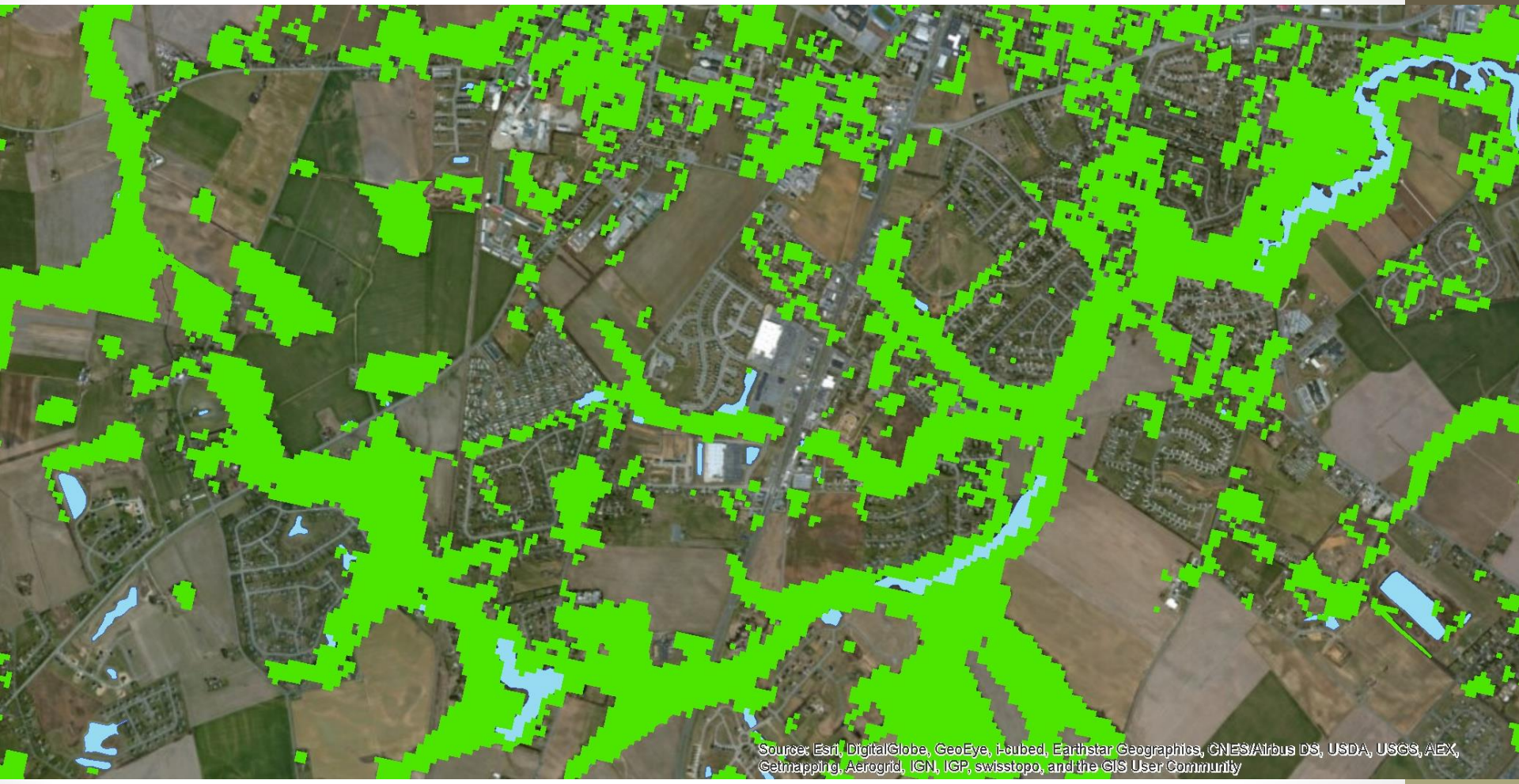
FOREST VS. DEVELOPED TREE CANOPY

DE 2012 LULC

Where is the Tree Canopy?

DE 2012 LULC
NLCD 2011 Tree Canopy Layer >= 33%

DE 2012 LULC
NLCD 2011 Tree Canopy Layer >= 10%



EXTRACTION

DE 2012 LULC
Dover AFB

DE 2012 LULC Harrington, DE

DE 2012 LULC
Goldsboro, MD