Great Lakes Watershed Management System (GLWMS)

Quantifying and Tracking Nutrient Reductions

GLSNRP Dialogues Meeting
Aug 21, 2024
Jeremiah Asher

Institute of Water Research
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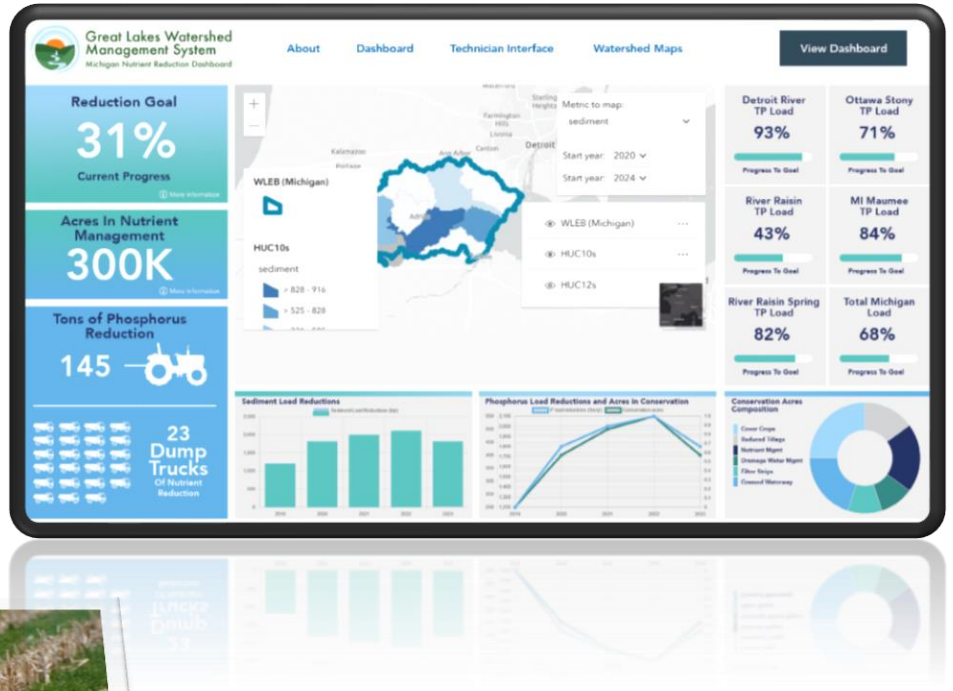
Quantifying and Reporting Field Scale Conservation

GLWMS can quantify and report field scale conservation activities using any model outputs



SWAT (Texas A&M, USDA ARS)
HYDRUS 3D (open source)
L-THIA (Purdue)
STEPL (EPA)
RUSLE (USDA NRCS)
SEDMOD
WEPS (USDA NRCS)

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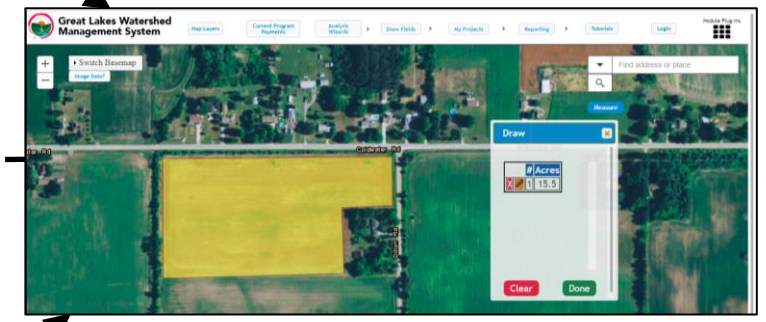
Conceptual Modeling Flow Chart

Dynamic Models
RUSLE
SEDMOD
STEP-L
L-THIA

Soil erosion,
Sediment delivery
Runoff volume
Phosphorus loading
Nitrogen loading

User-digitized field boundaries, current conditions, and proposed BMPs



GLWMS

Look-up Tables
SWAT
WEPS

Groundwater recharge
Phosphorus loading
Wind erosion

GLWMS Development Goals

- ❑ Develop a system that could…
  - Prioritize placement of conservation practices
  - Allow what-if scenarios
  - Track changes over time
- ❑ Accommodate customized workflows for different audiences
- ❑ Modular or plug-in based approach to modeling
- ❑ Simple user interface to access complex models

GLWMS Well Established and Broadly Supported

- GLWMS has been expanding for over 10 yrs with regular system updates and enhancements
- Over $28M in conservation funding and platform development have been invested through the GLWMS

U.S. EPA
GLRI
Army Corps Engineers
Coca-Cola
Method Company
The Nature Conservancy
Purdue University
Michigan State University
USDA NRCS
Delta Institute

Established Training and Familiarity

MAEAP technicians receive annual training as part of the existing Saginaw and River Raisin projects

Technicians are actively working with farmers to run the tool, assess benefits, and map and track adopted BMPs

www.iwr.msu.edu/glwms/

Apps For quick access, place your bookmarks here on the bookmarks bar. Import bookmarks now... Other bookmarks

Great Lakes Watershed Management System

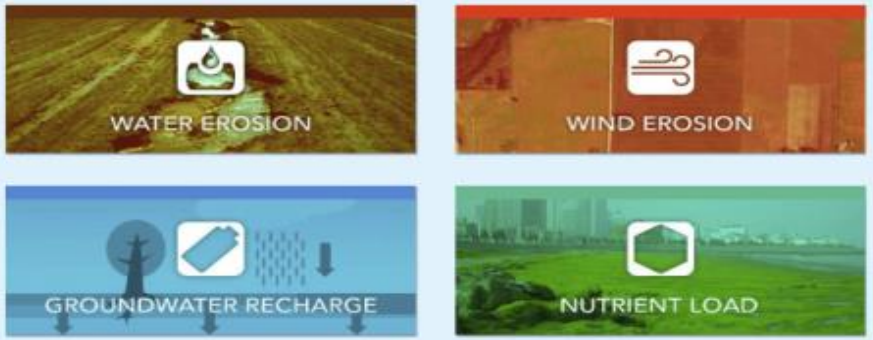
Note: If you would like access the legacy Great Lakes Watershed Mangement System, please use this link.

Learn more about the Great Lakes Watershed Management System

Work with our team to customize the Great Lakes Watershed Management System for your needs

Access how-to materials, learn about the models used in the system, and view upcoming training events.

Analysis Type



Customized View

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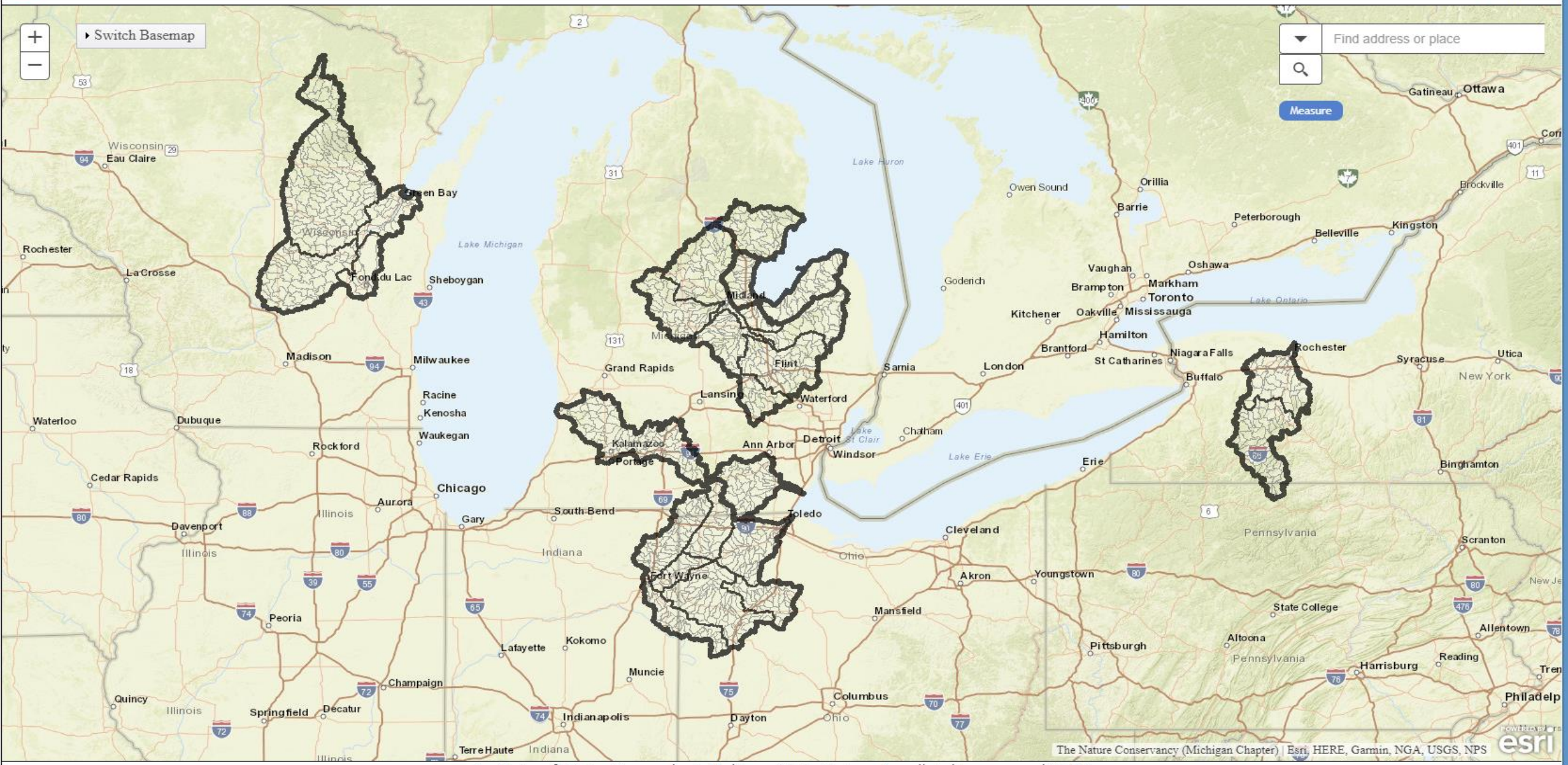
Secure | https://iwr.msu.edu/glwms2/Map.aspx

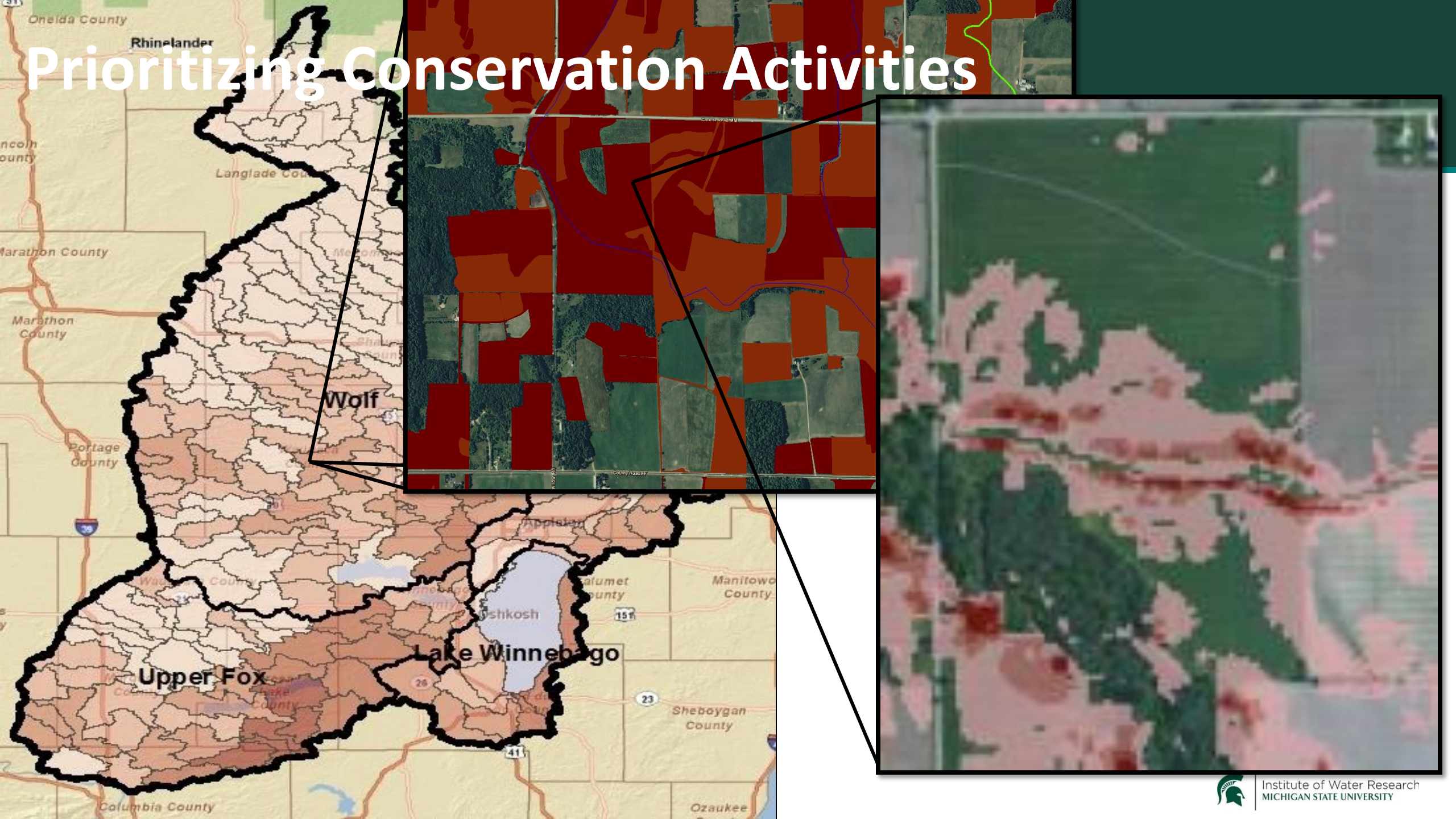
Apps For quick access, place your bookmarks here on the bookmarks bar. Import bookmarks now... | Other bookmarks

Great Lakes Watershed Management System

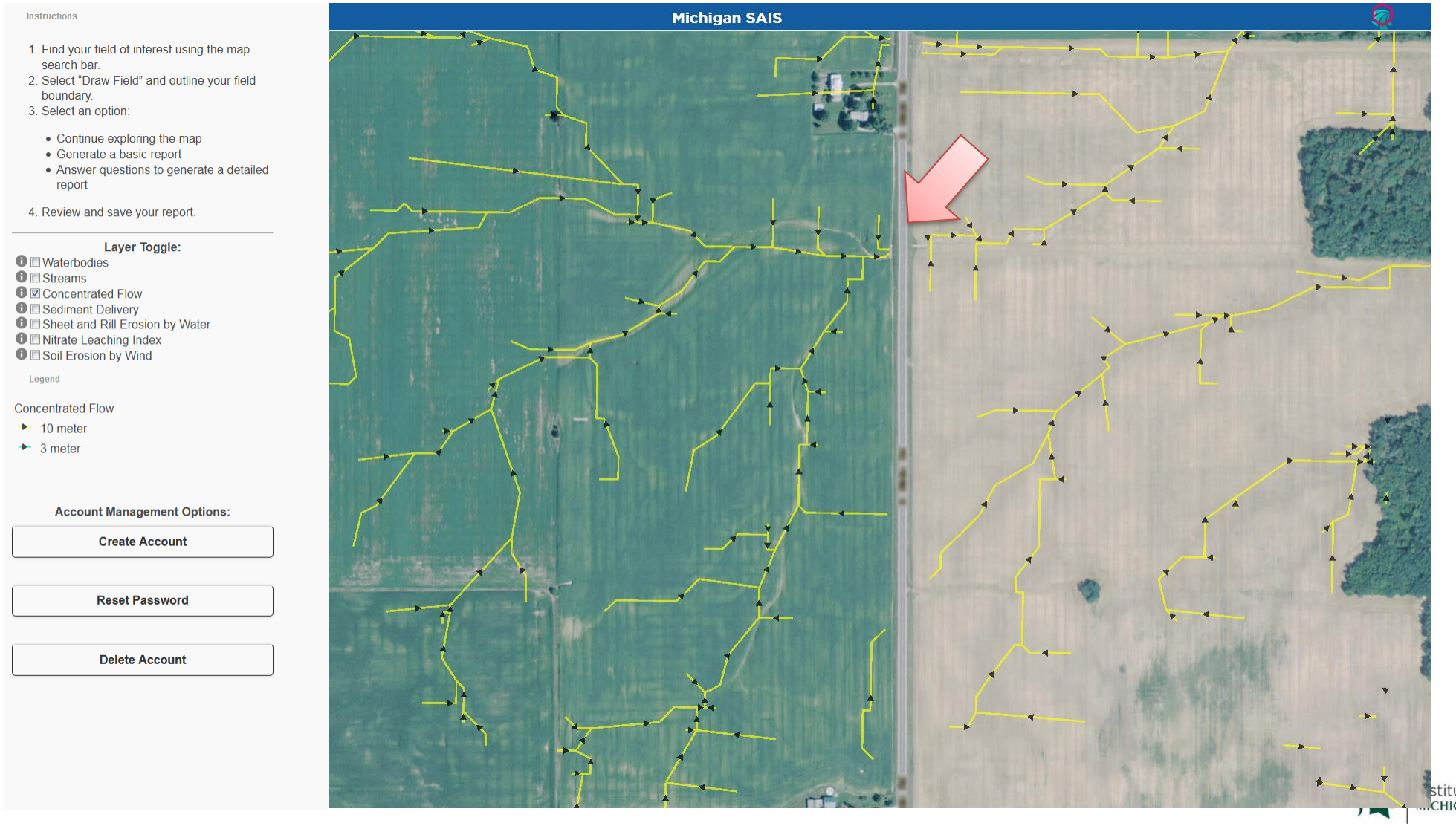
Map Layers | Current Program Payments | Analysis Wizards | Draw Fields | My Projects | Reporting | Tutorials | Login | Module Plug-ins



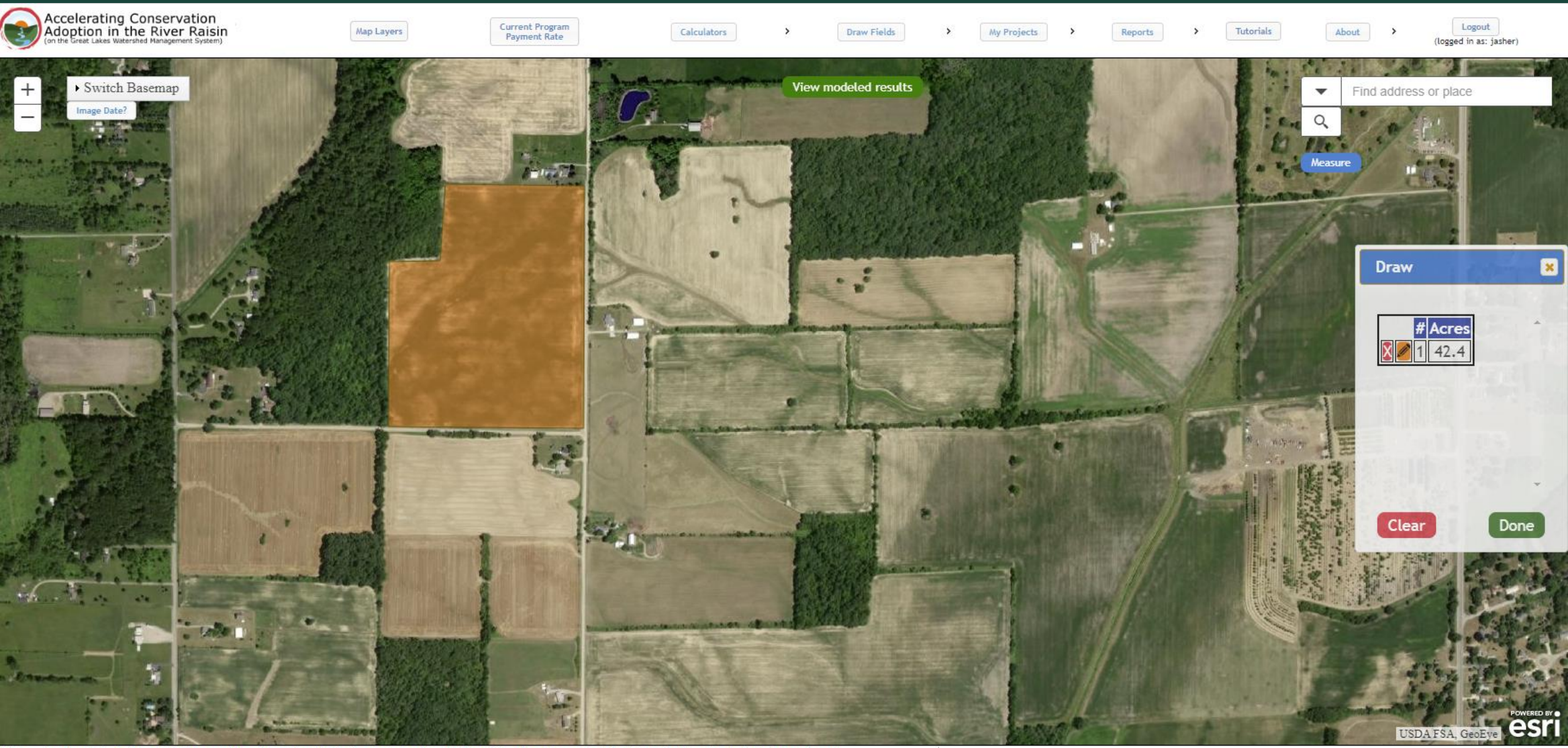
Prioritizing Conservation Activities



Concentrated Flow in SAIS



Source: Jerry Grigar, NRCS



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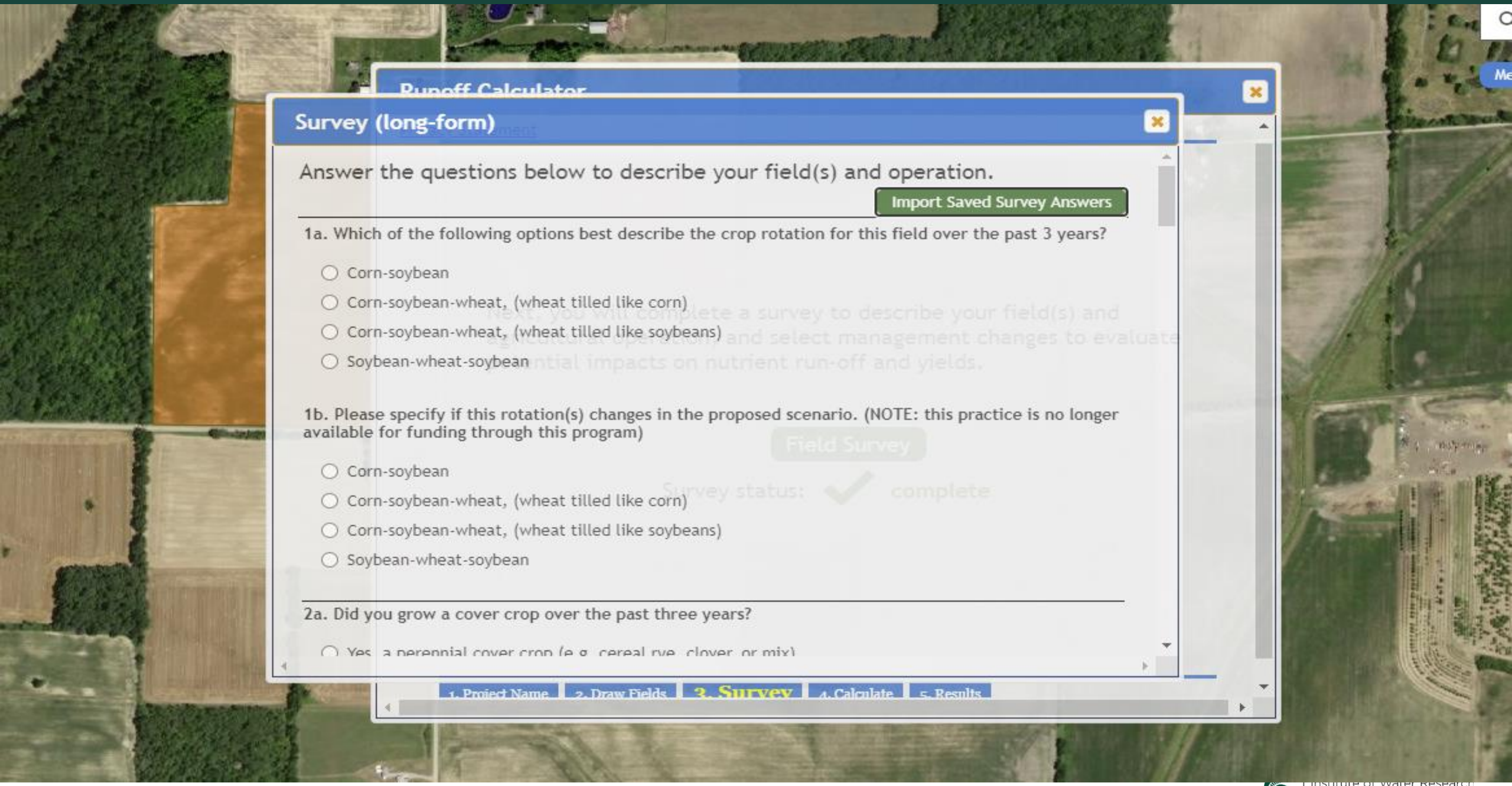
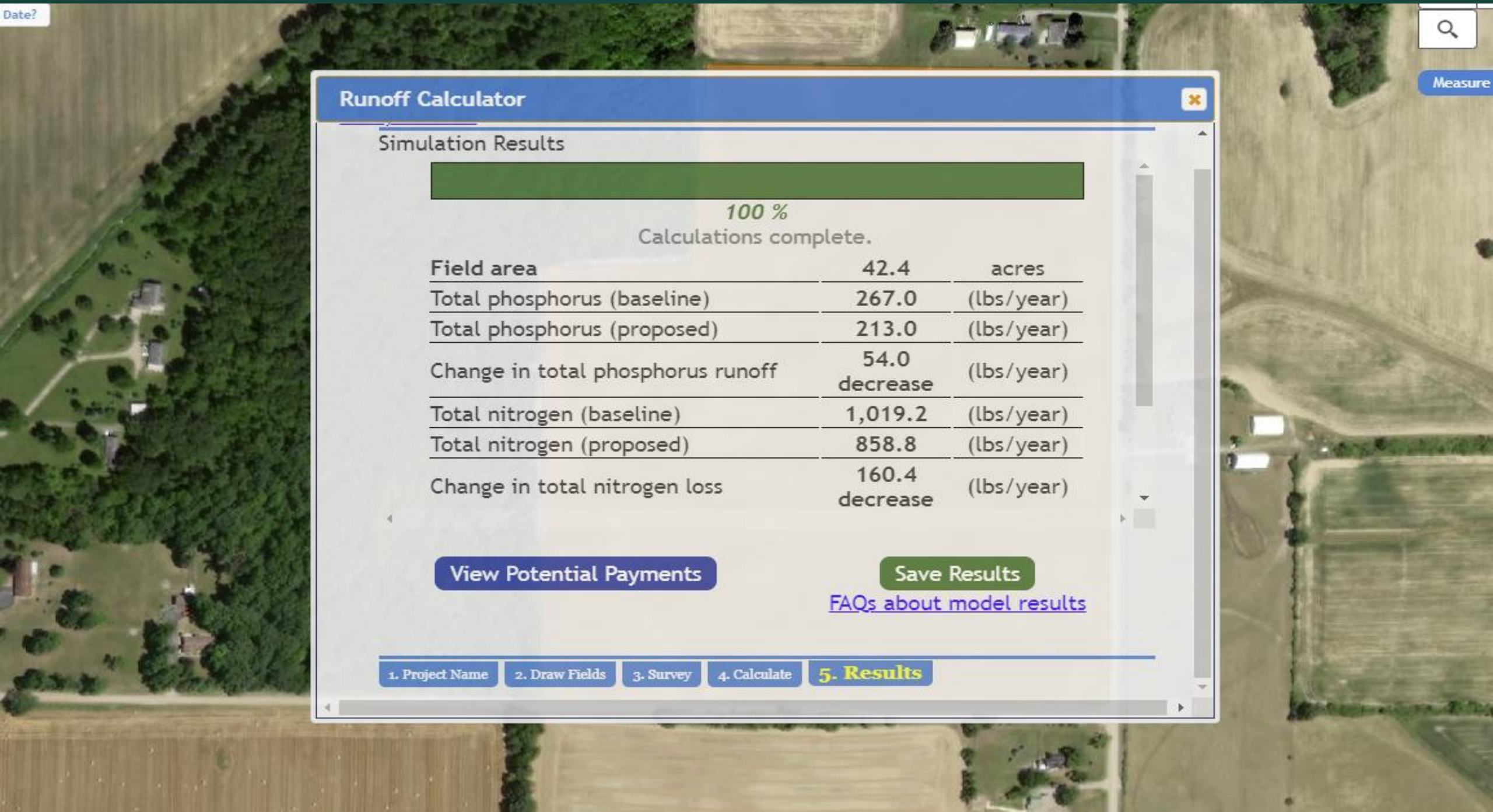
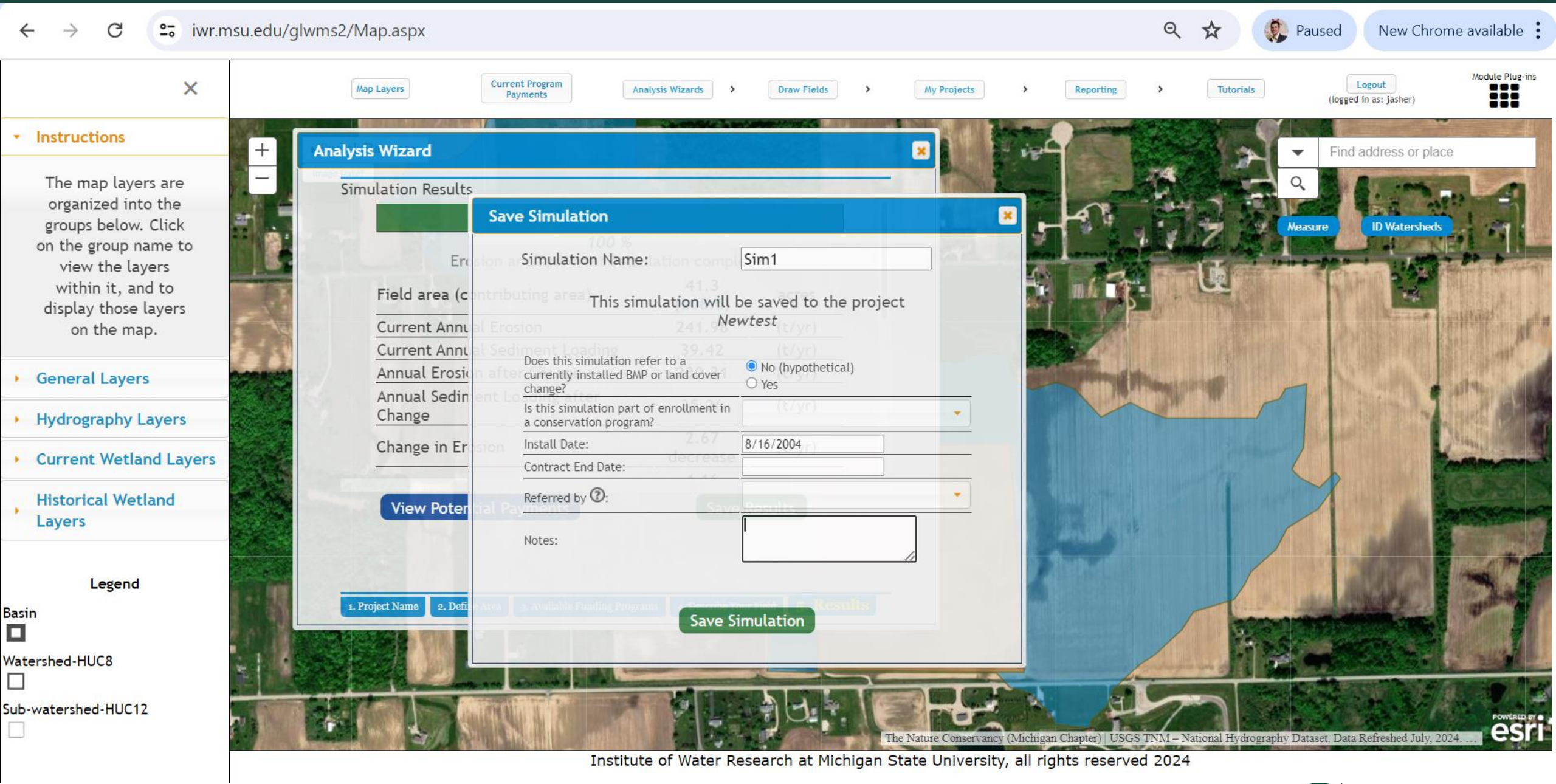

Runoff Calculator
Survey (long-form)
Answer the questions below to describe your field(s) and operation.
Import Saved Survey Answers
1a. Which of the following options best describe the crop rotation for this field over the past 3 years?
Corn-soybean
Corn-soybean-wheat, (wheat tilled like corn)
Corn-soybean-wheat, (wheat tilled like soybeans)
Soybean-wheat-soybean
1b. Please specify if this rotation(s) changes in the proposed scenario. (NOTE: this practice is no longer available for funding through this program)
Corn-soybean
Corn-soybean-wheat, (wheat tilled like corn)
Corn-soybean-wheat, (wheat tilled like soybeans)
Soybean-wheat-soybean
2a. Did you grow a cover crop over the past three years?
1. Project Name
2. Draw Fields
3. Survey
4. Calculate
5. Results


Date?
Measure
Runoff Calculator
Simulation Results
100 %
Calculations complete.
Field area 42.4 acres
Total phosphorus (baseline) 267.0 (lbs/year)
Total phosphorus (proposed) 213.0 (lbs/year)
Change in total phosphorus runoff 54.0 decrease (lbs/year)
Total nitrogen (baseline) 1,019.2 (lbs/year)
Total nitrogen (proposed) 858.8 (lbs/year)
Change in total nitrogen loss 160.4 decrease (lbs/year)
View Potential Payments
Save Results
FAQs about model results
1. Project Name
2. Draw Fields
3. Survey
4. Calculate
5. Results



Michigan Nutrient Tracking Dashboard

MDARD is partnering with MSU-Institute of Water Research (IWR) to build off IWR's Great Lake Watershed Management System

Beginning of a 3 yr effort to work with partners to co-design, build, and test, and deploy the nutrient tracking dashboard

System will be able to track investments in conservation across all funding sources

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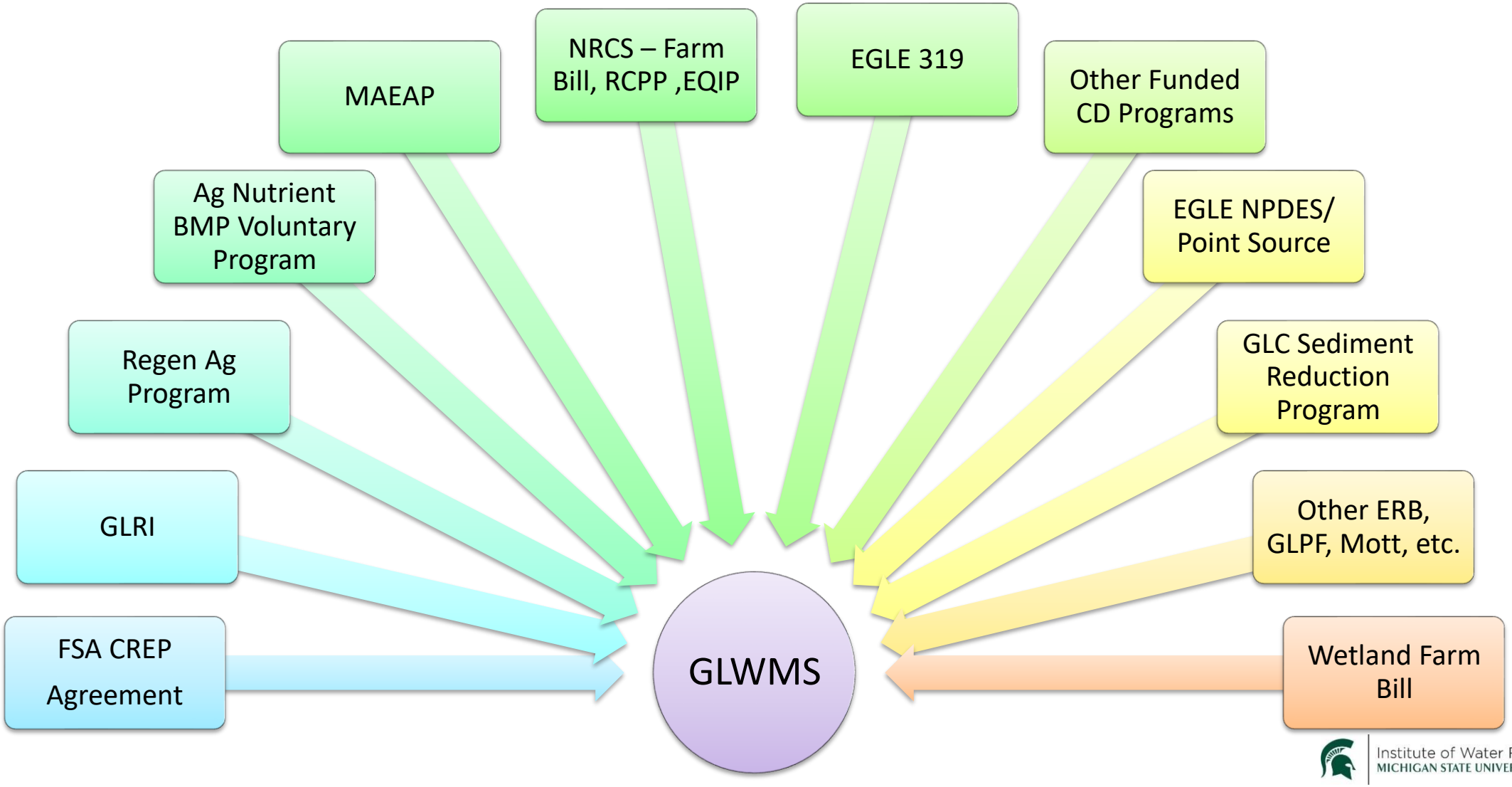
Track Investments Across All Funding Sources



Developing Conservation Practice Metrics

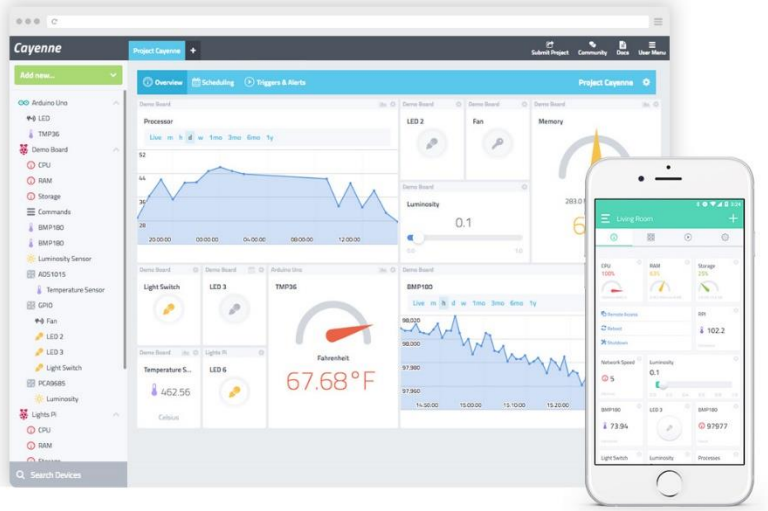
Conservation Practices

- Conservation Tillage
- Buffer Strips
- Nutrient Management
  - Commercial
  - Manure
  - Soil P Test
- DW Management
- Cover Crops
- Grassed Waterway
- Phosphorus Structure

Metrics

- Acres of Conservation
- Total Phosphorus
- Soluble Phosphorus
- # of Practices Types
- Sediment Reduction
- Soil Health

Dashboard



Watershed scale mapping, visualization, and analysis of data

Long-term nutrient reduction goal tracking

Visualize data easily with infographics

Tracking and monitoring of water quality and conservation metrics

View Dashboard

Reduction Goal

31%

Current Progress

More Information

Acres In Nutrient Management

300K

More Information

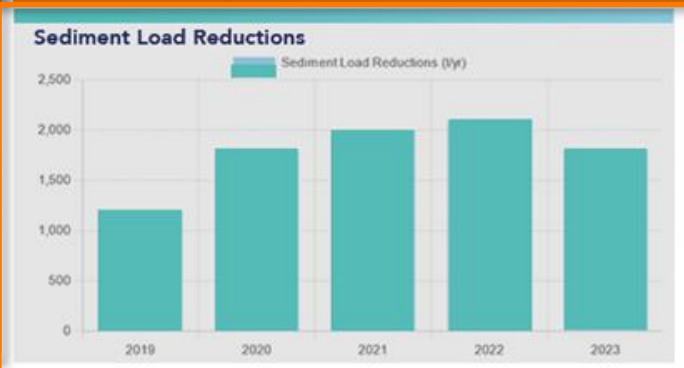
Tons of Phosphorus Reduction

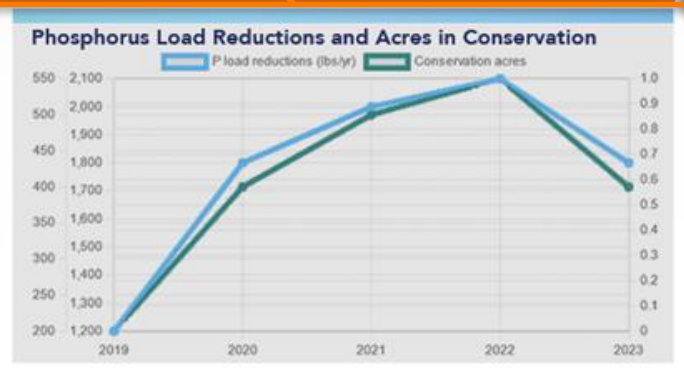
145

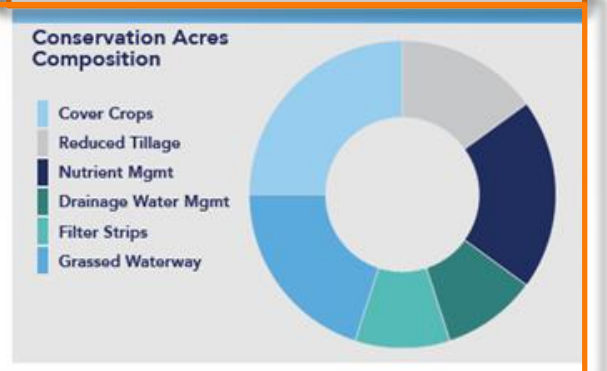
23 Dump Trucks Of Nutrient Reduction

Detroit River TP Load: 93%	Ottawa Stony TP Load: 71%
River Raisin TP Load: 43%	MI Maumee TP Load: 84%
River Raisin Spring TP Load: 82%	Total Michigan Load: 68%

Progress To Goal







Next Steps

- Calibrate new SWAT models recently developed for the Michigan WLEB
- Develop protocols for integrating the 12 data sources
- Connect newly funded water quality monitoring data to the dashboard
- Test and deploy the Nutrient Tracking Dashboard by Sept 2026

Questions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Thank you!