Connecting Geospatial Education with Industry and Government: A New York Experience

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Connecting Geospatial Education with Industry and Government: A New York Experience

4-H Geospatial Science and Technology

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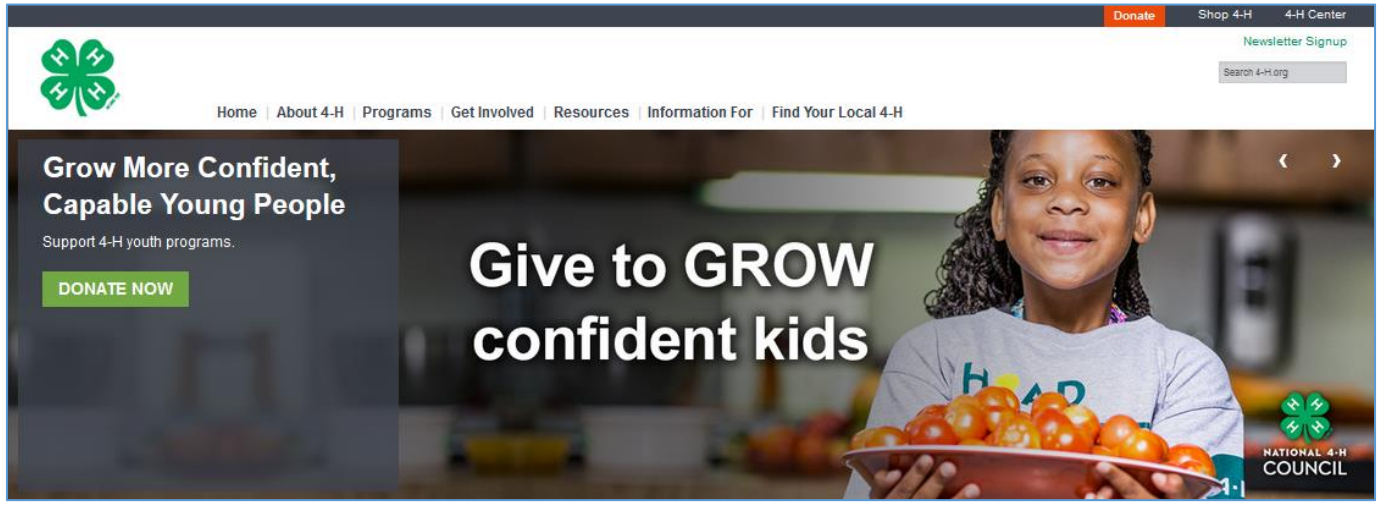
What is 4-H?

- In New York
  - 133,846 youth
  - 200 educators
  - 12,775 adult volunteers



4-H is the nation's largest positive youth development and youth mentoring organization, empowering six million young people in the U.S.

In partnership with 110 universities, 4-H life changing programs are research-backed & available through 4-H clubs, camps, afterschool & school enrichment programs in every county & parish in the U.S.

4-H is the youth development program of our nation's Cooperative Extension System & USDA.

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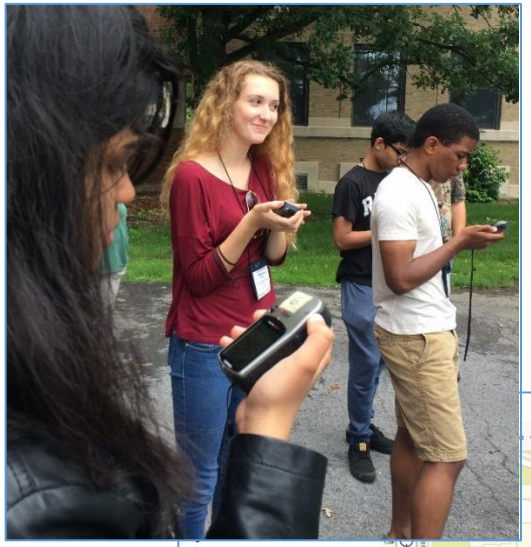
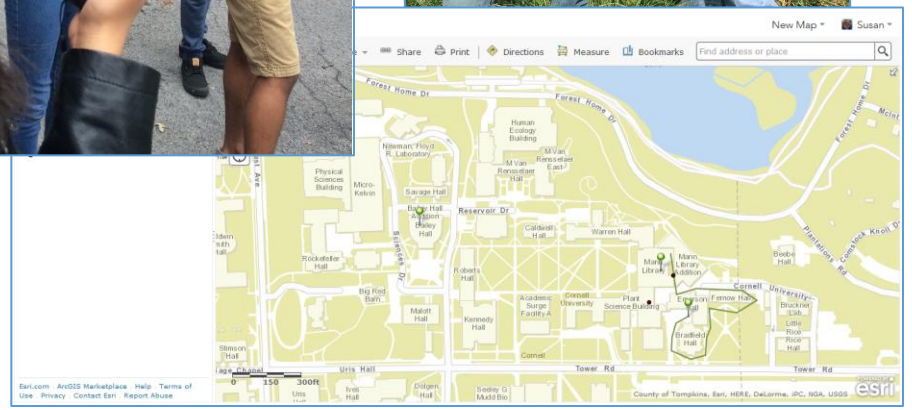
4-H Geospatial Science and Technology

- Educator Professional Development
  - GPS
  - GIS
  - Remote sensing
  - Community Mapping Projects
- Equipment loan
- Consultation
- Youth Map Recognition





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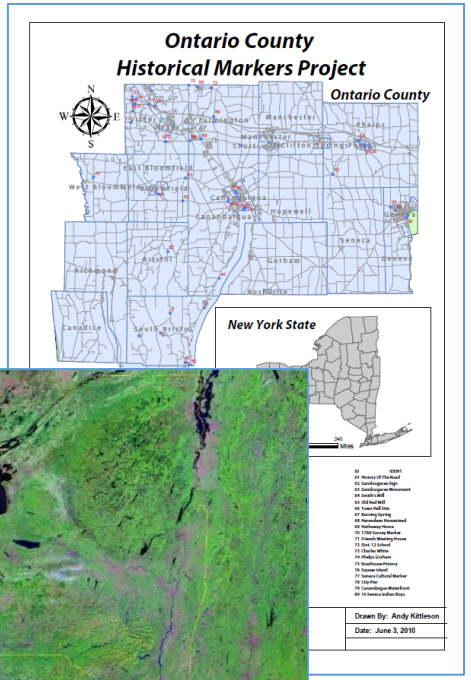
Primary Connections

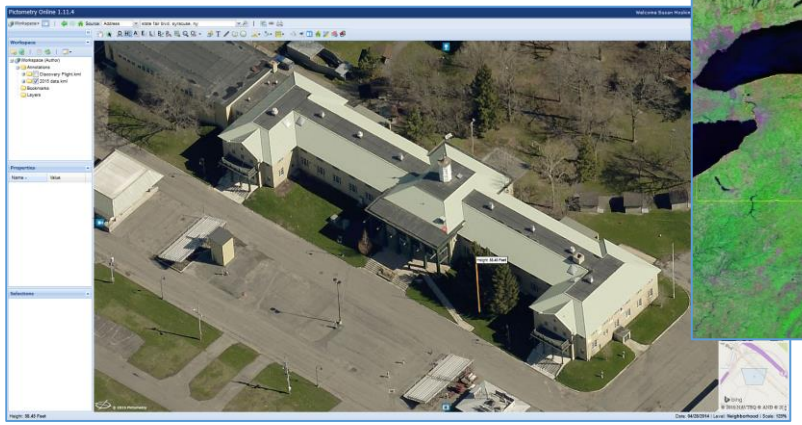
- ESRI 4-H Grants
  - ArcGISOnline for Organizations
  - EdUC, San Diego, CA
  - GGLEAD
- NASA Landsat
  - Adopt-a-Pixel
  - iGETT to HiGETT
- Pictometry, Inc.
  - Pictometry Online

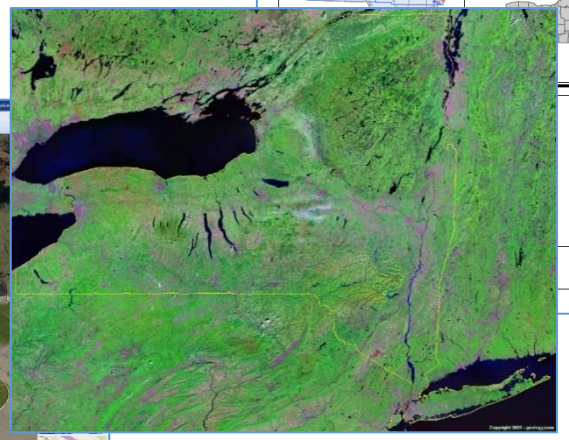
4-H Educator Training CCE Oneida

ESRI ArcMap for Community Service



Pictometry at the Youth Building at NY State Fair





New York Landsat Mosaic

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Local Connections

- CCE Broome 4-H
  - – Binghamton City Council
    - Pothole Mapping
- CCE Ontario – Local Agriculture
  - Farm Stand Maps
- CCE Genesee – Business/Education Alliance
  - **M**ath **S**cience **T**echnology Summer Camp

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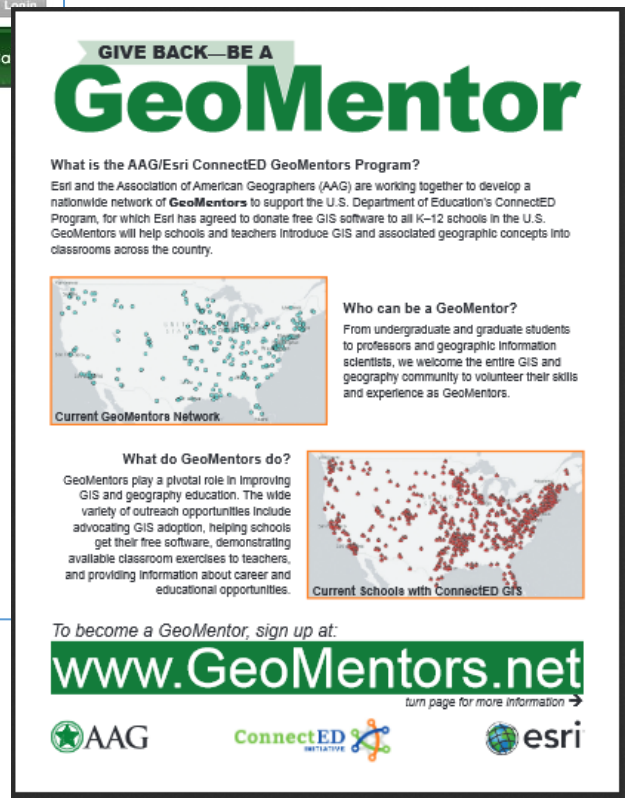
Making the Connection….



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Example: NUAIR/AUVSI Industry Days

- Andro
- AUVSI
- Avyon
- Cognizant
- CTM Machinists
- DragonFly Unmanned Aerial Solutions

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Monroe Community College

STATE UNIVERSITY OF NEW YORK

Heather Pierce, Instructor, Monroe Community College

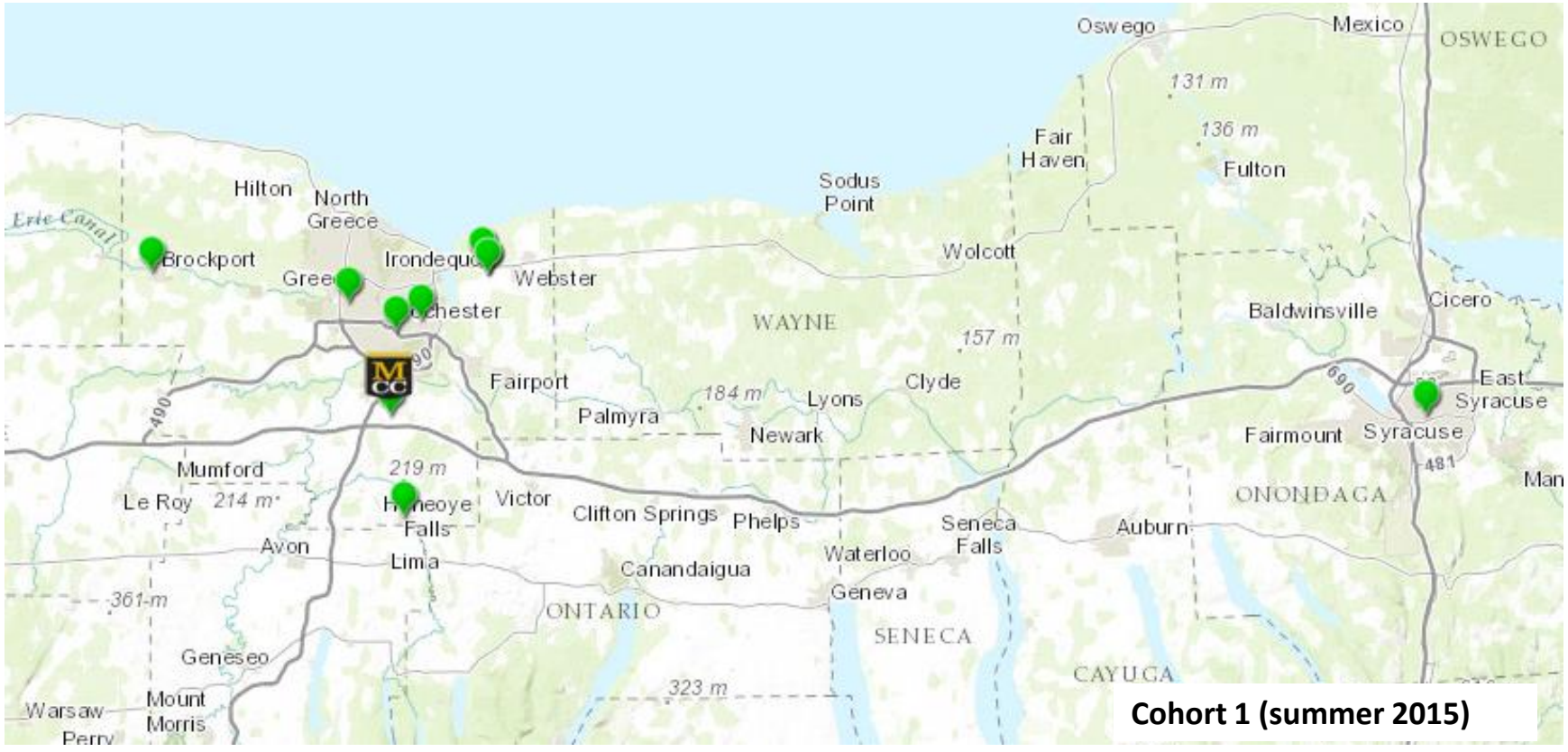
Jonathon Little, Assistant Professor, Monroe Community College

October 30, 2015

The GeoTech Consortium of Western New York was funded through the U.S. National Science Foundation (NSF) Office of Advanced Technological Education under Grants Award # 1501076 to Monroe Community College.

GeoTech Consortium of Western NY

- Goal: develop a career pipeline between high schools, MCC, and the geospatial industry.



Cohort 1 (summer 2015)

Fall 2016 (anticipated)

- Geography A.S. Degree
  - –with a geospatial technology concentration

- Geospatial Technology Certificate

GIST Certificate Two-semester Sequence

Fall Semester:

Physical Geography Lab (GEG 100) – 1 cr.
Physical Geography (GEG 101) – 3 cr.
Digital Earth (GEG 130) – 3 cr.
Cartography (GEG 131) – 3 cr.
Intro to Remote Sensing (GEG 133) – 3 cr.

Spring Semester:

Human Geography (GEG 102) – 3 cr.
Spatial Analysis and GIS (GEG 230) – 3 cr.
Capstone Course in Geospatial Technology (GEG 239) – 2 cr.
Elective (see below*)

***Elective Options:**

Students should consult with their advisor to select an elective based on their career goals or transfer plan.

- Technical Communication (ENG 251) – 3 cr.
- Programming in Python (CPT 101) – 4cr.
- Business GIS (GEG 135) – 3 cr.

Partners

- Pictometry
- GIS-SIG
- Lightower Fibertech
- Monroe County GIS

GTCWNY

EAGLEVIEW TECHNOLOGIES PICTOMETRY INTELLIGENT IMAGES

GIS SIG
A Forum for Geographic Information Sharing
AM/FM-CAD-COGO-GIS-LIS-Photogrammetry-Remote Sensing
Serving the Spatial Data/Digital Mapping Community in the Genesee/Finger Lakes Region

lightower fibertech networks

Mapping Monroe

Mapping septic fields with Remote Sensing

Paul L. Richards and Marine David
Department of Earth Sciences
The College at Brockport
Montpellier SupAgro, France

OBJECTIVES

- Determine if PICTOMETRY Oblique Imagery can be used to map Septic Leach Fields
- Determine the best way to use the data
- Determine errors and bias involved in the process including:

    Sites Hidden by Tree Canopy
    Sites that are simply not observable from the data
    Other uncertainties/bias

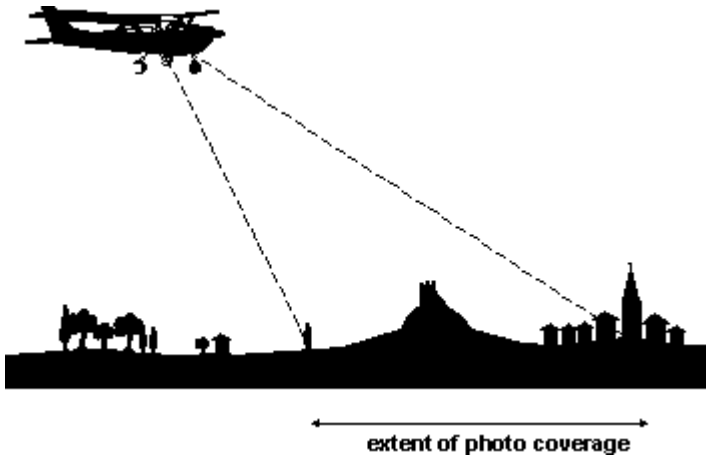
Map all Septic Fields in Oak Orchard Watershed

Why Bother Mapping Septic Fields?

- Very little spatial information about them available
- They are potential sources of Nutrients, and potentially pharmaceuticals.
- They are a source of water and are hydrologically active every day of the year.
- Currently they are modelled strictly based on census data with no thought on their location relative to streams. Yet field studies of septic fields suggest that distance to streams, gradient, soil type and distance above water table are all important factors that govern nutrient fluxes from them.
- Recent Well Contamination events from spring spreading of manure have been analyzed using DNA techniques and Human E Coli have been found. This had to be from septic systems.

Pictometry: oblique imagery

- *Aerial images taken at a 40 degree angle: Enables the eye to perceive the relief*
- *Views from 4 orientations, different years and seasons*
- *True color (no near-infrared bands)*
- *Resolution is 3 to 6 inches, depending on the type of data collected*
- *Multiple dates available*



Differences in color: darker green above the septic field

- *Pipes release the wastewater into the surrounding ground*
- *Microenvironment is richer in nutrient and water*
- *Vegetation (grass) grows darker*

March 2013

April 2010

The start time of the growing season can have a large impact on the results

Leaking septic fields

Shape of ground: raised septic fields

- Mostly the trenches
- Sometimes indirectly (leaves during Fall)

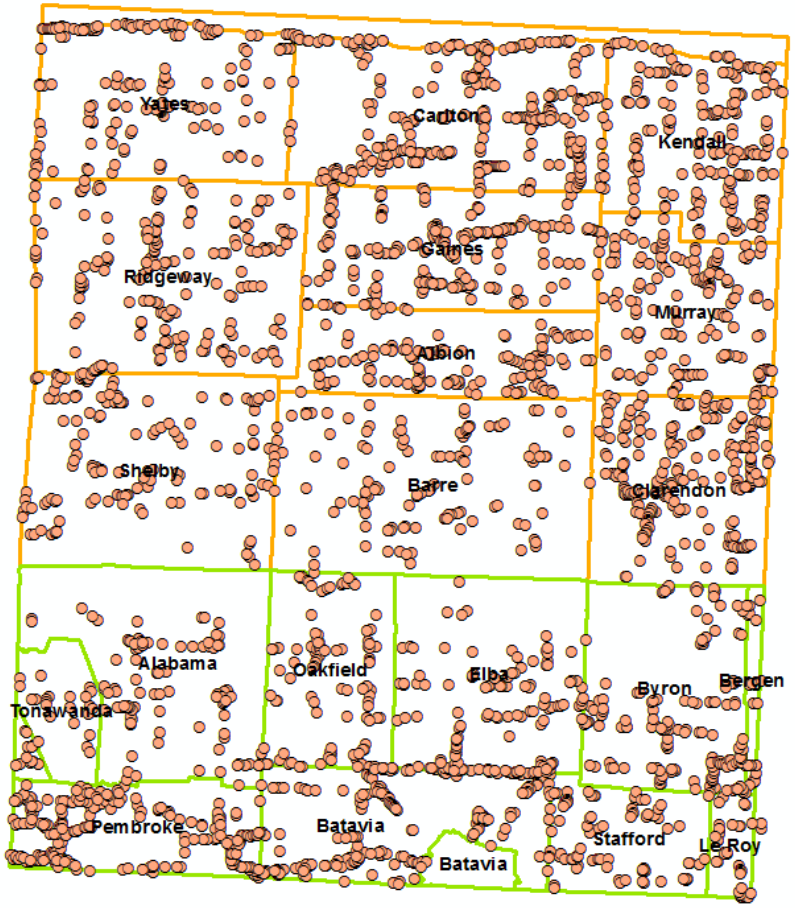
Ground truthing the results

- Comparison with data from Health Departments of Genesee and Orleans county
- Leach field dbf: Orleans, no GPS coordinates
- Distribution box (indirect) dbf, the same properties as leach field file
- GPS position, description of spots
- Evaluate how many of them we could spot using previous tools

Results: efficiency of the mapping

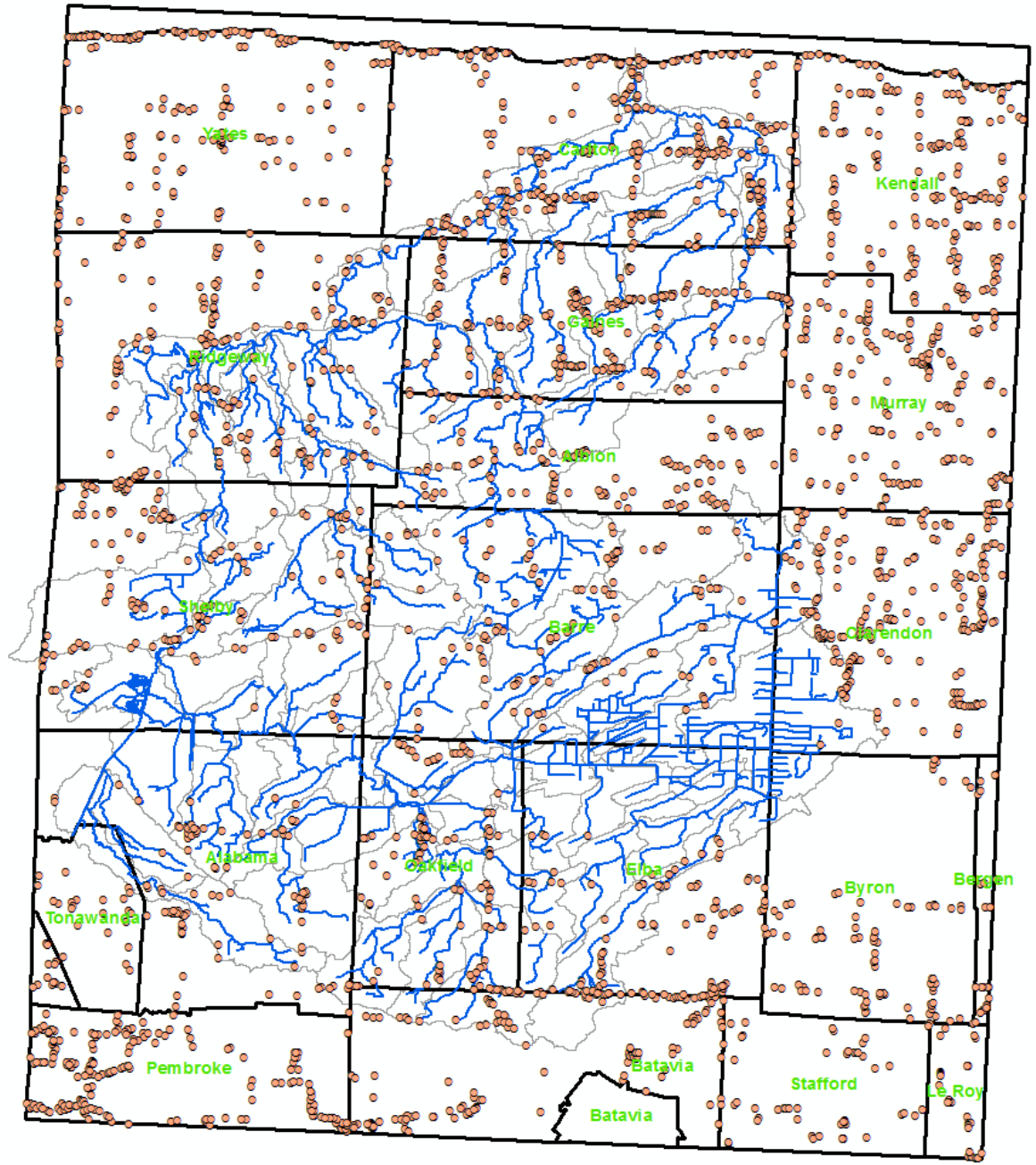
Township	Yates	Carlton	Kendall	Ridgeway	Gaines	Albion	Murray	Shelby	Barre	Clarendon
Septic fields mapped	71%	74%	75%	78%	66%	67%	76%	76%	73%	77%
Presence of trees	10%	8%	11%	11%	10%	2%	5%	9%	10%	7%
Others	6%	6%	4%	5%	15%	12%	10%	3%	0%	13%
Couldn't be spotted	12%	11%	11%	8%	10%	19%	10%	12%	17%	3%

Township	Alabama	Oakfield	Elba	Byron	Bergen	Pembroke	Batavia	Stafford	Leroy	Tonawanda
Septic fields mapped	78%	67%	75%	81%	75%	73%	72%	74%	73%	na
Presence of trees	3%	9%	3%	3%	0%	7%	9%	5%	9%	na
Others	16%	0%	16%	13%	0%	15%	9%	14%	9%	na
Couldn't be spotted	3%	24%	6%	3%	25%	5%	9%	7%	9%	na



Results: efficiency of the mapping

- 3075 mapped so far, 1154 in the watershed
- More than 70% of the septic fields spotted by the departments could be mapped
- 10% where trees were blocking the view
- Between 0-15% of the errors in the mapping appear to be due to inconsistencies in the Dept. of Health data.
- This method cannot identify septic systems that don’t have leach fields (i.e. Cess Pools).


Yates
Carlton
Kendall
Gaines
Ridgeway
Murray
Albion
Shelby
Barre
Clarendon
Alabama
Oakfield
Elba
Byron
Bergen
Tonawanda
Pembroke
Batavia
Batavia
Stafford
Le Roy

Conclusions

- The approach appears to be practical for mapping septic fields.
- Spatial information on these features are essential if we want to start addressing the role that septic fields have on our streams and waterbodies
- Septic flux calculations based on demographics could be greatly improved if we incorporate distance to streams, gradients, and account for spatial heterogeneities of septic fields.
- We can’t really regulate them or even start to consider addressing the messy politics about them if we don’t know where they are.