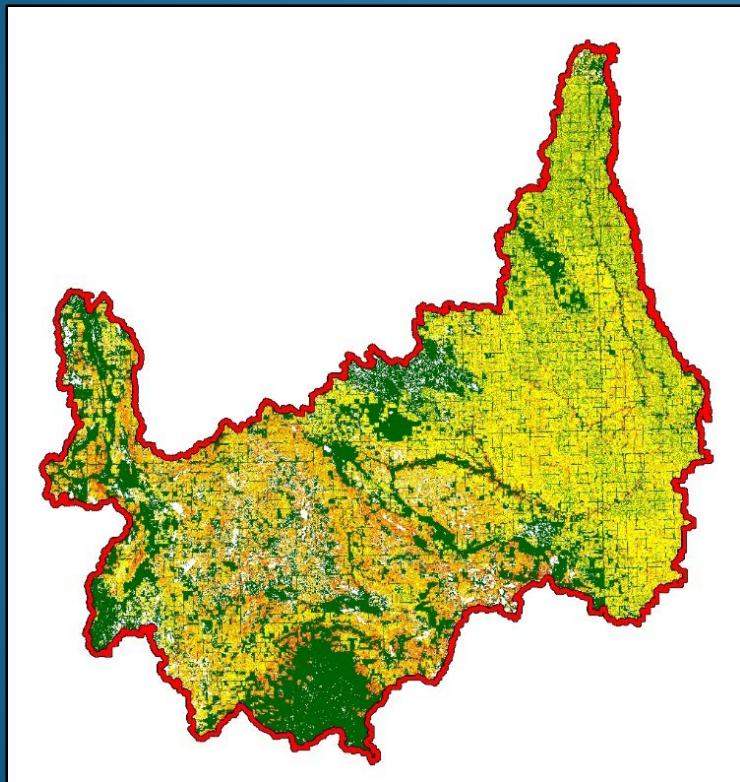


# Wild Rice River (ND)

## Water Quality Decision Support Application



**Project Proponent:**  
International Water Institute  
ND Department of Health  
County Soil Conservation Districts

**Presenter:**  
Zach Herrmann, PE  
Houston Engineering, Inc.

# Project Approach

Hydrologic Reconditioning

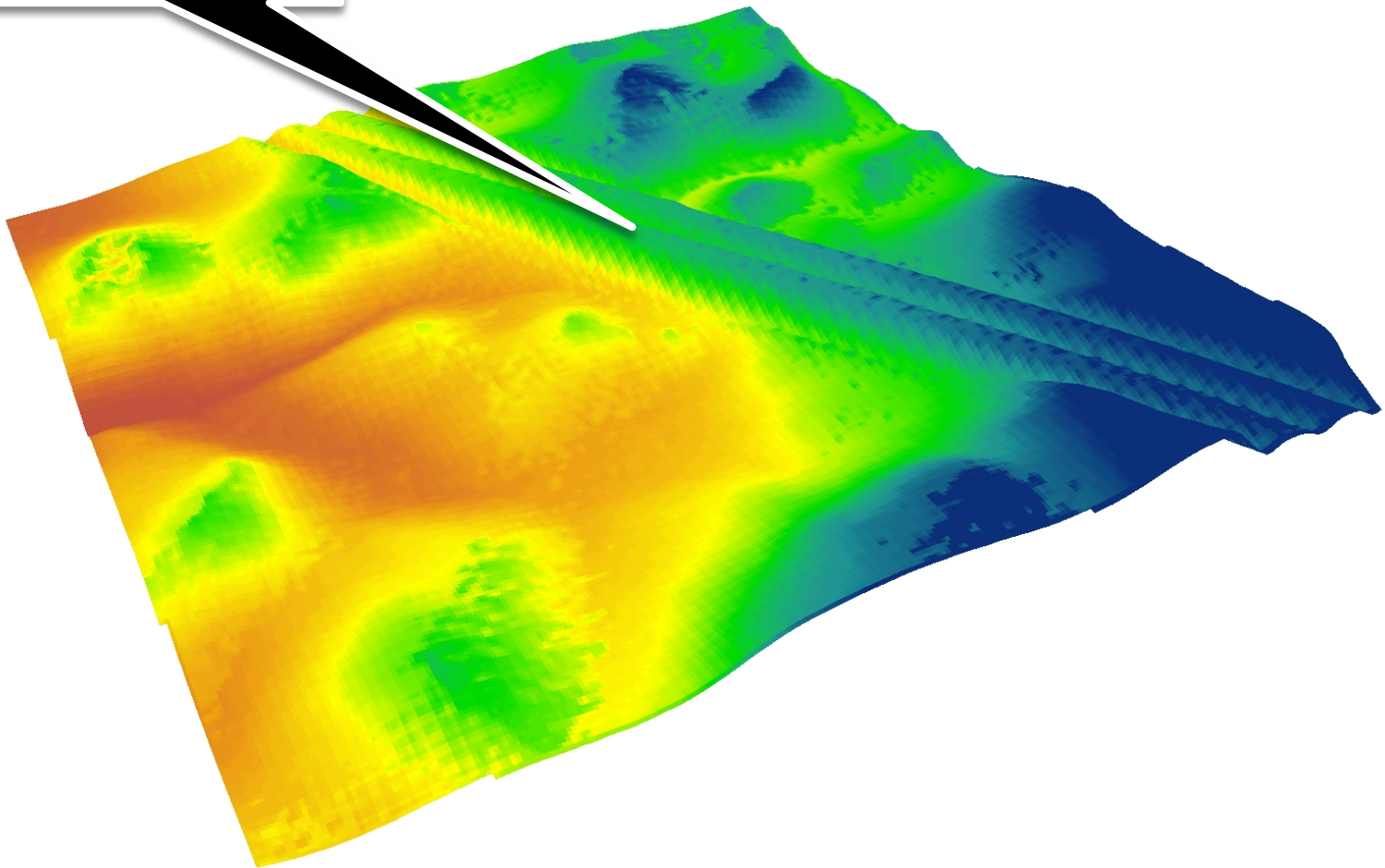
Non-Contributing Analysis

Water Quality Dataset Development

Web-Based Data Viewer

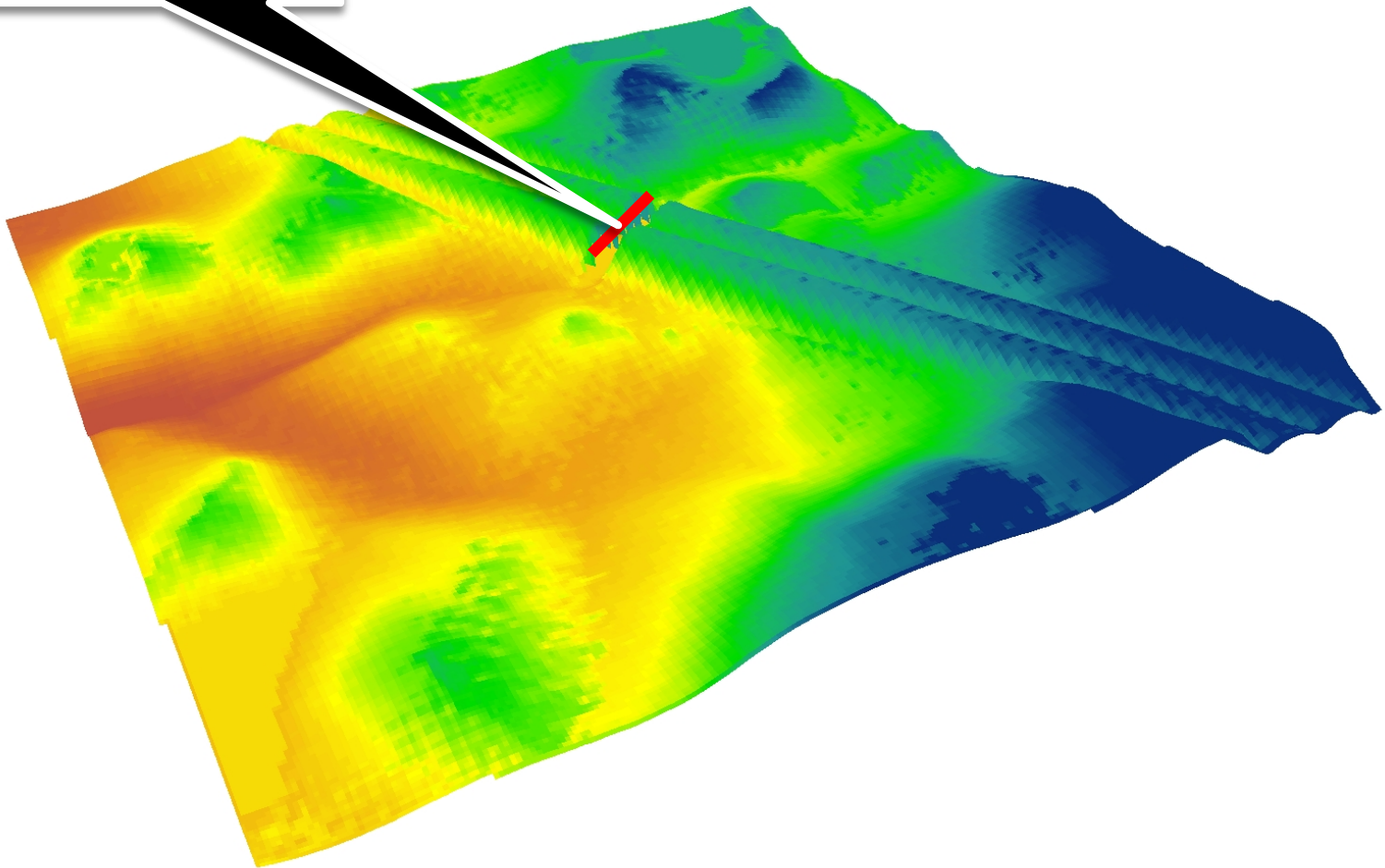
# Hydrologic Reconditioning

“Digital Dam”



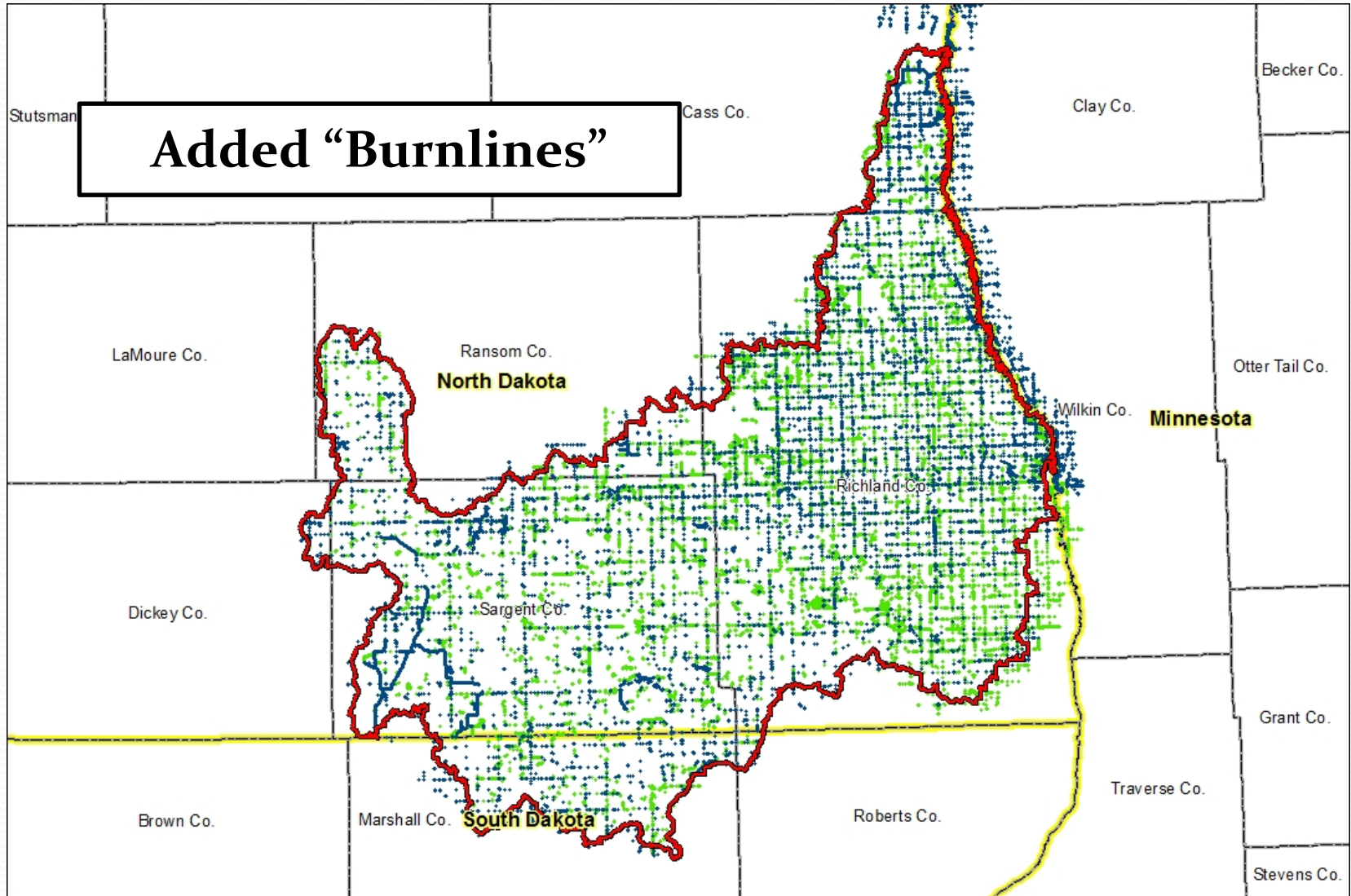
# Hydrologic Reconditioning

“Digital Dam”

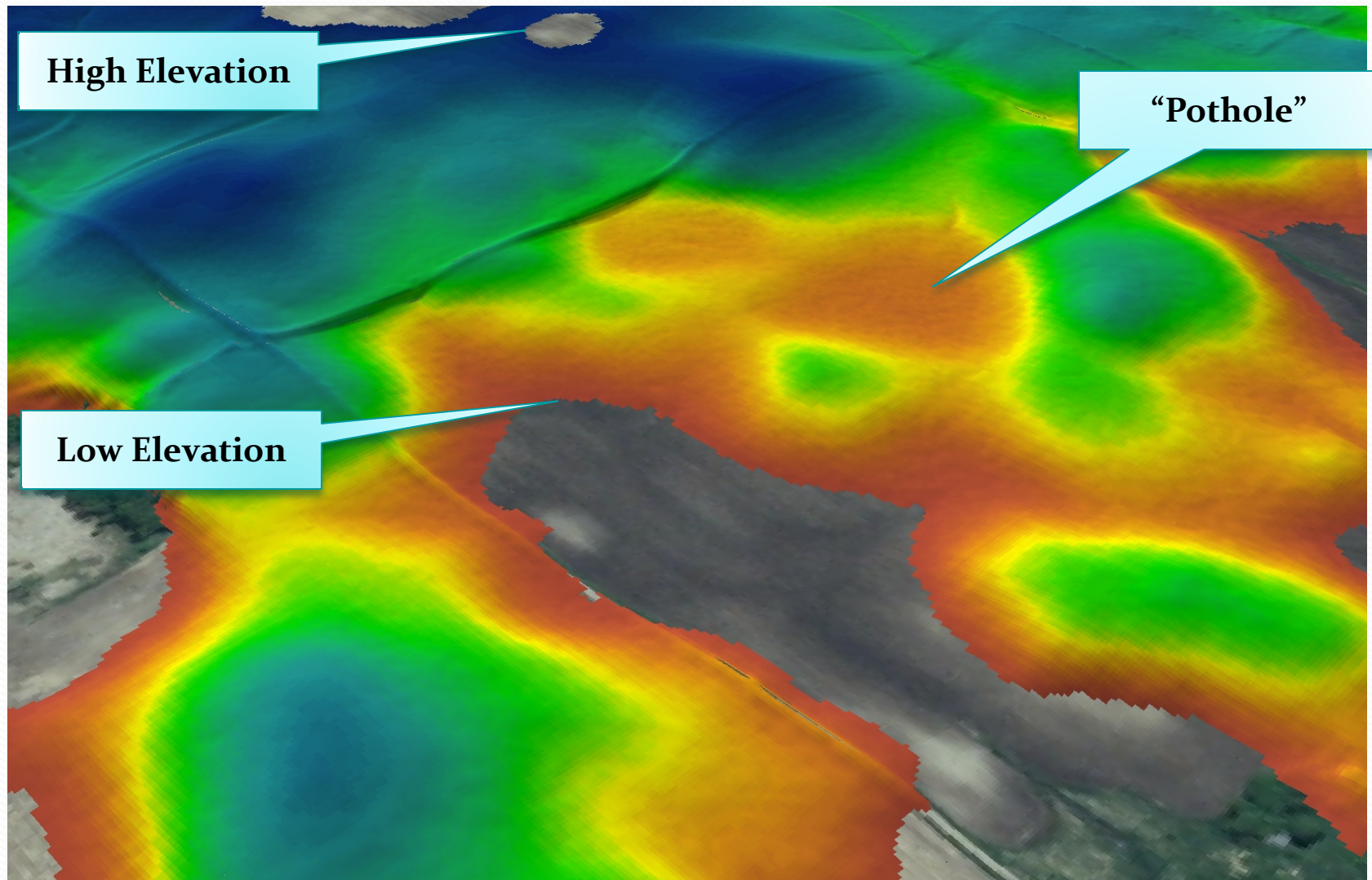




# Hydrologic Reconditioning

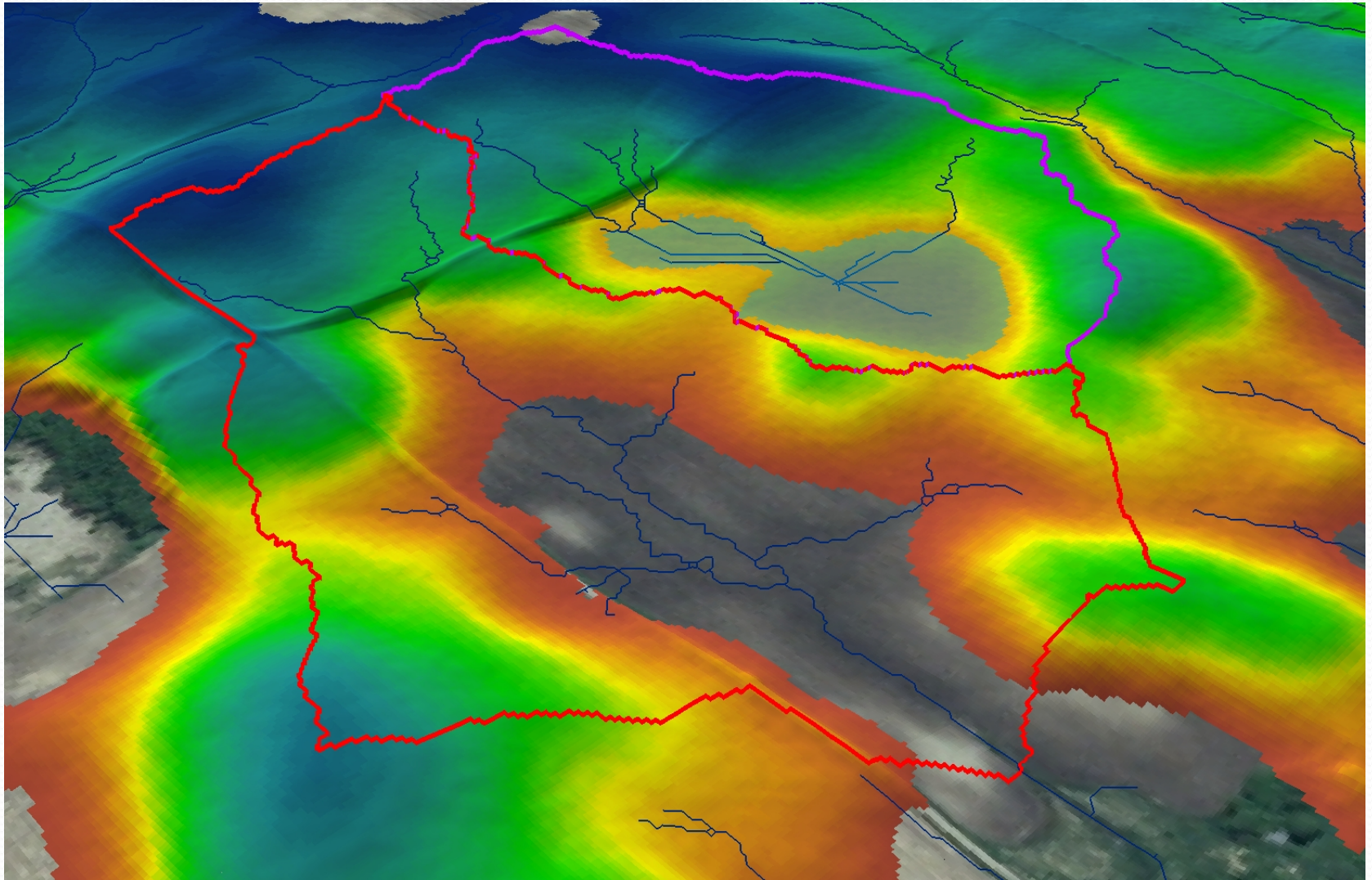


# Non-Contributing Analysis

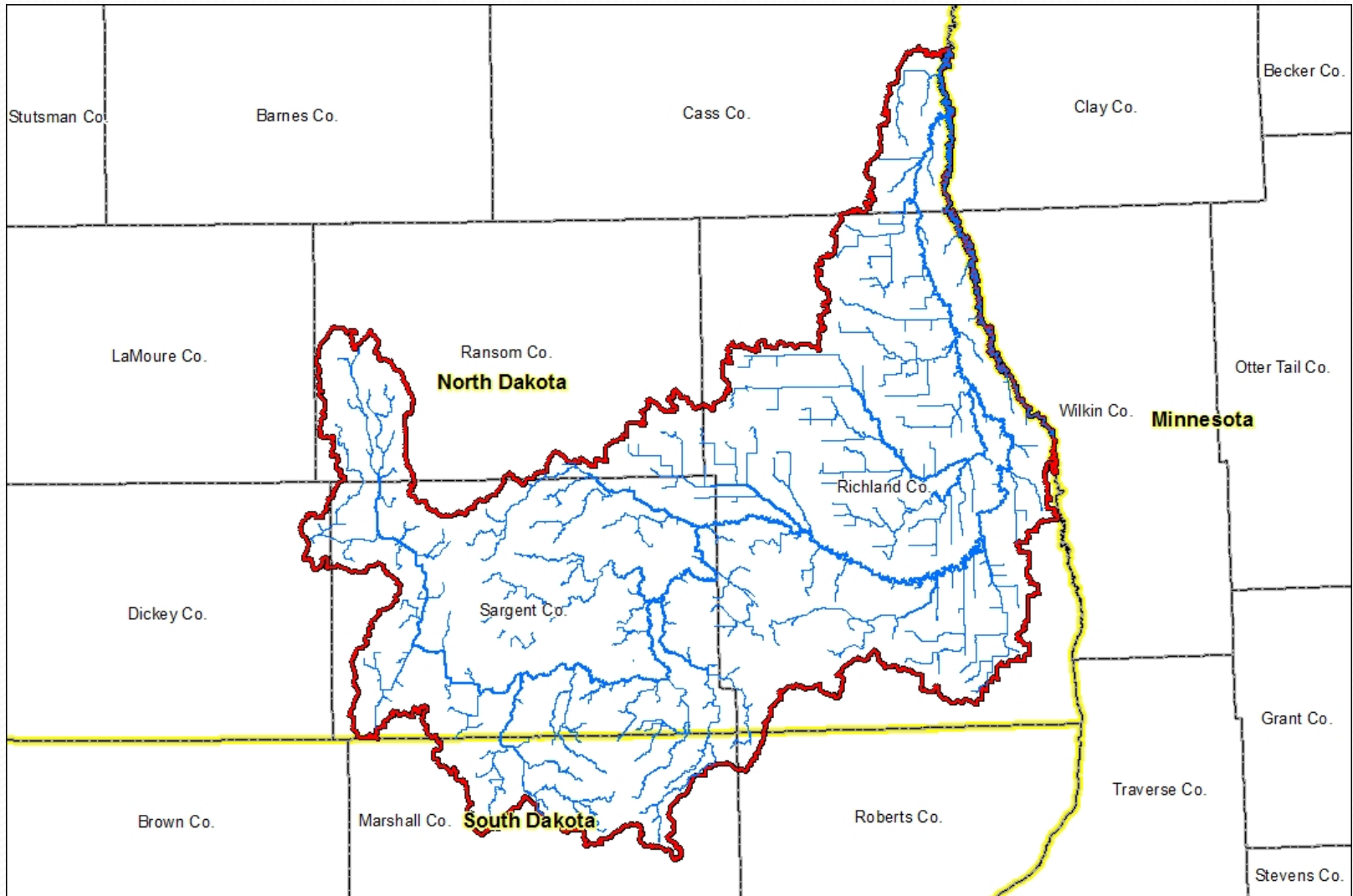




# Non-Contributing Analysis

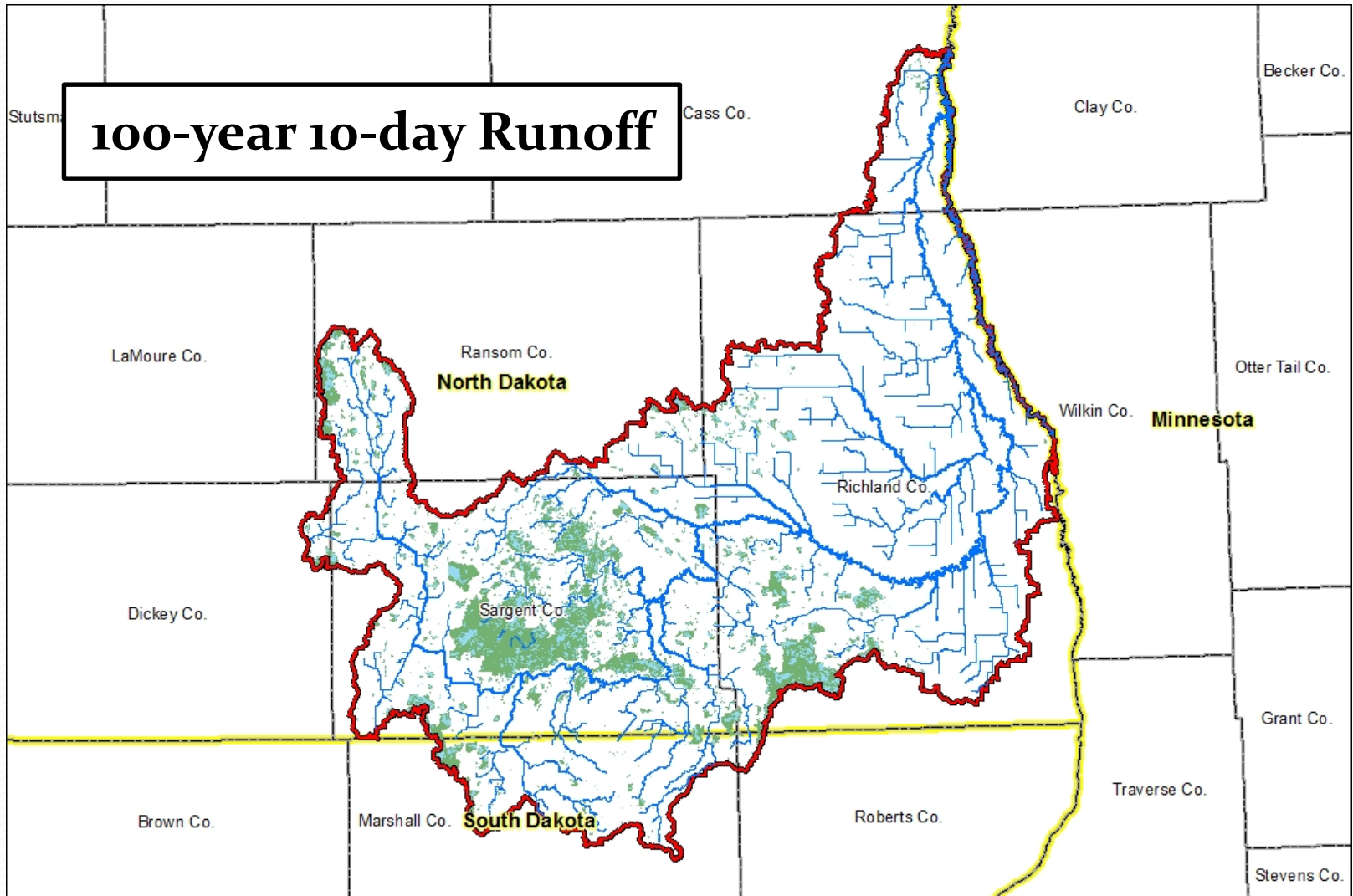


# All Contributing

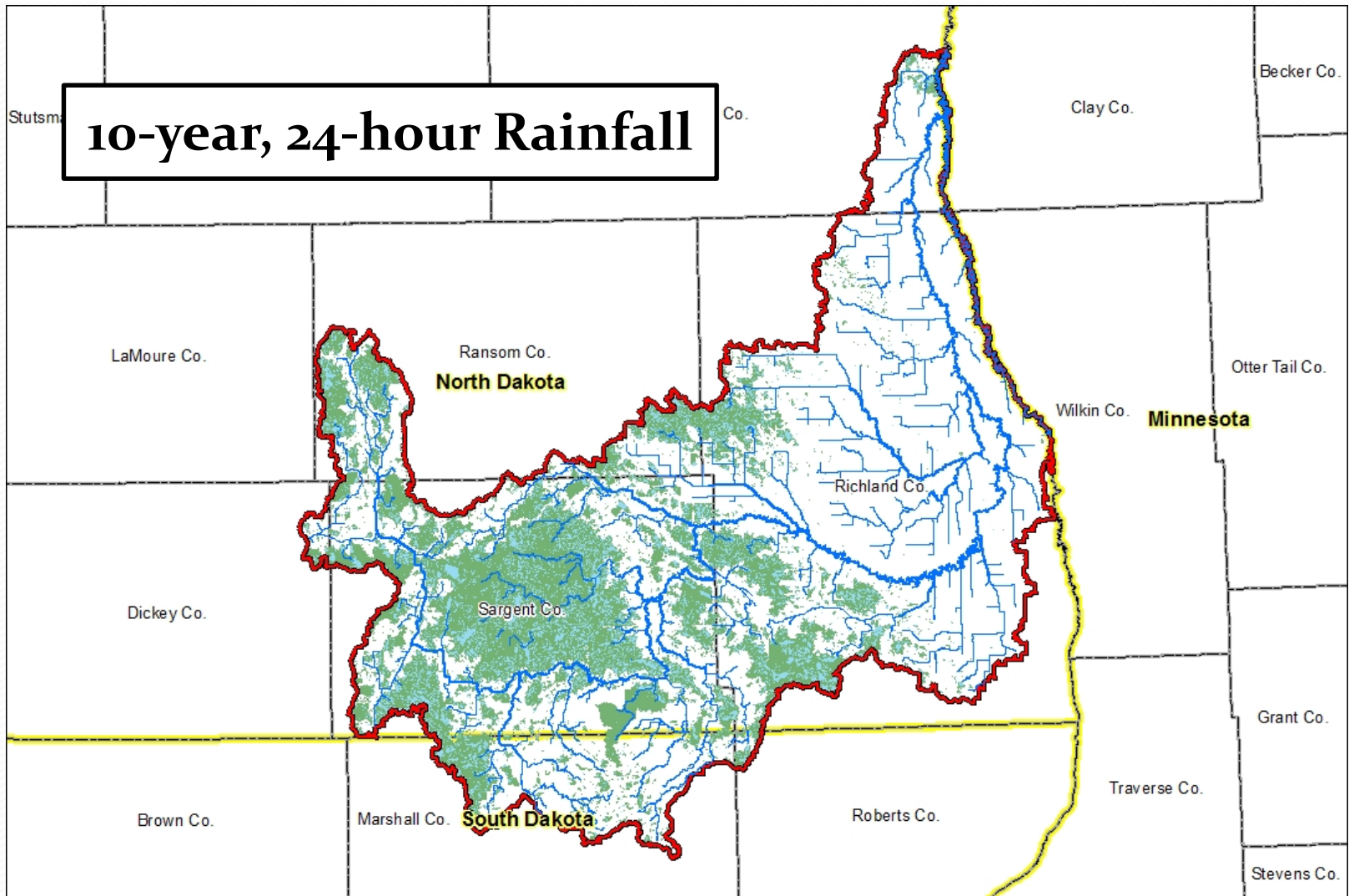




# Spring Runoff Contributing



# Summer Rainfall Contributing



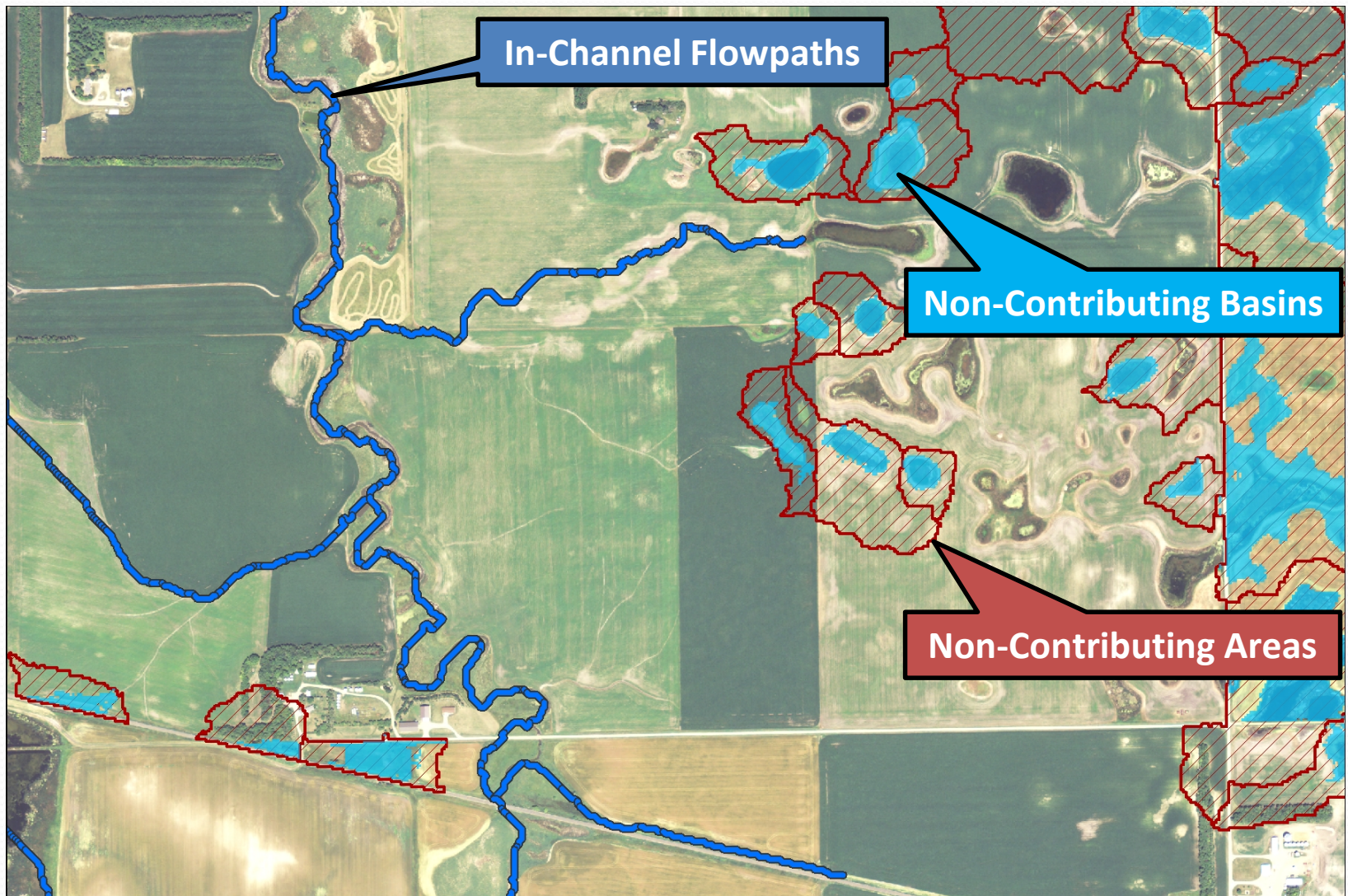


# Reconditioning – Field Scale



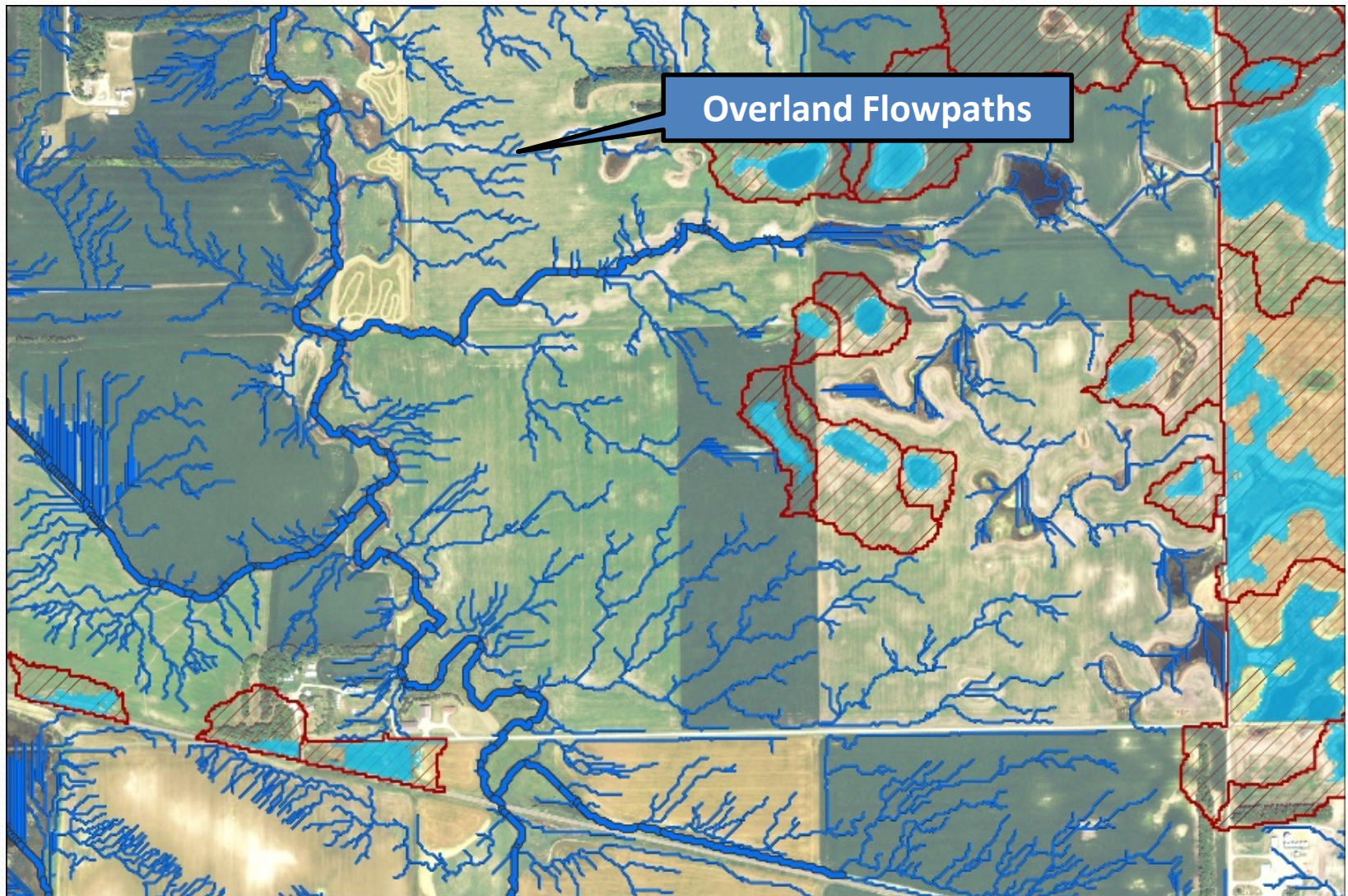


# Reconditioning – Field Scale





# Reconditioning – Field Scale



# Stream Power Index

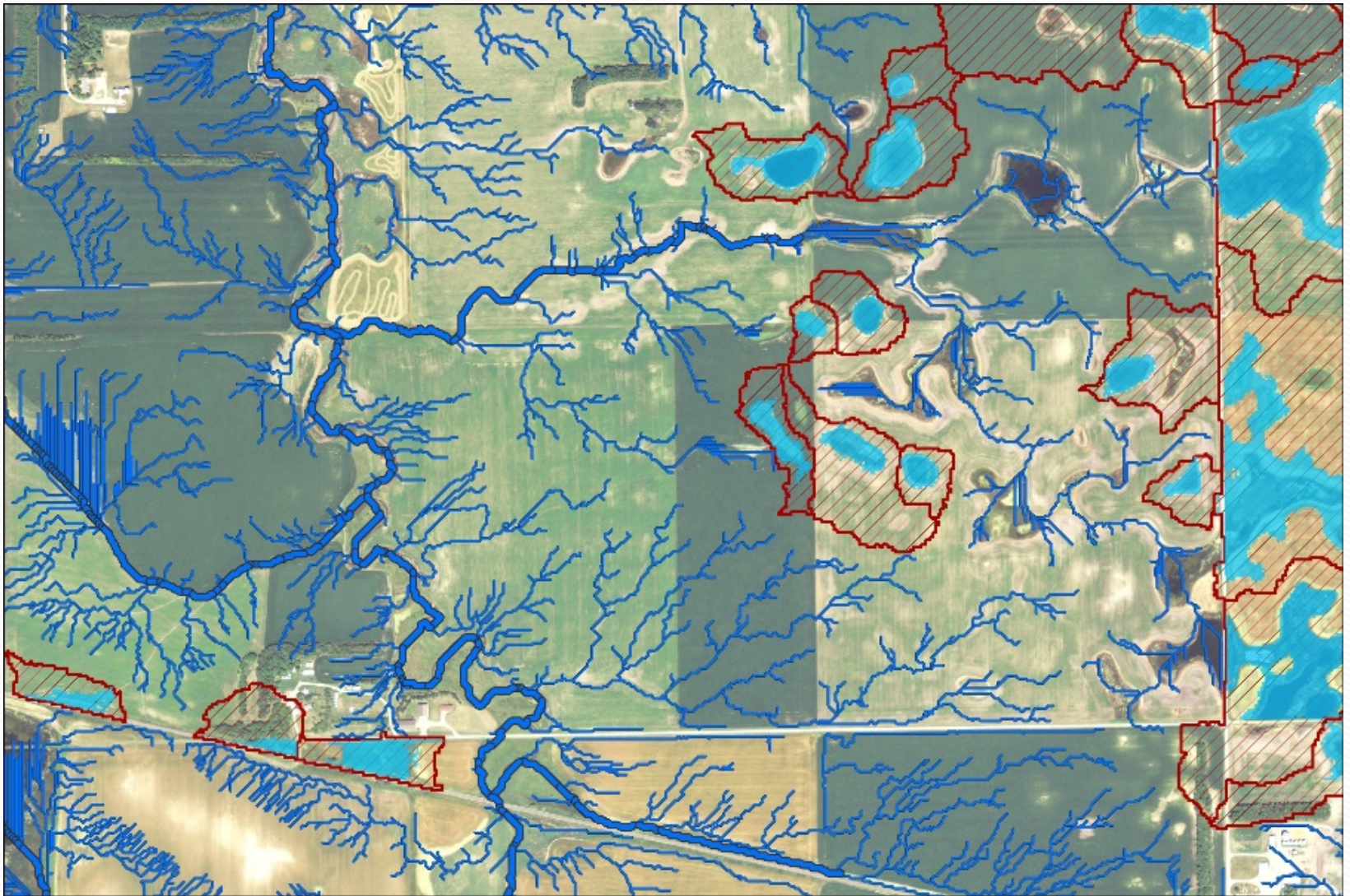
Measurement of potential energy of water as it flows over bare ground

$$SPI = \frac{\text{(contributing area)}}{\text{Amount of water expected}} \times \frac{\text{(slope)}}{\text{Slope of flow path}}$$

*Purpose: Identify locations with high potential for gully erosion*

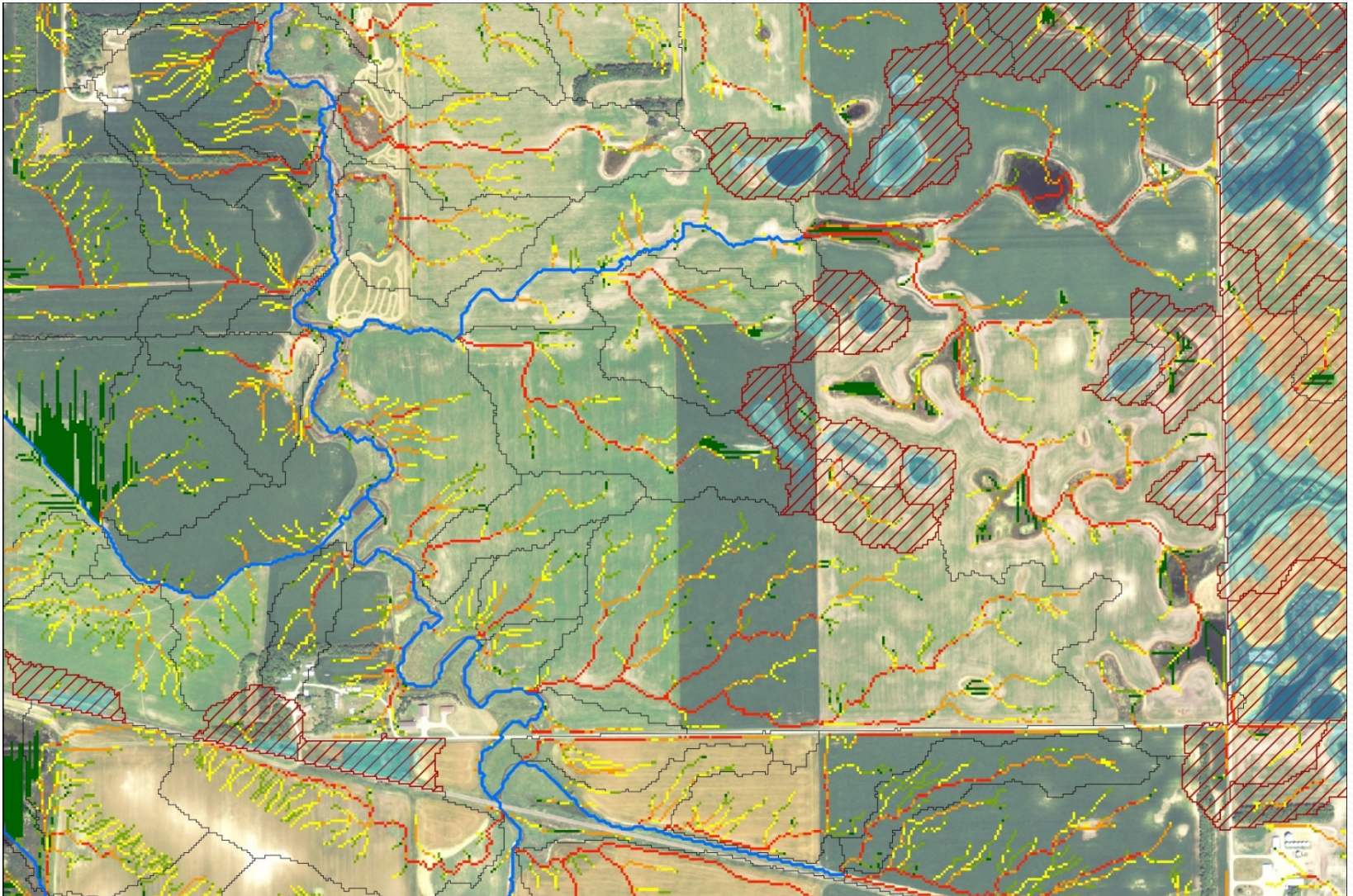


# Stream Power Index



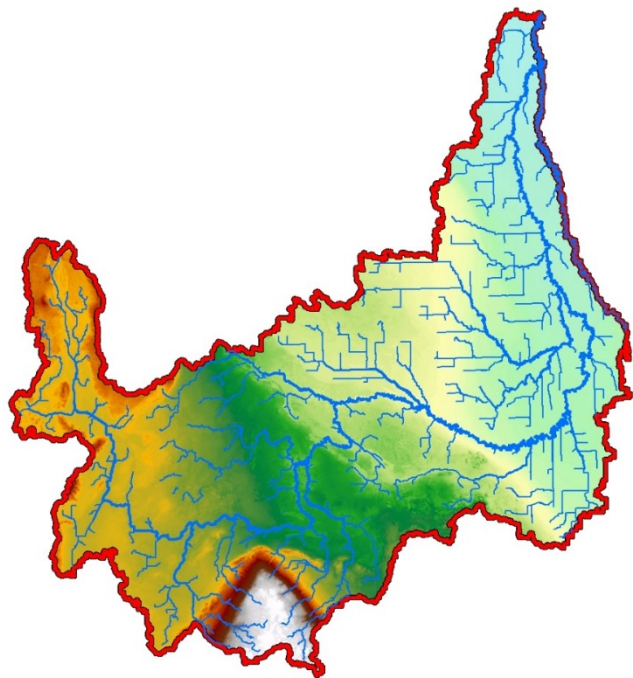


# Stream Power Index

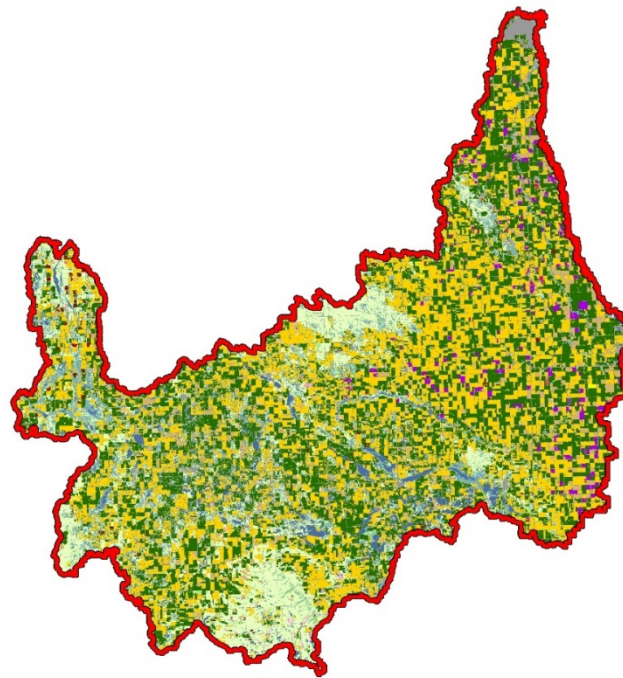




# Total Loading Estimates



Reconditioned LiDAR Data

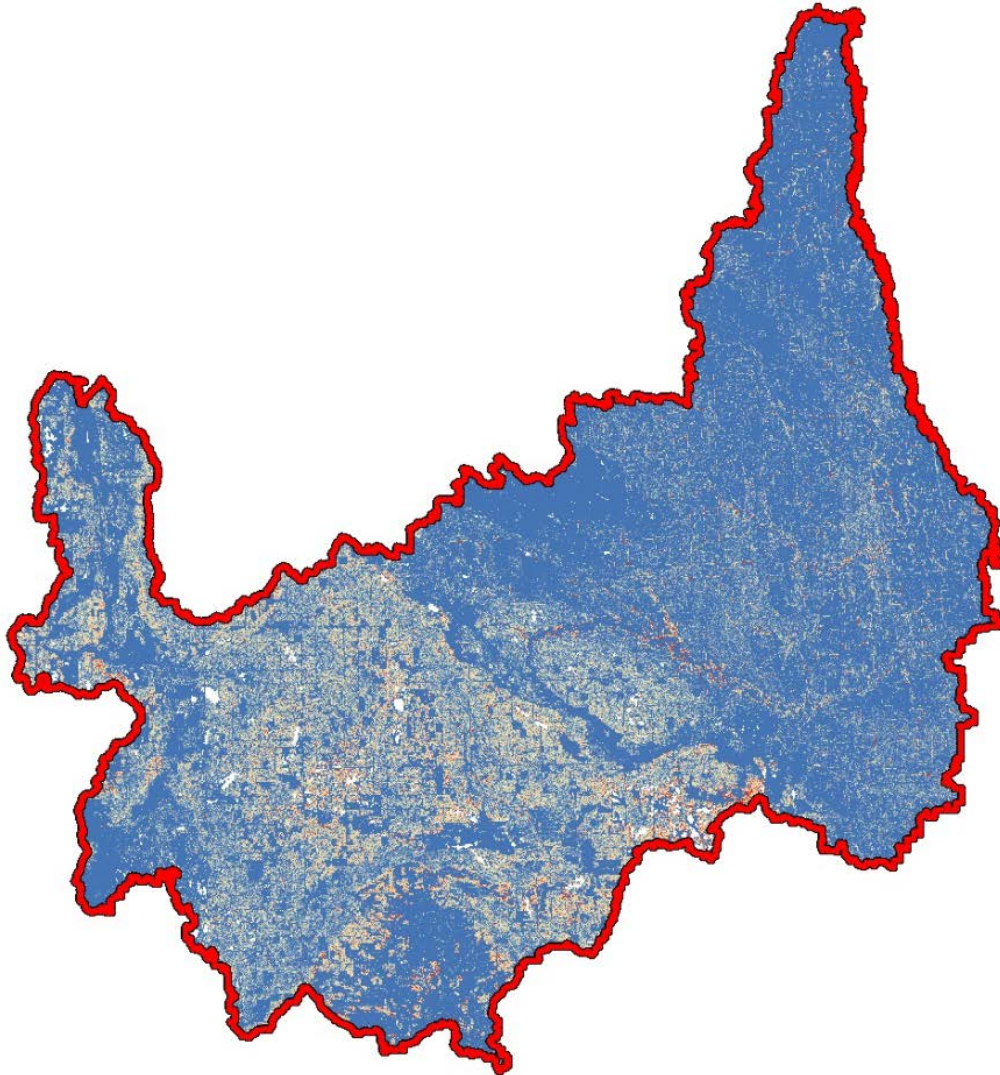


NASS Land Use Data

## Legend

- Alfalfa
- Barley
- Barren
- Canola
- Corn
- DbI Crop Barley/Soybeans
- DbI Crop Corn/Soybeans
- Deciduous Forest
- Developed/High Intensity
- Developed/Low Intensity
- Developed/Med Intensity
- Developed/Open Space
- Dry Beans
- Evergreen Forest
- Flaxseed
- Grassland Herbaceous
- Herbaceous Wetlands
- Mixed Forest
- Oats
- Open Water
- Other Hay/Non Alfalfa
- Peas
- Potatoes
- Rye
- Shrubland
- Soybeans
- Spring Wheat
- Sugarbeets
- Sunflower
- Sweet Corn
- Woody Wetlands

# Total Loading Estimates



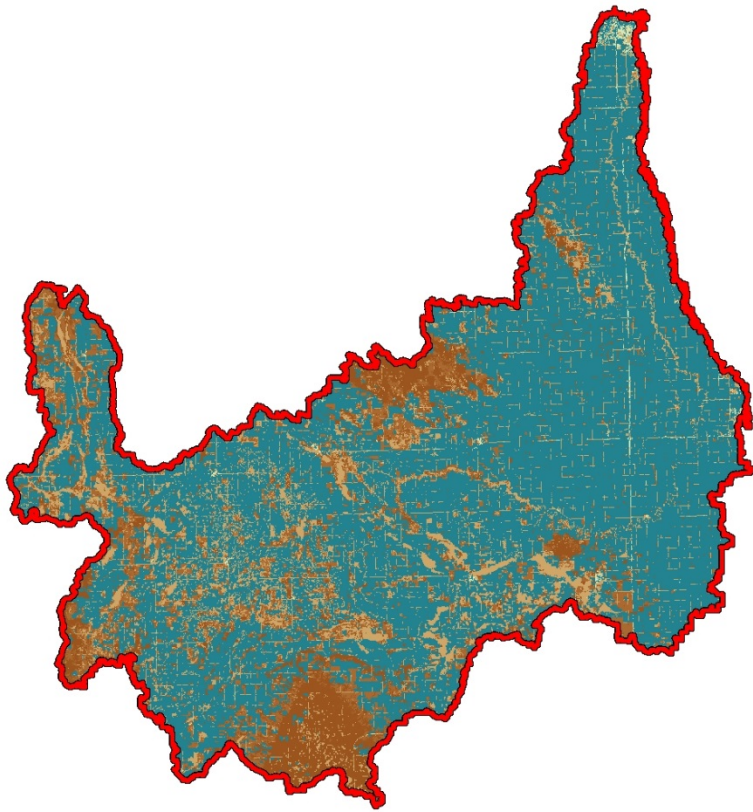
- RUSLE
- Developed by USDA
- Estimate soil erosion from fields

$$A = R \times K \times LS \times C \times P$$

Where,

- R = Rainfall and Runoff Factor
- K = Soil Erodibility Factor
- LS = Length-Slope Factor
- C = Cover and Management Factor
- P = Support Practice Factor

# Total Loading Estimates



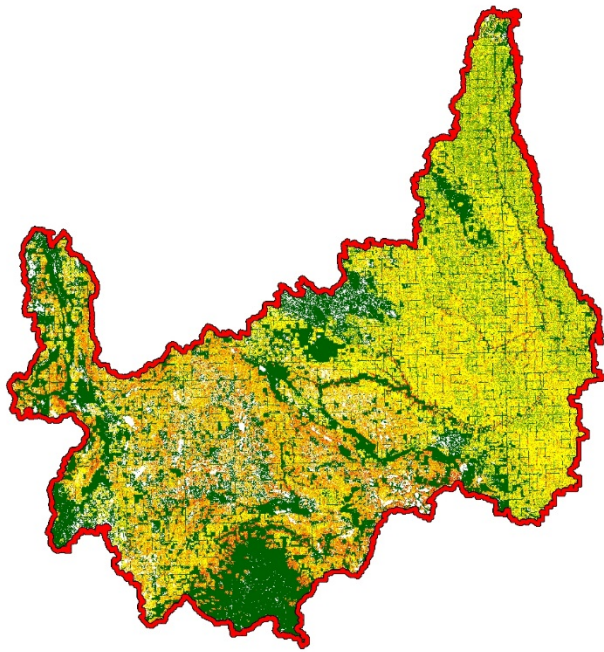
Total Nitrogen



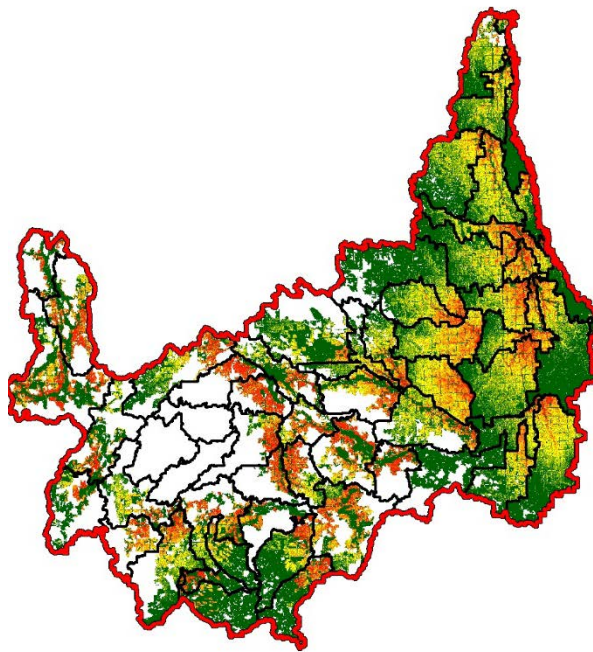
Total Phosphorus



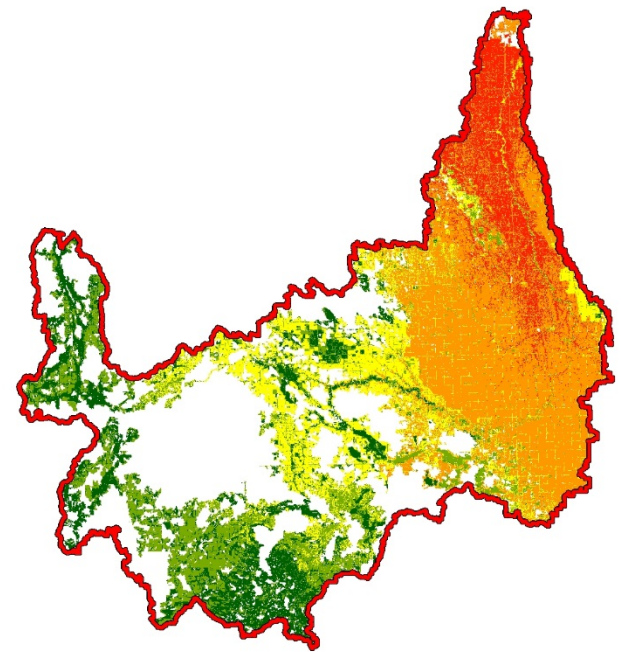
# Water Quality Index



Leaving Landscape



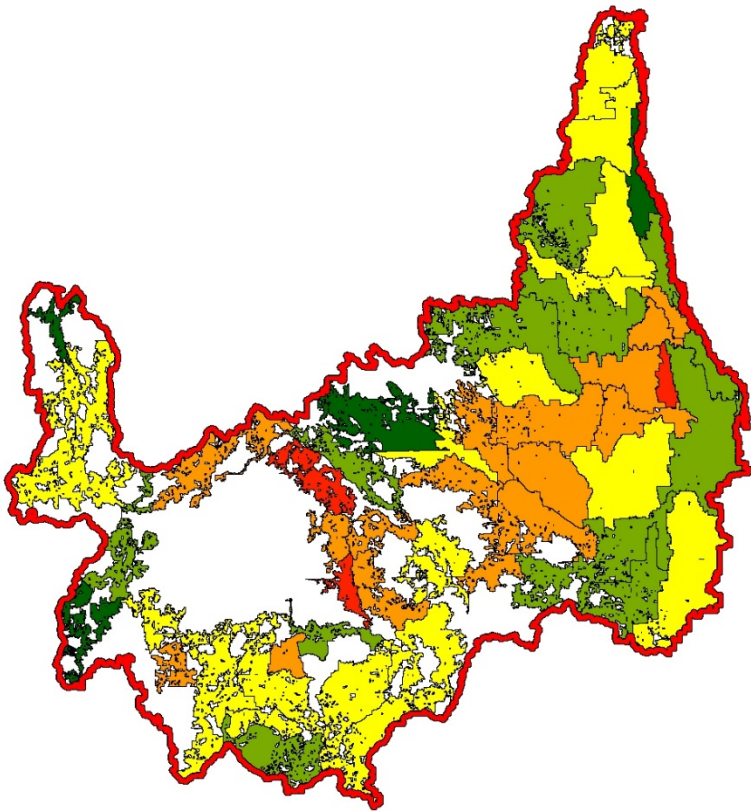
Subwatershed



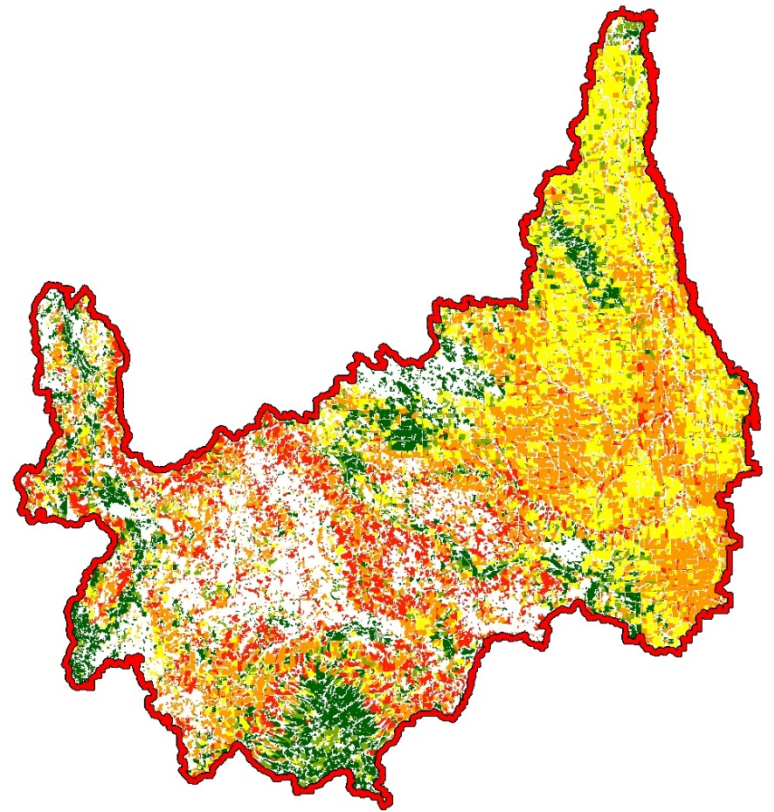
Watershed



# Watershed Scale



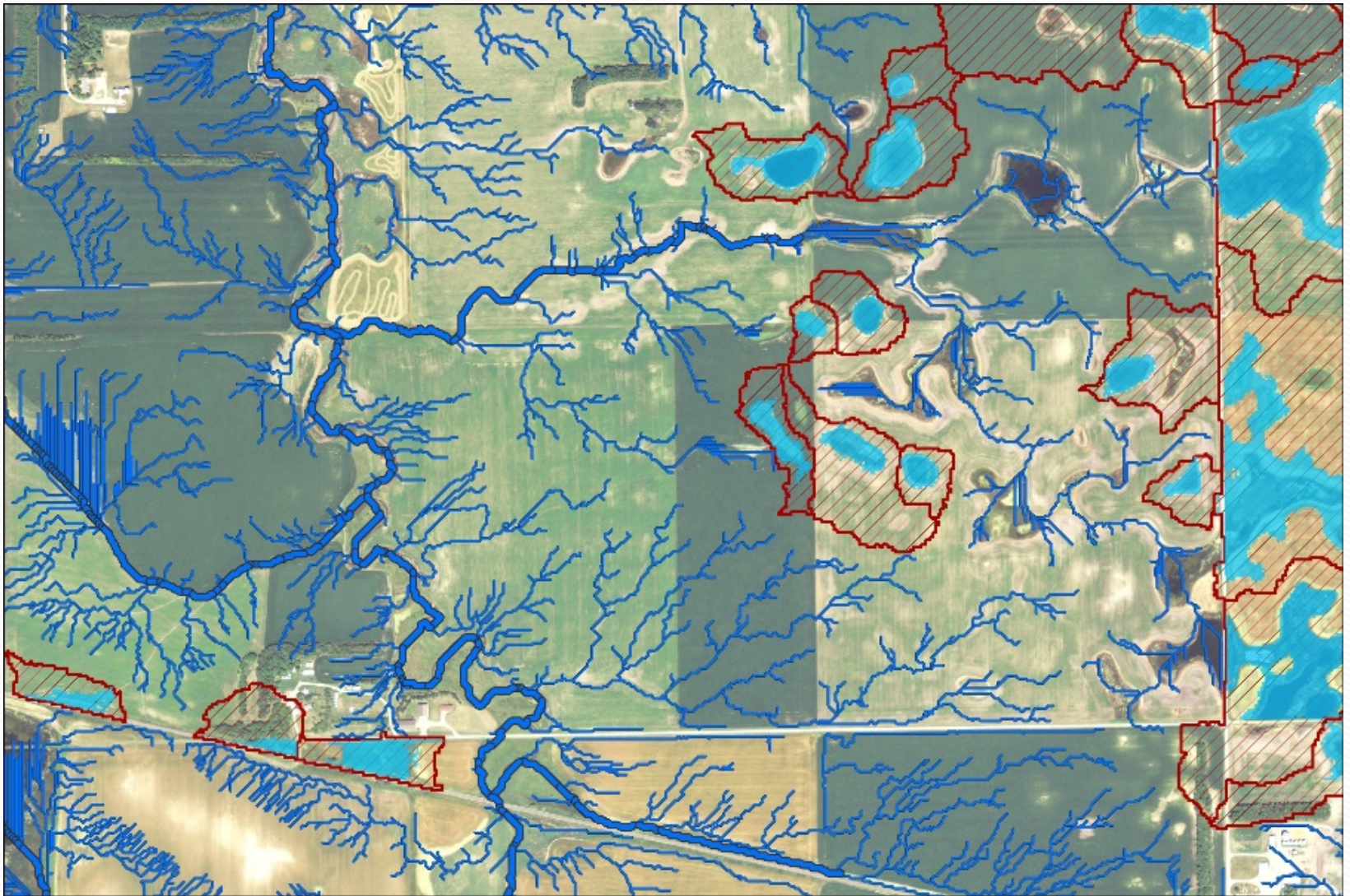
Subwatershed Ranked



Catchments Ranked

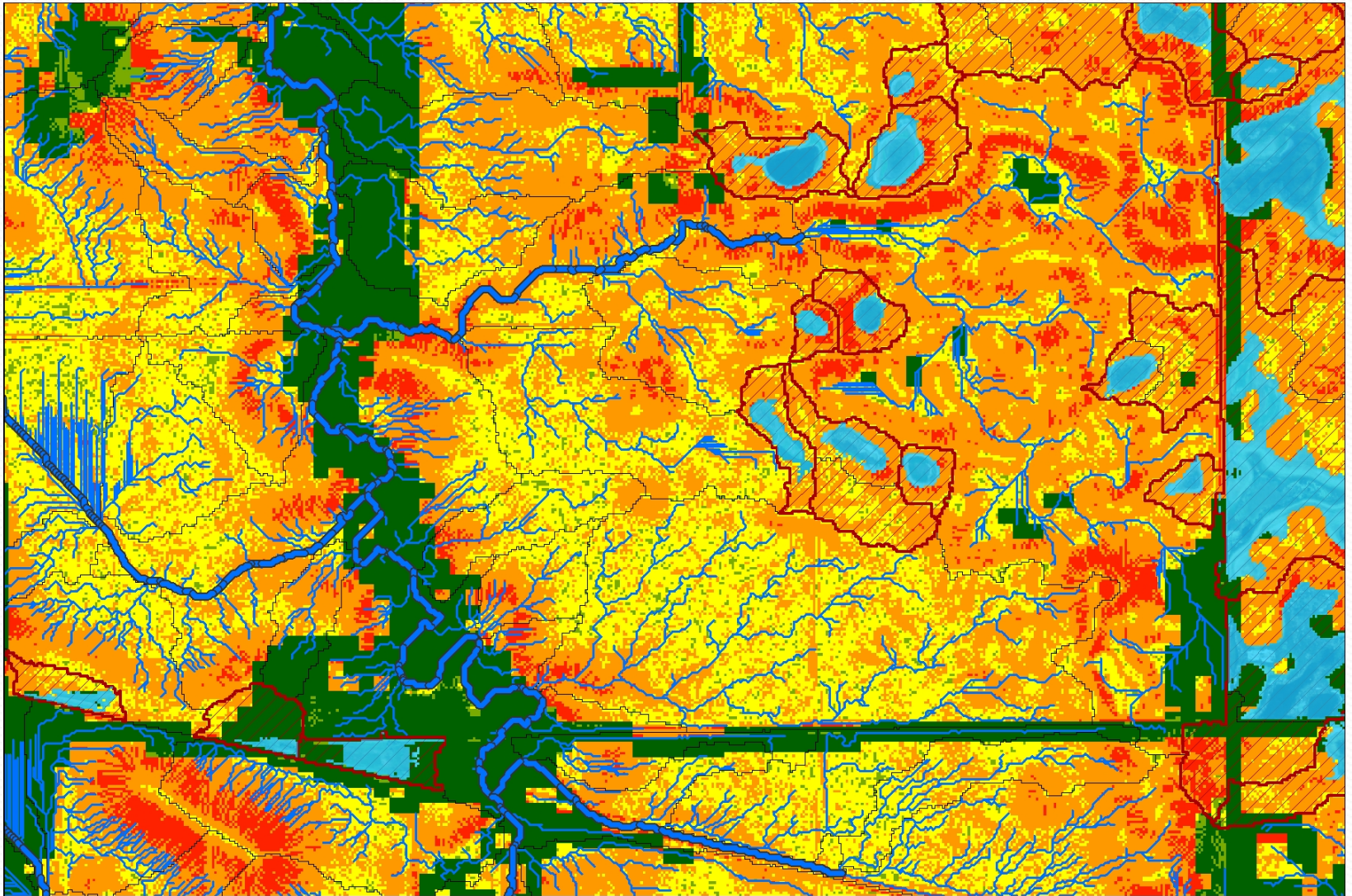


# On the Field





# On the Field





# Web-Based Data Viewer



## Red River Basin Decision Information Network

Shared Tools for Regional Problem Solving



### LAYERS

#### Map Layers

- PLSS Sec
- Project P
- Watershe
- Project P
- Biologic
- Water C
- Ground
- Existing
- Road-r
- Permitt
- Hydrol
- No
- Su
- ND Gover

#### Watershed Delineation

Follow the steps

**Step 1:** Turn on the "Flow Path" layer under Project Planning Tool GIS Layers -> Hydrology

**Step 2:** Select a tool and draw the watershed outlet on the map, the outlet must intersect a flow line.



Watershed Outlet Coordinates (UTM Zone 15):

X: 593635.73 Y: 5100414.23

Estimated Contributing Area (Sq.Miles): 258.12

**Step 3:**

[Delineate Watershed](#)

Results: Watershed Delineation Completed

Total Area (Sq.Miles): 258.14

[Download Watershed Outlet Shapefile](#)

[Download Watershed Shapefile](#)

**Step 4:**

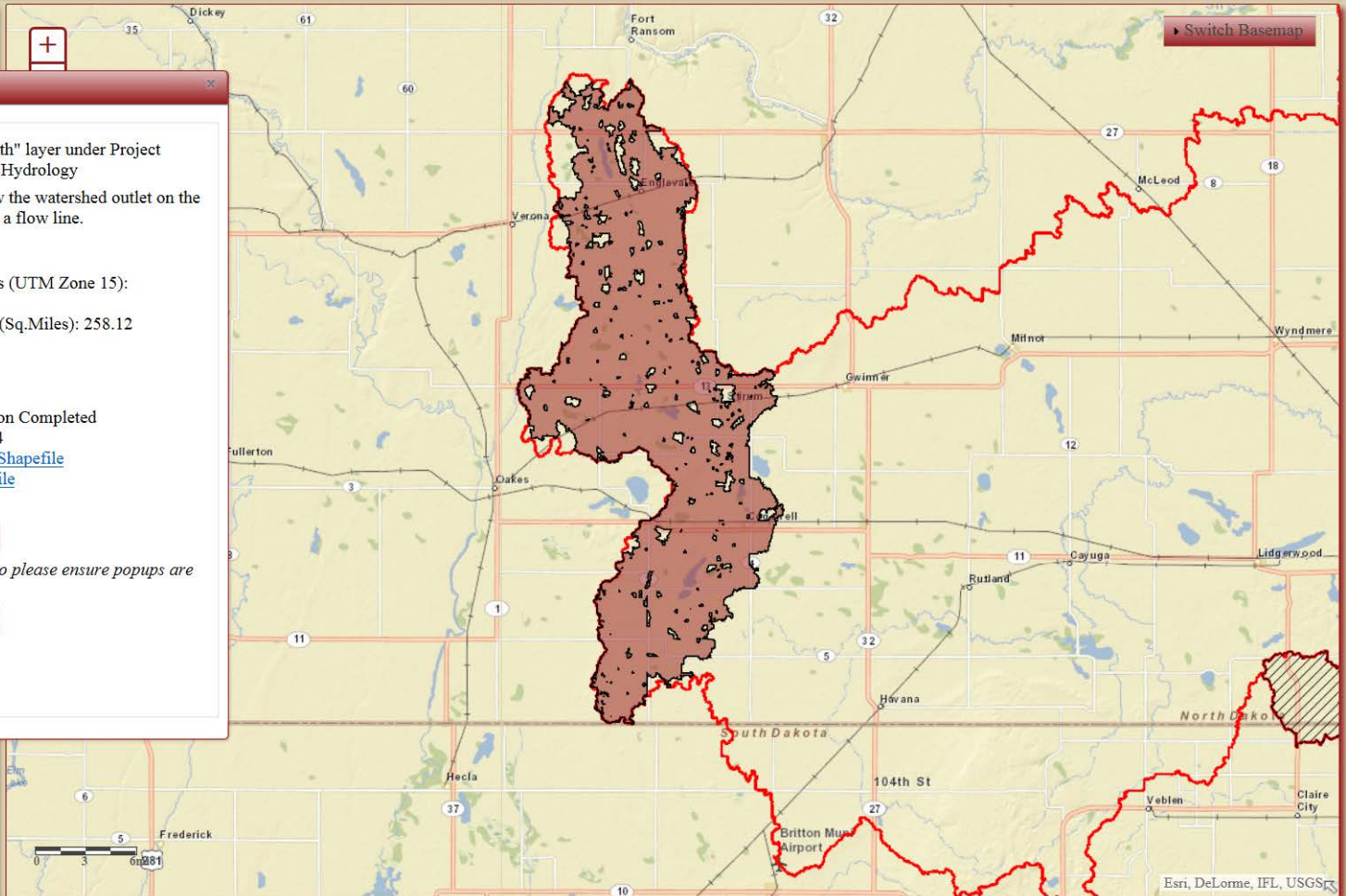
[Create Hydrology Report](#)

*\*Reports will open in popup so please ensure popups are not blocked.*

[Clear Map and Start Over](#)

SEARCH

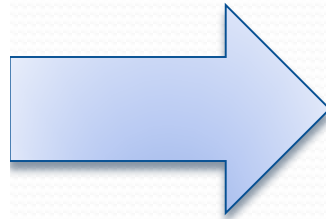
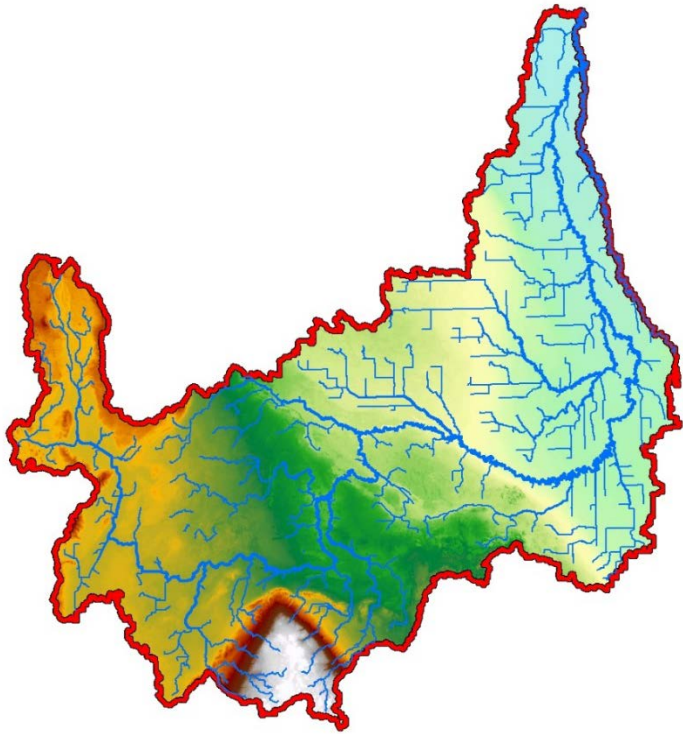
LEGEND



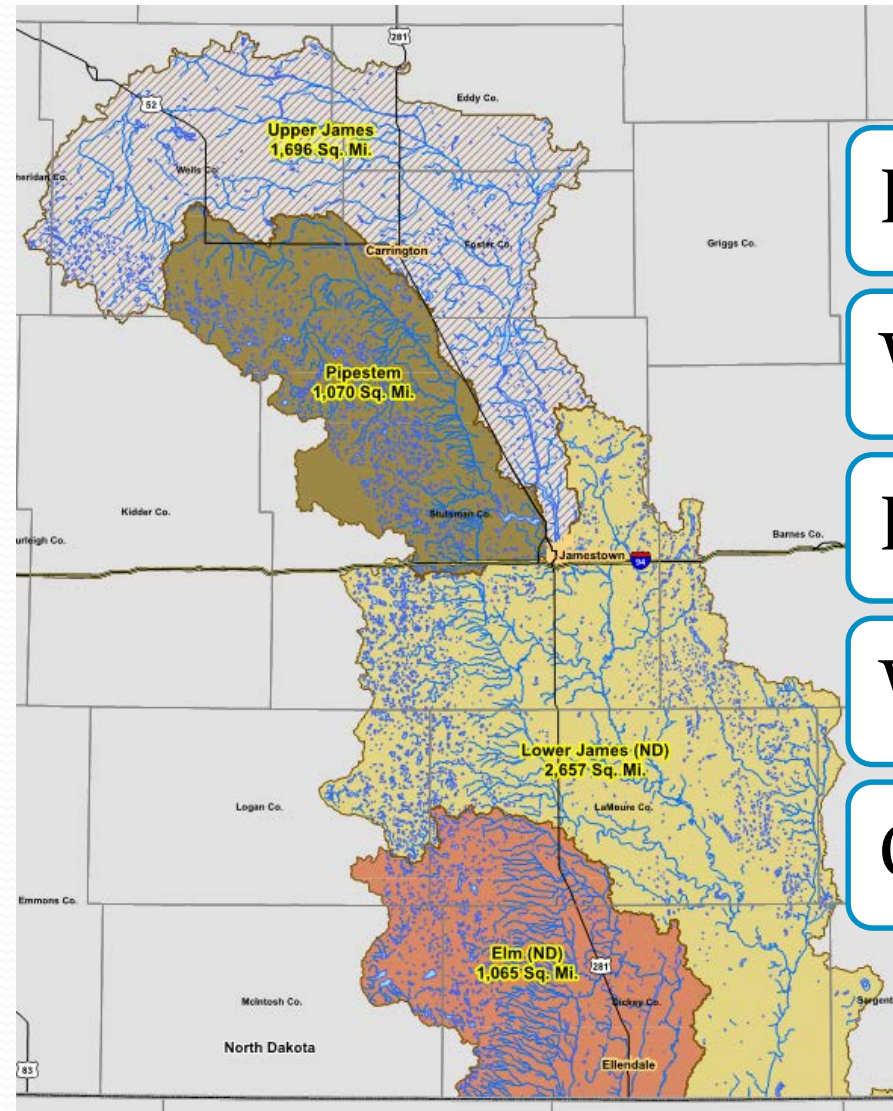
Esri, DeLorme, IFL, USGS



# Why?



# James River Watershed



Hydrologic Reconditioning

Water Quality Data

PTMApp – *Next Presentation*

Web Viewer

Outreach and Education



# Thank You!

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**Charles Fritz, Executive Director**  
**International Water Institute**  
charles@iwinst.org