

Geospatial Collaboration Open Source Tools Great Lakes Basin

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SharedGeo



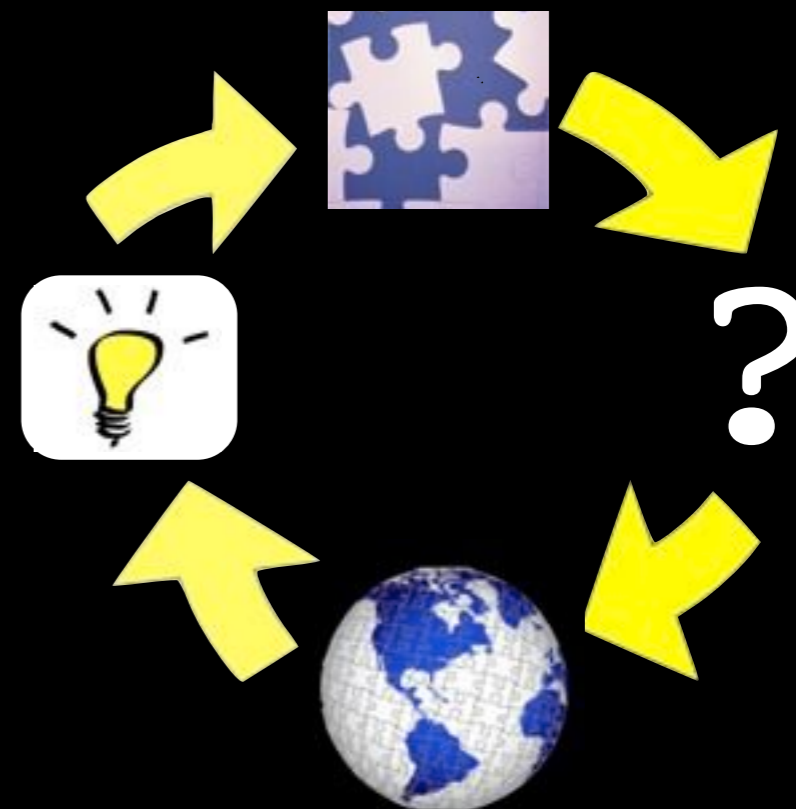
SharedGeo

About SharedGeo

- 501(c)(3) Non Profit
- Facilitate sharing and use of geospatial data
- Focus on Open Source Development
- Goal is to support the common good



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SharedGeo

Innovative delivery of CAP imagery





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National leader in U.S. National Grid products that support the Emergency Services Sector





SharedGeo

Innovative delivery of CAP imagery



National leader in U.S. National Grid products that support the Emergency Services Sector



Specializes in Open Source mapping and web services solutions.



Great Lakes Restoration Initiative (GLRI)



SharedGeo



Michigan Tech



- Clean up toxic substances
- Combat invasive species
- Restore wetlands and shore habitats

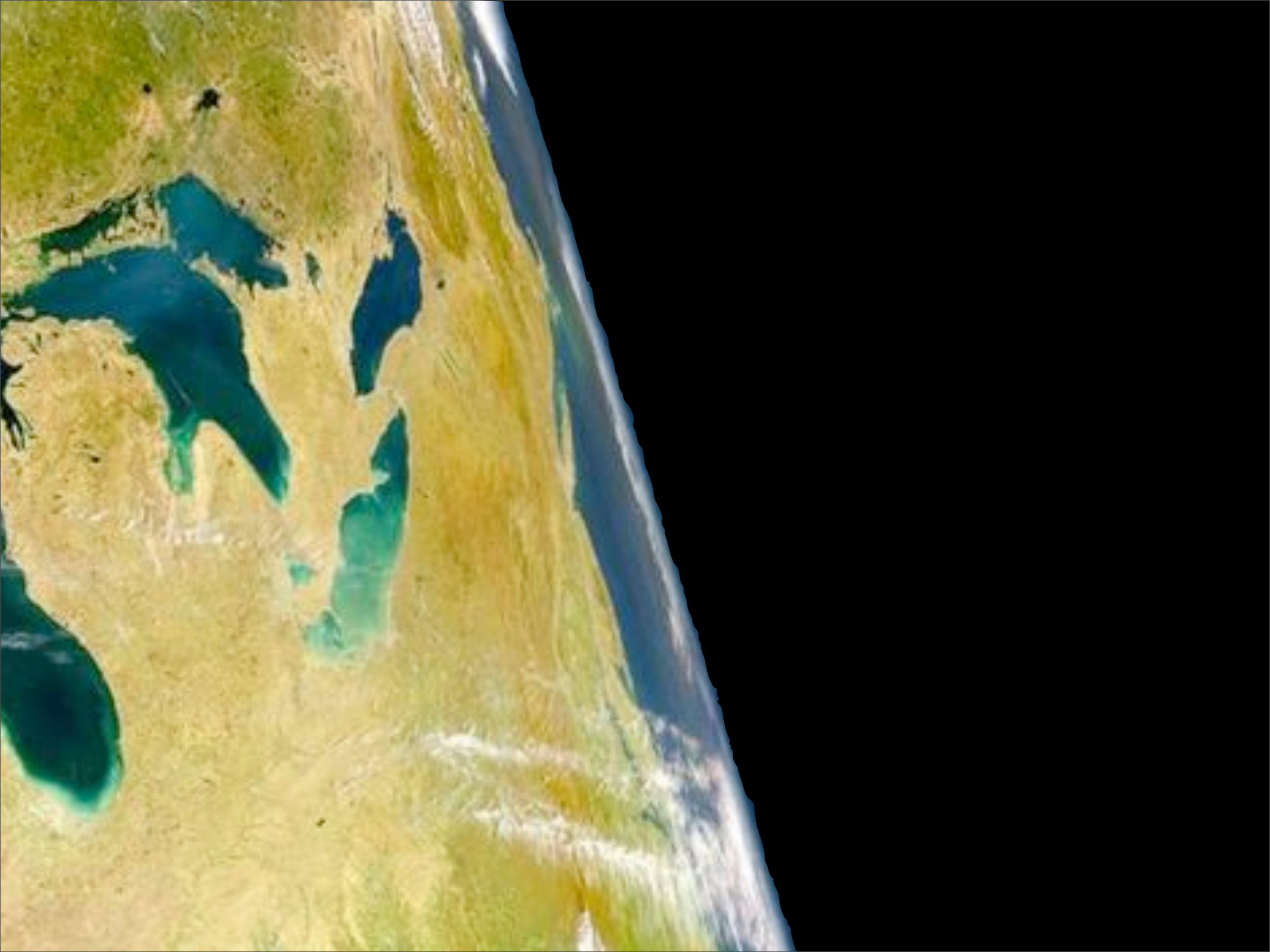
Great Lakes Restoration Initiative (GLRI)



- Clean up toxic substances
- Combat invasive species
- Restore wetlands and shore habitats







- 2 countries



- 2 countries
- 8 states



- 2 countries
- 8 states
- 1 province





- 2 countries
- 8 states
- 1 province
- Several regional organizations



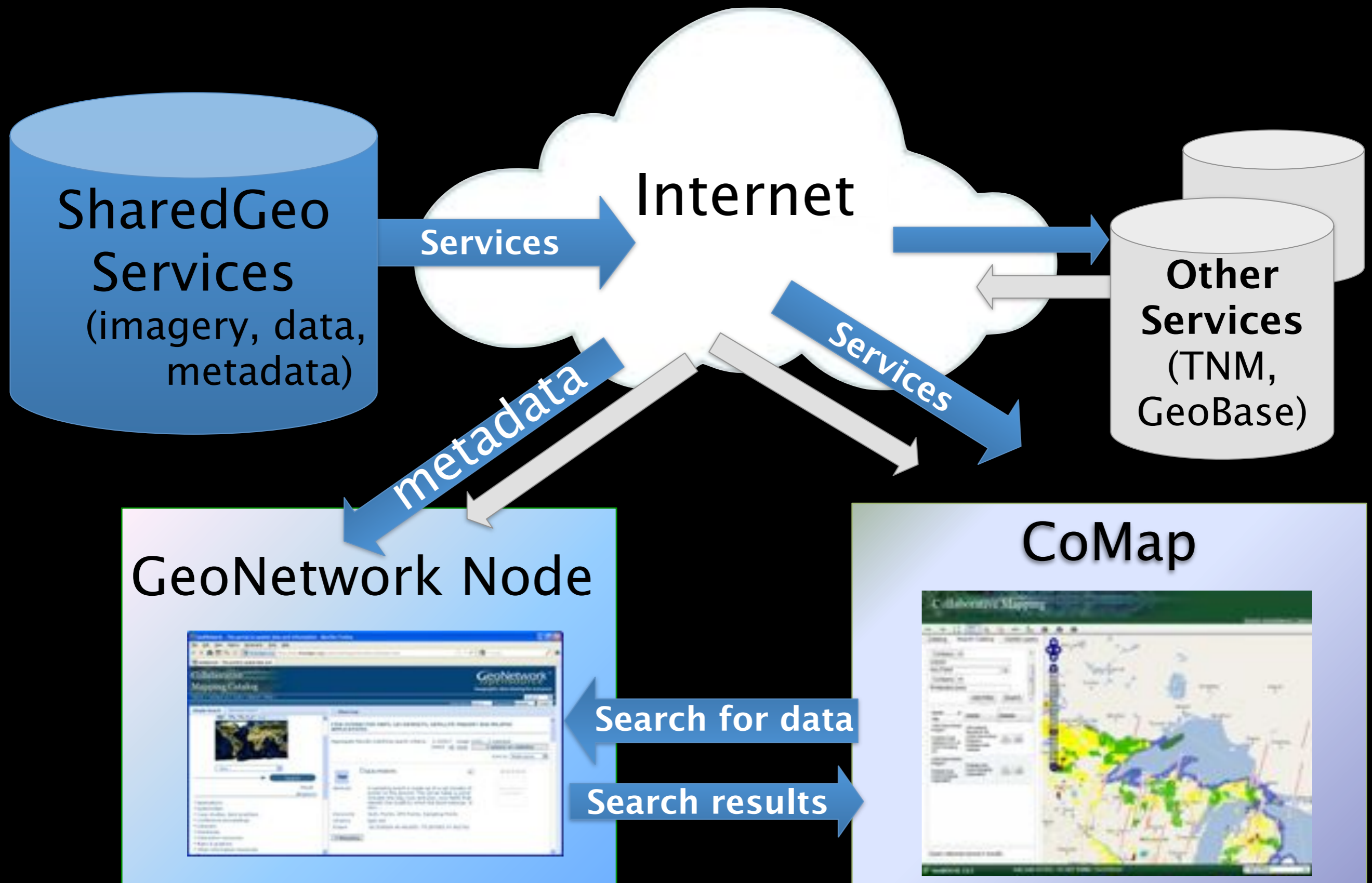
- 2 countries
- 8 states
- 1 province
- Several regional organizations
- Lots of counties, watershed districts, cities

GLRI - SharedGeo's Tasks

- Relate these data to available spatial data across the region
- Create a viewer in which to browse and evaluate data
- Make current and historical imagery and remotely sensed data available for download and use in map services

Project parts

- Map Viewer (CoMap)
- Data Catalog (GeoNetwork)
- Imagery (Imagery Services)



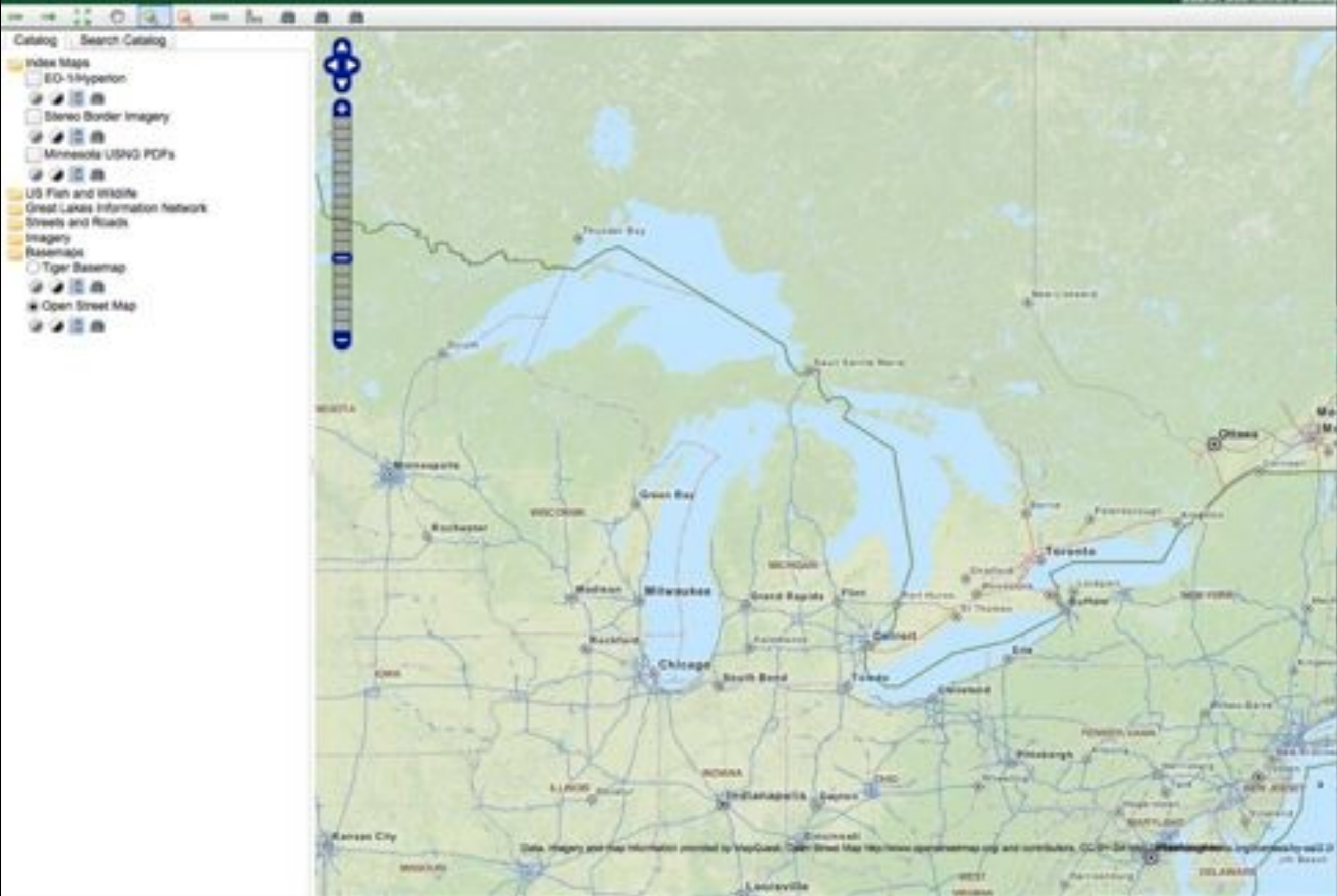
Collaborative Mapping (CoMap)

- Web map integration tool built with GeoMoose
- Data catalog tool built in to search for data sources
- Web map services (WMS) can be added to the map
- Transparent reference map built



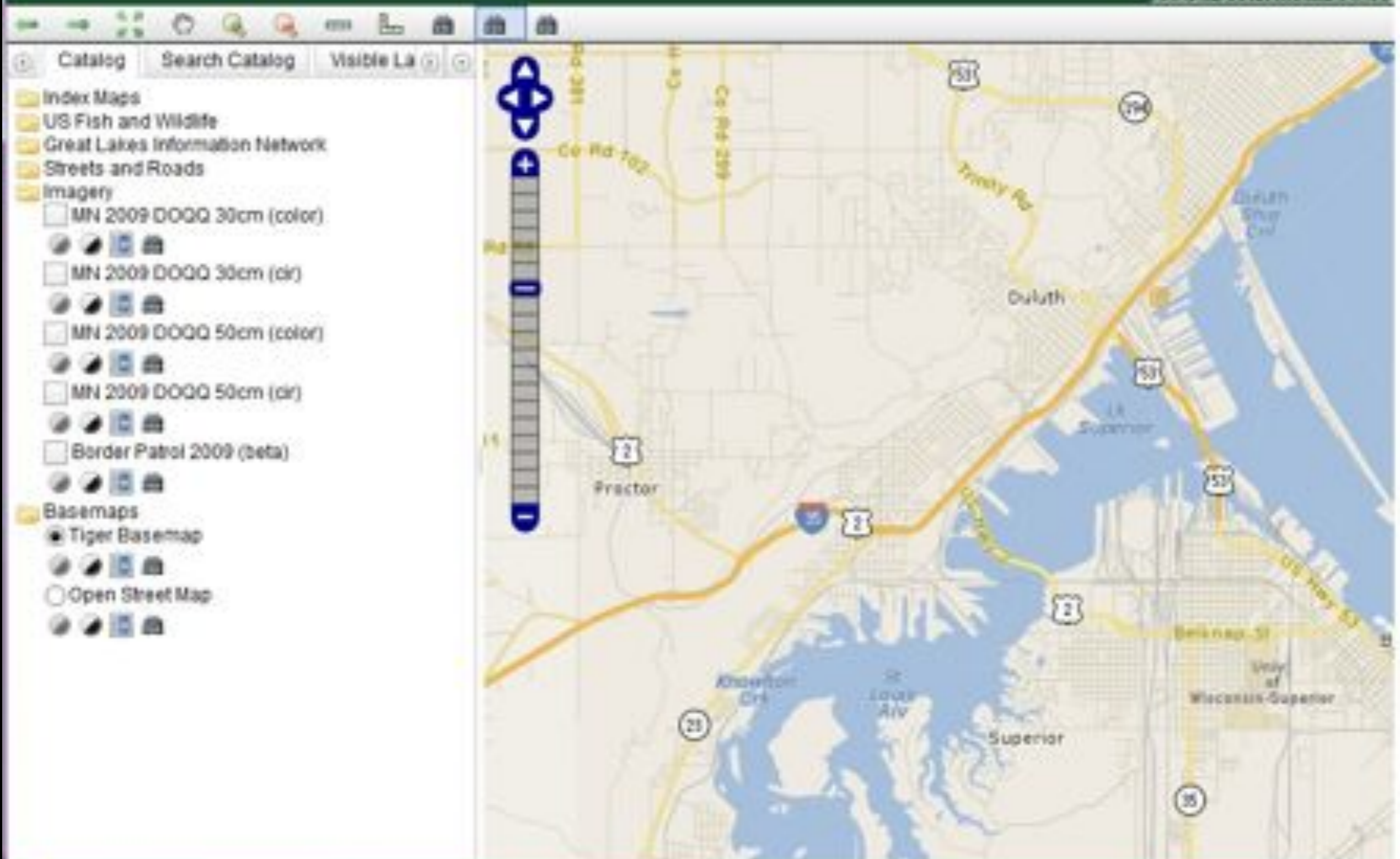






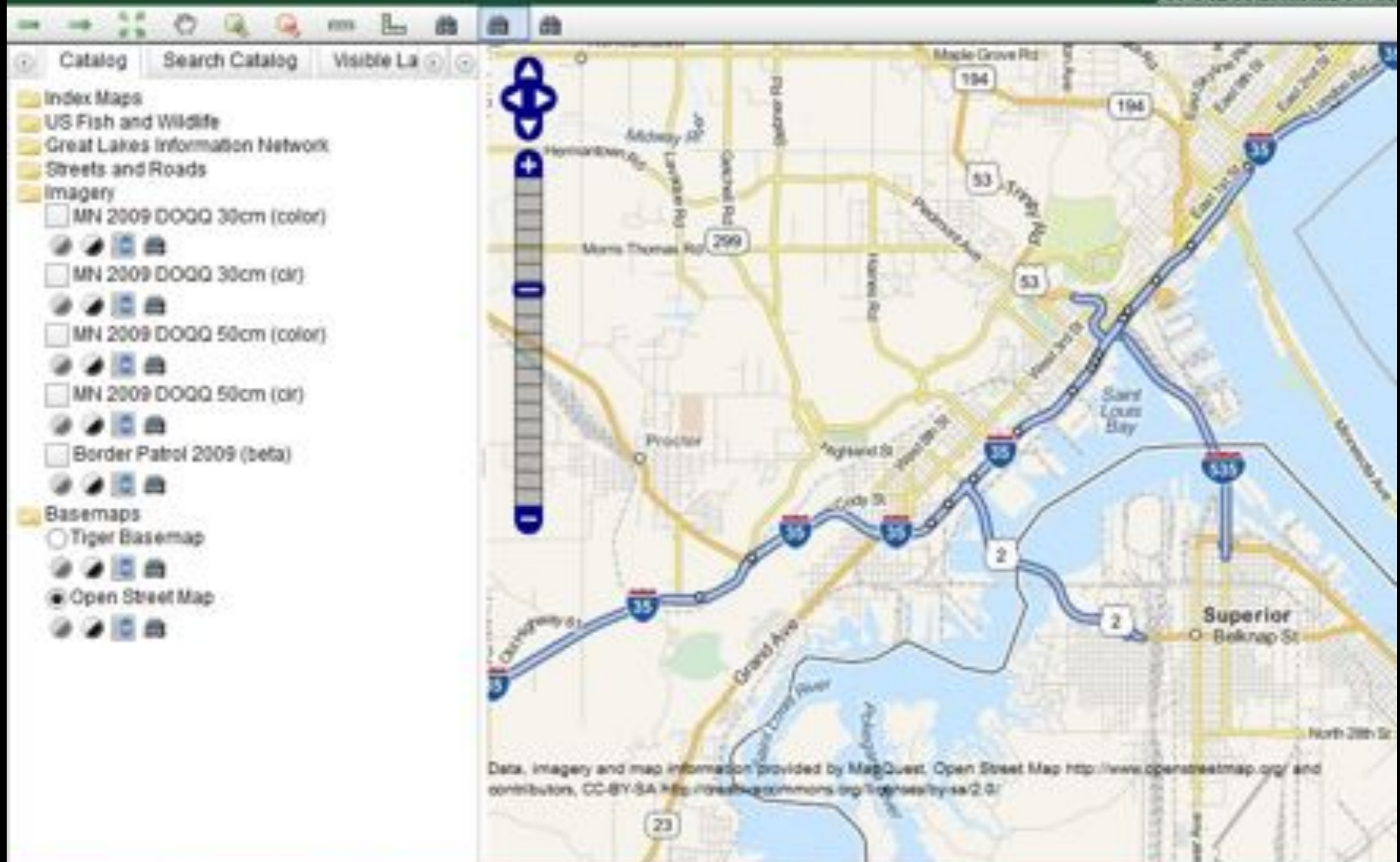
Collaborative Mapping

Search GeoNetwork Catalog



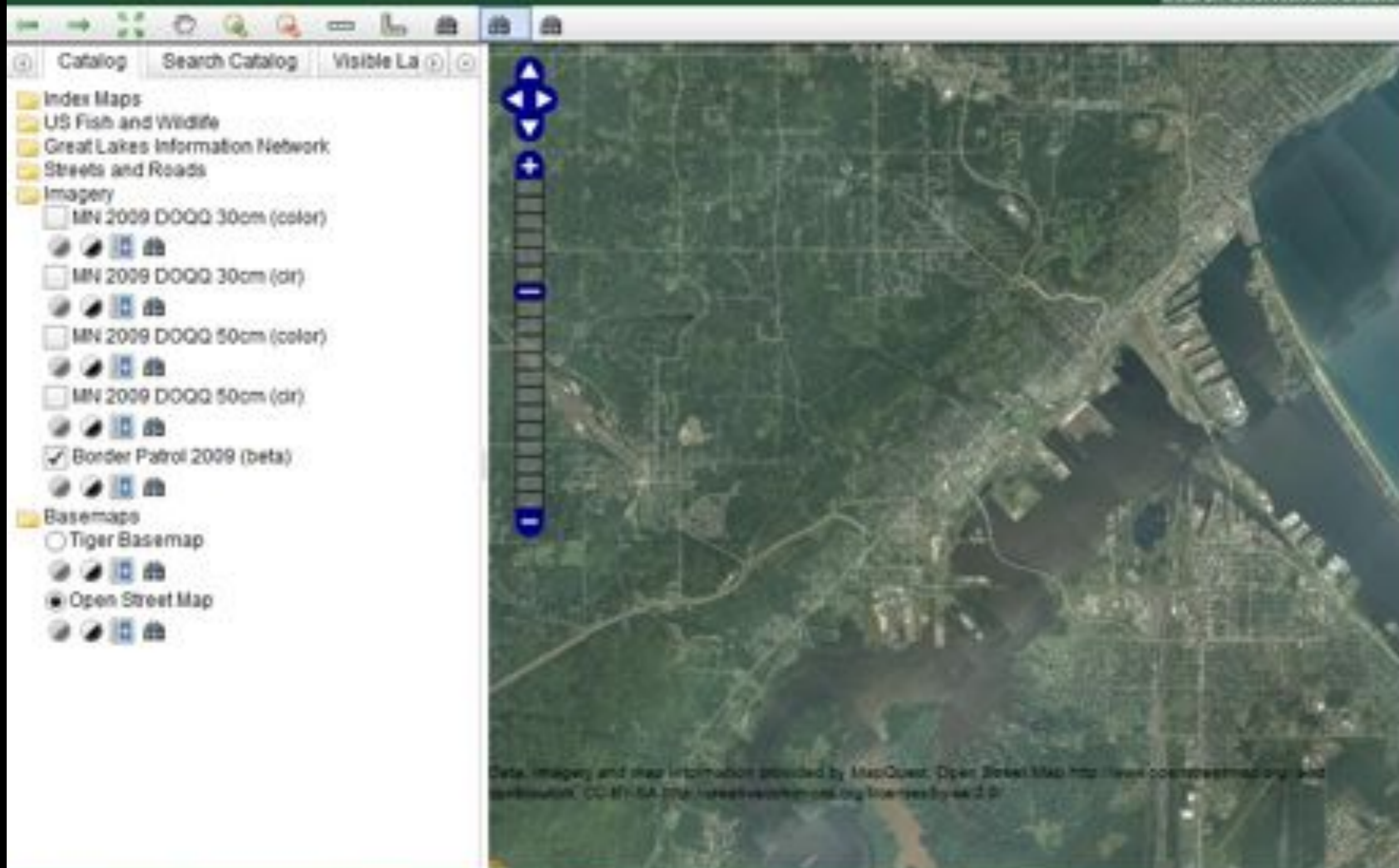
Collaborative Mapping

Search GeoNetwork Catalog



Collaborative Mapping

Search GeoNetwork Catalog



Catalog Search Catalog Visible La

- Index Maps
- US Fish and Wildlife
- Great Lakes Information Network
- Streets and Roads
- Imagery
 - ☐ MN 2009 DOQQ 30cm (color)
 - ☐ MN 2009 DOQQ 30cm (dir)
 - ☐ MN 2009 DOQQ 50cm (color)
 - ☐ MN 2009 DOQQ 50cm (dir)
 - ☒ Border Patrol 2009 (beta)
- Basemaps
 - ☐ Tiger Basemap
 - ☒ Open Street Map

Data, imagery and map information provided by MapQuest, Open Street Map <http://www.openstreetmap.org/> and GeoNetwork. CC-BY-SA. <http://creativecommons.org/licenses/by-sa/2.0/>

Collaborative Mapping

Search GeoNetwork Catalog

The screenshot displays the GeoMOOSE 2.8.1 web application interface. The main map area shows a city with roads and water bodies. Overlaid on the map are several yellow lines representing roads and a network of blue lines representing water features. The left-hand panel contains a catalog of maps and imagery, including:

- Index Maps
- US Fish and Wildlife
- Great Lakes Information Network
- Streets and Roads
- ☒ Tiger Streets
- Imagery
 - ☐ MN 2009 DOQQ 30cm (color)
 - ☐ MN 2009 DOQQ 30cm (dir)
 - ☐ MN 2009 DOQQ 50cm (color)
 - ☐ MN 2009 DOQQ 50cm (dir)
 - ☒ Border Patrol 2009 (beta)
- Basemaps
 - ☐ Tiger Basemap
 - ☒ Open Street Map

The bottom status bar shows the following information:

- GeoMOOSE 2.8.1
- Lat, Lon: 46.706, -92.247 USNG: 15TWM57587279
- 1:108336

Collaborative Mapping

Search GeoNetwork Catalog

The screenshot displays the GeoMOOSE 2.6.1 web interface. On the left is a catalog panel with the following sections:

- Index Maps**
 - ☐ EO-1/Hyperion
 - ☒ Stereo Border Imagery
- Footprints**
 - ☐ Minnesota USNG PDFs
- US Fish and Wildlife**
 - ☐ Great Lakes Information Network
 - ☐ Streets and Roads
 - ☒ Tiger Streets
- Imagery**
 - ☐ MN 2009 DOQQ 30cm (color)
 - ☐ MN 2009 DOQQ 30cm (cir)
 - ☐ MN 2009 DOQQ 50cm (color)
 - ☐ MN 2009 DOQQ 50cm (cir)
 - ☒ Border Patrol 2009 (beta)
- Basemaps**
 - ☐ Tiger Basemap

The main map area shows a coastal region with a blue water body and a green land area. A yellow line represents a boundary. Navigation tools on the right include a compass rose, a vertical scale bar, and a zoom slider. The status bar at the bottom shows the following information:

GeoMOOSE 2.6.1 Lat, Lon: 45.809, -92.168 USNG: 15TWM63470429 1108336

Collaborative Mapping

Search GeoNetwork Catalog

The screenshot displays the Collaborative Mapping web application interface. At the top, a green header bar contains the title "Collaborative Mapping" and a search bar labeled "Search GeoNetwork Catalog". Below the header is a toolbar with various icons for map navigation and editing. On the left side, a panel titled "Visible Layers" and "Find Image Files" contains a section for "Available Tools". This section lists four tools: "Navigate", "Draw Point", "Draw Line", and "Draw Polygon", each with a radio button. The "Draw Polygon" tool is currently selected. Below the tool list are "Cancel" and "Go!" buttons. The main area of the interface is a map showing a satellite view of a landscape with a blue body of water. A yellow polygon is drawn on the land, and several blue lines represent roads or paths. A vertical toolbar with navigation controls is positioned on the left side of the map. At the bottom of the interface, a green status bar displays the text "GeoMOOSE 2.6.1", the coordinates "Lat, Lon: 48.809, -92.149 USNG: 15TWM64968428", and a scale indicator "1:108336".

Available Tools:

- ☐ Navigate
- ☐ Draw Point
- ☐ Draw Line
- ☒ Draw Polygon

Cancel Go!

Data, imagery and map information provided by MapQuest, Open Street Map <http://www.openstreetmap.org/> and contributors, CC-BY-SA <http://creativecommons.org/licenses/by-sa/2.0/>

GeoMOOSE 2.6.1 Lat, Lon: 48.809, -92.149 USNG: 15TWM64968428 1:108336

Collaborative Mapping

Search GeoNetwork Catalog

Visible Layers

Find Image Files

[Back to Settings](#)

Images available for the selection area

Border Patrol

☐ [Border_StereoM0304/M0904/58005_23.tif](#)

☐ [Border_StereoM0304/M0904/58005_24.tif](#)

☒ [Border_StereoM0304/M0904/58005_25.tif](#)

☒ [Border_StereoM0304/M0904/58005_26.tif](#)

☐ [Border_StereoM0304/M0904/58005_27.tif](#)

☐ [Border_StereoM0304/M0904/58006_25.tif](#)

☒ [Border_StereoM0304/M0904/58006_26.tif](#)

☐ [Border_StereoM0304/M0904/58006_27.tif](#)

☐ [Border_StereoM0304/M0904/58006_29.tif](#)

Download Checked Images

Data, imagery and map information provided by MapQuest, Open Street Map <http://www.openstreetmap.org> and contributors, CC-BY-SA <http://creativecommons.org/licenses/by-sa/2.0/>



Collaborative Mapping

Search Geonetwork Catalog

The screenshot displays the GeoMOOSE 2.8.1 web application. The interface includes a top navigation bar with a search function, a sidebar for map layers, a main map area, and a bottom status bar.

Map Layers Sidebar:

- Index Maps**
 - ☒ EO-1/Hyperion
 - ☐ Stereo Border Imagery
 - ☐ Minnesota USNG PDFs
- US Fish and Wildlife**
- Great Lakes Information Network**
- Streets and Roads**
 - ☒ Tiger Streets
- Imagery**
 - ☐ MN 2009 DOQQ 30cm (color)
 - ☐ MN 2009 DOQQ 30cm (dir)
 - ☐ MN 2009 DOQQ 50cm (color)
 - ☐ MN 2009 DOQQ 50cm (dir)
 - ☐ Border Patrol 2009 (beta)
- Basemaps**
 - ☒ Tiger Basemap
 - ☐ Open Street Map

Map Area: The main map area shows a city street grid with major roads highlighted in yellow. Road shields for US-53, MN-154, and MN-23 are visible. A blue location pin is placed on the left side of the map.

Bottom Status Bar:

- GeoMOOSE 2.8.1
- Lat, Lon: 46.788, -92.162 USNG: 15TWM63948192
- Scale: 1:54168

Collaborative Mapping

Search GeoNetwork Catalog

Catalog Search Catalog Visible Layers

- Index Maps
 - ☒ EO-1/Hyperion
 -
 - ☒ Stereo Border Imagery
 -
 - Footprints**
 - ☐ Minnesota USNG PDFs
 -
 - US Fish and Wildlife
 - Great Lakes Information Network
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 -
 - Imagery
 - ☐ MN 2009 DOQQ 30cm (color)
 -
 - ☐ MN 2009 DOQQ 30cm (dir)
 -
 - ☐ MN 2009 DOQQ 50cm (color)
 -
 - ☐ MN 2009 DOQQ 50cm (dir)
 -
 - ☐ Border Patrol 2009 (beta)
 -
 - Basemaps
 - ☒ Tiger Basemap
 -

Map showing the Great Lakes region with various overlays and labels. Labels include: Bear Is, Superior, Southwestern, Harriet, Wisconsin, Paines Is, Chequamegon, Big Timber, and Shawberr Is. A vertical scale bar is visible on the left side of the map.

GeoMOOSE 2.6.1 Lat, Lon: 46.874, -92.242 USNG: 15TWM577914 11733376

Collaborative Mapping

Search GeoNetwork Catalog

The screenshot displays the Collaborative Mapping web application. On the left, a search filter panel is visible with tabs for 'Catalog', 'Search Catalog', and 'Visible Layers'. The 'Search Catalog' tab is active, showing a search filter configuration. A red arrow points from the 'Search Catalog' tab in the left panel to the same tab in the main search filter panel. The main search filter panel contains the following elements:

- Contains [v]
- USGS
- Any Field [v]
- Contains [v]
- Protected area
- Add Filter
- Search

The background shows a map of Wisconsin with various locations labeled, including St. Cloud, St. Paul, Eau Claire, Marshfield, Nicolet, Green Bay, Oshkosh, La Crosse, Markesh, Shawano, and Manitowish. The map is overlaid with a grid of red lines. The bottom status bar displays the following information:









- GeoMOOSE 2.6.1
- Lat, Lon: 51.490, -94.208 USNG: 15JVT1605
- 1:6033504

Collaborative Mapping

Search Geonetwork Catalog

Catalog Search Catalog Visible Layers


Contains ▾
USGS
Any Field ▾
Contains ▾
Protected area
Add Filter Search

| Source | Abstract | Metadata |
|--|--|---|
| USGS Gap Analysis Program | Web Mapping Services for the USGS GAP analysis |   |
| Protected Areas Database of the US Owner/Managing Unit | Protected Areas Database |   |
| USGS Gap Analysis Program | Protected Area Owner/Managing Organization |   |
| Protected Area Owner/Managing Organization | Protected Area Owner/Managing Organization |   |

Query returned about 2 results.

GeoMOOSE 2.6.1 Lat, Lon: 43.845, -95.241 USNG: 15TUJ1957 1-6933504

Collaborative Mapping

[Catalog](#)
[Search Catalog](#)
[Visible Layers](#)

[Red Lake](#)

Contains 

USG8

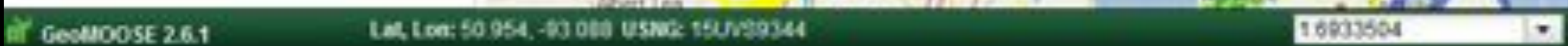
Any Field    

Contains Protected area

Region

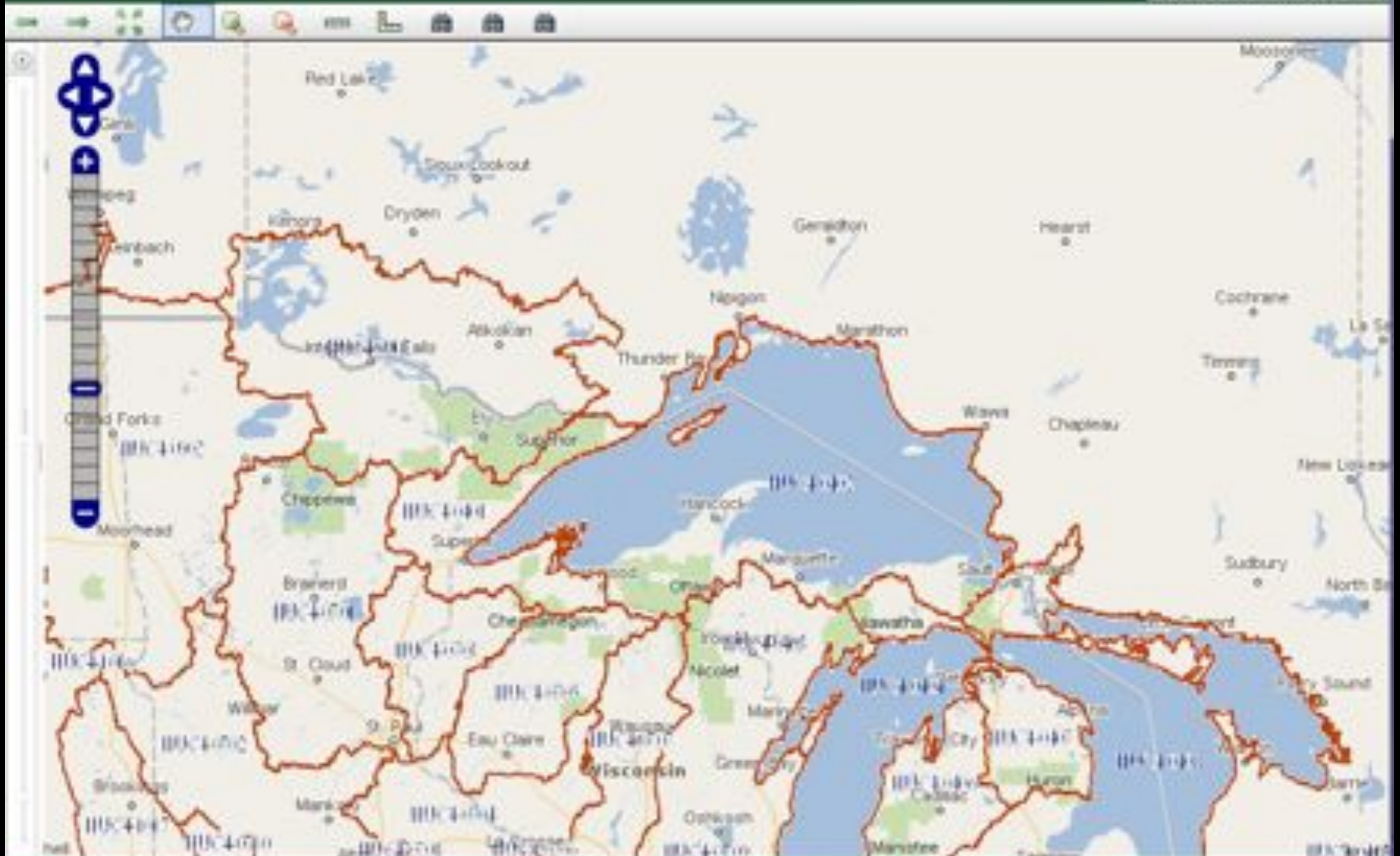
Source:  Abstract:  Introduction:                          

Query returned about 2 results.



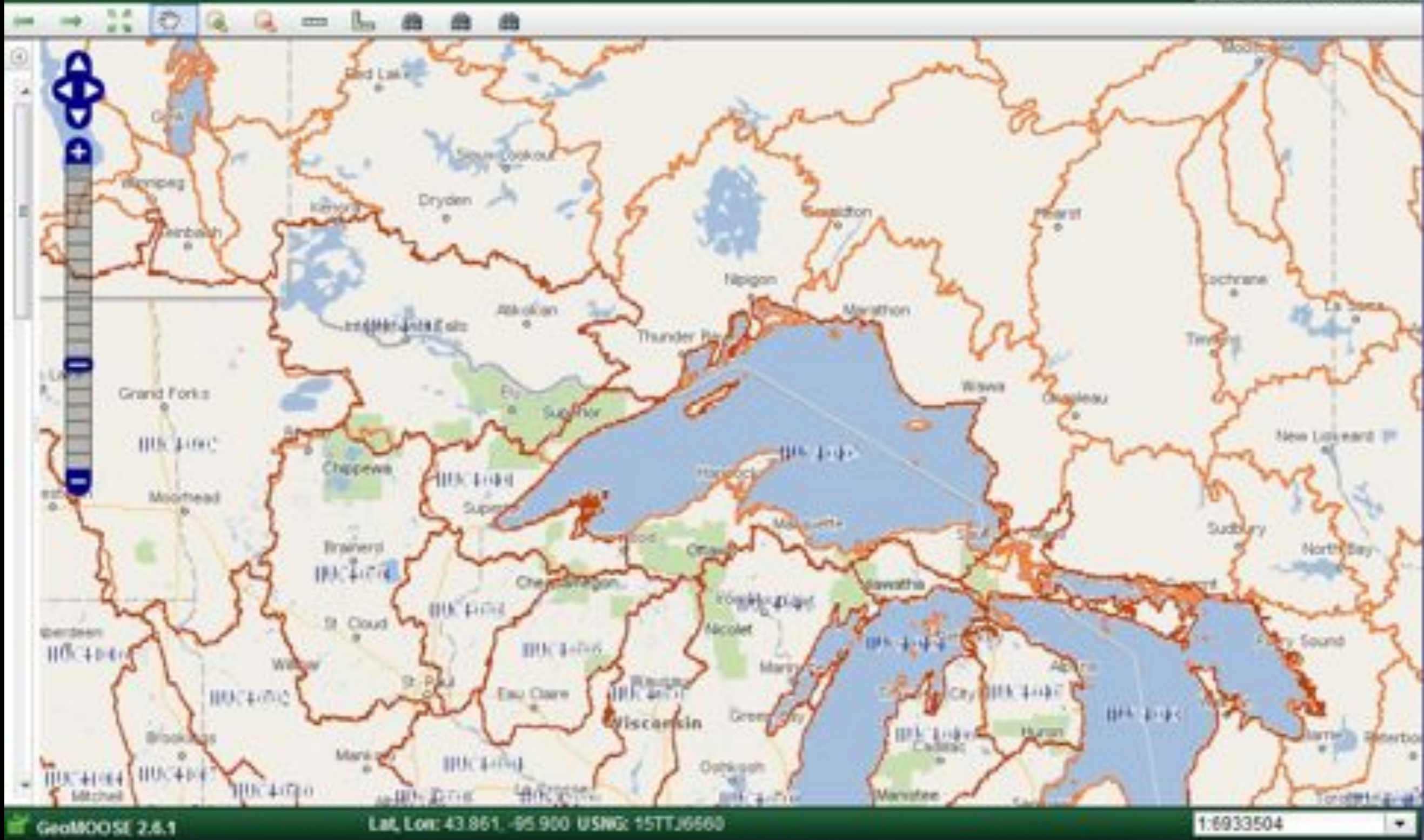
Collaborative Mapping

[Search GeoNetwork Catalog](#)



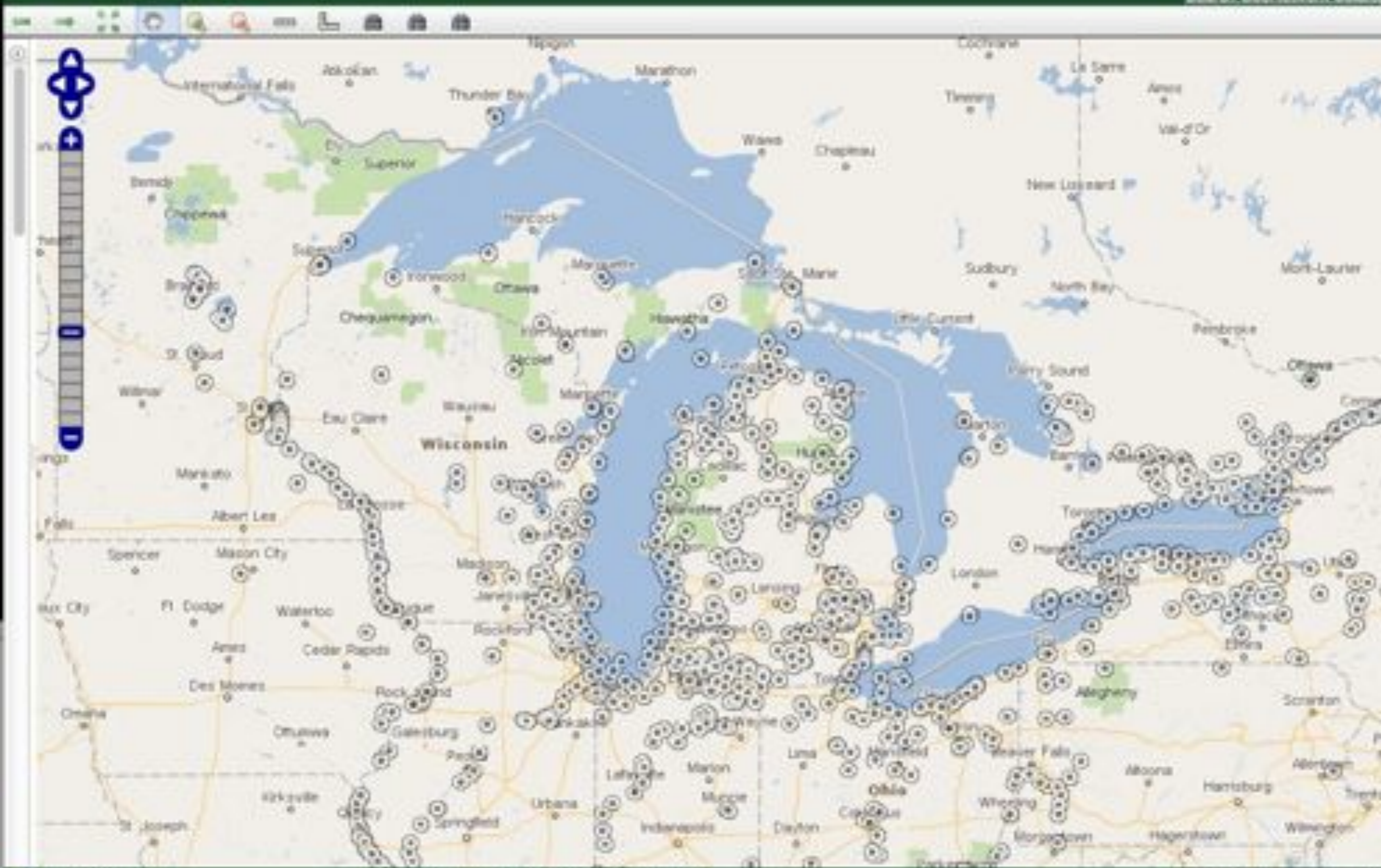
Collaborative Mapping

Search GeoNetwork Catalog



Collaborative Mapping

[Search GeoNetwork Catalog](#)



How the search works:

GeoNetwork

- Is a tool to manage spatial data resources
- Outputs a Catalog Web Service (CS-W)
- CSW is a standards-compliant way to serve metadata about data, services
- Metadata can be harvested from other data catalog and/or service
 - CSW, Z39.50, WAF, WMS, GeoNetwork nodes

Spatial Data Catalog

GeoNetwork harvests and catalogs metadata and services

A catalog web service (CSW) is published. This can be queried from the web map and more

Metadata
and services from
SharedGeo, OGC-
compliant nodes
(TNM, GeoNode)

JavaScript
CSW
Connector

GeoNetwork
Opensource





Imagery

- Imagery Exists
- Needs to be more available

Needs to Support

- Web Mapping (WMS,Tiles)
- Classification (WCS, downloads)
- Non-Orthos
 - Linked Documents (PDFs, ground level photos, ...)
 - Perspective (for Stereo reconstruction)
 - Radar/Lidar
 - ...

Orthos



Obliques



Historical Time Series

1980



1981

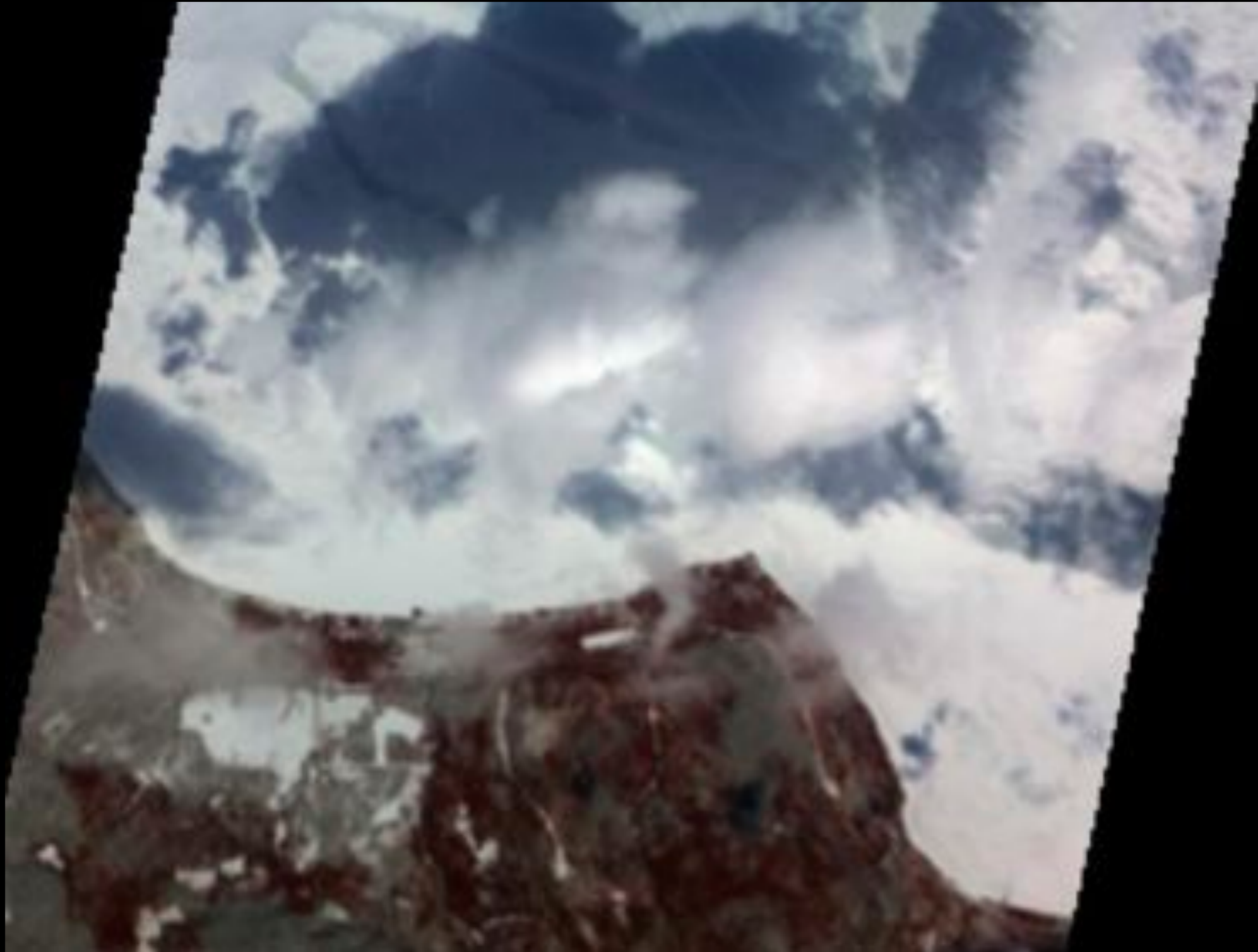


1983

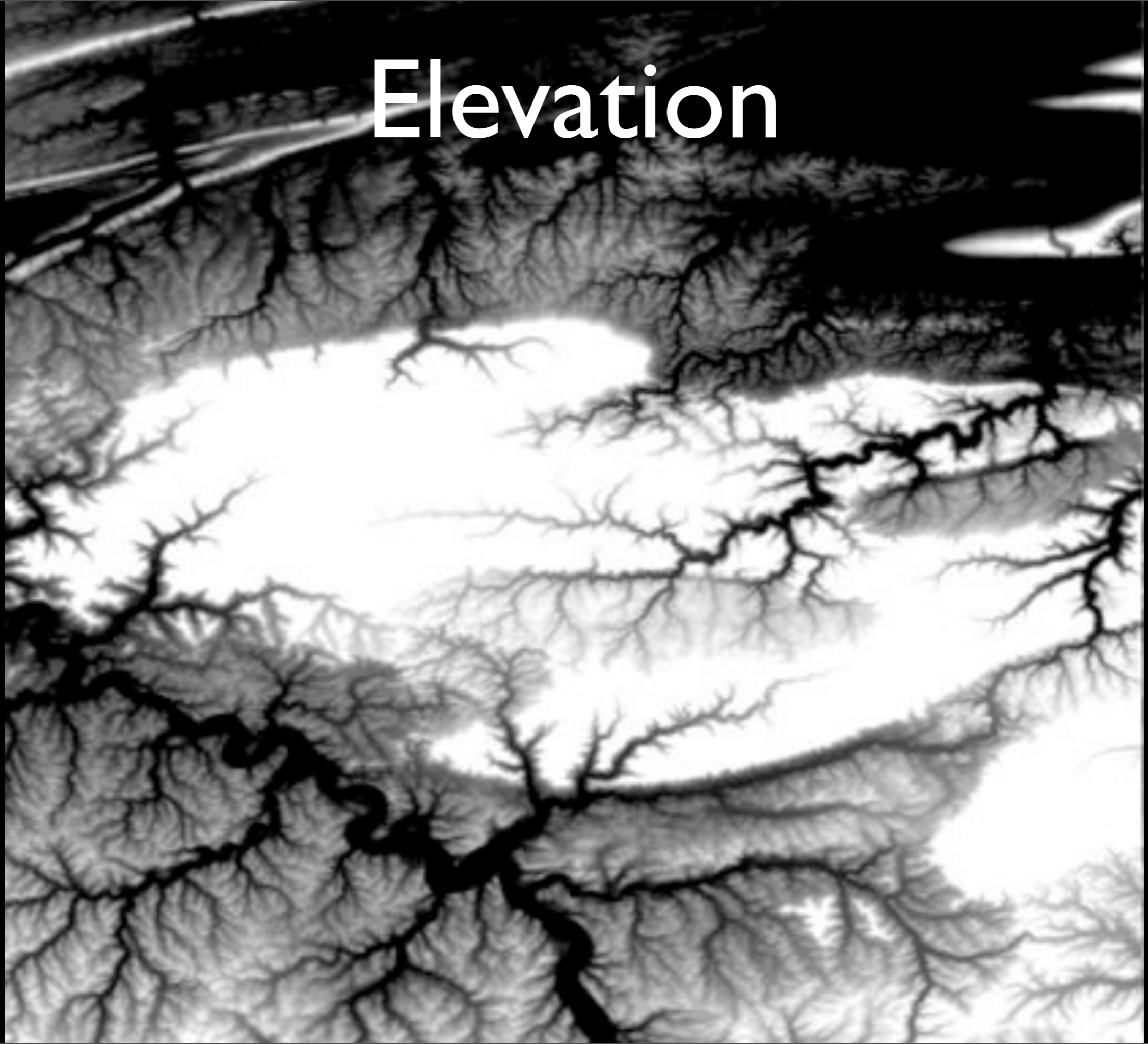


Radar

Hyperspectral (EO-1)



Elevation



Stereo



The Datasets

- Support up to 50TB of data initially
- Satellite Imagery, Aerial Ortho-photos,
(and other formats: radar, stereo pairs)

The Datasets

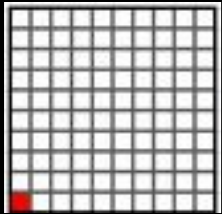
The Datasets

■ = 1 GB

The Datasets



= 1 GB

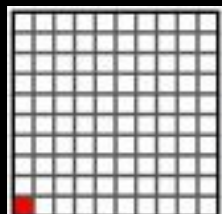


= 100 GB

The Datasets



= 1 GB



= 100 GB

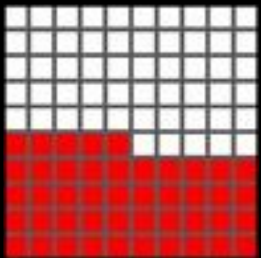


= 1 TB

The Datasets

The Datasets

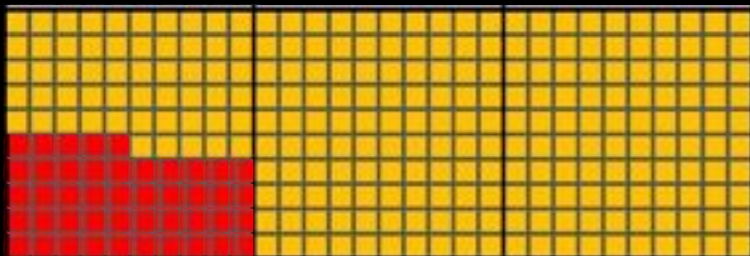
~45 GB - MN FSA MrSID (1 year)



The Datasets

~45 GB - MN FSA MrSID (1 year)

~250 GB - MN 8 Years



The Datasets

~45 GB - MN FSA MrSID (1 year)

~250 GB - MN 8 Years

~600 GB - MN Imagery WMS



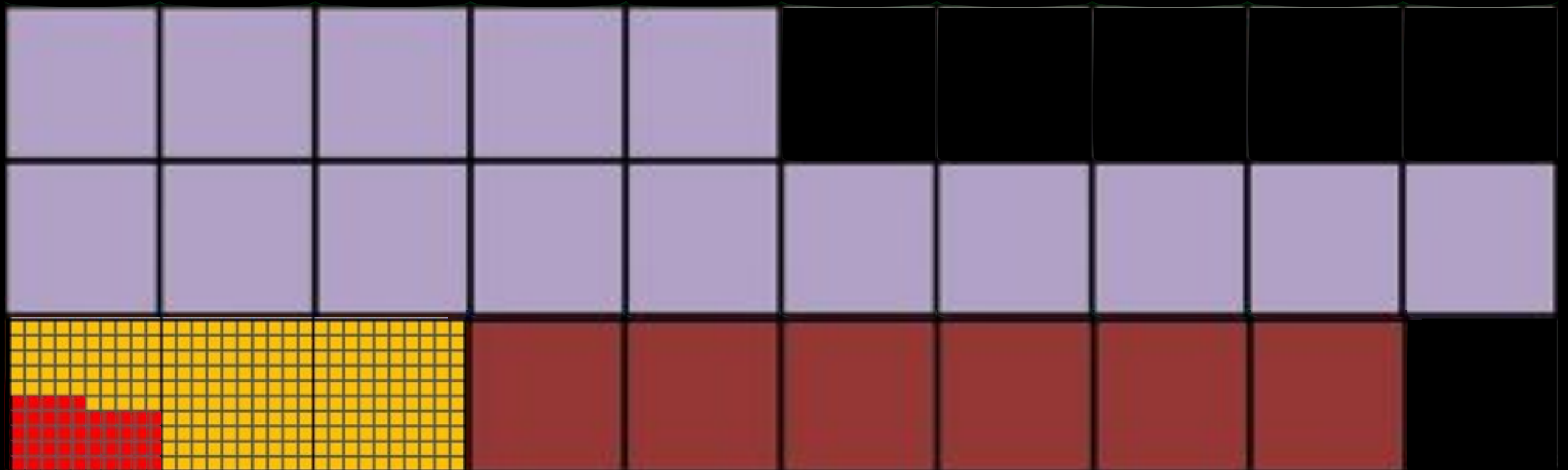
The Datasets

~45 GB - MN FSA MrSID (1 year)

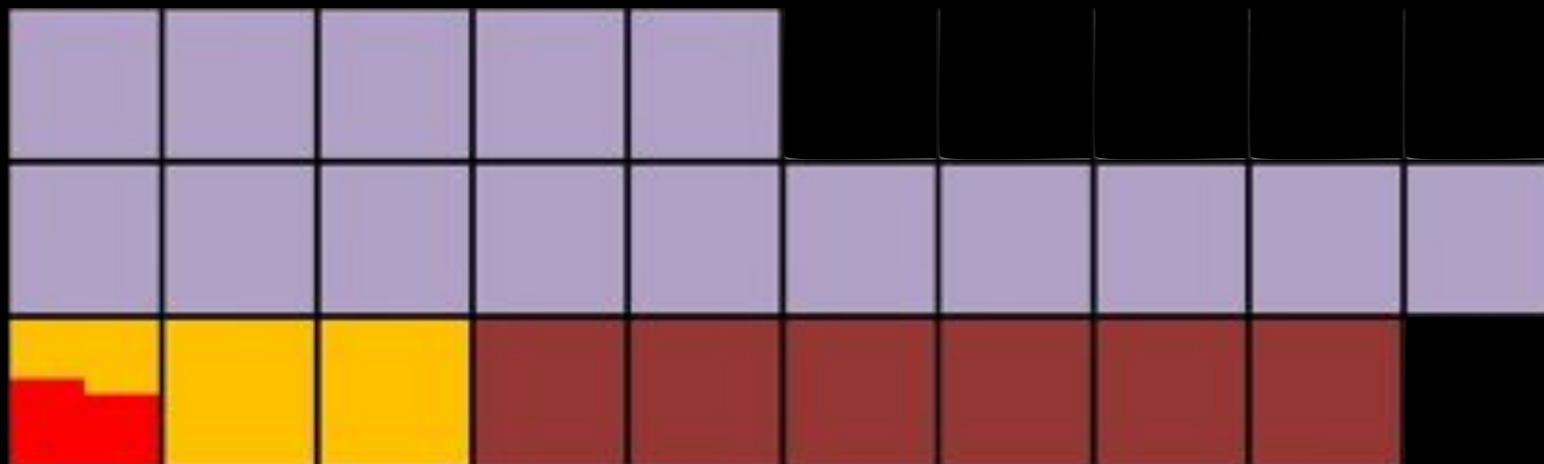
~250 GB - MN 8 Years

~600 GB - MN Imagery WMS

~1.5 TB - 2009 DOQQ Leaf Off

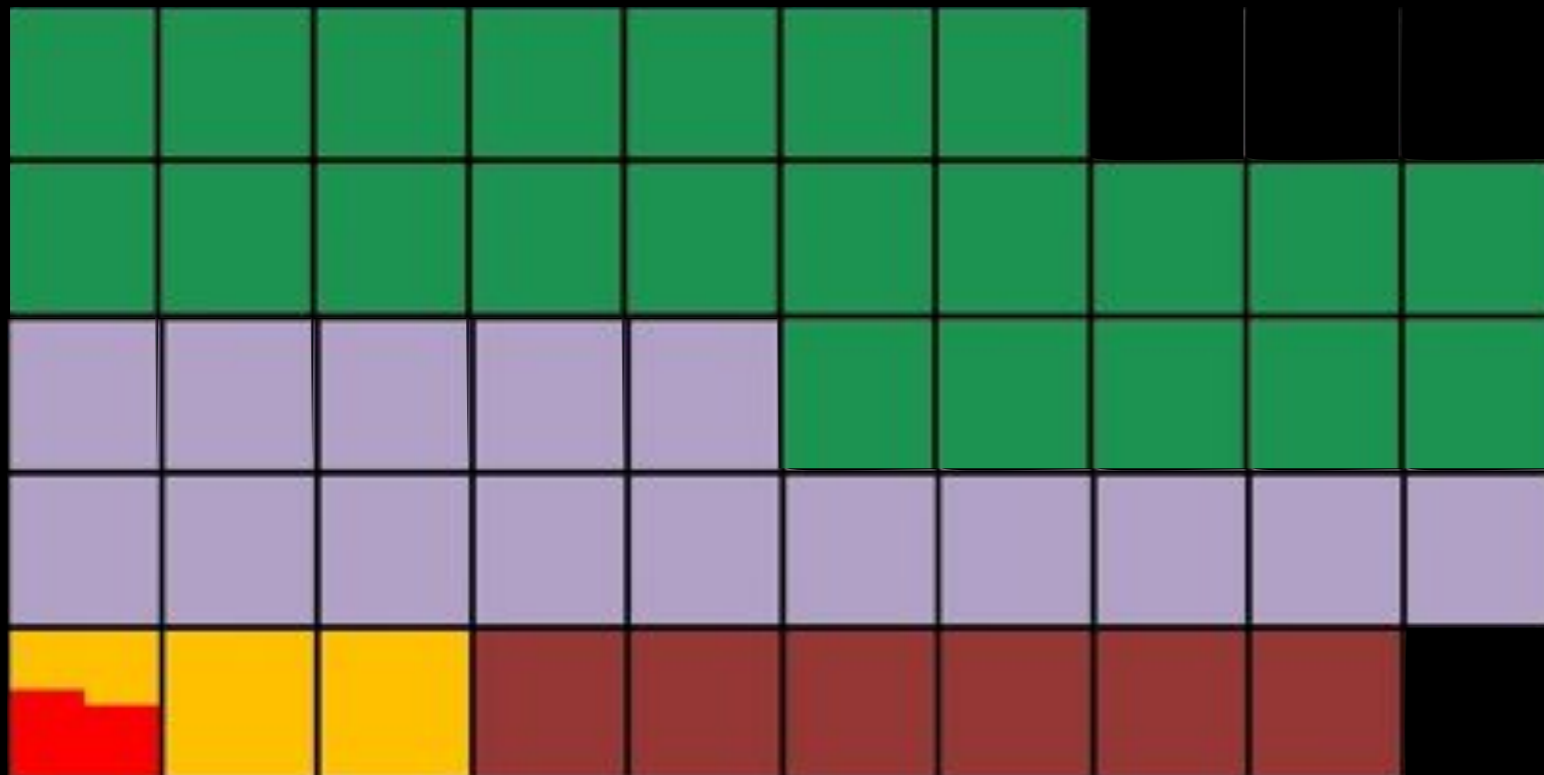


The Datasets



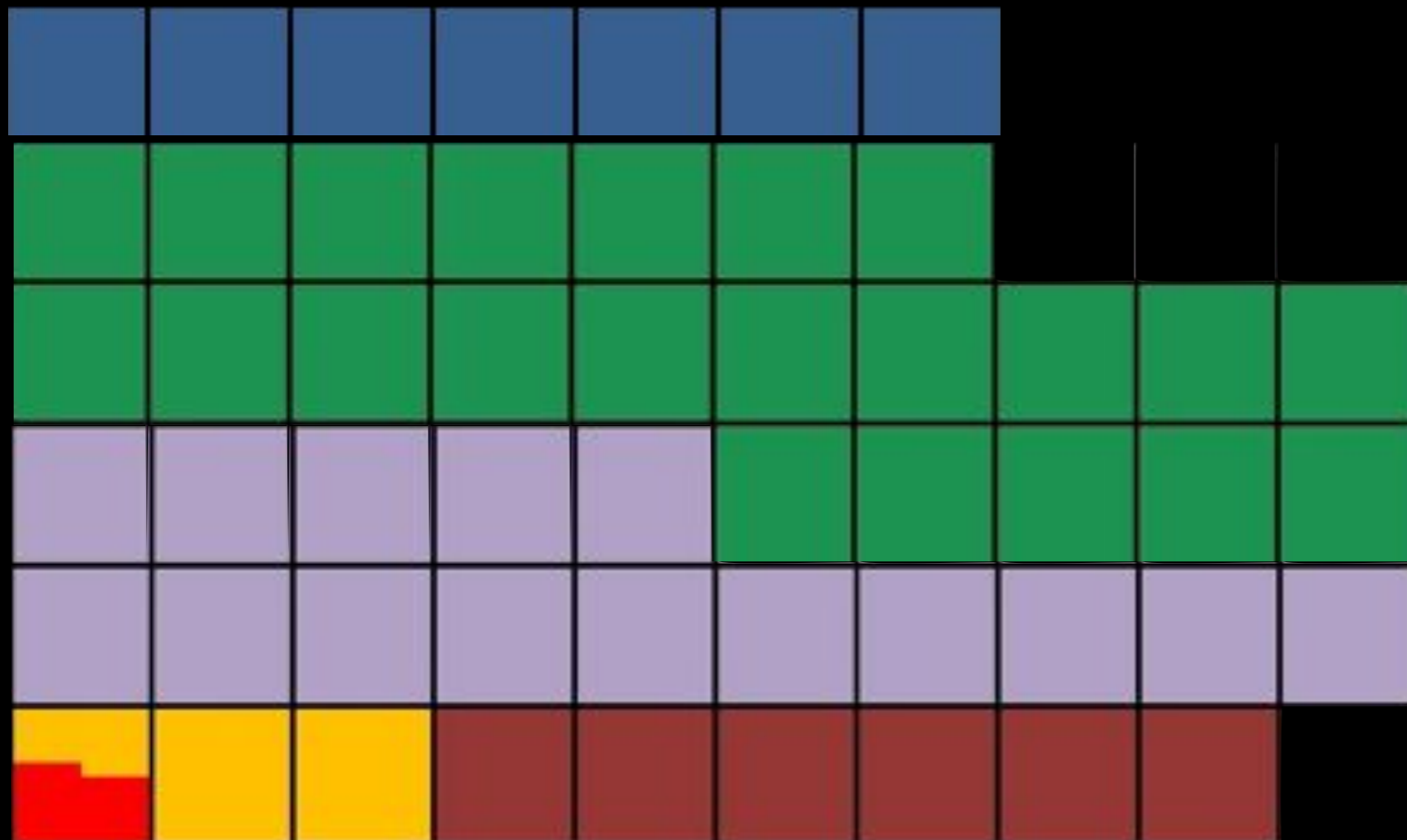
The Datasets

~ Satellite Imagery and Radar



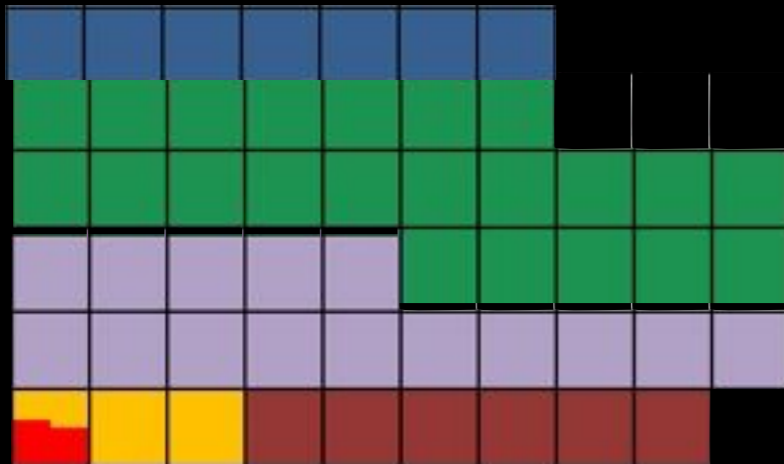
The Datasets

- ~ Satellite Imagery and Radar
- ~ Border Patrol Orthos



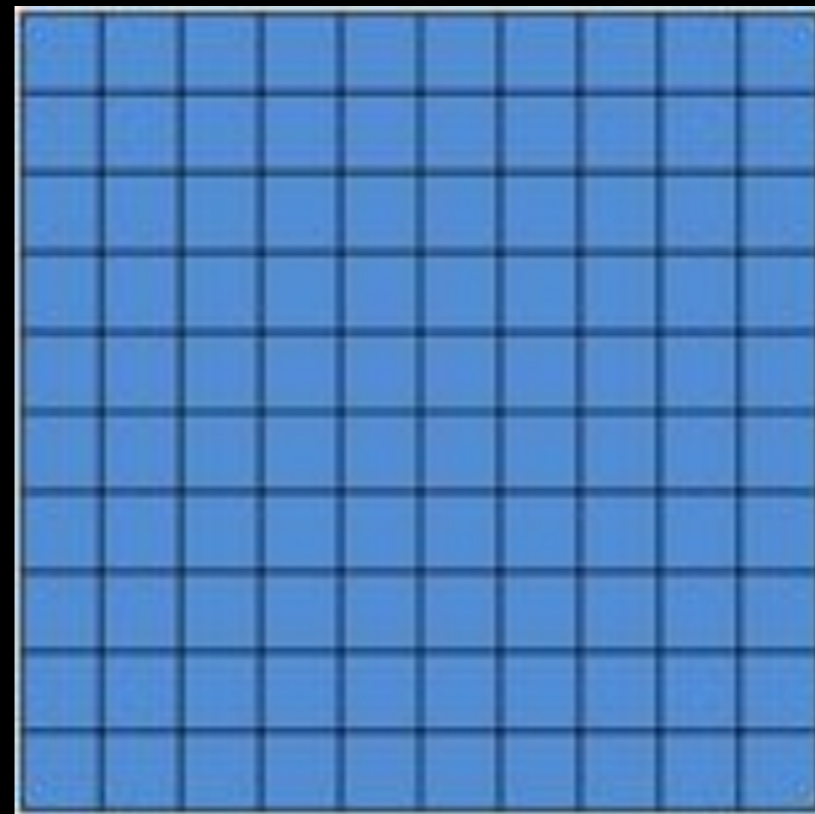
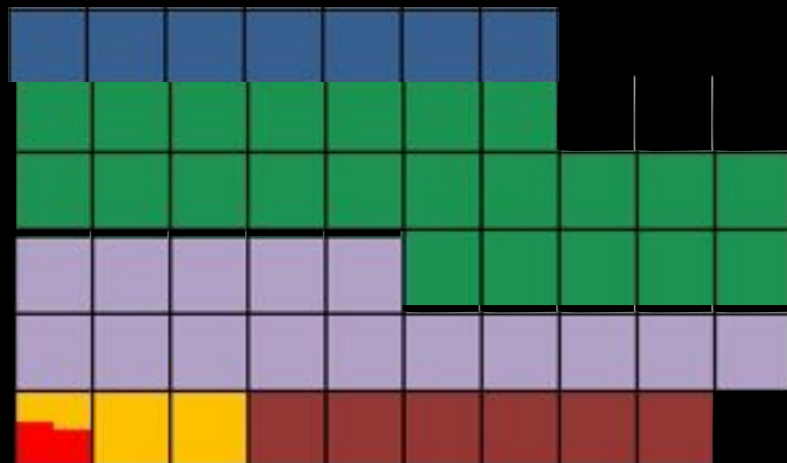
The Datasets

- ~ Satellite Imagery and Radar
- ~ Border Patrol Orthos



The Datasets

- ~ Satellite Imagery and Radar
- ~ Border Patrol Orthos
- ~ Border Patrol Stereos



The Constraints

- Limited initial budget
- Limited staff time to manage system
- Ability to grow seamlessly as data grows
- Limit access to sensitive/licensed datasets

Imagery Web Services

SharedGeo Services
(imagery, data, metadata)

MapCache

MapServer

Swift

OpenAerialMap

Raw Data

Raw Data

PostgreSQL

1. Web Mapping Services (WMS)
2. Web Coverage Services (WCS)
3. Web Tile Services (WTS)
4. Metadata
5. Raw & Processed Data Downloads

How this made imagery more available?

- Viewed Online
- WMS
 - Quantum GIS
 - Google Earth
 - ArcGIS

How this made imagery more available?

- Viewed Online
- WMS
 - Quantum GIS
 - Google Earth
 - ArcGIS

Yes!

Summary

Summary

- Problem
 - Make current and historical imagery available
 - Catalog spatial data across the region
 - Create a map viewer

Summary

- Problem
 - Make current and historical imagery available
 - Catalog spatial data across the region
 - Create a map viewer
- Solution
 - Created a scalable solution using Open Source tools, OGC and other standards, and open data sources
 - Built our own tools when others not available
 - Will share components we created

Next Steps

- Increase number of catalogs we harvest
- Add more imagery and data
- Help the user sort out the wealth of data
- Outreach to data users



Thank you

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SharedGeo
www.sharedgeo.org

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