DIGITAL MAPPING TECHNIQUES 2014

The following was presented at DMT'14
(June 1-4, 2014 - Delaware Geological Survey,
Newark, DE)

The contents of this document are provisional

See Presentations and Proceedings
from the DMT Meetings (1997-2014)

http://ngmdb.usgs.gov/info/dmt/

Ohio Karst

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Outline

- What is karst
- Methods
- Field + Photos

What is Karst

- Forms by dissolution of
  - Carbonates (limestone or dolomite)
  - Evaporites (gypsum or salt)

Columbus Ls.

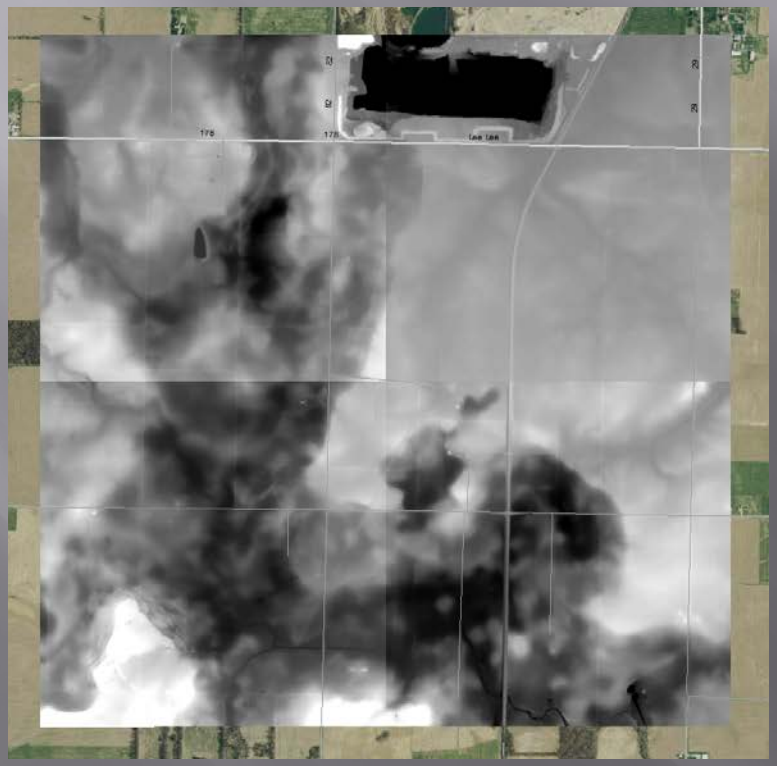
- Characterized by:
  - Sinkholes
  - Disappearing streams
  - Caves
  - Springs

Methods

- LiDAR (Light Distance And Ranging)
  - 2006 @ 0.5ft vertical accuracy (OSIP)
  - DEM mosaicing
  - ‘Fill Sinks’
  - Create grid code
- Imagery
  - 2012 and older @ 6in per-pixel OSIP II.

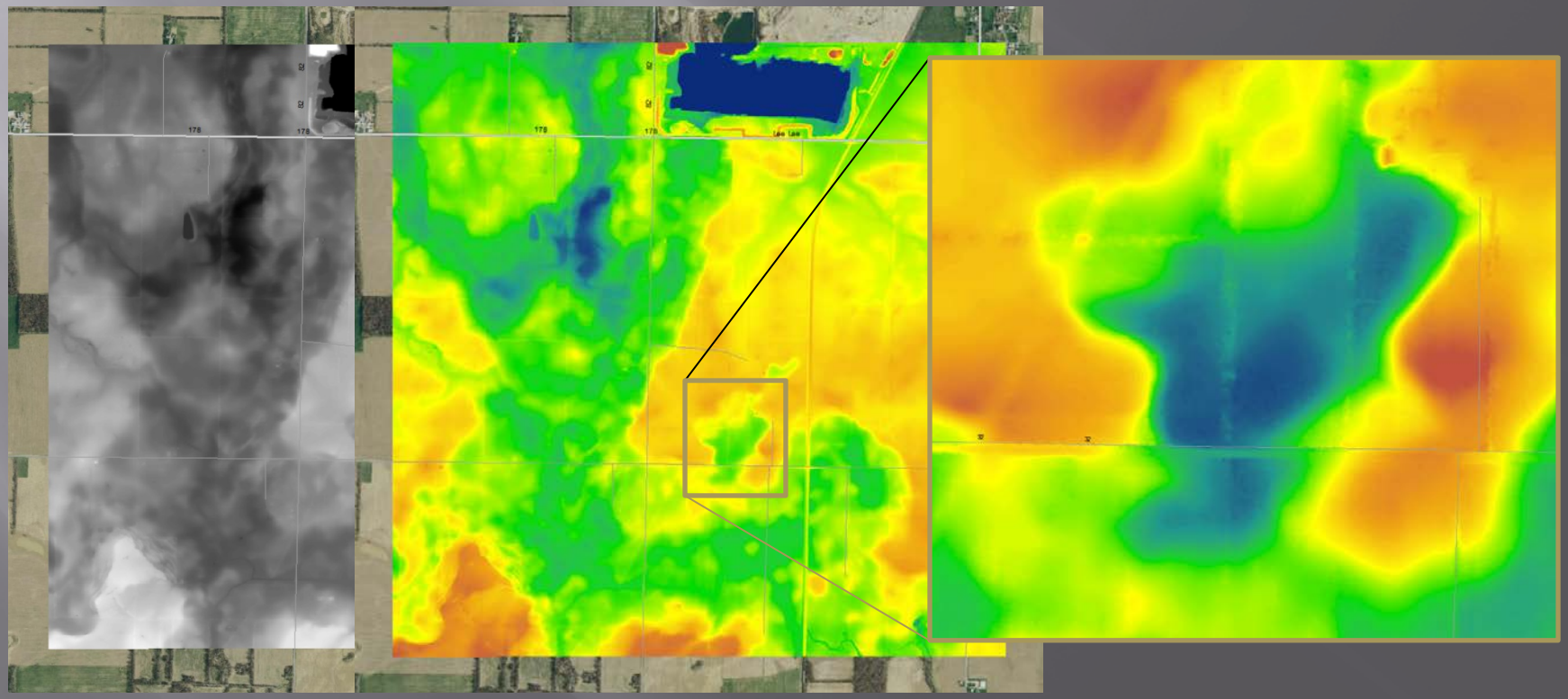
Mosaic

- Clip the LiDAR to the project extent.
- Mosaic to new raster (in parts) 16bit+-, 1band.



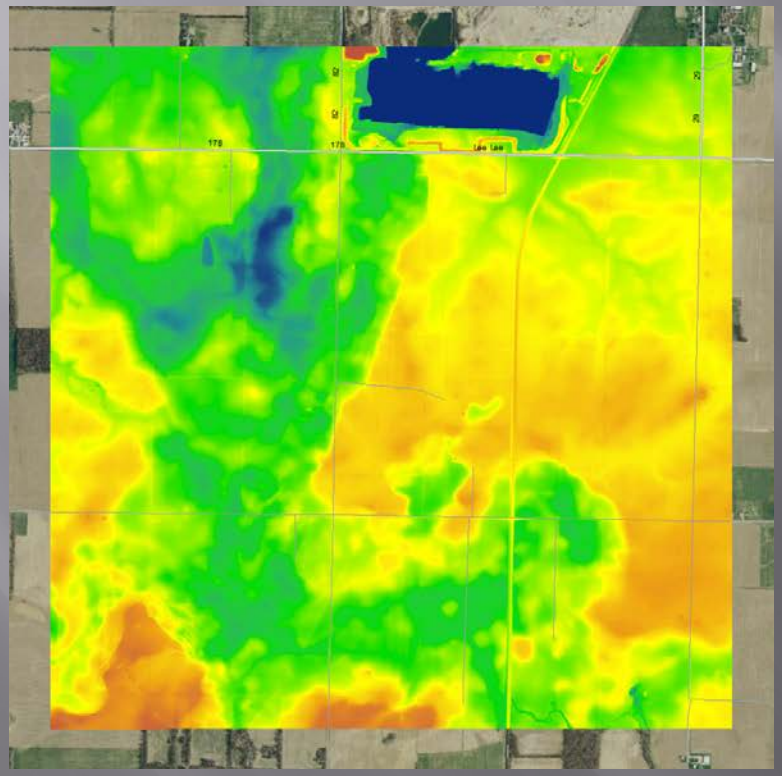
Loss of Contrast (If Using DEM)

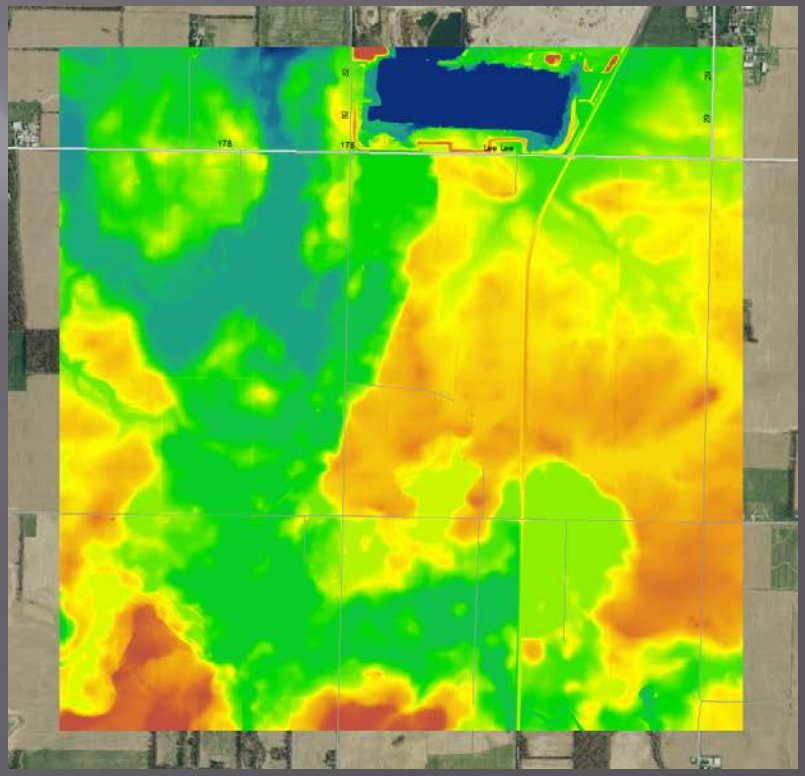
- Symbology -> Stretched -> Statistics -> From Current Display Extent.
- Shows full ramp when zoomed in.



Fill (Spatial Analyst)

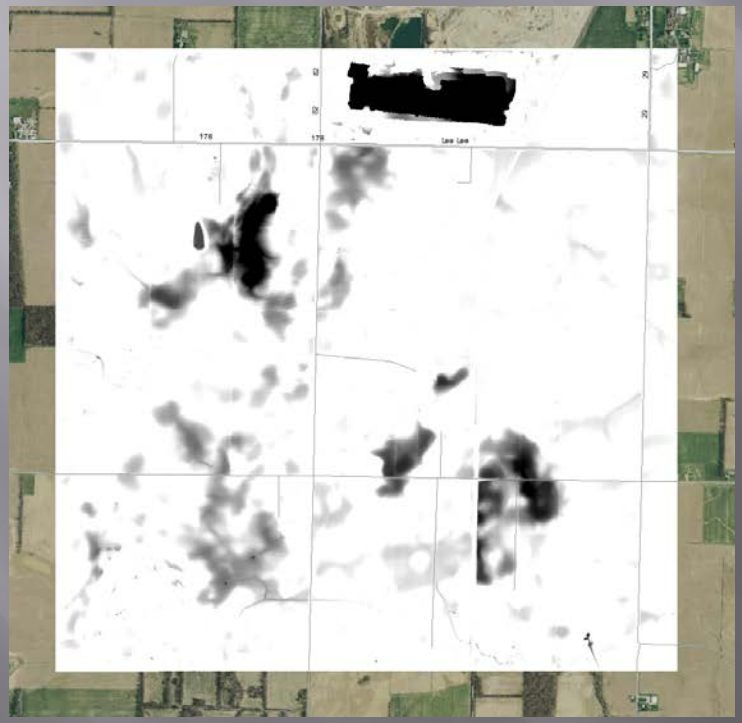
- Removes low enclosed areas.

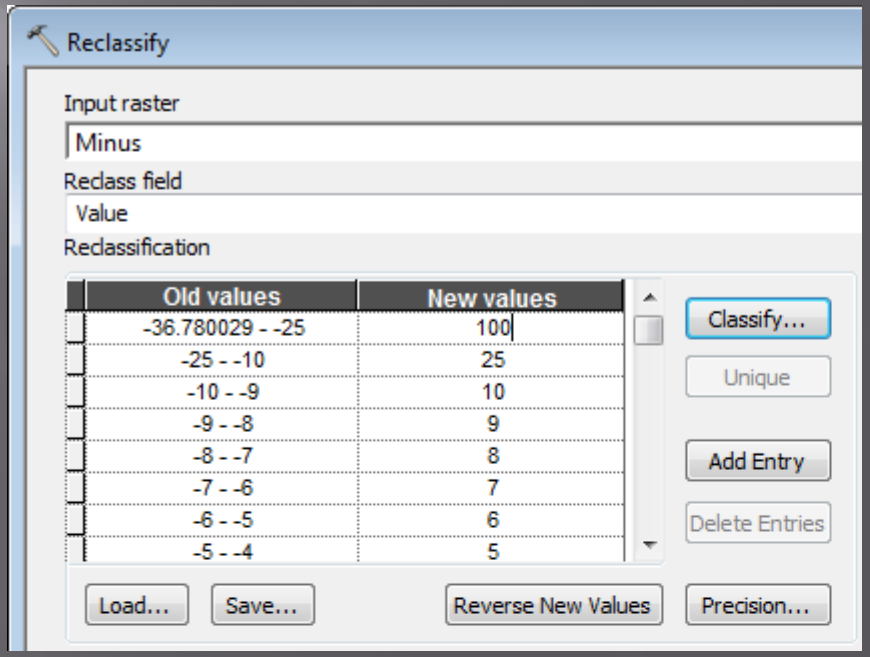




Minus (Spatial Analyst)

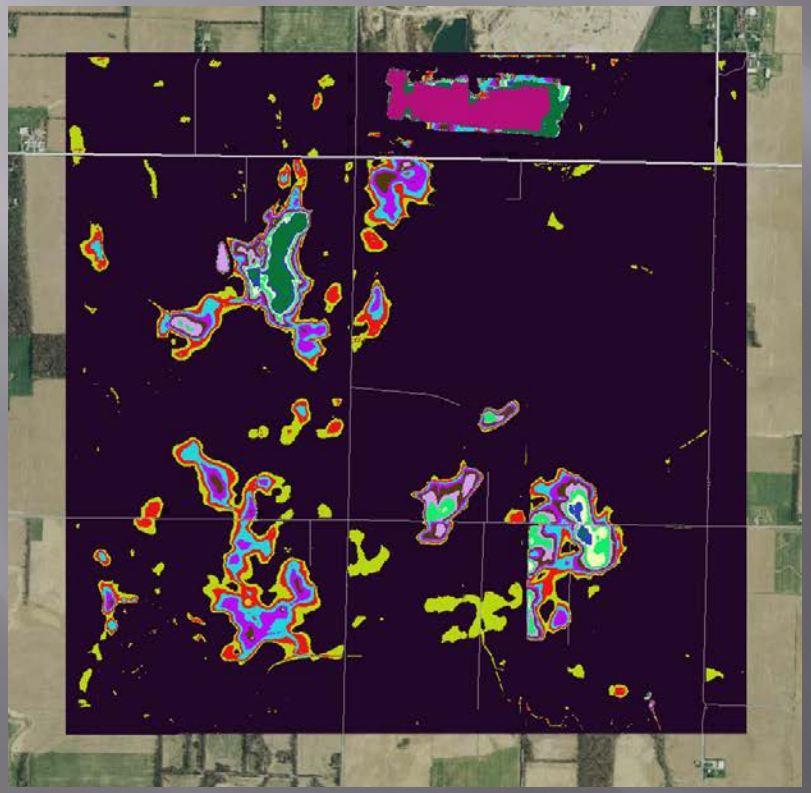
- Subtract the filled from the unfilled (ID lows).
- Reclassify (spatial analyst) using a gridcode.

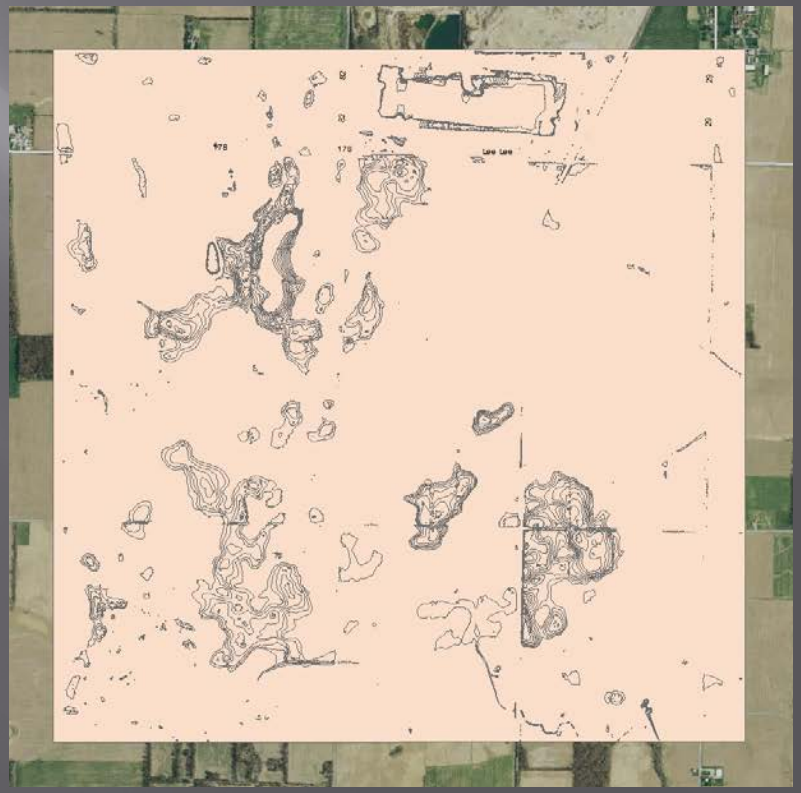




Convert

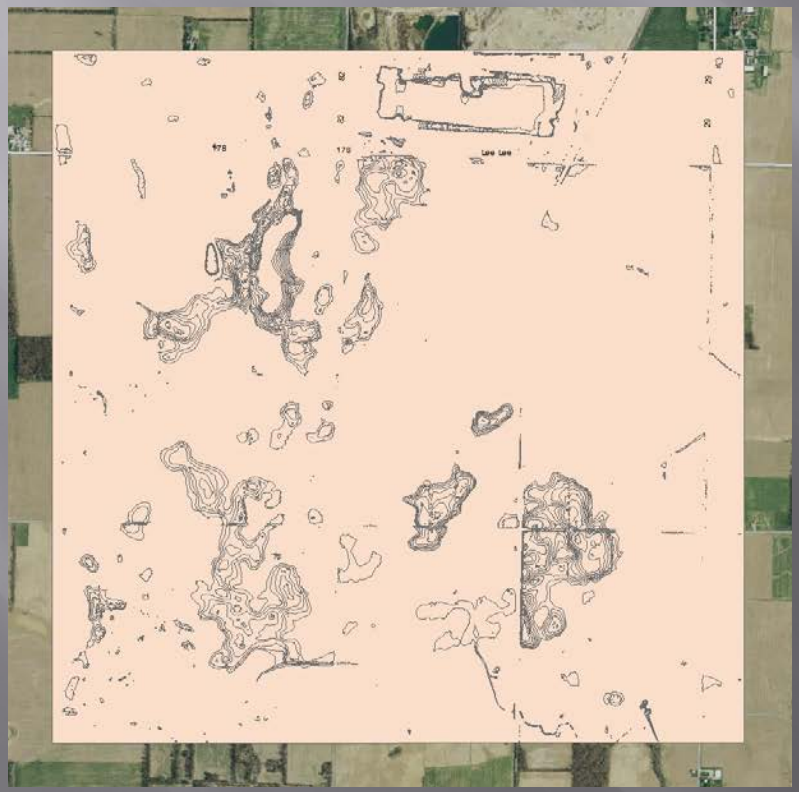
- Convert .grid to .shp to allow editing (raster to polygon).

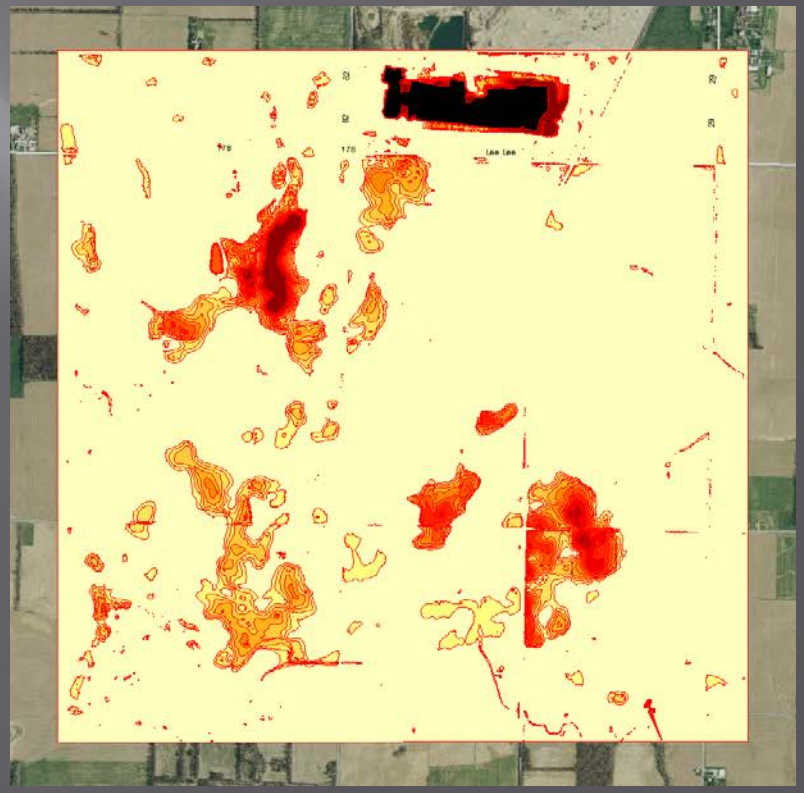




Color

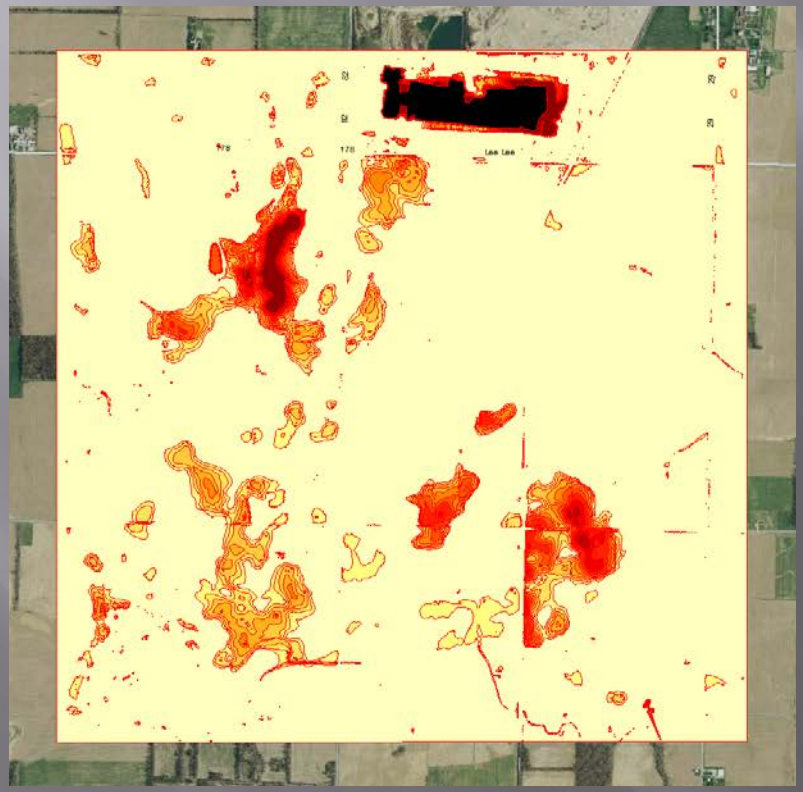
- Assign a custom color ramp to gridcode.

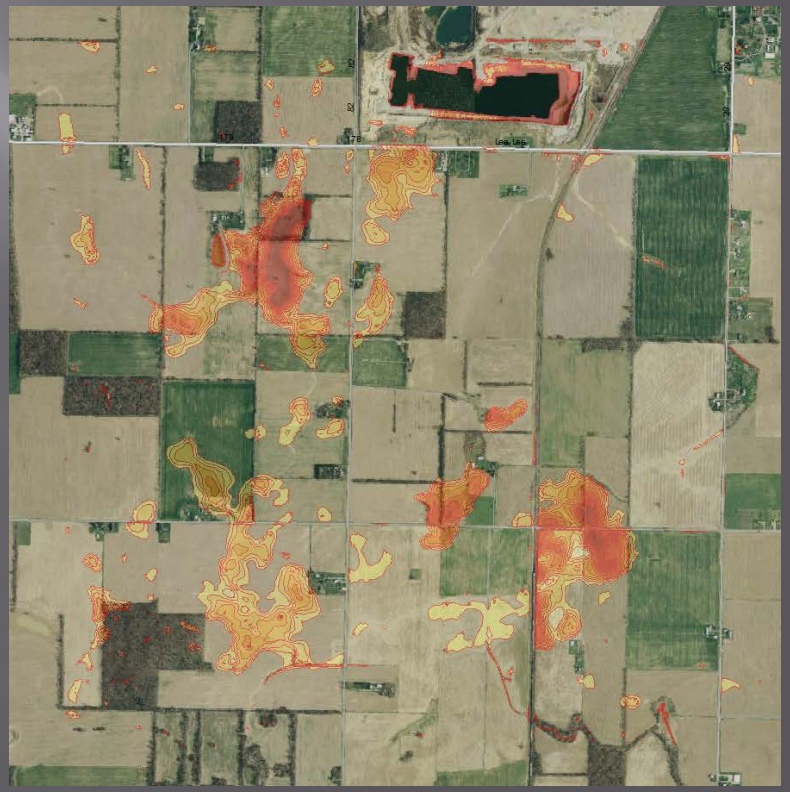




Cleaning Up

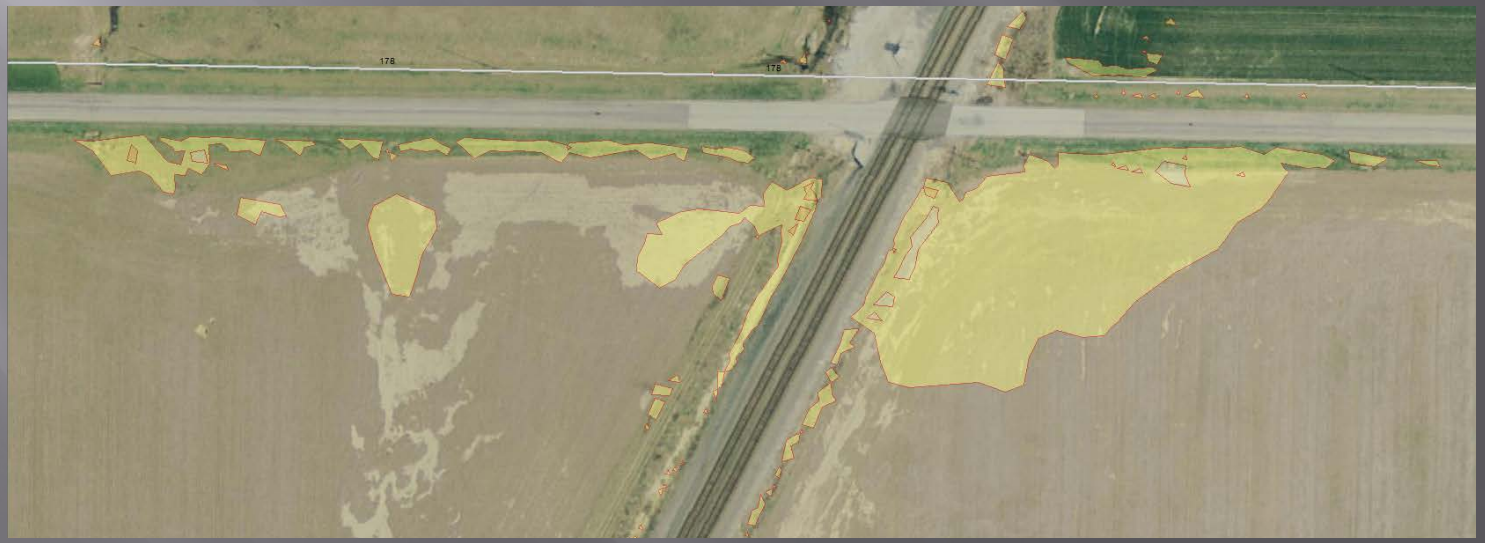
- Begin Removing Polygons (especially 1ft)
- Adjust transparency (60%)





Small Polygons

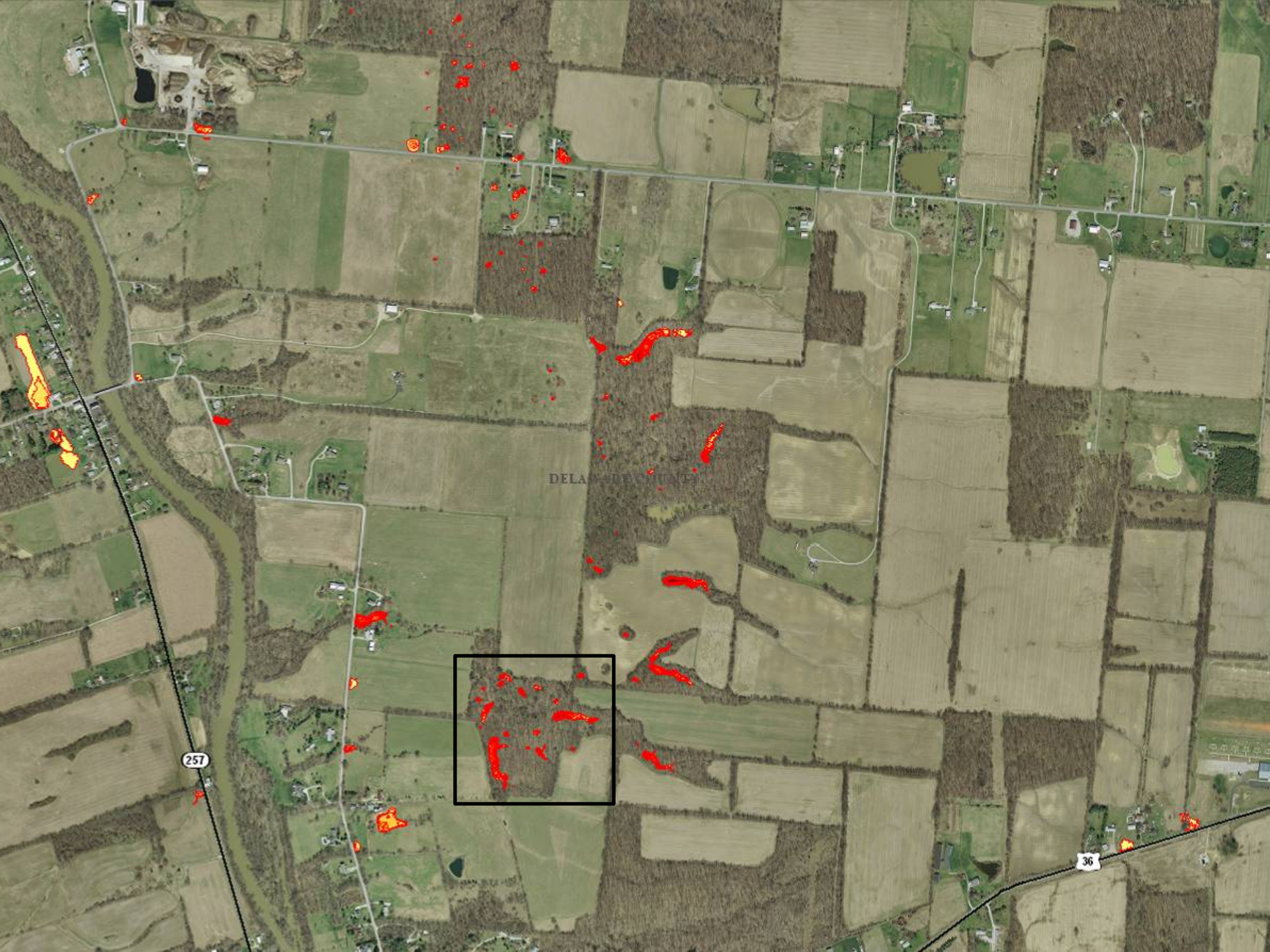
- Features such as ground roughness, ditches, and waves on bodies of water contribute hundreds of thousands of tiny polygons.
- How to delete these isolated pocks without affecting the larger groups of polygons?



‘Automated’ removal

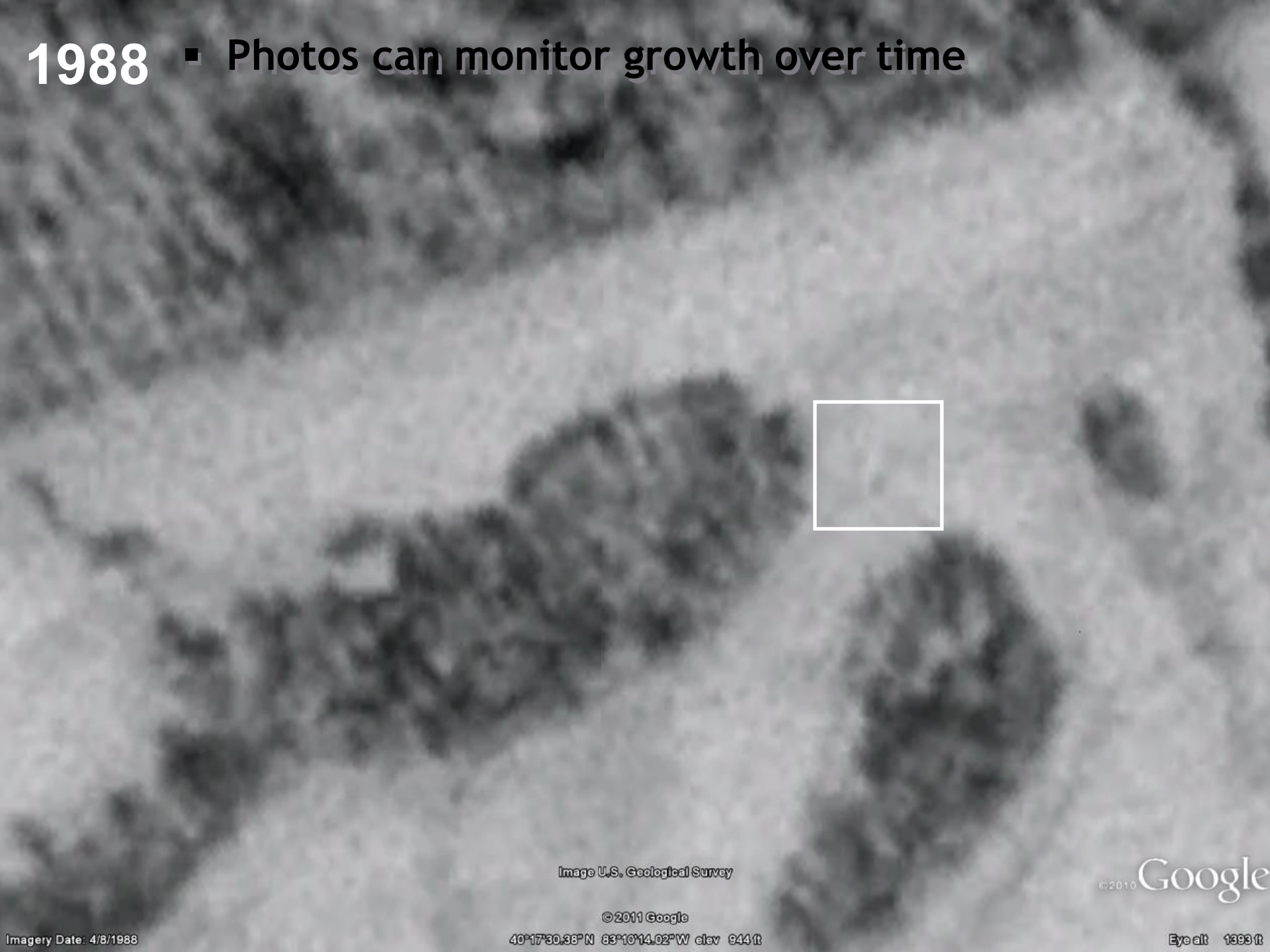
- Select polys smaller than area 6.25 (res. is 2.5^2).
- Export small polys to a file and delete from main set (after backup). Save.
- Start editing small polys.
- ‘Select by location’ small polys set that intersects the main set (sans small polys).
- Switch selection, delete selection, save.
- Right click main feature class -> load -> load data (choose small polys feature class).
- Consider deleting Grid code 1 polys this way.

257
36


257
36

1988

- Photos can monitor growth over time



2006

- Photos can monitor growth over time

2007
DELAWARE COUNTY
103

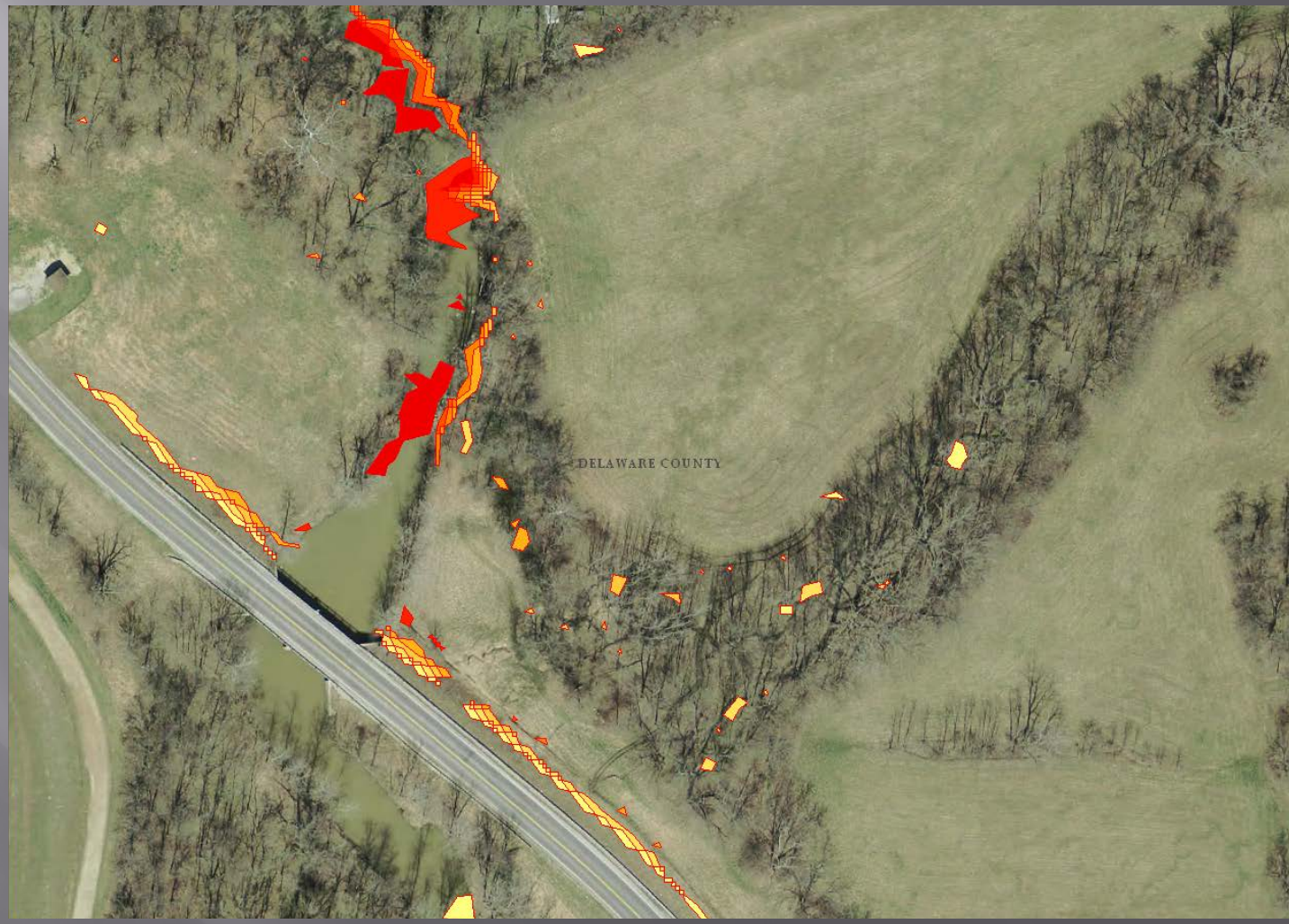
2008
DELAWARE COUNTY
103

2010
DELAWARE COUNTY
103

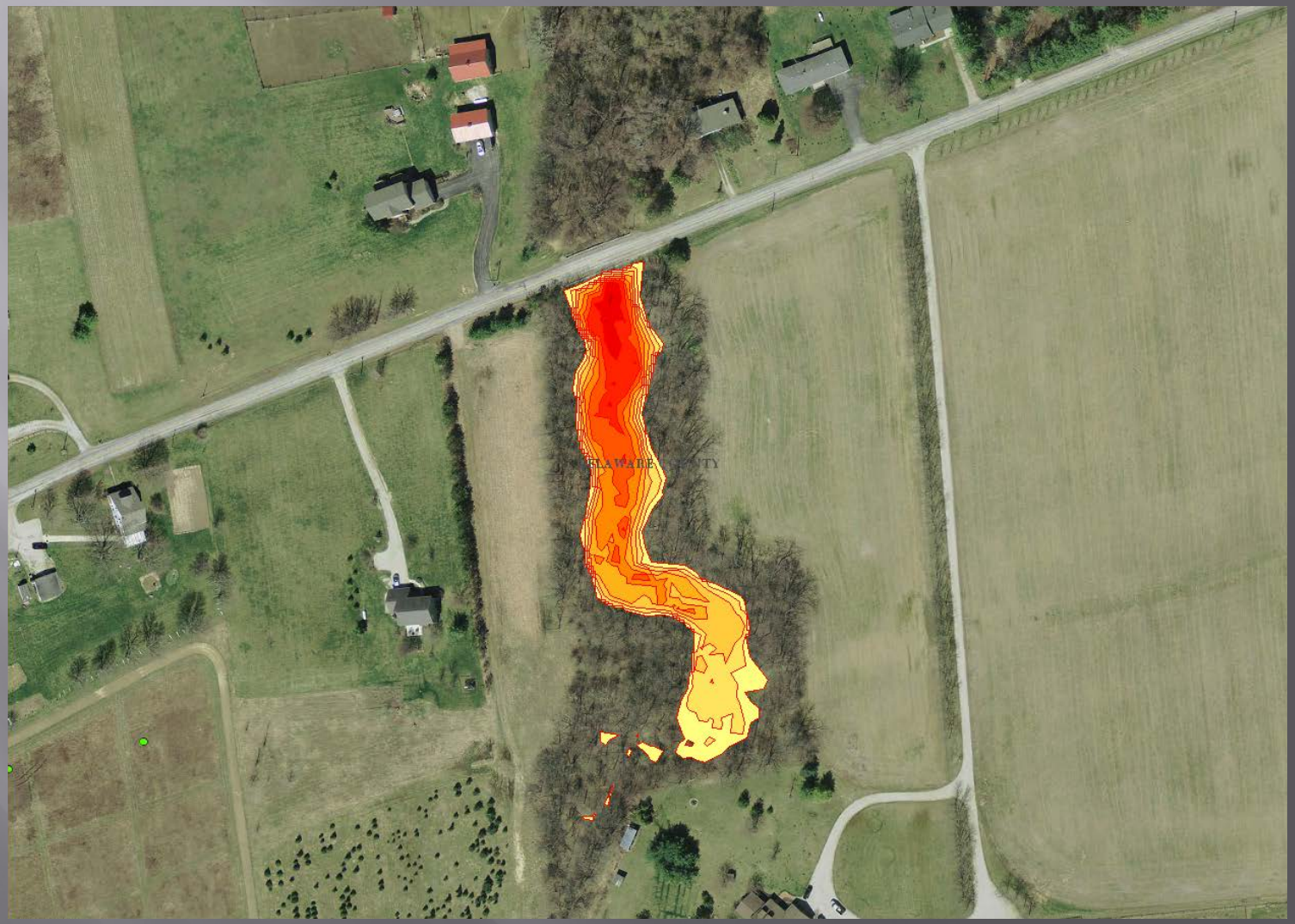
Mid.
2011

Field Verification

- Stream bank/ water reflections
- Culverts/ bridges
- Storm drains
- Foundations

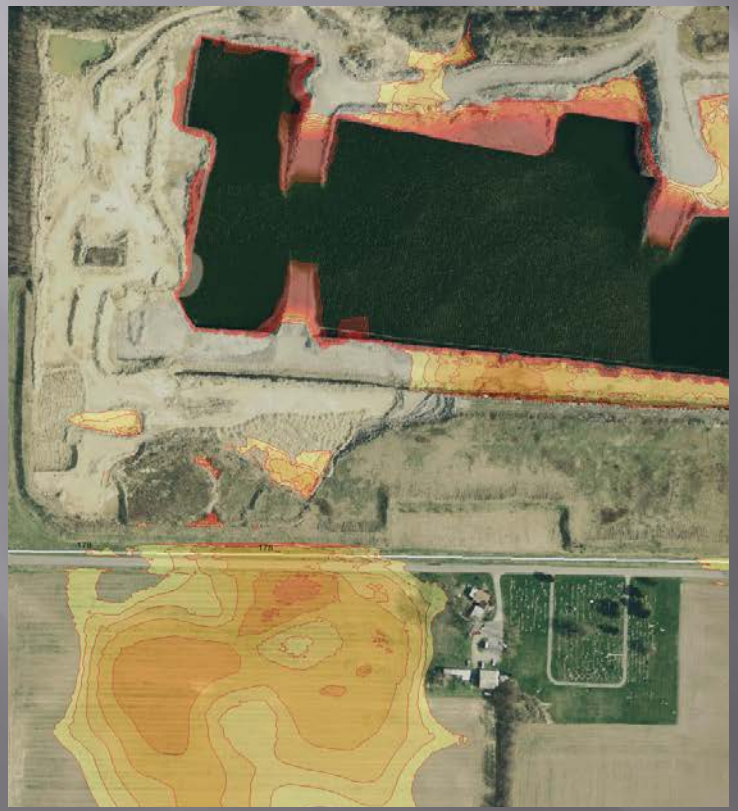


Bridge interrupts LiDAR



Non Karst Lows

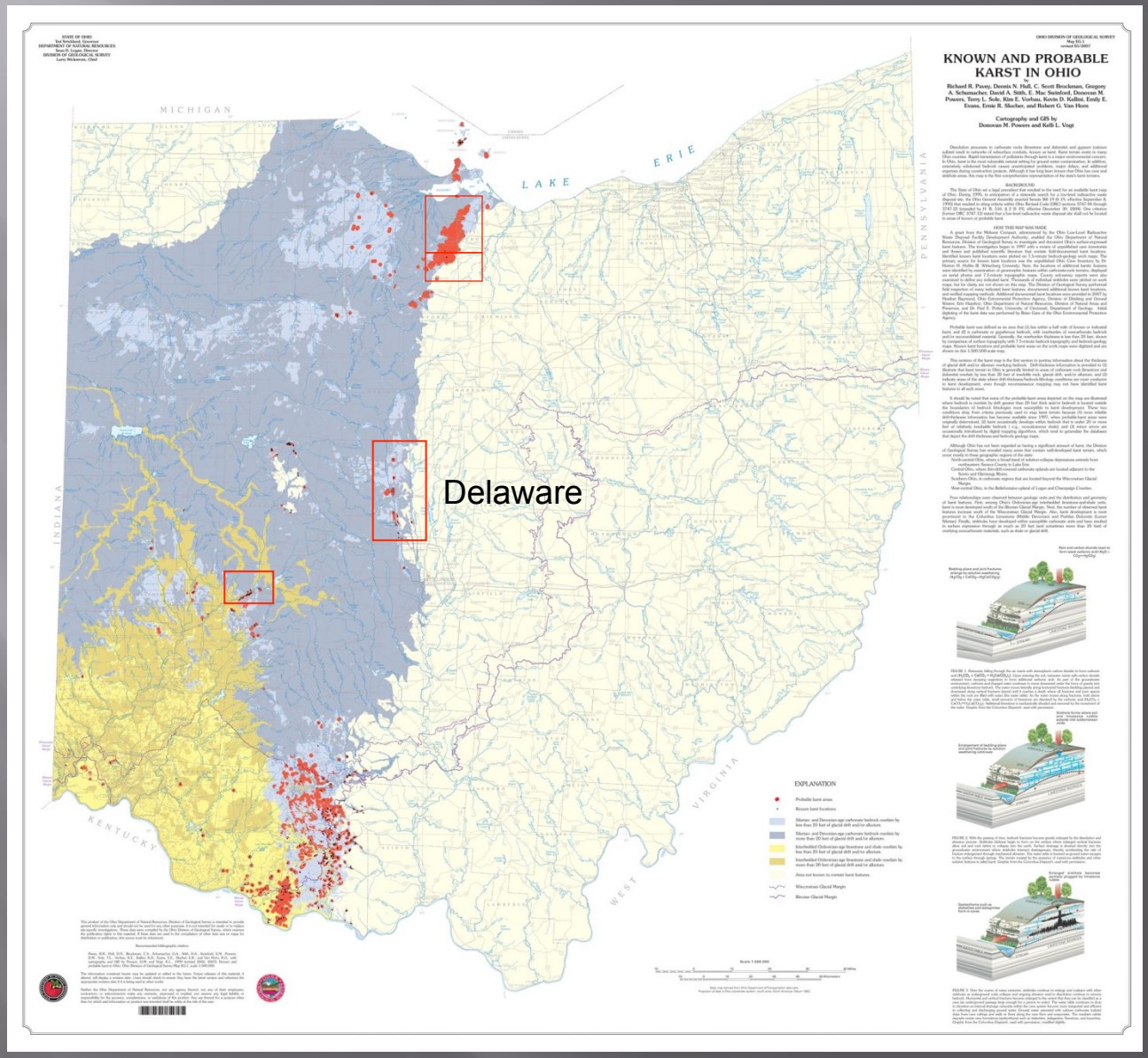
- Quarries and stream channels.



Failing drain tile

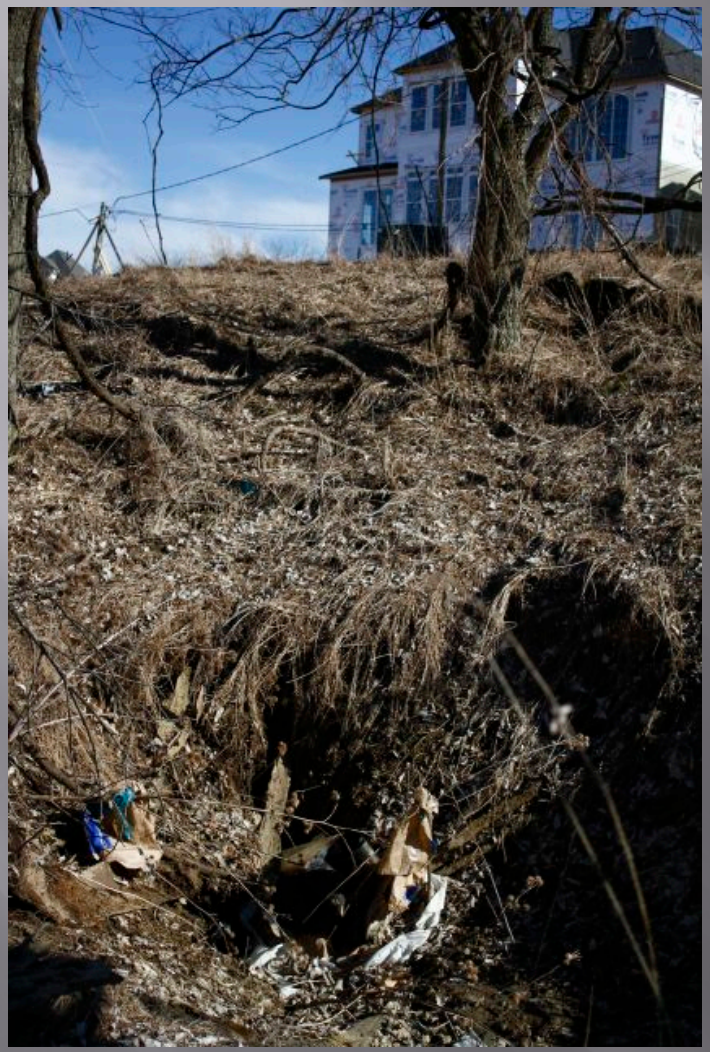
Known and Probable Karst in Ohio EG-1

revised 5-2007



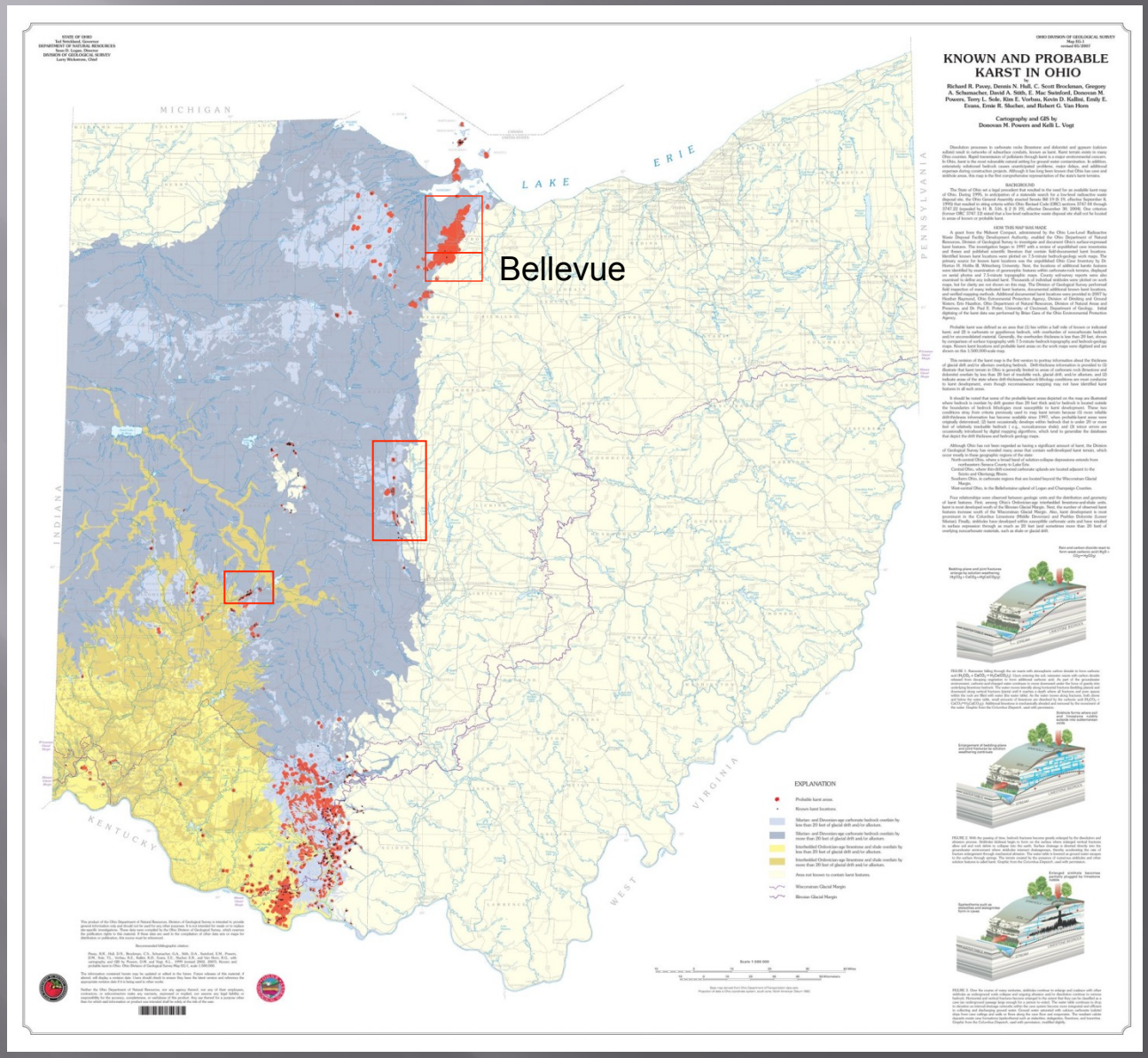
Sink mapped in 2011

Sink revisited in 2014



Known and Probable Karst in Ohio EG-1

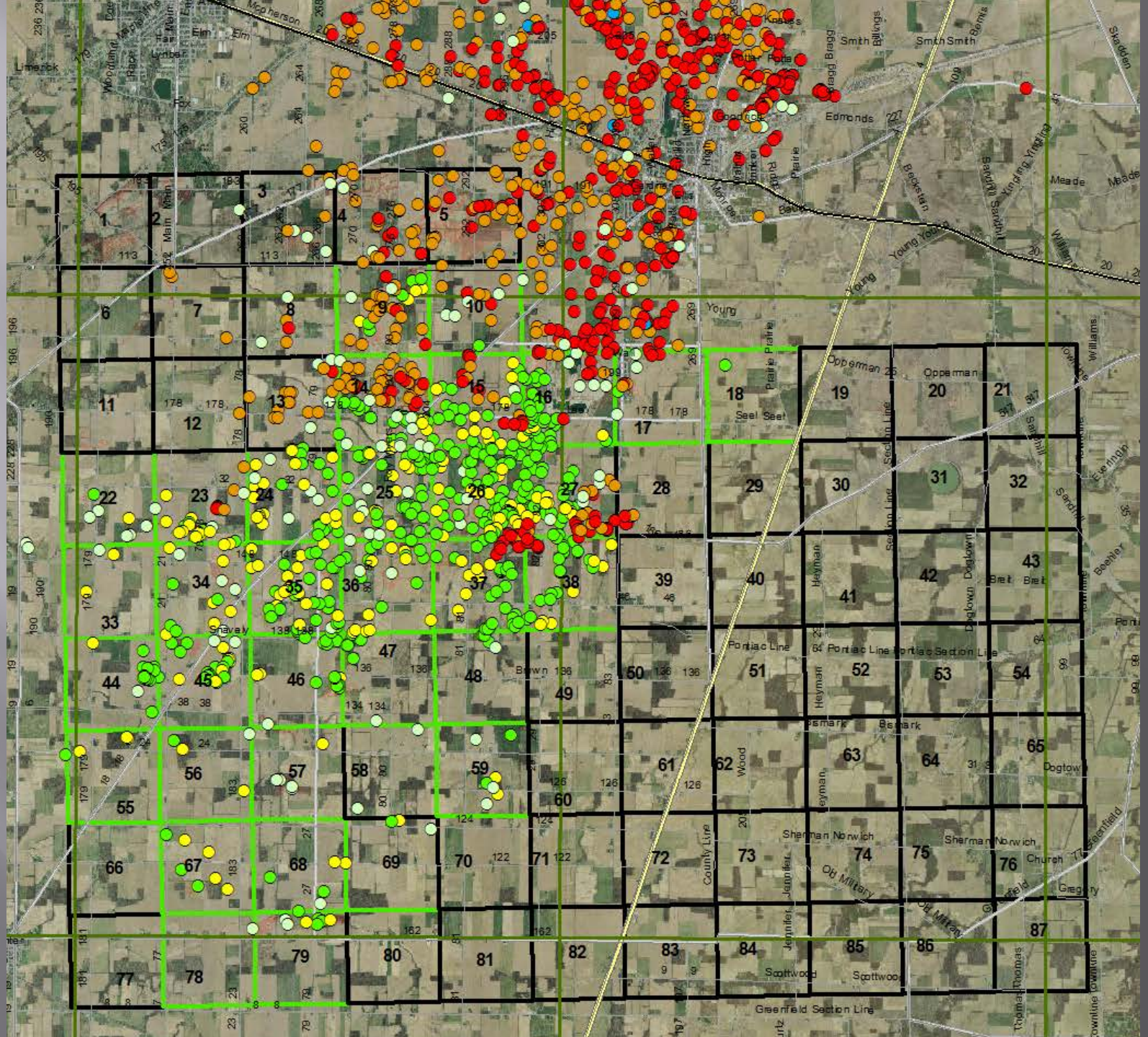
revised 5-2007



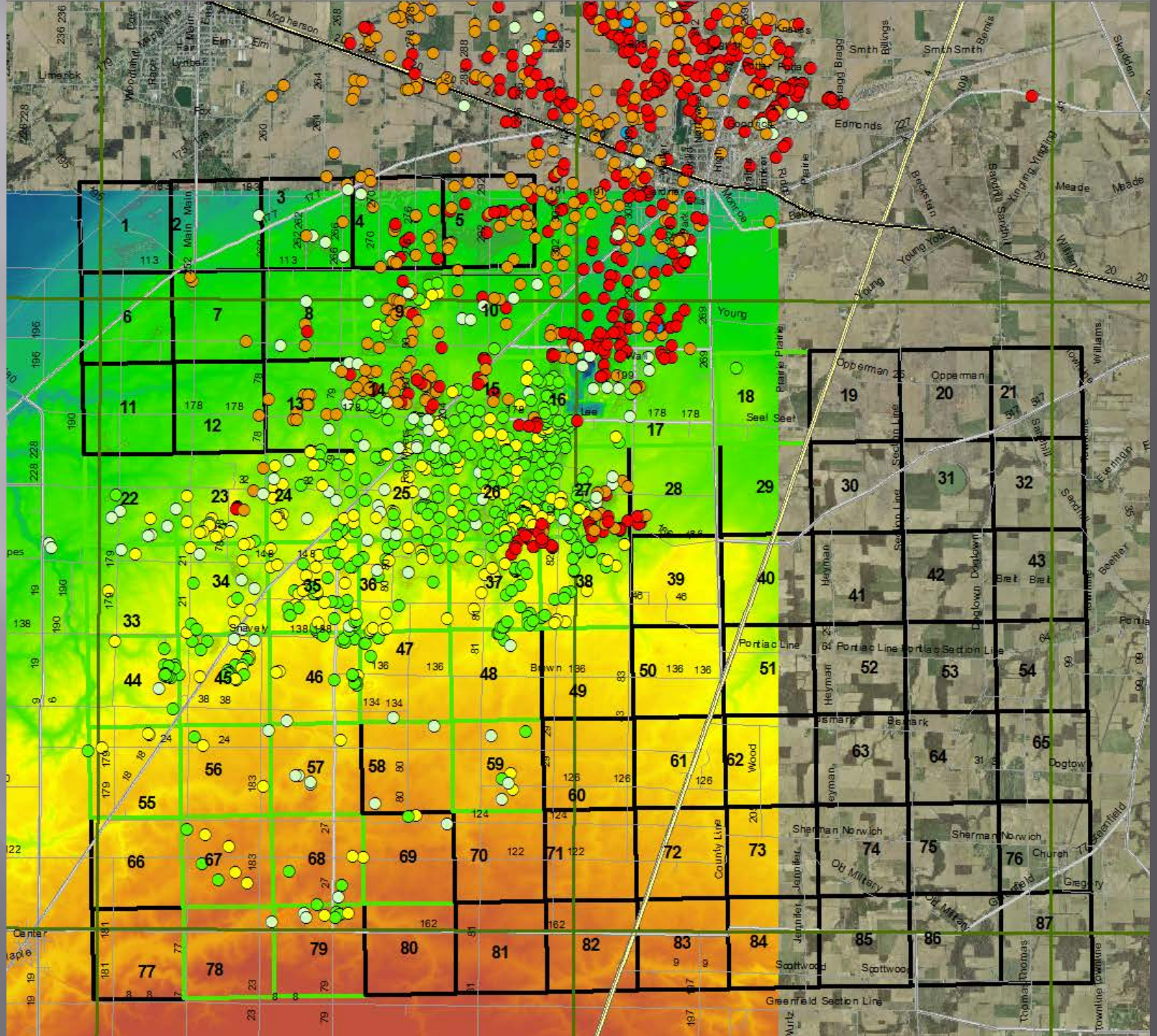
Urban development

Infrastructure

Groundwater contamination



Limerick
Elm
Lynbar
Fox
Smith
Smith Smith
Edmonds
Meade
Young
Opperman
Seel
Pontiac Line
Pontiac Section Line
Bismark
Sherman Norwich
Church
Gregory
Scottwood
Greenfield Section Line
Snavely
Brown
Heyman
Doglown
Breit
Wood
County Line
Jennifer
Old Military
Thomas
Williams
Sandhill
Beckstein
Sandhill Sandhill
Yingling Yingling
Skadden
Bemis
Bragg Bragg
Prairie
Prairie Prairie
Section Line
Townline
Everingin
Boehler
Greenfield



Smith
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Edmonds
Meade
Young
Opperman
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Pontiac Line
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Bismark
Sherman Norwich
Sherman Norwich
Church
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Snavely
Lee
Main
Elm
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Limerick
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Heyman
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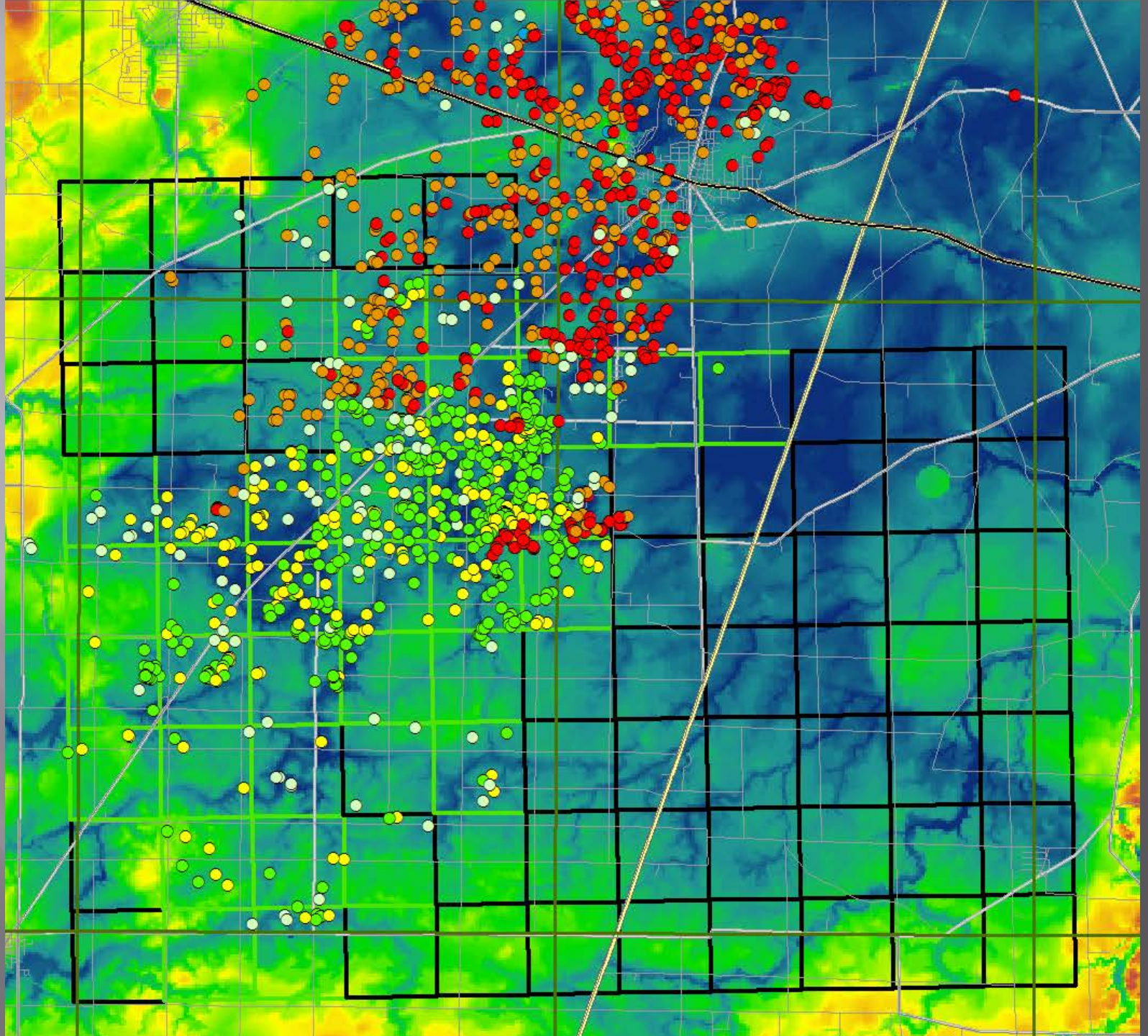
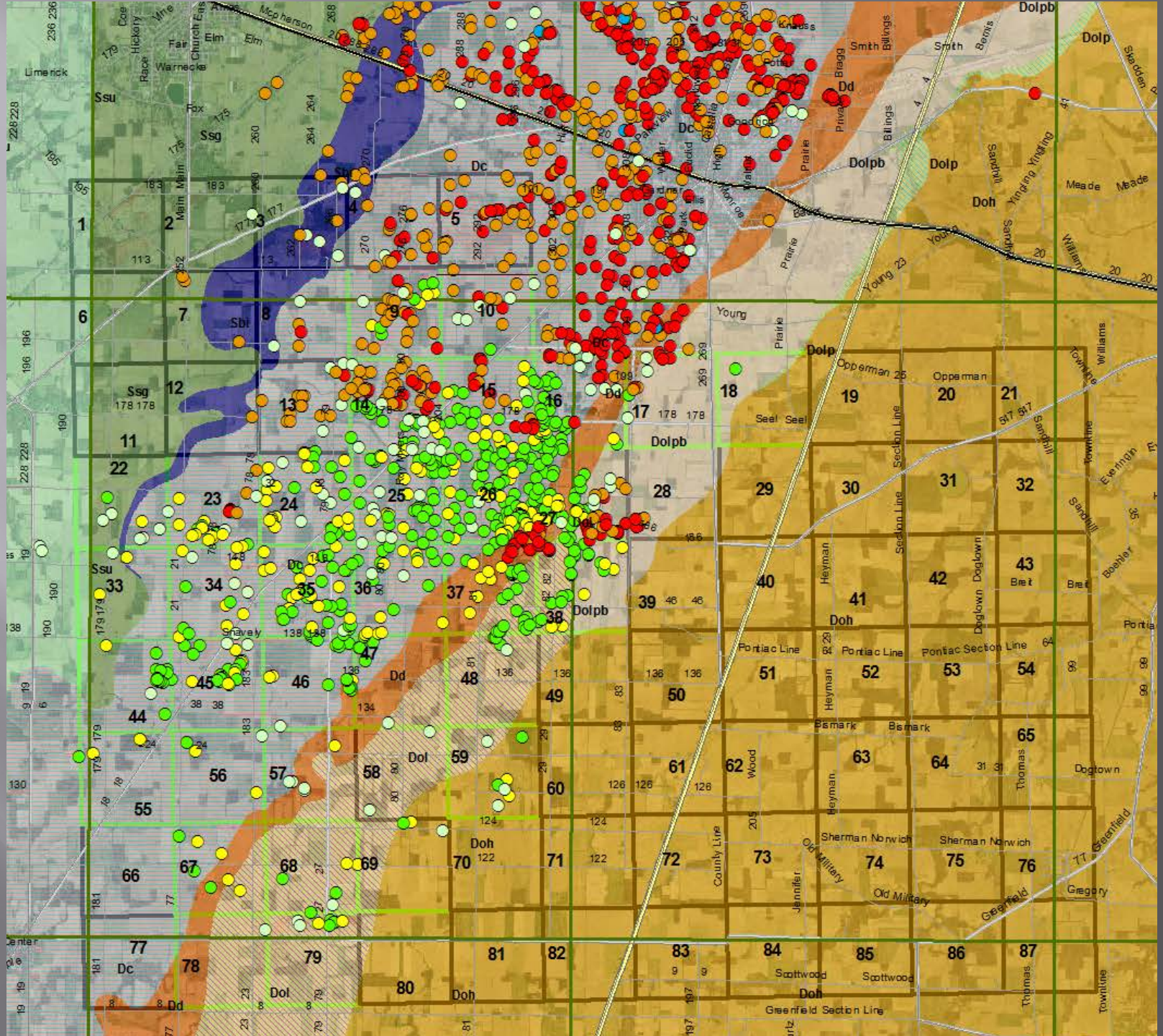
Dogtown
Gregory
Jennifer
County Line
Wood
Williams
Thomas
Townline
Beckstein
Sandhill
Young Young
Prairie
Section Line
Wurtz




Limerick
Warnecke
Fox
Ssg
Ssu
Sbi
Dc
Dd
Dolpb
Dolp
Doh
Dol
Young
Prairie
Section Line
Pontiac Line
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Sherman Norwich
Scottwood
Greenfield Section Line
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Boehler
Townline
Evernigh
Smith
Billings
Bragg
Bernis
Skedden
Knauss
Yingling
Main
Elm
Church
Hickory
Race
Cole
Mine
Mcpherson
Arnold
Fair
Private
Parkview
Water
Field
High
Monroe
Walnut
Prairie
Sandhill
Meade
Williams
Young 23
Opperman 25
Pontiac Line
Section Line
Heyman
Dogtown
Bismark
Sherman Norwich
Old Military
Greenfield
Scottwood
Thomas
Townline
Gregory
Jennifer
County Line
Wood
Dogtown
Evernigh
Skedden
Boehler
Brei
Seel
Shively
Warnecke
Limerick

Sinkholes
in Area

Drainage and erosion

Diagonal sink

Sink from field

Trash filled

Trash in sink throat

Deer bones

Clean sink

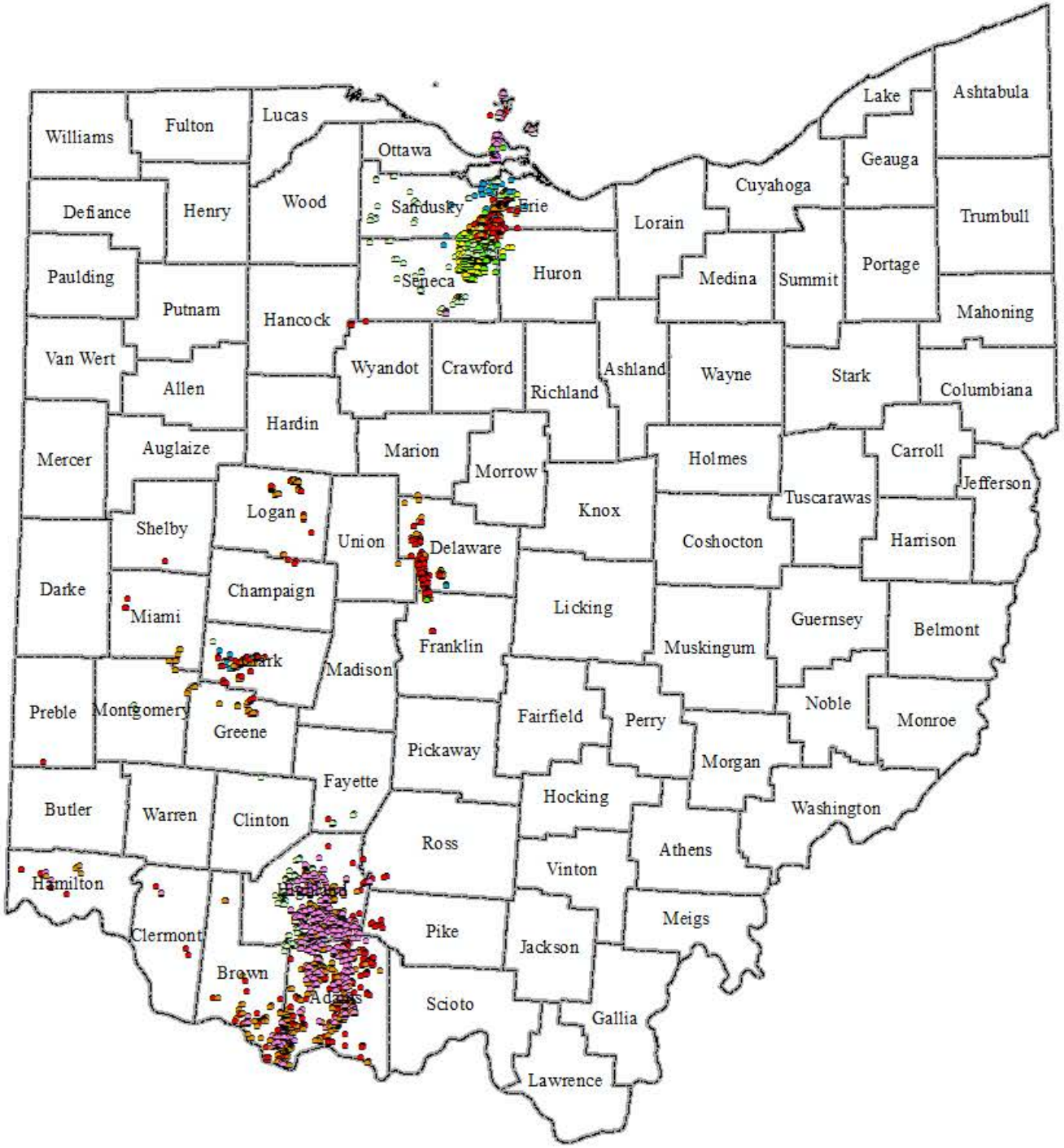
Diagonal Sink

- Large recent collapse near a house.
- Many sinks in this field.

Bellevue South statistics

- 937 total points of interest (502 left to check)
- 159 Confirmed sinkholes
- 180 Suspect visited points
- 96 Suspect Not Visited (poor LiDAR/aerial)
- 412 photos

- Many rock or concrete filled sinks
- Many stand pipes (more than elsewhere)
- Some trash filled (less than other areas)


Williams
Fulton
Lucas
Ottawa
Lake
Ashtabula
Geauga
Cuyahoga
Defiance
Henry
Wood
Sandusky
Erie
Lorain
Trumbull
Paulding
Putnam
Hancock
Seneca
Huron
Medina
Summit
Portage
Mahoning
Van Wert
Allen
Wyandot
Crawford
Richland
Ashland
Wayne
Stark
Columbiana
Mercer
Auglaize
Hardin
Marion
Morrow
Holmes
Carroll
Jefferson
Shelby
Logan
Union
Delaware
Knox
Tuscarawas
Harrison
Darke
Miami
Champaign
Clark
Madison
Franklin
Licking
Coshocton
Guernsey
Belmont
Preble
Montgomery
Greene
Pickaway
Fairfield
Perry
Muskingum
Noble
Monroe
Butler
Warren
Clinton
Fayette
Ross
Hocking
Morgan
Washington
Hamilton
Clermont
Brown
Adams
Pike
Vinton
Athens
Meigs
Jackson
Scioto
Gallia
Lawrence