Fox Illinois River Basin TMDL

A Framework for Surface Water Quality Improvement

October 31, 2023

Update Webinar #1

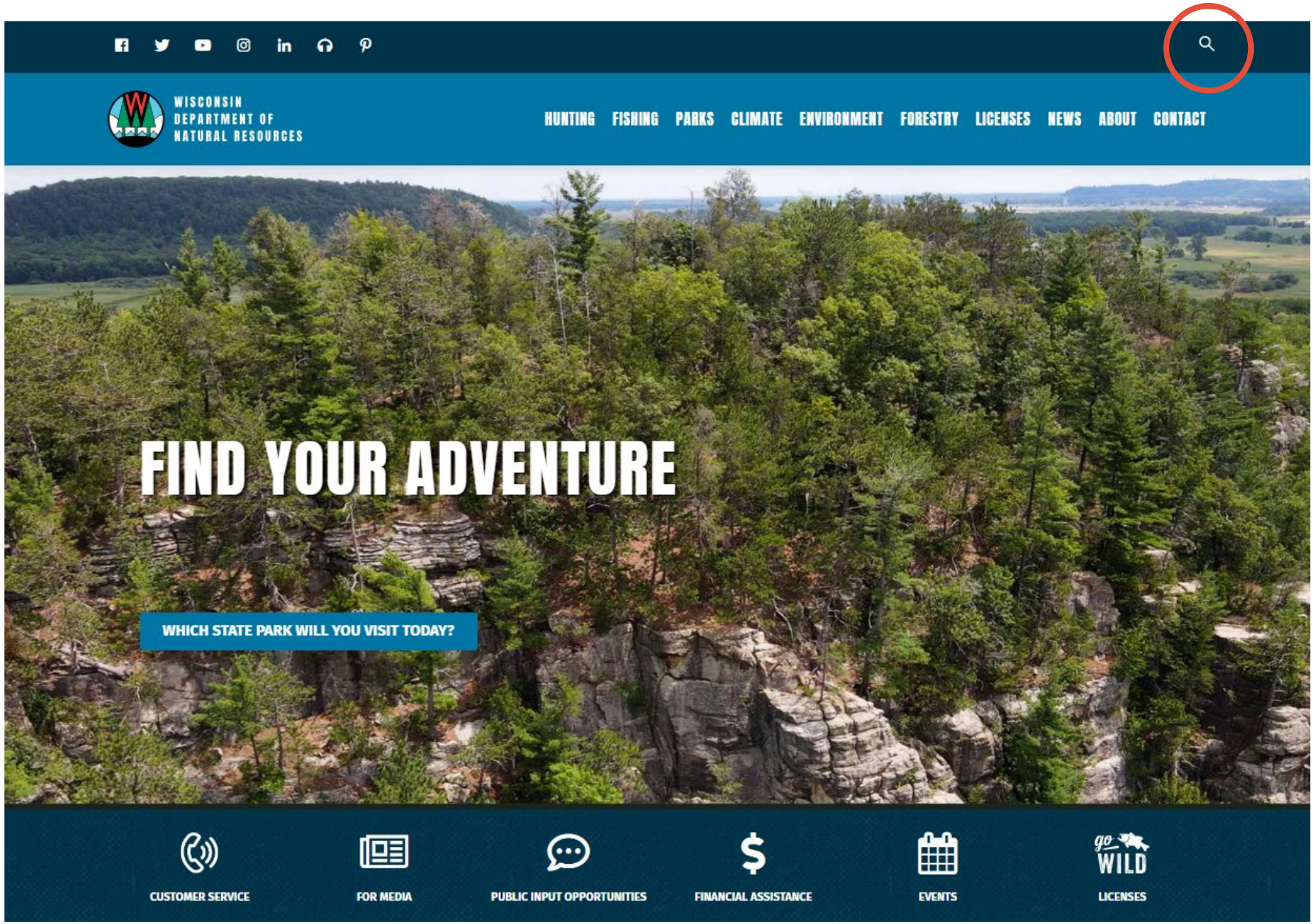
Today's Format

- Introductions
- Presentation covering TMDL water quality monitoring results, agricultural survey results, subbasin delineation, and watershed modeling plans
- Question & Answer session

- Both the recorded presentation and slides will be available on the DNR website

https://dnr.wi.gov/topic/TMDLs/FoxIllinois.html

or search "Fox Illinois River TMDL"



dnr.wi.gov

Click magnifying glass and type “Fox Illinois River TMDL” into the search bar

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

HUNTING FISHING PARKS CLIMATE ENVIRONMENT FORESTRY LICENSES NEWS ABOUT CONTACT

» TOPIC » TMDLS

FOX ILLINOIS RIVER BASIN TMDL

A FRAMEWORK FOR WATER QUALITY IMPROVEMENT

Fox River at Waterford

Total Maximum Daily Loads (TMDLs)

- Overview
- TMDLs In Development
- Approved TMDLs
- Implementation
- Point Source
- Nonpoint Source
- Map and Projects

For more information, contact:

Eric Hettler
TMDL Modeler
Water Quality Program

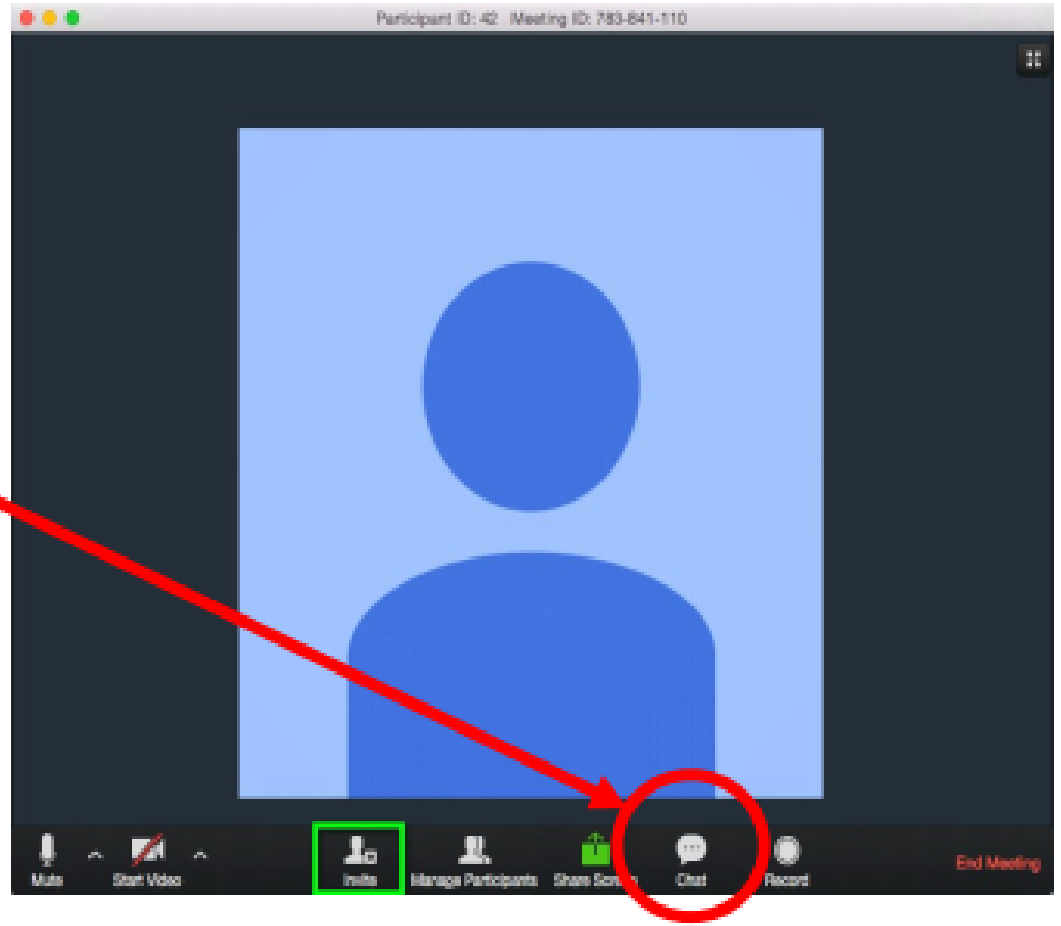
GovDelivery Sign-up

Subscribe to receive updates about the Fox Illinois River Basin TMDL.

Zoom

Click **Chat** in the meeting controls.

NOTE: If don't see controls, tap screen and they will pop up.



Today's Presenter

Eric Hettler, PE
TMDL Modeler

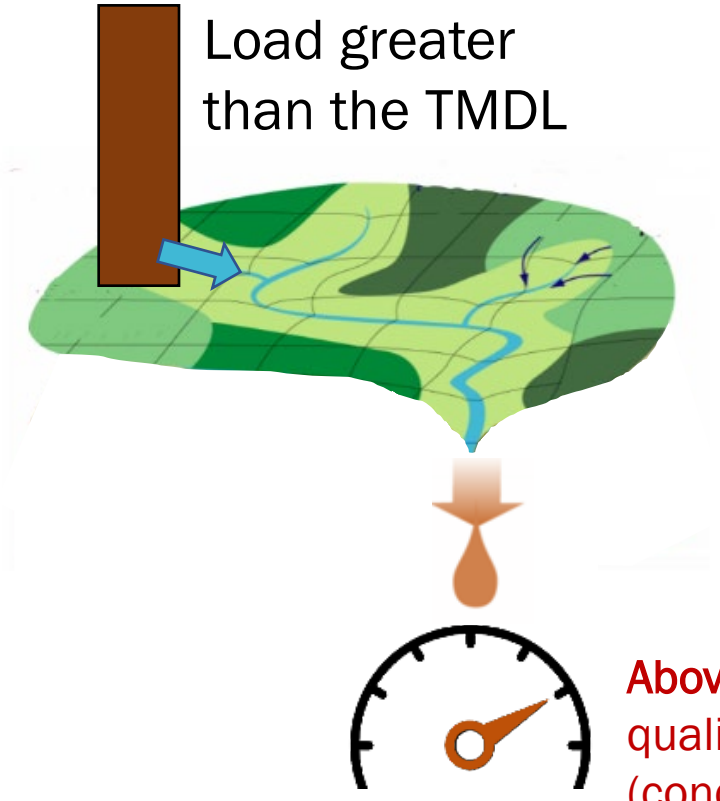
Presentation Outline

- TMDL Process Refresher
- Monitoring results
- Agricultural survey results
- Watershed model subbasin delineation
- Next steps

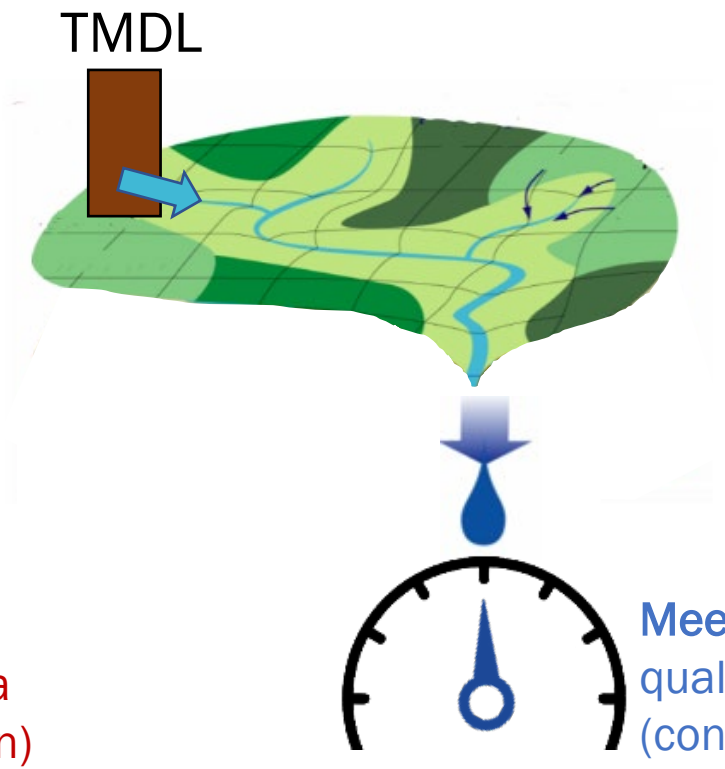
TMDL Overview

Total Maximum Daily Load (TMDL)

TMDL: Amount of a pollutant a waterbody can receive and still meet water quality standards



Above water quality criteria (concentration)



Meets water quality criteria (concentration)

Total Maximum Daily Load (TMDL)

EPA requires that waters listed as impaired on Wisconsin's 303d list have TMDLs developed

TMDL =

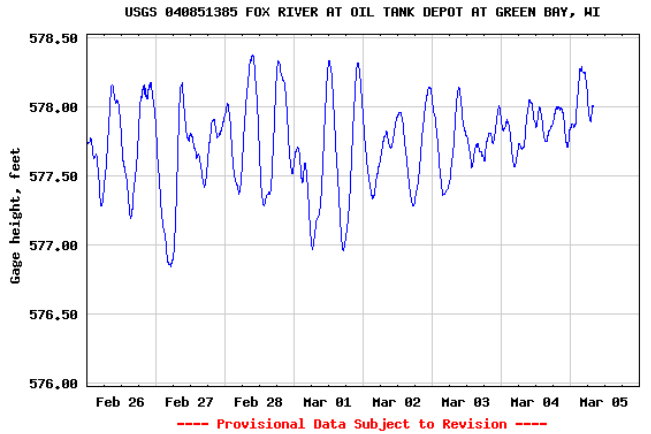
Load Allocation

+

Wasteload Allocation

+

Margin of Safety



Fox Illinois River Basin TMDL

FOXIL TMDL Project Extents and Counties

Primary Counties

Waukesha: 333 mi² (57% of county)

Walworth: 331 mi² (57% of county)

Kenosha: 218 mi² (79% of county)

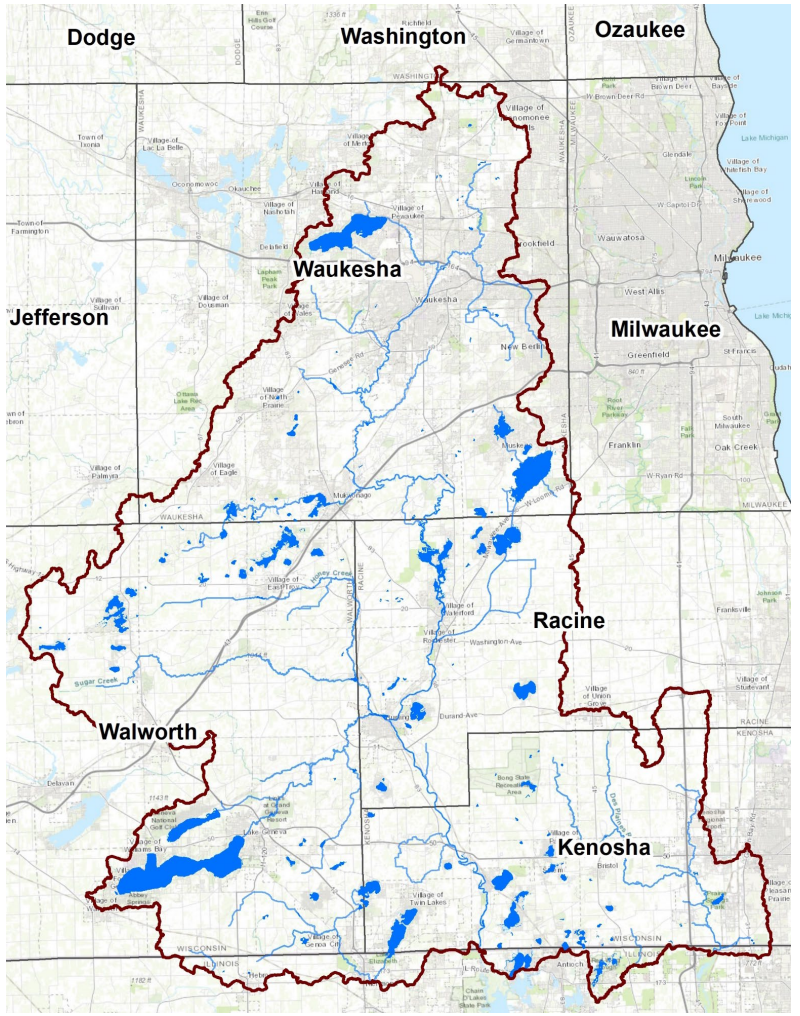
Racine: 175 mi² (52% of county)

Minor Counties

Jefferson: 1.5 mi² (0.3 % of county)

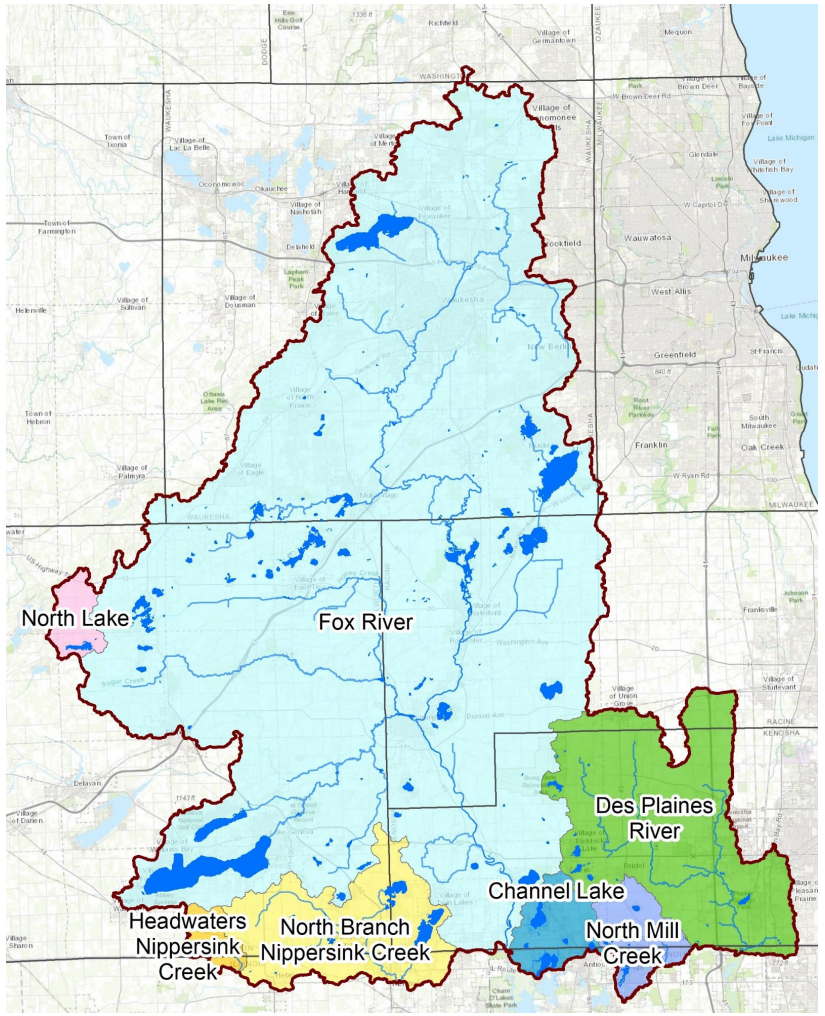
Washington: 0.4 mi² (0.2 % of county)

Milwaukee: 0.3 mi² (0.1 % of county)



FOXIL TMDL Watersheds

- Fox River
- Des Plaines River
- Headwaters Nippersink Creek
- North Branch Nippersink Creek
- North Lake
- Channel Lake
- North Mill Creek



TP Impairments – 303(d) List

River and Stream Impairments

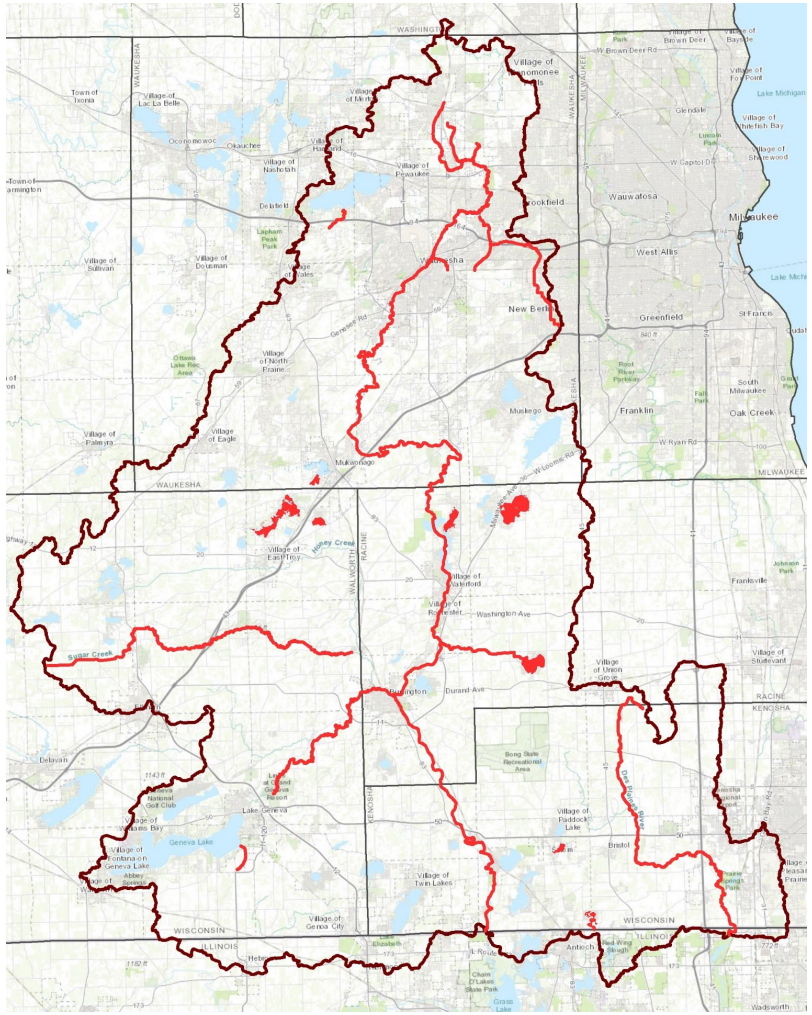
11 named streams/rivers

~170 stream miles

Lake Impairments

9 lakes

1 impoundment (Fox River)



TSS Impairments – 303(d) List

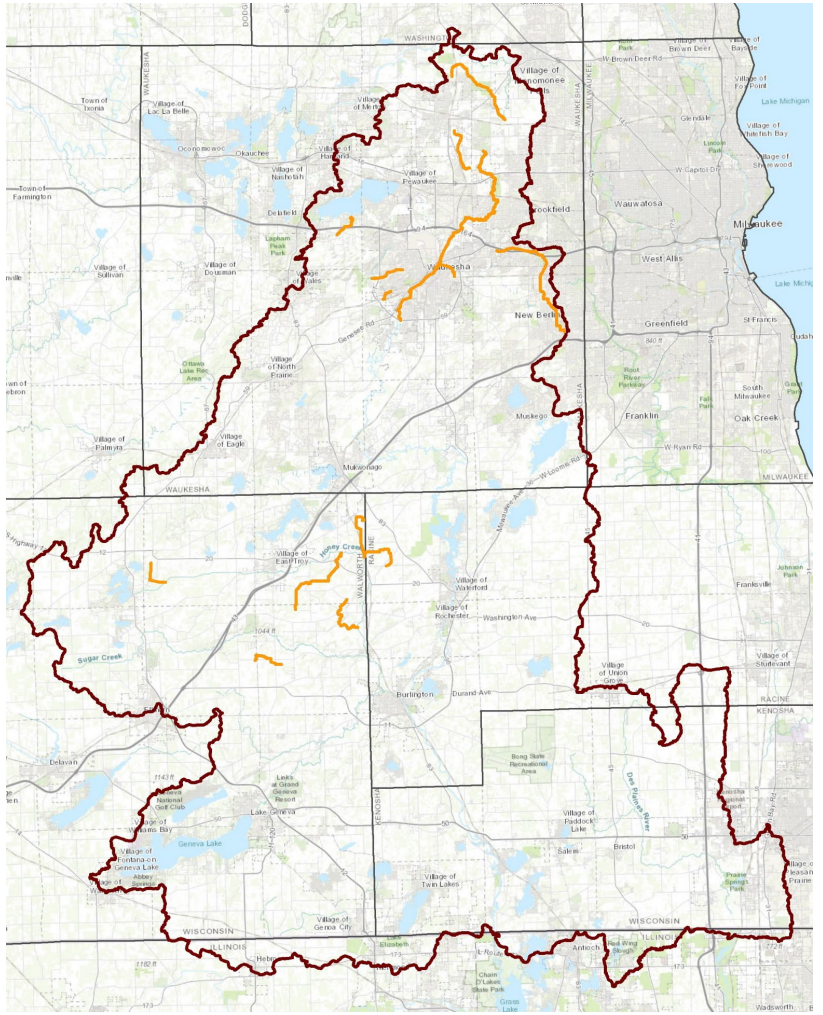
River and Stream Impairments

7 named streams/rivers

~55 stream miles

Lake Impairments

1 impoundment (Fox River)



FOXIL TMDL Development

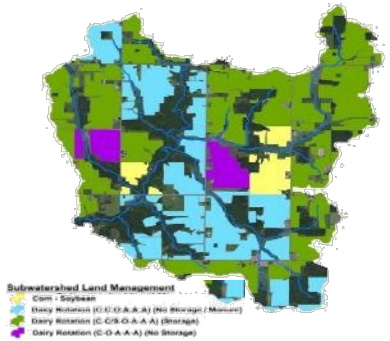
TMDL Development Overview

Monitoring
Conceptualization

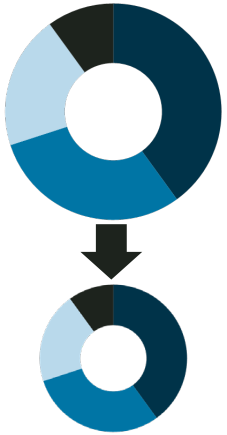
Modeling

Allocations

Implementation



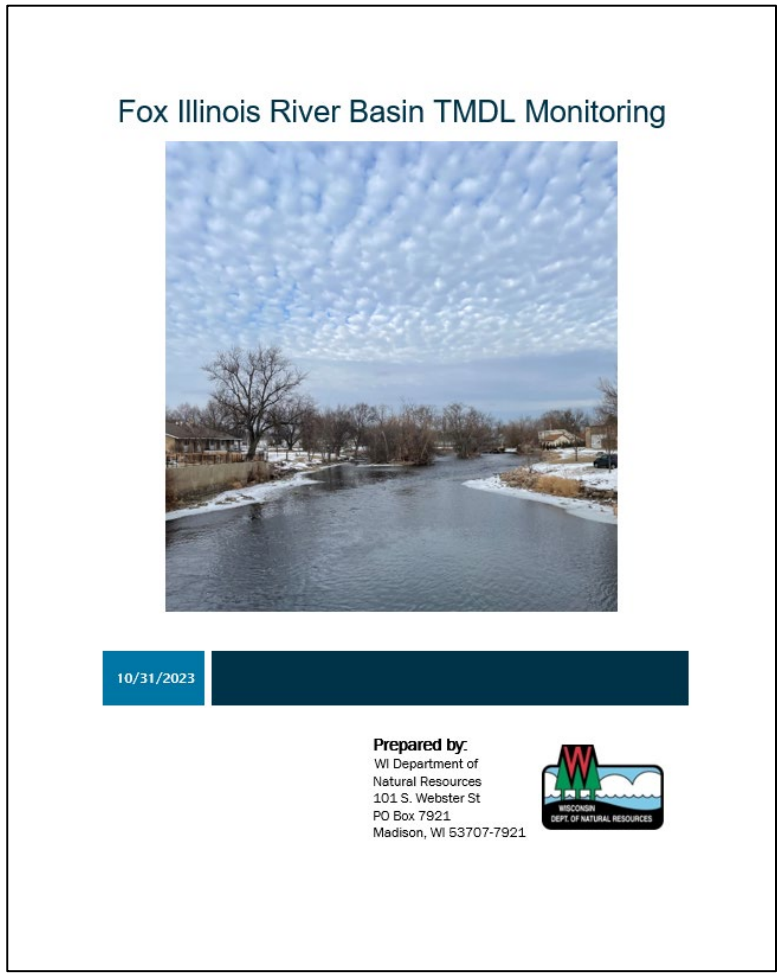
Baseline



TMDL


Monitoring
Conceptualization
Modeling
Allocations
Implementation

DNR Monitoring Report



APPENDICES

Available at https://dnr.wisconsin.gov/topic/TMDLs/FOXIL

DNR Monitoring Team

- **Rachel Sabre**
- Mike Shupryt
- Mike Sorge
- Craig Helker
- Arthur Watkinson
- Michelle Soderling
- Amanda Schmitz
- Mica Kromrey
- Sarah Fanning
- Camille Bruhn
- Kim Kuber
- Holly Stagemann
- Loretha Jack
- Breanna Crane
- Jim Amrhein
- Tim Asplund

Water Quality Monitoring and Data

Water Quality Monitoring

- Total Phosphorus
- Total Suspended Solids
- Dissolved Orthophosphate

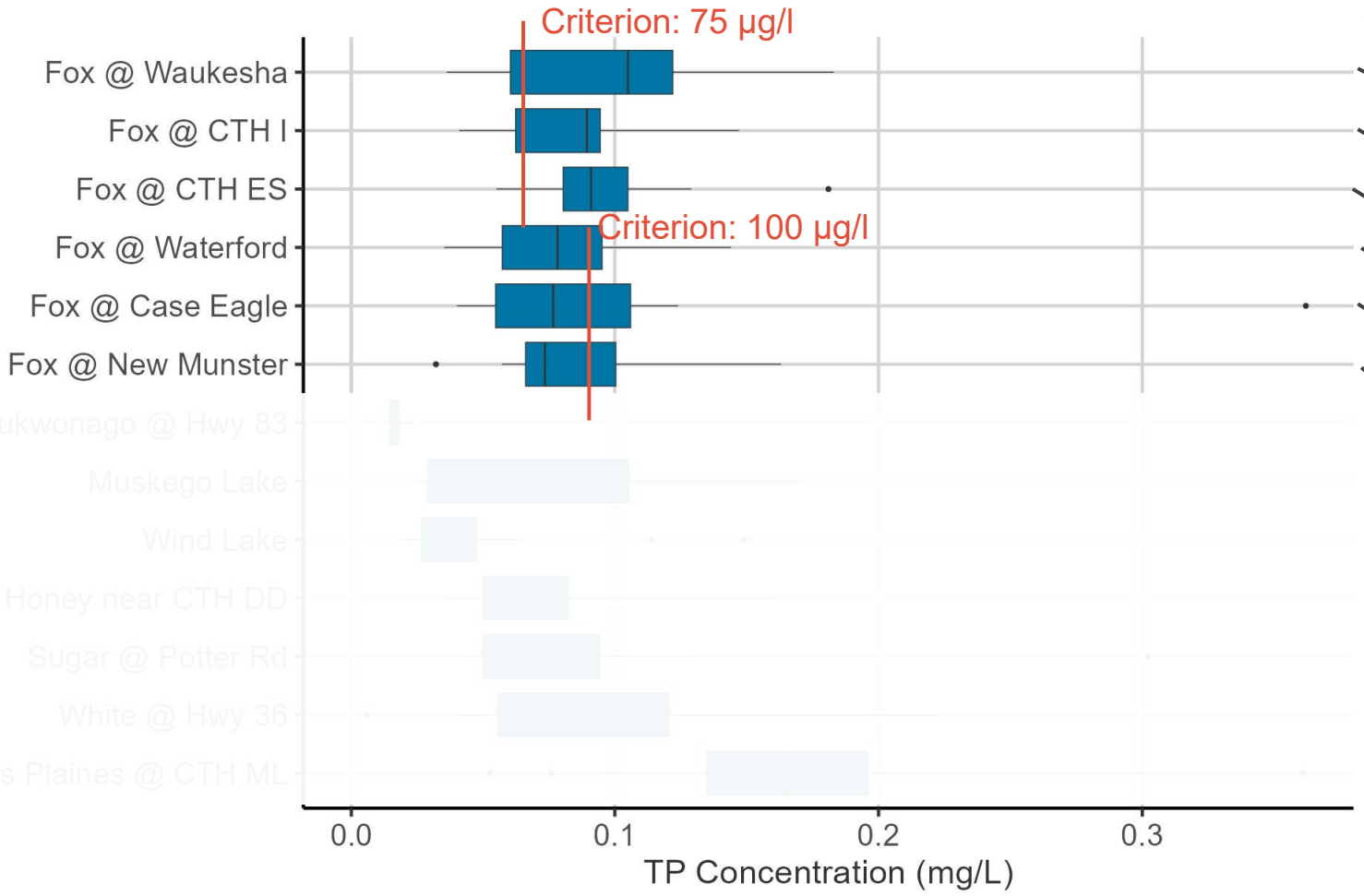
WISCONSIN DEPT. OF NATURAL RESOURCES

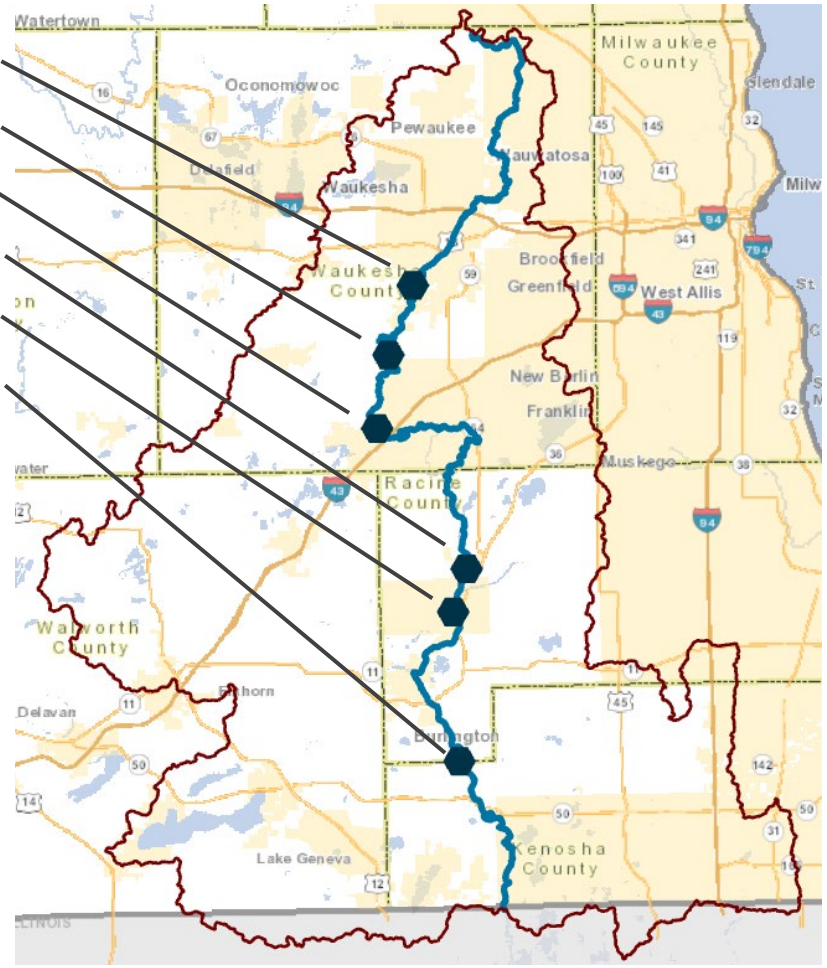
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

CADMUS & EOR water ecology community

Wisconsin State Laboratory of Hygiene
UNIVERSITY OF WISCONSIN–MADISON

Total Phosphorus (Growing Season)





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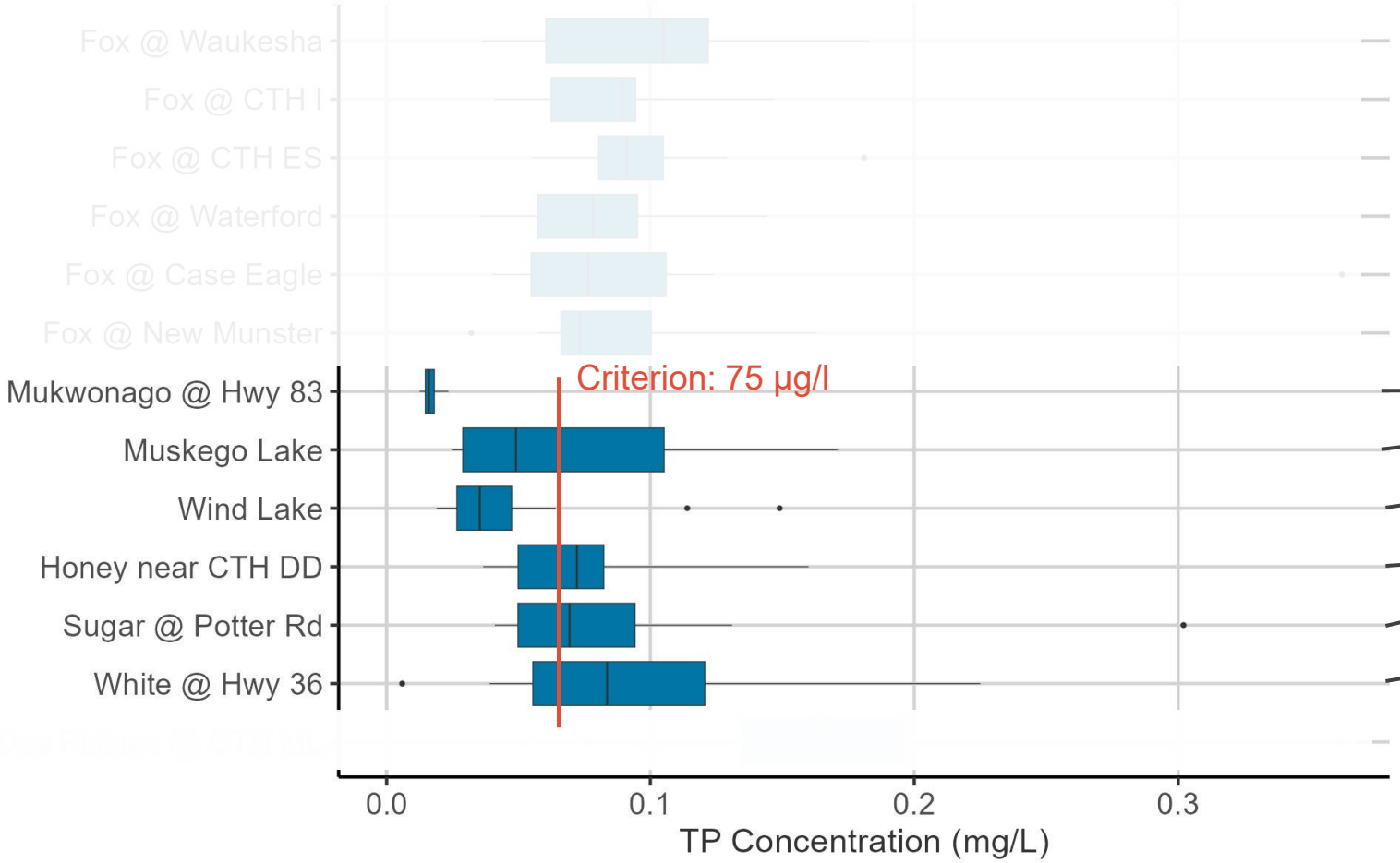

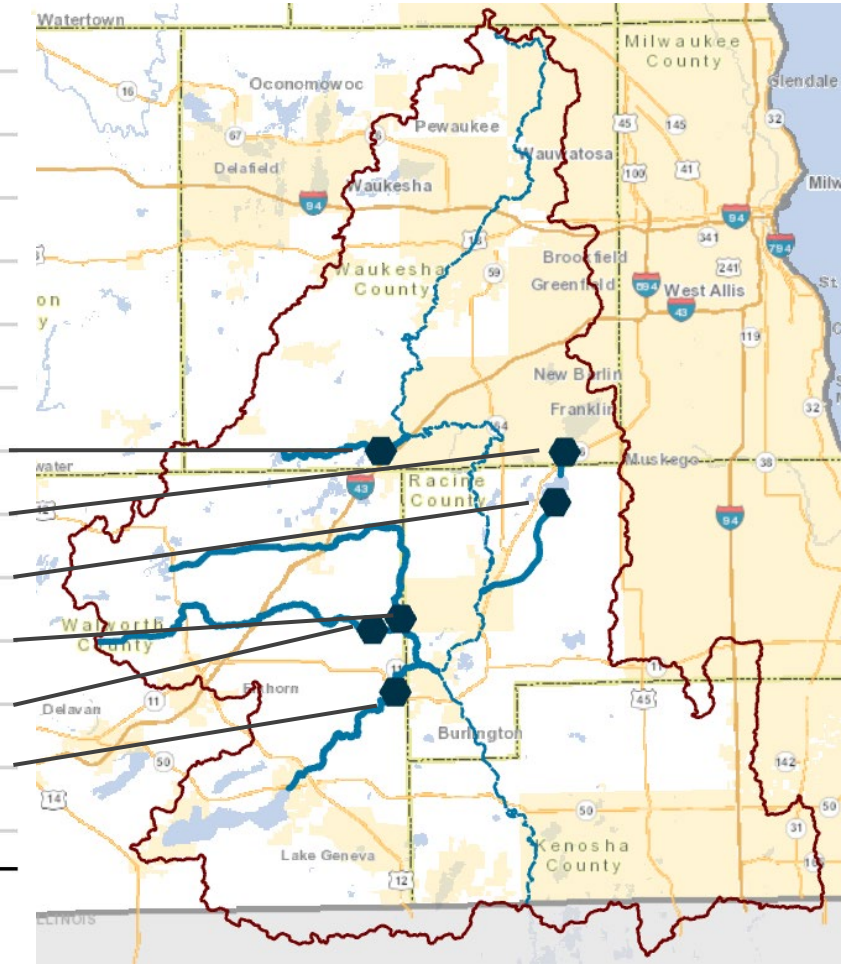

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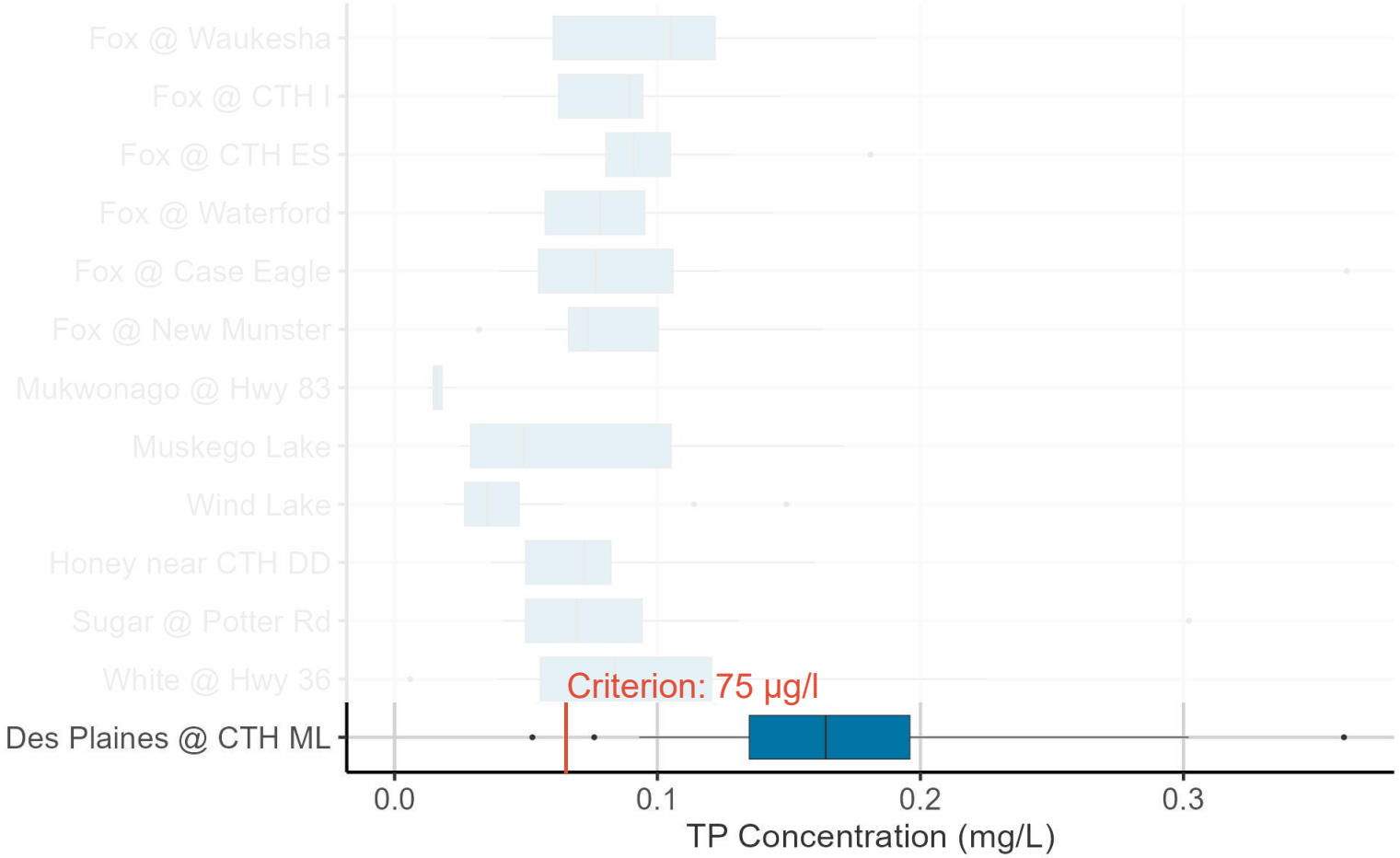
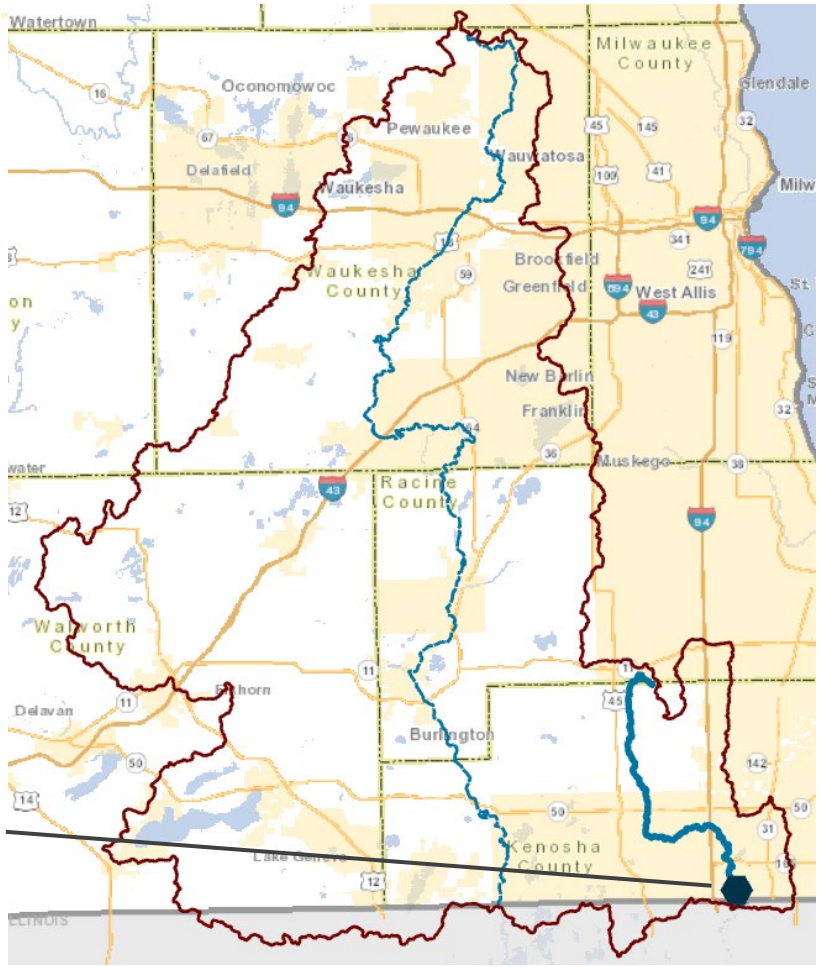
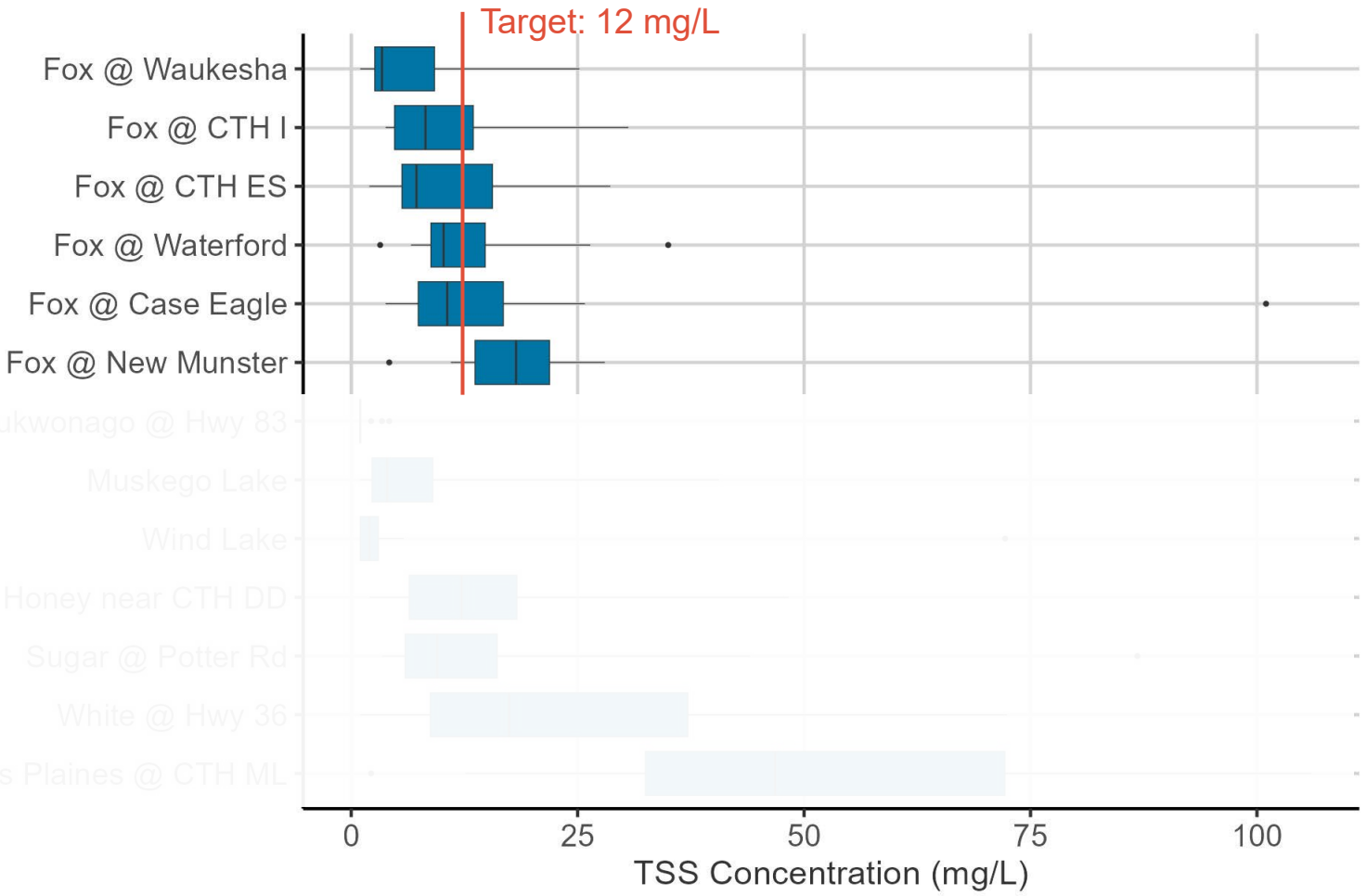
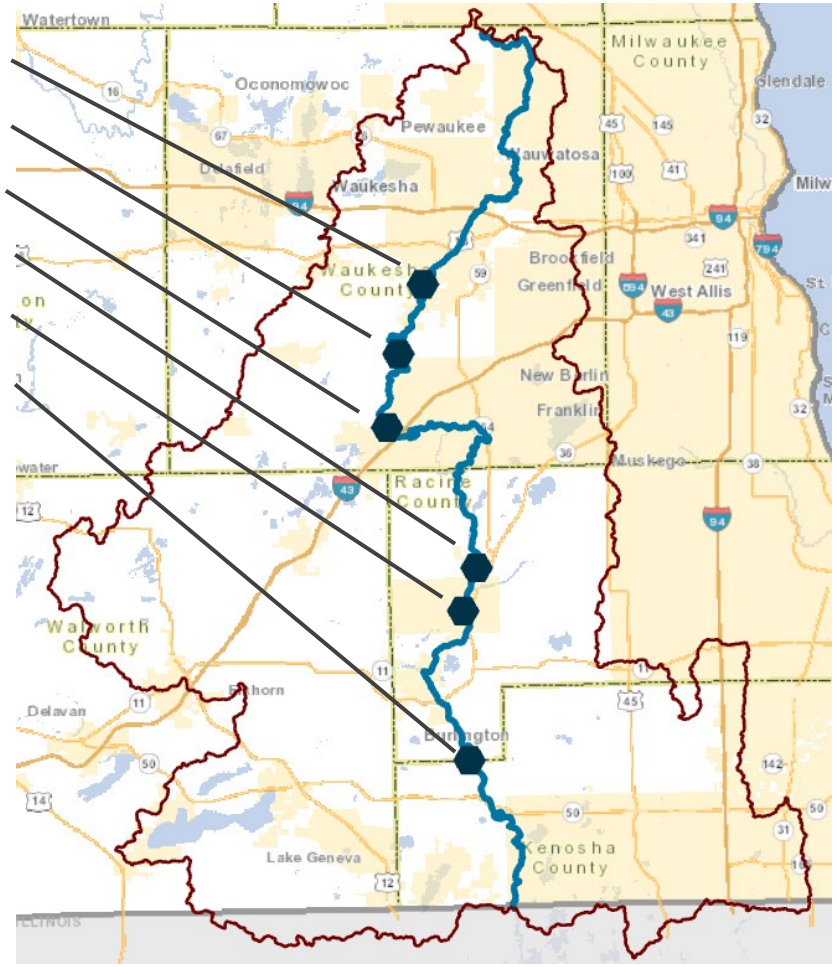




Total Suspended Solids (Growing Season)





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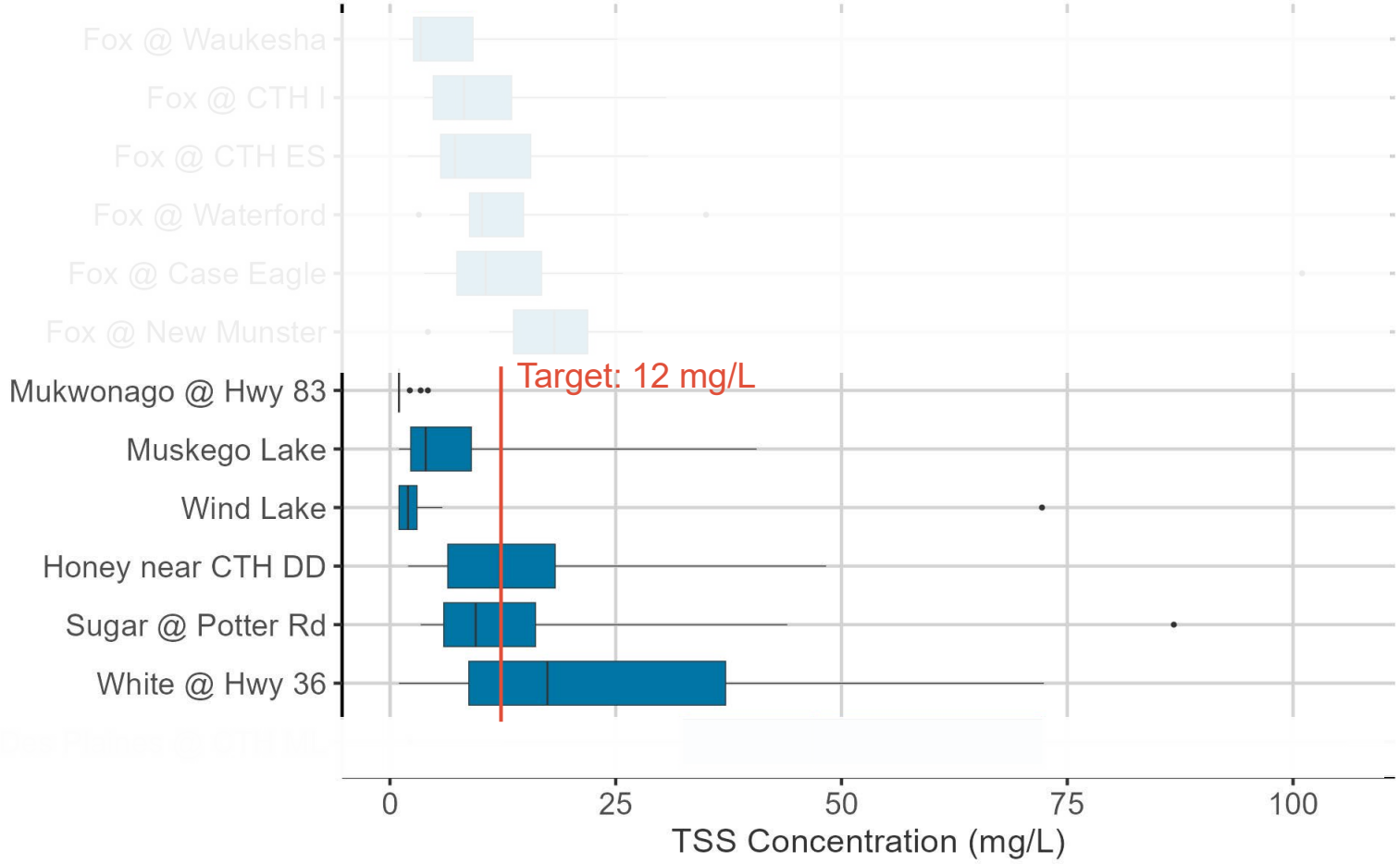

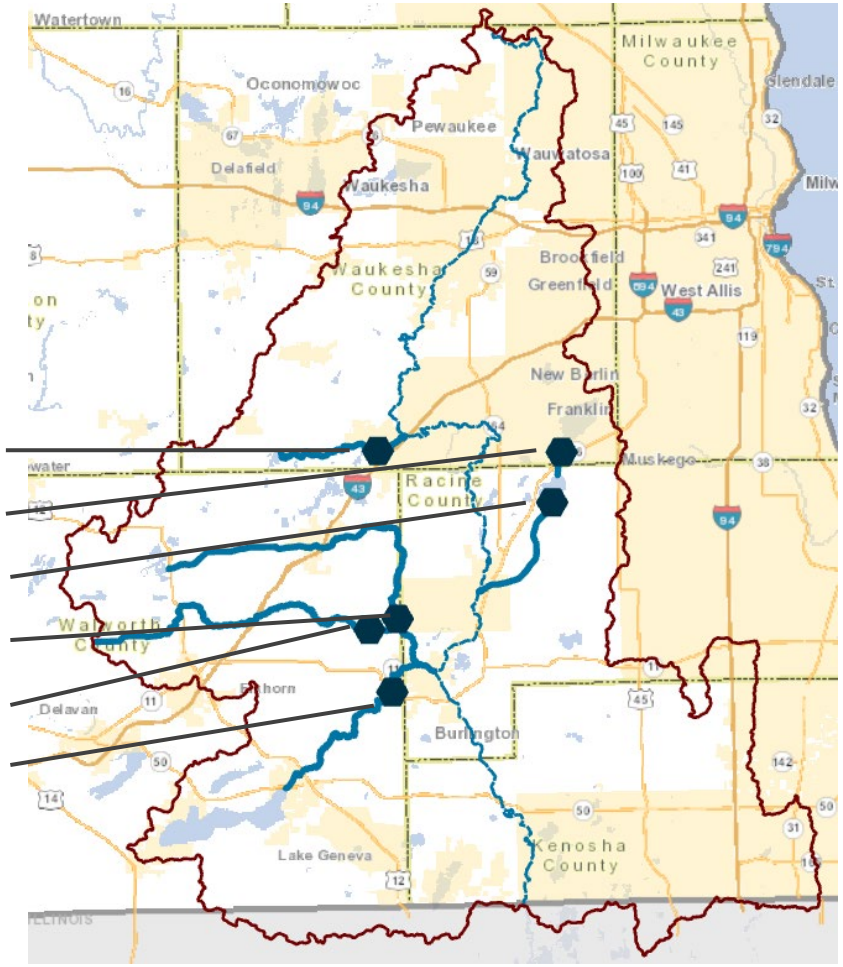

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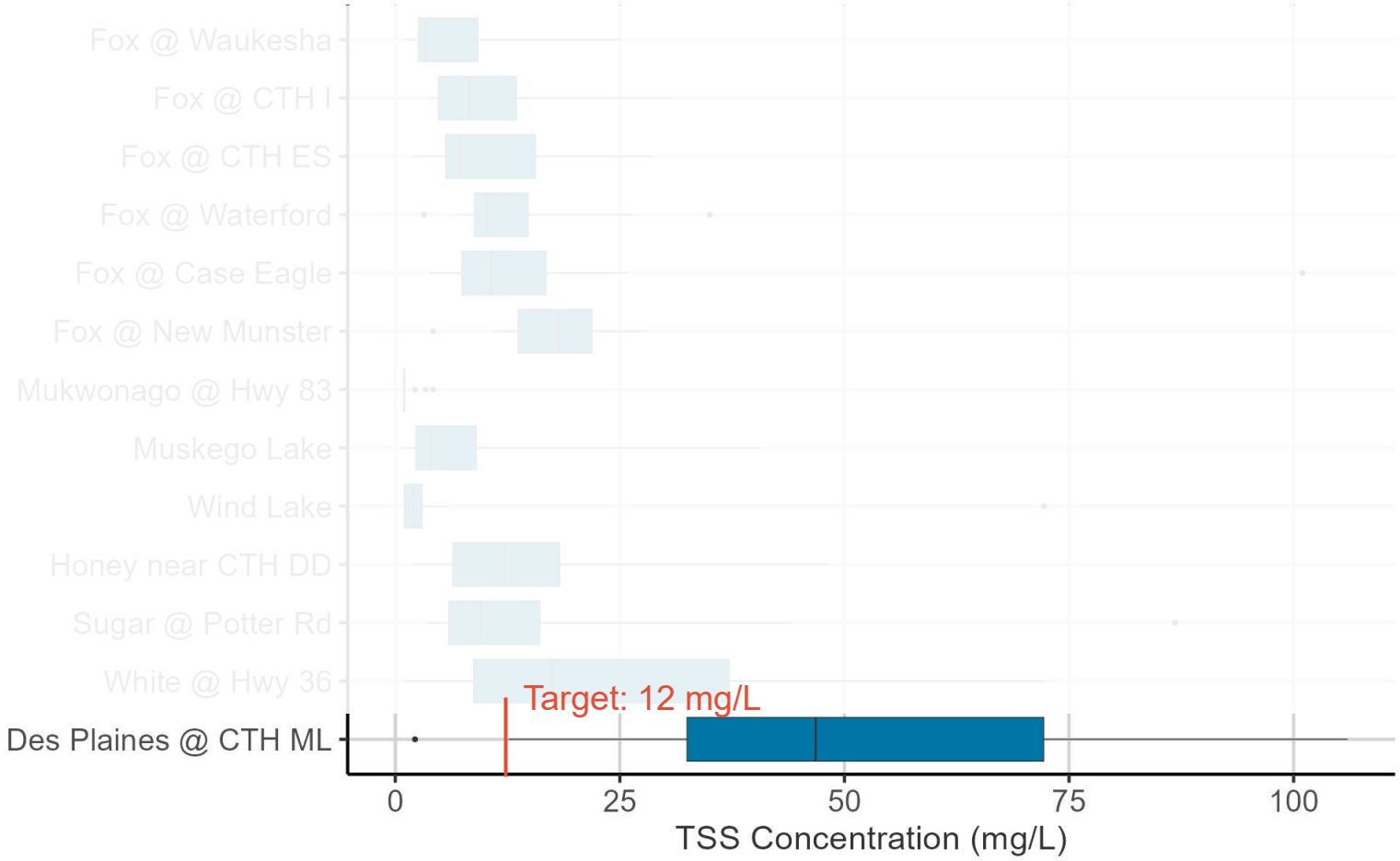
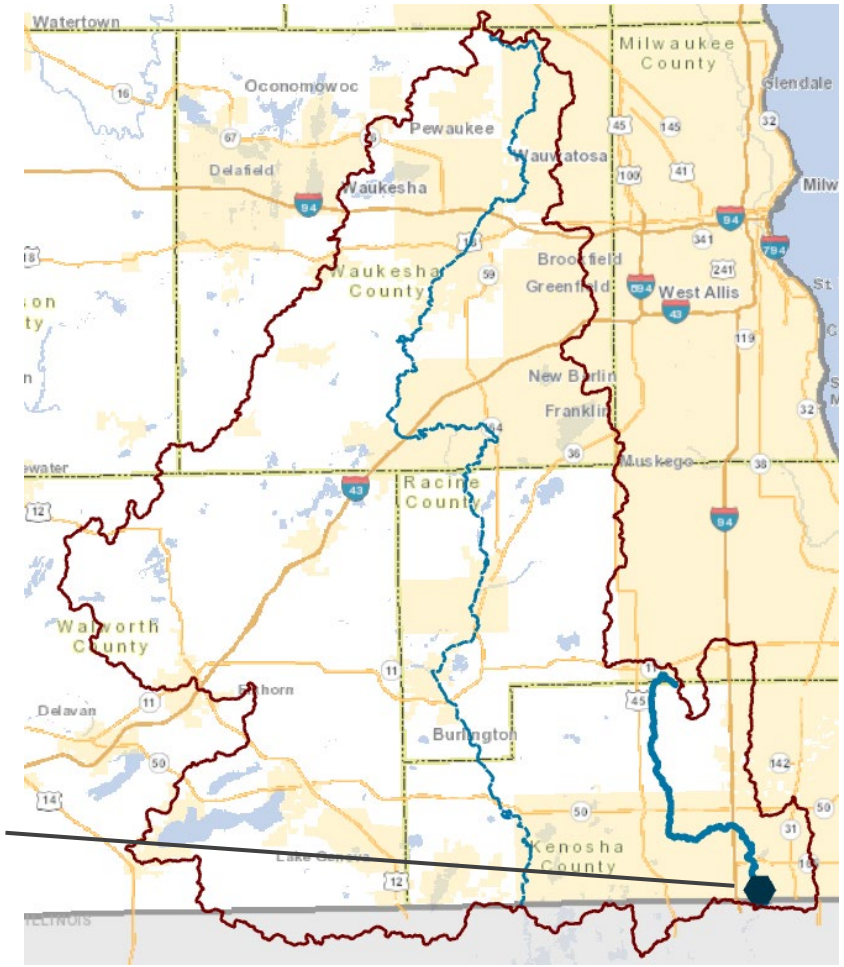
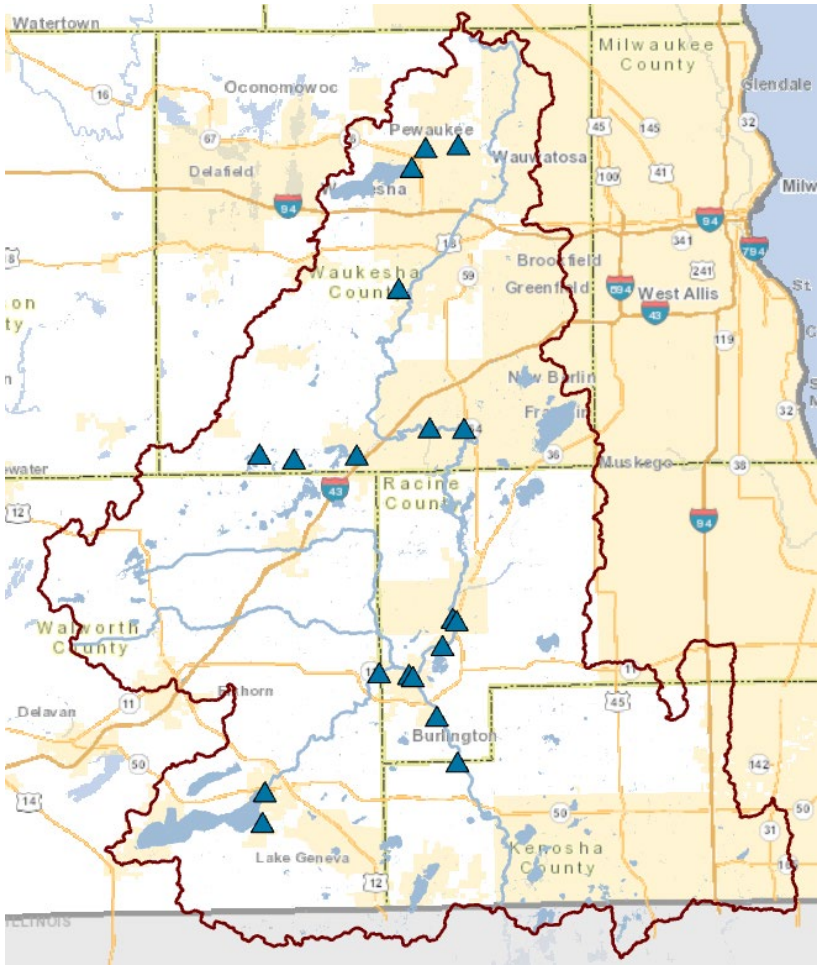
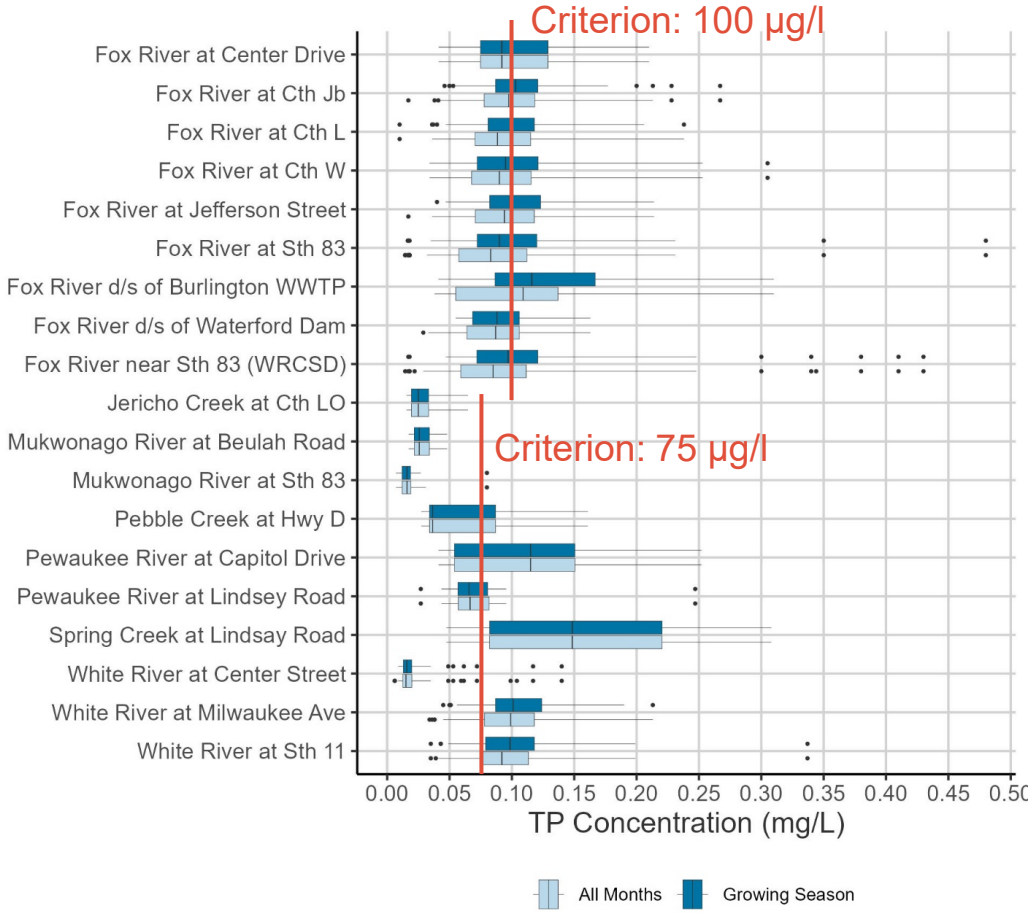




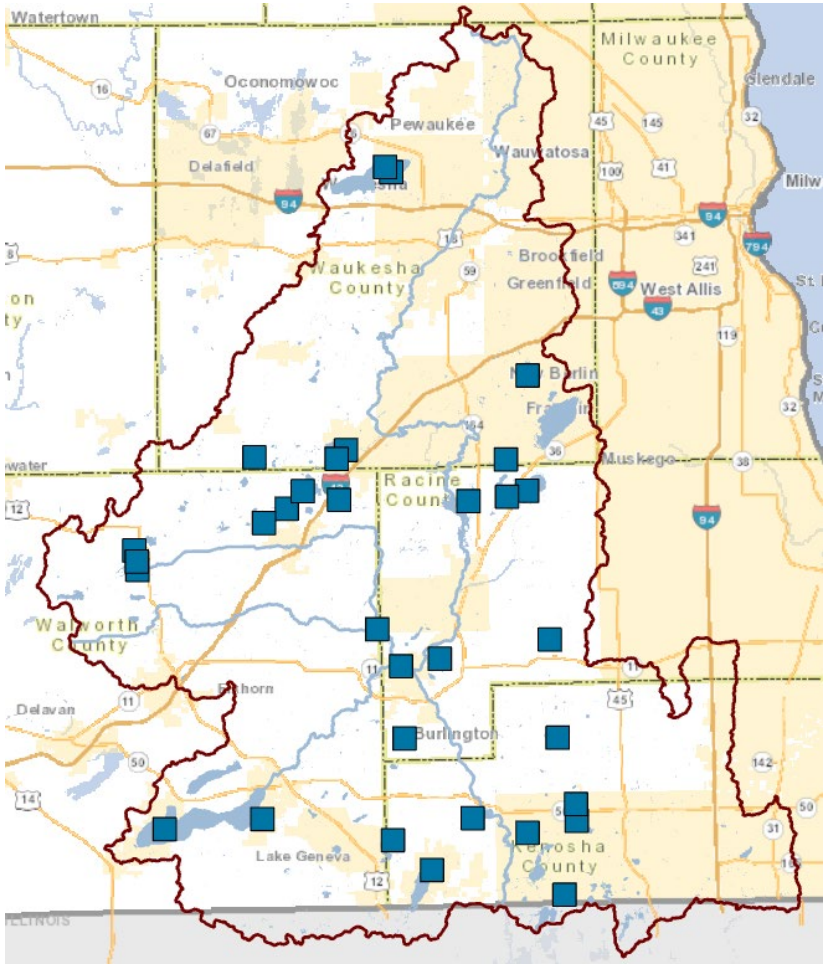
Supplemental River & Stream TP Data



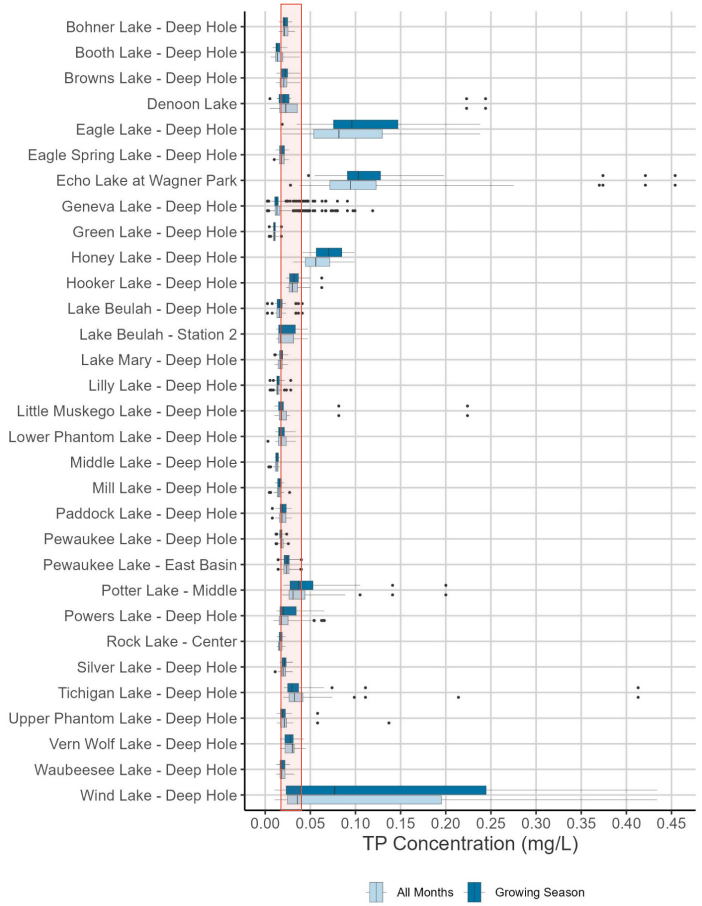
19 sites with adequate data



Supplemental Lake TP Data



28 lakes with adequate data

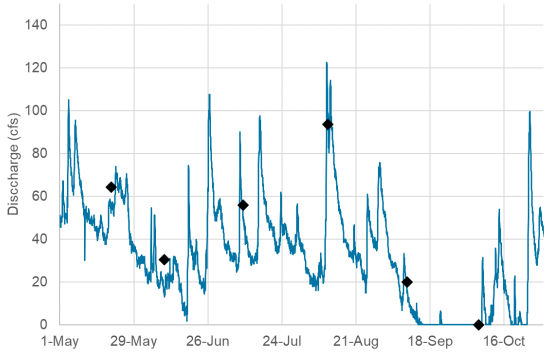


Lake Criteria:
15-40 µg/L, depending on lake type

Stage and Flow Data

Continuous Flow Estimates

Primary Goal:
Continuous Flow
Data



Continuous Flow Estimates

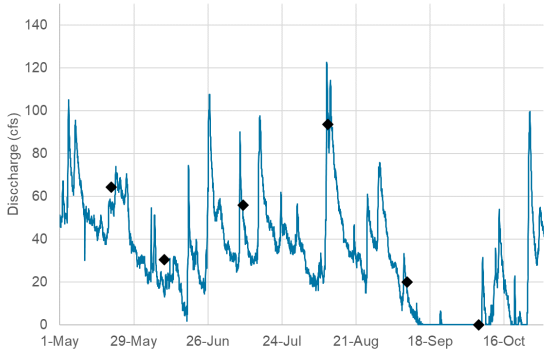
Continuous Stage Data

+

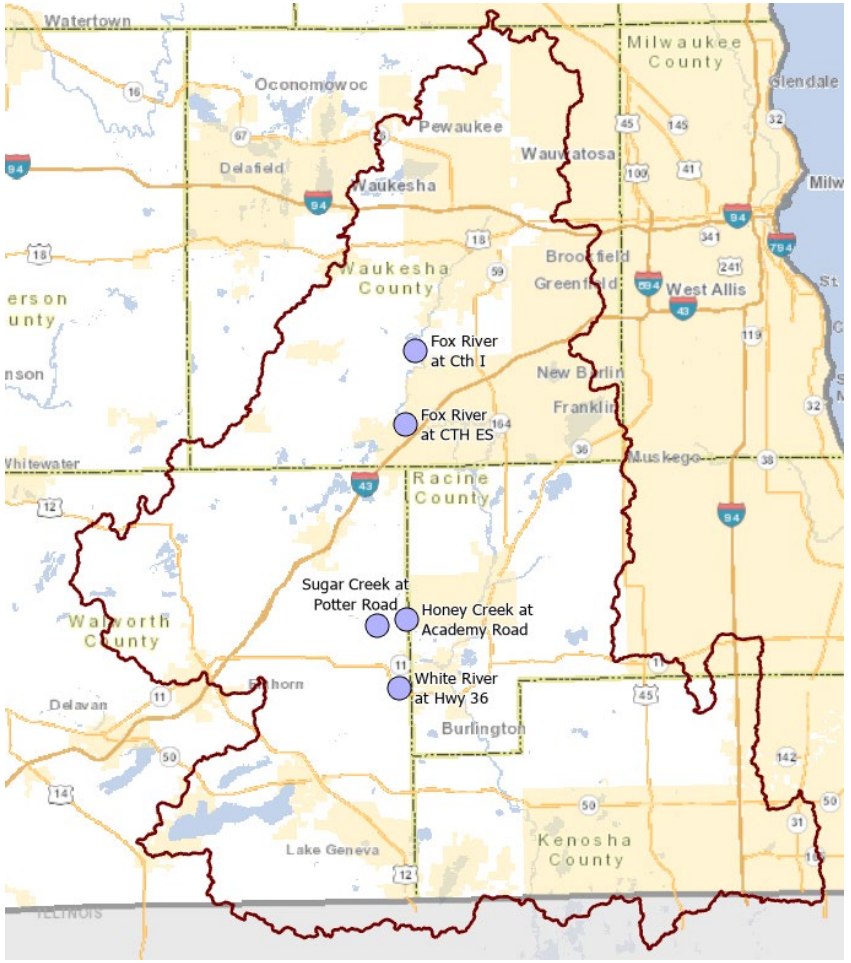
Periodic Flow Data

→

Primary Goal: Continuous Flow Data



Continuous Stage Monitoring



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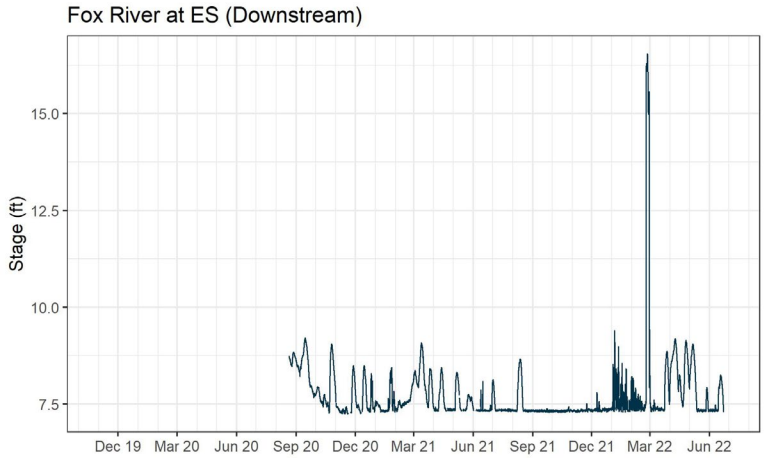
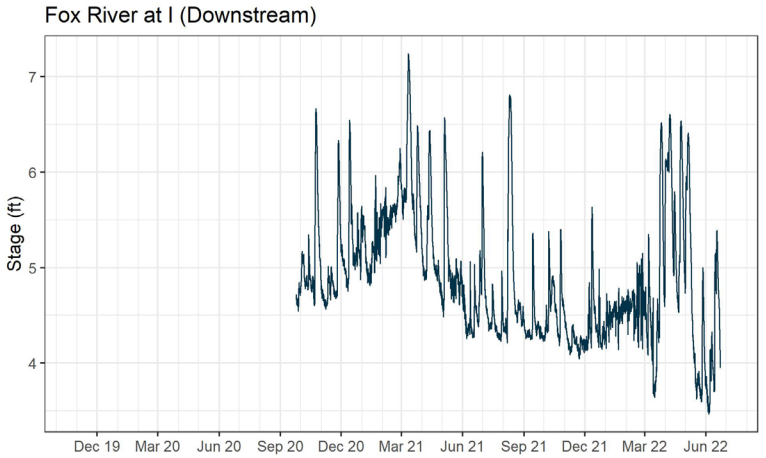
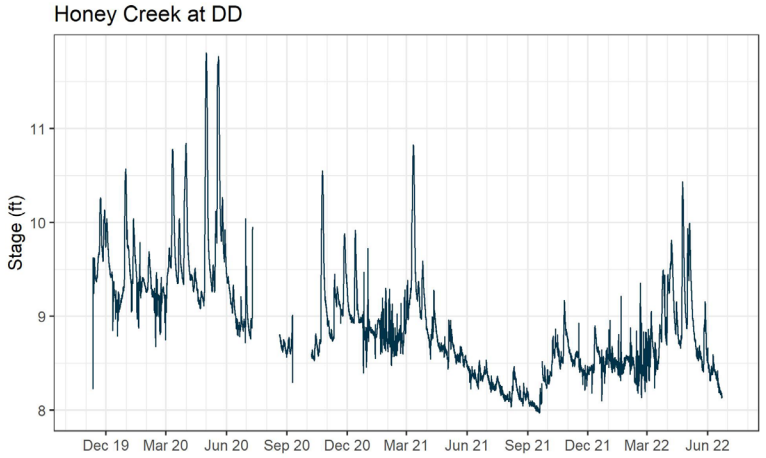
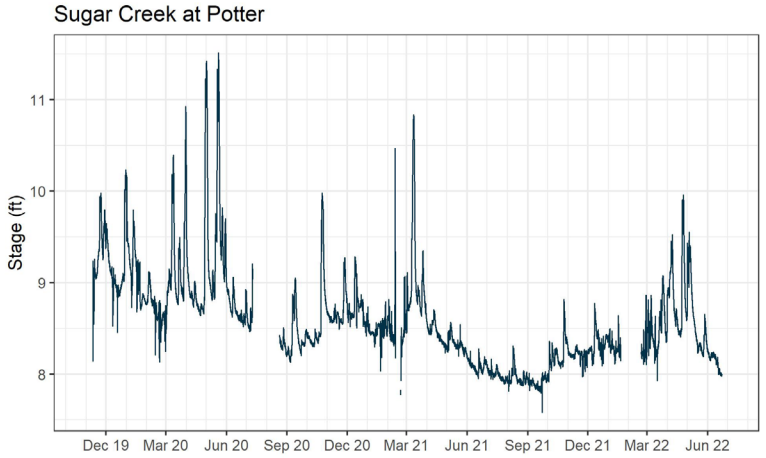
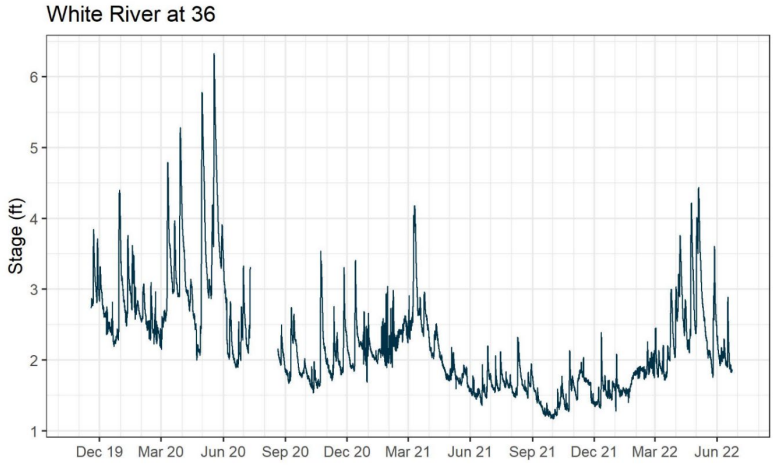


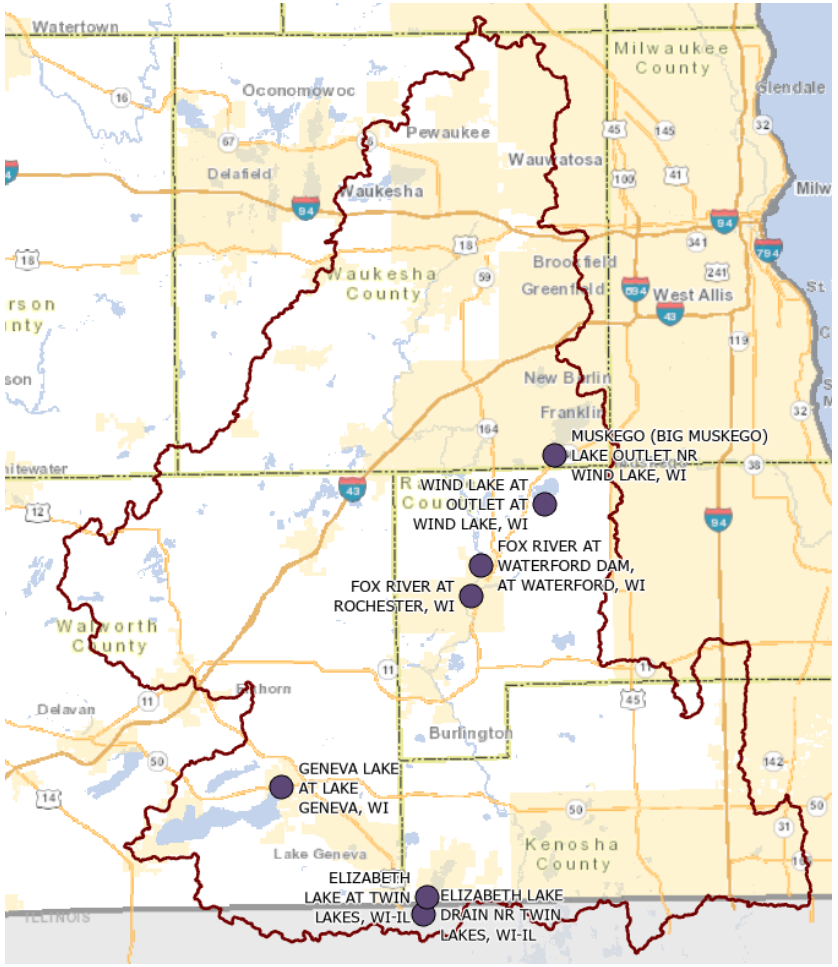




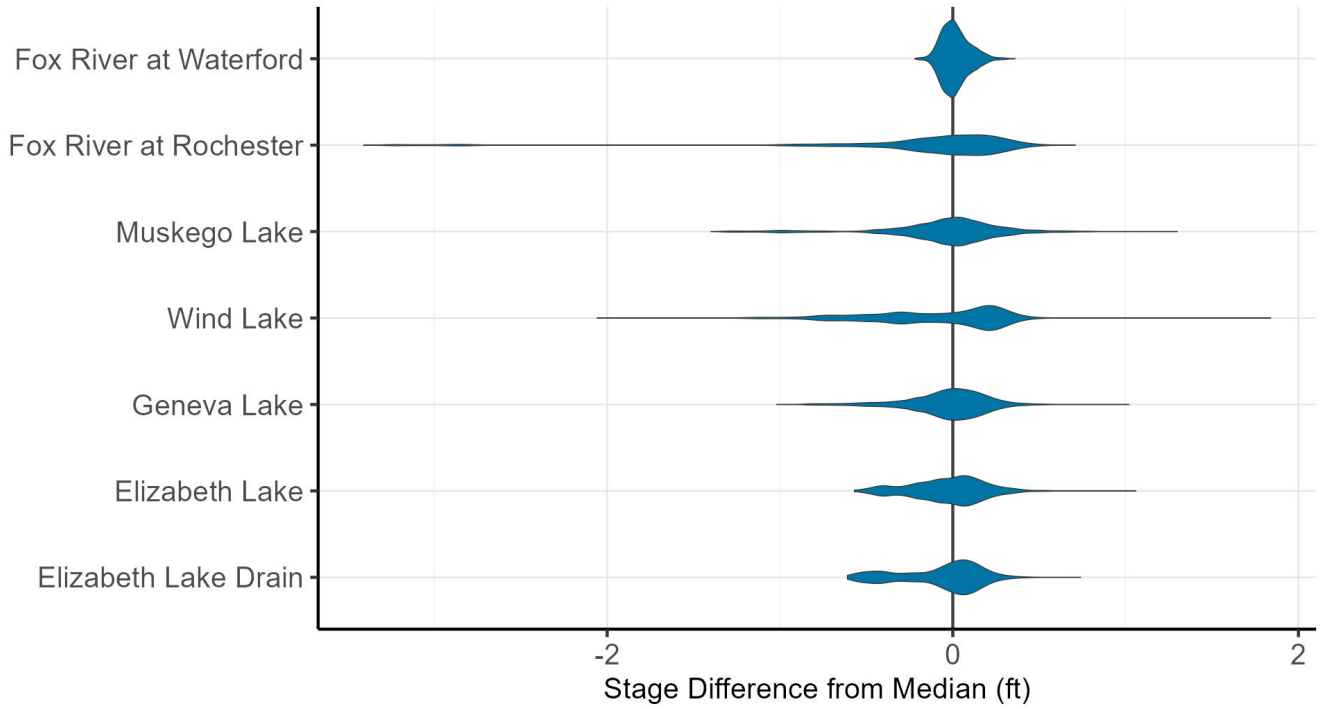




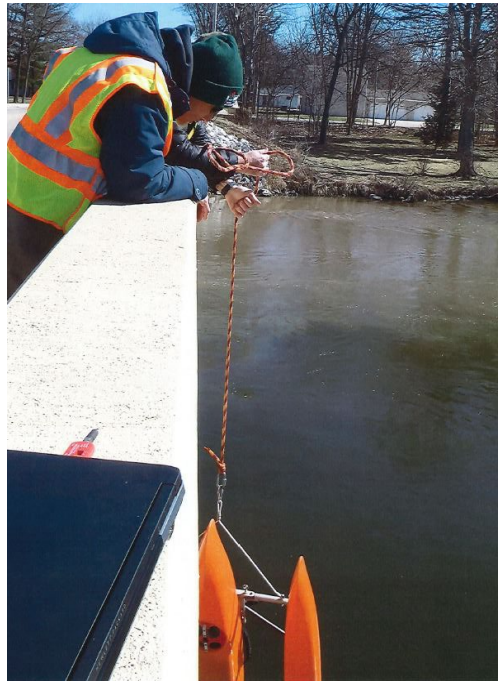
Supplemental Stage Data



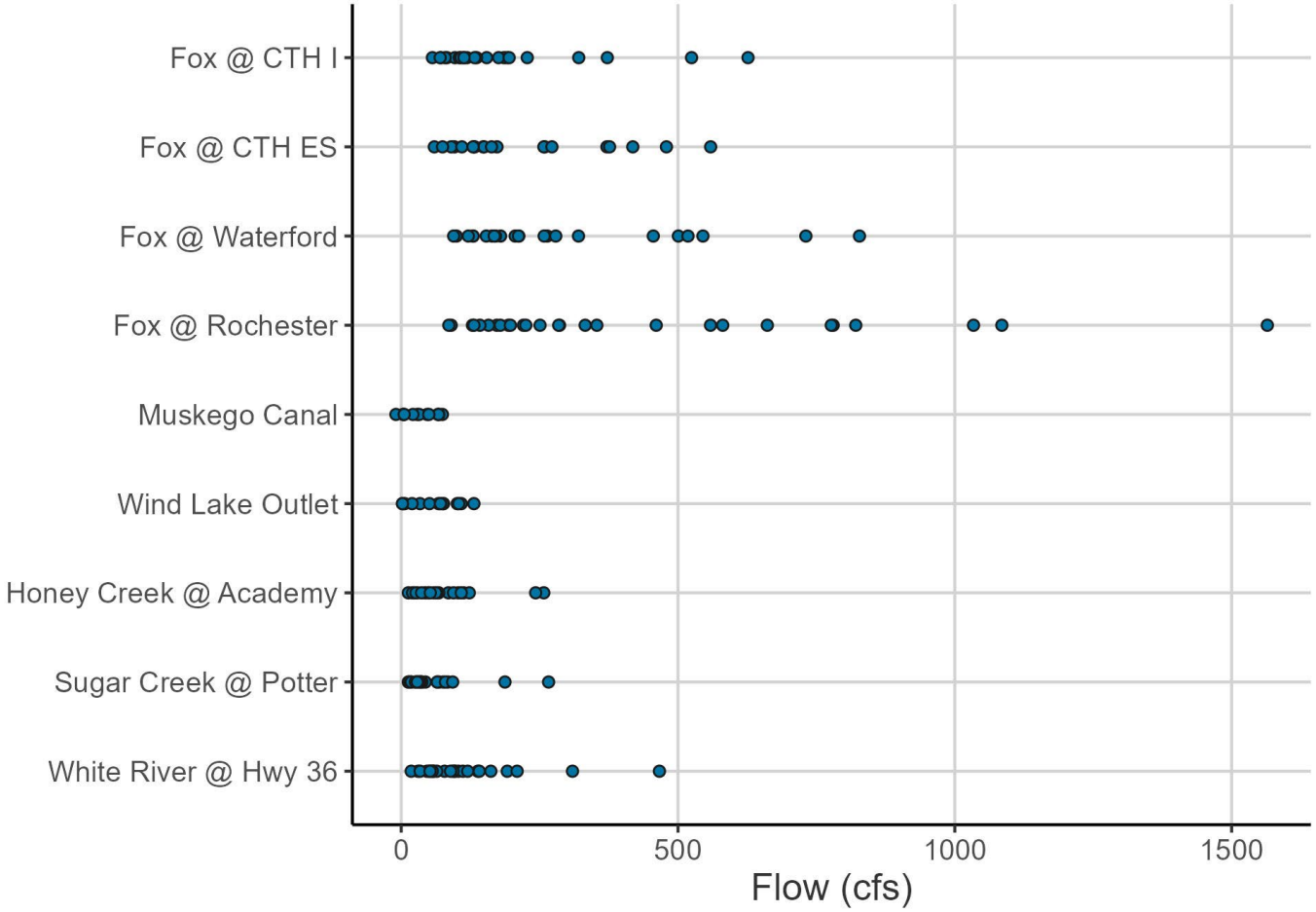
7 USGS stage gages



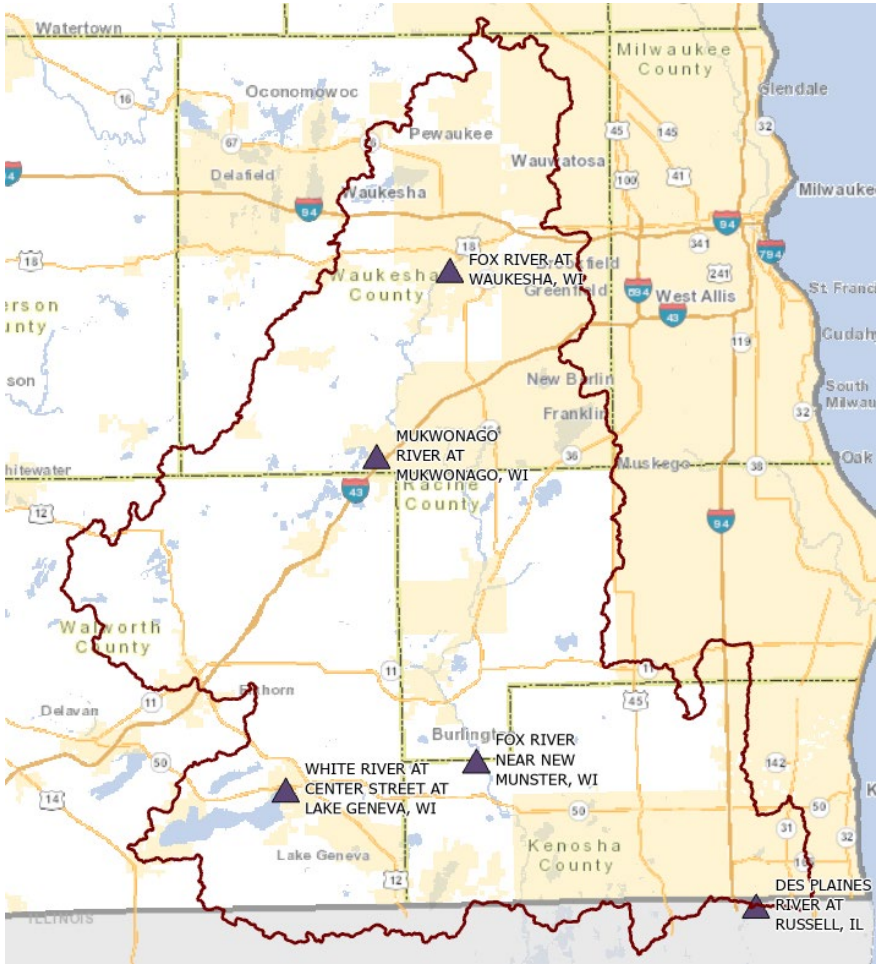
Flow Monitoring



Periodic Flow Monitoring

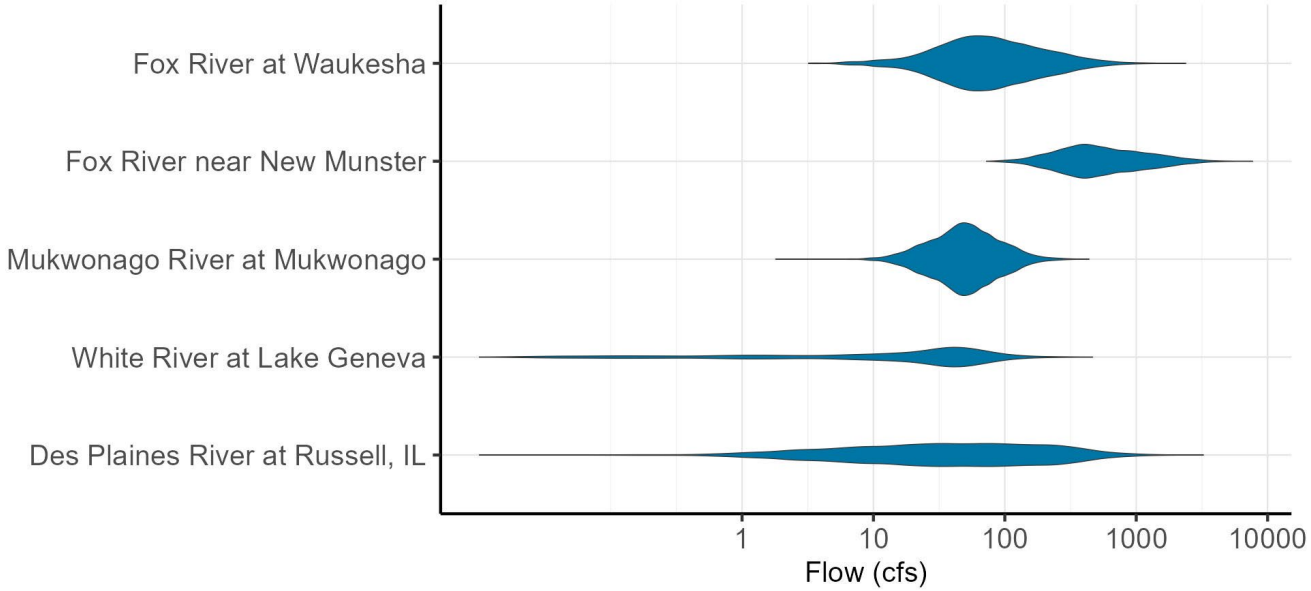


Supplemental Flow Data



5 USGS flow gages

USGS science for a changing world




Monitoring
Conceptualization
Modeling
Allocations
Implementation

TMDL Process: Conceptualization

What's happening in the watershed?

- Land use/management
- Climate
- Soils, topography, slope
- Hydrography

Agricultural Survey Summary

Agricultural Survey

Agricultural Surveys

- Questions to summarize agricultural practices in HUC 12s

- Topics
  - Land use and land cover
  - Crop rotations
  - Tillage practices
  - Soil phosphorus
  - Fertilizer management
  - Tile drainage

Special Thanks

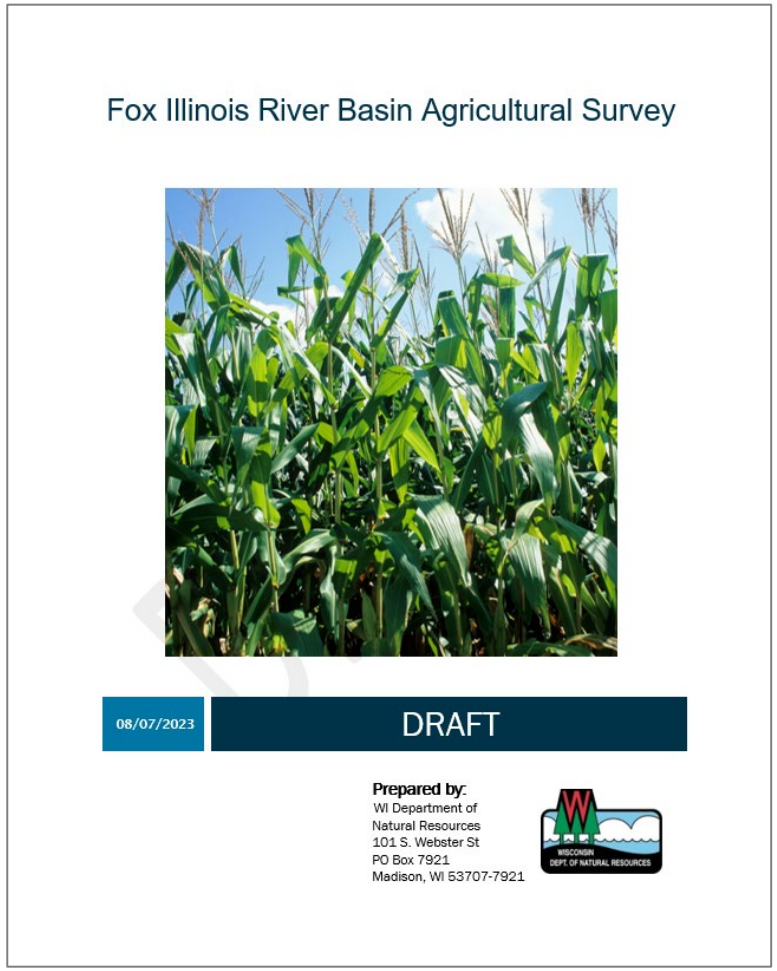
Mark Jenks, Kenosha County

Chad Sampson, Racine County

Brian Smetana, Walworth County

Alyssa Vaughan and Alan Barrows, Waukesha County

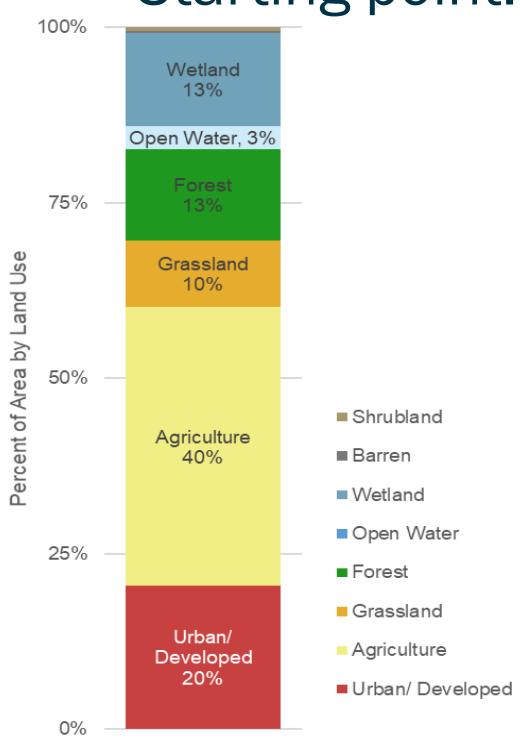
DNR Agricultural Survey Summary Report

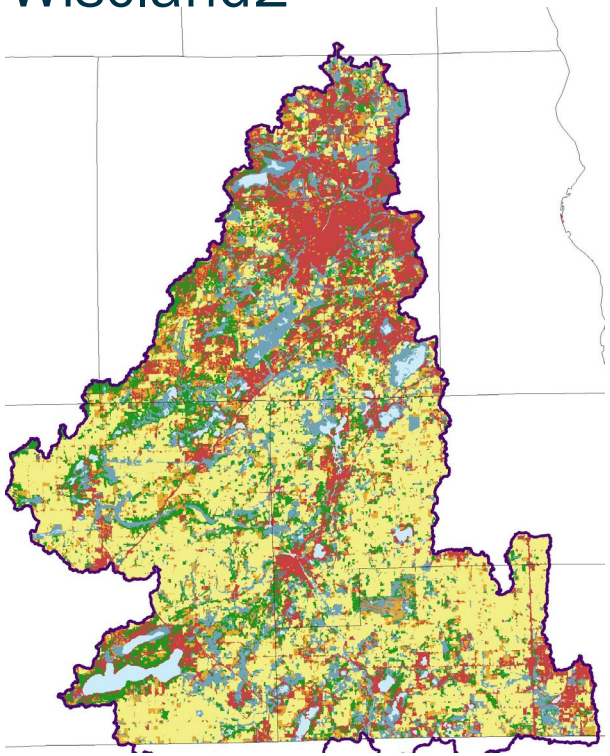


Available at https://dnr.wisconsin.gov/topic/TMDLs/FOXIL

Ag. Land Cover Updates

Starting point: Wiscland2





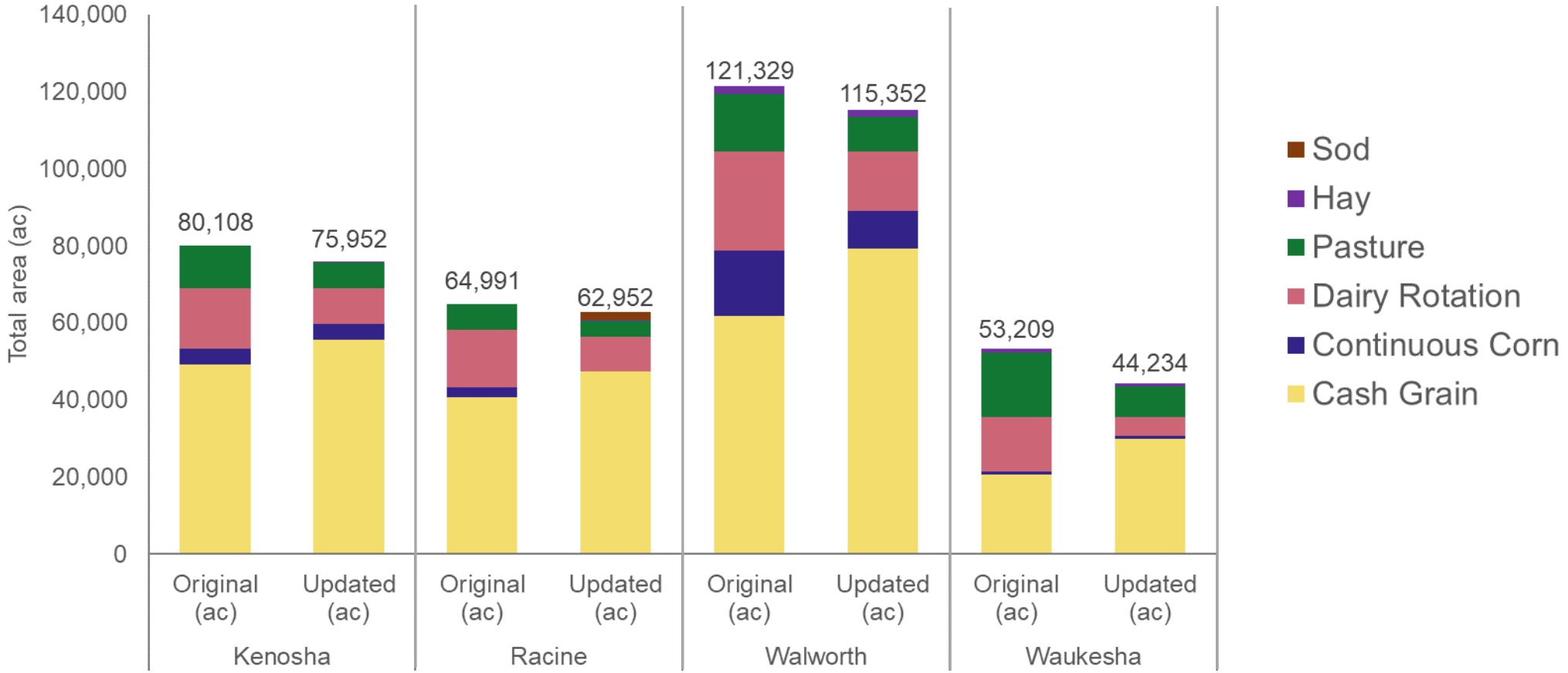
1. Dairy → Cash Grain

2. Cont. Corn → Cash Grain

3. Miscellaneous → Sod

4. Pasture → Idle Grassland

Ag. Land Cover Updates: Results



Crop Rotations

	Rotation	Rotation Year 1	2	3	4	5	6
1.	Dairy Sequence 1	CS	Cs	SOY	WW	ALF	ALF
2.	Dairy Sequence 2	CS	Cs	CS	ALF	ALF	ALF
3.	Cash Grain Sequence 1	CG	SOY	CG	SOY	CG	SOY
4.	Cash Grain Sequence 2	CG	SOY	WW	CG	SOY	WW
5.	Continuous Corn	CG	CG	CG	CG	CG	CG
6.	Continuous Hay	ALF	ALF	ALF	ALF	ALF	ALF
7.	Sod	SOD	SOD	SOD	SOD	SOD	SOD

CG: Corn Grain	CS: Corn Silage	SOY: Soybeans	WW: Winter Wheat	ALF: Alfalfa	SOD: Sod

Tillage Practices

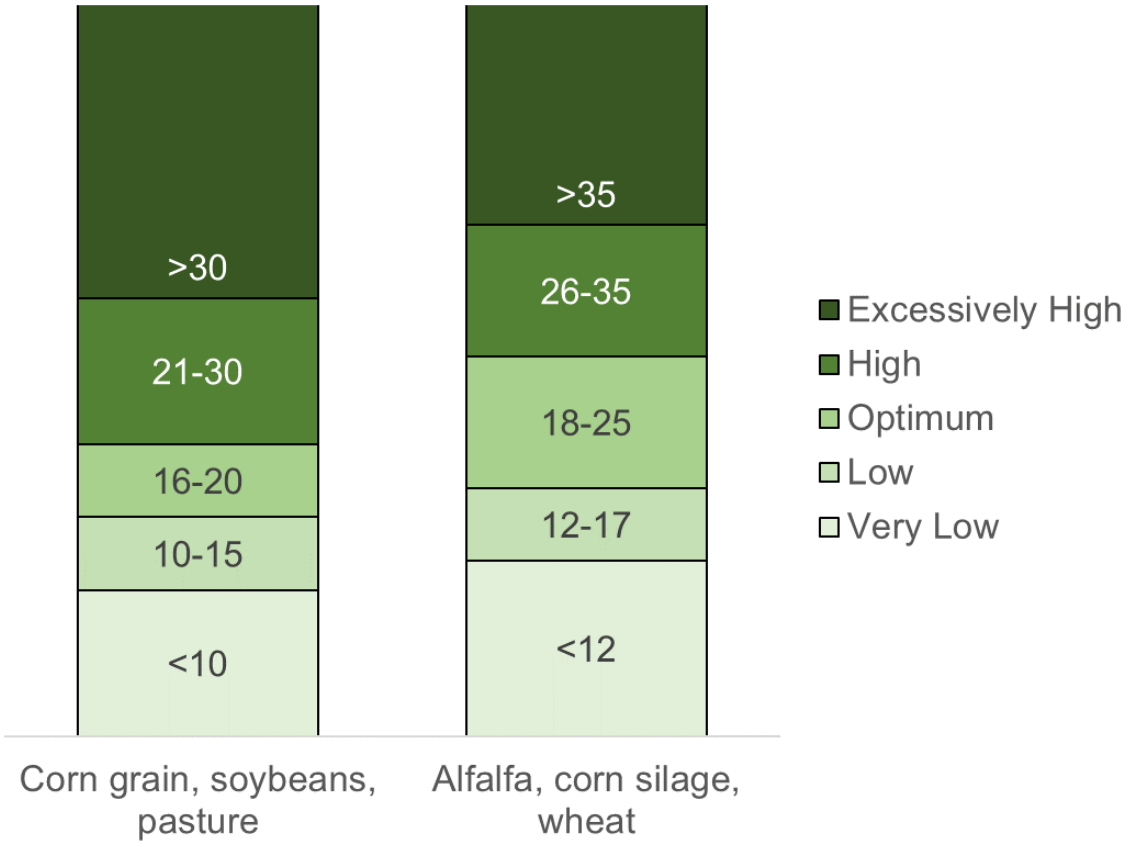
ID	Fall Tillage	Spring Tillage	Crop
Till 1	Chisel plow	Field cultivate (x2)	Dairy, Corn
Till 2	Vertical till	Field cultivate	Dairy, Corn, Cash Grain
Till 3	None	Vertical till	Corn
Till 4	Field cultivate	None	Cash Grain
Till 5	Vertical till (corn), No till (soy & wheat)	Field cultivate (corn), No till (soy & wheat)	Cash Grain

Soil Phosphorus

Values from Survey

County	Average Soil P (ppm)
Kenosha	34 - 63
Racine	30 - 60
Walworth	30 - 80
Waukesha	Not available

Average soil P interpretation from A2809



Fertilizer Applications

Chemical fertilizer application

Rotation	Average Rate (lb. P/ac/yr)*
Cash Grain	35
Continuous Corn	45
Pasture and Hay	None
Sod	45

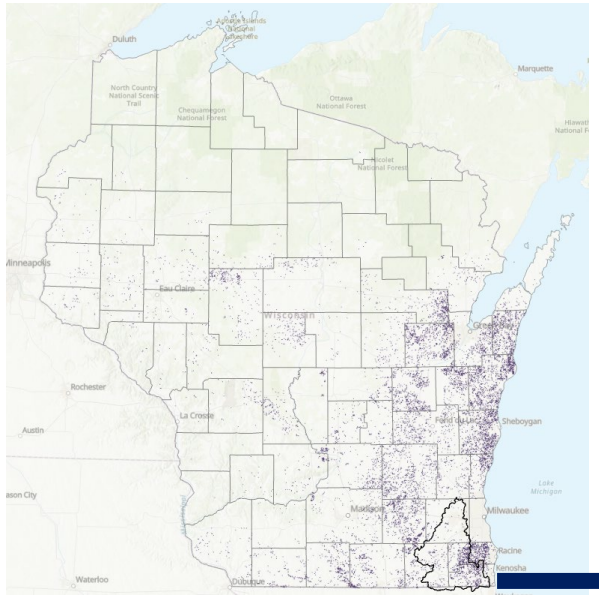
**Note: Expressed as lb. P as P_2O_5*

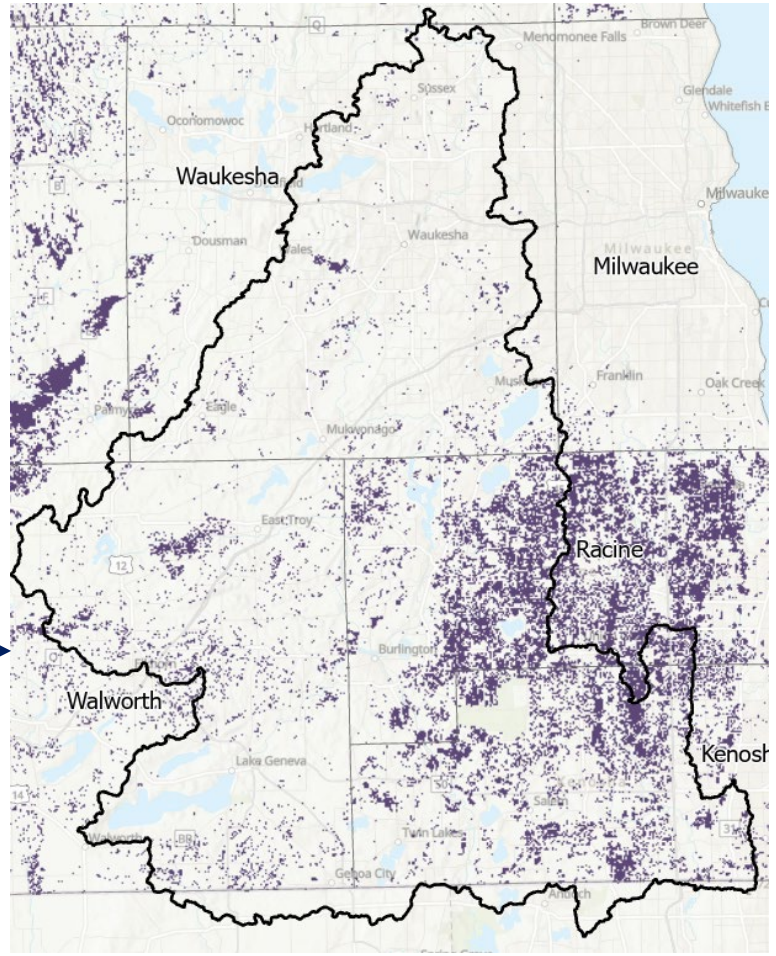
Manure applications

Method	Amount Applied	P conc. (lb./unit)*
Daily Haul	25 ton/ac/yr	3 lb./ton
Storage	12,500 gal/ac/yr	5 lb./10,000 gal

Tile Drainage

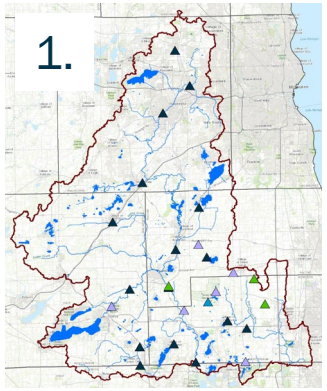
County	Percent of fields with tile drainage
Kenosha	50 - 75
Racine	50 - 90
Walworth	0 - 35
Waukesha	Not Available

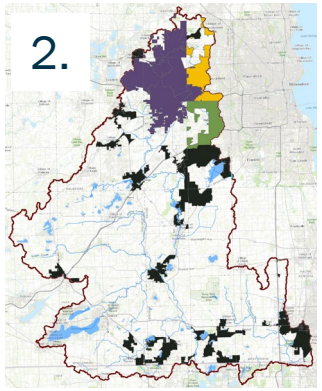


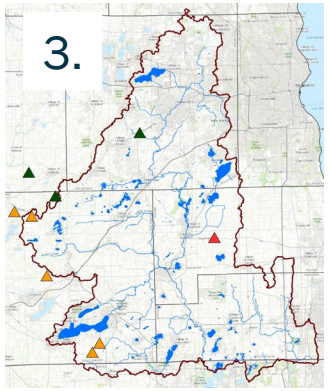


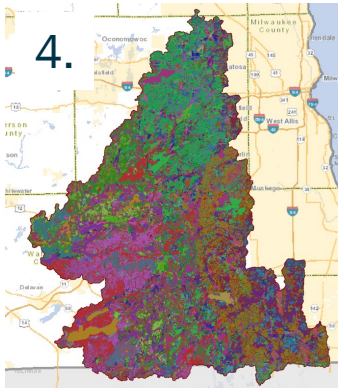
Additional Data Sources for Conceptualization

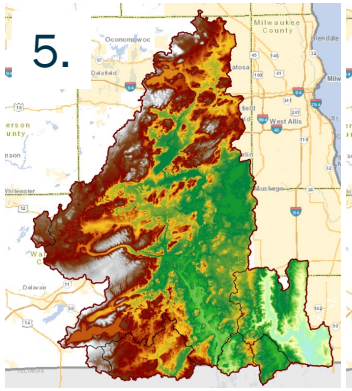
Additional Data Sources

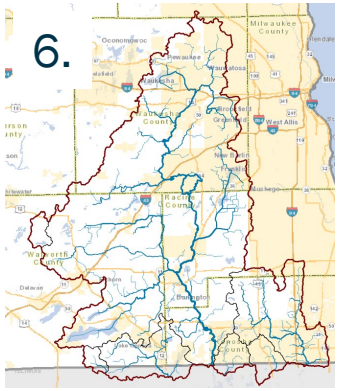


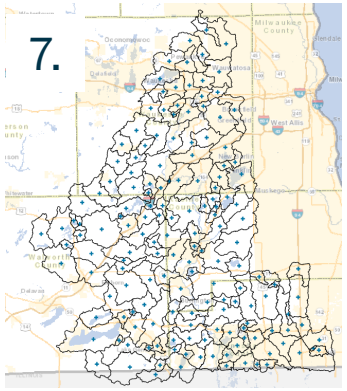












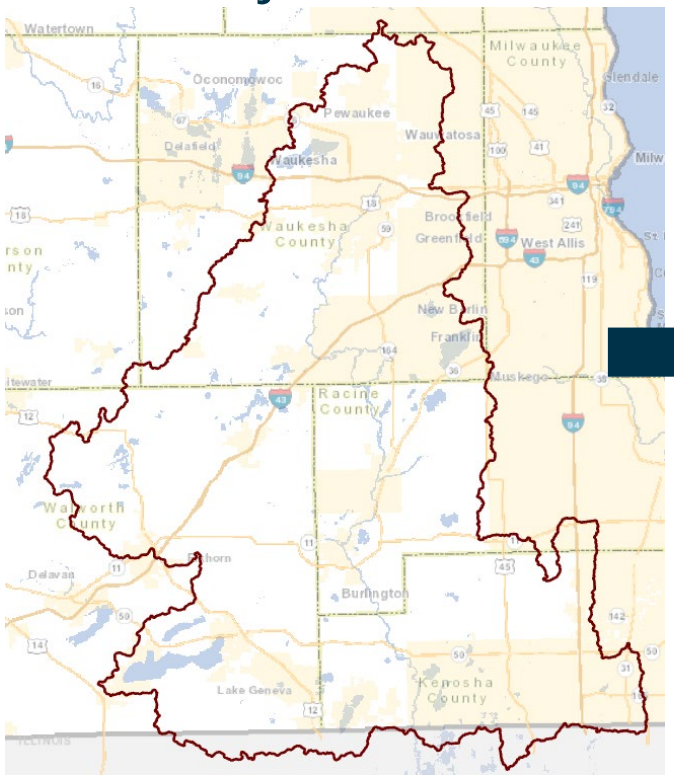
1. Point Sources
2. MS4s
3. CAFOs
4. Soils
5. Elevation
6. Hydrography
7. Climate


Monitoring
Conceptualization
Modeling
Allocations
Implementation

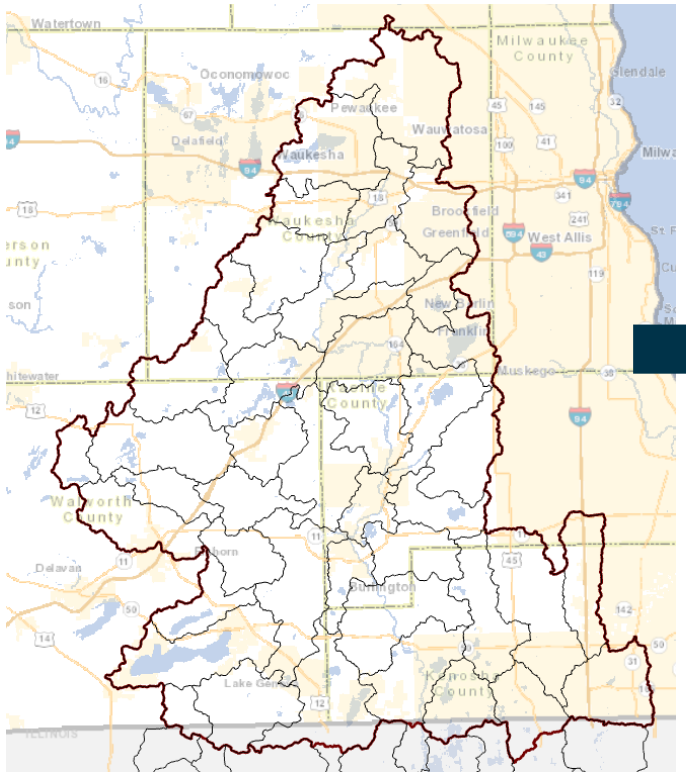
SWAT Model Subbasin Delineation

Subbasin Delineation Basics

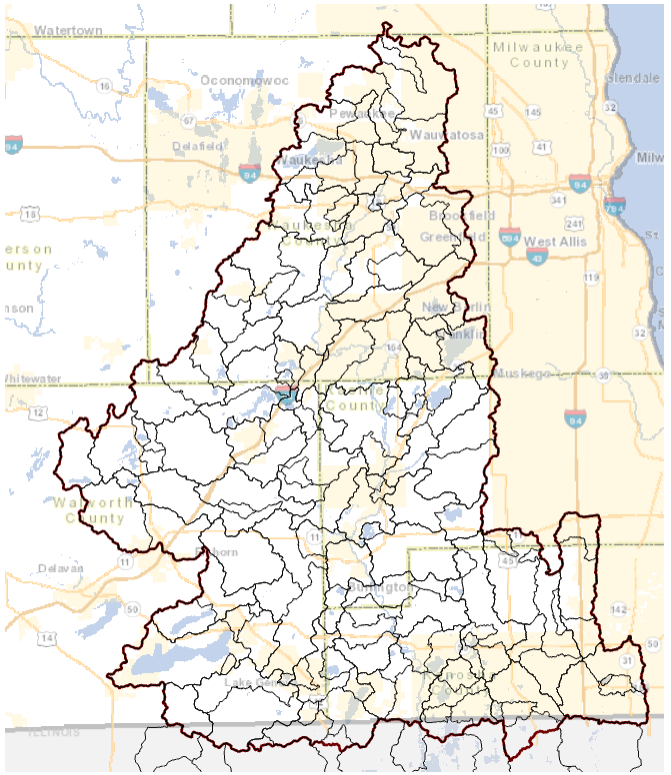
Project Area



HUC 12s



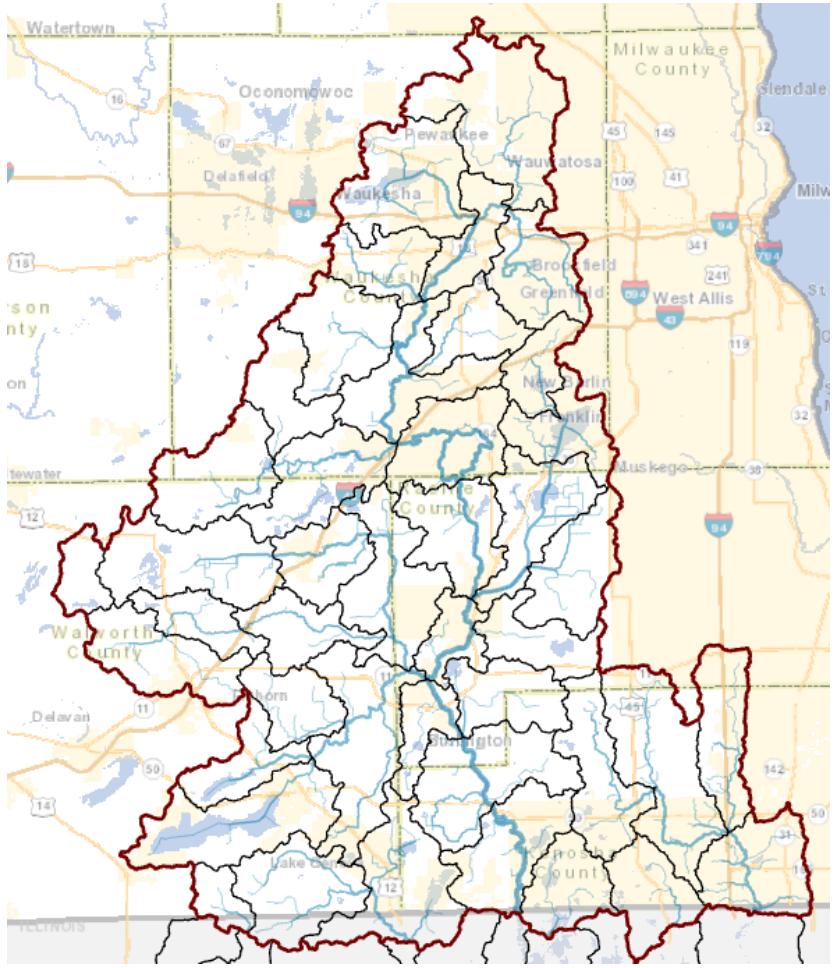
Model Subbasins



Subbasin Delineation Process

Split a subbasin at locations that fulfill the following criteria:

1. HUC 12 boundary
2. Monitoring station or USGS Gage
3. Outfall location
4. Adaptive management plan point of compliance
5. Change in TP criteria
6. Change in TP impairment status
7. Large lake (>100 ac)



Subbasin Delineation Process

Split a subbasin at locations that fulfill the following criteria:

1. HUC 12 boundary
2. Monitoring station or USGS Gage
3. Permitted Outfall location
4. Adaptive management plan point of compliance
5. Change in TP criteria
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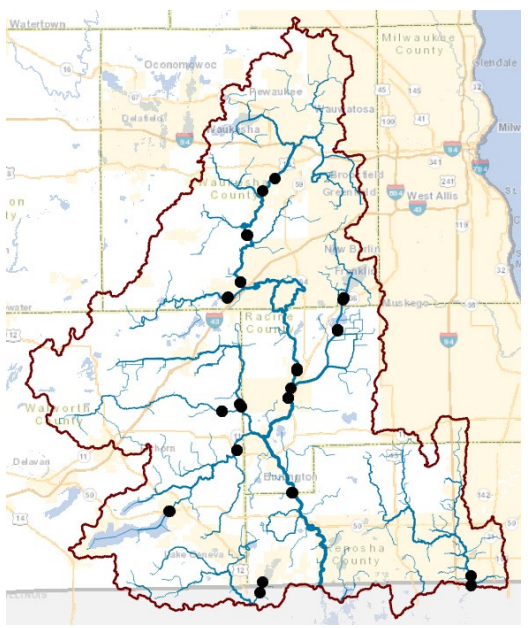

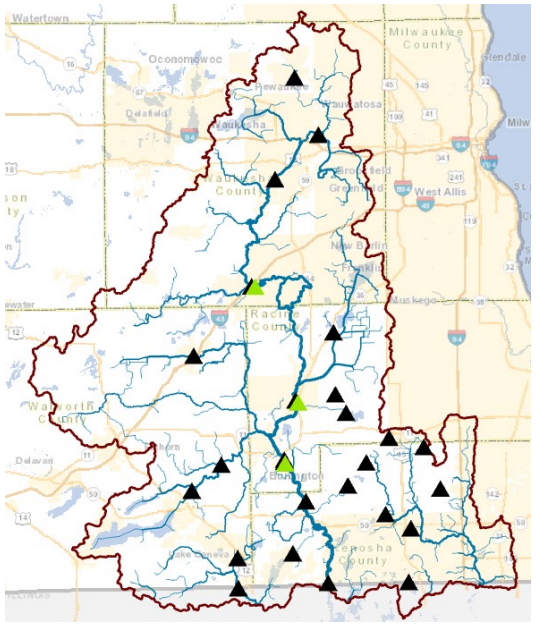

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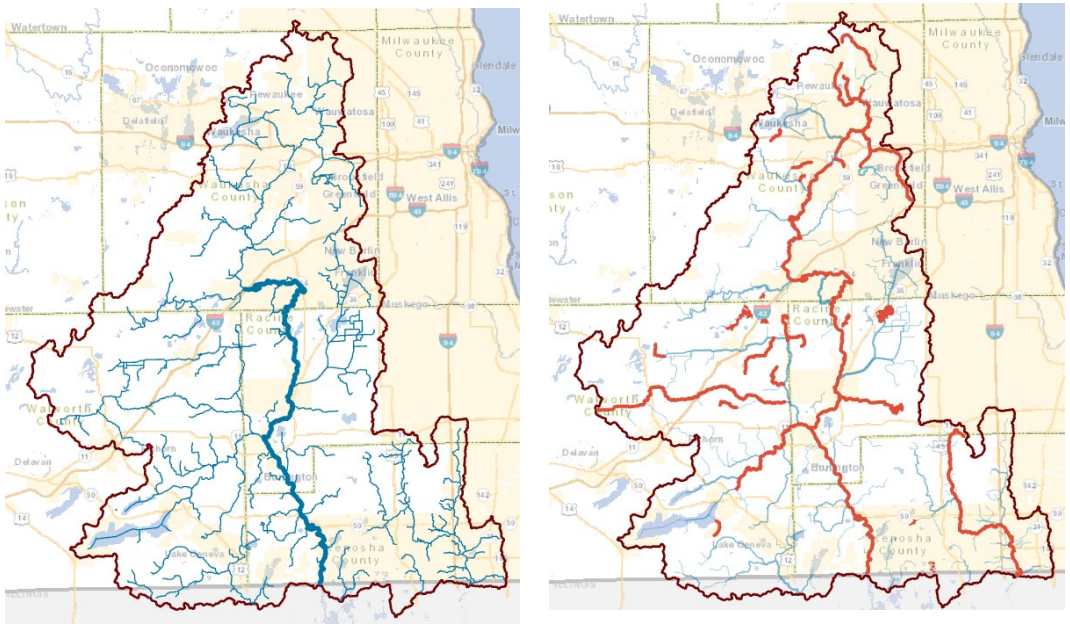

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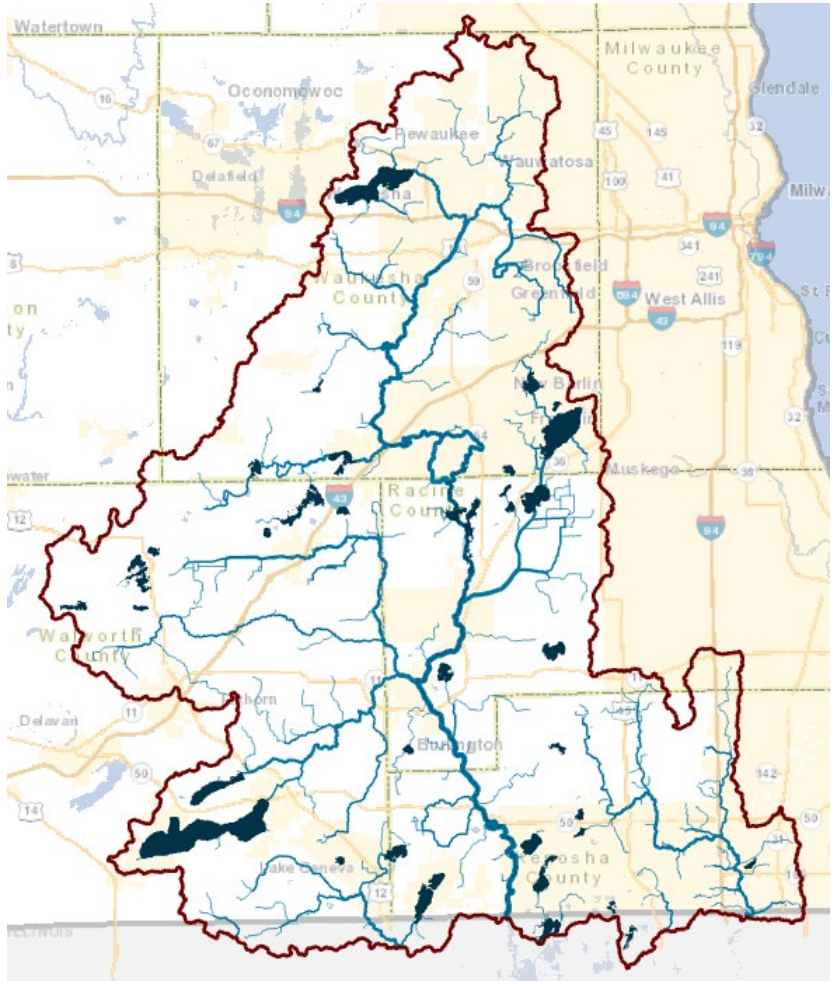


Subbasin Delineation Results

HUC 12s

Number: 42

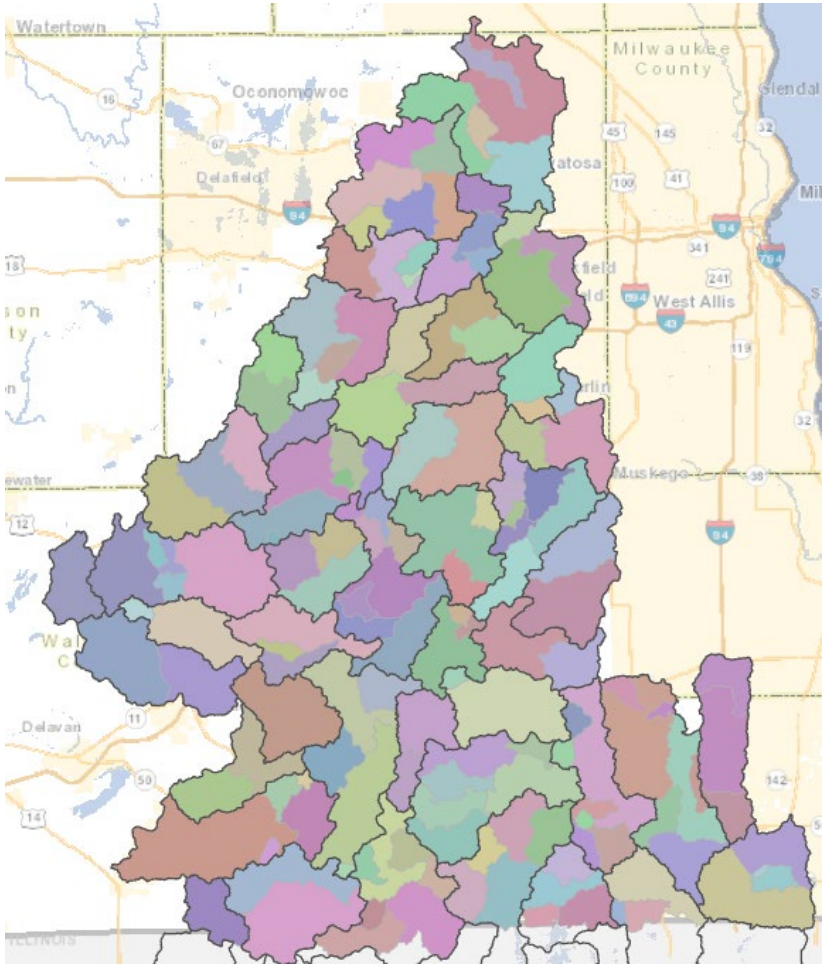
Average size: ~16,000 acres

Model subbasins

Number: 158

Average size: ~4,400 acres

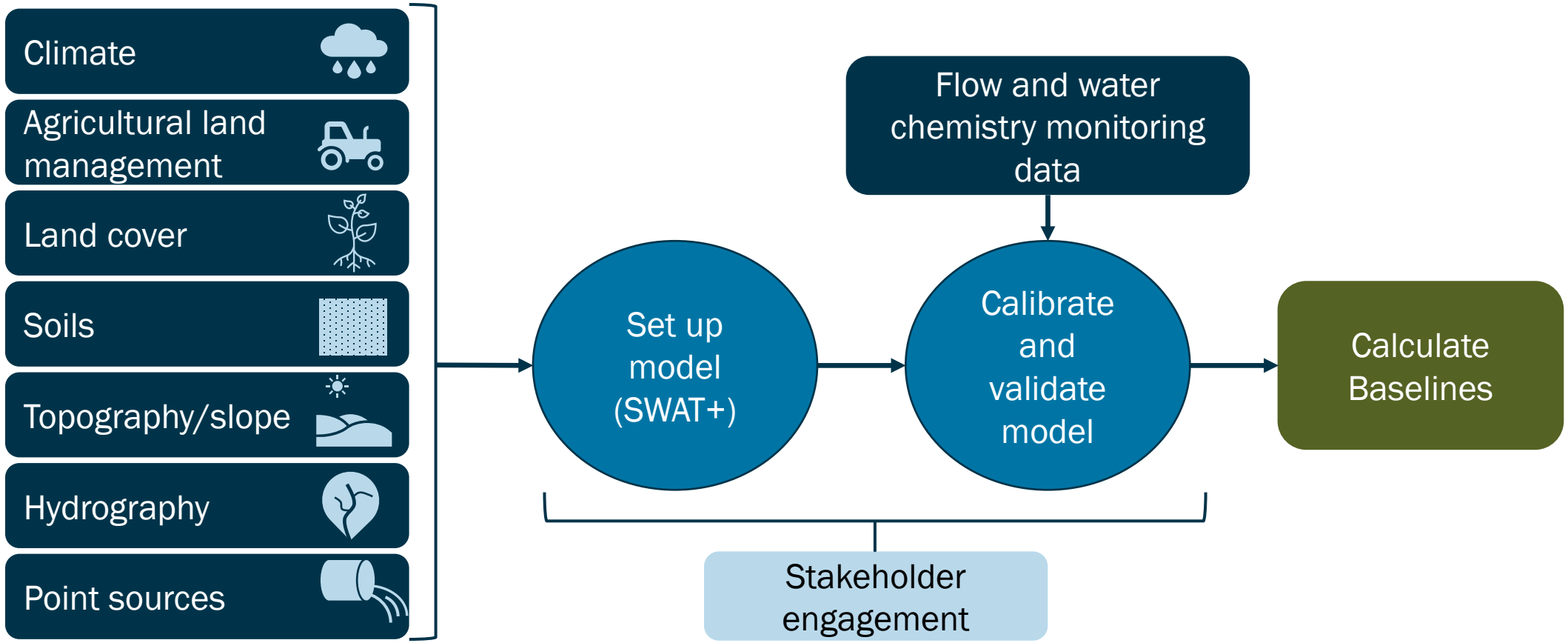
Average # per HUC 12: 3-4



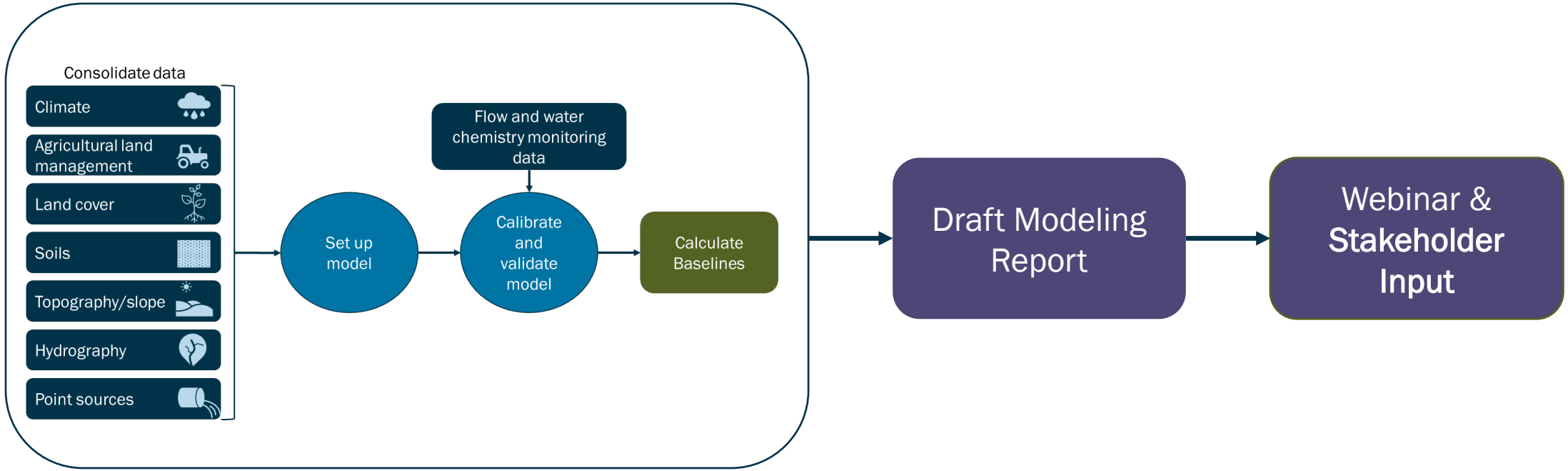
** Note: Shapefile of model subbasins will be posted on the project website for review*

Modeling: Next Steps

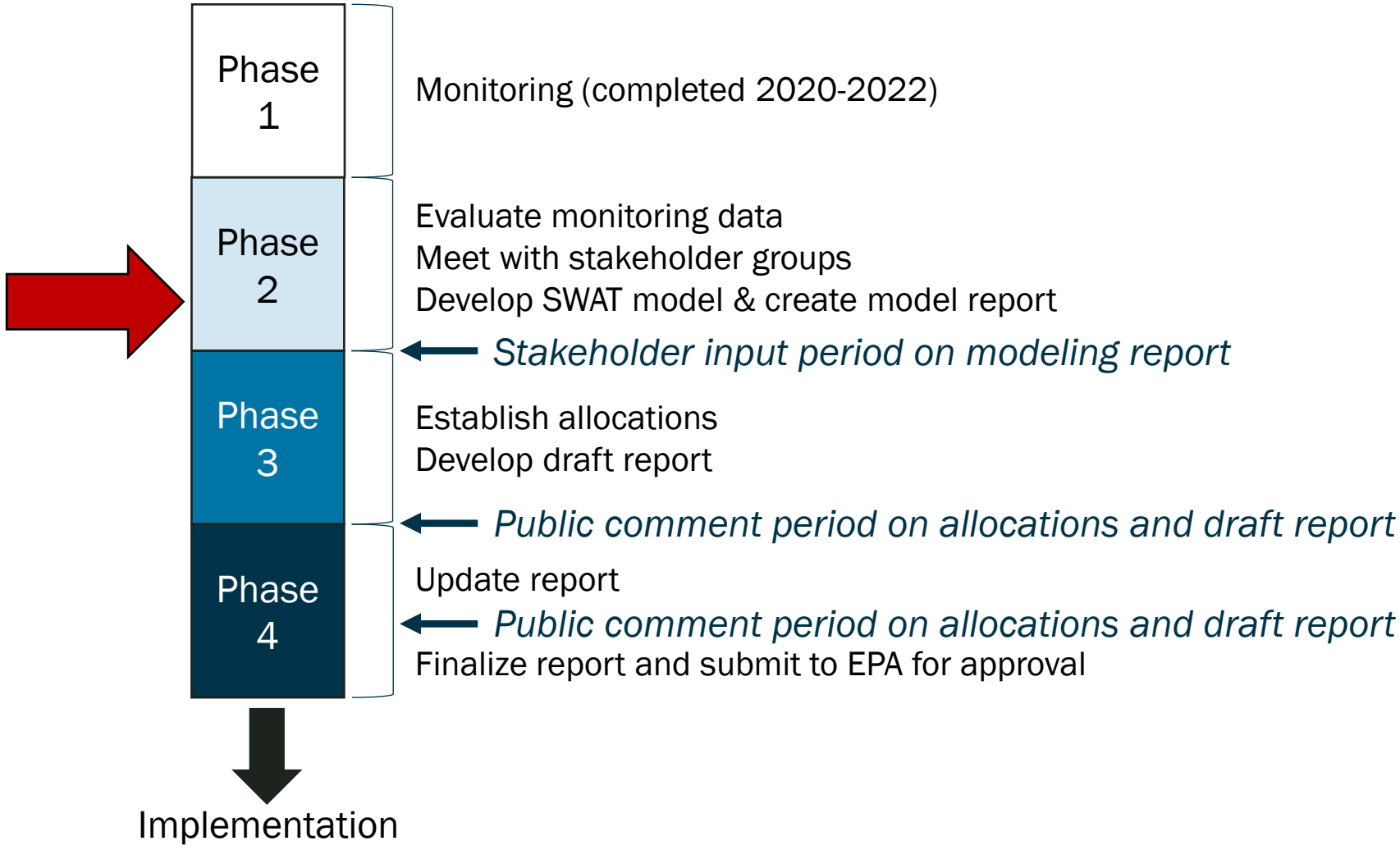
Model Calibration and Validation



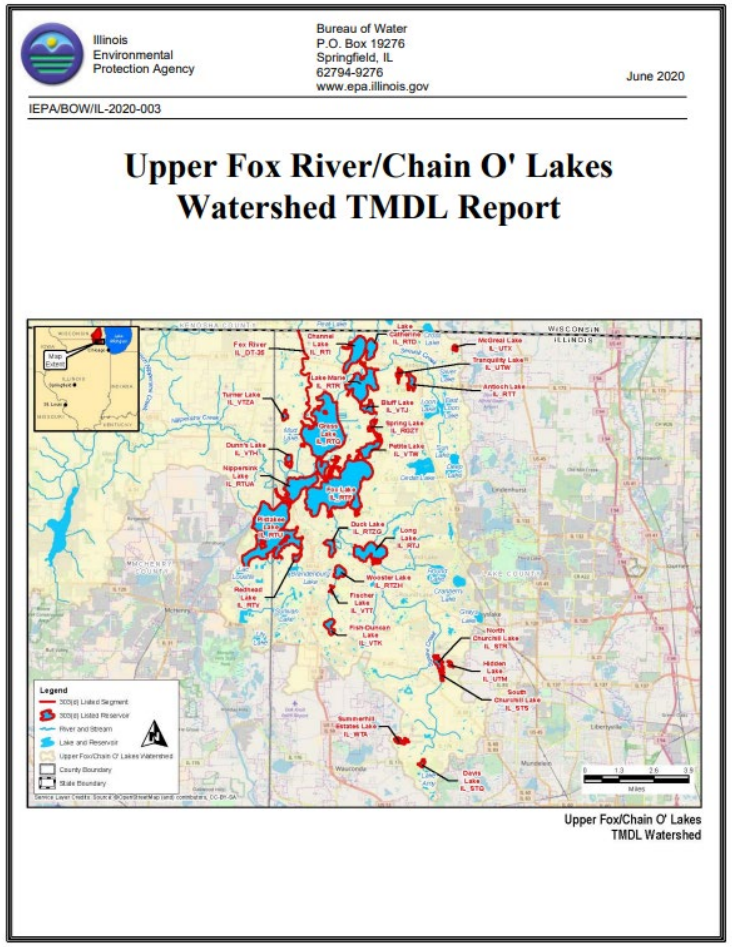
Produce Modeling Report



Summary of Next Steps



Illinois Chain O’ Lakes TMDL



Illinois Environmental Protection Agency

Bureau of Water
P.O. Box 19276
Springfield, IL
62794-9276
www.epa.illinois.gov

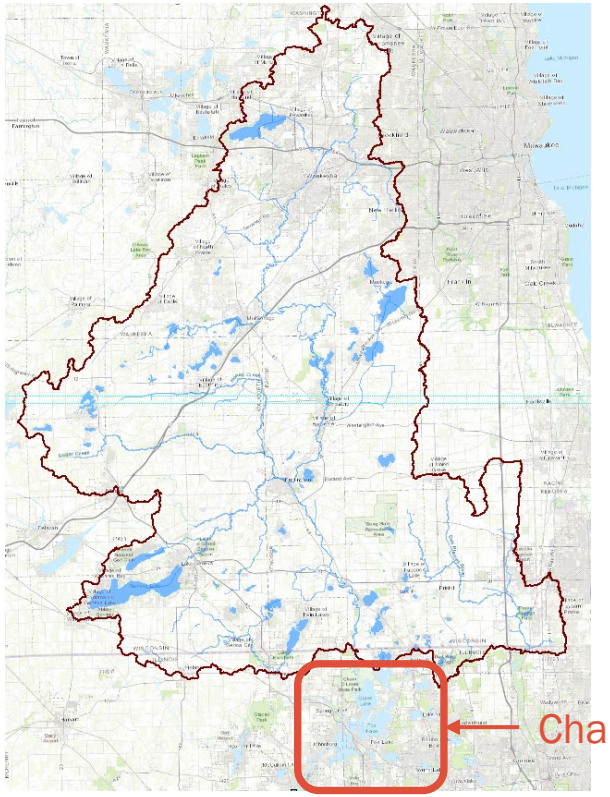
June 2020

IEPA/BOW/IL-2020-003

Upper Fox River/Chain O' Lakes Watershed TMDL Report

Upper Fox/Chain O' Lakes TMDL Watershed

Approved by EPA in 2020



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Stormwater: Samantha Katt & Pete Wood

Agriculture & Urban Nonpoint: Jesse Bennett

Modeling: Eric Hettler

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Subscribe to GovDelivery on the FOXIL Website:

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or search for “Fox Illinois TMDL” on dnr.wi.gov

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OFF THE RECORD"