Wisconsin
State Cartographer's Office

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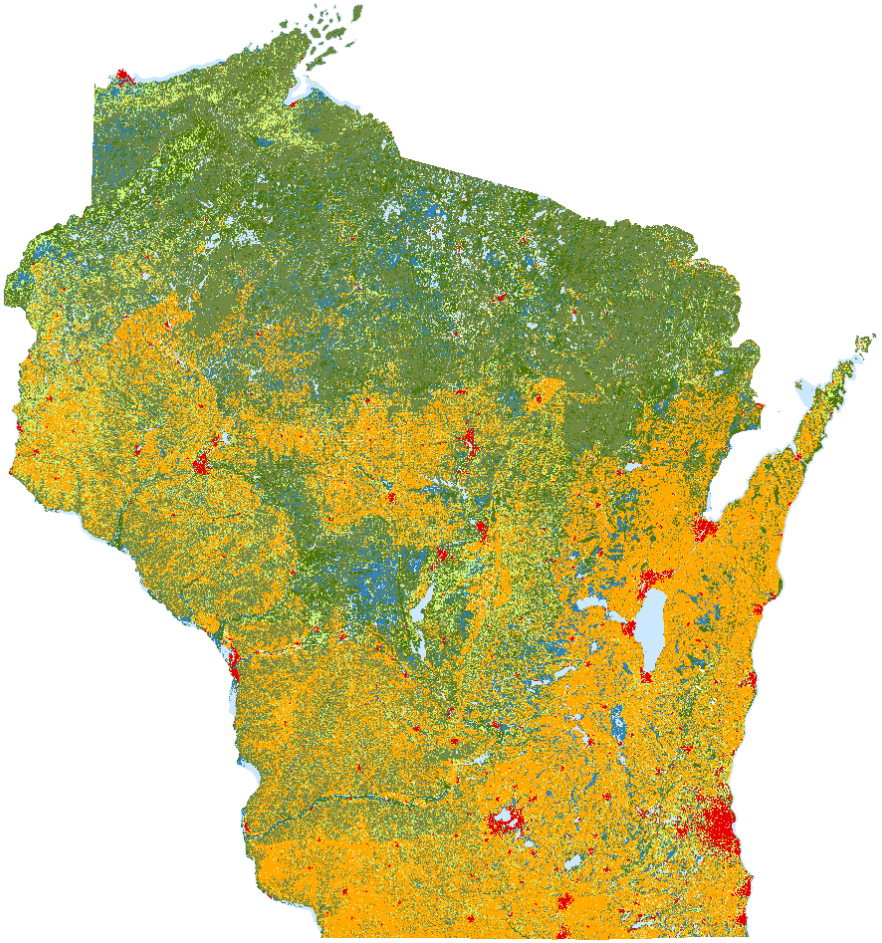
UNIVERSITY OF WISCONSIN–MADISON

Wiscland-2: Land Cover Mapping for Wisconsin



Jo Horton
State Cartographer's Office

Carly Mertes
State Cartographer's Office

Land cover?

- **Land cover**: physical surface of the land

- **Land use**: how humans use that land

Land cover data

NLCD

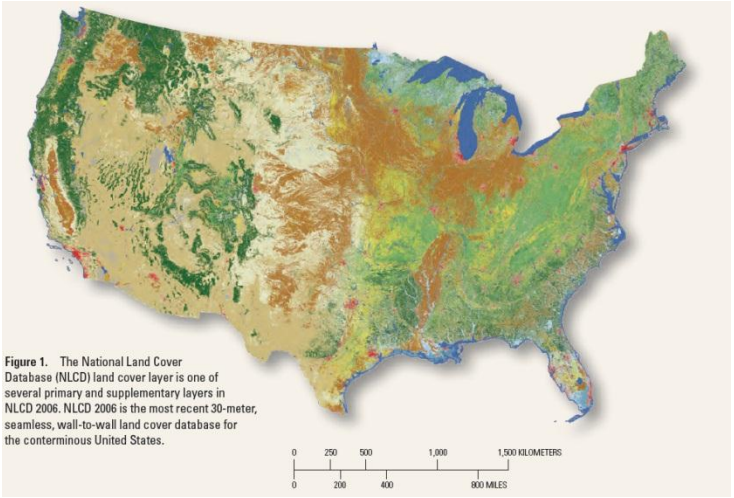
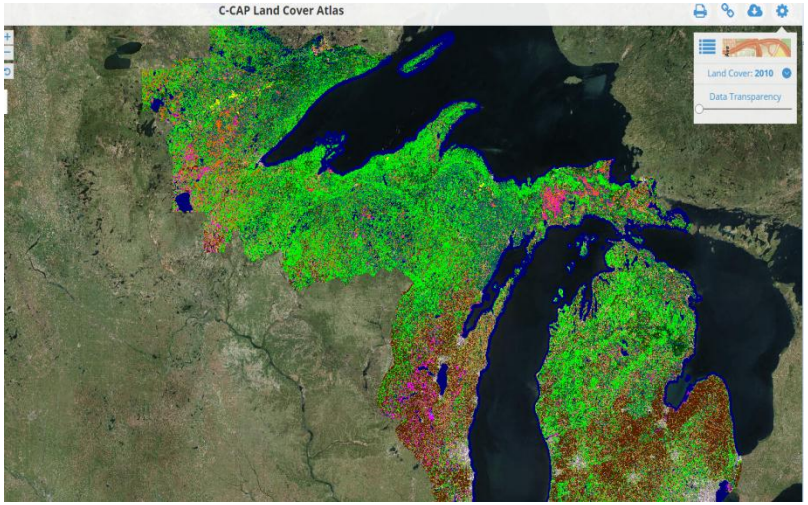


Figure 1. The National Land Cover Database (NLCD) land cover layer is one of several primary and supplementary layers in NLCD 2006. NLCD 2006 is the most recent 30-meter, seamless, wall-to-wall land cover database for the conterminous United States.

USGS Fact Sheet 2012-3020. February 2012.

C-CAP



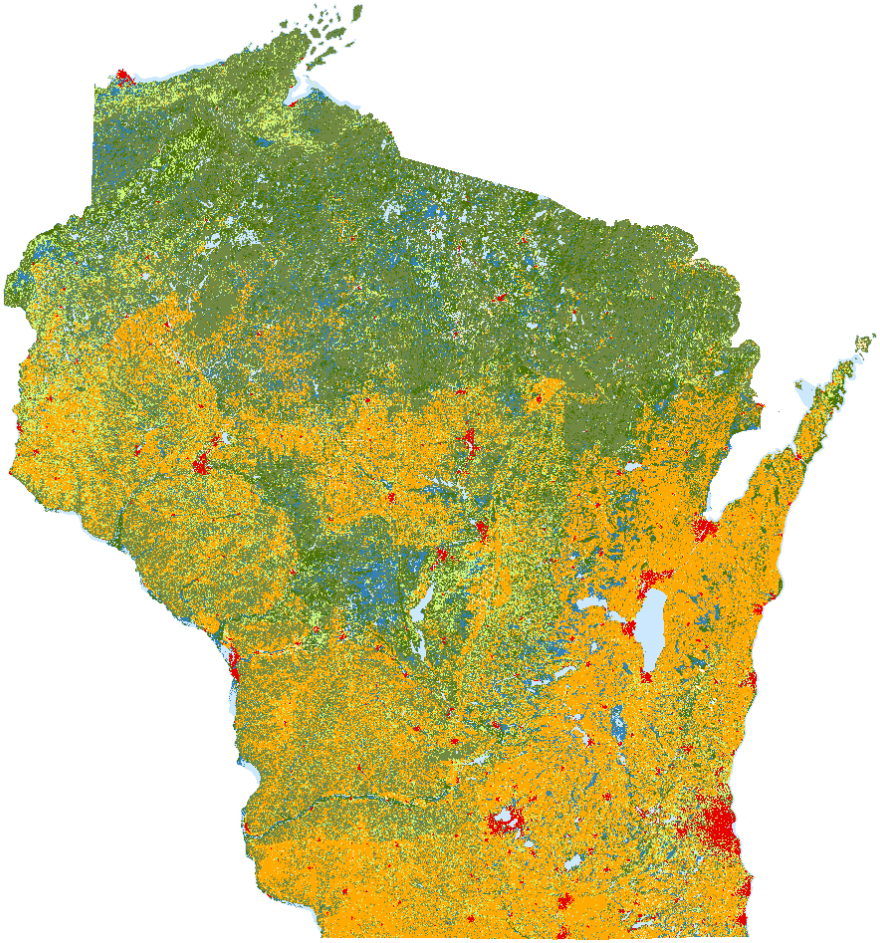
NOAA Coastal Change Analysis Program (C-CAP) Land Cover Atlas
https://coast.noaa.gov/ccapatlas/

Wiscland

Produced in 1990s

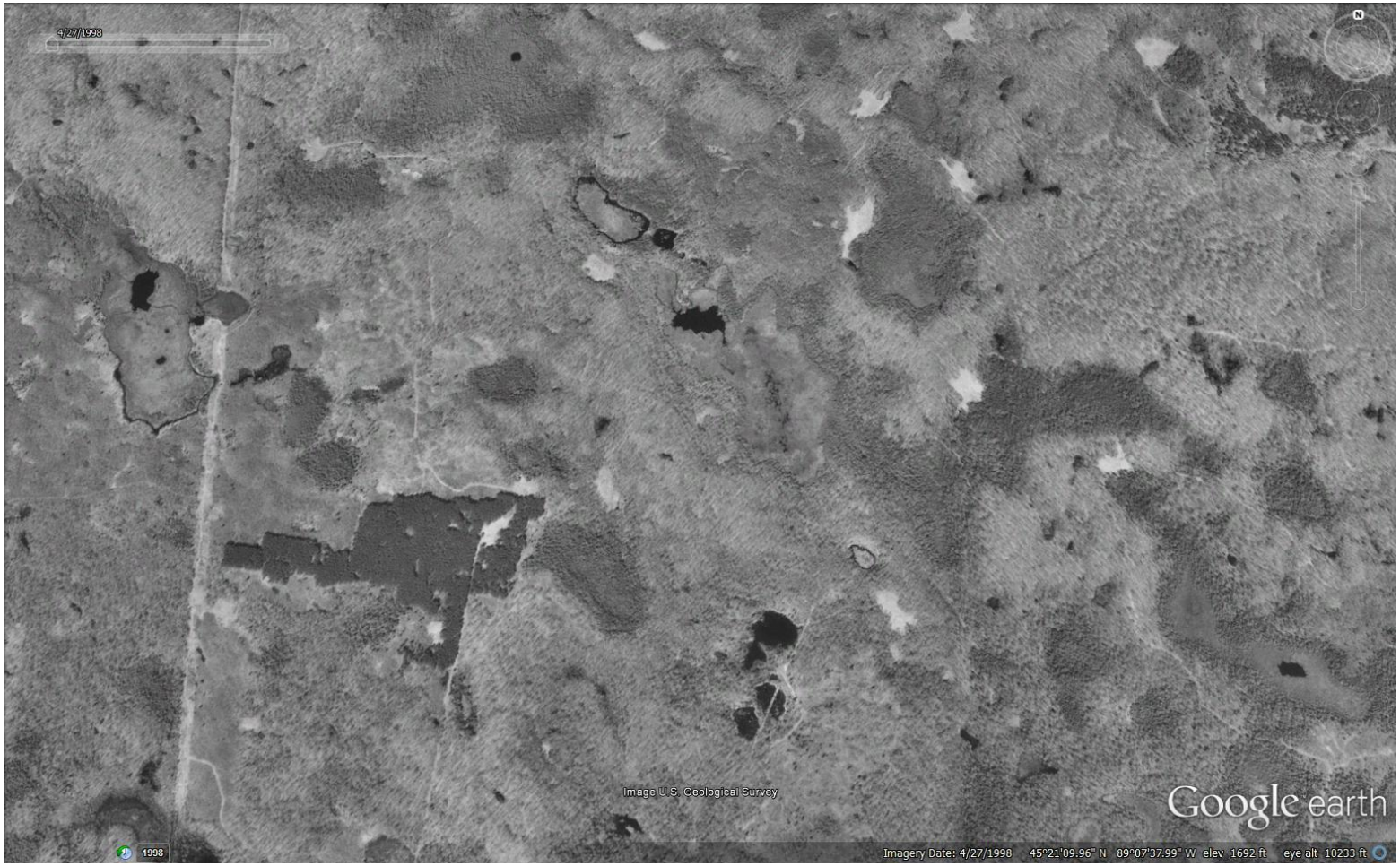
61-97% overall accuracy
by classification unit

40-100% user accuracy
by land cover class



Motivation

Langlade County, WI: Google Earth Imagery 1998-2013



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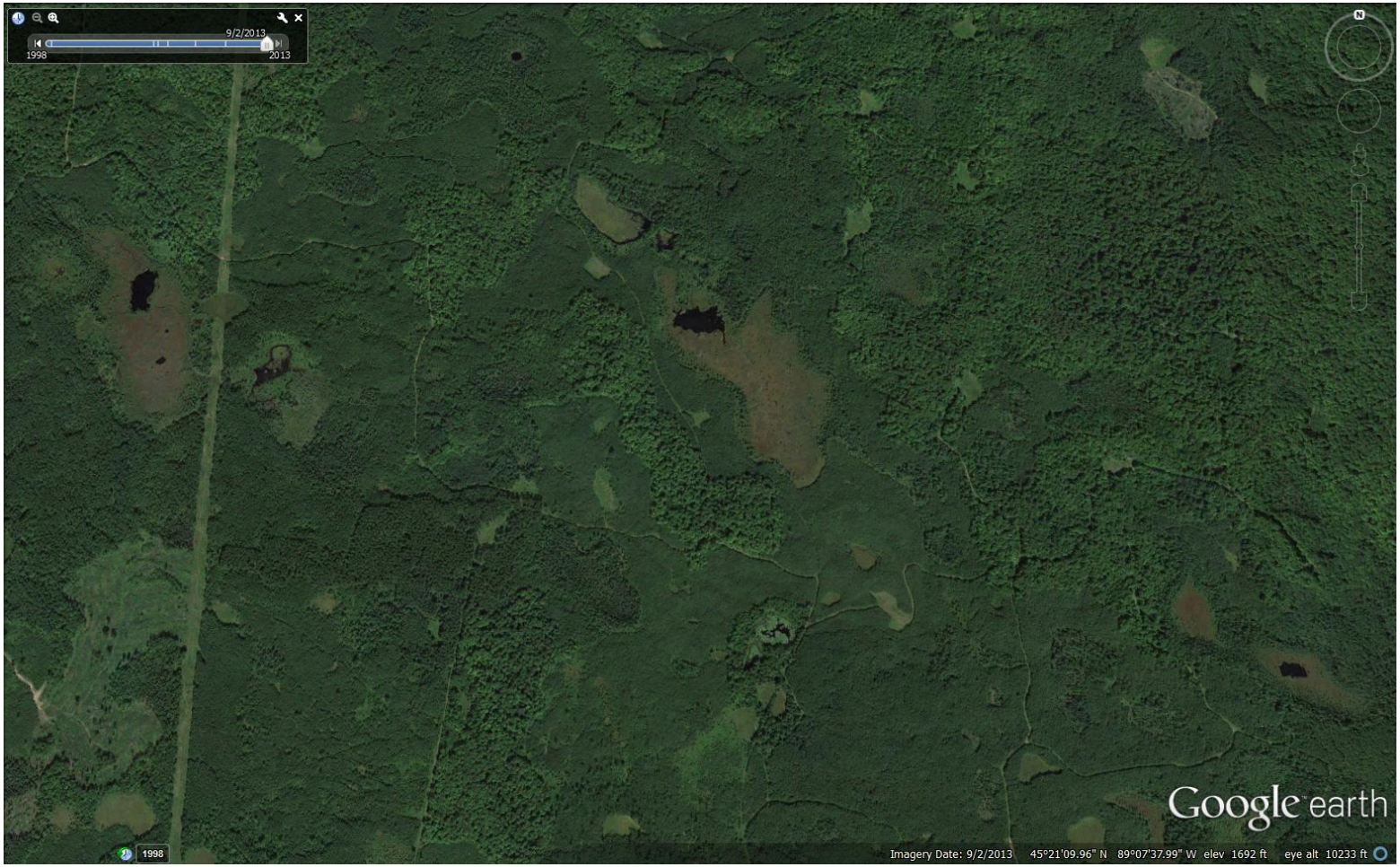


Motivation

Sun Prairie, WI: Google Earth Imagery 2000-2014

Motivation

Sun Prairie, WI: Google Earth Imagery 2000-2014

Motivation

Photo of herd by Wisconsin Deer Management Assistant Program participant

Photo source: Wisconsin DNR

Other business drivers:
- Habitat modeling
- Conservation planning
- Forest resource mapping

Who's Involved

Department of Natural Resources

Represent stakeholders

Define deliverables

University of Wisconsin

Project management, Outreach (SCO)

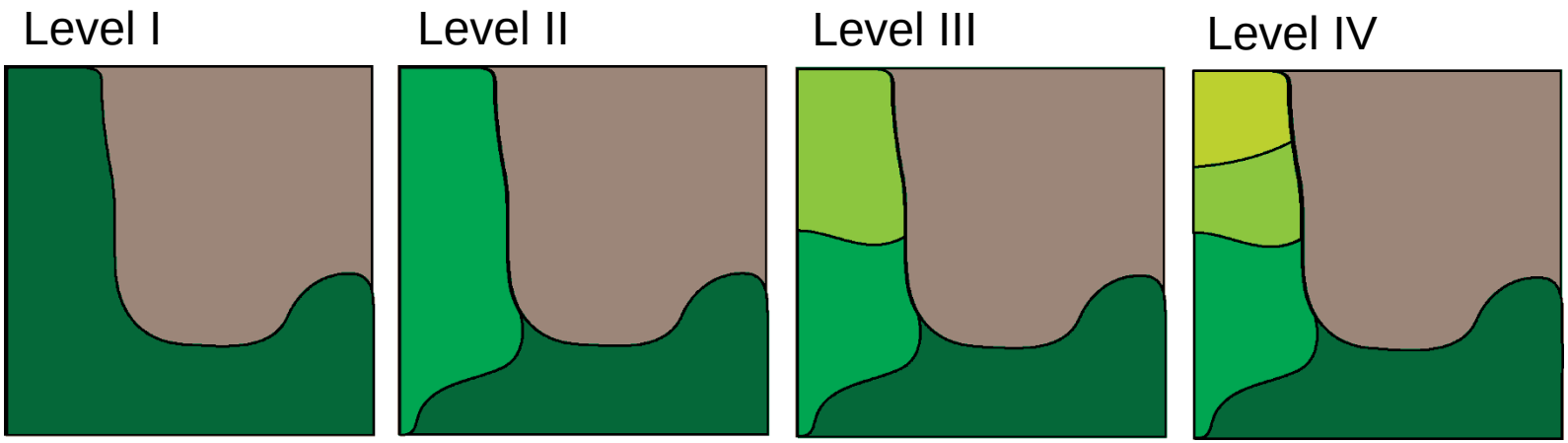
Image classification (Project Team)

Science Advisory Committee

Review and advise on methods

Deliverables

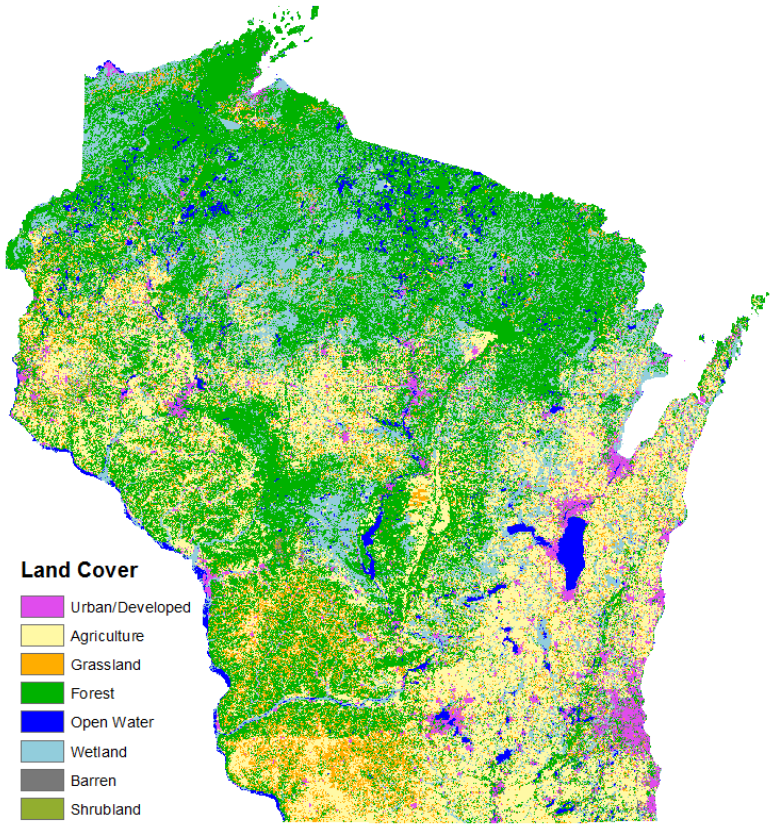
- Land cover dataset with ~50 classes
- Hierarchical classification



Class scheme

Level I

Urban/developed
Cropland
Grassland
Forest
Water
Wetland
Barren
Shrubland



Data inputs – Sample data

- Need examples of each of these ~50 classes
- Draw on existing sources of field data, e.g.
  - Forest inventories from WDNR and USFS
  - Grasslands data from WDNR
  - Wetlands data from Wisconsin Wetlands Inventory

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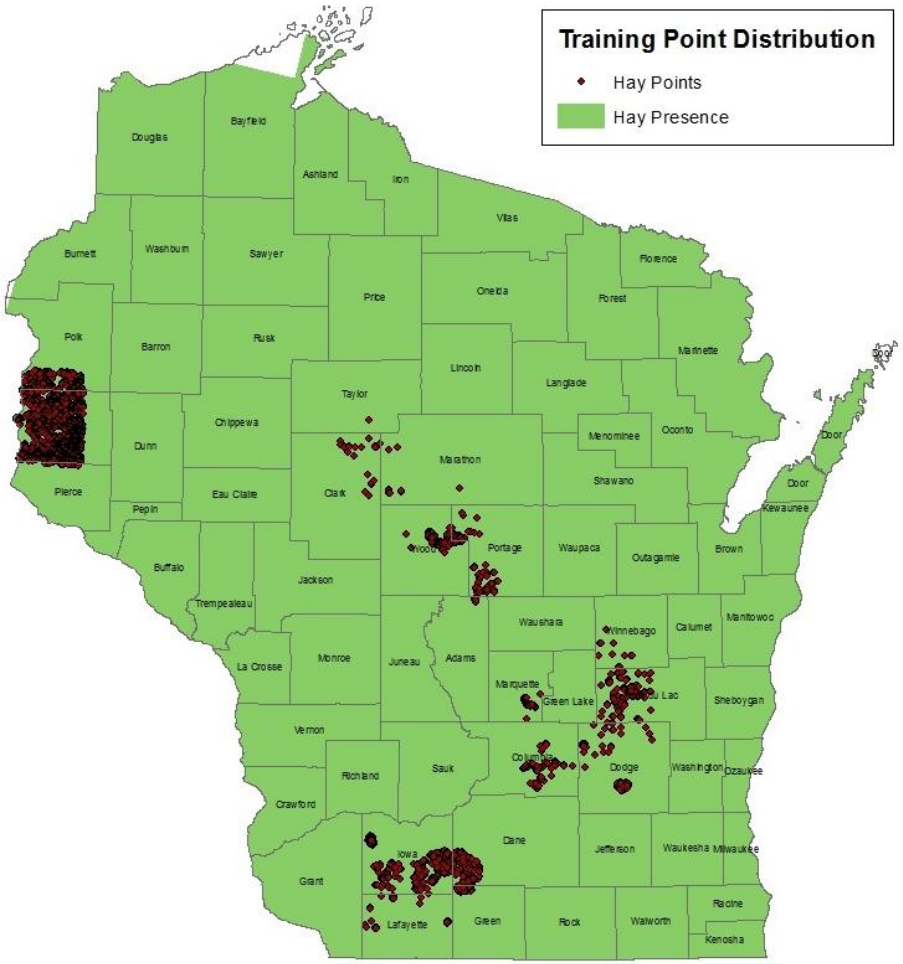

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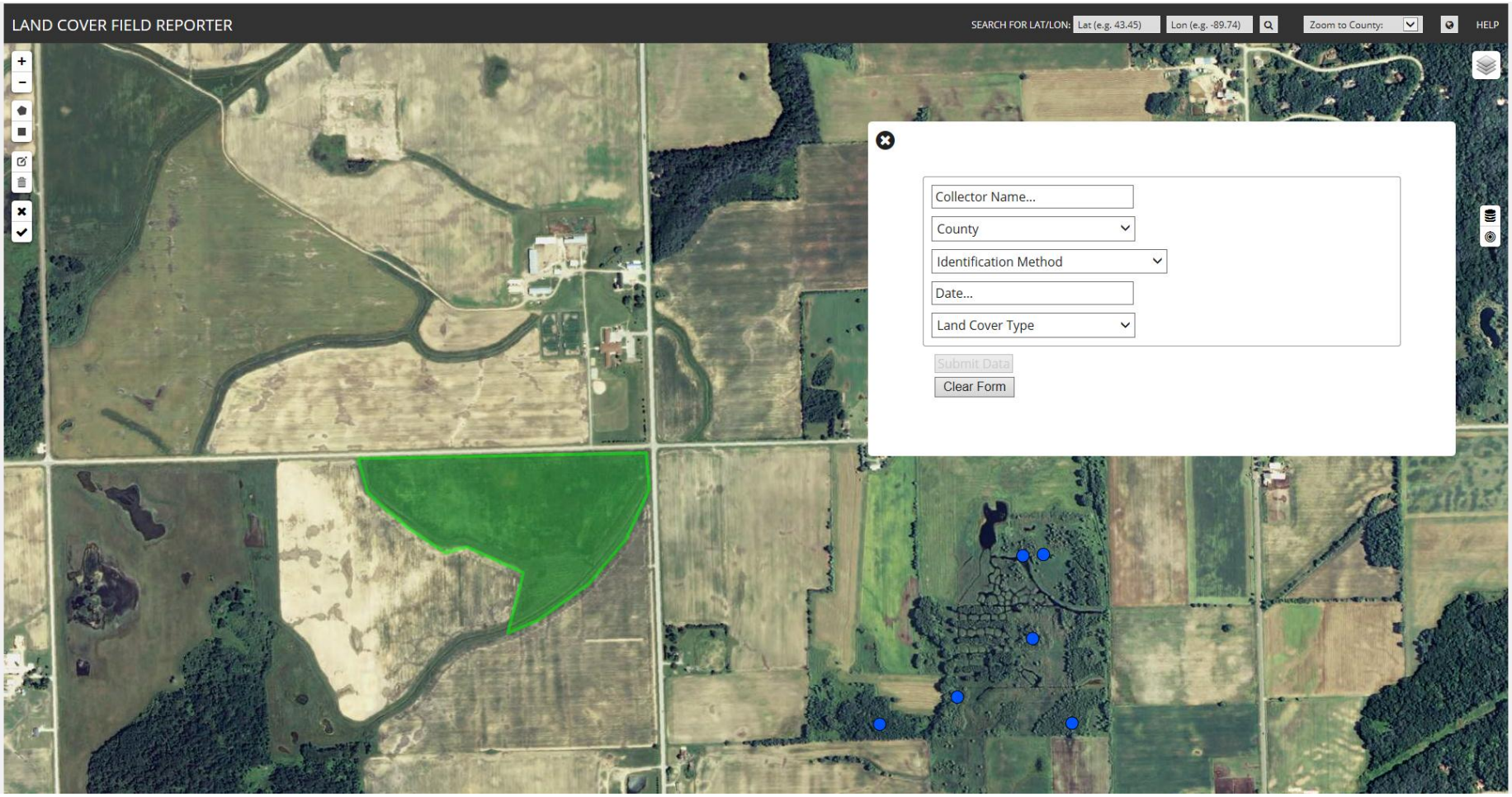


Data inputs – Feature data

- 30m Landsat imagery, 2010-2014
- Vegetation Indices
  - Enhanced Vegetation Index (EVI), Normalized Difference Moisture Index (NDMI), Modified Soil Adjusted Vegetation Index (MSAVI), Normalized Burn Ratio (NBR)
  - Annual metrics (max, min, mean, std dev)

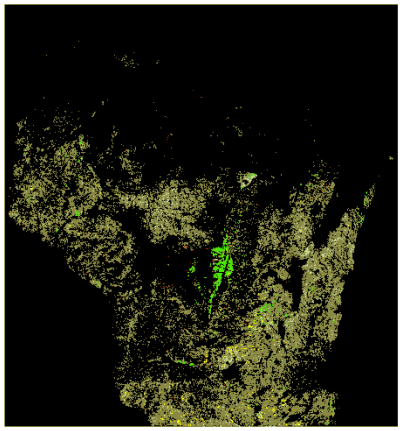
Data inputs – Feature data

- Topographic data
  - DEM, slope, aspect, floodplain and lowland indicators
- Soil data and indices
  - Available water capacity, soil organic carbon, topographic wetness index, soil type, hydrologic soil group

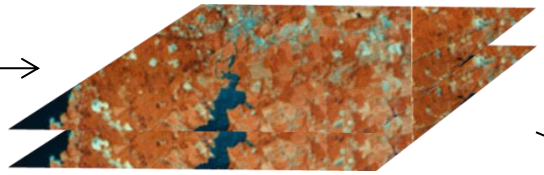
Cropland

- Cropland is already well-characterized for the state
  - National Agriculture Statistics Service CDL
    - Annual updates, 30m resolution, high accuracy for crop types of interest
  - Statewide crop rotations data from DNR Water Quality project
    - Based on CDL and field interviews with county officials

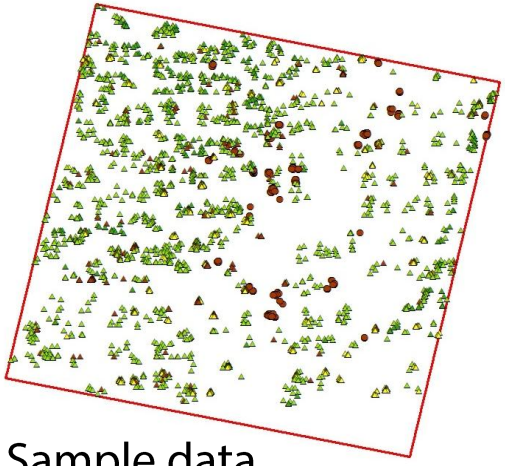
Putting it all together



Cropland classification

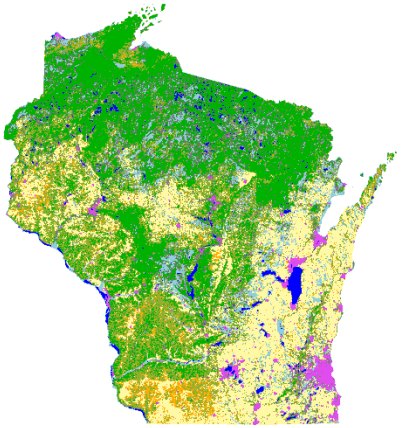


Feature data



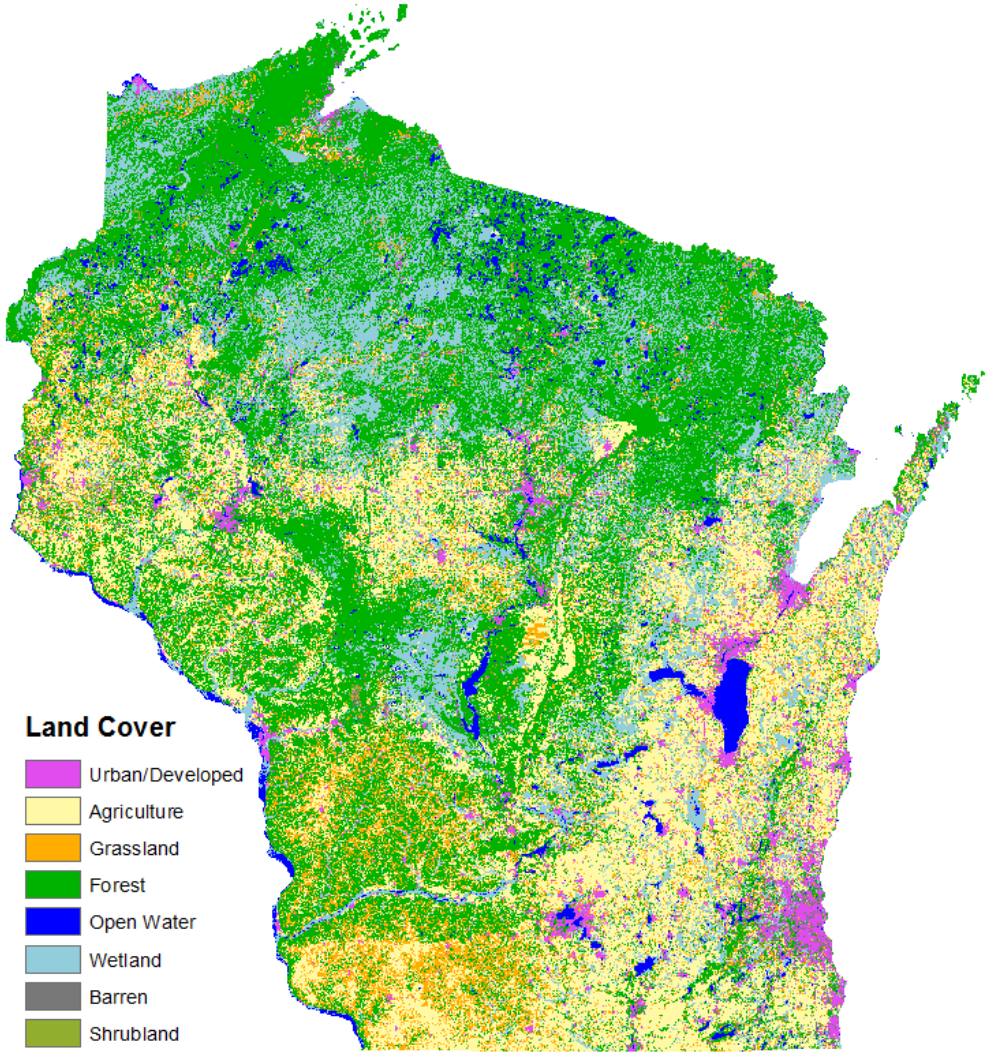
Sample data

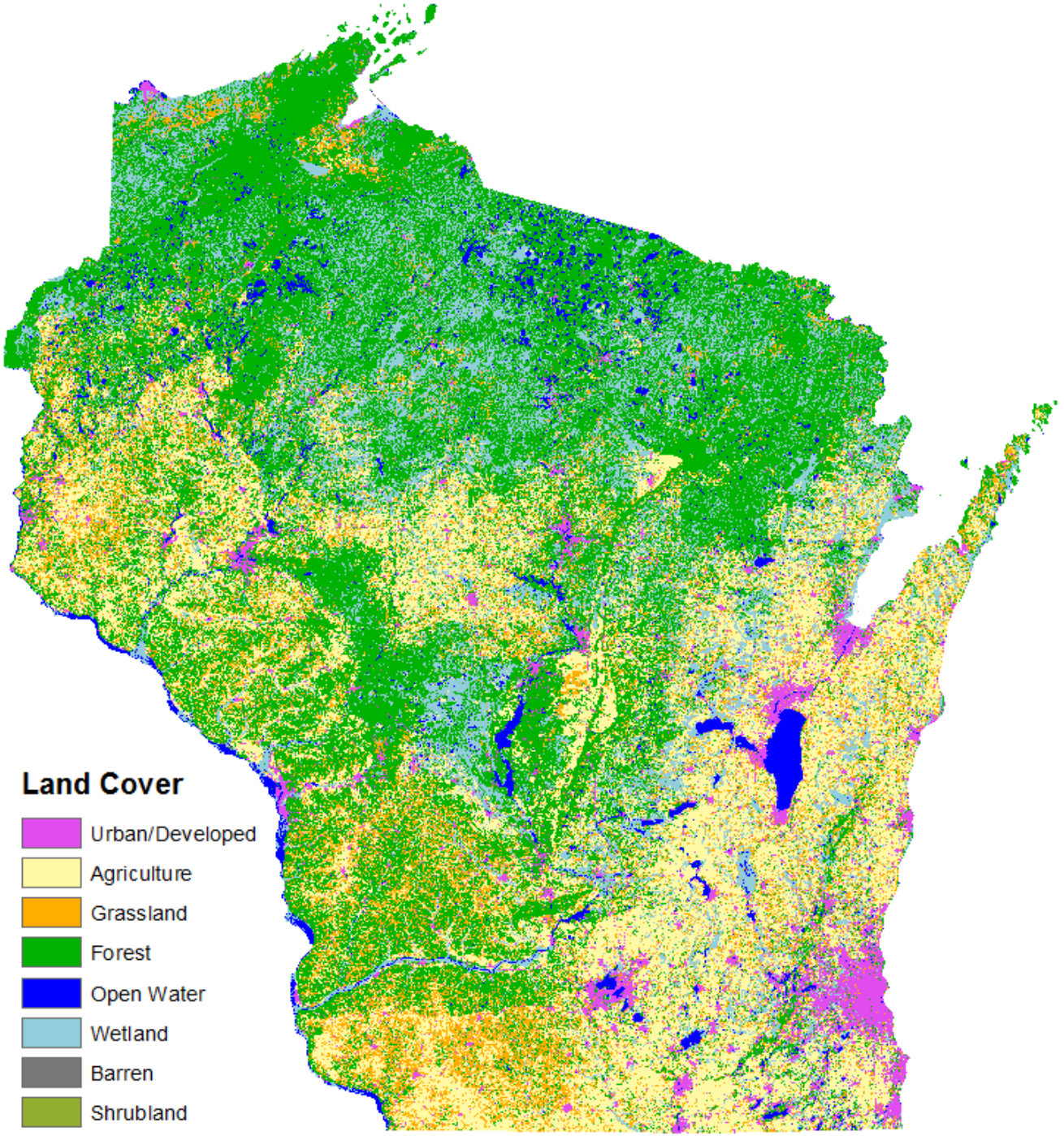
Level I map



Level 1 results

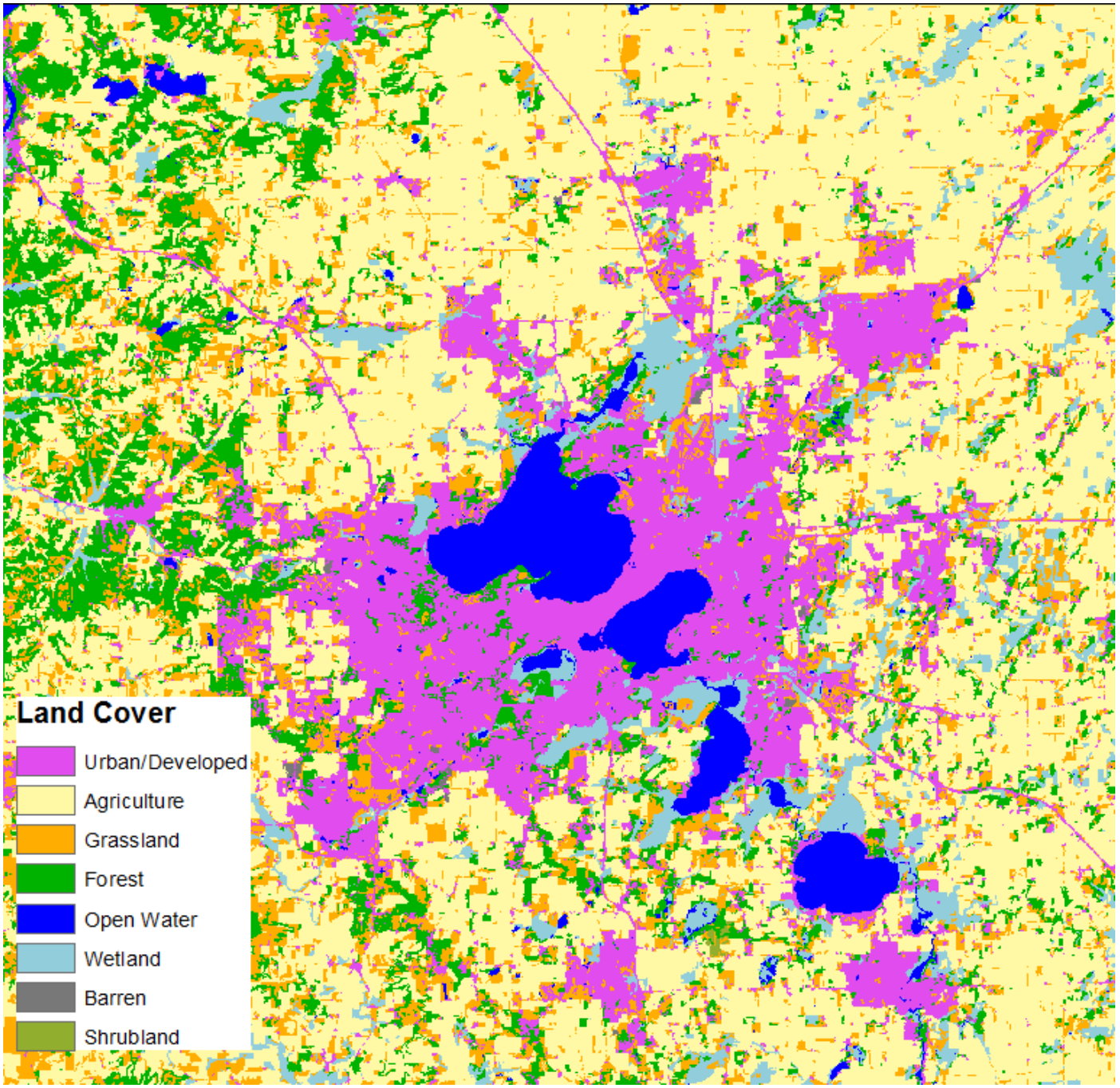
- Interim deliverable reviewed by DNR Evaluation Team in January
- Final revisions to Level 1 just completed




Land Cover
Urban/Developed
Agriculture
Grassland
Forest
Open Water
Wetland
Barren
Shrubland

Level 1 Accuracy

- Overall Accuracy estimates at >90%
- Per-class accuracy generally over 85%
- Shrubland lowest accuracy category
  - Complex class
  - Small portion of the landscape overall
  - Various strategies to improve accuracy met with limited success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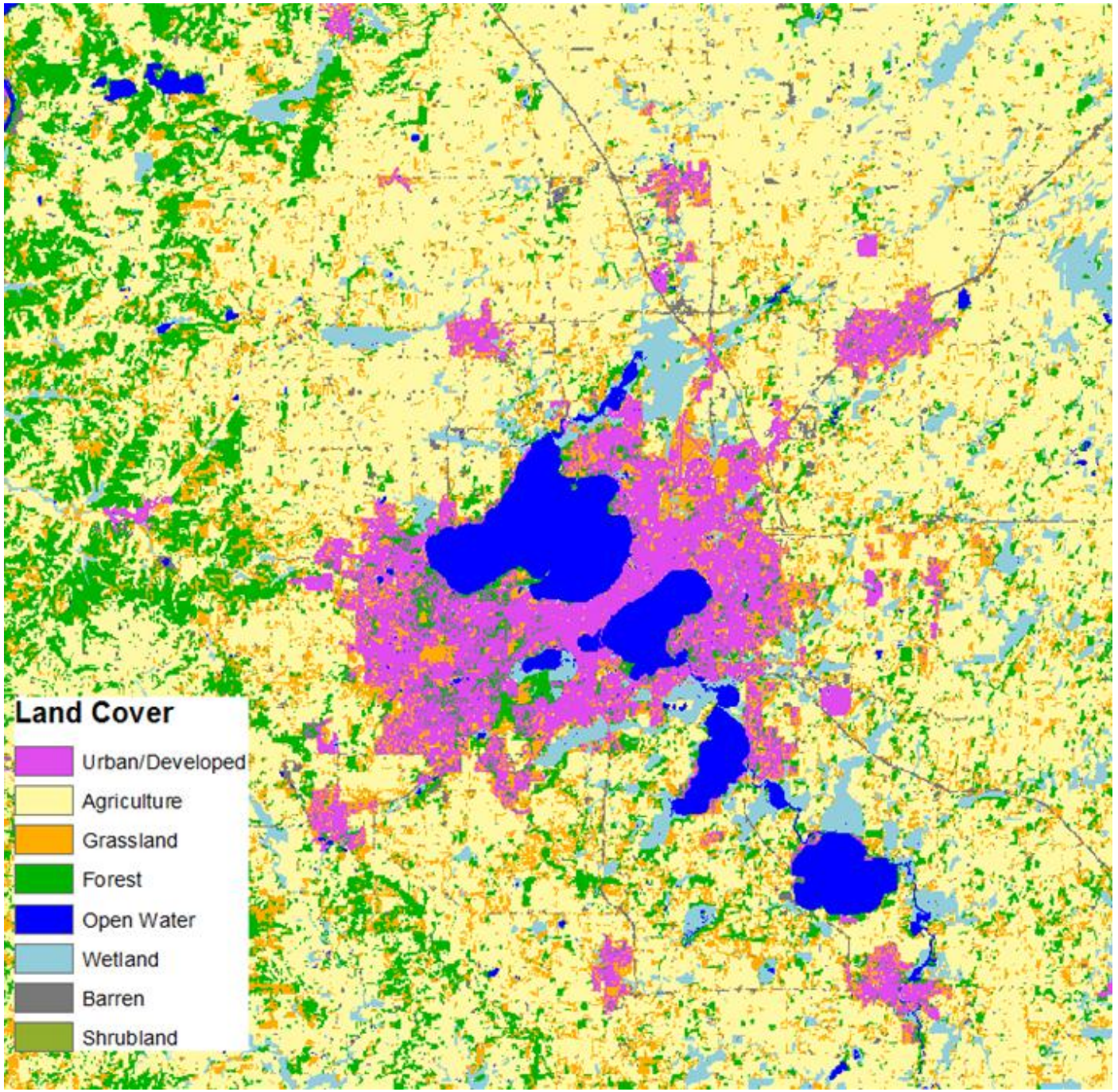
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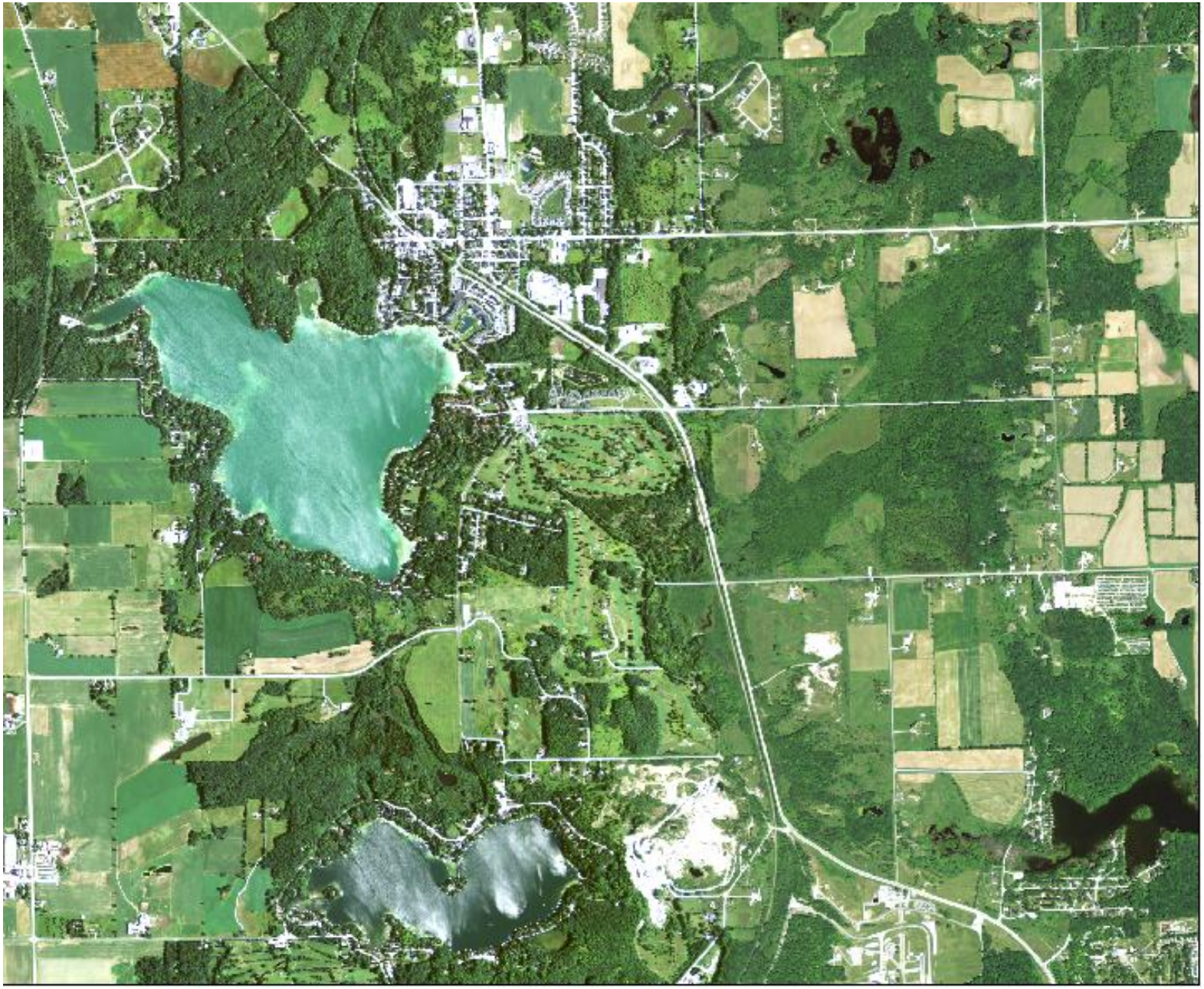

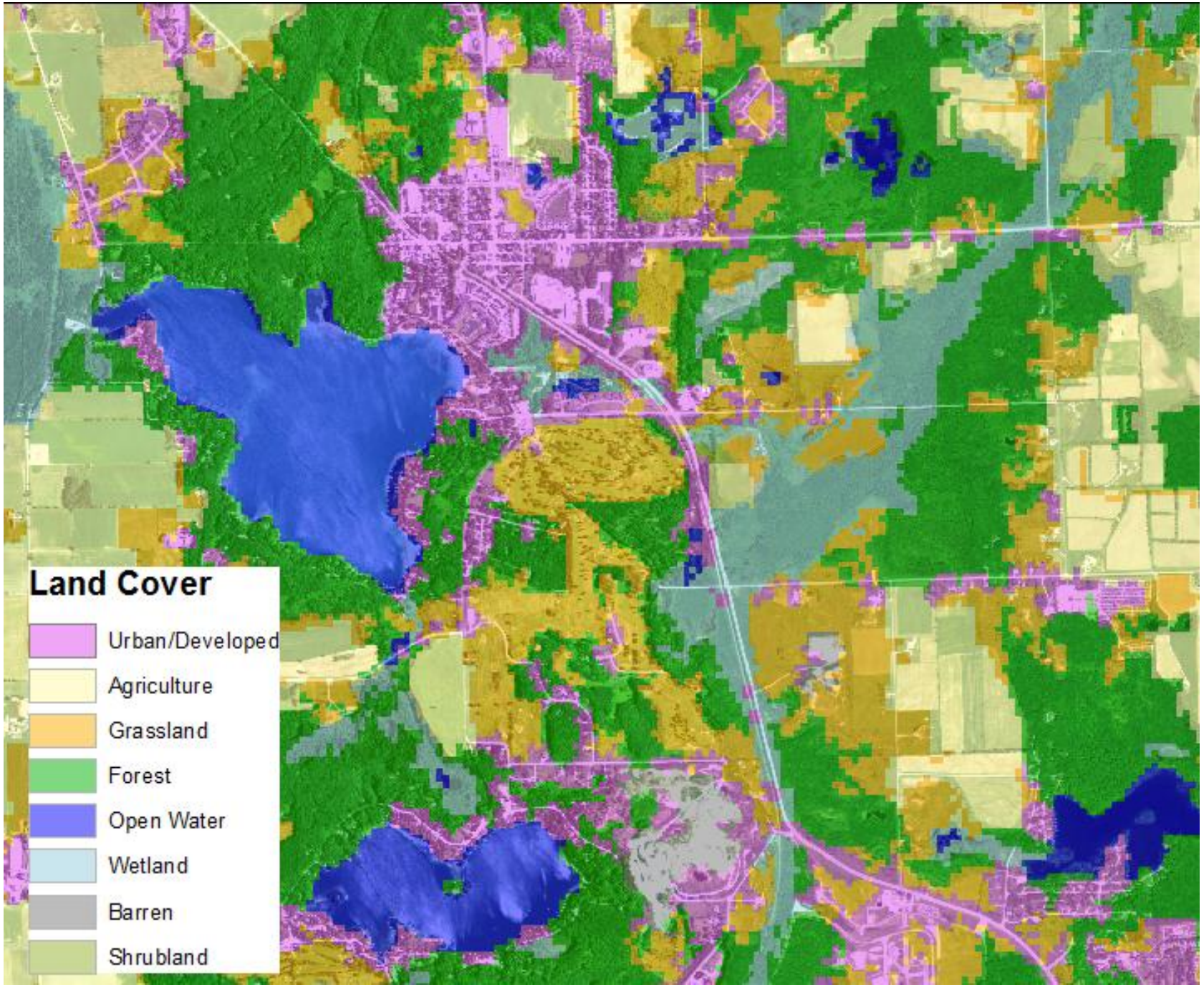
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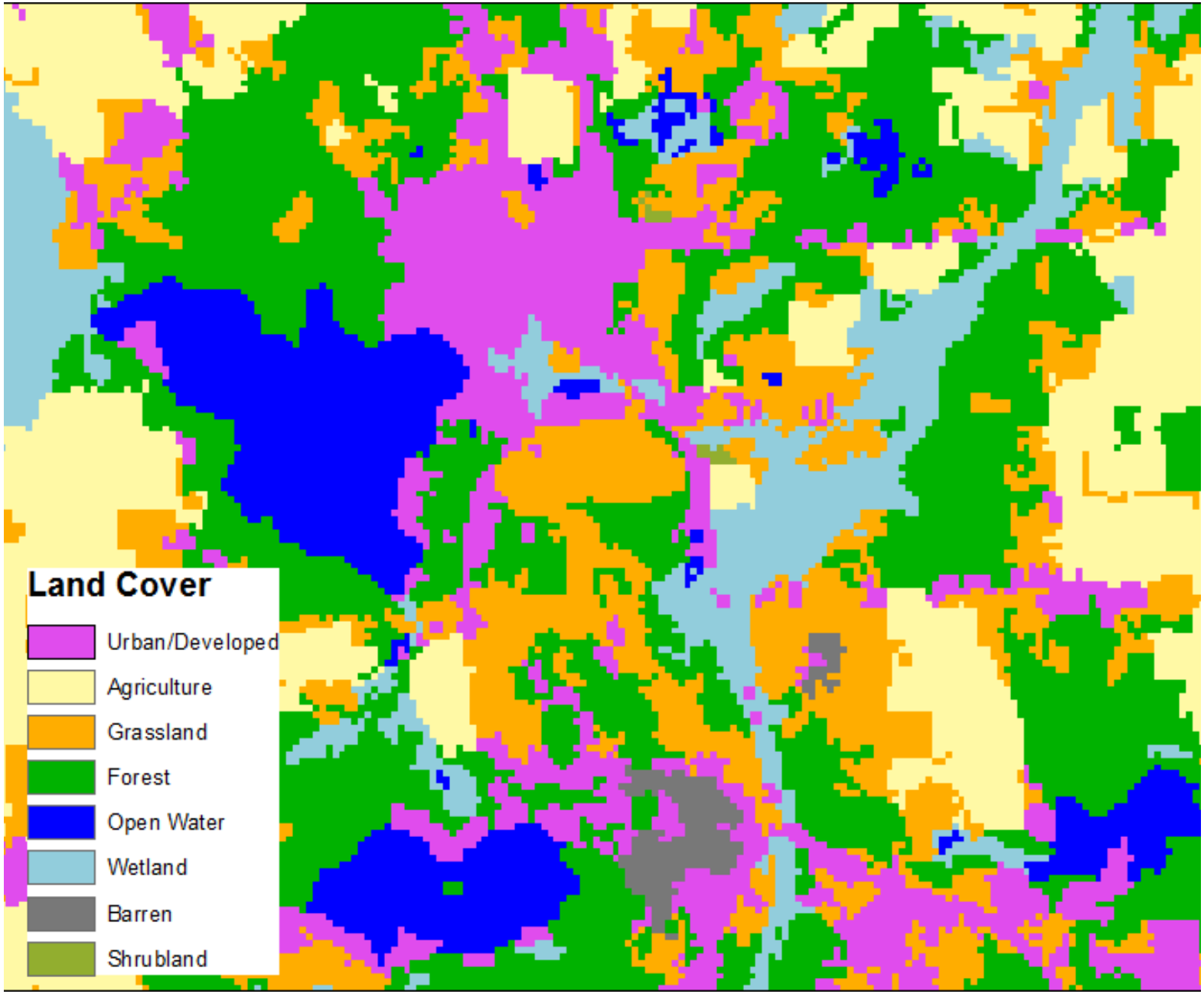
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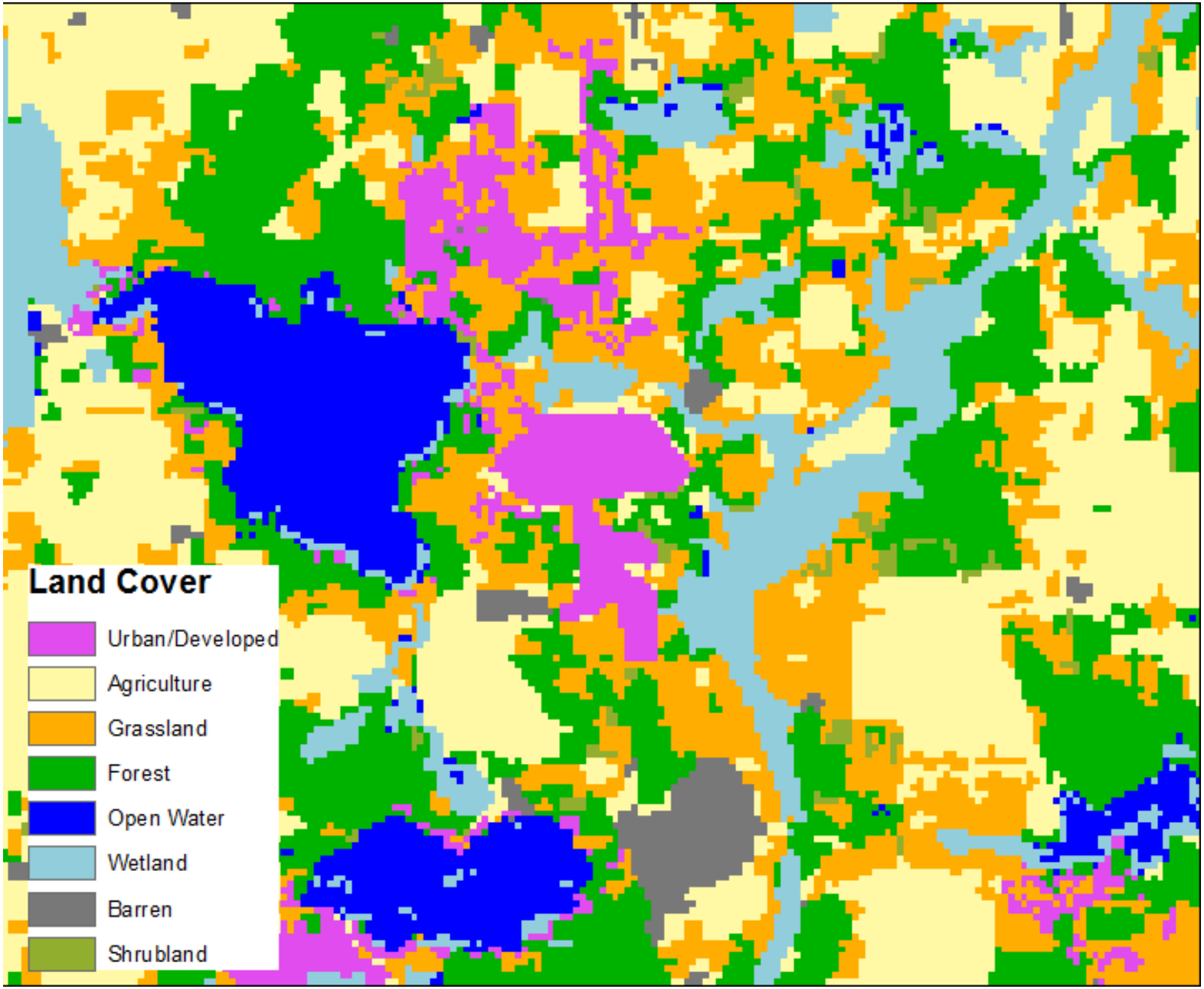
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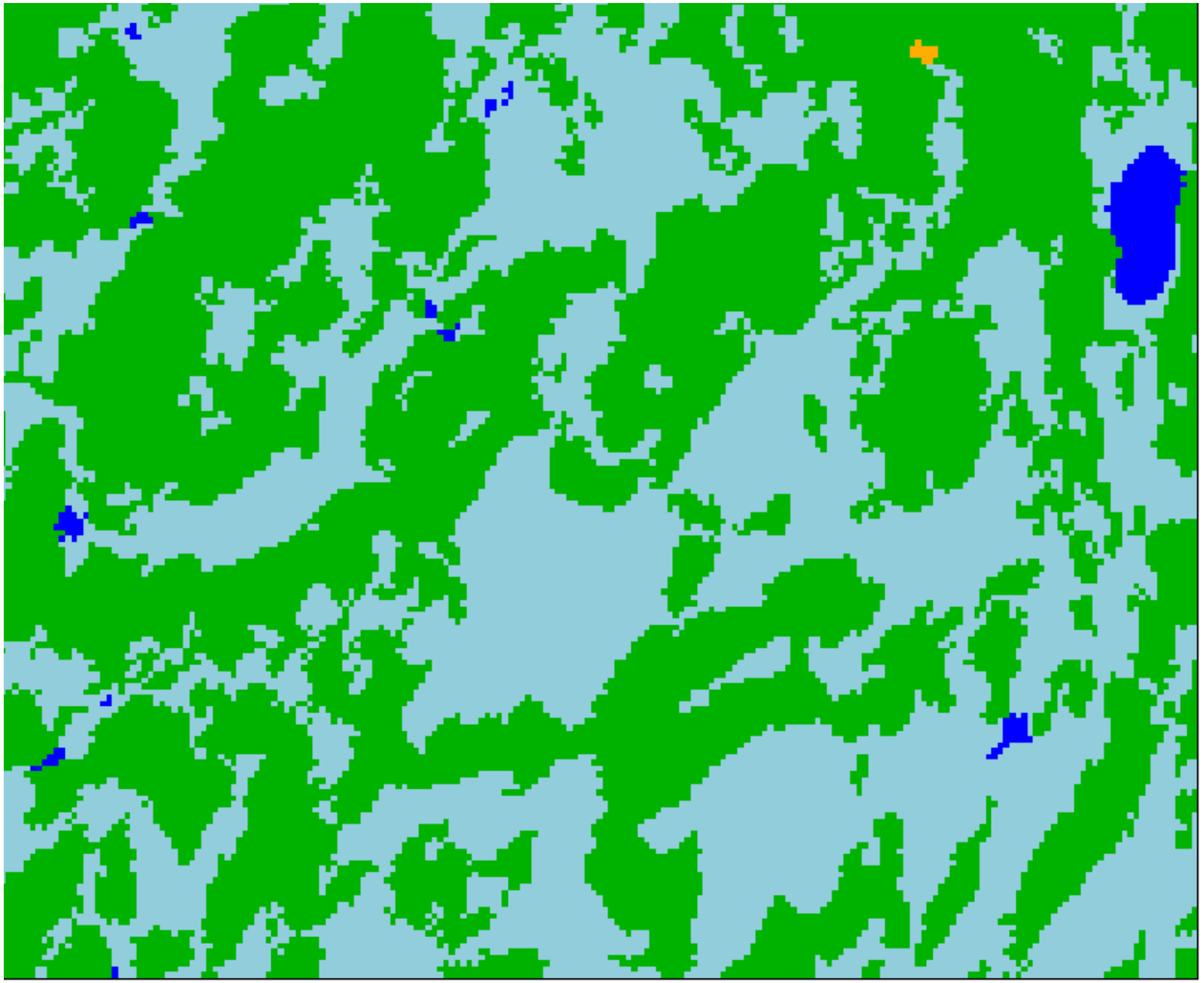
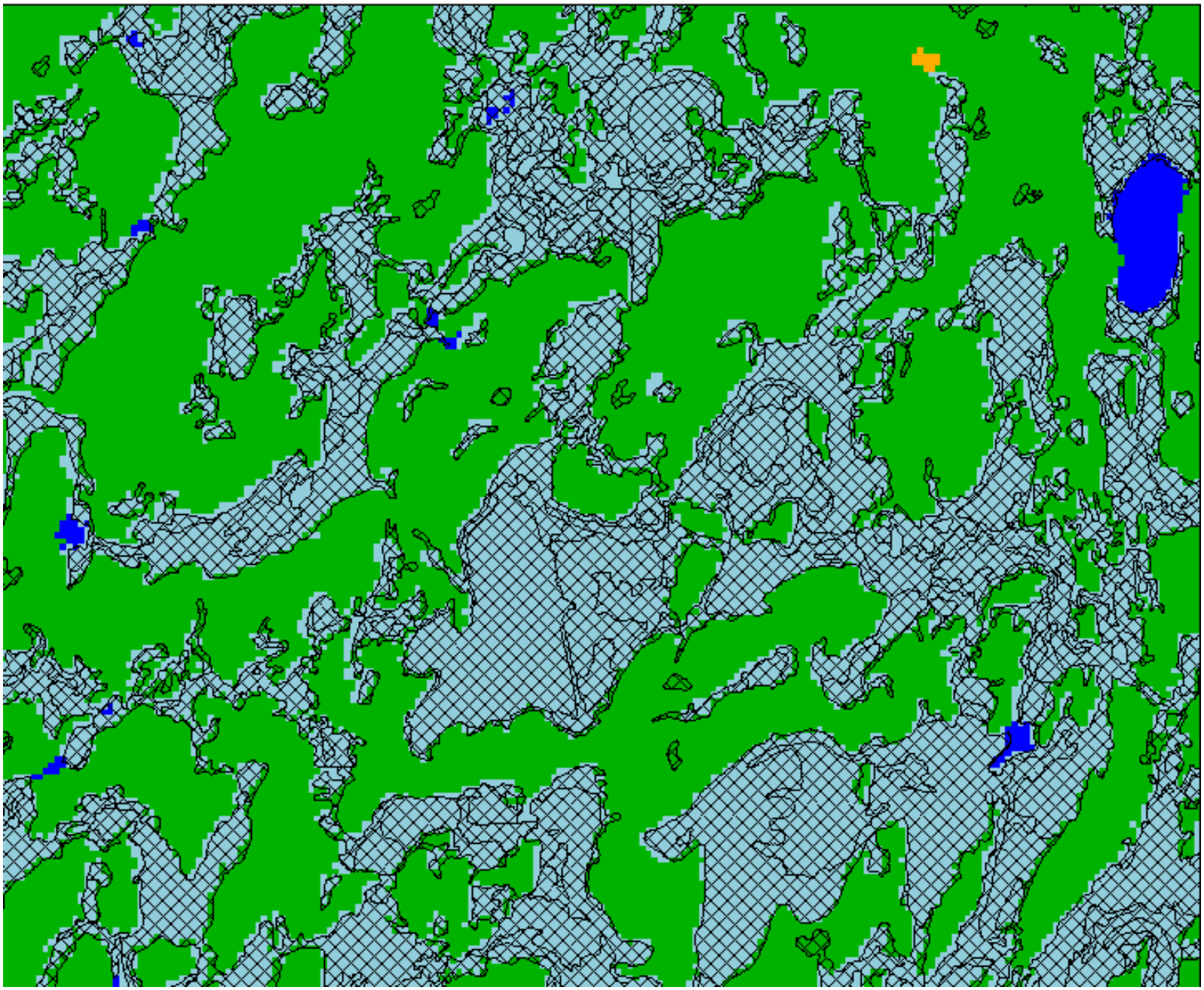
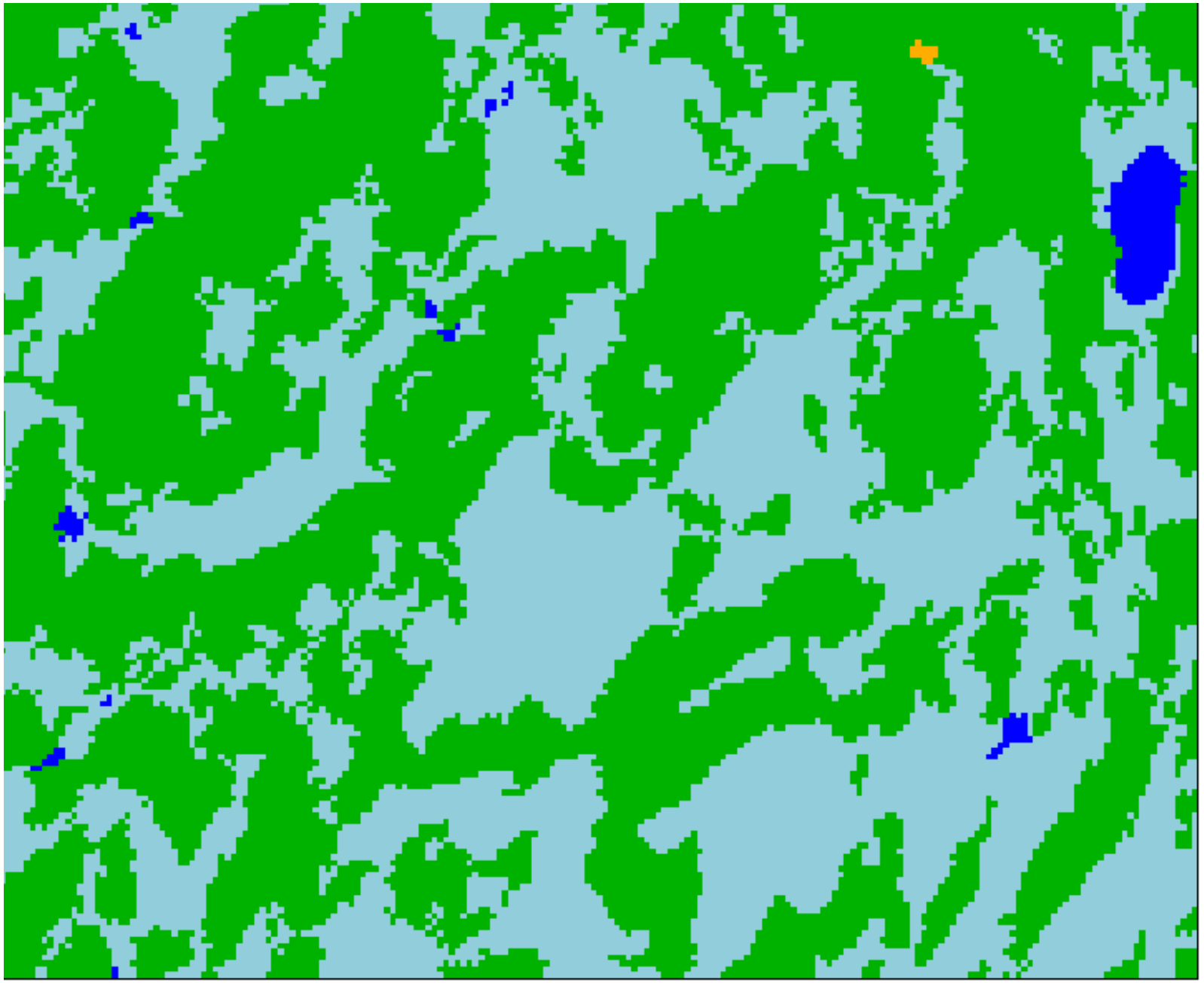
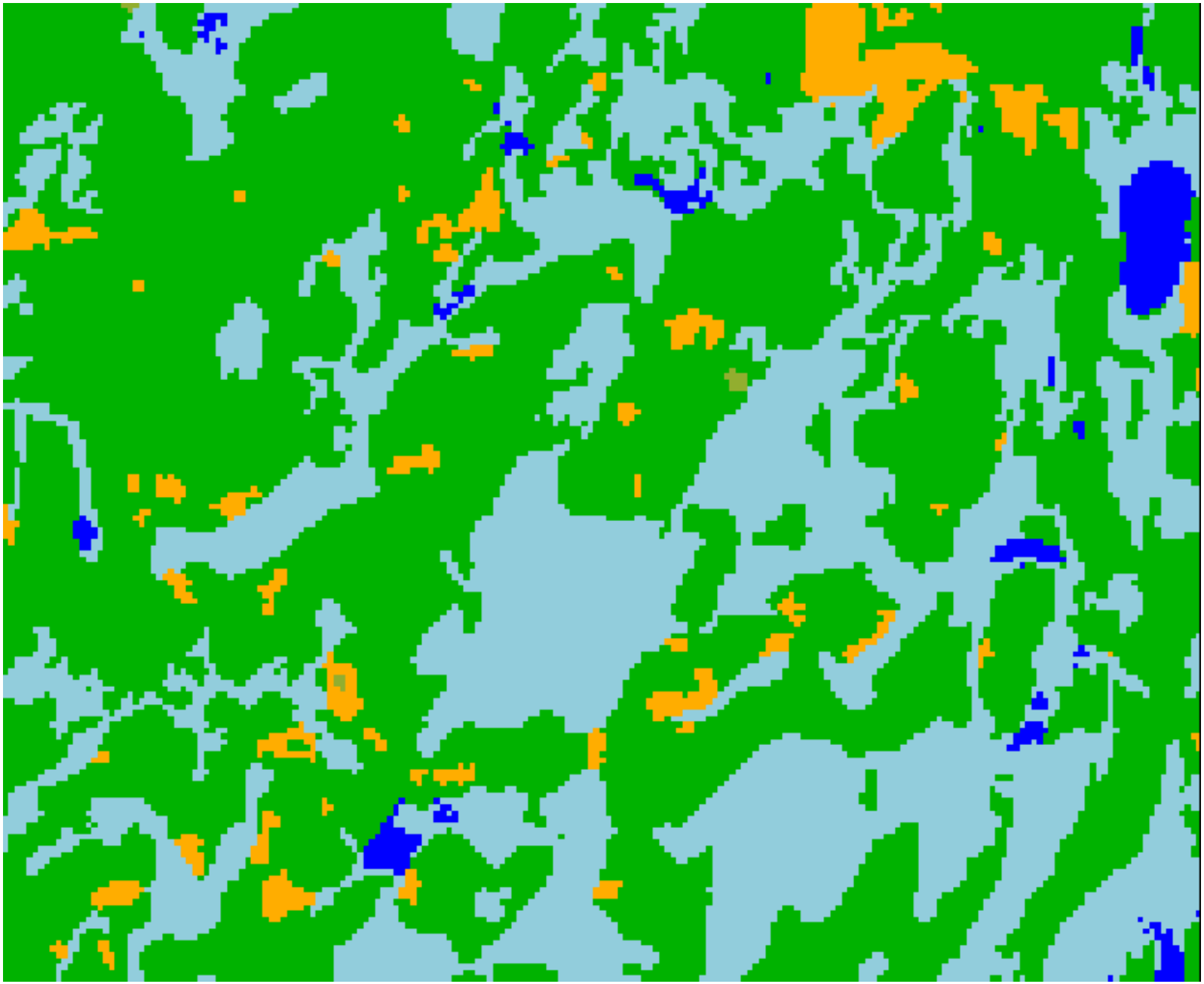




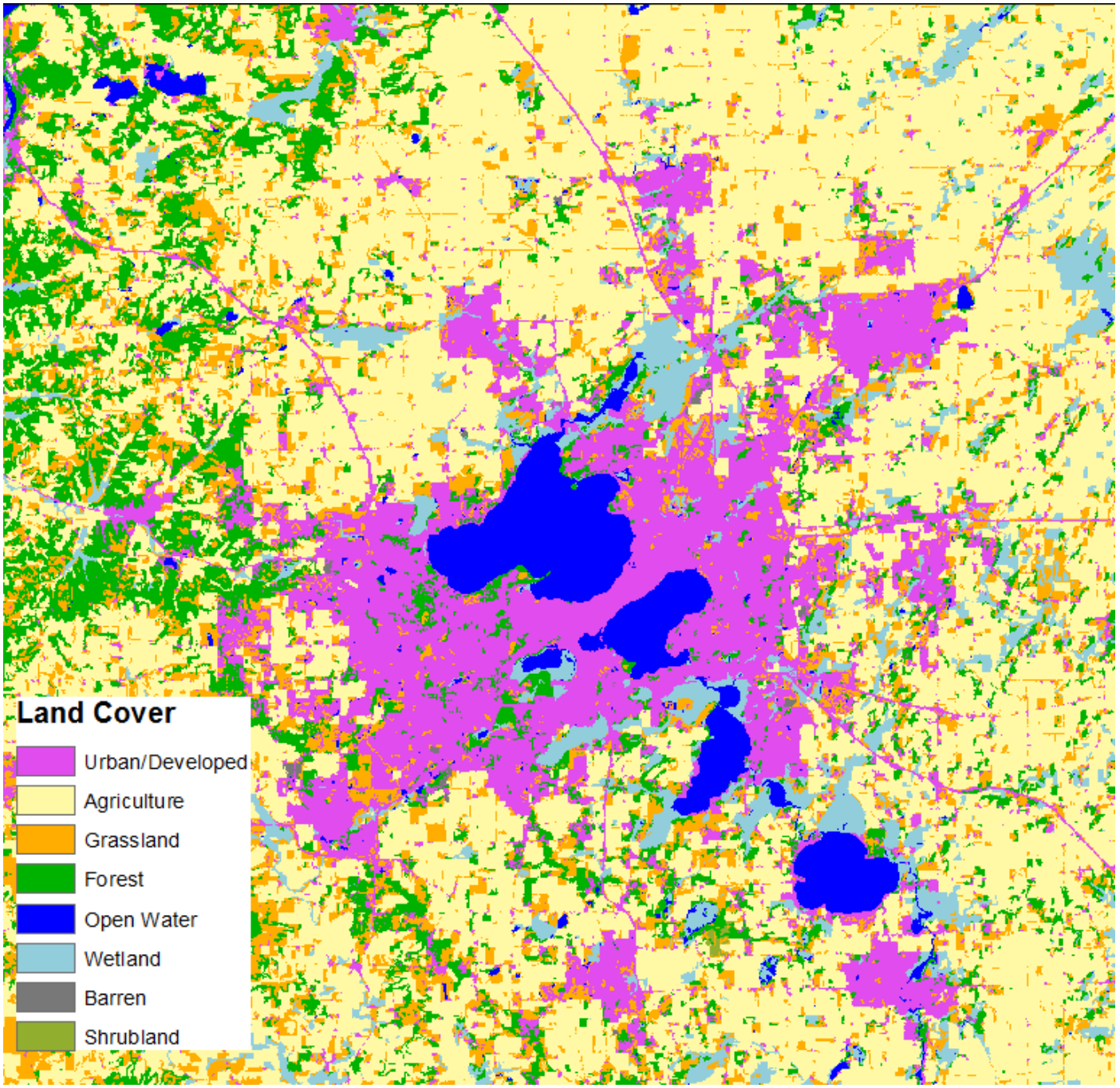




Level 2

- Currently in process
- 'Nested' classification
- Draft delivery to Evaluation Team next week

FOREST
Coniferous
Fir Spruce (FS)
Jack Pine (PJ)
Red Pine (PR)
White Pine (PW)
Hemlock Hardwoods (H)
Broad-leaved Deciduous
Aspen (A)
Paper Birch (BW)
Red Maple (MR)
Oak (O)
N. Pin Oak, Black Oak
Red Oak
White Oak/Burr Oak
Central Hardwoods (CH)
Walnut
Northern Hardwoods (NH)
Sugar Maple
Mixed Deciduous/Coniferous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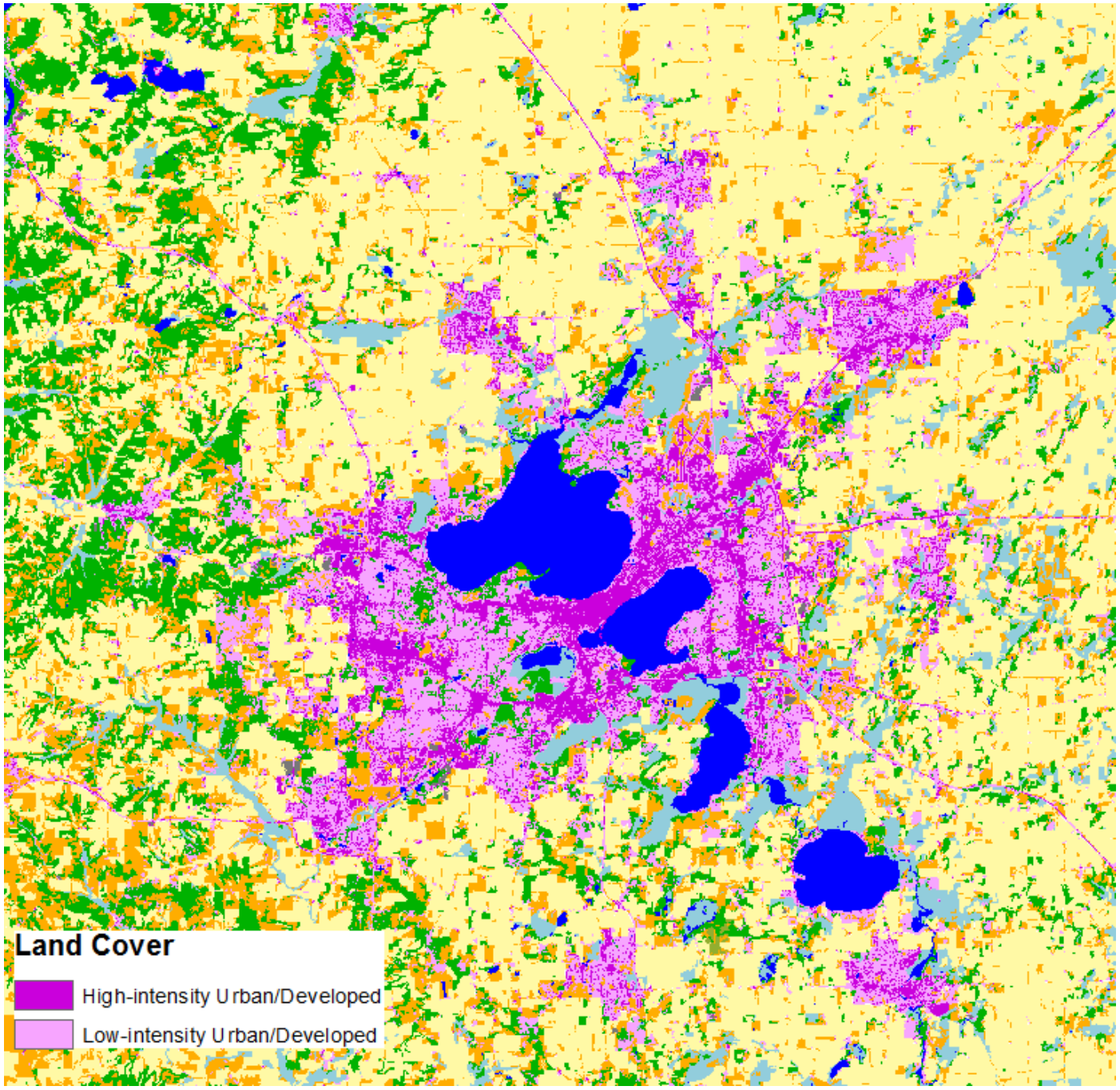
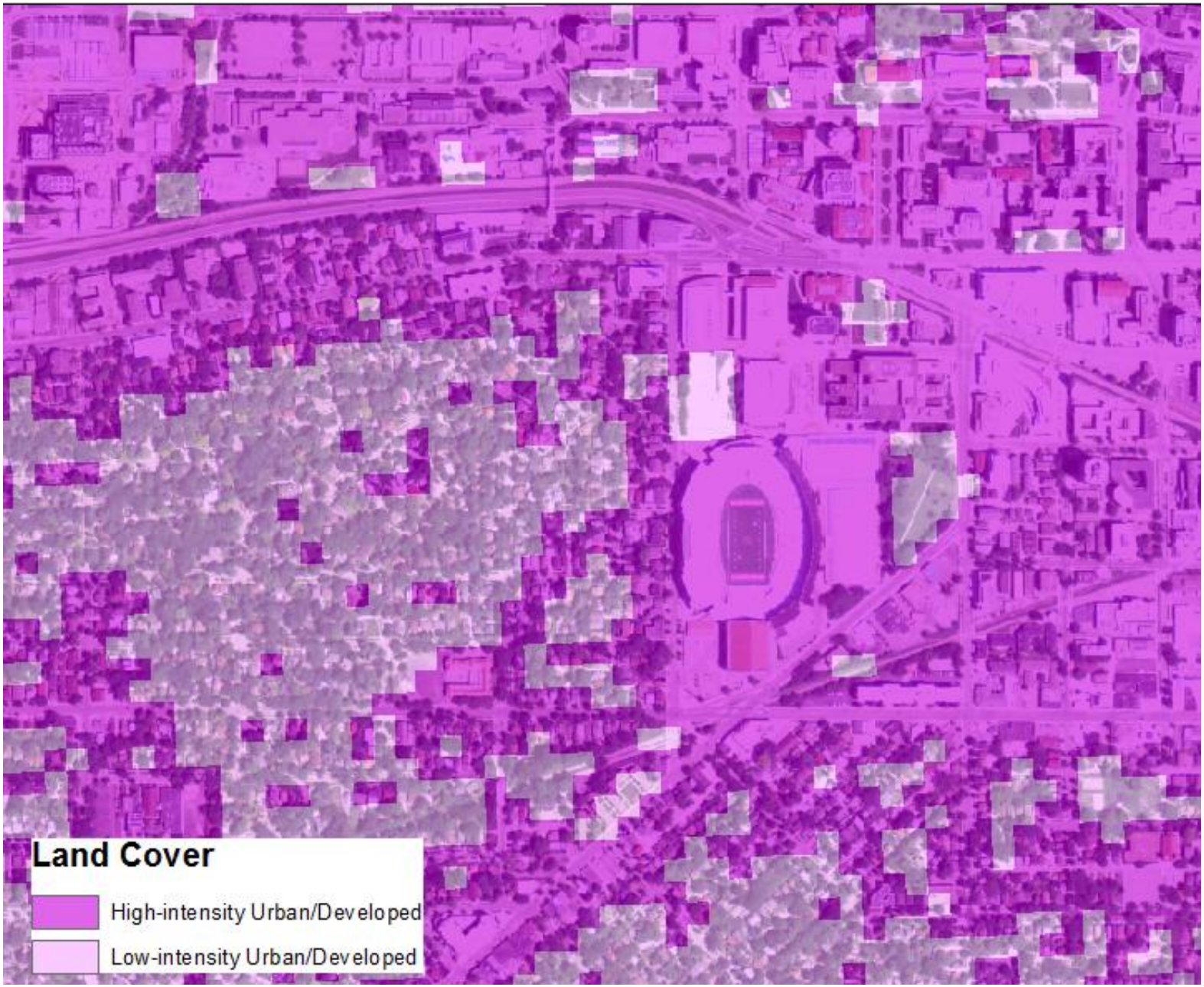

Land Cover
High-intensity Urban/Developed
Low-intensity Urban/Developed


Land Cover
High-intensity Urban/Developed
Low-intensity Urban/Developed

Project Completion

- Completion of each level of classification followed by review/comment period for Evaluation team
- Final product delivery scheduled for June 30, 2016
  - 4 levels of classification
  - User Guide
  - Metadata and documentation

Further Details

- SCO Project Website
  - http://www.sco.wisc.edu/projects/landcover.html
  - Pilot report, project updates, staff bios, mailing list sign-up, etc.
- Deer Trustee Report
  - http://dnr.wi.gov/topic/wildlifehabitat/documents/trusteereport.PDF
- The Wiscland-2 project is a cooperative effort between UW-Madison and the Wisconsin DNR with funding from the Federal Aid in Wildlife Restoration Program, grant# W-160-P-25

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