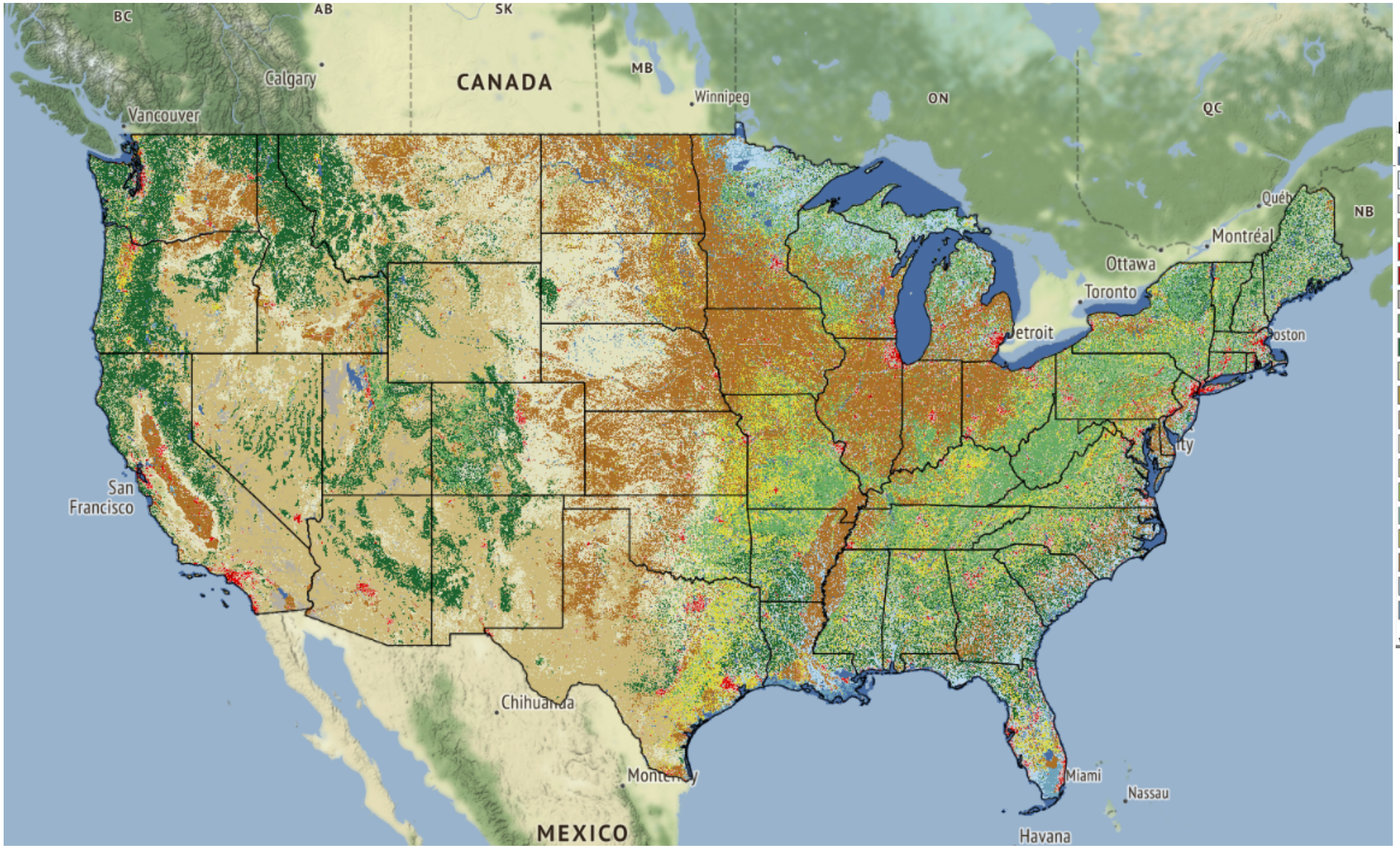
Mike Strager

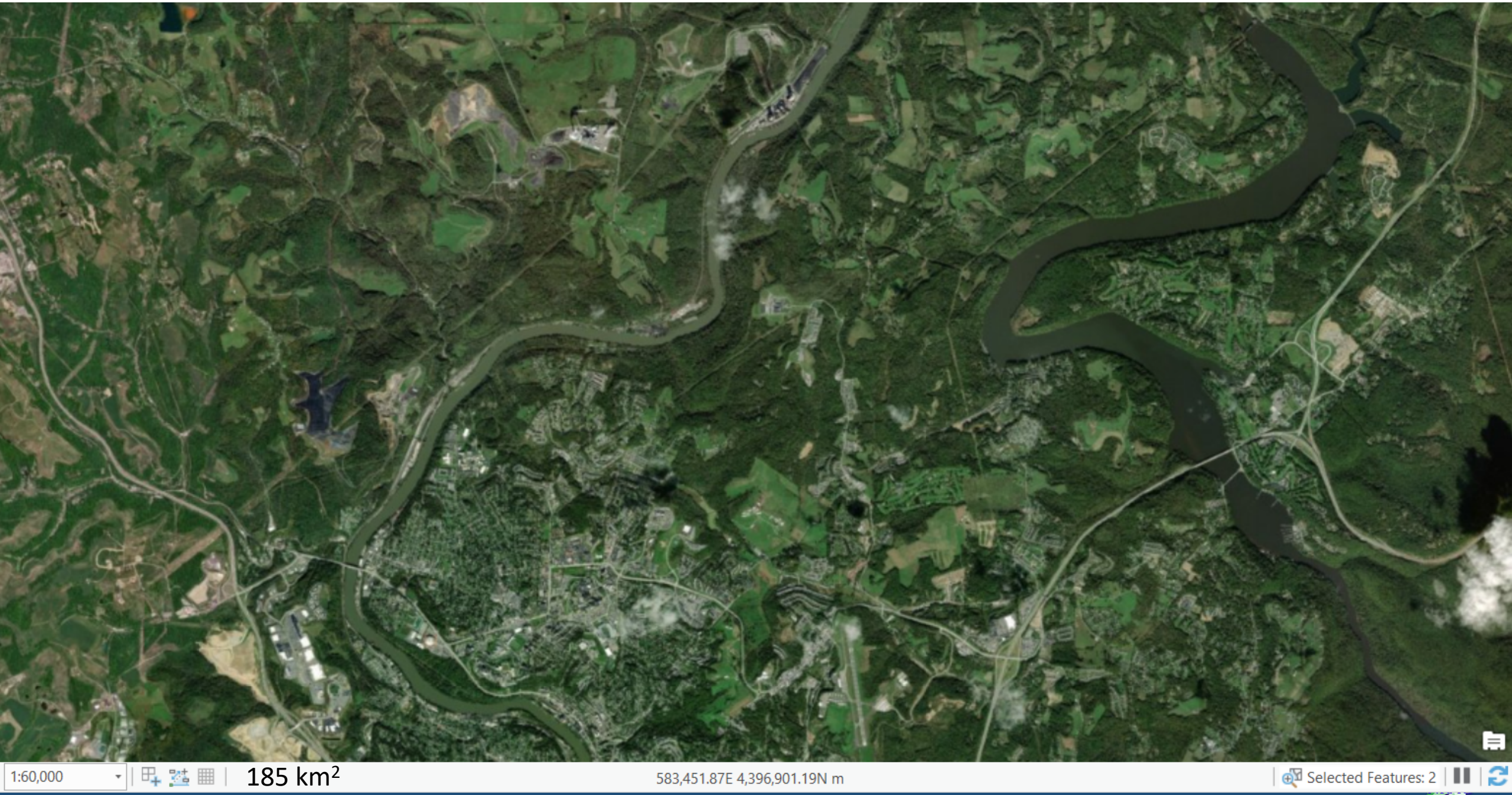
West Virginia University®
SCHOOL OF NATURAL RESOURCES

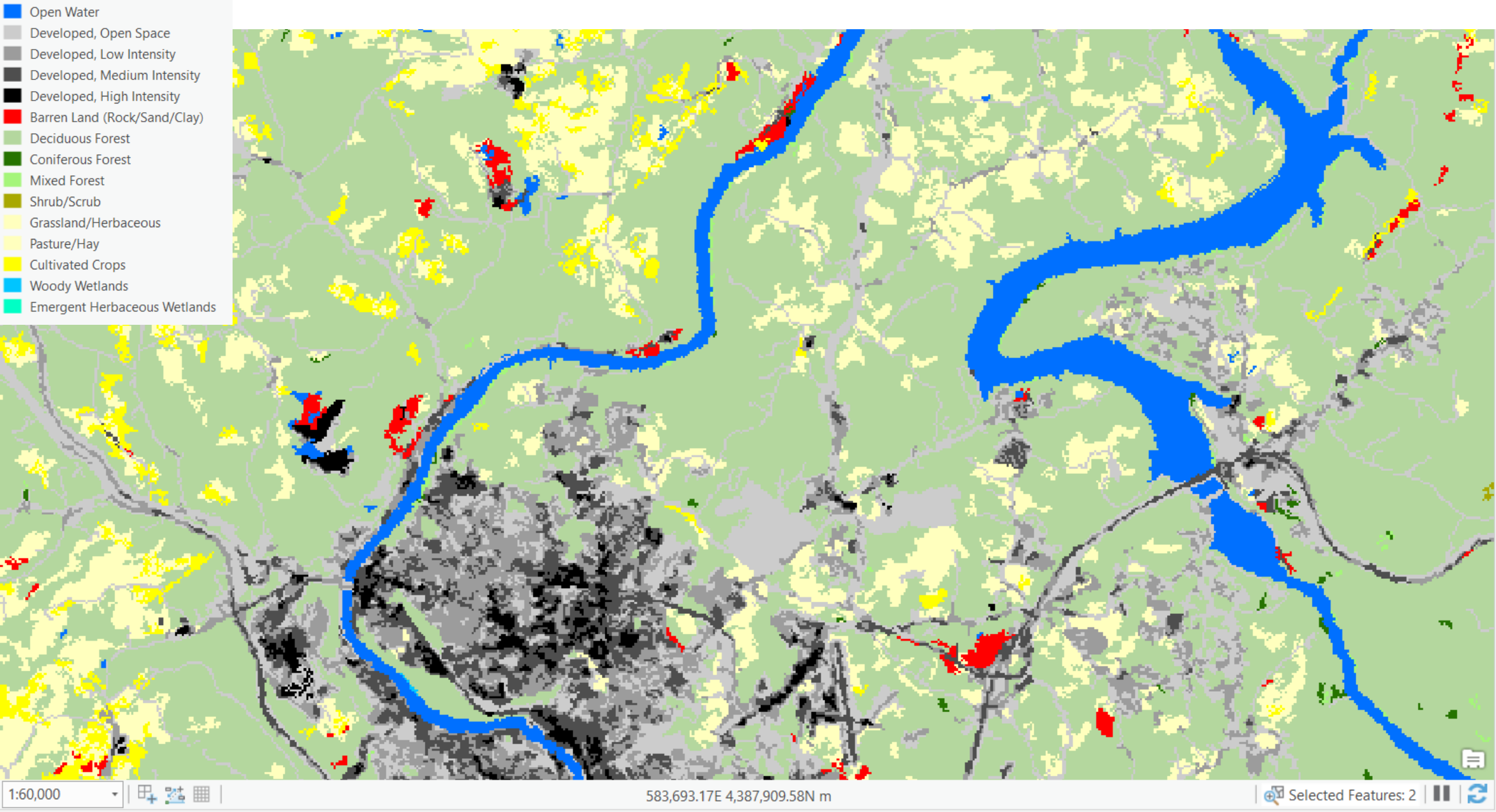
Natural Resource Analysis Center

Celebrating 20+ years of Partnership
Multi-Resolution Land Characteristics Consortium

Years 2016, 2013, 2011, 2008, 2006, 2004, 2001




1:60,000
185 km²
583,451.87E 4,396,901.19N m
Selected Features: 2


Open Water
Developed, Open Space
Developed, Low Intensity
Developed, Medium Intensity
Developed, High Intensity
Barren Land (Rock/Sand/Clay)
Deciduous Forest
Coniferous Forest
Mixed Forest
Shrub/Scrub
Grassland/Herbaceous
Pasture/Hay
Cultivated Crops
Woody Wetlands
Emergent Herbaceous Wetlands
1:60,000
583,693.17E 4,387,909.58N m
Selected Features: 2

Measure
1:10,000
5 km²
589,287.53E 4,392,981.12N m
Selected Features: 2

Measure
ATARI
1:10,000
589,264.25E 4,392,979.00N m
Selected Features: 2

USDA
United States Department of Agriculture
Farm Service Agency

2007, 2009, 2011, 2014*, 2016*, 2018*

*Color infrared and Nat Color

NAIP Imagery

What is NAIP?

The National Agriculture Imagery Program (NAIP) acquires aerial imagery during the agricultural growing seasons in the continental U.S. A primary goal of the NAIP program is to make digital ortho photography available to governmental agencies and the public within a year of acquisition.

NAIP is administered by the USDA's Farm Service Agency (FSA) through the Aerial Photography Field Office in Salt Lake City. This "leaf-on" imagery is used as a base layer for GIS programs in FSA's County Service Centers, and is used to maintain the Common Land Unit (CLU) boundaries.

How can NAIP be used?

NAIP is used by many non-FSA public and private sector customers for a wide variety of projects. A detailed study is available in the *Qualitative and Quantitative Synopsis on NAIP Usage from 2004 -2008.* Access a list of NAIP Information and Distribution Nodes.

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When is NAIP acquired?

NAIP projects are contracted each year based upon available funding and the FSA imagery acquisition cycle. Beginning in 2003, NAIP was acquired on a 5-year cycle. 2008 was a transition year, and a three-year cycle began in 2009. Click here >> for an interactive status map of NAIP acquisitions from 2002 - 2015.

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What are NAIP Specifications?

NAIP imagery is acquired at a one-meter ground sample distance (GSD) with a horizontal accuracy that matches within six meters of photo-identifiable ground control points, which are used during image inspection.

The default spectral resolution is natural color (Red, Green and Blue, or RGB) but beginning in 2007, some states have been delivered with four bands of data: RGB and Near Infrared

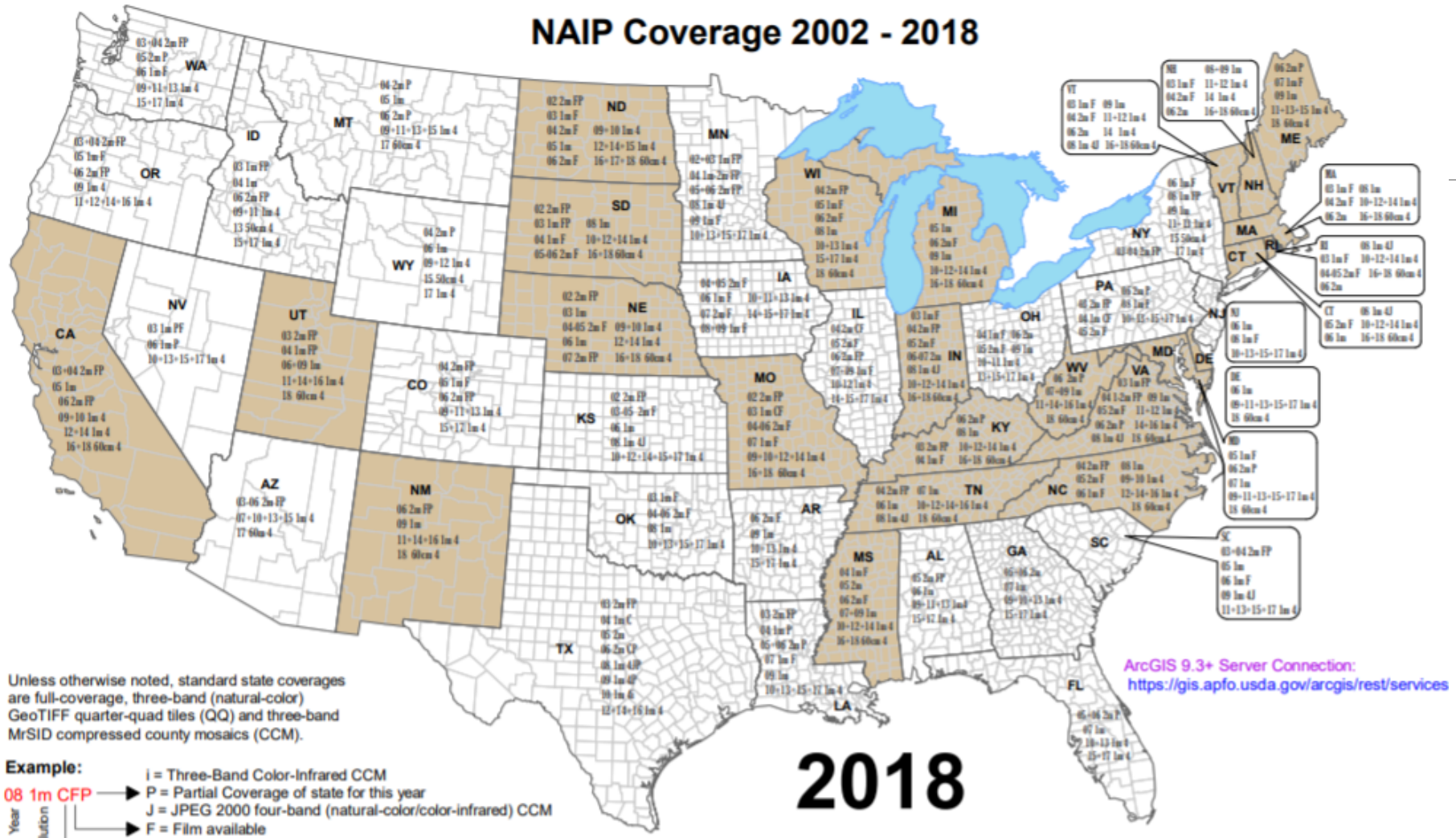
Contractually, every attempt will be made to comply with the specification of no more than 10% cloud cover per quarter quad tile, weather conditions permitting.

All imagery is inspected for horizontal accuracy and tonal quality.

USDA

United States Department of Agriculture

NAIP Coverage 2002 - 2018



Unless otherwise noted, standard state coverages are full-coverage, three-band (natural-color) GeoTIFF quarter-quad tiles (QQ) and three-band MrSID compressed county mosaics (CCM).

Example:

08 1m CFP

- Year
- Resolution
- i = Three-Band Color-Infrared CCM
- P = Partial Coverage of state for this year
- J = JPEG 2000 four-band (natural-color/color-infrared) CCM
- F = Film available
- C = Three-band Color-infrared GeoTIFF QQ & CCM
- 4 = Four-Band (Natural Color/Color Infrared) GeoTIFF QQ.

Check "All NAIP Format & Years" layer to view all years available

To view layers individually click on the *Layers* icon in the left margin of the document. Uncheck (turn off eyeball symbol) each NAIP Coverage year except for the one that you want to view. This will ensure the accurate coverage is portrayed.

2018

- 50-60 cm resolution
- 1 meter resolution
- 2 meter resolution

Updated August 27, 2018

ArcGIS 9.3+ Server Connection:
https://gis.apfo.usda.gov/arcgis/rest/services

US Department of Agriculture
Farm Service Agency
Aerial Photography Field Office
2222 West 2300 South
Salt Lake City, UT 84119-2020
Tel: 801-844-2922 Fax: 855-415-2014
Email: apfo.sales@slc.usda.gov
Website: www.apfo.usda.gov

remote sensing

MDPI

Article

Large-Area, High Spatial Resolution Land Cover Mapping Using Random Forests, GEOBIA, and NAIP Orthophotography: Findings and Recommendations

Aaron E. Maxwell [1,*], Michael P. Strager [2], Timothy A. Warner [1], Christopher A. Ramezan [1], Alice N. Morgan [2] and Cameron E. Pauley [1]

[1] Department of Geology and Geography, West Virginia University, Morgantown, WV 26506, USA; Tim.Warner@mail.wvu.edu (T.A.W.); Christopher.Ramezan@mail.wvu.edu (C.A.R.); cepauley@mix.wvu.edu (C.E.P.)

[2] Davis College of Agriculture, Natural Resources, and Design, West Virginia University, Morgantown, WV 26506, USA; mstrager@wvu.edu (M.P.S.); anm0049@mix.wvu.edu (A.N.M.)

* Correspondence: Aaron.Maxwell@mail.wvu.edu; Tel.: +1-304-293-2026

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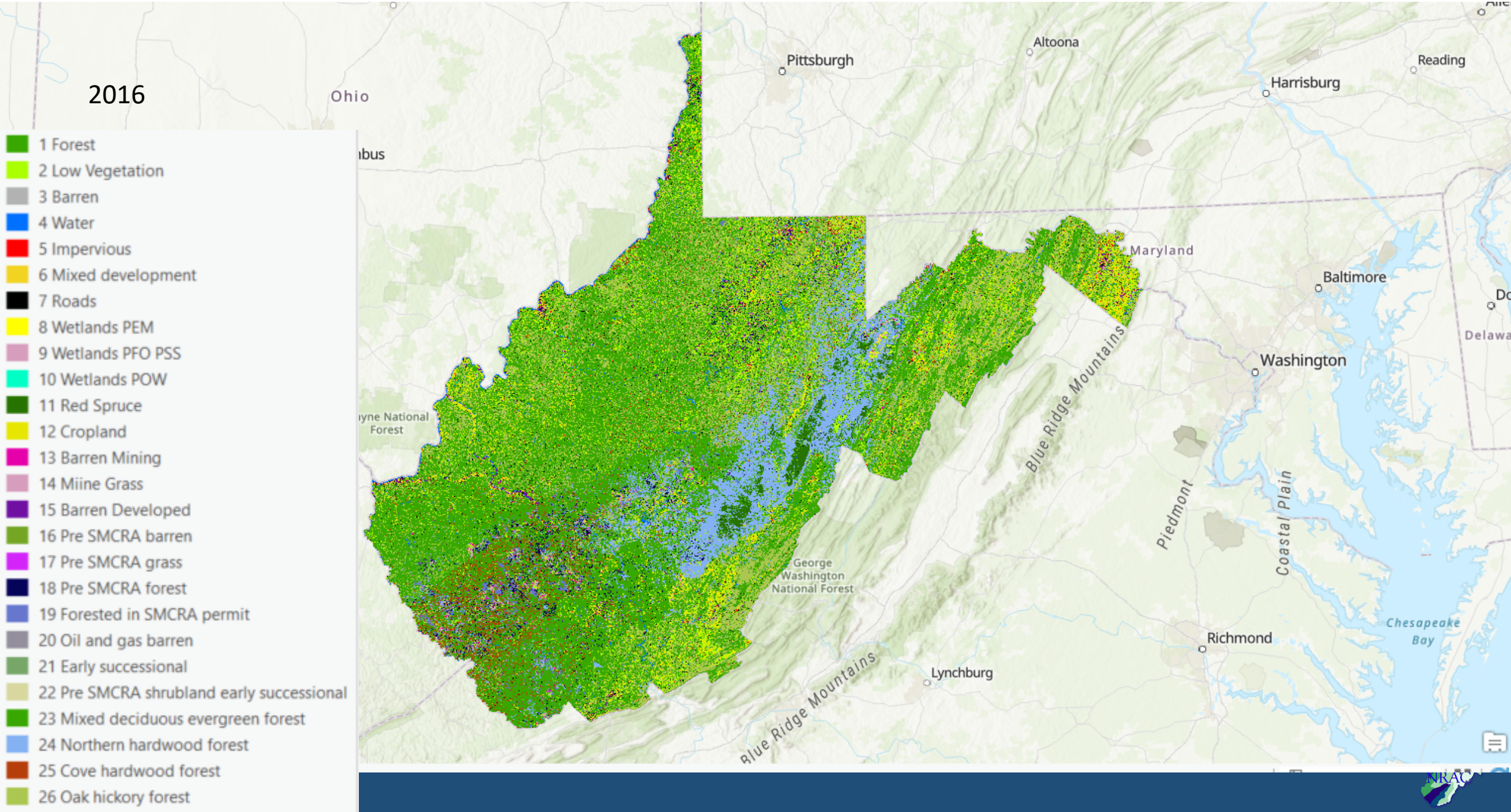
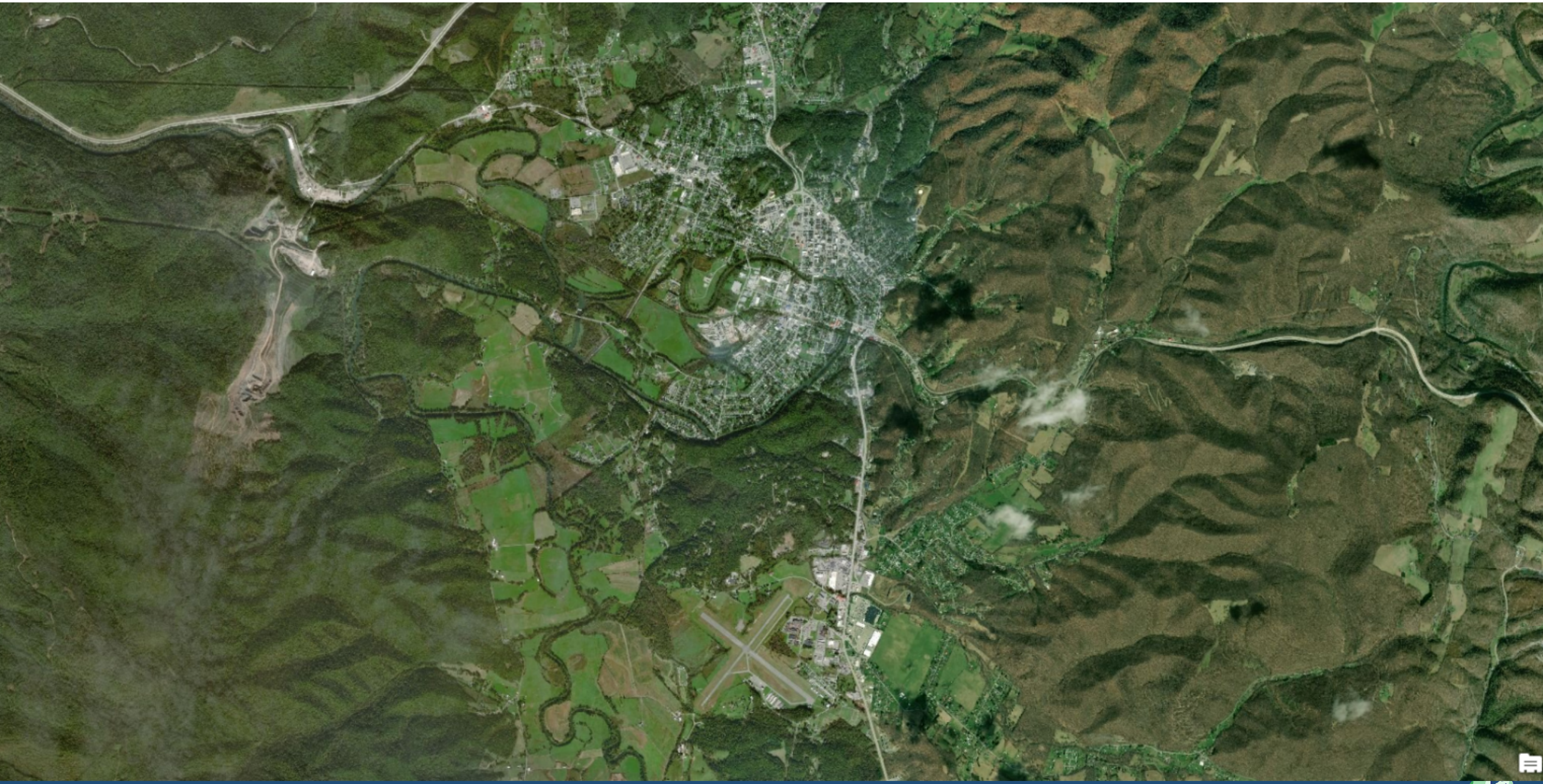
Abstract: Despite the need for quality land cover information, large-area, high spatial resolution land cover mapping has proven to be a difficult task for a variety of reasons including large data volumes, complexity of developing training and validation datasets, data availability, and heterogeneity in data and landscape conditions. We investigate the use of geographic object-based image analysis (GEOBIA), random forest (RF) machine learning, and National Agriculture Imagery Program (NAIP) orthophotography for mapping general land cover across the entire state of West Virginia, USA, an area of roughly 62,000 km^2. We obtained an overall accuracy of 96.7% and a Kappa statistic of 0.886 using a combination of NAIP orthophotography and ancillary data. Despite the high overall classification accuracy, some classes were difficult to differentiate, as highlight by the low user's and producer's accuracies for the barren, impervious, and mixed developed classes. In contrast, forest, low vegetation, and water were generally mapped with accuracy. The inclusion of ancillary data and first- and second-order textural measures generally improved classification accuracy whereas band indices and object geometric measures were less valuable. Including super-object attributes improved the classification slightly; however, this increased the computational time and complexity. From the findings of this research and previous studies, recommendations are provided for mapping large spatial extents.

Keywords: land cover; land cover mapping; object-based image analysis; GEOBIA; machine learning; random forests; National Agriculture Imagery Program; NAIP


2016
1 Forest
2 Low Vegetation
3 Barren
4 Water
5 Impervious
6 Mixed development
7 Roads
8 Wetlands PEM
9 Wetlands PFO PSS
10 Wetlands POW
11 Red Spruce
12 Cropland
13 Barren Mining
14 Miine Grass
15 Barren Developed
16 Pre SMCRA barren
17 Pre SMCRA grass
18 Pre SMCRA forest
19 Forested in SMCRA permit
20 Oil and gas barren
21 Early successional
22 Pre SMCRA shrubland early successional
23 Mixed deciduous evergreen forest
24 Northern hardwood forest
25 Cove hardwood forest
26 Oak hickory forest
Ohio
Pittsburgh
Altoona
Harrisburg
Reading
Maryland
Baltimore
Washington
Blue Ridge Mountains
Piedmont
Coastal Plain
Chesapeake Bay
George Washington National Forest
Richmond
Lynchburg
Blue Ridge Mountains



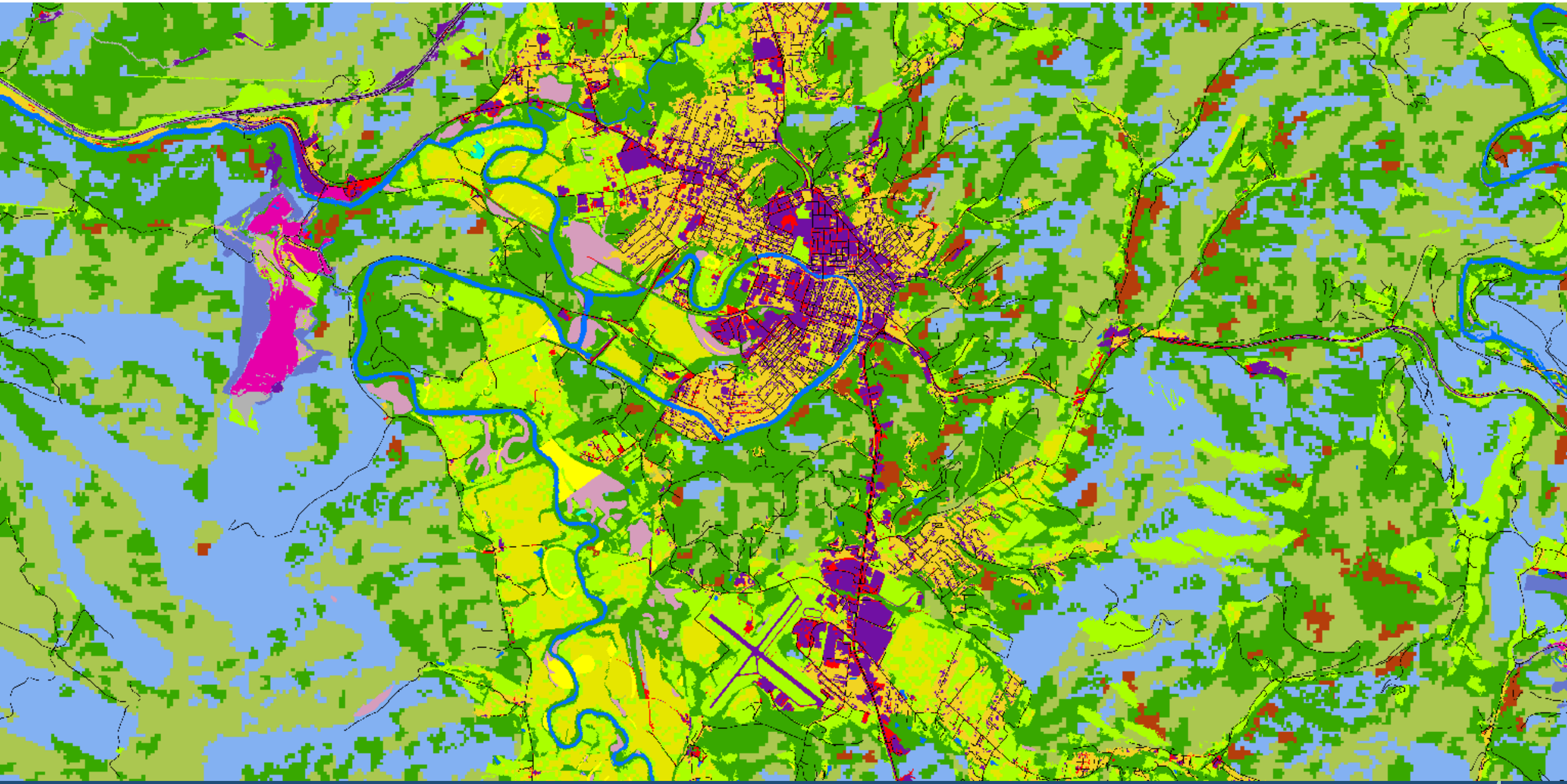


Table 2. Mapped classes and training and validation object summary.

Class	Description	Number of Training Objects	Number of Validation Objects
Forest	Areas dominated by tall, woody vegetation and mature forests. This class includes forest and woodlands.	13,347	20,561
Low Vegetation	Low vegetation such as grasslands, pastureland, agricultural fields, and croplands.	13,353	3146
Barren	Non-vegetated areas not associated with impervious surface. This class includes bare soil, quarries, and surface mine features.	1056	162
Water	All standing water, including rivers, streams, ponds, lakes, and impoundments.	1098	188
Impervious	All areas dominated by impervious surface, such as road surfaces, parking lots, airport runways, and buildings.	1205	424
Mixed Developed	Areas dominated by mixed development and mixed land cover, such as residential areas, yards, and development.	1022	517
Total		31,081	24,998

Collaborative opportunities

How to serve out these products?

1. Classified imagery by user provided shapefile
2. GIS processing and classification code for other states to incorporate

HydroGlobe, HydroShare

Others…