Michigan Hydrography Initiative Pilot Project

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DTMB

Hydrography Data Improvement Pilot Project

- Hydrography Focus Group Initiated in 2018
- Proof of Concept in 2019
- Kalamazoo River Watershed Pilot Project in 2020
  - MSU developing new flow lines based on QL2 LiDAR data
  - Culverts gathering
- Coordinating with USGS on new standards and NHD attributes
- Machine learning being tested
- Benefits to other projects – wetlands delineation
- Need culverts to provide more accurate results

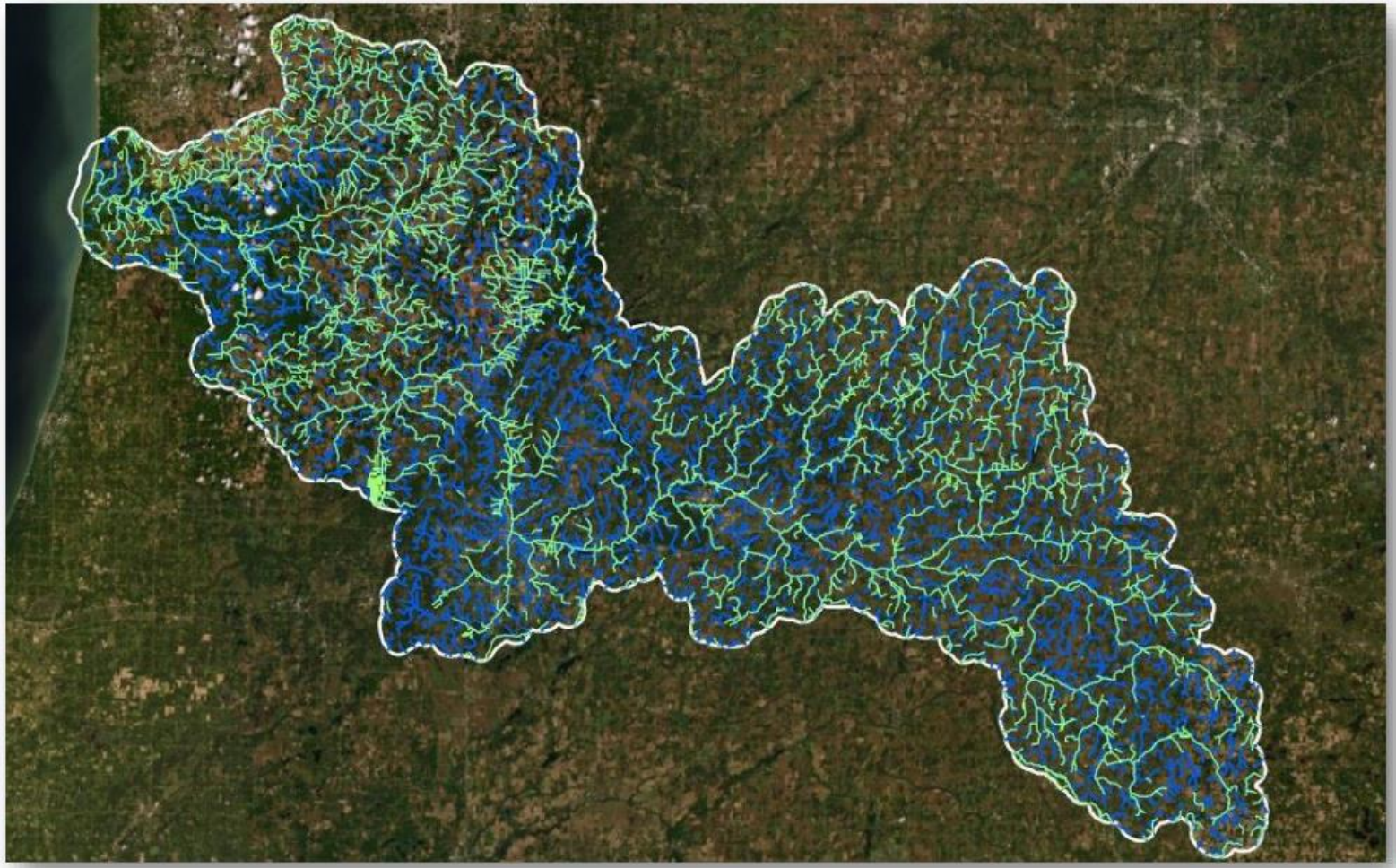
Next Steps

- Use cases

Emergency Management	Fish Stocking	Minerals	Real Estate	Nutrient Load Modeling
Parks and Recreation	Habitat Management	Invasive Species	Natural Rivers Program	Charter Fishing Program
Forest Inventory	Conservation Enforcement	Wetland Protection	Hydrologic Modeling	Wildlife Management
Fire Management	Oil and Gas Mining	Hydrologic Studies	Floodplain Program	Endangered Species
Watershed Delineations	Geologic Mapping	Containment Investigations	Coastal Management	Water Table Mapping
Navigation	Tourism	Environmental Assessments	Cartography	Asset Management

Kalamazoo River Watershed

Draft Flowlines



NHD
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Technology, Management & Budget

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Hydrography Alignment Pilot Research Project

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EGLE

Department of Natural Resources DNR Michigan

Data Resources

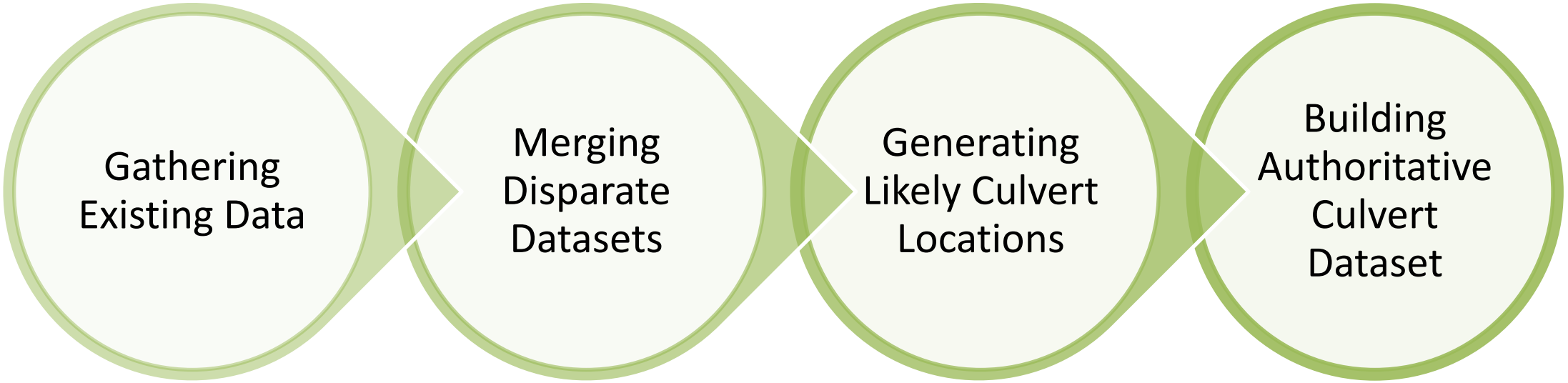
- Current NHD
- QL2 LiDAR (MiSAIL, USGS)
  - Digital Elevation Models (native resolution)
  - Breaklines (waterbodies and areas)
  - Intensity raster data
- Recent high-resolution, leaf-off orthoimagery
- USFWS National Wetlands Inventory (Updates coming from SOM EGLE)
- Culvert databases
  - Michigan Communities
  - Michigan Department of Transportation
  - Transportation Asset Management Council
  - Michigan Department of Natural Resources

Elevation Hydro Process

- Objectives of the Pilot Project:
  1) Develop methodologies for updating existing NHD Geography
     - Flowlines, Areas and Waterbodies
  2) Build efficient, repeatable models to complete data processing, while leveraging existing knowledge
  3) Establish relationships/connections with stakeholders inside and outside State of Michigan
  4) Estimate rough budgetary costs for a Statewide Hydrography realignment

Elevation Hydro Process

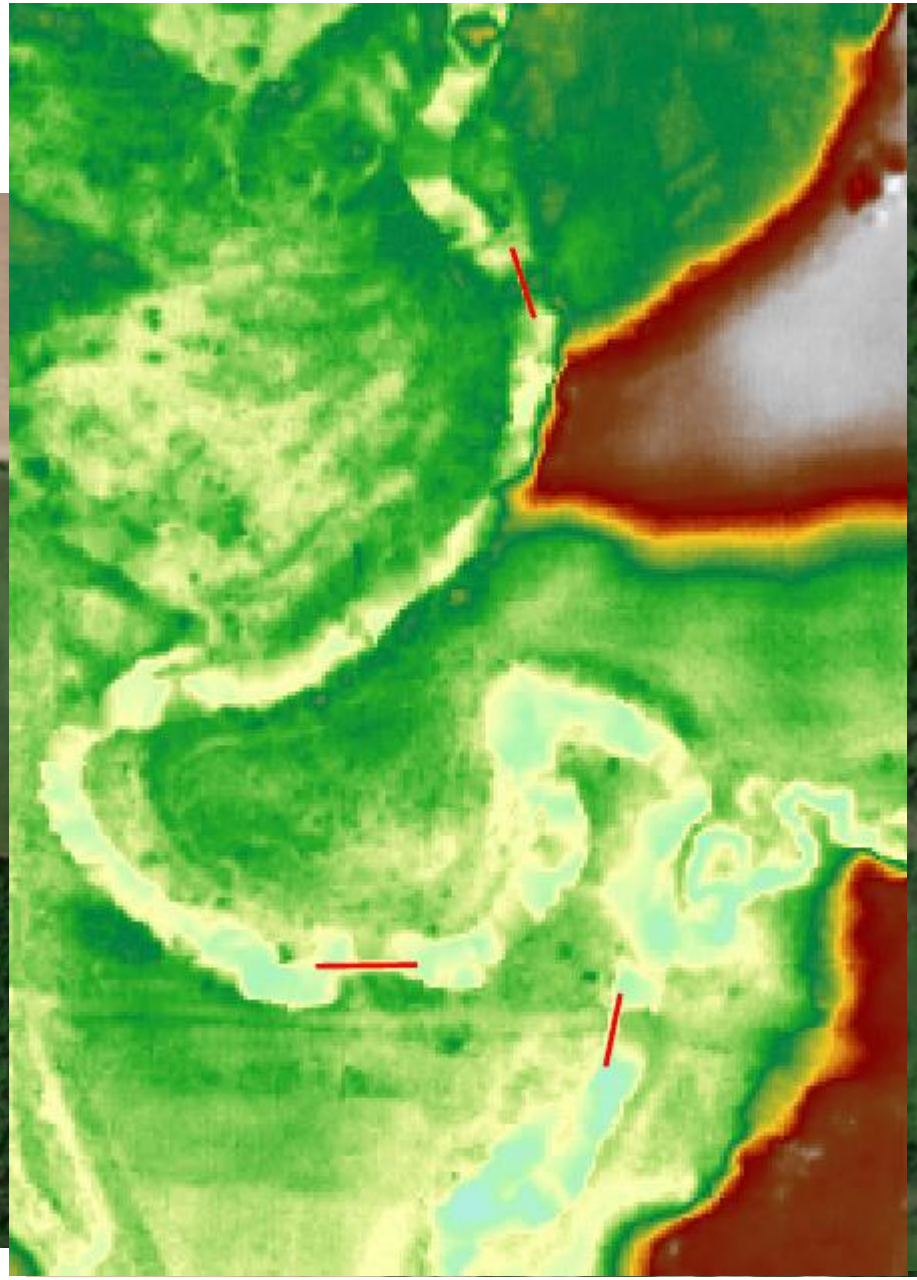
- Culverts



MAJOR & MINOR ROADS – DRIVEWAYS – FIELDS – OTHER BARRIERS TO FLOW

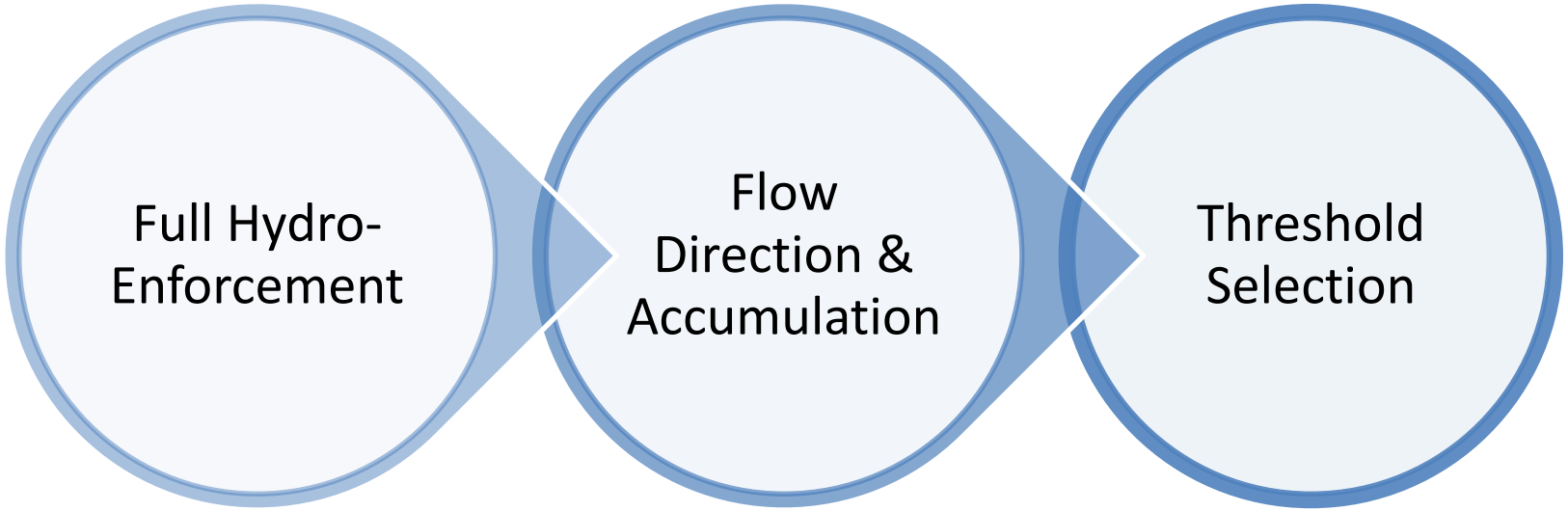
Elevation Hydro Process

- Culverts
  - ~40,000 per HUC8



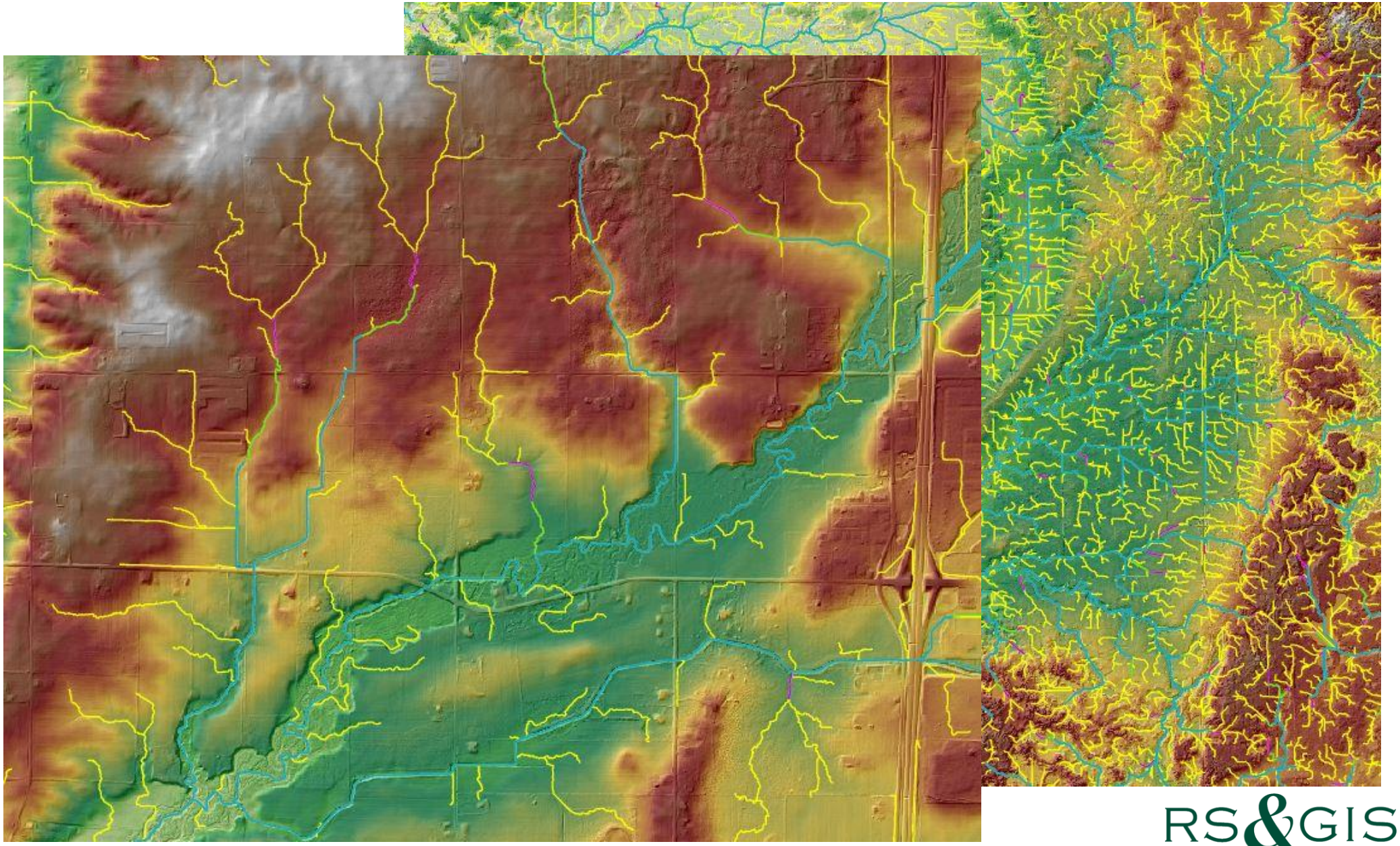
Elevation Hydro Process

- Flowlines



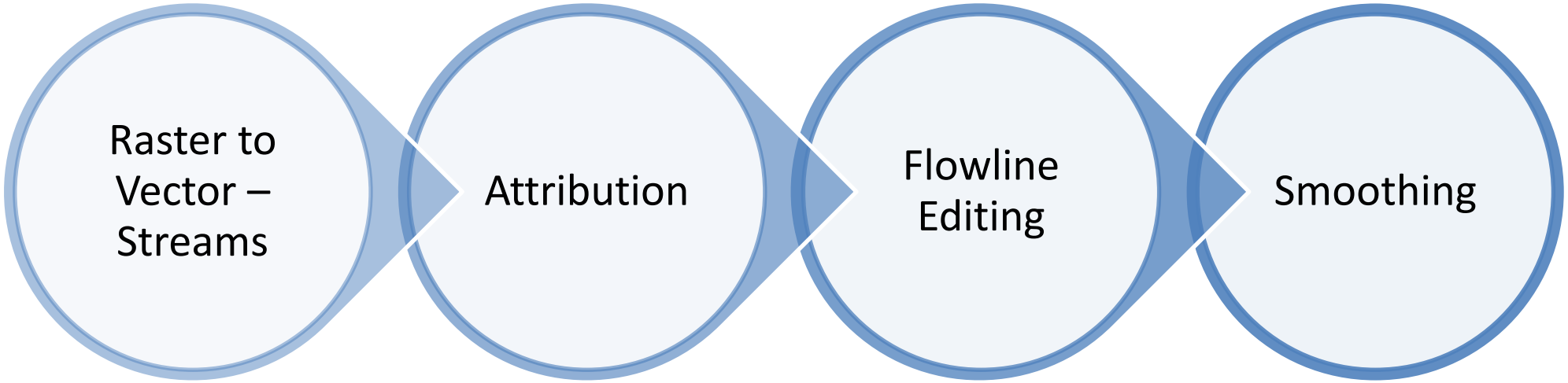
Elevation Hydro Process

- Flowlines



Elevation Hydro Process

- Flowlines…continued

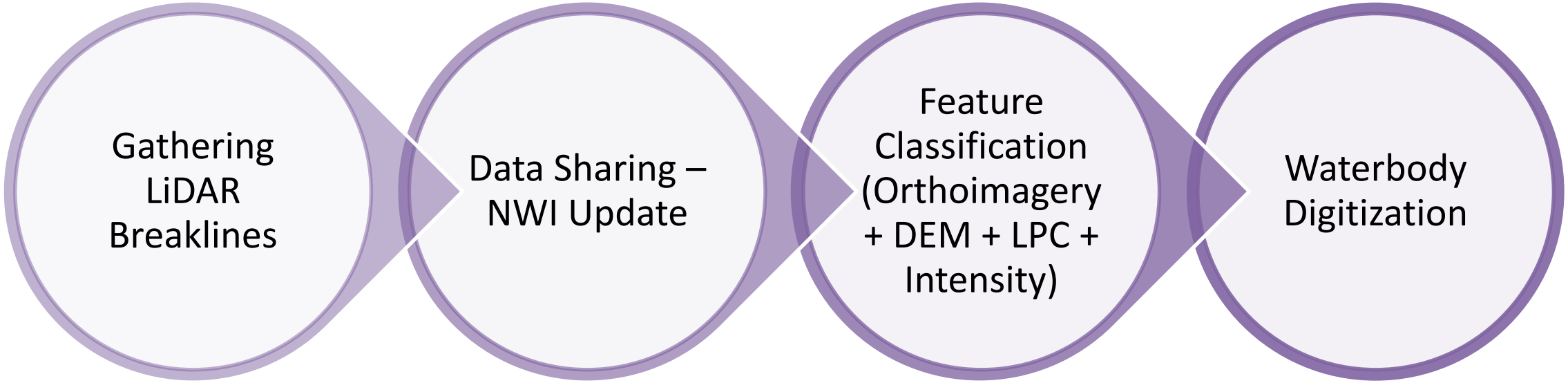


Elevation Hydro Process

- Flowlines…continued

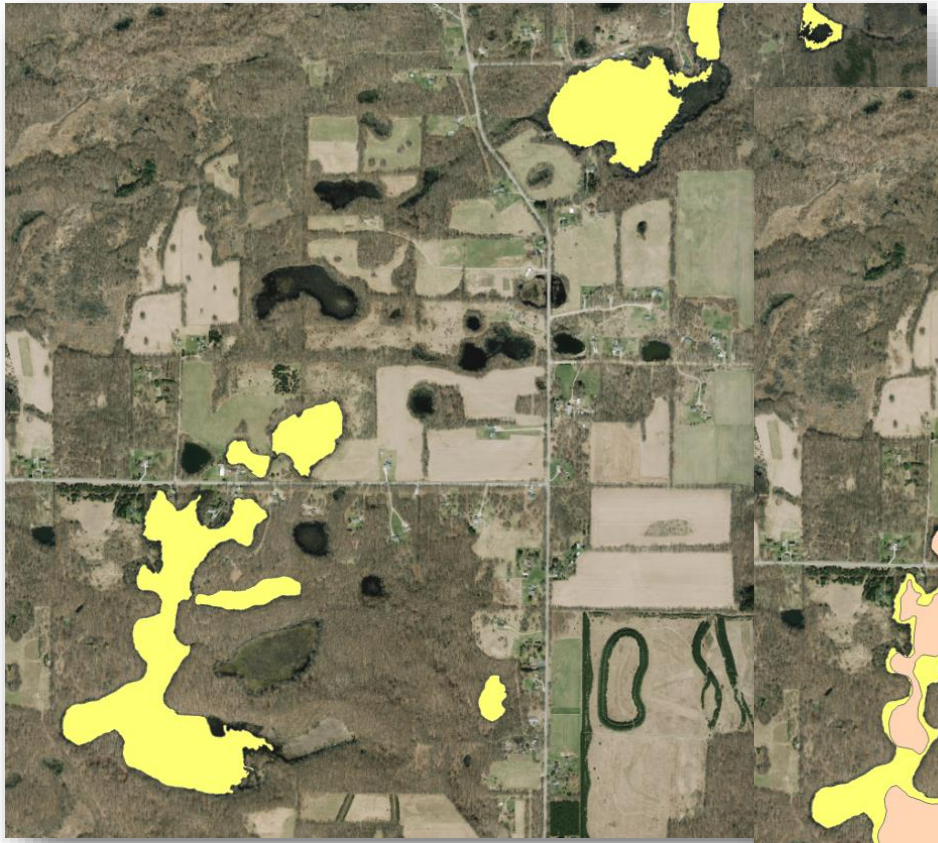
Elevation Hydro Process

- Waterbodies

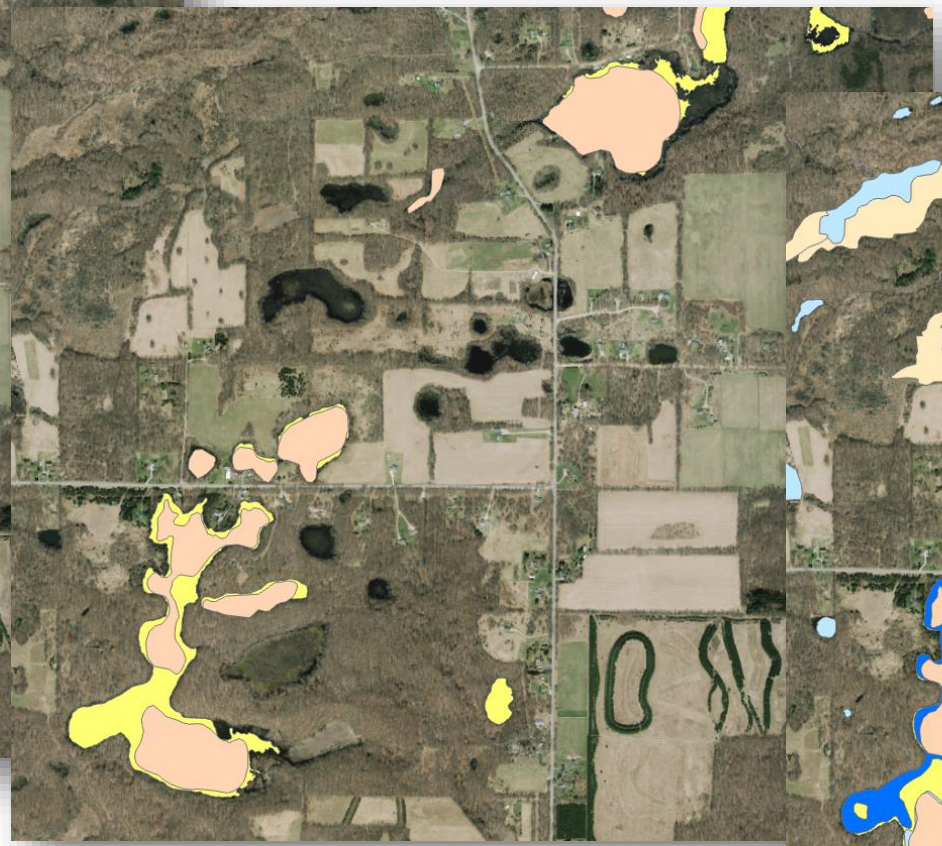


Elevation Hydro Process

- Waterbodies

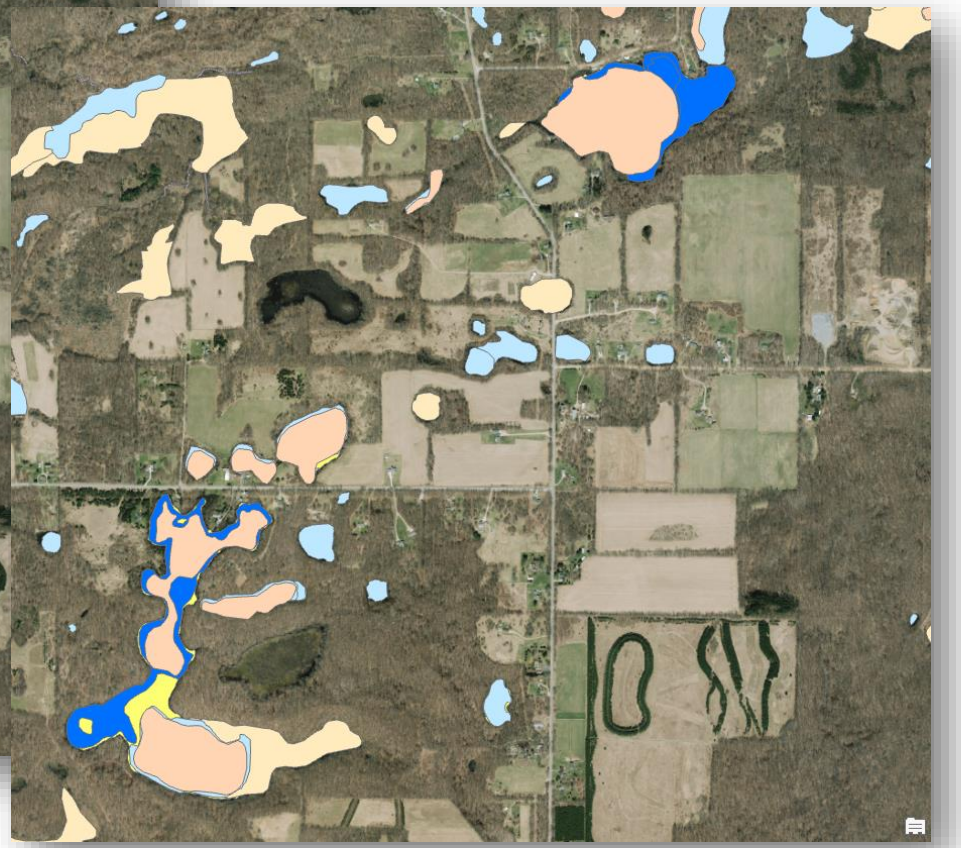


LiDAR Breaklines



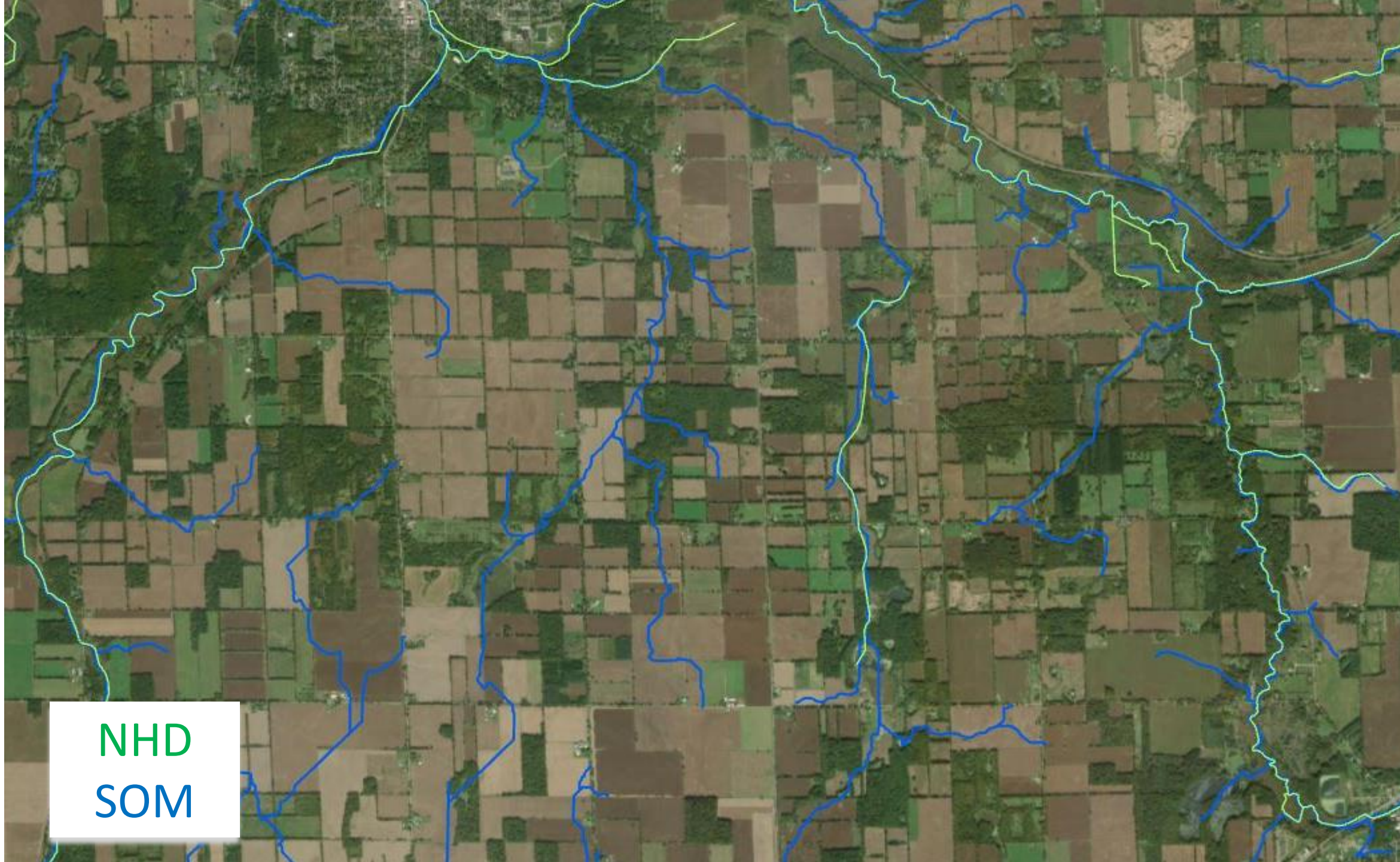
LiDAR Breaklines + NHD

LiDAR Breaklines + NHD + NWI



Challenges

- Disparate and incomplete existing culvert data
  - Everyone does it differently
  - Many inventories collect point data only and only at roads
  - Both the large number of culverts and variety of “culverts” in terms of type and length
- Lack of an efficient automated culvert process
  - Automated processes were time consuming and did not work well enough
  - Results took too much time to review
- Big data processing
  - The search for the right sized subset to reduce processing & improve workflows
- NHD – EHD Mismatch
  - Existing NHD does not match elevation derived hydrography well


NHD
SOM

Successes

- Robust methodology developed for mapping culverts
  - Existing data + manual methods = accurate and authoritative dataset
  - This could form the basis of a State of Michigan authoritative culvert dataset
- Flexible, inclusive flowline model
  - Inclusive of both small- and large-scale EDH
  - Flexible settings for thresholds and smoothing
  - Processing at HUC10 level (buffered)
- New relationships established
  - USGS, USFS
  - State of Michigan EGLE, DNR, DOT, DTMB
  - Communities (County GIS, Drain Commissions, Road Commissions)
- Buy-in from State Agencies – everyone is hungry for this data

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Next Steps

- Establish project for conflation of attributes
- Define thresholds for flowlines and attributes
  - Collaborate with USGS and others
  - Best practices, guidelines, develop initial plan to move conflation forward
- Develop project plan and timelines for continued regional hydrography development
- Continued outreach to stakeholders
- Part of continued project will be to develop a long-term maintenance plan and roll up of updates through our Michigan Geographic Framework Data Hub to USGS NHD

Questions

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