Finding Beauty in Lidar Details

Ryan E. Bowe and Kent Park

Tuesday, September 17, 2019

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Indiana GIS day 2019

IN Statewide Lidar 2017 B17
USGS CONTRACT: G16PC00022
TASK ORDER NUMBER: G17PD00269

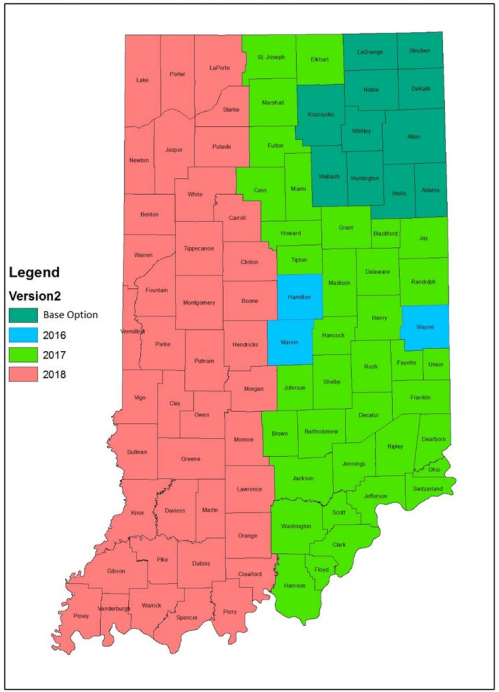
IN Statewide Lidar 2017 B17

Kent Park

IN Statewide Lidar 2017 B17

- 36,344 Square miles of 07. M NPS (2 points per square meter lidar, covering the State of Indiana
- USGS ***v1.2*** Base Specification

- Western Lake Erie Basin conservation
- National NRCS WLEB CEAP study
- CEAP water quality study
- ARS edge-of-field and in stream monitoring
- Water sediment and control Basins
- IDEM monitoring sites
- Modernization of floodplain maps
- Local Government storm water and drainage programs
- Agriculture and precision farming
- Urban and regional planning



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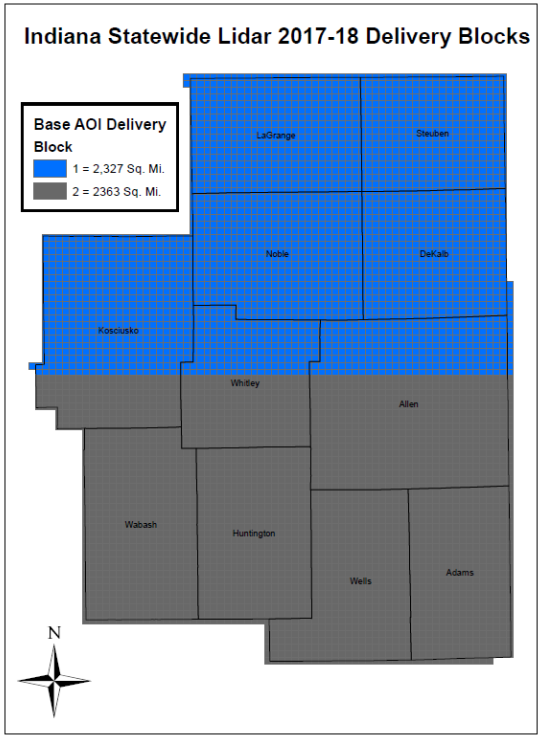
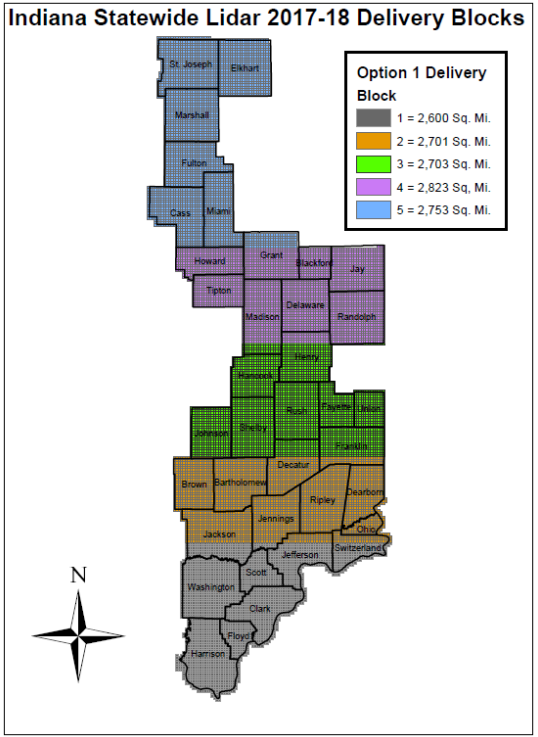
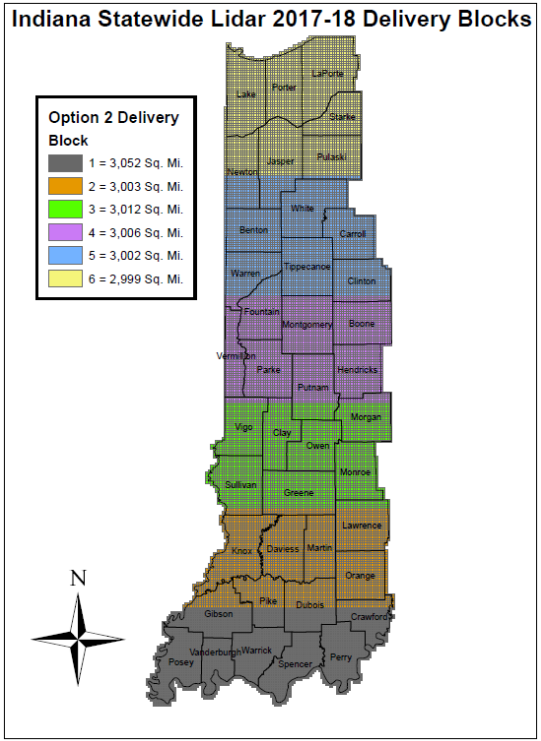
Task Order Deliverables

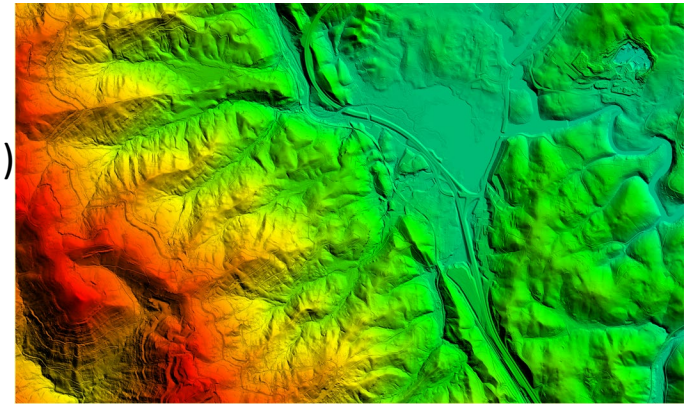






Point Cloud Classification

- Class 1 — Processed but not classified
- Class 2 — Bare earth ground
- Class 7 — Noise (low or high, manually identified, if needed)
- Class 9 — Water
- Class 10 — Ignored Ground (Break line Proximity)
- Class 17 — Bridge Decks
- Class 18 — High Noise



- Georeference information included in LAS header (OGC WKT). In accordance with LAS specification Version 1.4 - R13 published 15 July 2015, the Coordinate Reference System (CRS) shall be represented in each LAS file using OGC (2001) dialect of Well Known Text (WKT)

Coordinate Reference Information

Base AOI and Option 1 AOI:

- Indiana State Plane Coordinate System, East Zone, NAD83 (HARN) horizontal
- NAVD88 vertical using geoid model GEOID12B
- Units for both the horizontal and vertical datum will be expressed in US Feet to two (2) decimal places
- The European Petroleum Survey Group (EPSG) spatial reference is 2967

Option 2 AOI:

- Indiana State Plane Coordinate System, West Zone, NAD83 (HARN) horizontal
- NAVD88 vertical using geoid model GEOID12B
- Units for both the horizontal and vertical datum will be expressed in US Feet to two (2) decimal places
- The European Petroleum Survey Group (EPSG) spatial reference is 2968

Tile Index:

- 5,000 feet x 5,000 feet tiles using Indiana's existing Statewide Ortho-Lidar tile grid, in the appropriate Indiana State Plane Coordinate System

Task Order Deliverables

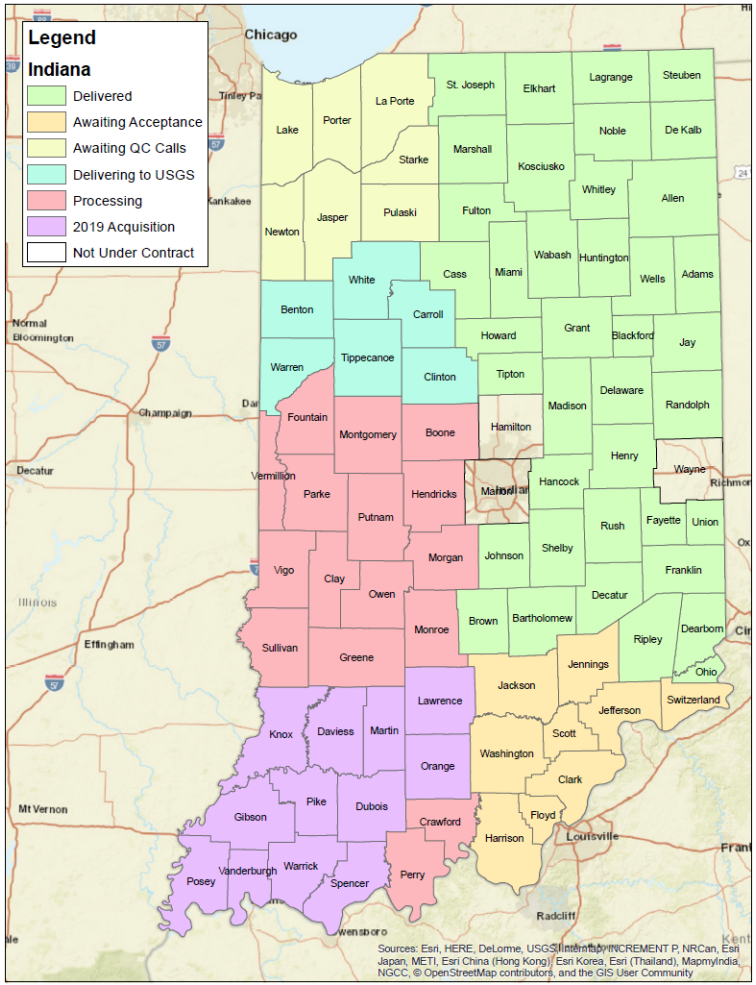
1. Project deliverables shipped to USGS/NGTOC for QA review
2. NGTOC team reviews all products and provides feedback to Woolpert
3. Woolpert makes the necessary corrections, provides back to USGS/NGTOC
4. Woolpert distributes delivery data per task order direction

Upon USGS/NGTOC acceptance:

- One (1) copy of the final tiled lidar data products to be delivered to NRCS for distribution to each county
- Two (2) copies of the final lidar data products to be delivered to USGS/NGTOC

Task Order Deliverables

- Raw Point Cloud (Raw Swath) in LAS 1.4 Format
- Classified Point Cloud in LAS 1.4 Format
- Bare Earth Surface Raster DEM in Erdas IMG Format (2.5 sf)
- Hydrologic Break line Data Set in Esri File GDB Format
- Intensity 8-bit GeoTiff Images (2.5 sf)
- Control and QC Check Points in Esri File GDB Format
- Tile Index in Esri GDB Format
- Buffered Project Boundary in Esri File GDB Format
- Collection Flight Line Index in Esri File GDB Format
- FGDC Task Order Level Metadata in XML Format
- Project Reporting (Acquisition, Processing, Survey) in PDF Format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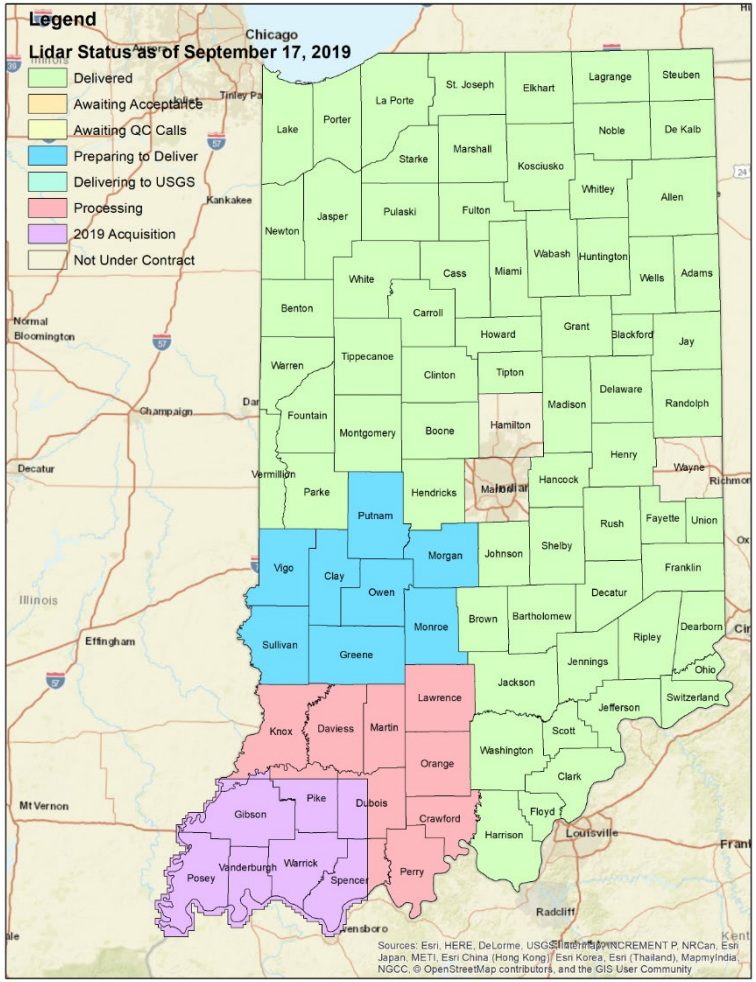
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Contours

- ASPRS American Society for Photogrammetry and Remote Sensing
- FEMA Federal Emergency Management Agency
- NSSDA National Standard for Spatial data Accuracy
- USGS-NMAS US Geological Survey-National Map Accuracy Standards
- USACE US Army Corps of Engineers

Contours

Contours

Under the new ASPRS standards, contours do not have an accuracy applied to them, they are considered a "graphic representation of the surface". The accuracy standard is applied to the lidar points and DEM data.

Contours

Accuracy Standard. The lidar data acquisition and processing is based on the "U.S. Geological Survey National Geospatial Program Lidar Base Specification Version *1.2*" (**now v1.3**). The State of Indiana 2016-2018 orthoimagery program has adopted the 2014 American Society of Photogrammetry and Remote Sensing (ASPRS) Positional Accuracy Standards for Digital Geospatial Data (Edition 1, Version 1.0) Guidelines. Both standards were developed in harmony to provide a foundation for geospatial data development based upon the current technology and methodologies.

Contours

- Accuracy of the Derived DEM: The ASPRS accuracy (ACCZ) of the derived DEM is calculated and reported in three (3) ways:
- RMSEz (Non-Vegetated): The required RMSEz is: ≤10 cm.
- Non-Vegetated Vertical Accuracy (NVA) The required NVA is: ≤19.6 cm at a 95% confidence level, derived according to NSSDA, i.e., based on RMSEz of 10 cm in the “open terrain” and/or “urban” land cover categories.
- Vegetated Vertical Accuracy (VVA): The required VVA is: ≤29.4 cm at a 95th percentile level, derived according to ASPRS Guidelines, vertical accuracy Reporting for lidar data, i.e., based on the 95th percentile error in vegetated land cover categories combined (tall grass, brush, forested areas). This is a required accuracy.

- Approximately 67% of all measurements are within 10cm (3.9-inches) and 95% within 19.6 cm (~7.7 inches) on hard un-obstructed surfaces.

- Approximately 95% (with 5% unrestricted outliers) of all measurements are within 29.4 cm (~11.6 inches) in Vegetated land cover categories combined (Tall Grass, Brush, Forested Areas).

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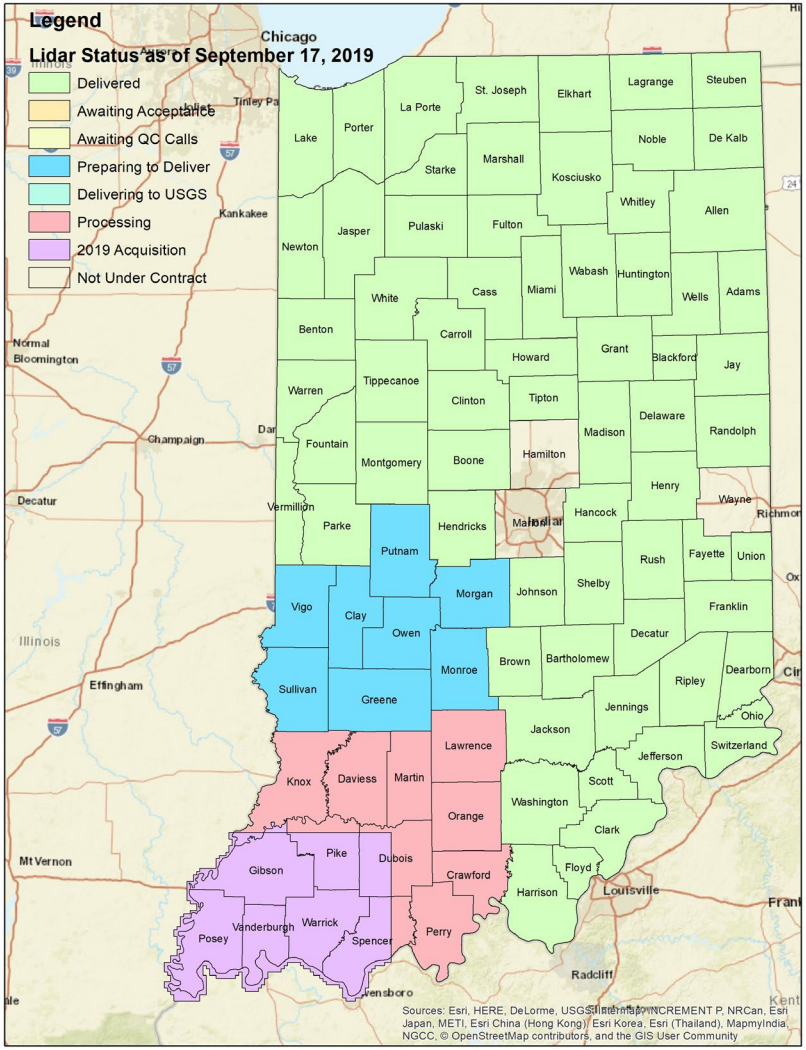
Indiana GIS day 2019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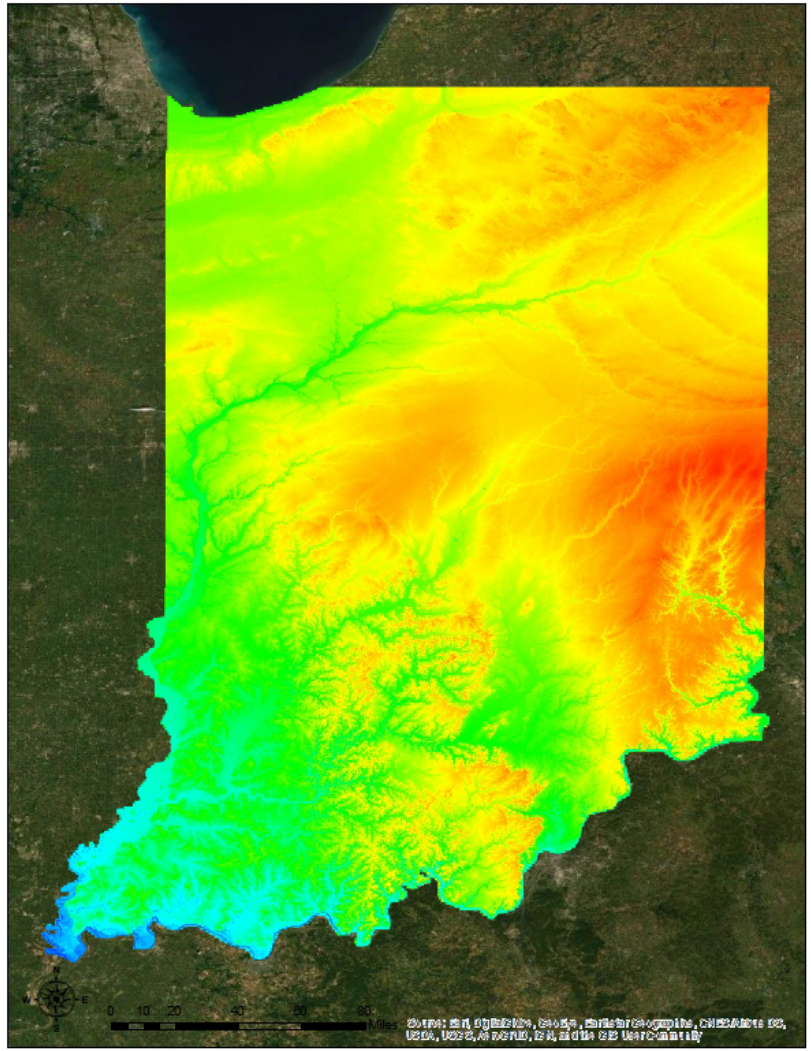
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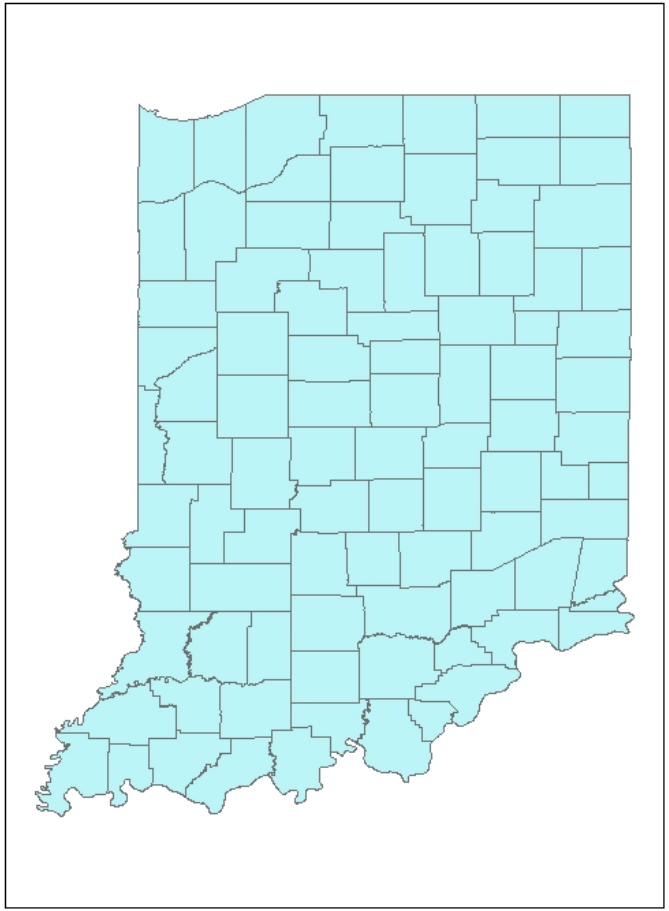

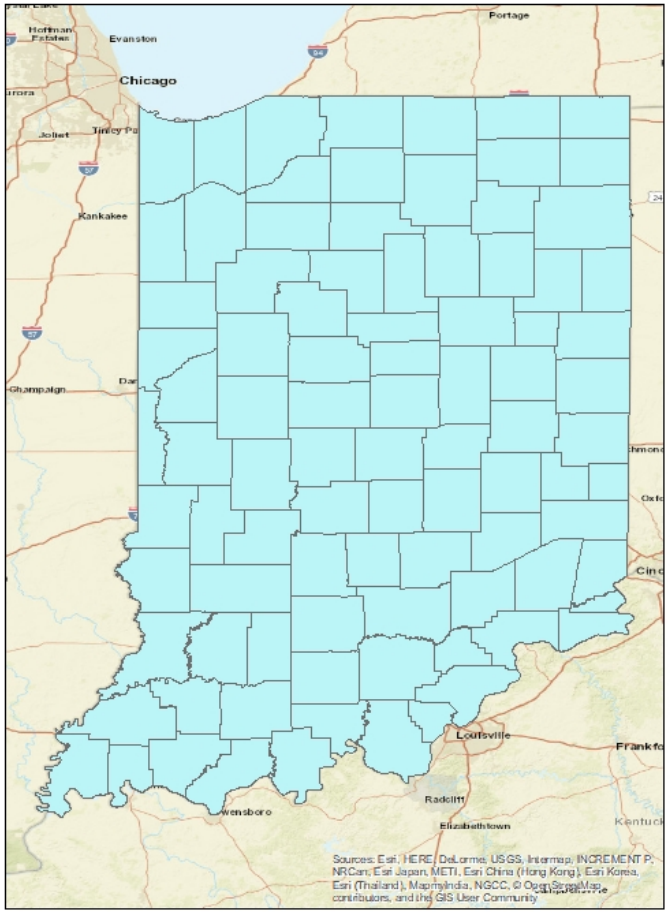
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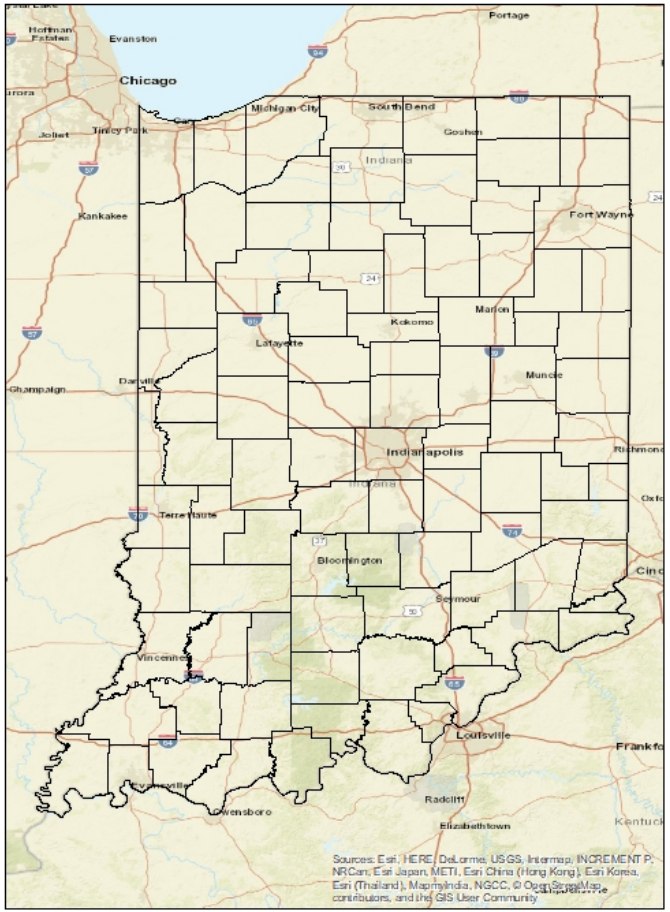
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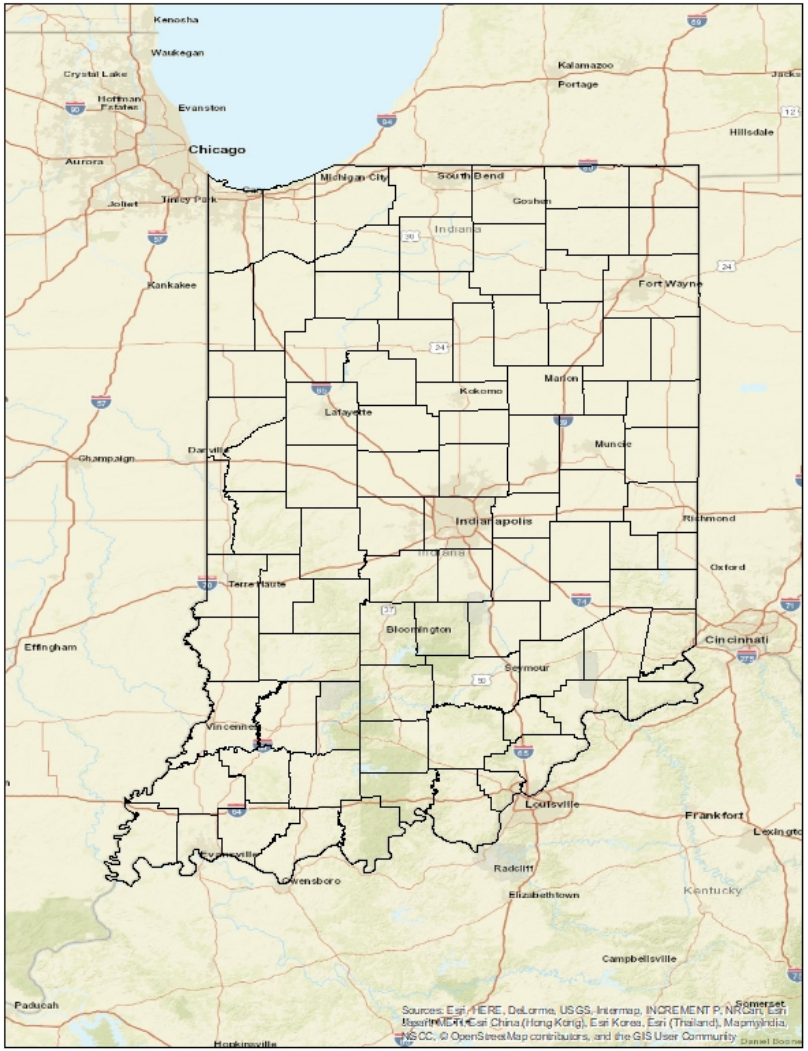
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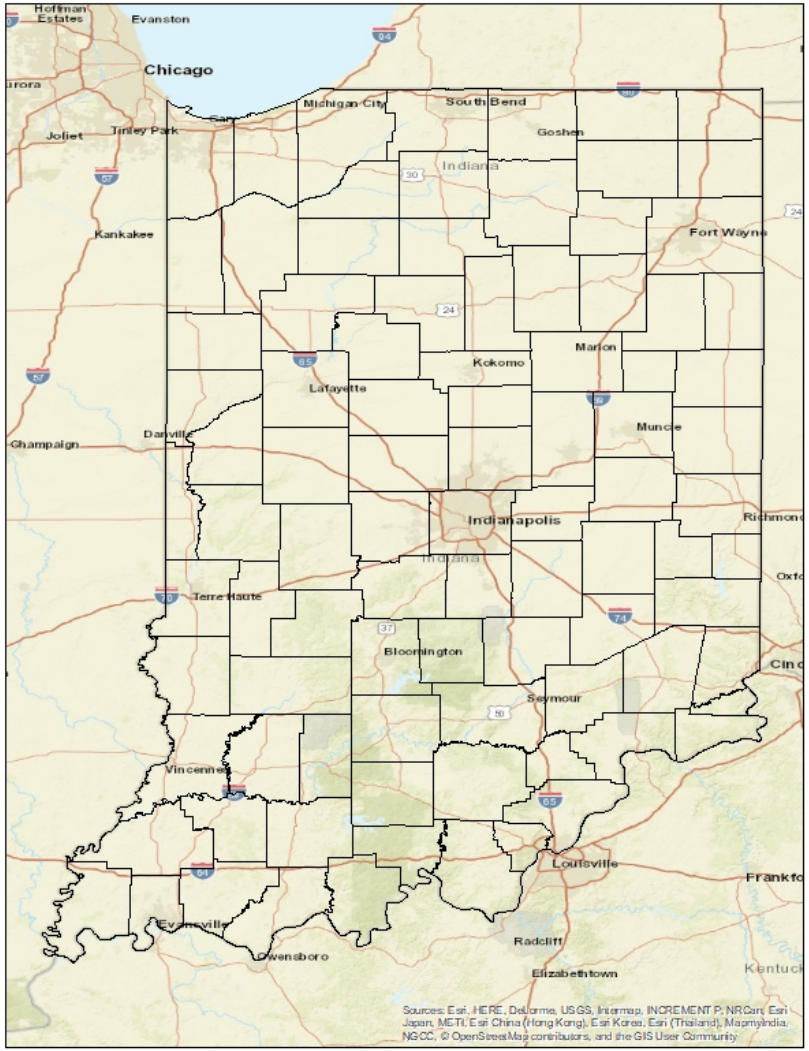
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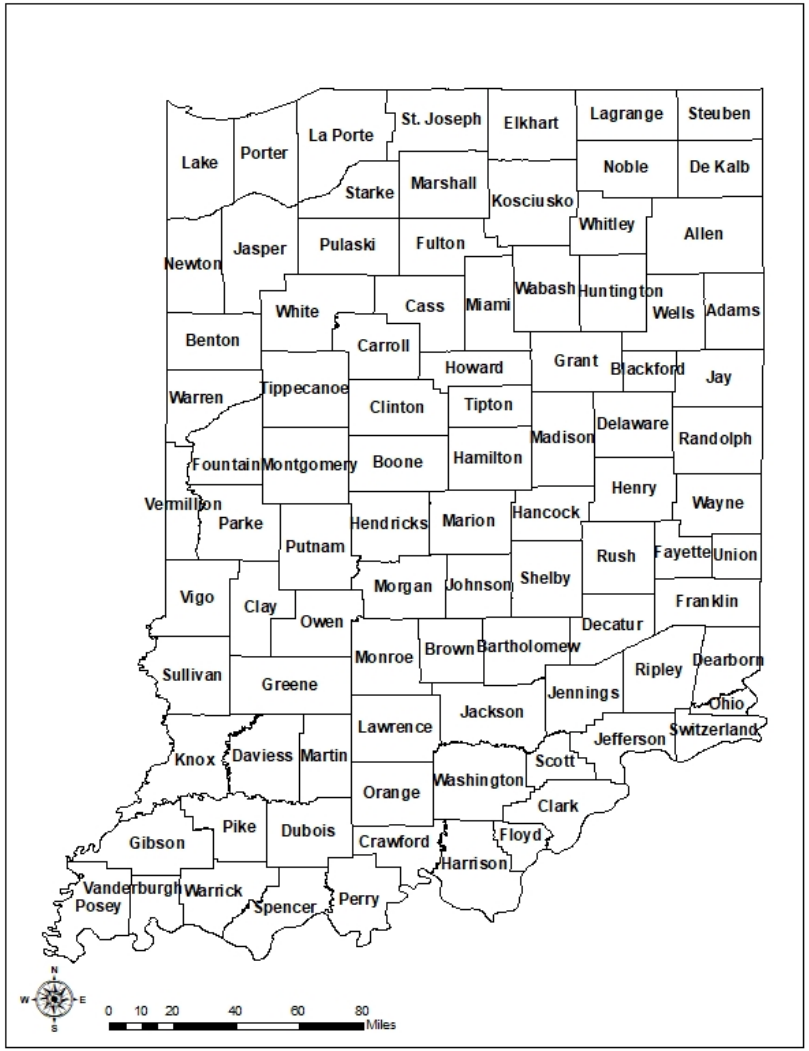
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Lagrange
Steuben
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De Kalb
Starke
Marshall
Kosciusko
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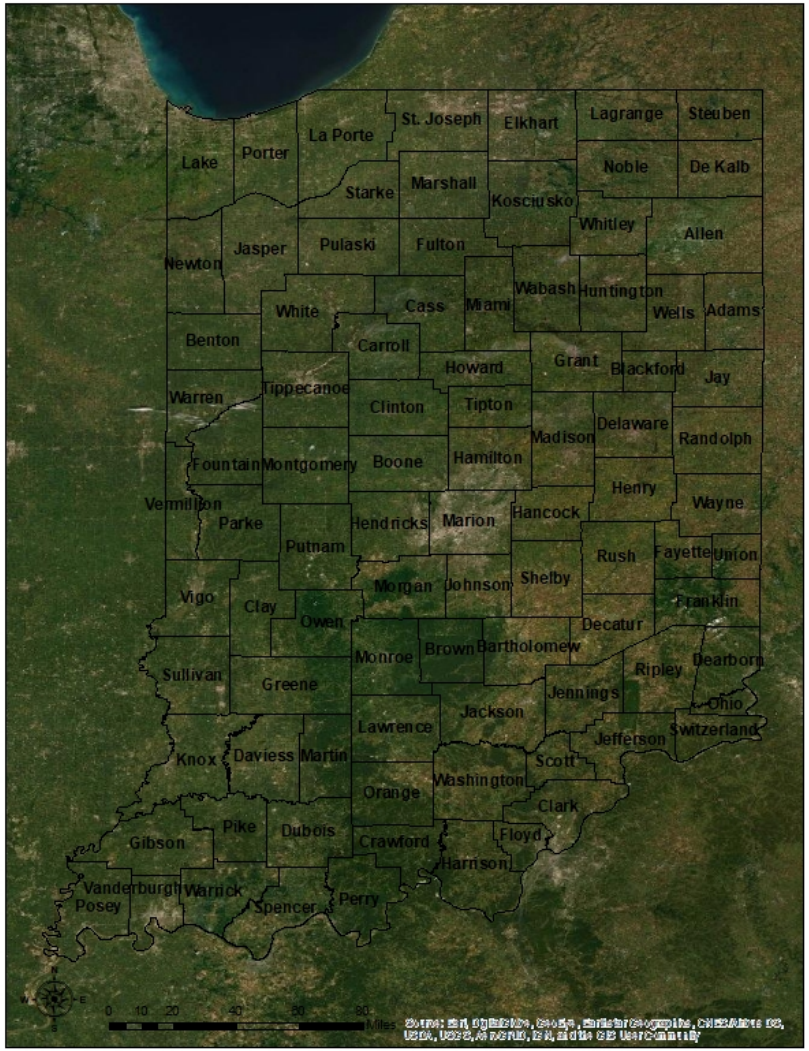
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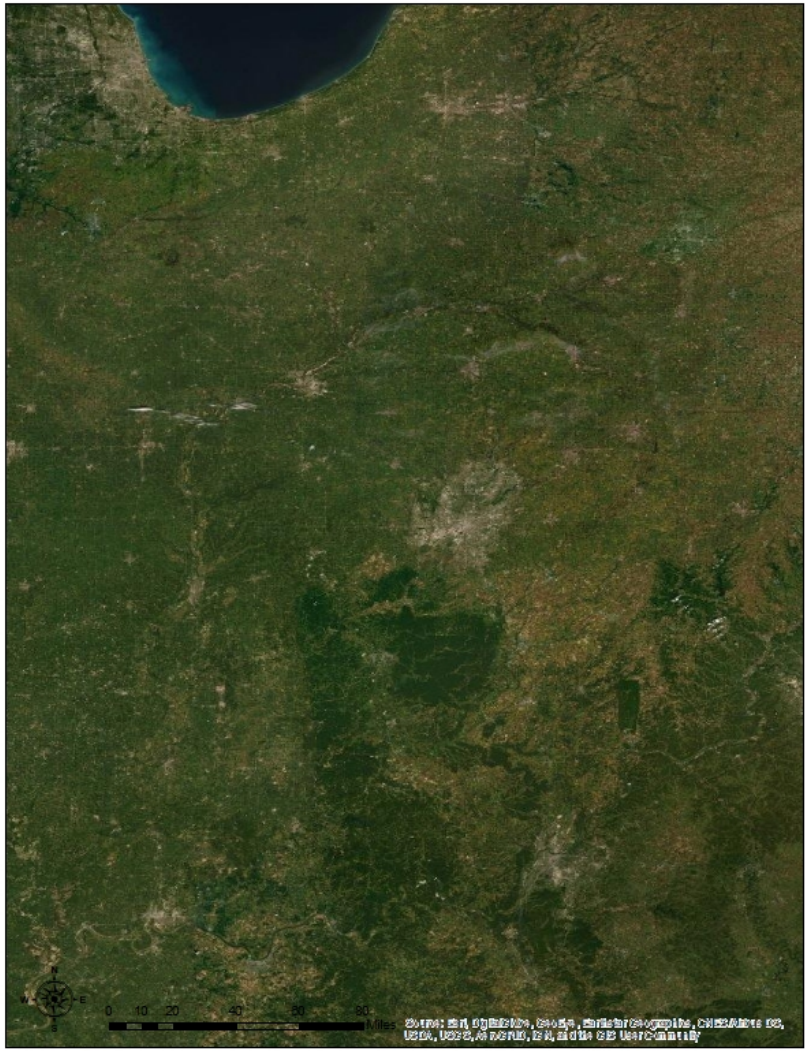
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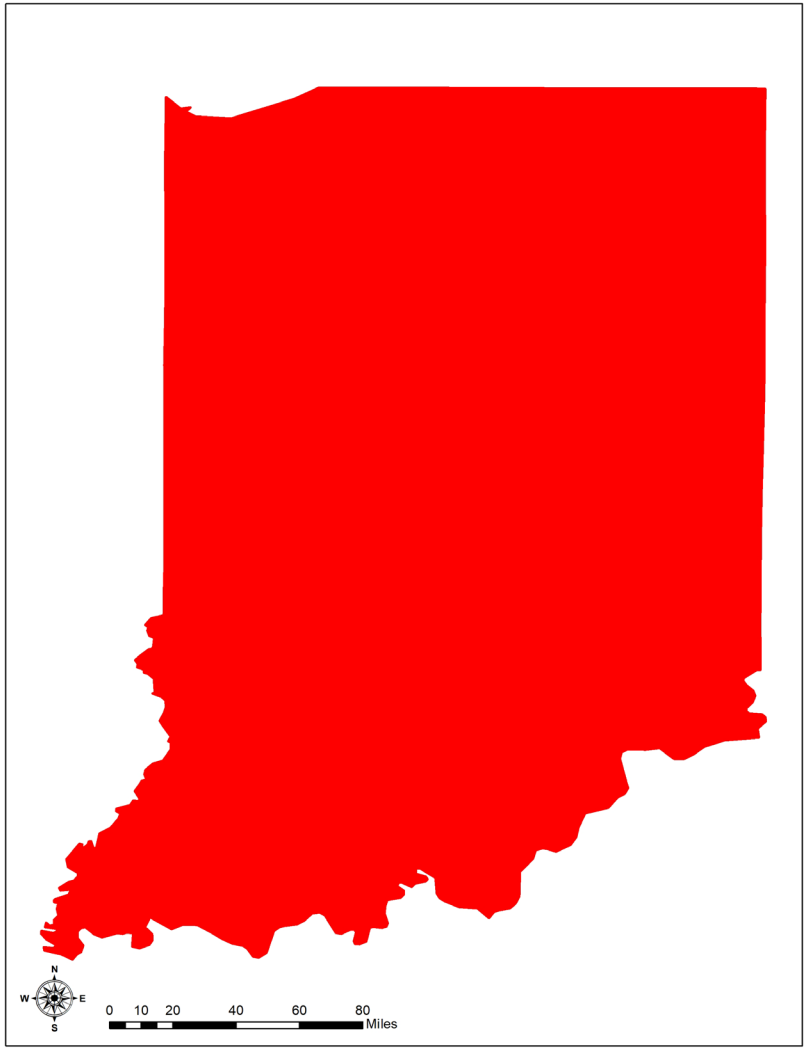
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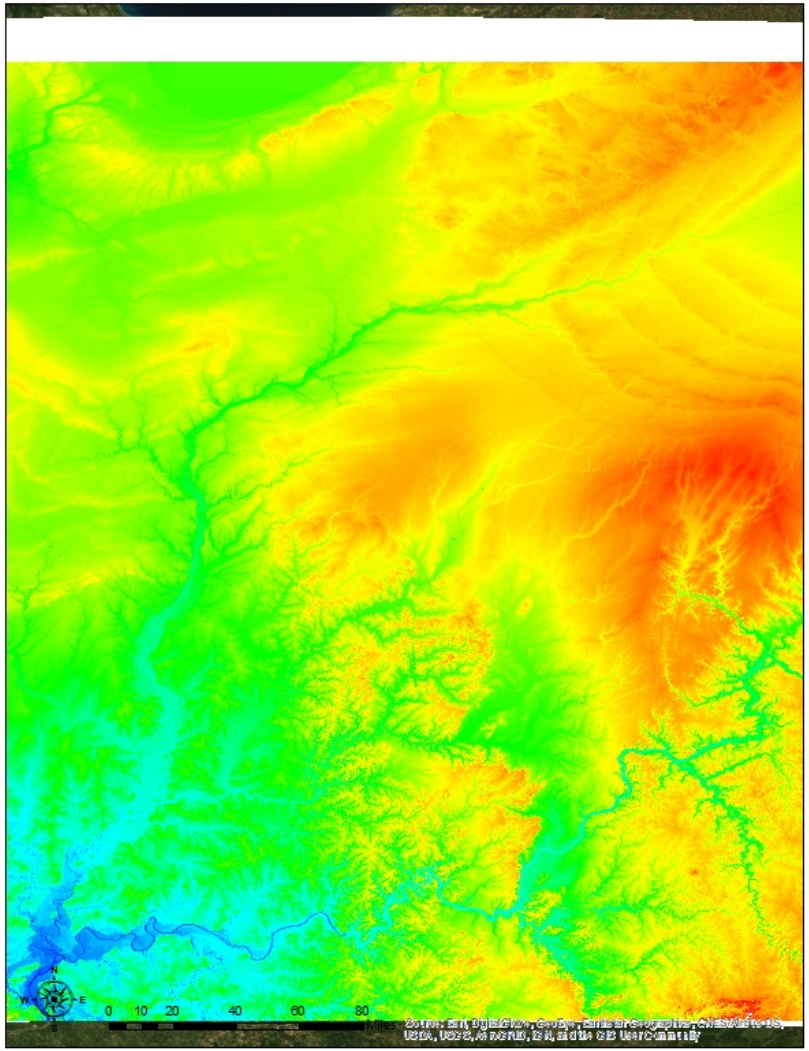
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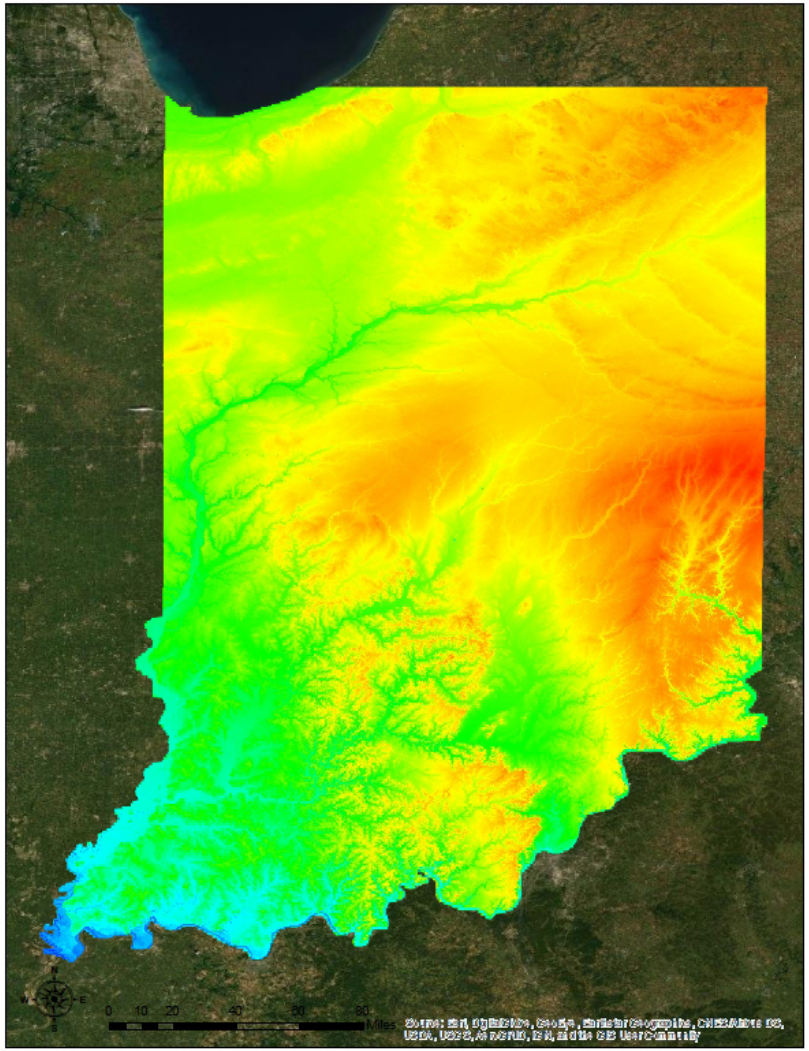
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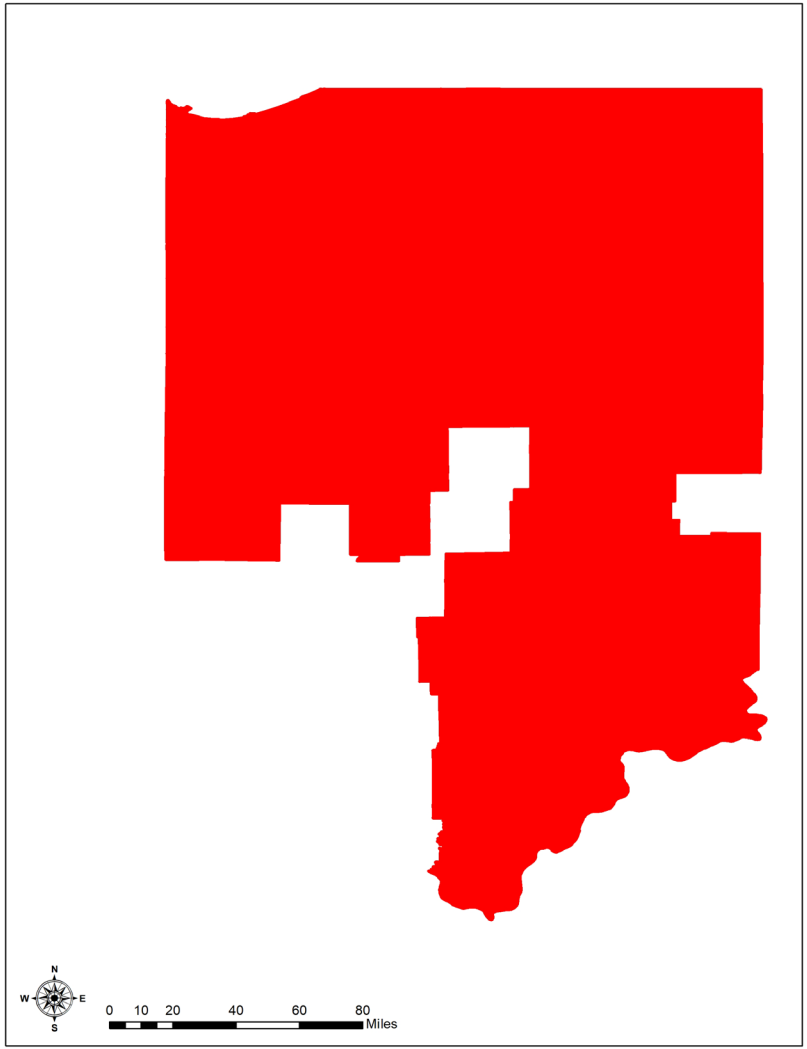
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Hoffman Estates
Evanston
Chicago
Aurora
Michigan City
South Bend
Gary
Goshen
Joliet
Tinley Park
Indiana
Kankakee
Fort Wayne
Marion
Kokomo
Lafayette
Muncie
Champaign
Danville
Indianapolis
Indiana
Terre Haute
Bloomington
Seymour
Vincennes
Louisville
Evansville
Radcliff
Owensboro
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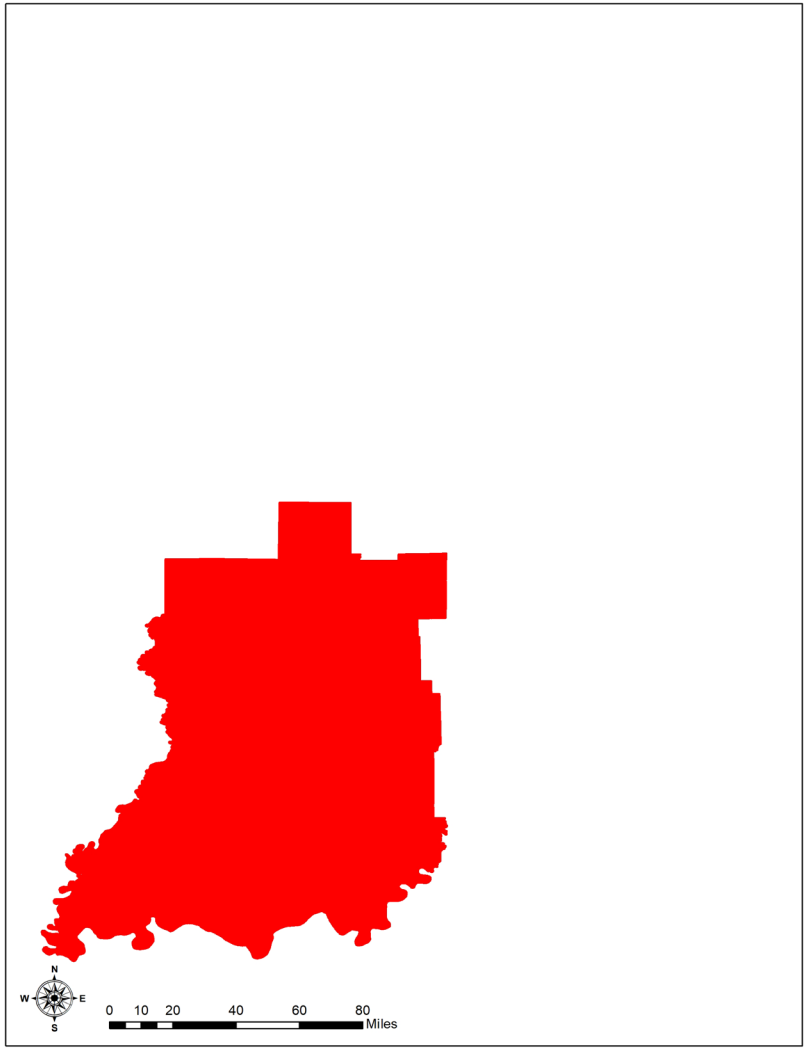
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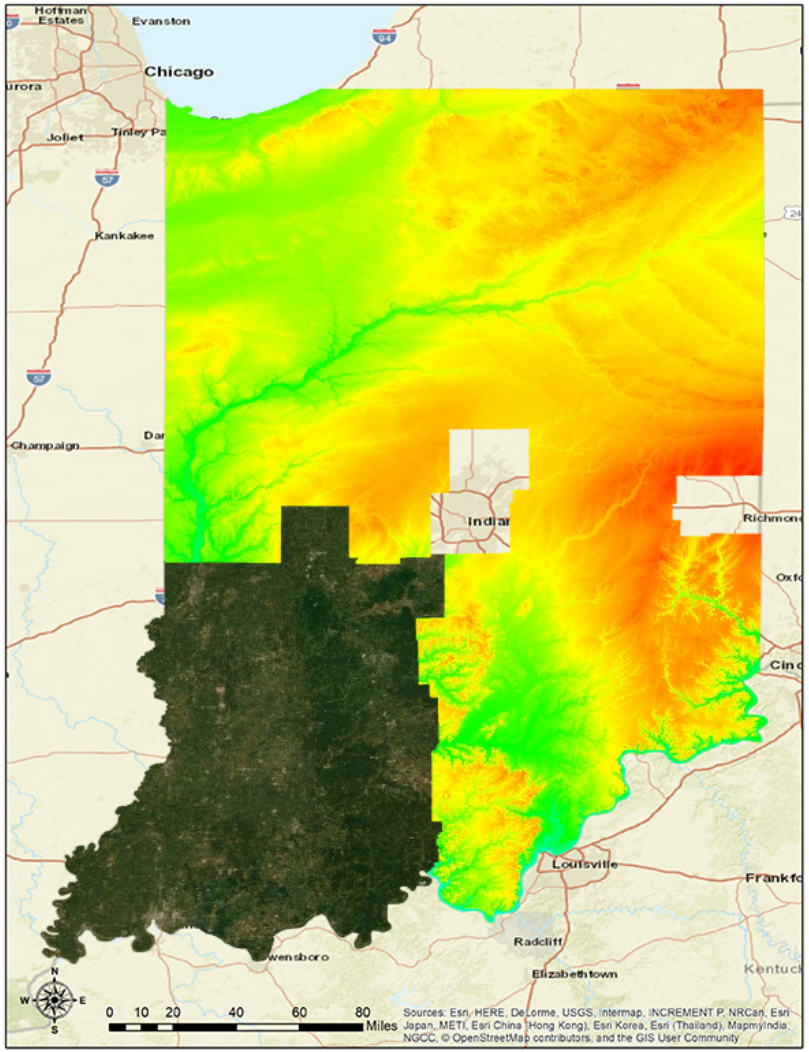
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