

# WETLAND MAPPING CONSORTIUM

## *Minnesota's "Restorable Wetland Prioritization Tool"*

*Mark Gernes  
Minnesota Pollution Control Agency*



**Hosted by the Association of State Wetland Managers  
Supported by the McKnight Foundation**

Photo credit: Jeanne Christie



*If you have any technical difficulties during the webinar you can send us a question in the webinar question box or call Laura at (207) 310-8708 during the webinar.*

# AGENDA



- **Welcome and Introductions (5 minutes)**
- **WMC Webinar Recordings/Schedule (5 minutes)**
- **Minnesota’s “Restorable Wetland Prioritization Tool” (30 minutes)**
- **Question & Answer (15 minutes)**
- **Wrap up (5 minutes)**

# ASWM WEBINAR SERIES MODERATOR

Marla Stelk,  
Policy Analyst

Association of State  
Wetland Managers



# PRESENTER

**Mark Gernes**  
Wetland Plant  
Ecologist



*Minnesota Pollution Control Agency*

# WEBINAR SCHEDULE/RECORDINGS

Association of State Wetland Managers - Protecting the Nation's Wetlands.



### What's New:

- Less Than Half of Americans Make Anthropogenic Connection
- Clean Water Act 2.0: Rights of Waterways
- Virginia Coastal Partners Workshop: Save the Date
- FGCU appoints director for new Everglades Wetland Research Park
- LA: Expanded Louisiana Coastal Zone Boundary Approved
- Wetland Breaking News - Current Issue

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- Doing Business With ASWAM
- Support Wetlandkeepers
- Volunteer
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- Publications
- ASWAM Members (Login Req.)
- Newsletter
- Insider's Edition

### Conference Schedule

State Wetland Managers holds webinars on topics of which relate to a specific project and work ASWAM holds webinars as part of its members' topics of interest to members. Please click on name below for more details about individual webinars, if you have any questions about a webinar, please contact Laura at [email address]. If you are a member, and you missed a webinar, please contact Laura at [email address]. Part of the members' webinar series, please post the recordings of the webinars going forward.



A presentation given during a webinar.

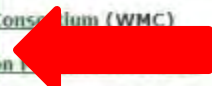
### Webinar Series

Function Alliance (NFFA) [Future](#) [Past](#)

### Conservation (WMC)



[Wetland Program Plans Project](#)

[Stream Identification/Delineation/Mitigation Project](#)



# WEBINAR SCHEDULE/RECORDINGS

Association of State Wetland Managers - Protecting the Nation's Wetlands.



**In the News:**

- Great Barrier Reef's 'unprecedented' threat from dredging, dumping
- EPA Awards \$660K to Comm. for Climate Change
- European seafloor survey reveals depth of marine litter problem
- 100th anniversary of passenger pigeon's extinction reveals lessons
- 'Alien' Plant Species Are Fighting Toxic Waste At Liberty State Park
- Wetland Breaking News - Current Issue

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**Hot Topics**

- Ag News
- MS River & Wetlands
- Gulf Oil Spill
- Sea Level Rise Tools

**ASWM Webinars/Conference Schedule**

The Association of State Wetland Managers holds webinars on various topics, most of which relate to a specific project and work group. In addition, ASWM holds webinars as part of its members' webinar series on topics of interest to members. Please click on the webinar group name below for more details about individual webinars. In all cases, if you have any questions about registering for a webinar, please contact Laura at [laura@aswm.org](mailto:laura@aswm.org). If you are a member, and you missed a webinar that was part of the members' webinar series, please contact us. We will post the recordings of the webinars going ahead.



A presentation given during a webinar

**Special ASWM Webinars**

**Future:**

**Special ASWM American Wetlands Month Webinar** - May 29, 2014 - 3:00pm EDT

**Past:**

**Special ASWM Webinar: Options for Financing Environmental Enhancement at the Local Level in Oregon** - January 23, 2014 - To view Webinar, [click here](#).

**Special ASWM Webinar: Wetland Link International North America** - October 29, 2013 - To view Webinar, [click here](#).

**Special ASWM Webinar - Koontz v. St. Johns River Water Management District: What Happened and Where Do We Go From Here** - Wednesday, July 17, 2013 - 3:00 p.m. ET - To view Webinar and PowerPoint Presentations, [click here](#).

**Members' Wetland Webinar Series**

[Future](#) [Past: Members Only](#) [Past: Nonmembers](#)

**Natural Floodplain Functions Alliance (NFFA)**

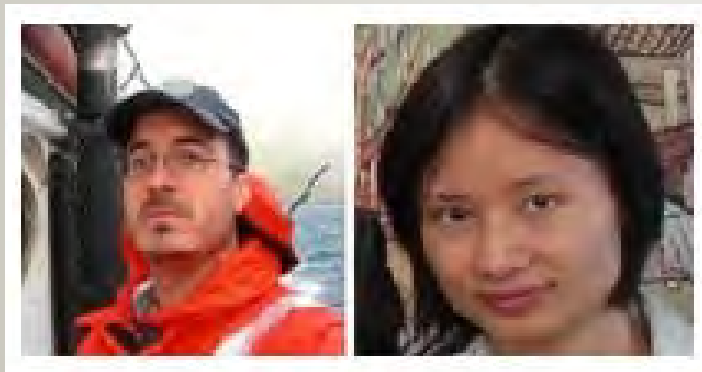
[Future](#) [Past](#)

**Wetland Mapping Consortium (WMC)**

[Future](#) [Past](#)

# WMC WEBINAR POSTED FROM FEB. 18, 2015

## Marsh Analysis and Planning Tool Incorporating Tides and Elevations (MAPTITE): A Geospatial Tool for Estuary Restoration



Chris Paternostro and Lijuan Huang  
NOAA



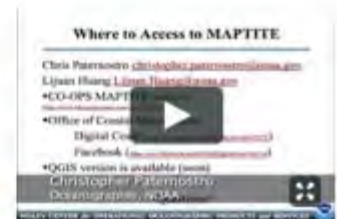
Part 1: Introduction: Marla Stelk, ASWM Policy Analyst, ASWM  
Presenter: Chris Paternostro, NOAA



Part 2: Presenter: Lijuan Huang, NOAA



Part 3: Presenter: Lijuan Huang, NOAA



Part 4: Presenter: Chris Paternostro, NOAA  
Questions



# Future Wetland Mapping Consortium Webinars

## July 15:

**Part 1 - “The Florida Wetlands Integrity Dataset: Using soils data, topographic indices, and Bayesian probability to identify wetlands” - Florida DEP**

## August:

No webinar

## September 16:

**Part 2 – “The Florida Wetlands Integrity Dataset: Analysis of nonrenewable energy data and construction of graph-theoretic networks to quantify landscape integrity” – Florida DEP**

# JOIN ASWM: BECOME A MEMBER AND/OR DONATE

Association of State Wetland Managers - Protecting the Nation's Wetlands.



**In the News:**

- World Stands By As Algae and Dead Zones Ruin Water
- E.P.A. Unveils 2nd Phase of Plan to Reverse Great Lakes Damage
- NC: Duke Energy creates \$10 million water fund
- Obama to create largest protected marine reserve in Pacific Ocean
- Federal judge rejects BP's request for repayment on oil spill claims
- Wetland Breaking News - Current Issue

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**Member's Login**

Hi Marla Stelk,

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**User Menu**

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**Recent Recorded Webinars**

**Association of State Wetland Managers**

ASWM Website has been upgraded and some links may not be working at this time. If you are experiencing any problems, please email [Sharon](#). Thank you for your patience.

**Picture of the Week**



**Donate Now**



**Join ASWM**



**WBN**

FREE  
Sign up for  
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[www.aswm.org](http://www.aswm.org)

# INTERESTED IN RECEIVING CEUS?

## Who can get CEUs?

- You must be a participant during the live webinar presentation.
- We are able to track webinar participation by registrants using our GoToWebinar software.
- **Documentation will state that you were a participant for X hours of a specific ASWM webinar.**

## Receiving Documentation

*If you need CEUs for your participation in today's webinar, you **must request** documentation from ASWM.*

*Please note that we will send the documentation to you **for you to forward** to the accrediting organization.*

Please contact **Laura Burchill**  
[laura@aswm.org](mailto:laura@aswm.org)  
(207) 892-3399

Provide:

- Your full name (as registered)
- Webinar date and Title

# MARK GERNES

IT WILL TAKE US A FEW MOMENTS TO MAKE THE SWITCH....



# Restorable Wetland Prioritization Tool

## - for Minnesota

MPCA: Mark Gernes

NRRI: Jeremy Erickson, Terry Brown, Lucinda Johnson,  
Valerie Brady,

### Restorable Wetland PRIORITIZATION TOOL

[Home](#) • [Project description](#) • [Links](#) • [The tool](#)



#### Helping decision makers prioritize where to restore and protect wetlands.

Minnesota wetlands provide a wealth of ecological benefits including water quality and habitat enhancement. Over the course of its history Minnesota has lost over 52 percent of its pre-settlement wetland area and those benefits associated with. This tool will aid individuals interested in wetland restoration or protection by:

- Predicting likely locations of restorable wetlands with a statewide restorable wetland inventory.
- Locating highly stressed areas most in need of water quality or habitat improvement.
- Prioritizing areas that already are or are most likely to result in high functioning sustainable wetlands.
- Identifying areas that will provide the greatest benefits in the form of water quality and habitat.
- Refining prioritizations with aerial imagery and available environmental data.

# *Restorable Wetland* PRIORITIZATION TOOL

- Tool was designed to help prioritize wetland restoration siting
- Potential for many other uses.

[WWW.mnwetlandrestore.org](http://WWW.mnwetlandrestore.org)

Or search “Minnesota Wetland Restoration”

# Objective #1

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- Prioritize areas where wetland restoration will result in the improvement of water quality (N and P) and habitat.



# Objectives #2 and #3

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- Identify areas that will most likely result in high quality wetlands that will be self-sustaining into the future.
- Identify areas most in need of wetland protection.





# What this tool is NOT...

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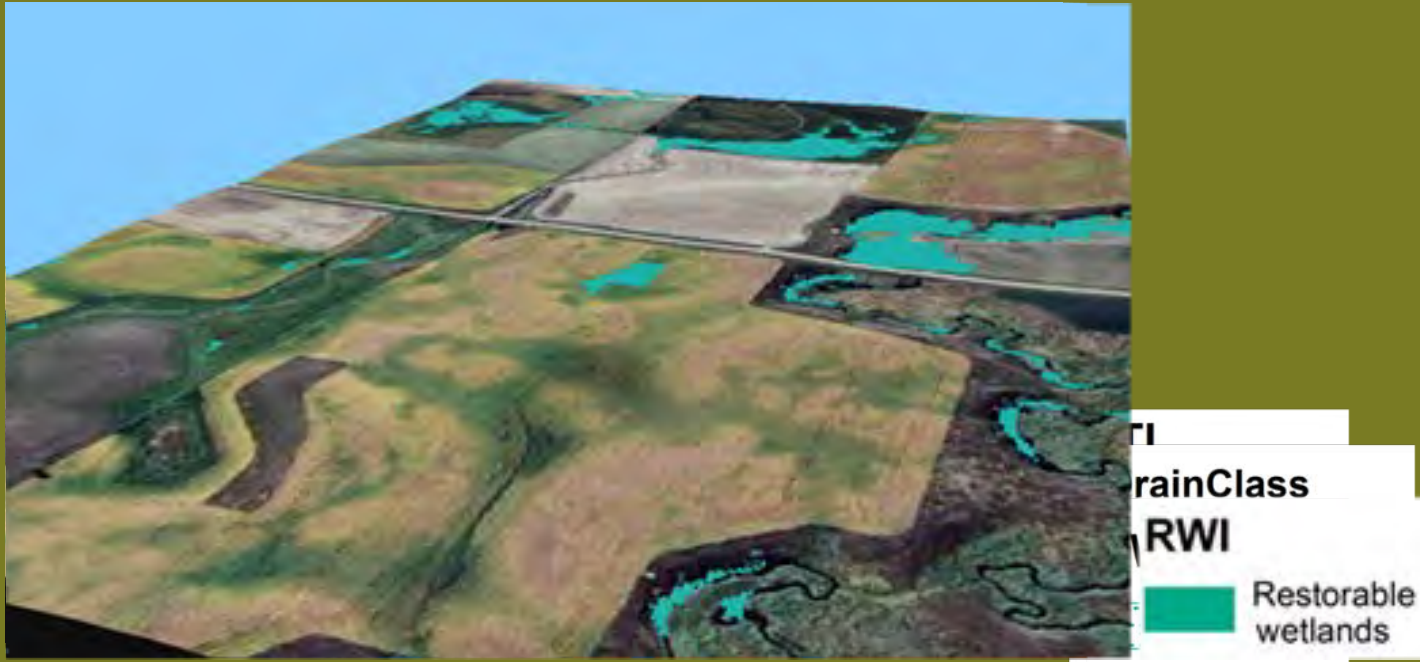
- A site-specific model to identify individual wetlands for restoration;

Does not replace:

- Wildlife Habitat Evaluation Procedure
- Detailed field surveys
- Water quality assessments
- Local knowledge
- Soil loss equations



# Restorable Wetland Delineation (CTI/SSURGO method)



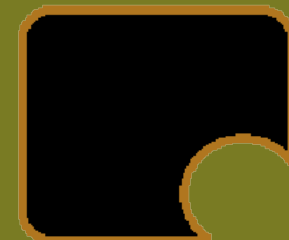
$$CTI = \ln (A_s / (\tan(\beta)))$$

Where

CTI > 10.5

Poorly or very  
poorly drained  
soils

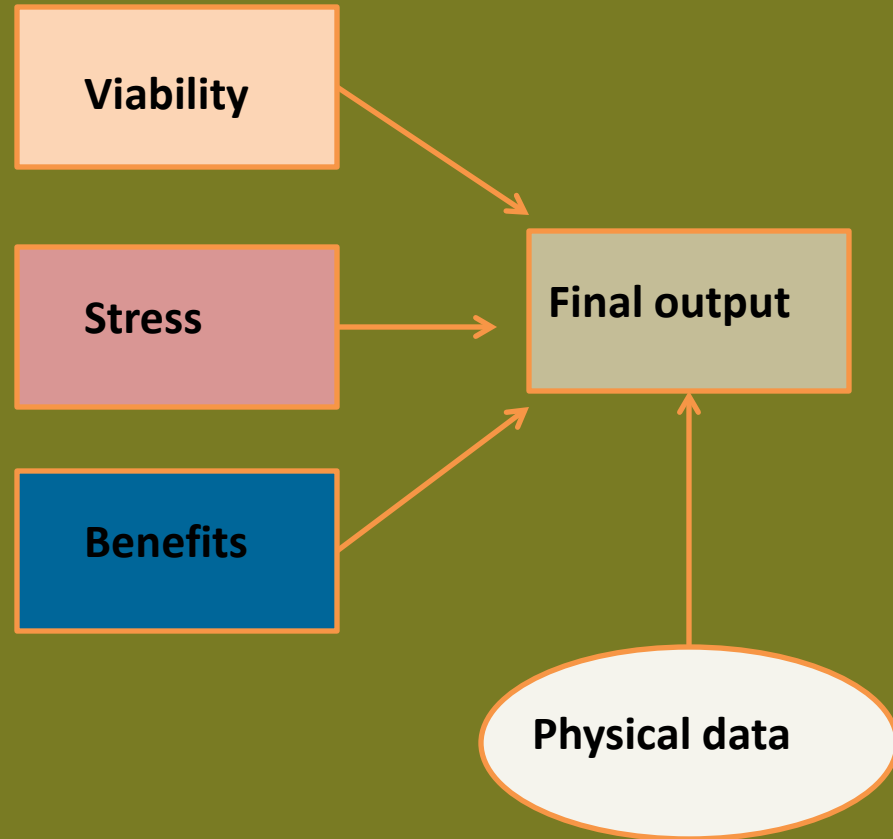
$A_s = (\text{flow accumulation} + 1) * (\text{pixel area } m^2)$   
 $\beta = \text{slope expressed in radians.}$



# Wetland restoration decision layers

(data layer summary)

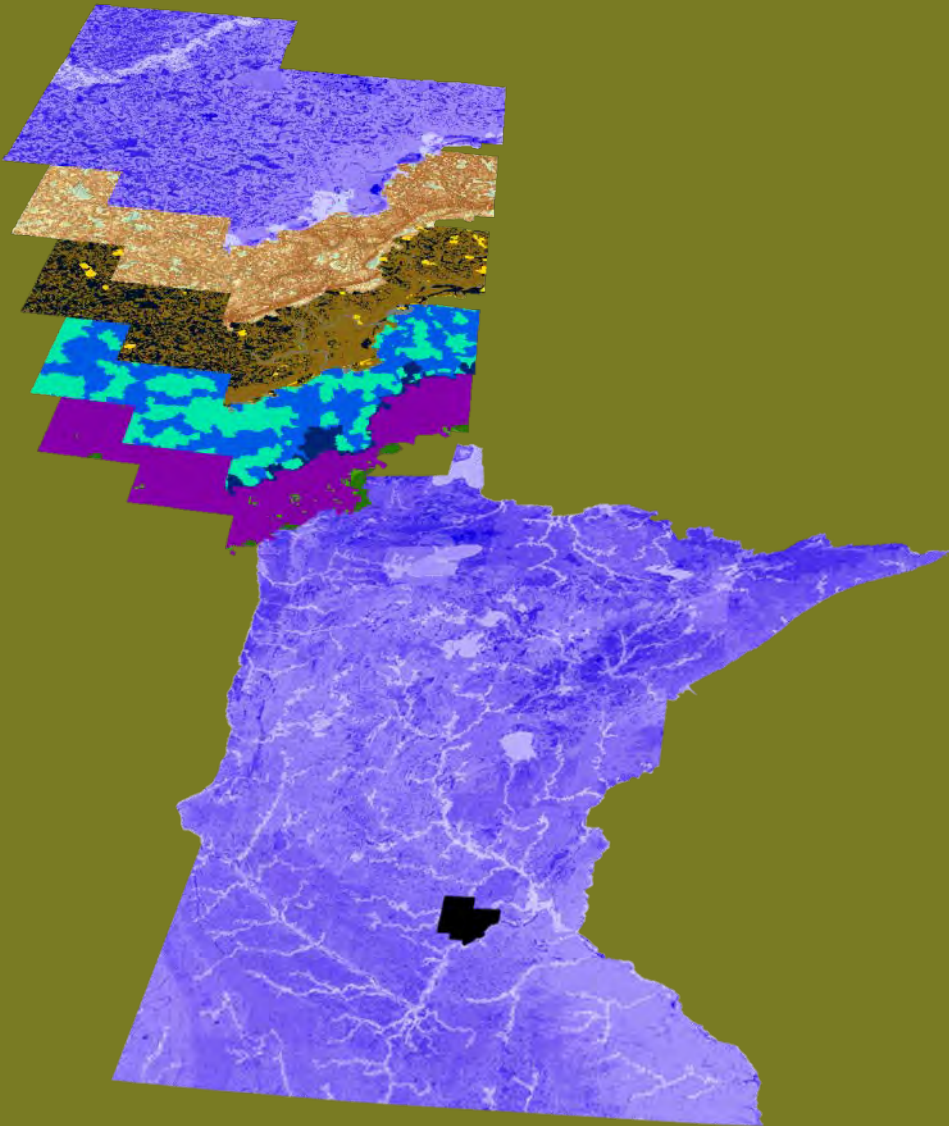
- **Viability**  
Factors that predict the success (or failure) of restoration
- **Stress**  
Factors that predict the level of anthropogenic stress
- **Benefits**  
Environmental services that will be enhanced by restoration
- **Physical data**  
Environmental data that acts as a potential modifier to the final output



# Viability

*Factors that predict the success (or failure) of restoration*

---

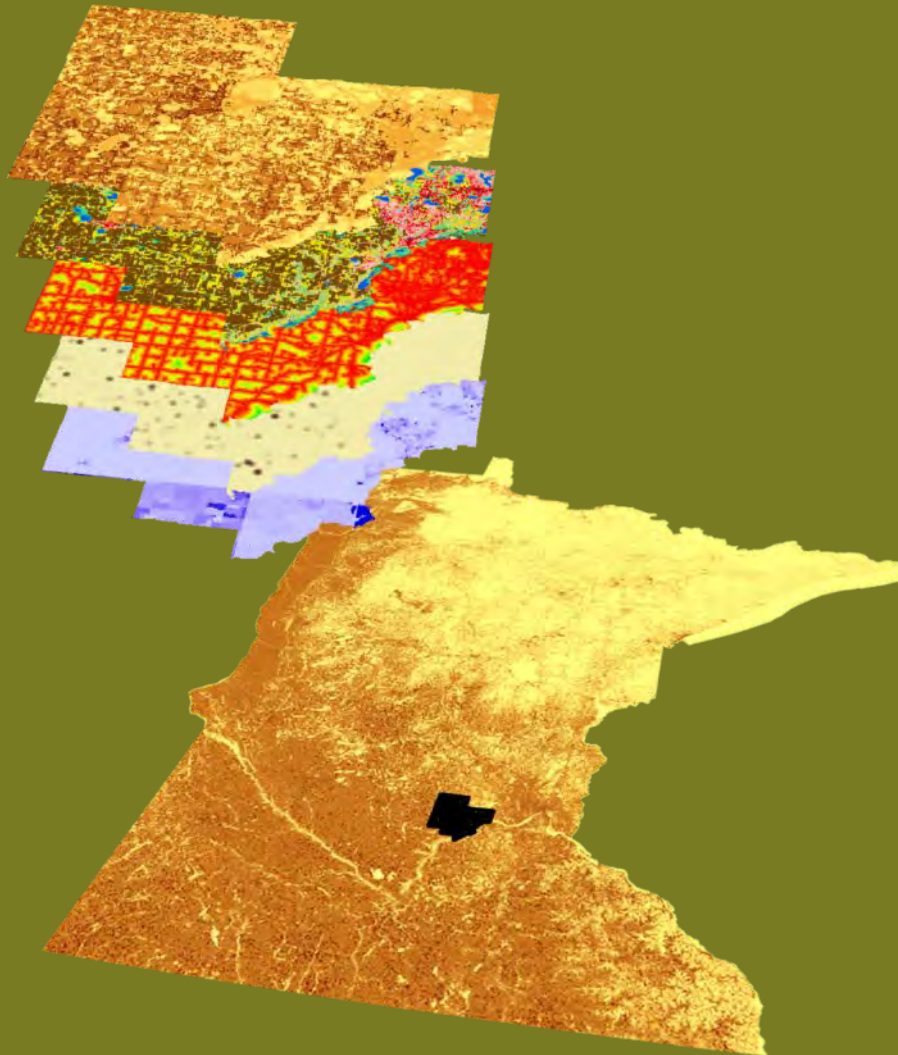


- Topography (CTI)
- Soil type
- Network position
- Ownership
- Natural land cover

# Stress

## *Factors that predict anthropogenic stress on the landscape*

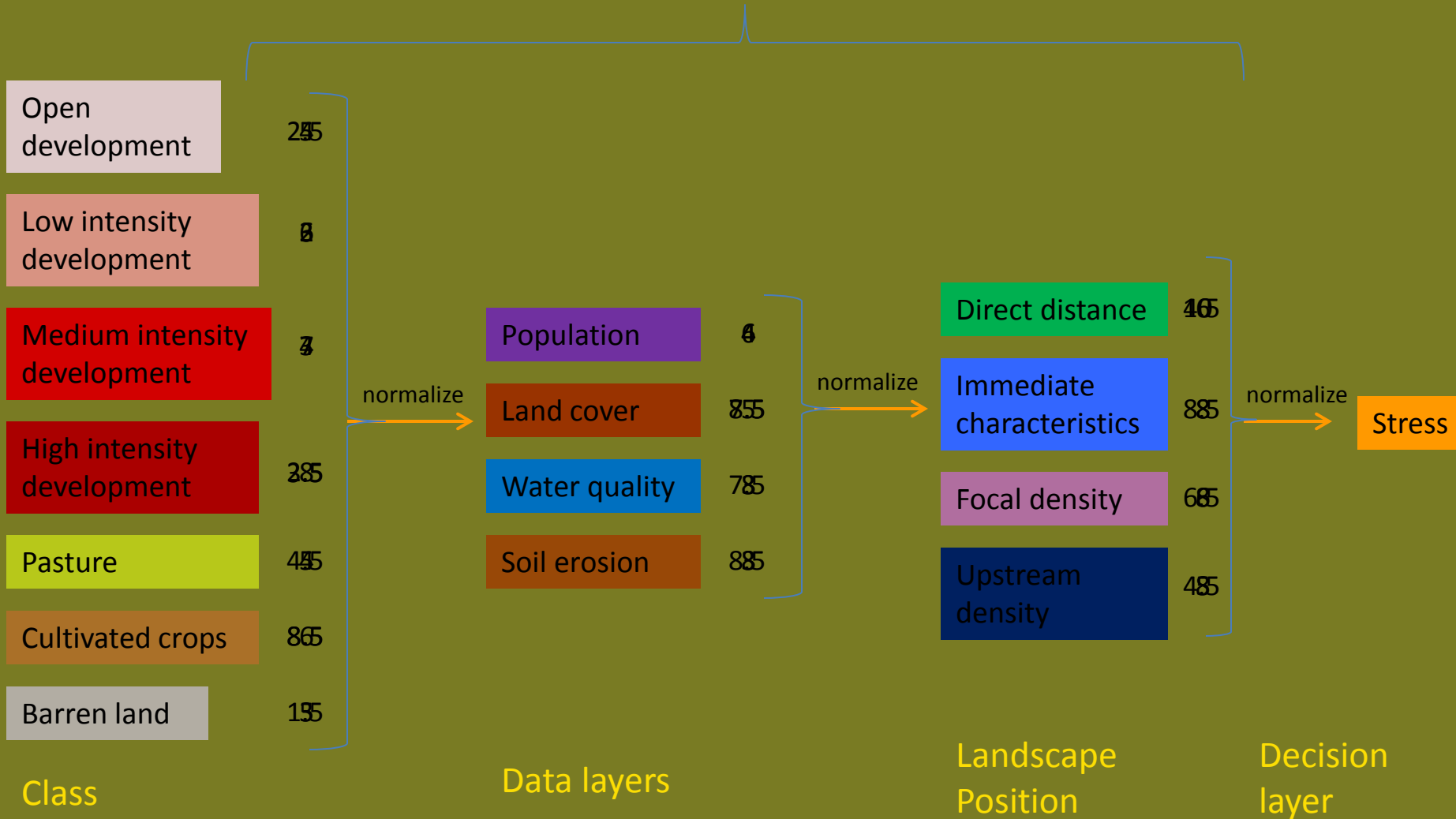
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- Land cover (2011 NLCD)
  - Open development
  - Low density development
  - Medium density development
  - High density development
  - Pasture
  - Cultivated crops
  - Barren land
- ◉ Roads (2013 MNDOT Roads)
- ◉ Feedlots (MPCA 2013)
- ◉ Population density (2010 Census)
- ◉ Soil erosion risk (EBI)
- ◉ Water quality risk (EBI)

# Spatial tool schematic

Focus area - Phosphorus



# Benefits (water quality/erosion)

*Environmental services that will be enhanced by restoration*

---

- Downstream flow distance to water
- Water quality risk (EBI)
  - Proximity to water
  - Stream Power Index (SPI)
- Downstream soil erosion risk (EBI)
  - RUSLE components (K, R, LS)
    - Downstream flow accumulation




# *Restorable Wetland*

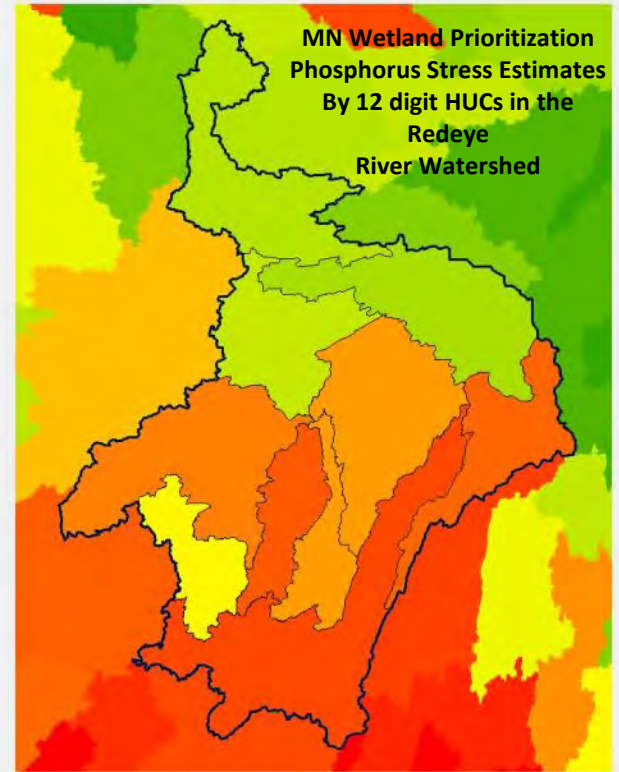
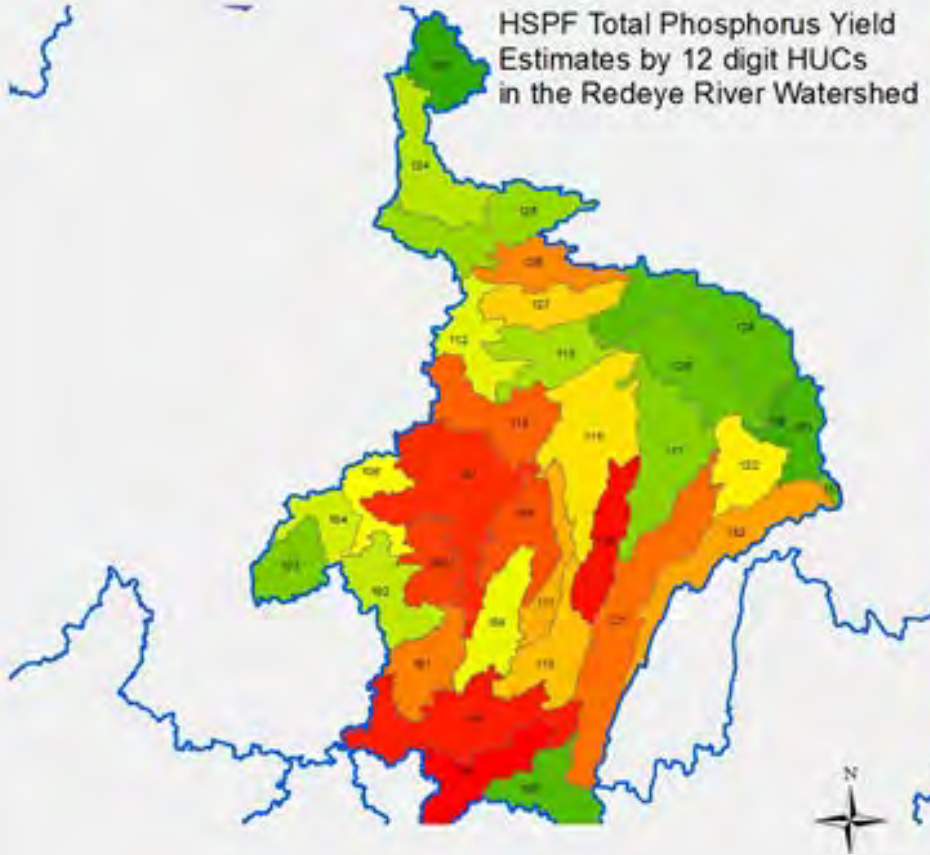
## PRIORITIZATION TOOL

- Several Statewide Data Layers
  - Restorable wetland layer(s)
  - Physical layers: imagery and background data – (Bing and Google)
  - Gap ownership; Population; Wild Rice locations; Impaired waters (streams, lakes and wetlands); surface water (lakes); streams; feedlots; wetlands; DEM and hillshade



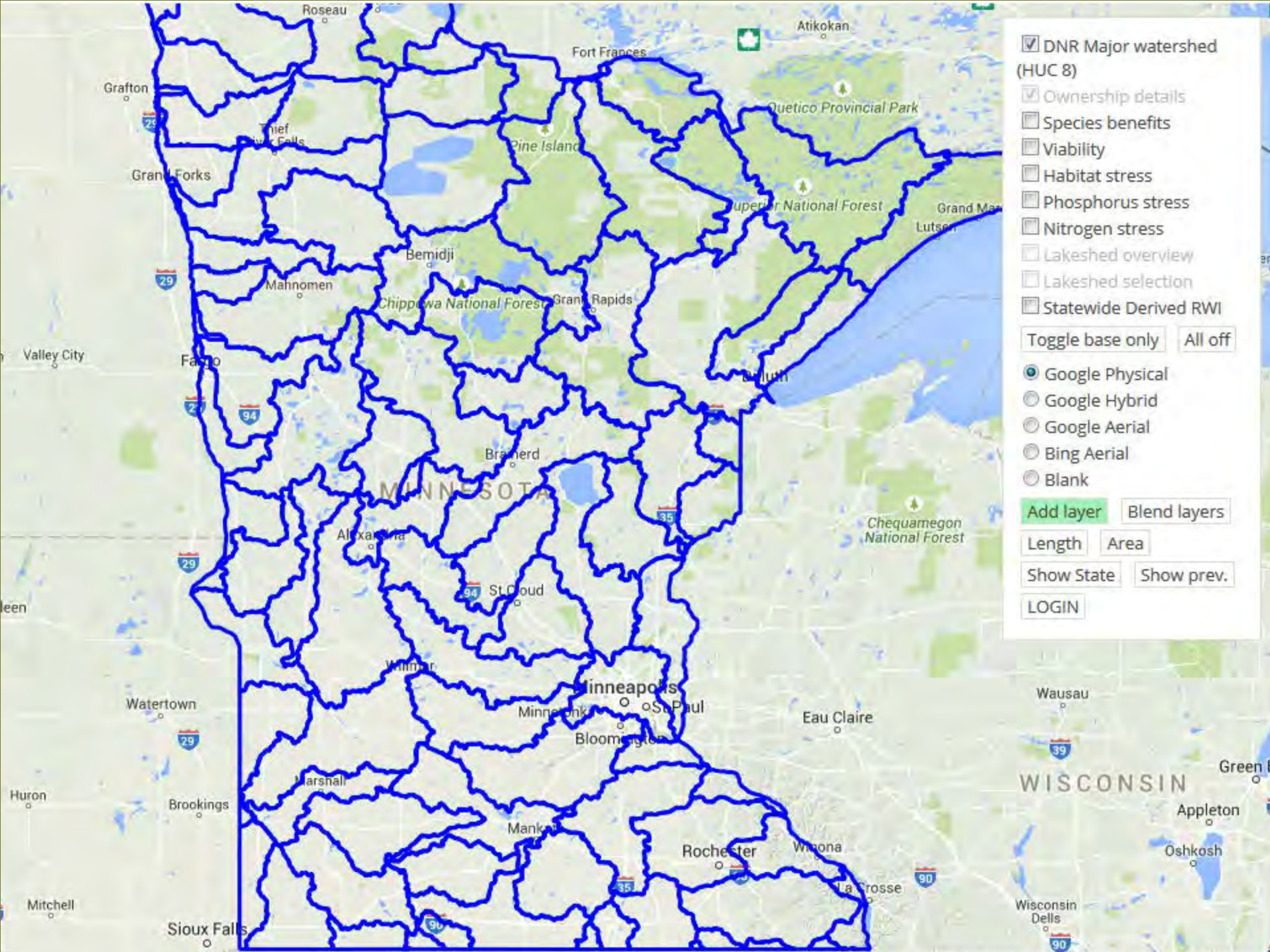
# *Restorable Wetland* PRIORITIZATION TOOL

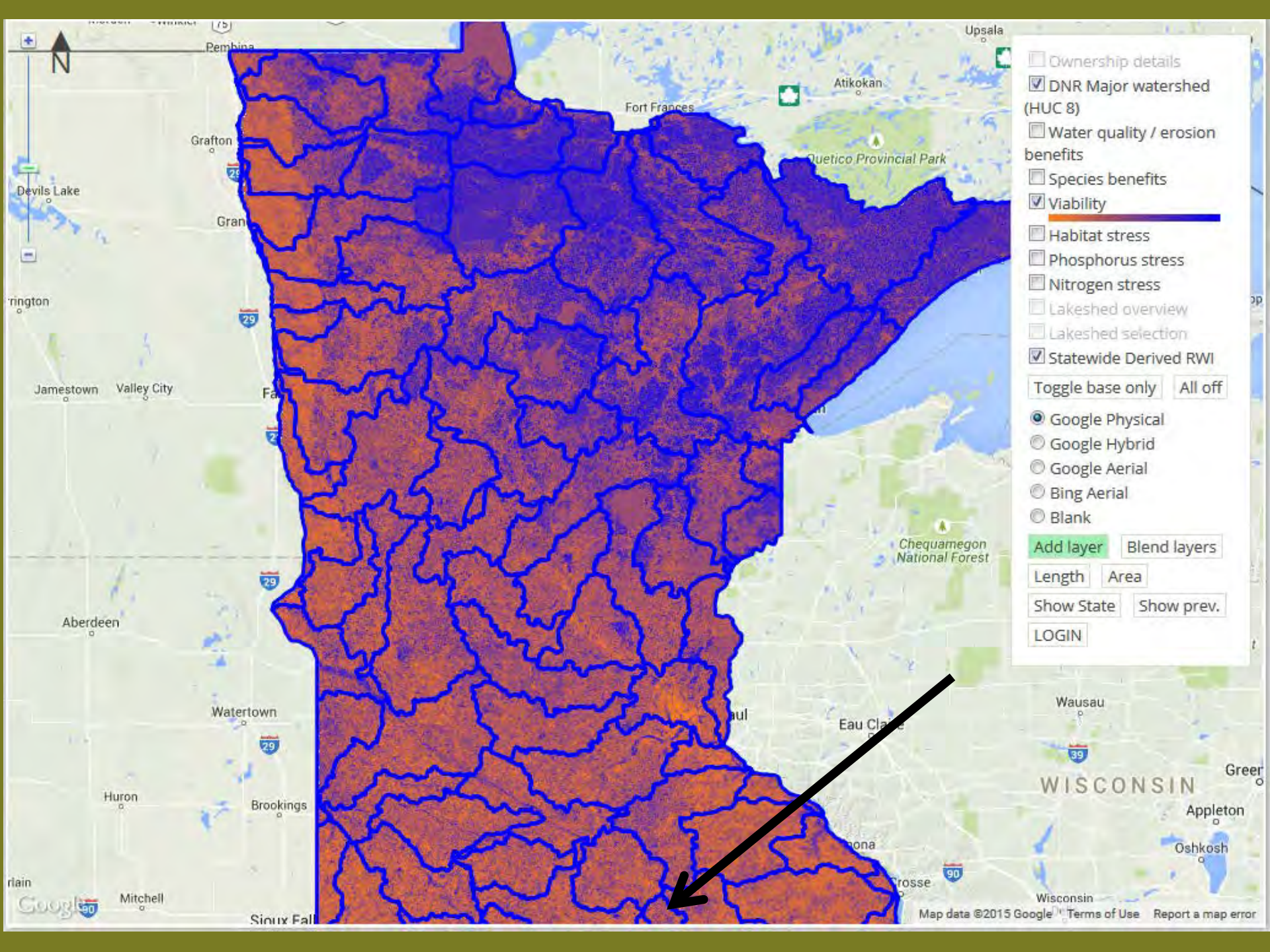
- 8 Statewide derived data layers can be downloaded and added to ArcMap projects
    - Nitrogen Stress
    - Phosphorus Stress
    - Habitat Stress
    - Viability
    - Species / Habitat Benefit
    - Water / Erosion Benefit
    - Statewide Restorable Wetland Inventory
    - Compound Topographic Index
- 
- A photograph of a wetland landscape. In the foreground, there is a dense field of green grass. A body of water, likely a pond or a slow-moving stream, occupies the middle ground. A single, small tree stands in the water. The background consists of rolling green hills under a cloudy, overcast sky.



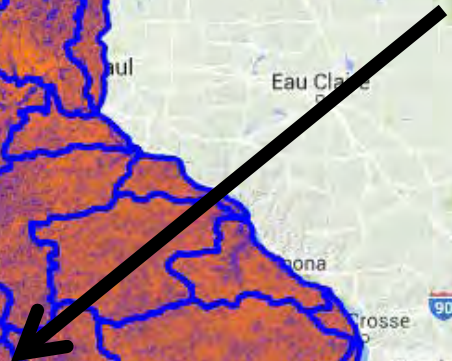
Redeye River  
Watershed  
In North Central  
MN







- Ownership details
  - DNR Major watershed (HUC 8)
  - Water quality / erosion benefits
  - Species benefits
  - Viability
  - Habitat stress
  - Phosphorus stress
  - Nitrogen stress
  - Lakeshed overview
  - Lakeshed selection
  - Statewide Derived RWI
- Toggle base only All off
- Google Physical
  - Google Hybrid
  - Google Aerial
  - Bing Aerial
  - Blank
- Add layer Blend layers
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- Show State Show prev.
- LOGIN





Bookmarks

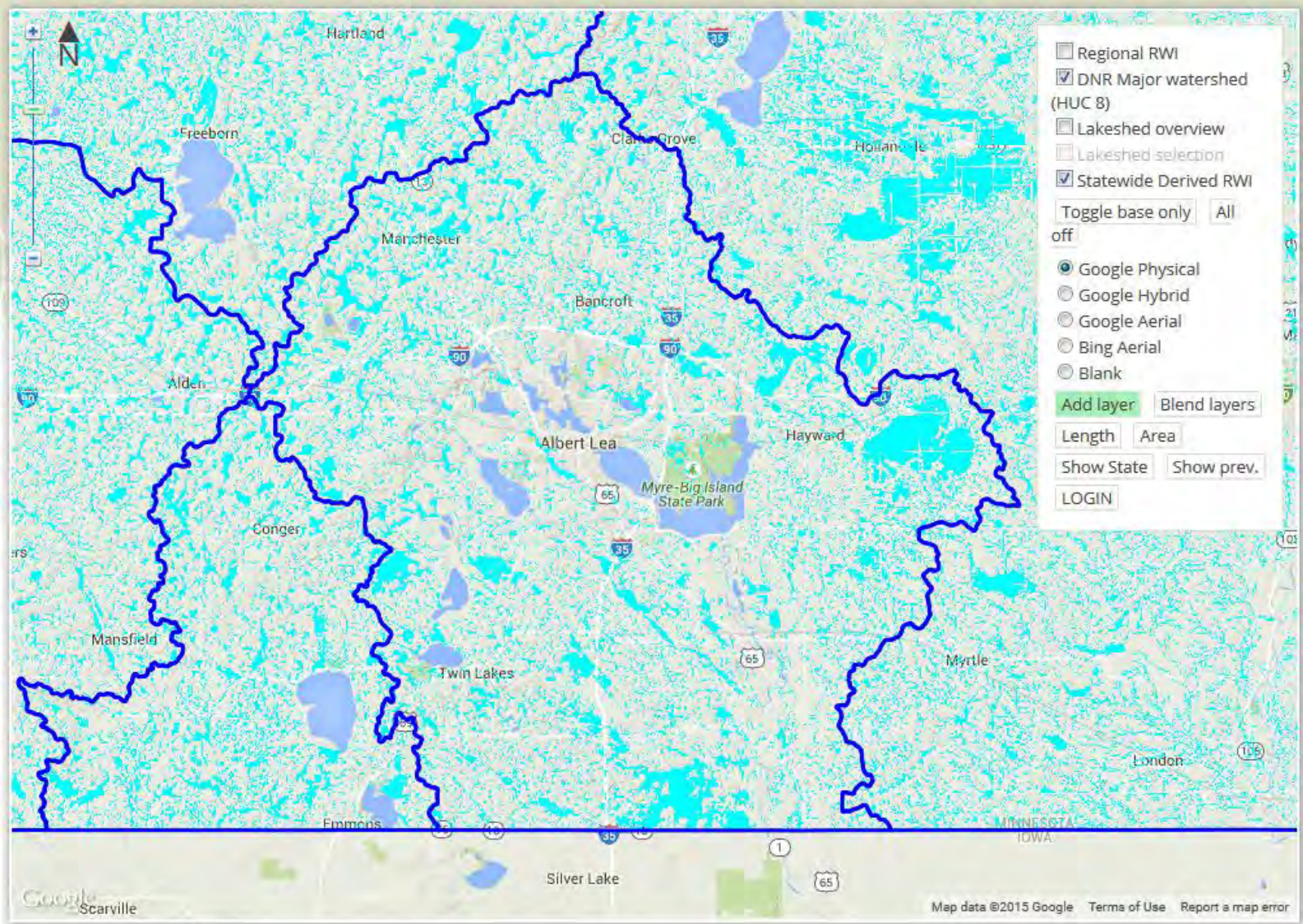
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# Restorable Wetland

## PRIORITIZATION TOOL

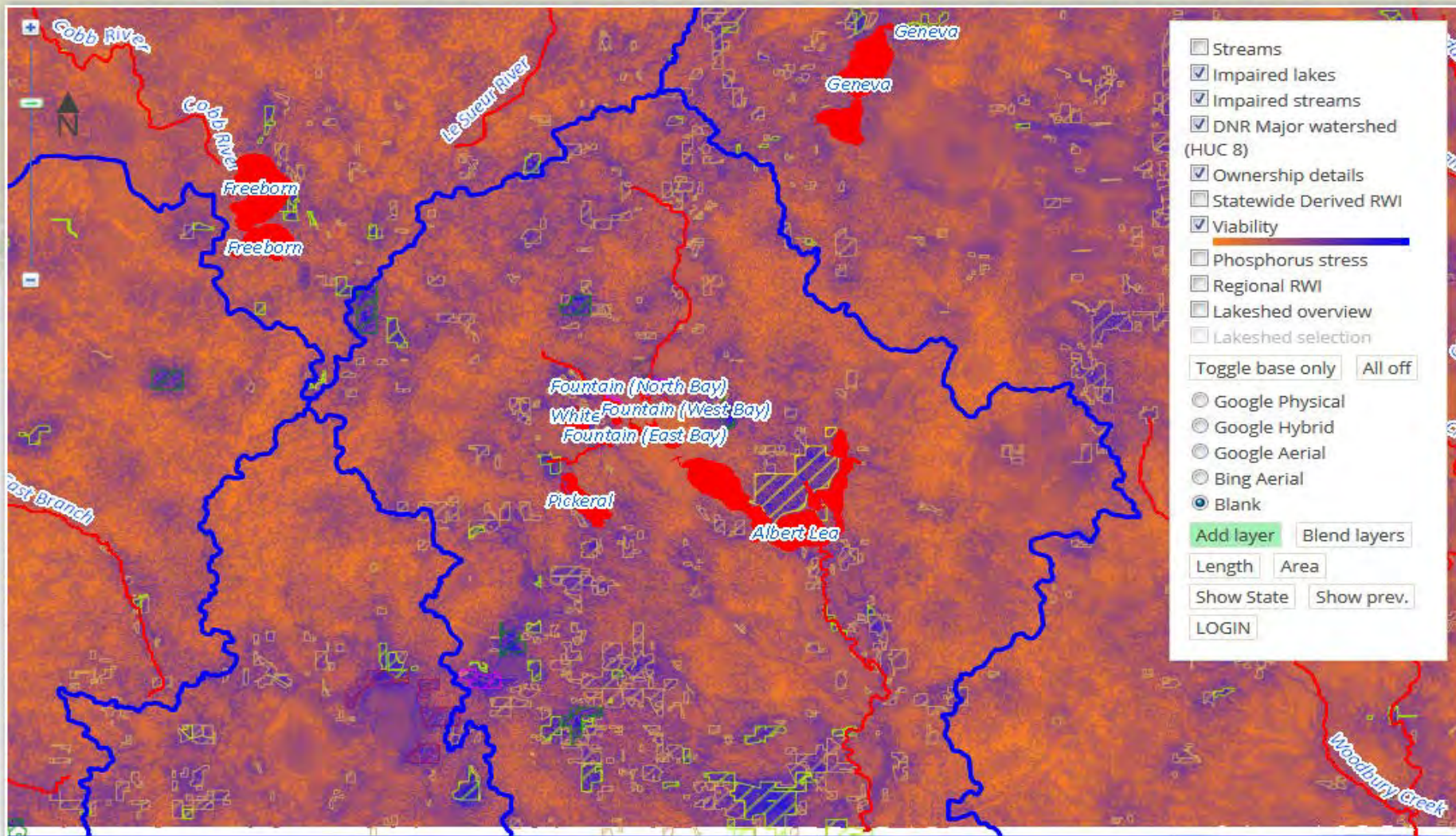
Home • Background • Links/Contact • The tool



# Restorable Wetland

## PRIORITIZATION TOOL

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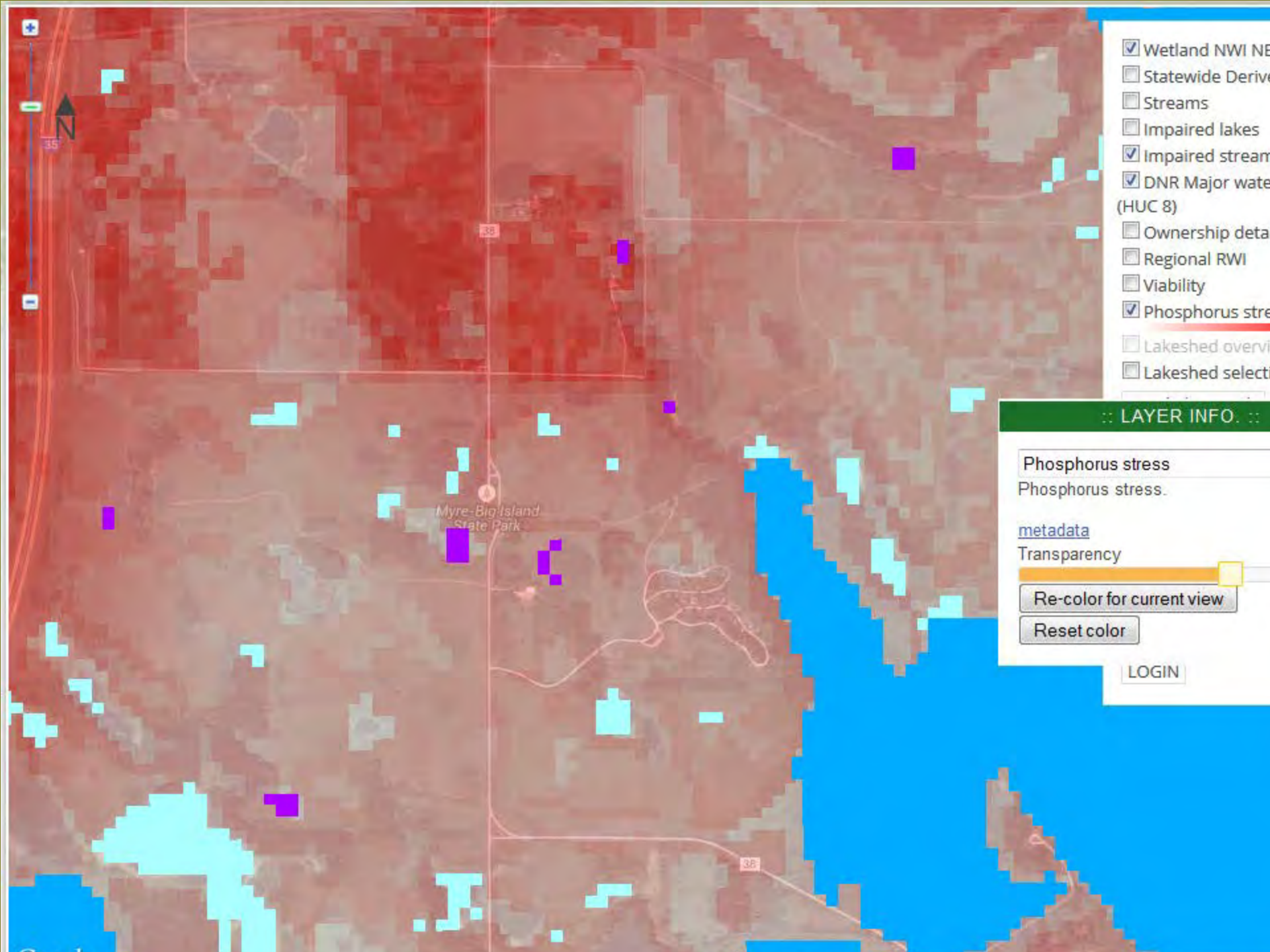
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**Minnesota  
Pollution  
Control  
Agency**

**CLEAN  
WATER  
LAND &  
LEGACY  
AMENDMENT**



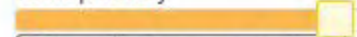
- Wetland NWI NE
- Statewide Derive
- Streams
- Impaired lakes
- Impaired stream
- DNR Major water (HUC 8)
- Ownership deta
- Regional RWI
- Viability
- Phosphorus stre
- Lakeshed overvi
- Lakeshed select

:: LAYER INFO ::

Phosphorus stress  
Phosphorus stress.

[metadata](#)

Transparency

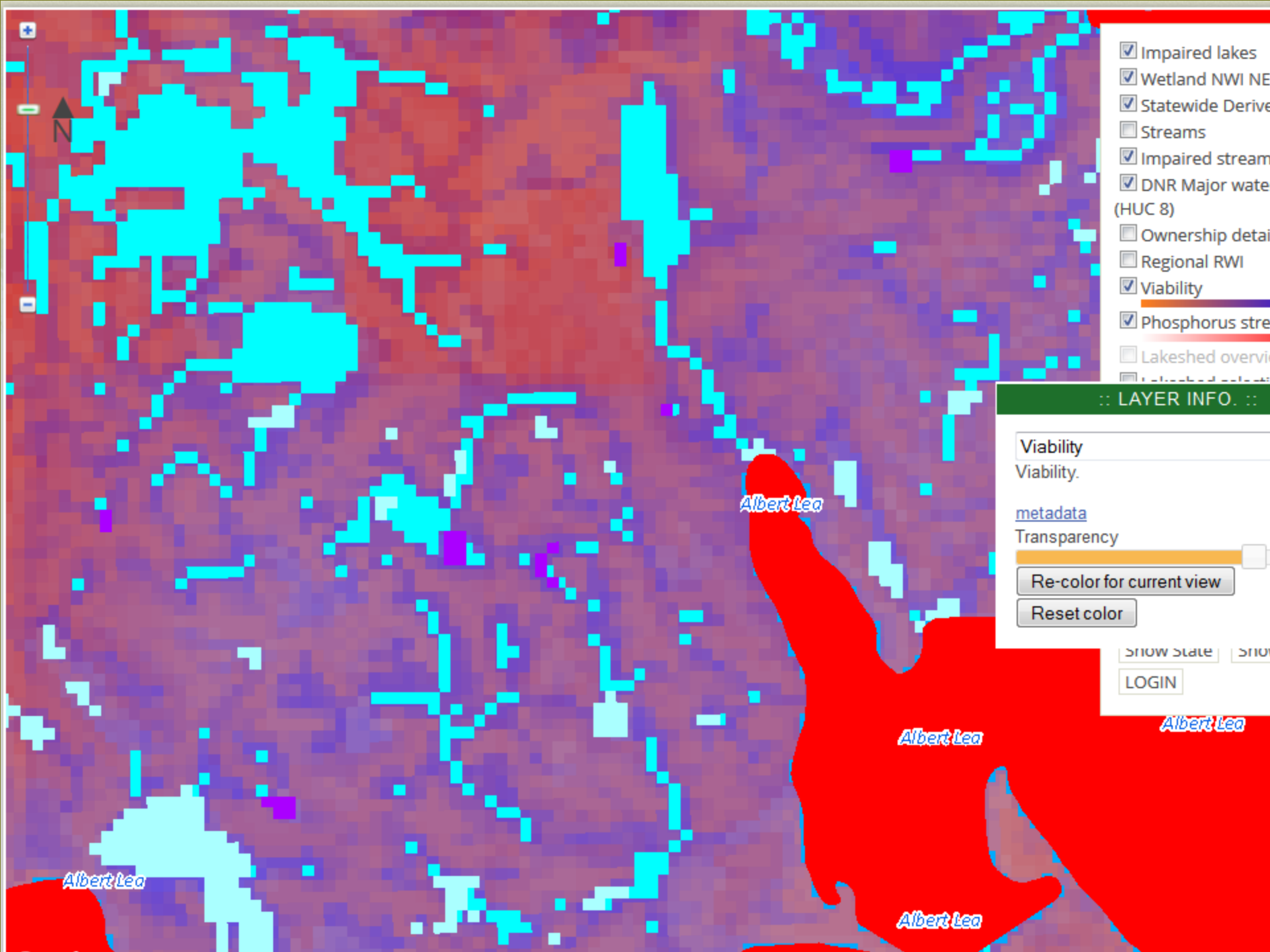


Re-color for current view

Reset color

LOGIN





- Impaired lakes
  - Wetland NWI NE
  - Statewide Derive
  - Streams
  - Impaired stream
  - DNR Major water
- (HUC 8)
- Ownership detail
  - Regional RWI
  - Viability
  - Phosphorus stre
  - Lakeshed overvi
  - Lakeshed select

:: LAYER INFO ::

Viability

Viability.

[metadata](#)

Transparency



Re-color for current view

Reset color

SHOW STATE SHOW

LOGIN

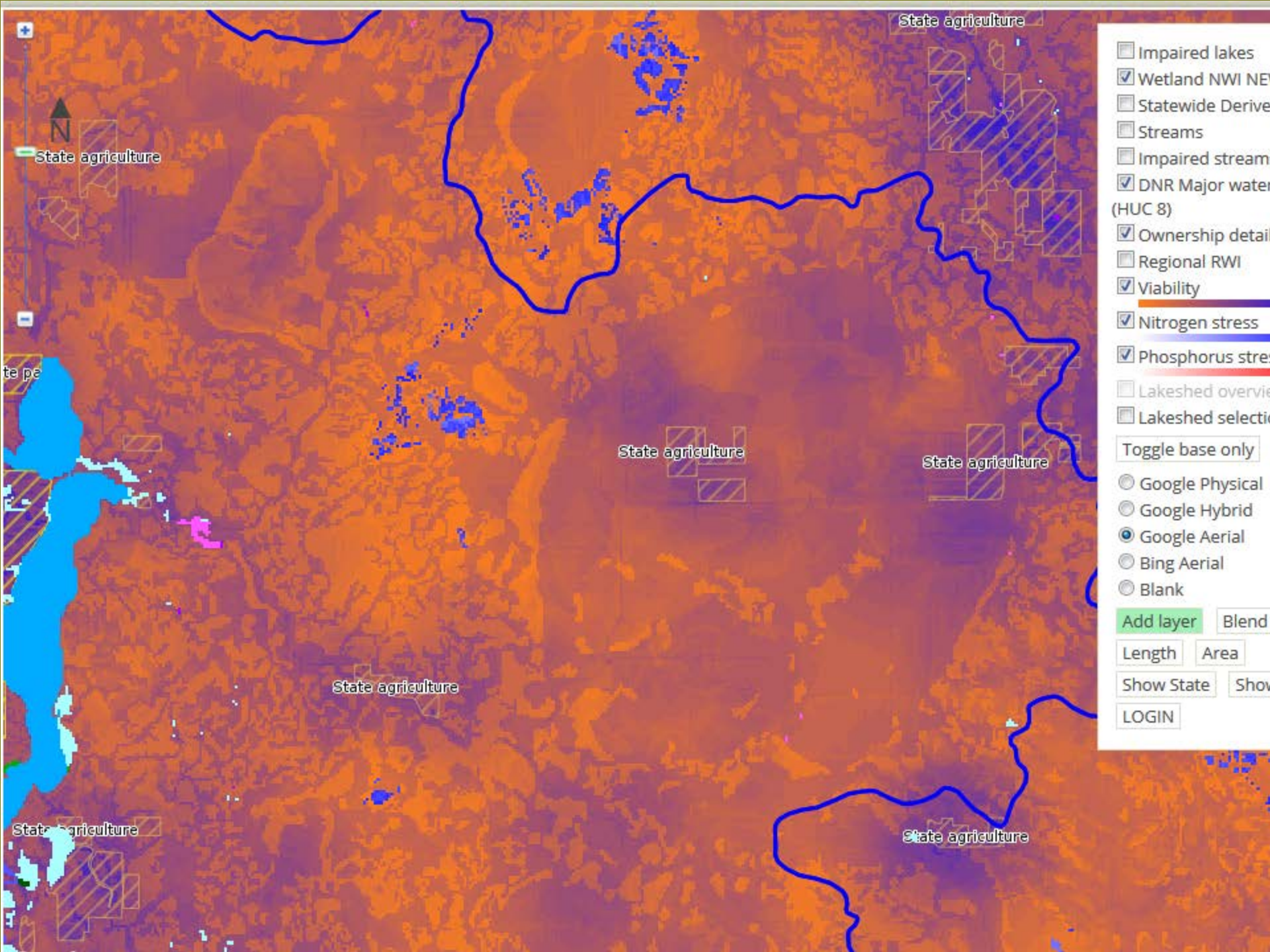
*Albert Lea*

*Albert Lea*

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State agriculture

State agriculture

State agriculture

State agriculture

State agriculture

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State agriculture

- Impaired lakes
  - Wetland NWI NE
  - Statewide Derive
  - Streams
  - Impaired stream
  - DNR Major water
- (HUC 8)
- Ownership detail
  - Regional RWI
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  - Nitrogen stress
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- Toggle base only
- Google Physical
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  - Google Aerial
  - Bing Aerial
  - Blank
- Add layer Blend
- Length Area
- Show State Show
- LOGIN

**LAYER INFO**

**Statewide Derived RWI**  
 This project's state wide Restorable Wetland Inventory, from 10 m LIDAR CTI

[metadata](#)

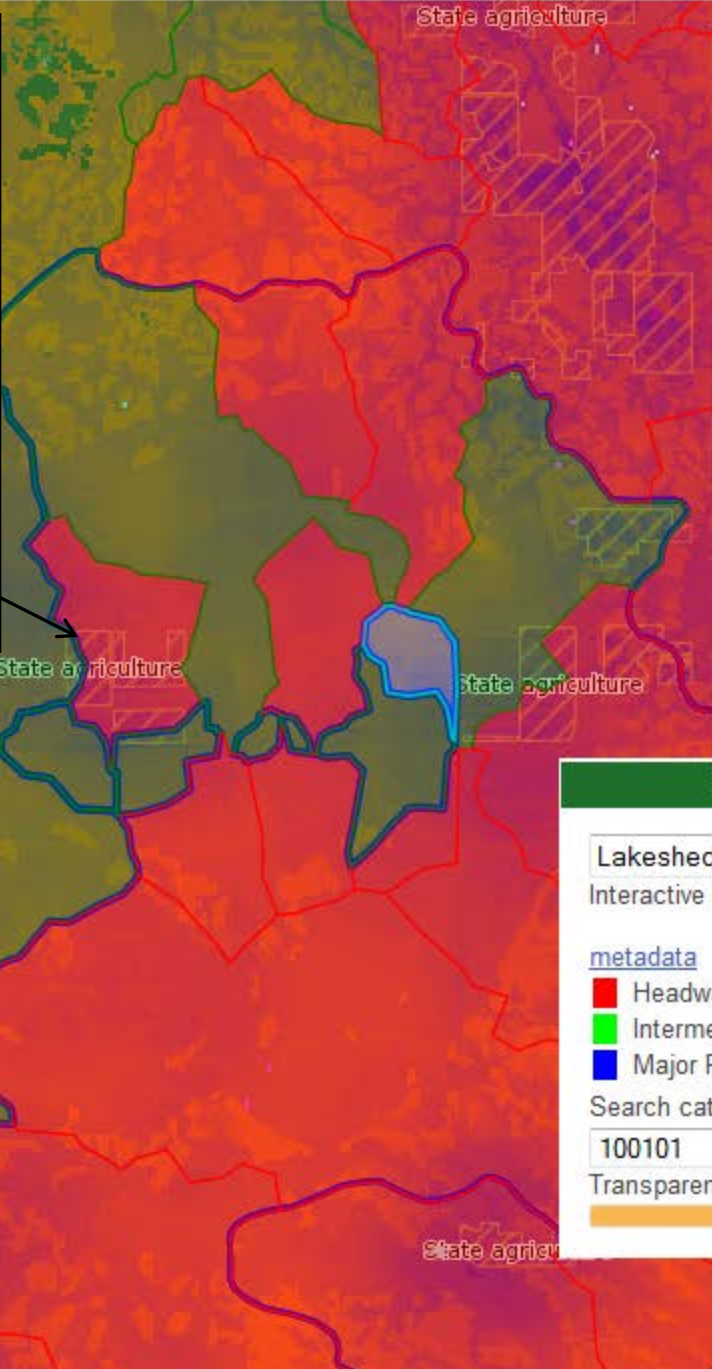
NRRI RWI from 10 m CTI  
 Transparency

**Basemap**

- Habitat stream
- Phosphorus
- Nitrogen stress
- Lakeshed overview
- Lakeshed selection

**Toggle base only**

- Google Physical
- Google Hybrid
- Google Aerial
- Bing Aerial
- Blank
- Google Physical
- Google Hybrid
- Google Aerial



**LAYER INFO**

- downstream sheds
- Impaired lakes
- Wetland NWI NEW
- Statewide Derived RWI
- Streams
- Impaired streams
- DNR Major watershed (HUC 8)
- Ownership details
- Regional RWI
- Viability
- Nitrogen stress
- Phosphorus stress
- Lakeshed overview
- Lakeshed selection

**Toggle base only** **All off**

Google Physical

**LAYER INFO**

**Lakeshed selection**  
 Interactive lakeshed selection

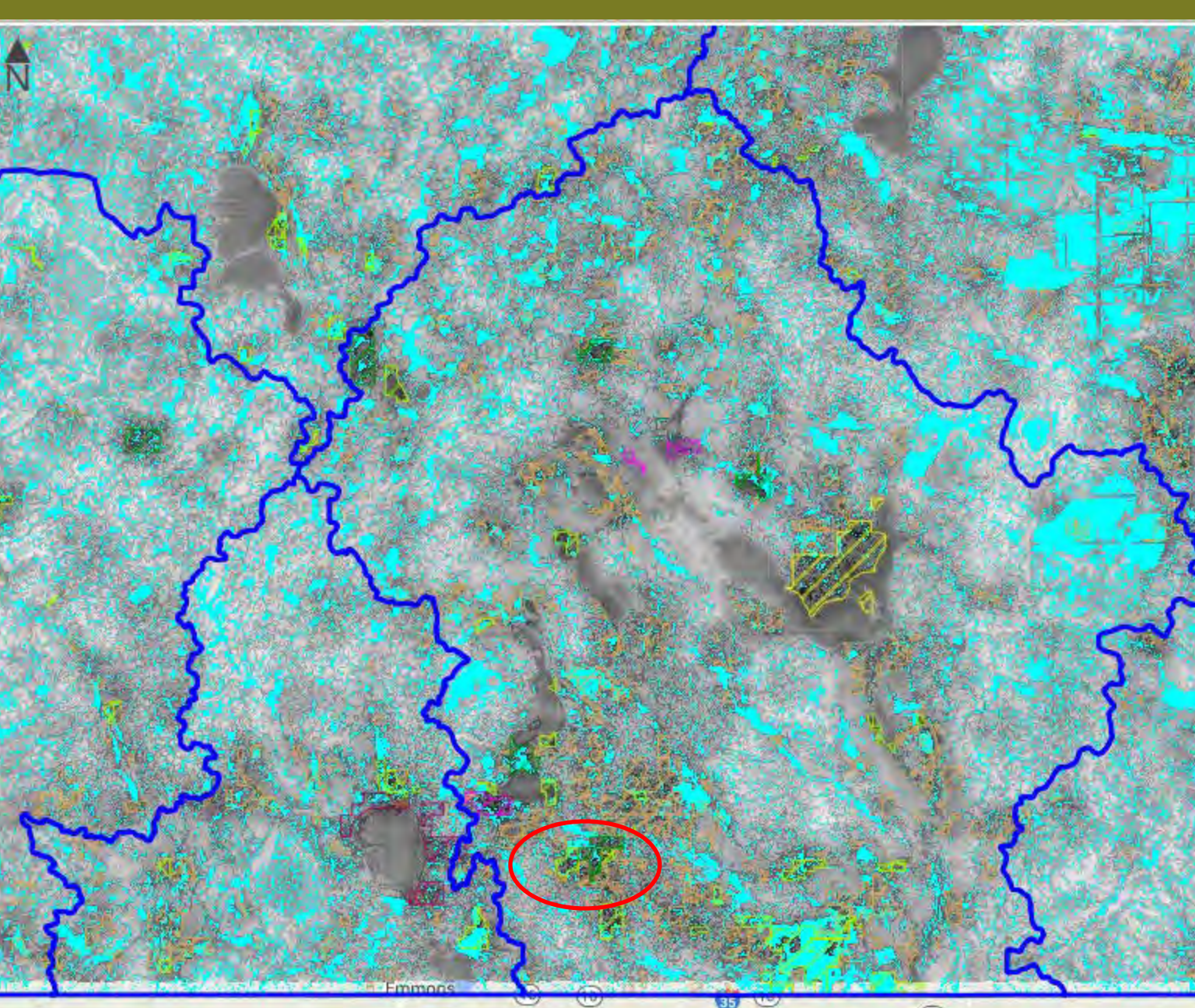
[metadata](#)

- Headwater
- Intermediate
- Major River

Search catch\_id:

100101

Transparency



- DNR Major watershed (HUC 8)
- Ownership details
- Statewide Derived RWI
- Blend 1
- Water quality / erosion benefits
- Viability
- Habitat stress
- Phosphorus stress
- Nitrogen stress

**BLEND CONTROL**

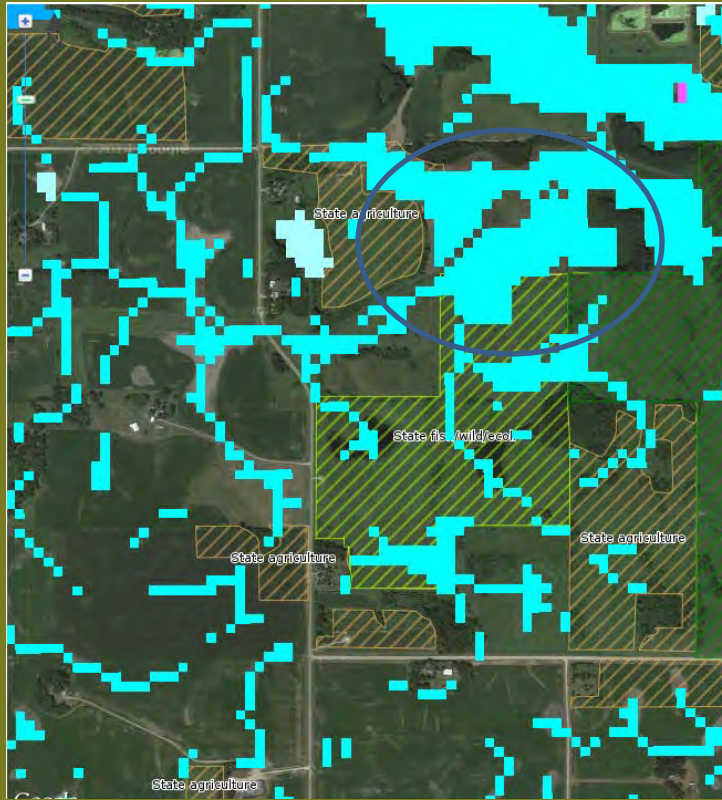
Viability  
4  
[Slider bar]

Water quality / erosion ben  
2  
[Slider bar]

Species benefits  
0  
[Slider bar]

***Moderately-strongly select Water quality / erosion benefits, and Strongly select Viability***

Blend request sent to server. Layer will load automatically when it's ready. Please don't Blend again until the layer just requested loads.



# Thanks!

**Restorable Wetland**  
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**Helping decision makers prioritize where to restore and protect wetlands.**

Minnesota wetlands provide a wealth of ecological benefits including water quality and habitat enhancement. Yet, it is estimated that Minnesota has lost over 52 percent of its pre-settlement wetland area and their associated benefits. This tool will aid individuals interested in wetland restoration or protection by:

- Predicting likely locations of restorable wetlands with a statewide restorable wetland inventory.
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SUSTAINABLE

Mark Gernes

[Mark.gernes@state.mn.us](mailto:Mark.gernes@state.mn.us)

651 757-2387

<http://www.mnwetlandrestore.org>

/

*Thank you for your  
participation!*



[www.aswm.org](http://www.aswm.org)