

NEW TOOLS FOR REAL-TIME DECISION MAKING AND RISK MANAGEMENT



Special Thanks...

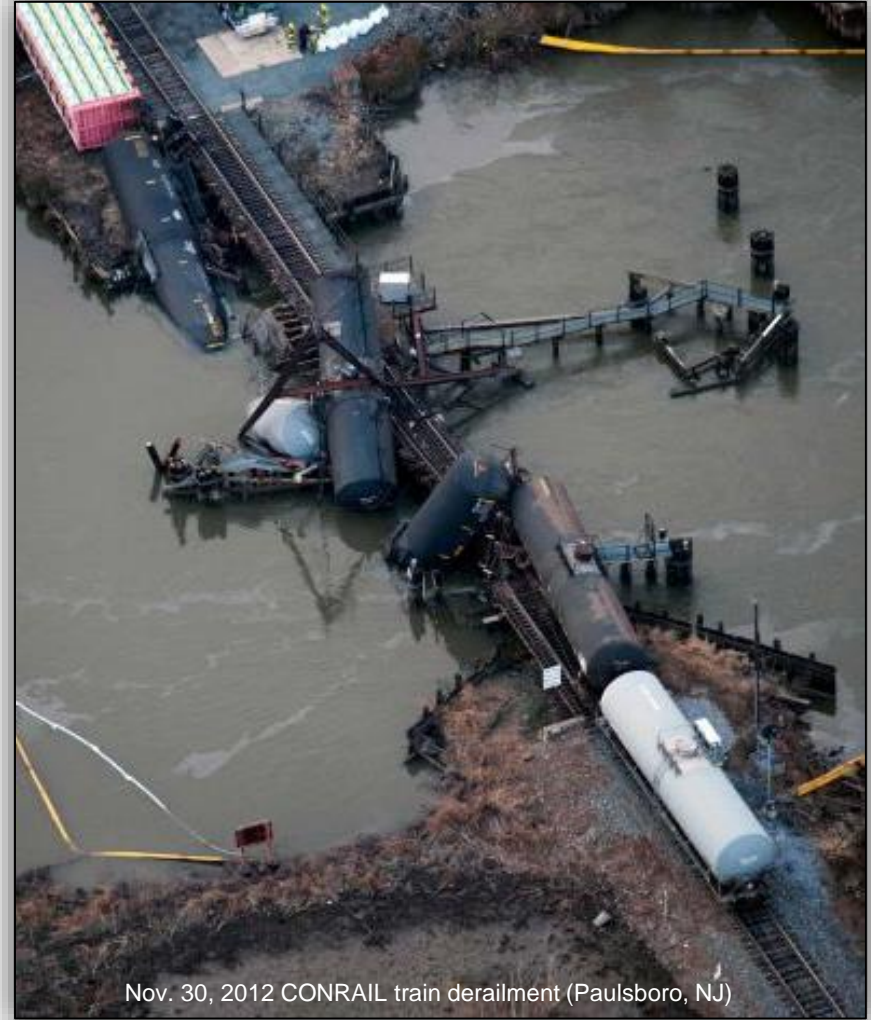
- Curtis Bartz, CN Manager Environmental Control
- Tammy Rabideau, CPG, Tt CN Program Manager
- Patti McCall, CPG, PWS, Tt CN Project Manager
- Tetra Tech GIS Gurus and Database Know-It-Alls:
 - Marco Capodivacca
 - Joel Peters
 - Alison Rauss
 - Bill Spiking



Why Wetland Atlas & Corridor Gap Analysis?

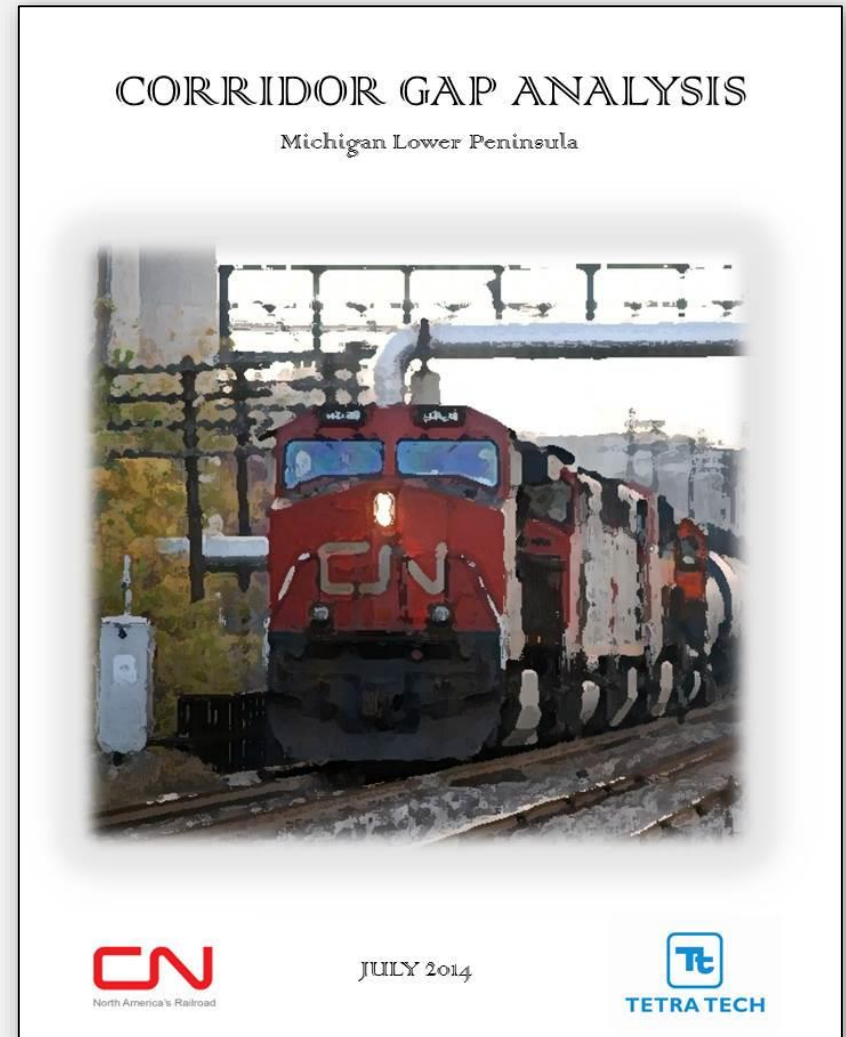


- Protect Natural Resources
- Ensure railroad activities are in compliance with regulations
- Planning tool



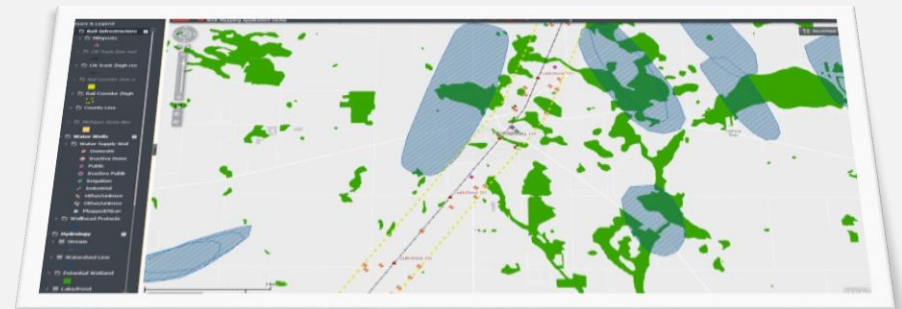
Presentation Outline

- Wetland Atlas and Corridor Gap Analysis Overview
- Scope and Uses
- Database Elements
- Web Services Architecture
- Demonstration



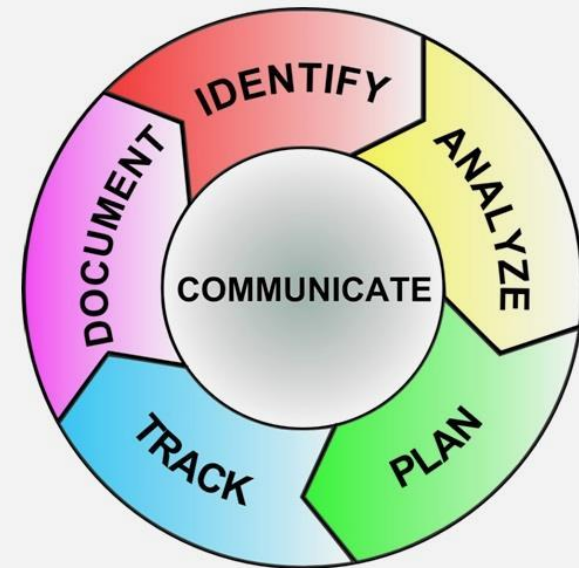
Wetland Atlas & Corridor Gap Analysis Overview

- Wetland Atlas focus
 - Wetland resources
 - Hydric soil
- Corridor Gap Analysis focus
 - Wetland Atlas focus
 - Land use
 - Threatened and Endangered Species
- Information/Decision Making Tool
 - GIS data tailored to client needs
 - Map based
 - Paper-Based (Atlases) and Web-based

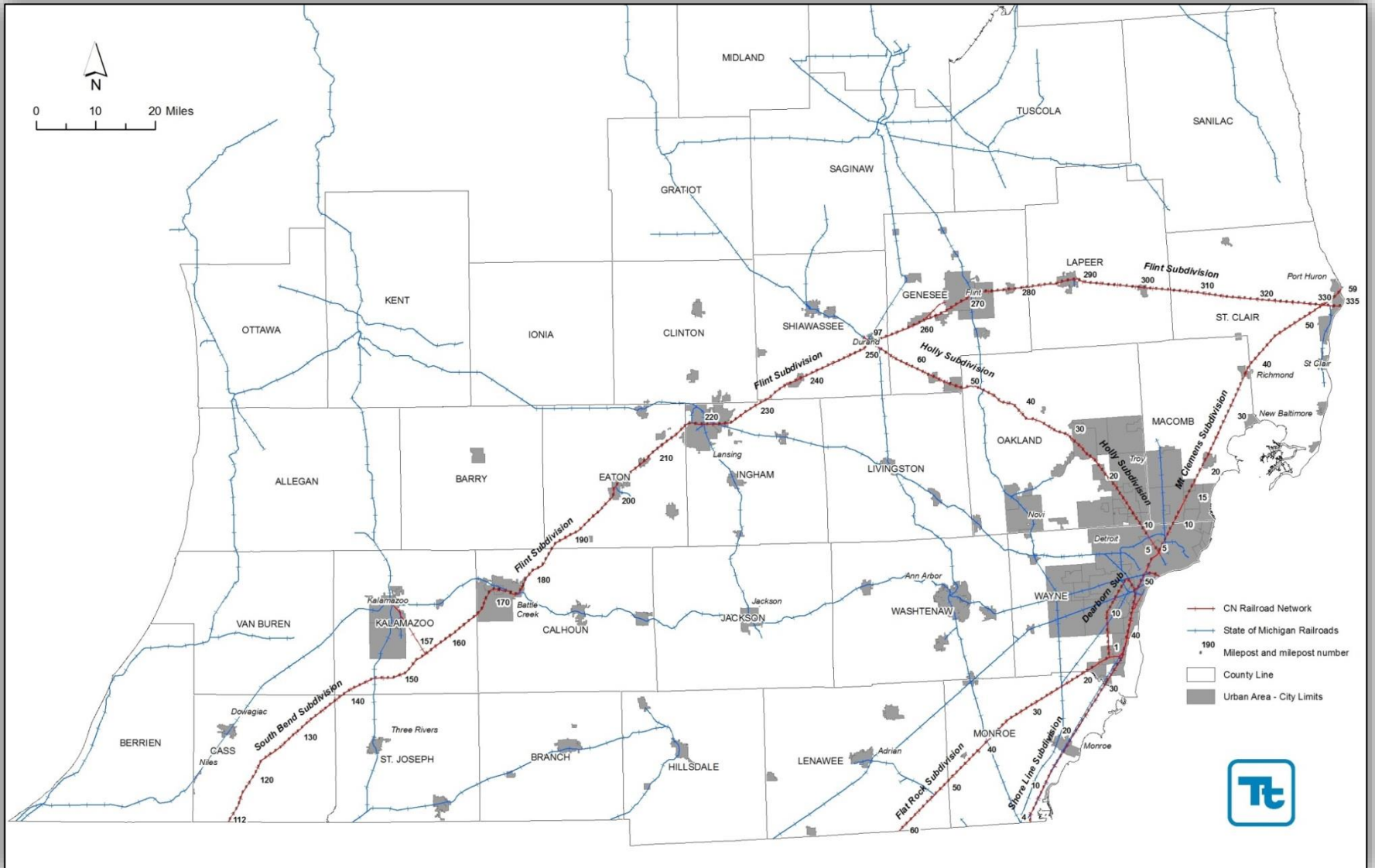


Scope and Uses

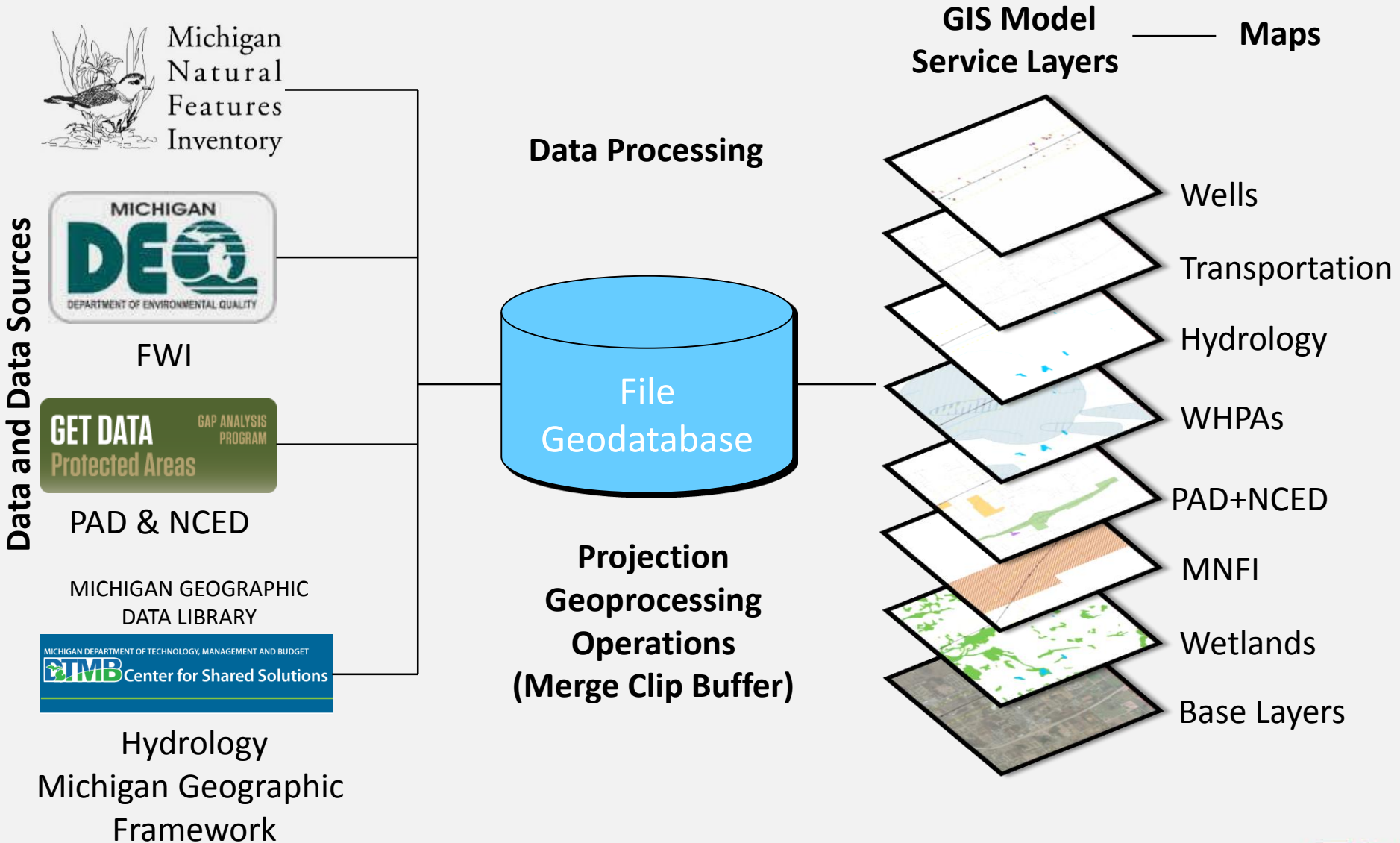
- Emergency Response and Initial Containment Measures
- Risk Assessment
- Planning (Rapid Assessment)



Database Elements: CN Railway Lower Peninsula



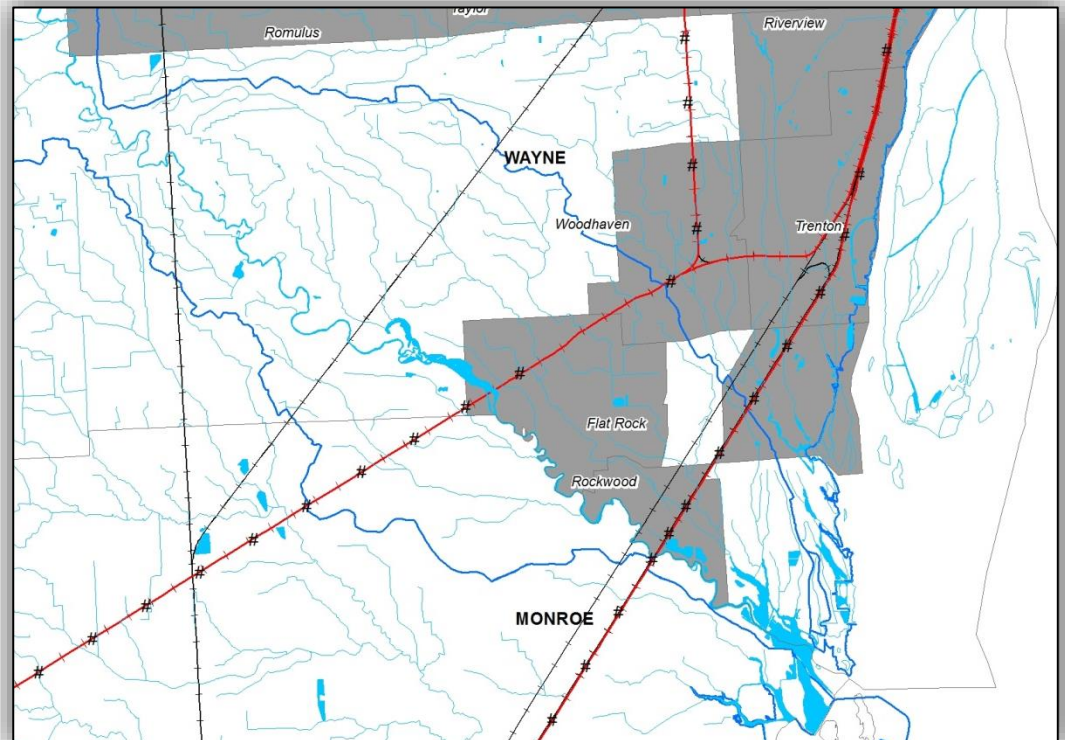
Database Elements: GIS Model



Database Elements Hydrology: Surface Hydrography/Watersheds

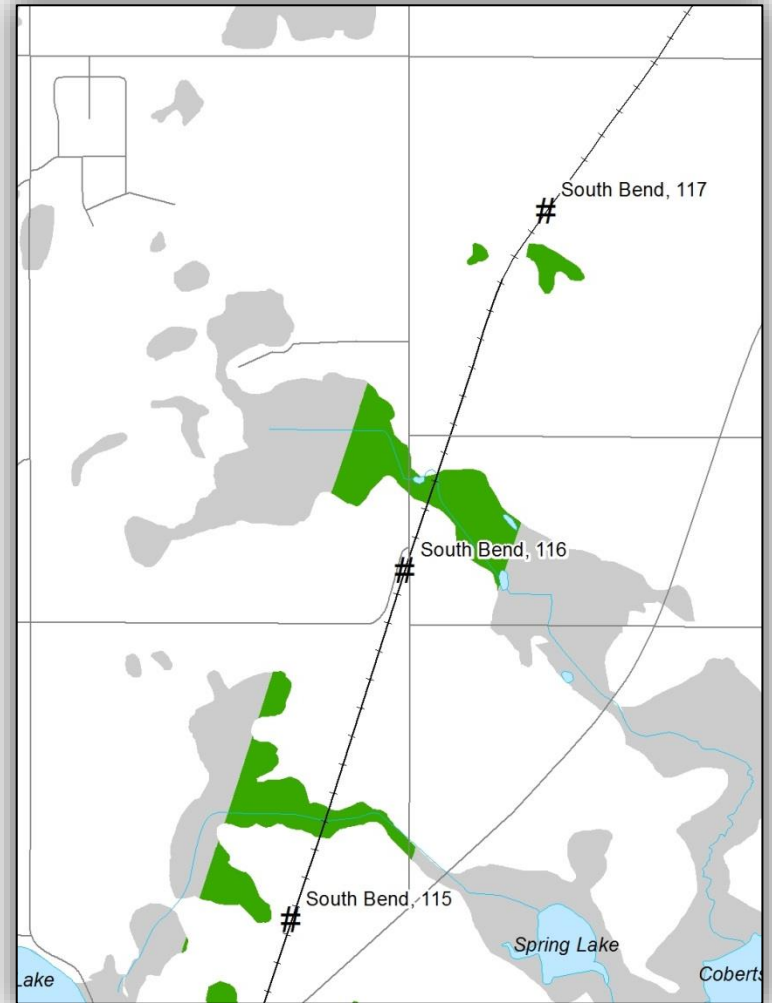
- Rivers, lake, streams features
 - Part on the Michigan Geographic Framework
 - To evaluate pathways and connections to Great Lakes

- Watersheds
 - Depicted using 8-digit HUC (Hydrologic unit Code)
 - Used in conjunction with surface drainage to estimate spill/impact dynamics



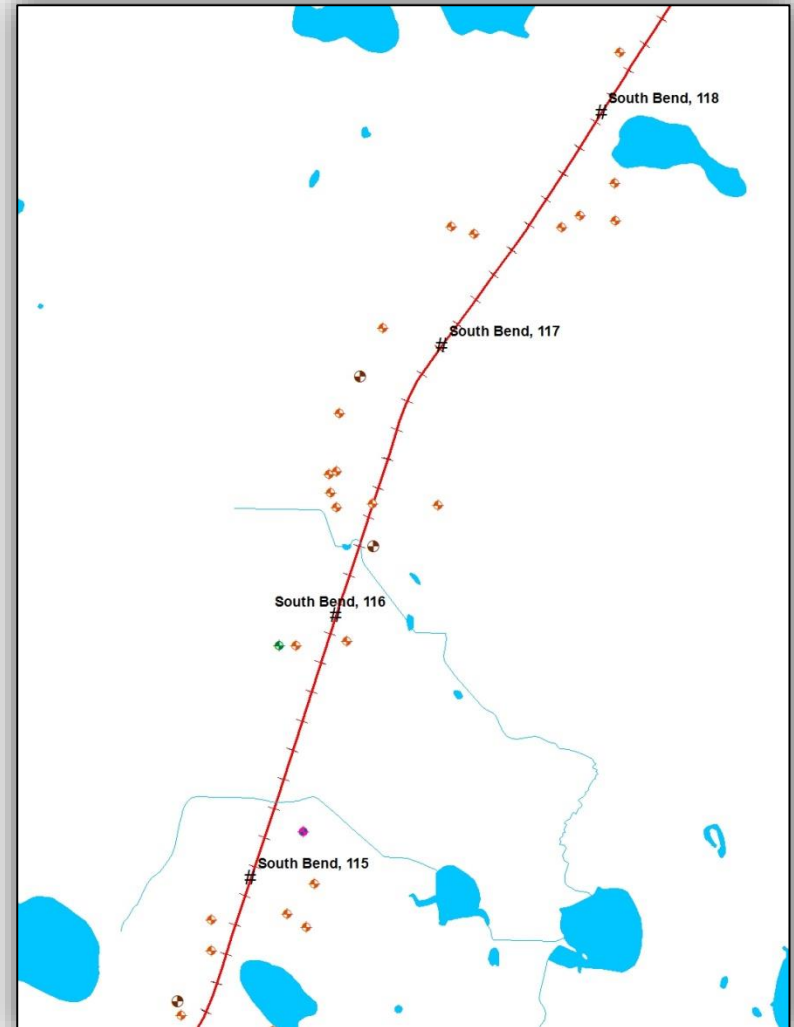
Database Elements Hydrology: Potential Wetland

- Potential and approximate locations of wetlands and wetland conditions
- County-based wetland inventory completed Jan 1, 2007
- Data analysis from multiple sources:
 - NWI (topography + aerial photo)
 - MIRIS Land Cover (aerial photo)
 - Soil data (USDA-NRCS)
- Field verification required



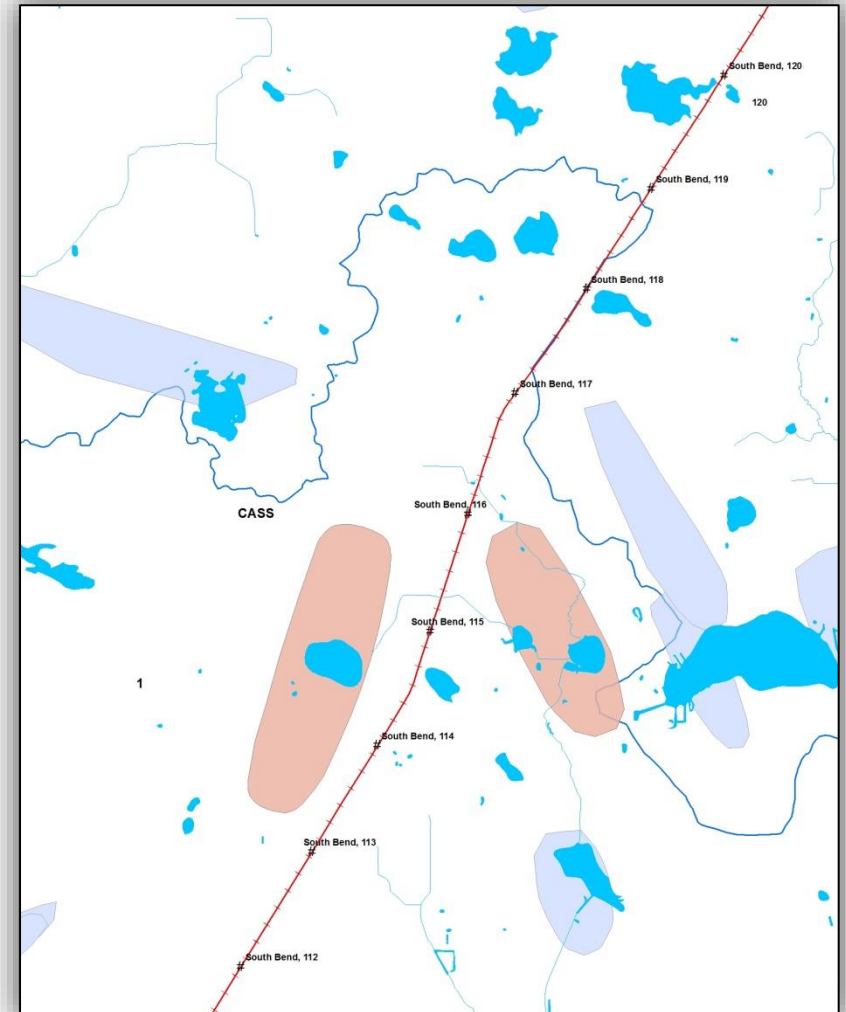
Database Elements Hydrology: Welogic Inventory

- Well data – Wellogic System (MDEQ statewide groundwater database)
 - Best available well inventory
 - Virtually 100% completeness since Jan 1 2000.
 - Lower rate of inclusion for older well installations
 - County-specific inventory
 - Location data accuracy is function of collection methods



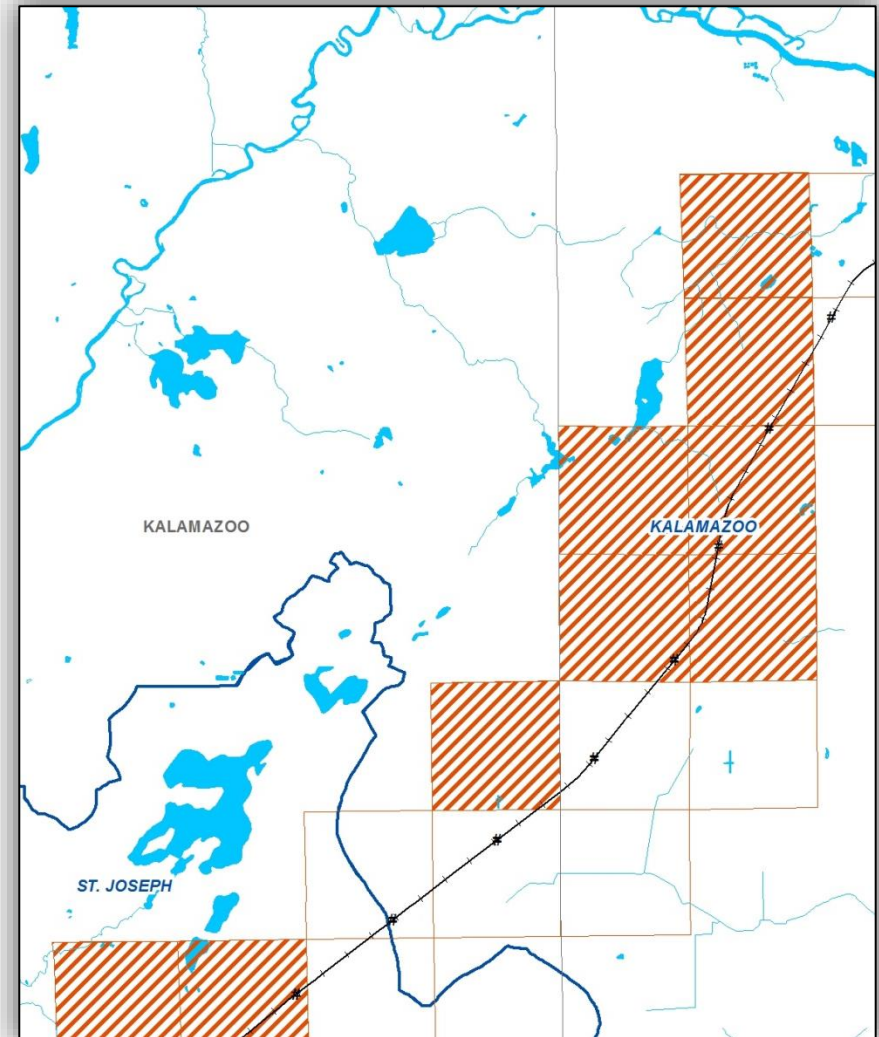
Database Elements Hydrology: Wellhead Protection Areas

- Institutionally established areas protective of public water supply system wells (PWSS).
- Identified by local governments in accordance with Michigan's Wellhead Protection Plan
- Protect drinking water from potential contamination within those areas/manage land development



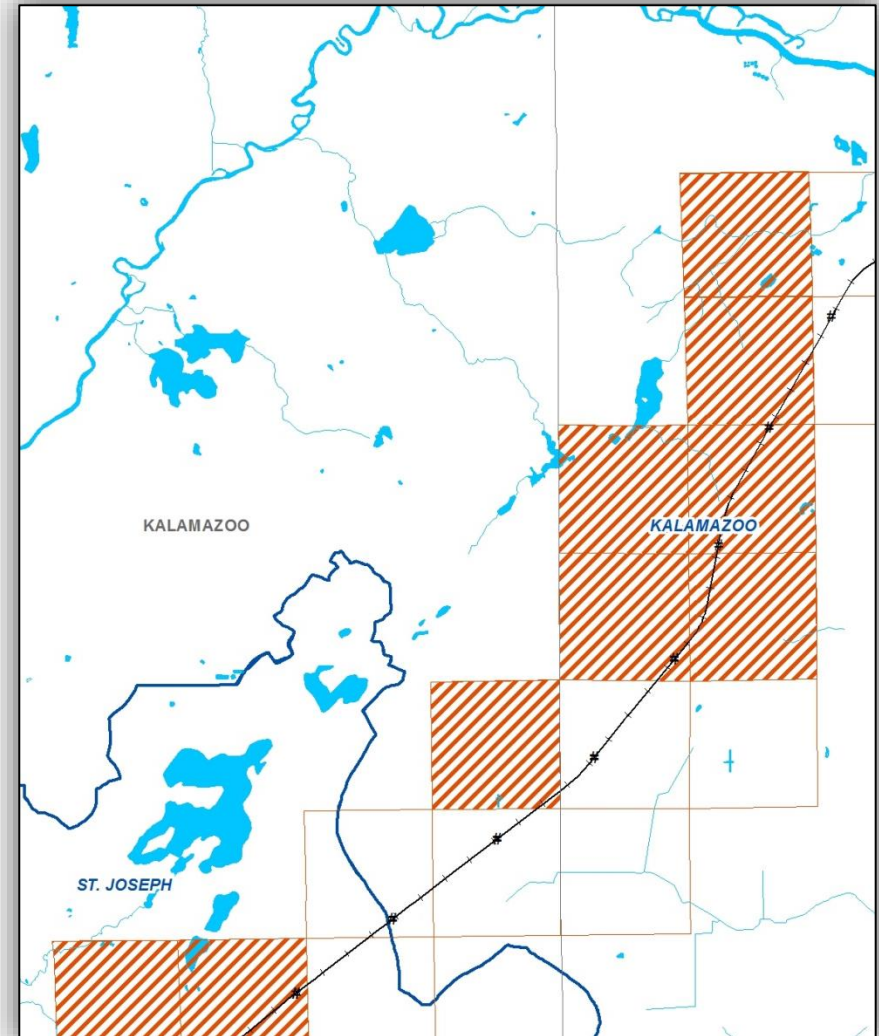
Database Elements: MNFI Database

- Occurrences of Special Interest Species (excerpt of MNFI state-wide database).
 - Animal/plant special interest species
 - Champion trees
 - Natural communities
 - Geological features
- The only comprehensive single source of existing data on Michigan's Natural Features



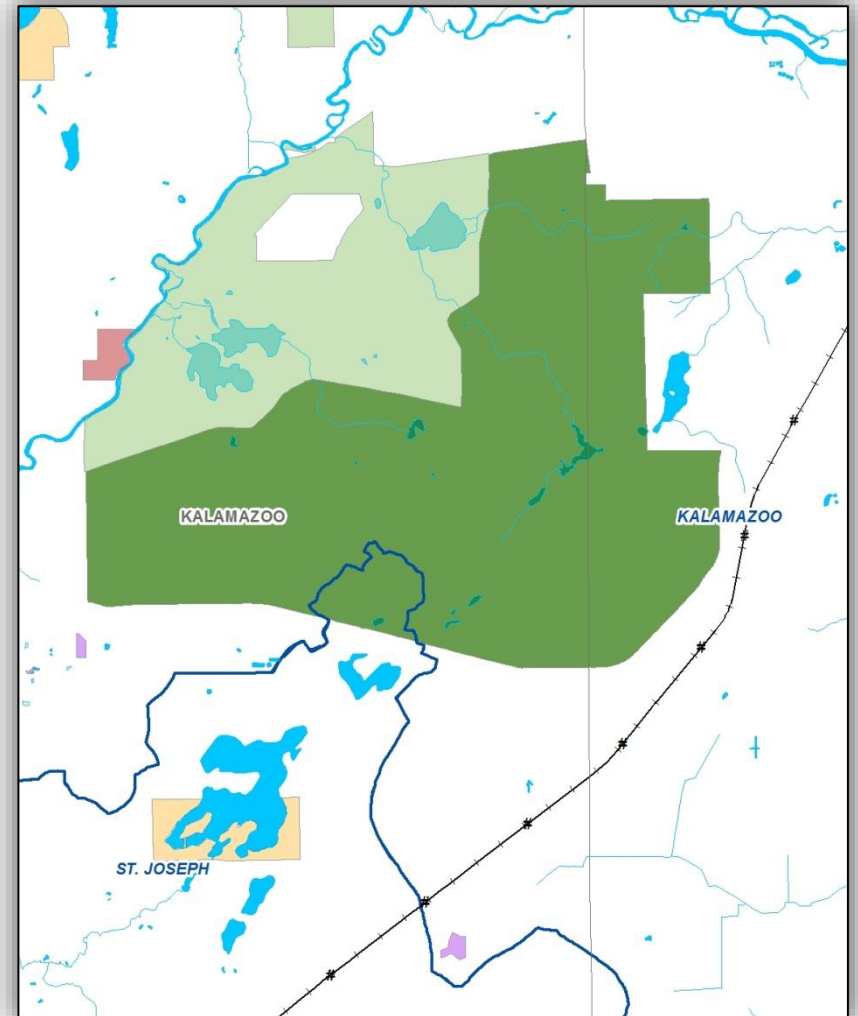
Database Elements: MNFI Database

- Ranking
 - Federal and State Endangered
 - Federal and State Threatened
 - Federal Candidate Species
 - State Special Concern Species
- Date of first/last observation
- Occurrences spatially located by PLSS sections.
- Tt coded occurrences by CN rail/milepost proximity.

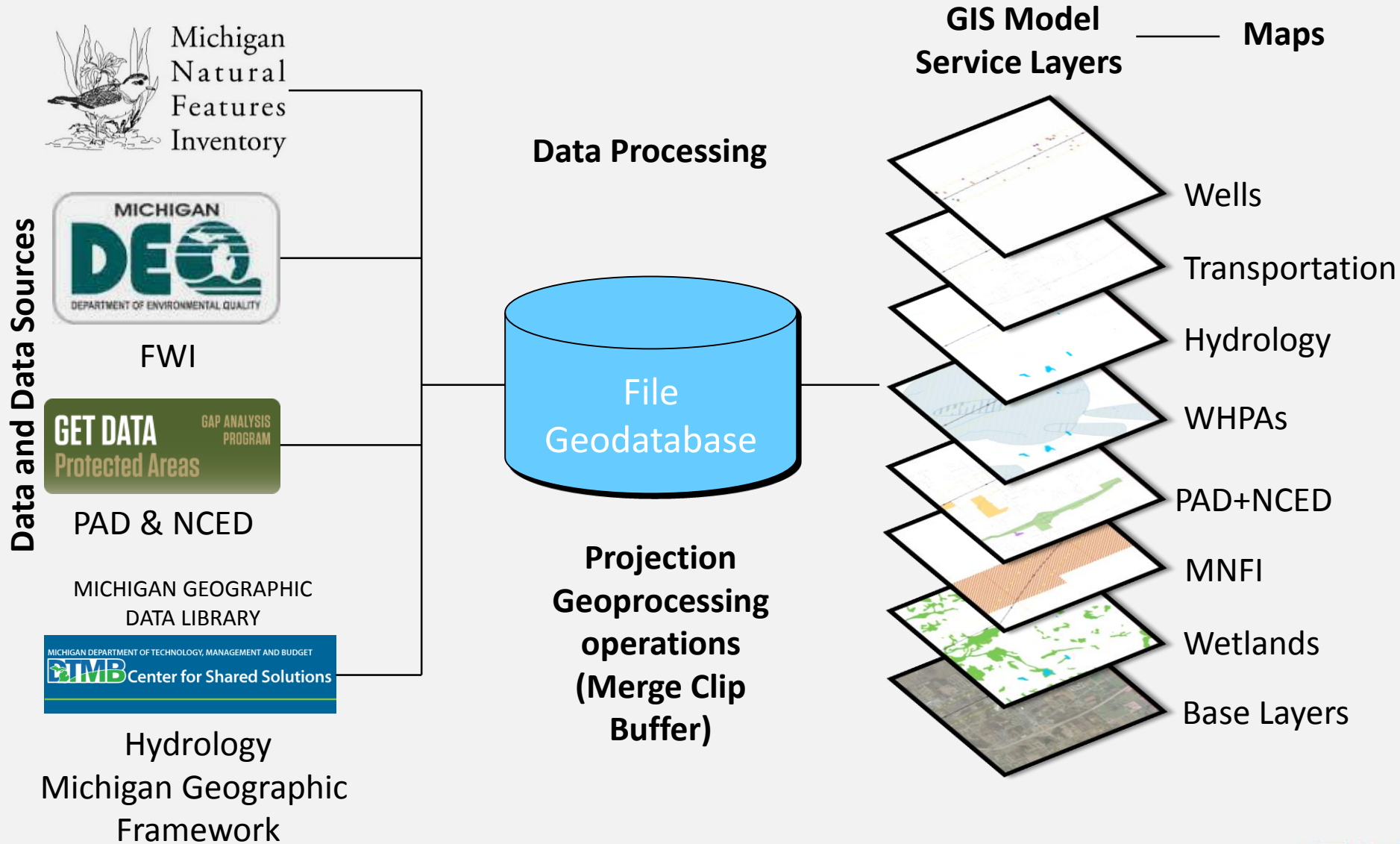


Database Elements Land Use: PAD-US & NCED

- Extract of the full PAD-US (Protected Areas Database) v.2 for the State of Michigan. October 2012.
- National Conservation Easement Database (NCED) (privately owned land)
- To evaluate spatial relationships with protected areas.



Database Elements – GIS Model



Web Services Architecture

Content

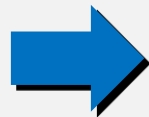
GIS Servers

Portal

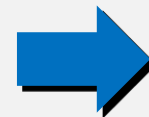
ArcGIS Online Services

Tetra Tech hosted
(GIS in the premises)

Project specific
Geodatabase



ArcGIS
Server



Portal
for ArcGIS

*Authoring
tools*

*Appearance
behaviors*

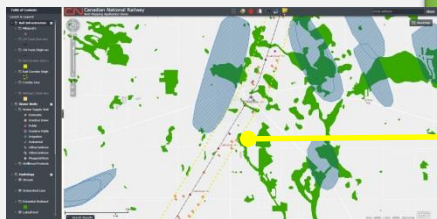
Web Services Architecture

People-Apps

Portal

GIS
Infrastructure

Web



Devices



Desktop



Server



ArcGIS Online
services

Flex Viewer Web Interface

WIDGETS: small applications with limited functionality executed within the web interface by the user

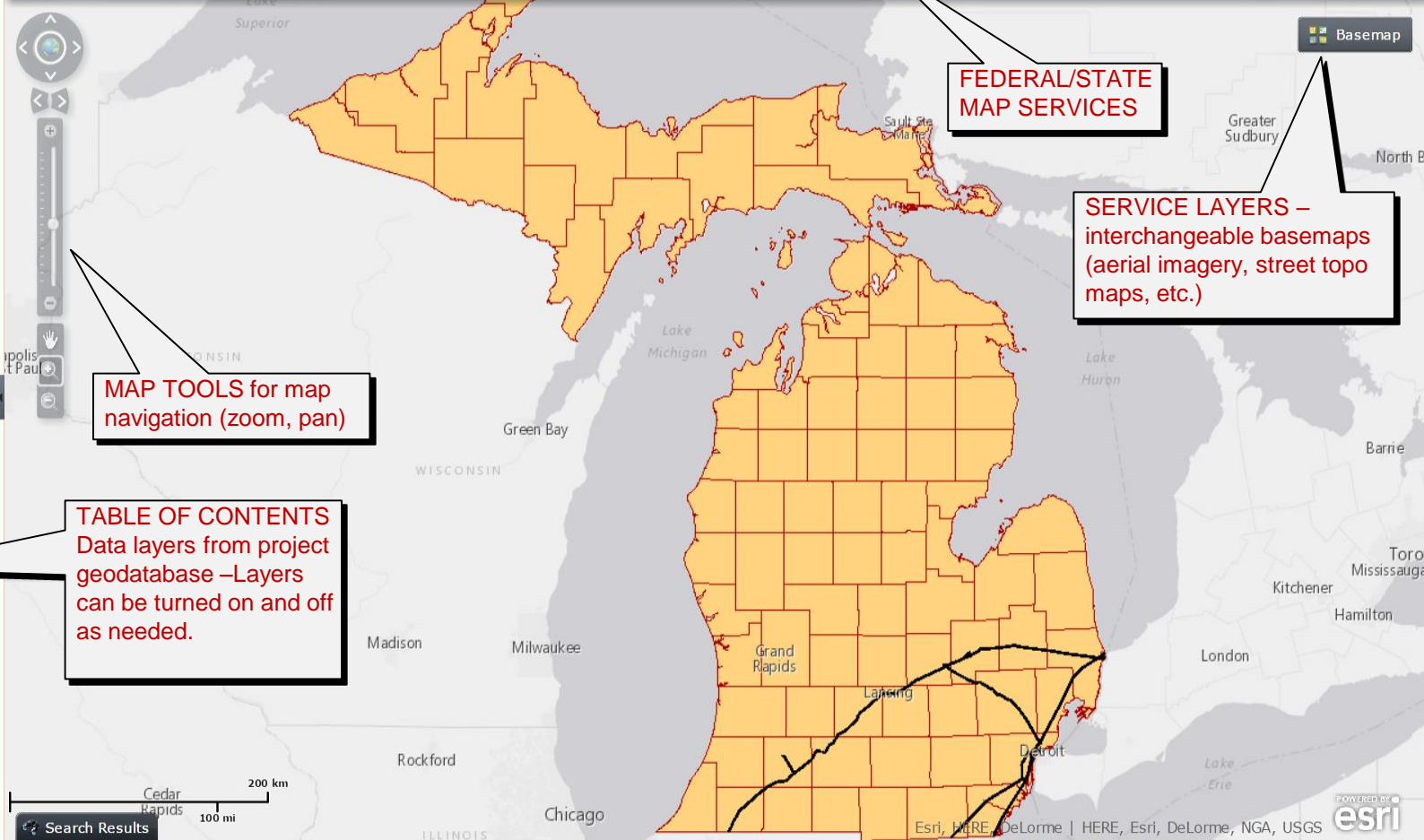


Table of Contents

Layers & Legend

- ▼ Rail Infrastructure
 - ▼ Mileposts
 - ▼ CN Track (low res)
 - ▼ CN Track (high res)
 - ▼ Rail Corridor (low res)
 - ▼ Rail Corridor (high res)
 - ▼ County Line
 - ▼ Michigan State Boundary
- ▼ Hydrology
 - ▼ Stream
 - ▼ Watershed Line
 - ▼ Potential Wetland (low res)
 - ▼ Lake/Pond
- ▼ Natural Resources
 - ▼ Michigan Natural Features
 - ▼ Area of Occurrence

MAP TOOLS for map navigation (zoom, pan)

TABLE OF CONTENTS
Data layers from project geodatabase –Layers can be turned on and off as needed.

FEDERAL/STATE MAP SERVICES

SERVICE LAYERS –
interchangeable basemaps (aerial imagery, street topo maps, etc.)

Basemap

Flex Viewer Web Interface

ACTIVE WIDGETS

The screenshot displays the Flex Viewer Web Interface for the Canadian National Railway. The interface includes a Table of Contents on the left, a main map area, and several active widgets. A search bar at the top right contains the text "Enter address" and an "About" link. The map shows rail infrastructure, including tracks and corridors, with a scale bar at the bottom left indicating 400 meters and 1000 feet. A "Search Results" box is visible at the bottom left of the map area.

LEGEND WIDGET
When open, it shows only currently active layers.

LOCATOR WIDGET
Used to find locations.
Mailbox icon = Search by address tool (currently shown)
Pin icon = Search by geographic coordinates tool (not shown)
Table Icon = Search by attributes tool (not shown)

BOOKMARK WIDGET
Used to bookmark map views.
Clicking on saved bookmarks allows quick navigation to preselected locations.
Bookmarked locations are retained after exiting the viewer.

Flex Viewer Web Interface

ACTIVE WIDGETS

Canadian National Railway
Web Mapping Application Demo

Enter address About

Basemap

Draw and Measure

Clear drawings

Fill Color: █ Style: Solid

Alpha: 0.4

Outline Color: █ Width: 1

DRAWING TOOL WIDGET

Can be used to sketch information on the map views.

Various graphic elements can be used; their properties can be selected from a rich array of options.

Show Measurements

Area Units: Acres

Distance Units: Feet

Shape dimensions are calculated as the graphic feature is being drawn and are permanently displayed on the feature as drawing is completed.

Dimensions include area perimeter and length.

Print

Title:

Subtitle:

Print

PRINTING WIDGET - Used to print map views, including any drawing element and written information on the map.

PDF printer can generate a PDF file to be shared electronically.

Map Labels: Downstream GS, Middle Creek, KALAMAZOO, Plint 188, Upstream GS, Set GS 2 here

Measurements: Length: 2,524.12 ft, Length: 395.87 ft, Length: 669.57 ft, Area: 12.82 ac Perimeter: 3,951.55 ft, Area: 21.49 ac Perimeter: 3,407.05 ft

Scale: 500 m, 1000 ft

Search Results

POWERED BY esri

Flex Viewer Web Interface

ACTIVE WIDGET

Enhanced Search

Search Layer: MNFI Area of Occurrences (...)

Use one of the graphical search tools to select Mileposts

Clear

Add search tolerance to point selection

Include text query in selection criteria

Buffer Graphic 1 Miles

SEARCH TOOL WIDGET

This tool allows information retrieval regarding environmental receptors in proximity of a target location.

Searches can be conducted on one data layer at a time, but results can be accumulated.

The tool offers three data search options: graphic, text and spatial.

A buffer can be applied to extend the search to a specific distance from the target location.

Search Results

EO ID	SCIENTIFIC NAME	COMMON NAME	FIRST OBSERVATI...	LAST OBSERVATI...	FEDERAL ST	STATE ST	TOWNSHIP	RANGE	SECTUIB	EORANK	SUBDIVISION	MILEPOST R	MILEPOS
8041	Sistrurus catenatus catenatus	Eastern massasauga	1985	1993	C	SC	01S	06W	5	CD	Flint		187
8041	Sistrurus catenatus catenatus	Eastern massasauga	1985	1993	C	SC	01S	06W	6	CD	Flint		186
8041	Sistrurus catenatus catenatus	Eastern massasauga	1985	1993	C	SC	01N	06W	28	CD	Flint		189
8041	Sistrurus catenatus catenatus	Eastern massasauga	1985	1993	C	SC	01N	06W	29	CD	Flint		188

Auto hide

Export... Print

Search Results can be exported as a spreadsheet or a text file, or printed to a PDF document to be exchanged electronically.

Questions



Questions
are
guaranteed in
life;
Answers
aren't.