

Update on the Status of the Upper Saginaw River Drainage Basin, Pine River Watershed Central, Lower Michigan

Presented to the Healthy Pine River Group

October 8, 2026

Alma College Great Lakes Watershed Institute

Alma College Environmental Studies Program

Montcalm Community College

Presentation Summary: What Questions Will We Answer?

- Are there indicators showing improvement in the watershed?
- Are we sampling in the correct places?
- Is the entire watershed heavily impacted by agricultural and rural inputs?
- Are there risks to the ecology of the watershed? If so, where?
- What can we expect in the future?

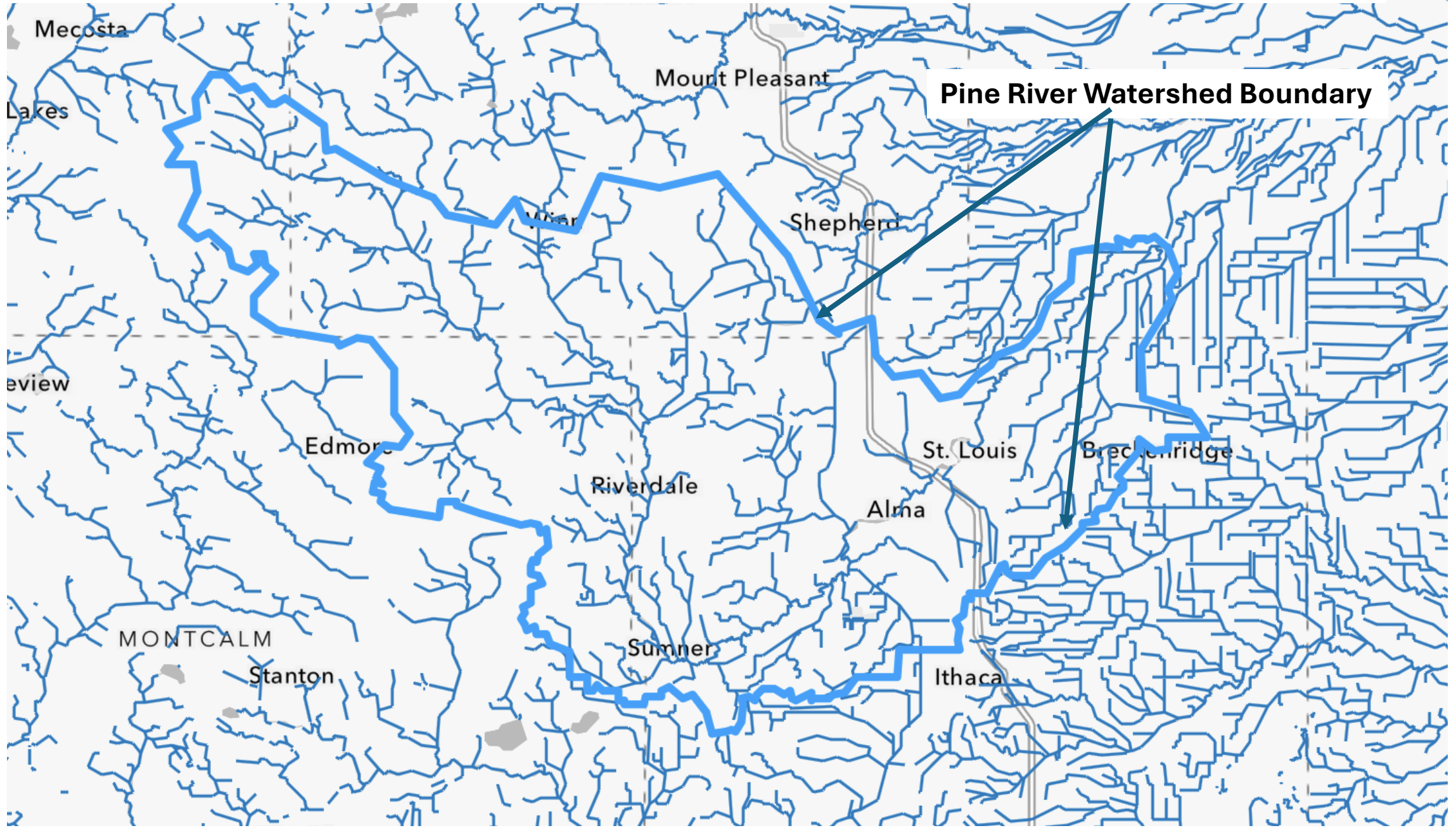
2026 Summary: What We Did on Our Summer "Vacation"

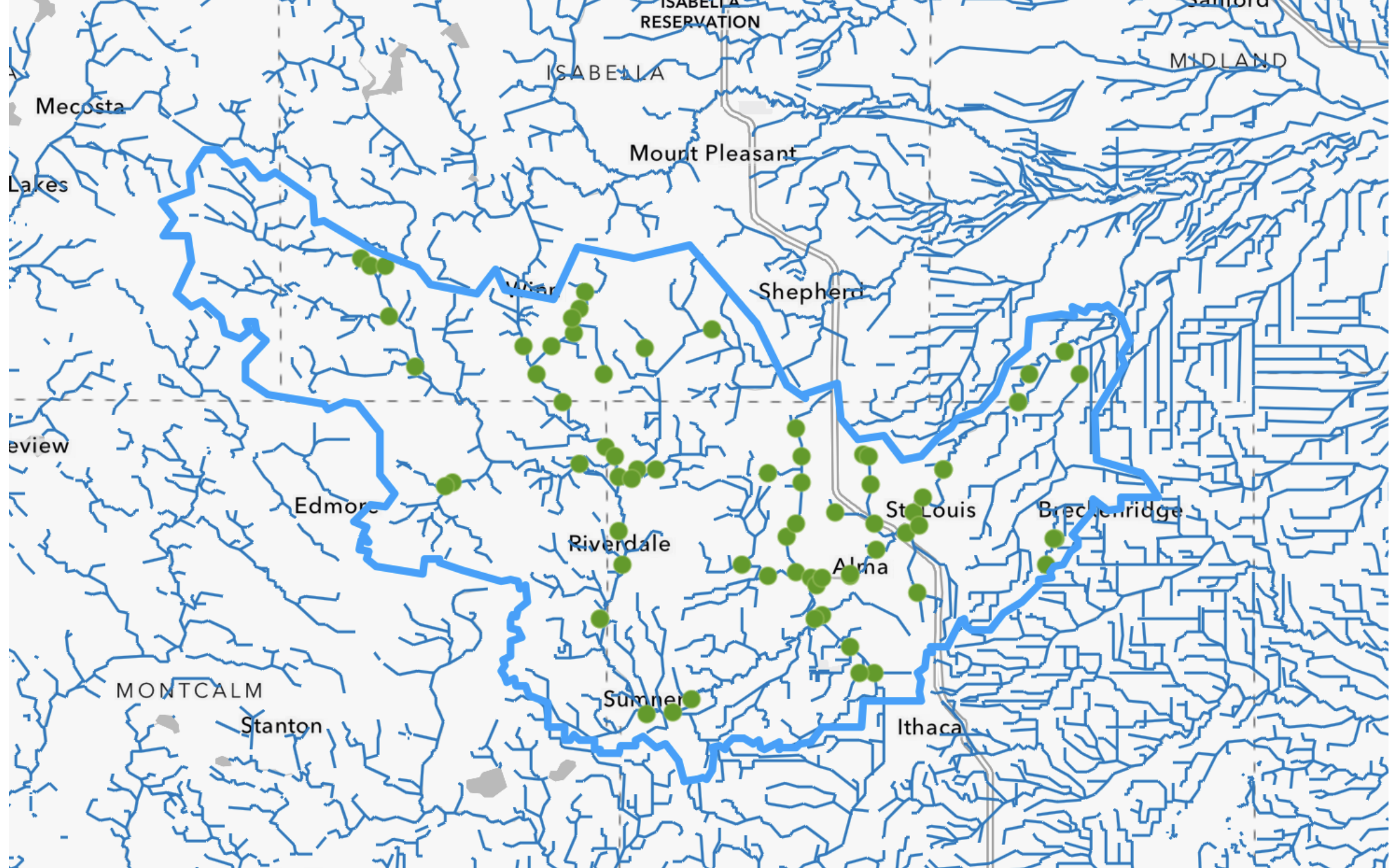
- Paige Kitts: Alma College **Using GIS to Assess Our Efforts So Far**

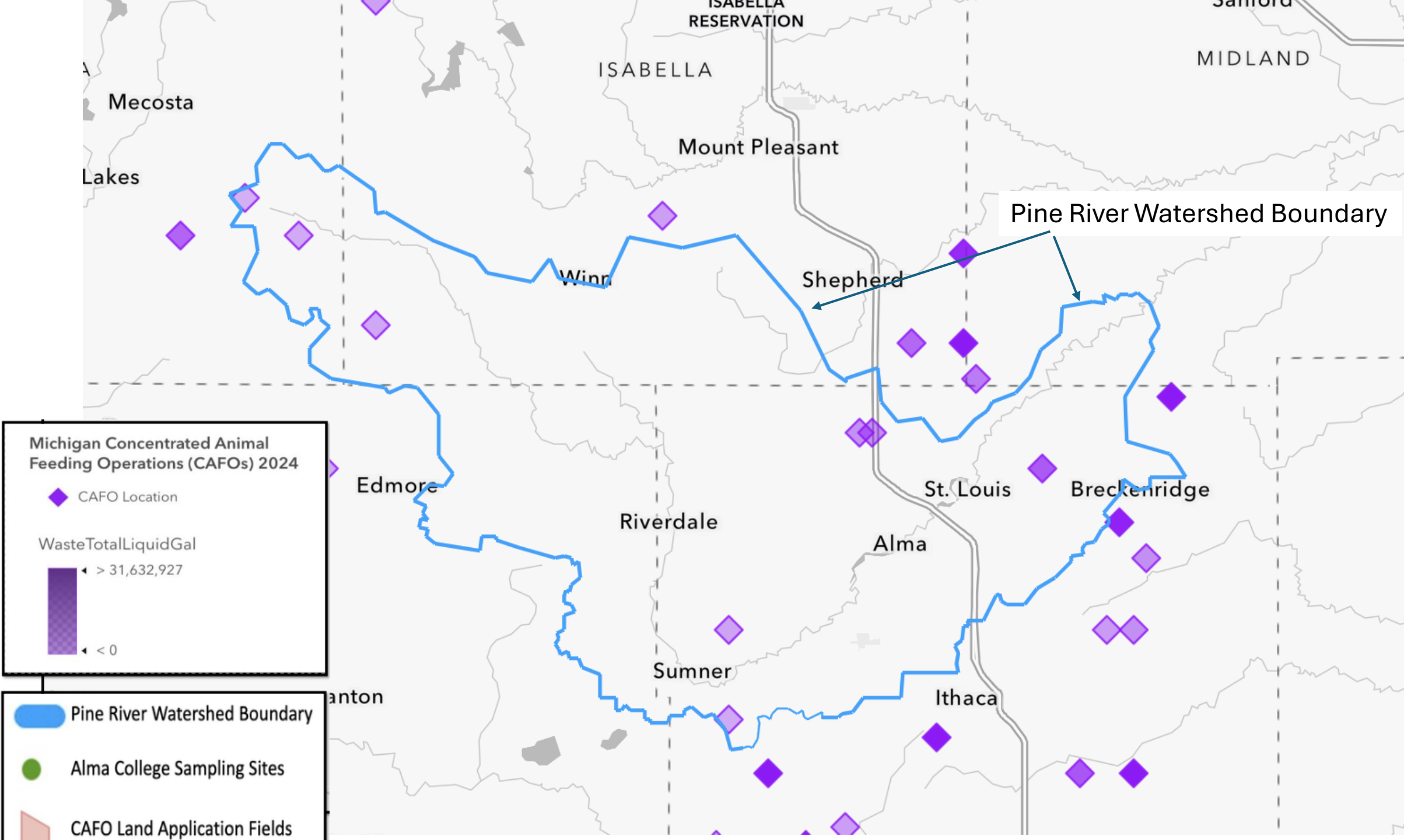
Are we sampling in places that make sense?

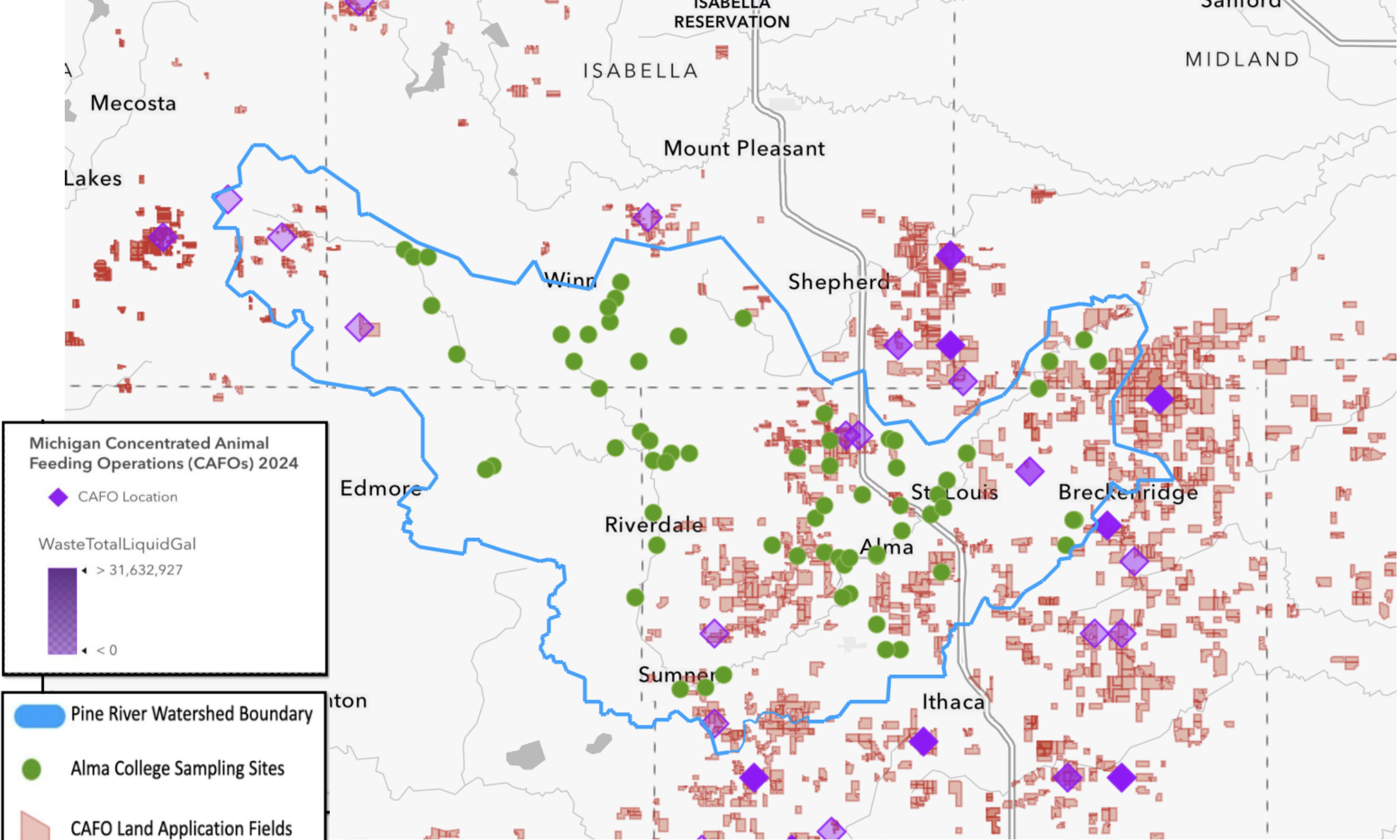
Are there areas where we should be sampling that we are not?

ALL TRIBUTARIES AND STREAMS FEEDING INTO THE PINE RIVER WATERSHED









What Did We Learn From Our GIS Work?

Trying to Find a “Clean” Part of the Watershed

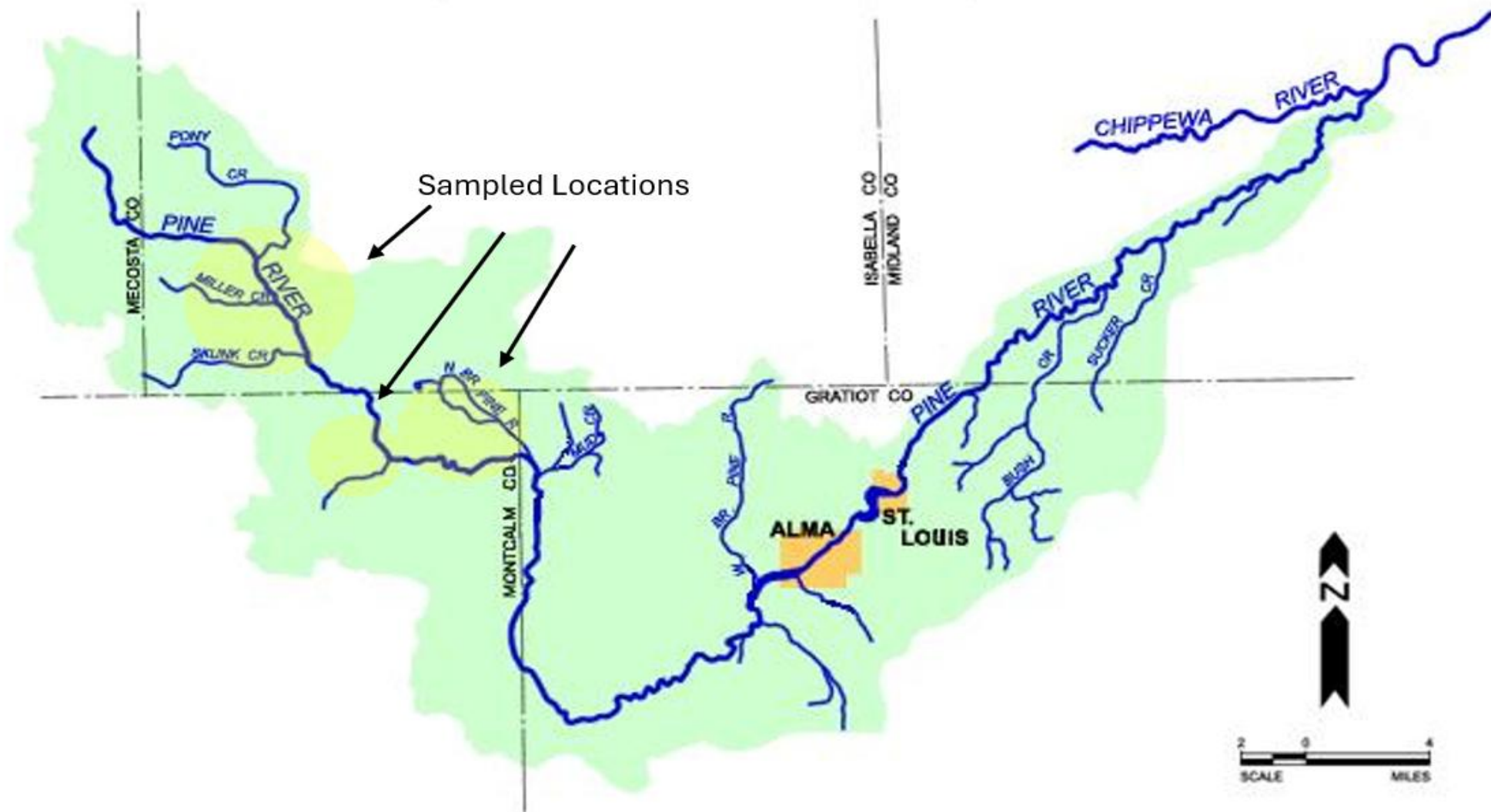
- Brooke Hetherington (AC) and Bre Welch (Montcalm CC)

How impacted is the watershed?

Are there places in the upper headwaters that exhibit relatively unimpacted conditions?

PINE RIVER BASIN

DRAINAGE AREA: 427 sq. mi.

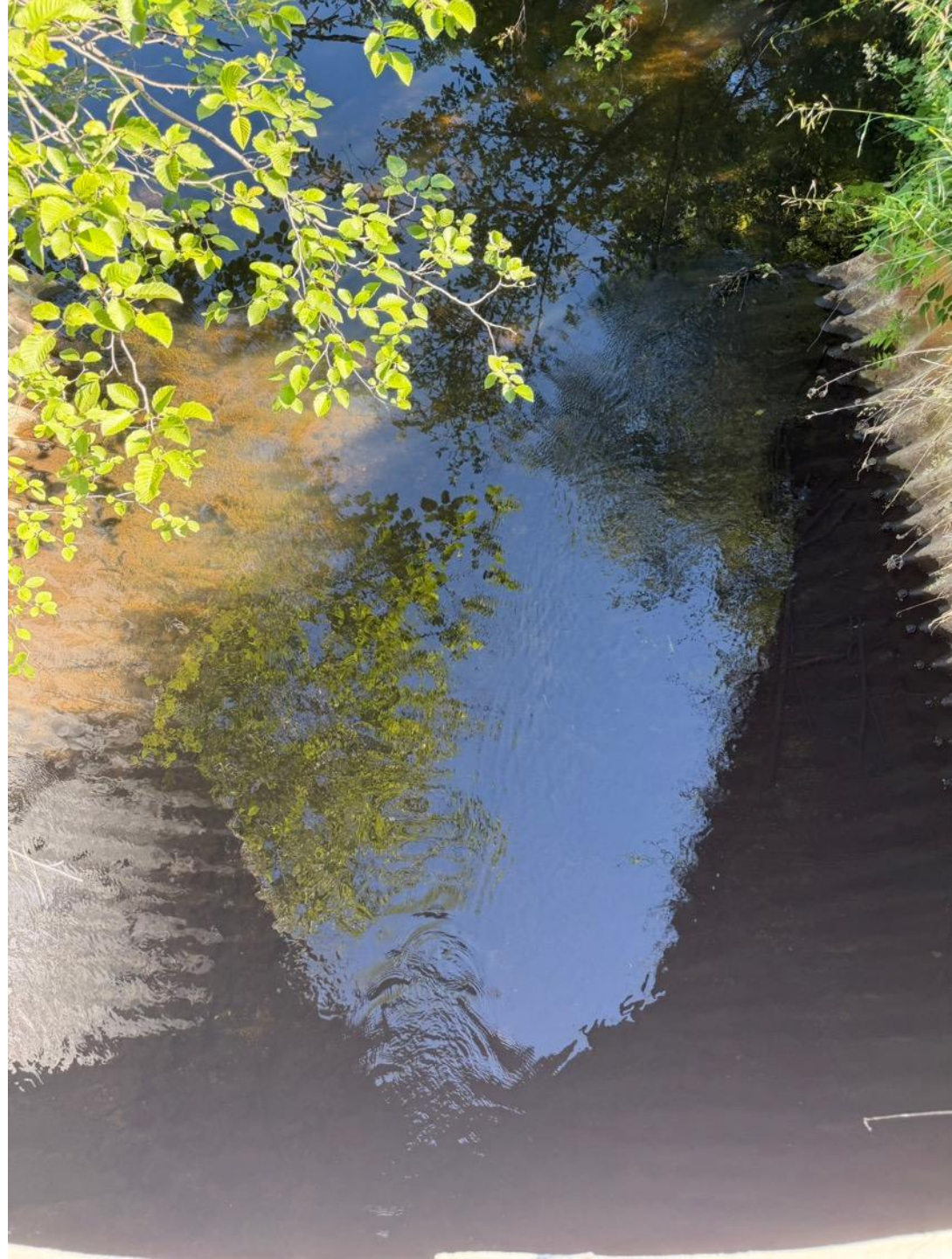


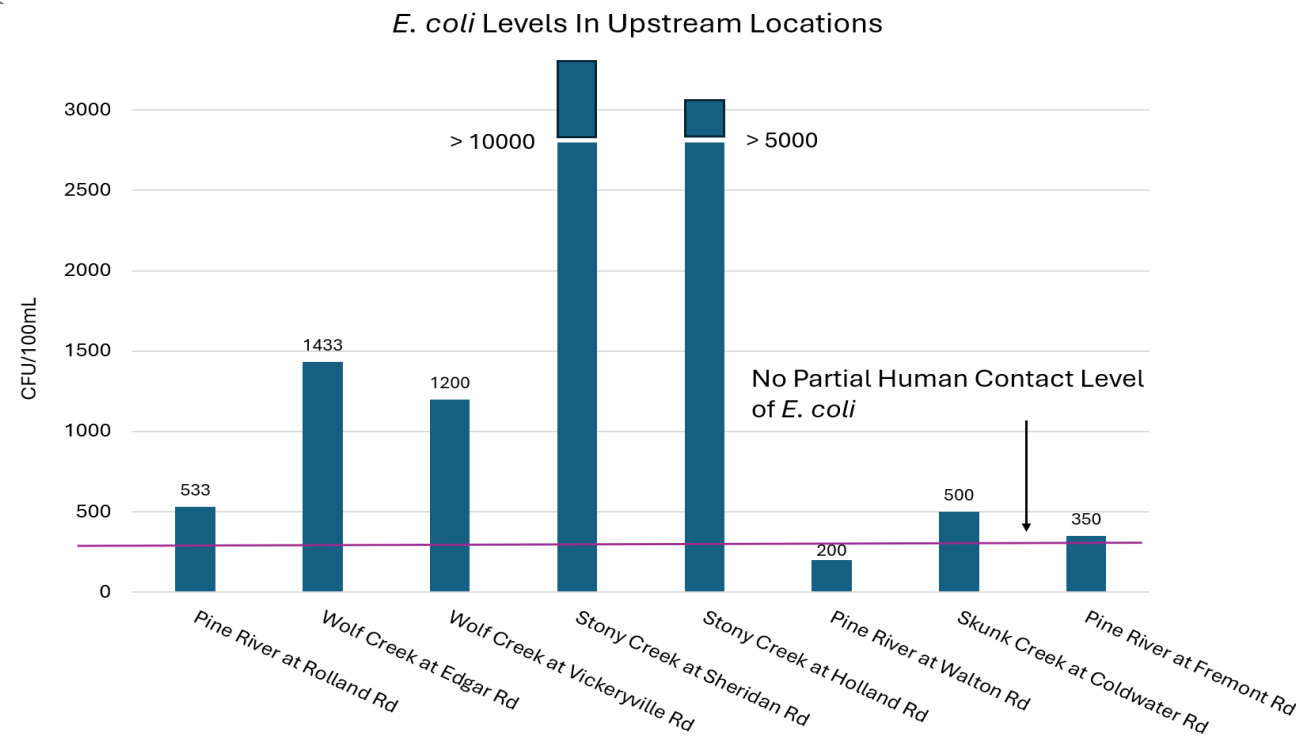
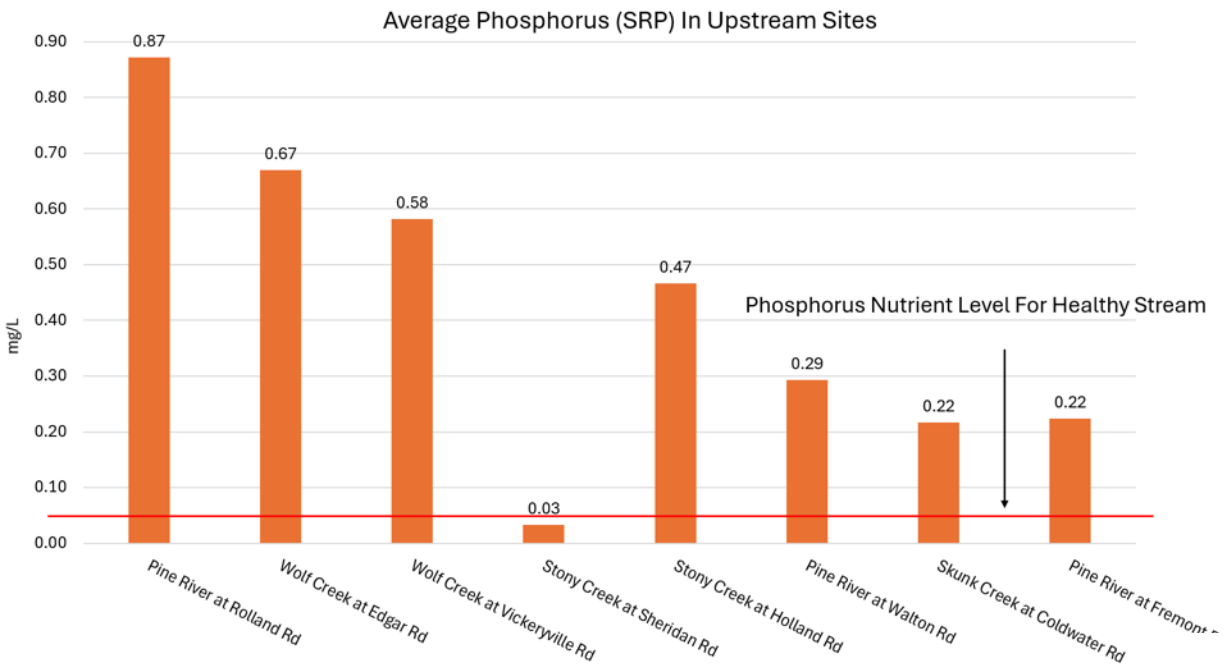






Pine River at Walton Road





Summary: Headwaters Status

- Out of the eight sites that were sampled, only one site had *somewhat* promising data suggesting that it may be unimpacted. Pine River at Walton Rd.
- The data collected is showing that the watershed is impacted by industrial agriculture, though there was some evidence of residential (septic) impacts as well
- More testing needs to be done to fully determine if the Pine River at Walton Rd. site is unimpacted and for more conclusive results overall.

How Impacted is the Watershed From an Ecological Perspective?

- Madison Ramirez and Nichole Heeschen: Alma College

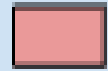
Are we finding evidence that the ecosystems in the watershed are being impacted by agricultural and rural pollution?

Comparative analysis between Lumberjack Park and Sugar Creek

Legend:



Macroinvertebrate Sampling Sites



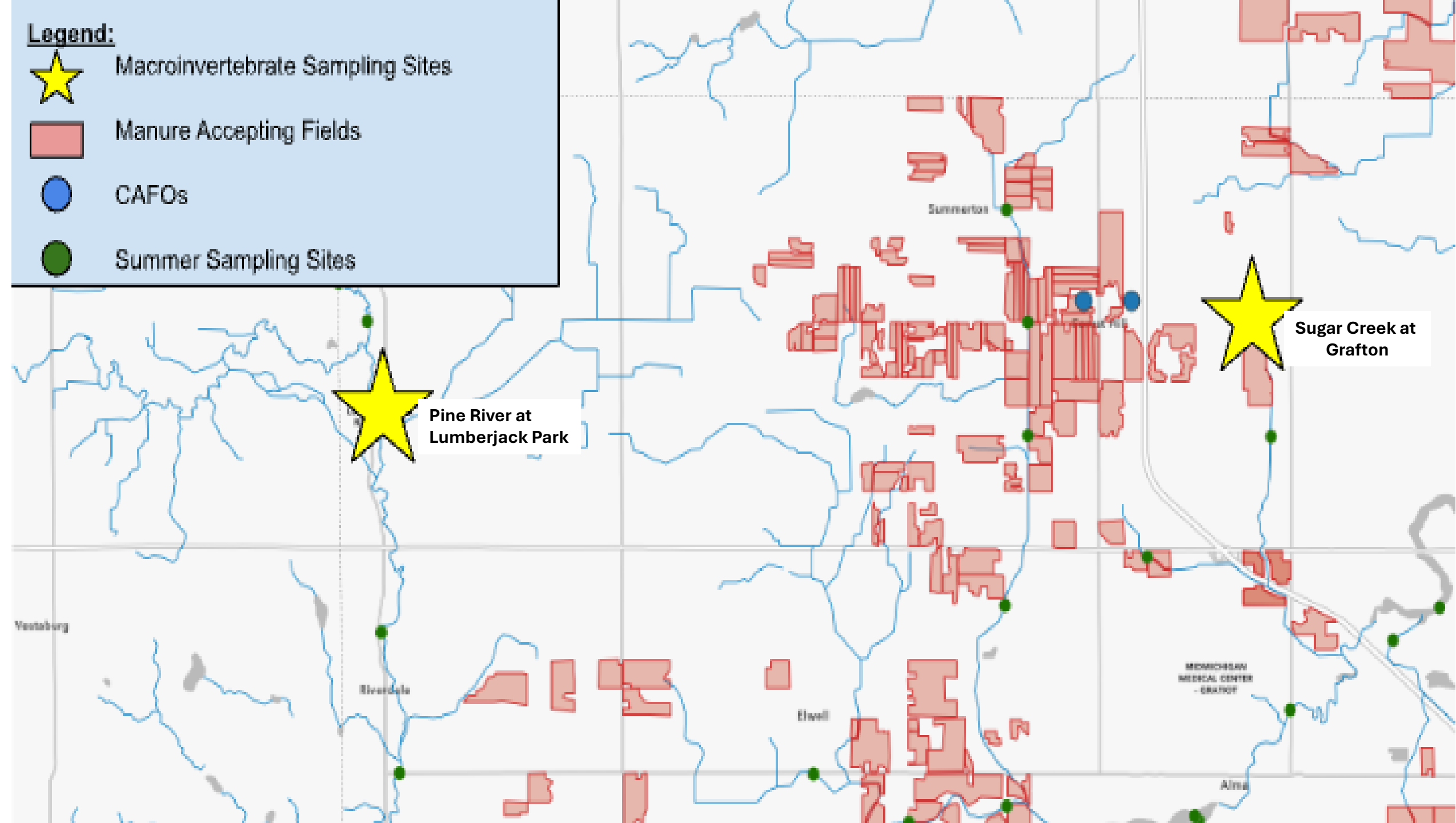
Manure Accepting Fields



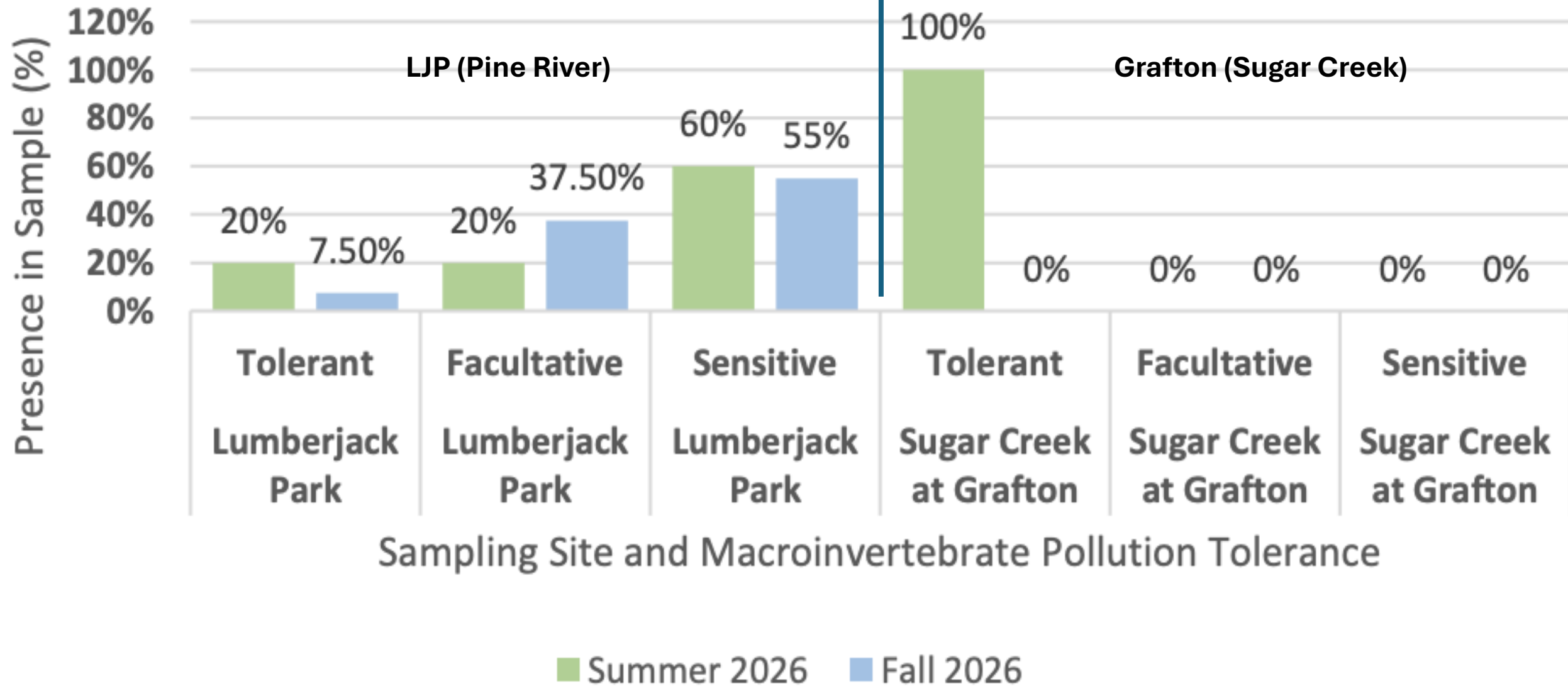
CAFOs



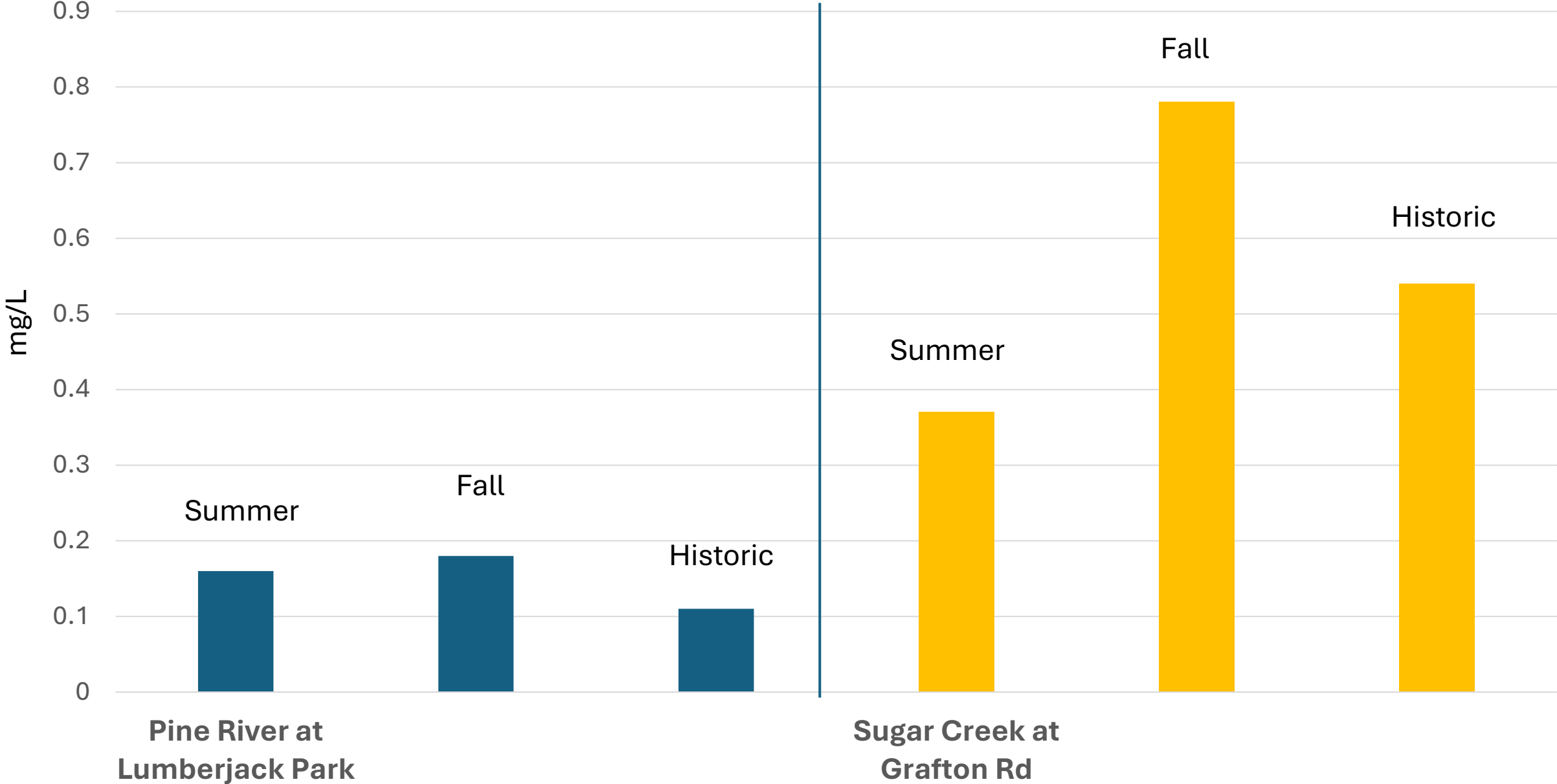
Summer Sampling Sites



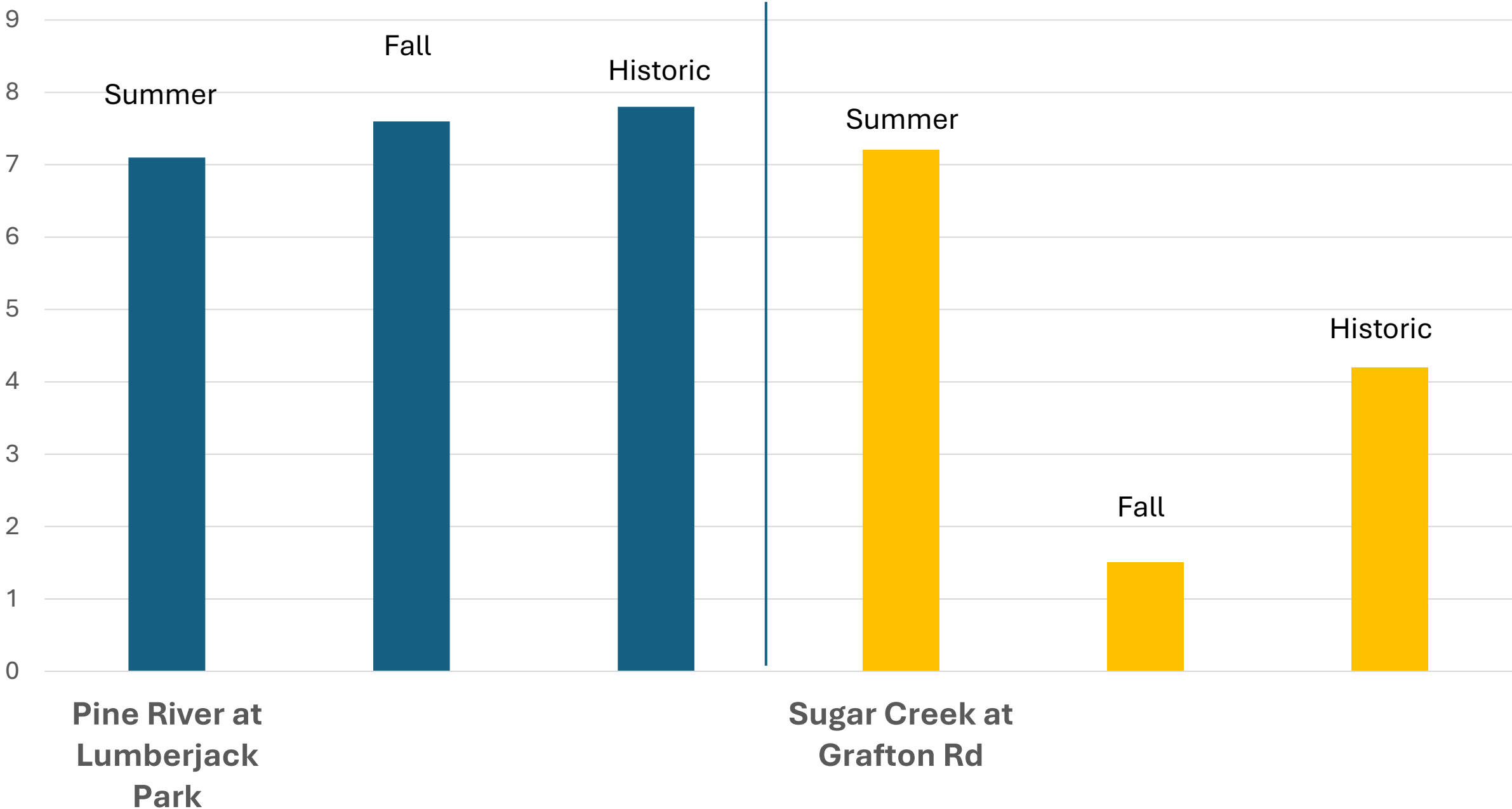
Macroinvertebrate Tolerance to Pollution Compared Between Two Sites and Two Sampling Seasons



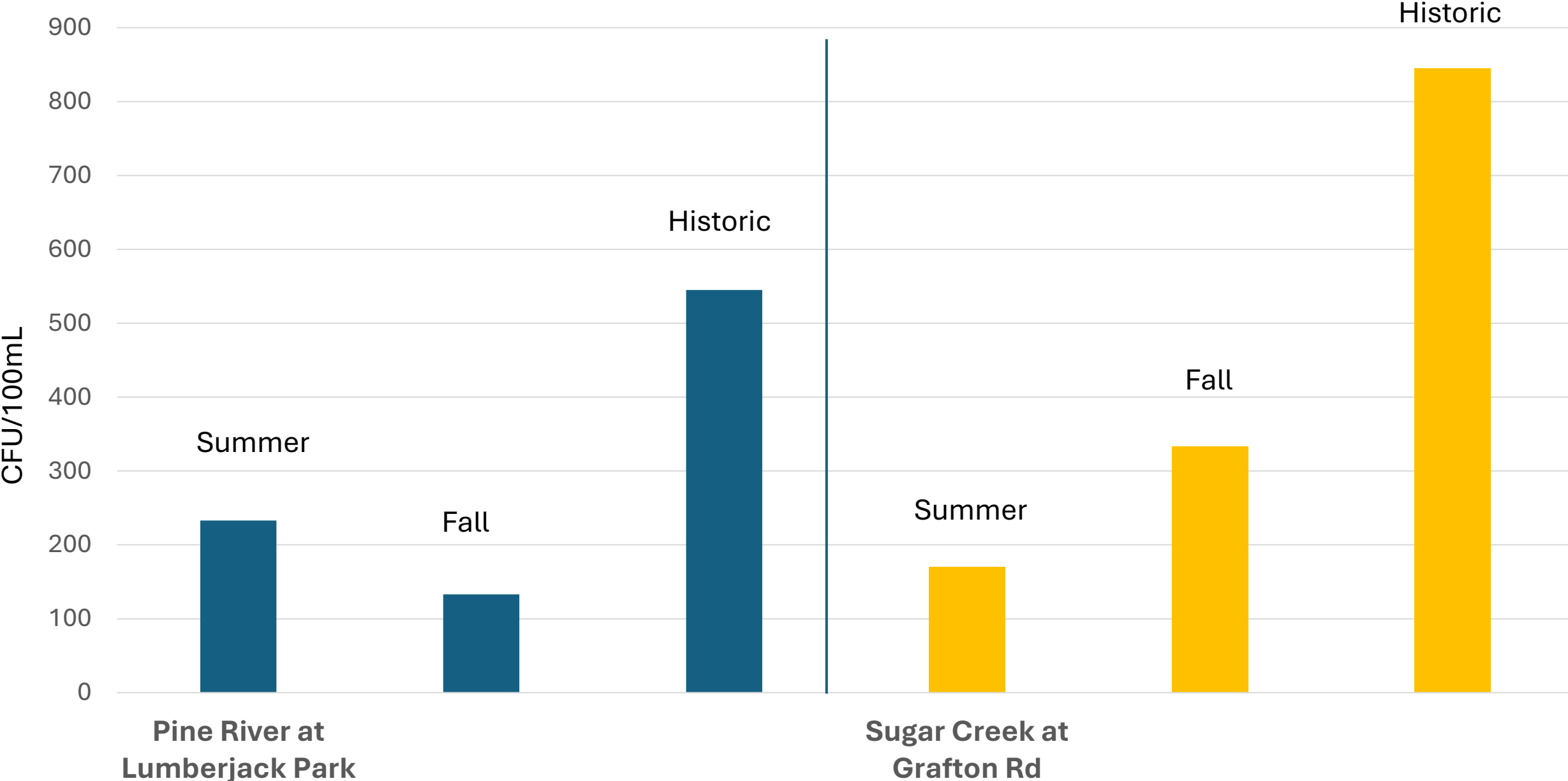
P Concentration (mg/L)



Dissolved Oxygen (mg/L)



E. coli (CFU/100mL)



Summary: Takeaways from our Macroinvertebrate Study

What Can We Expect in the Future?

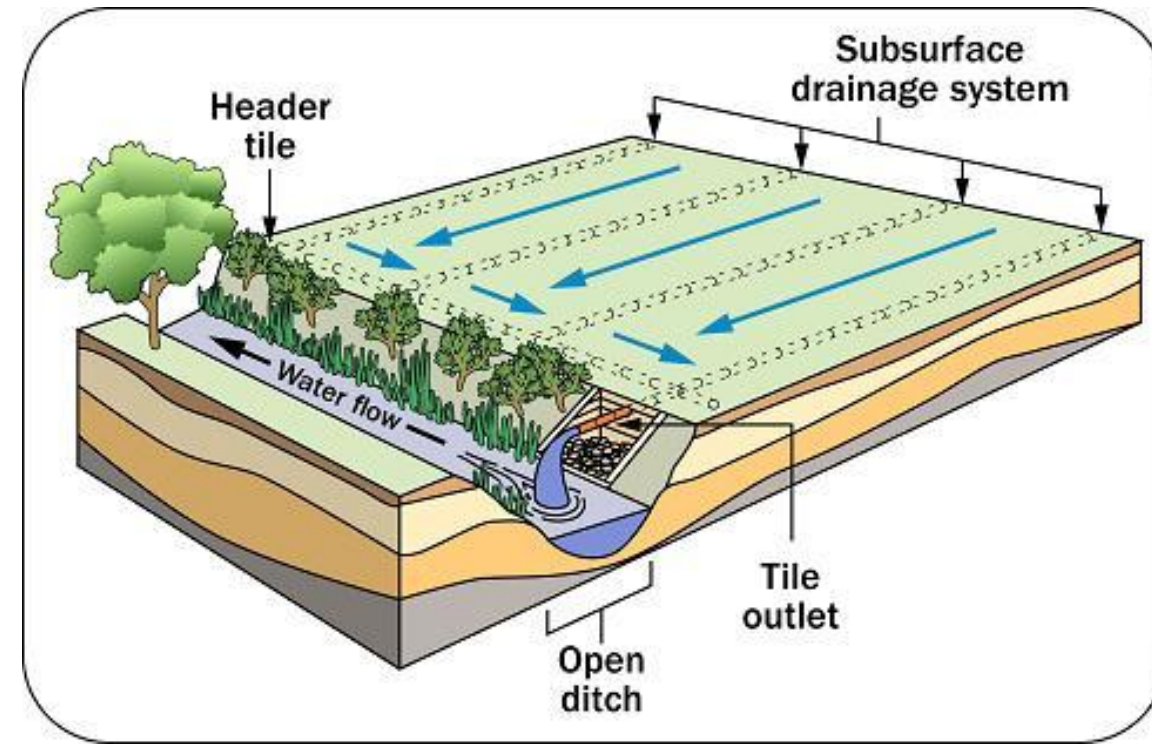
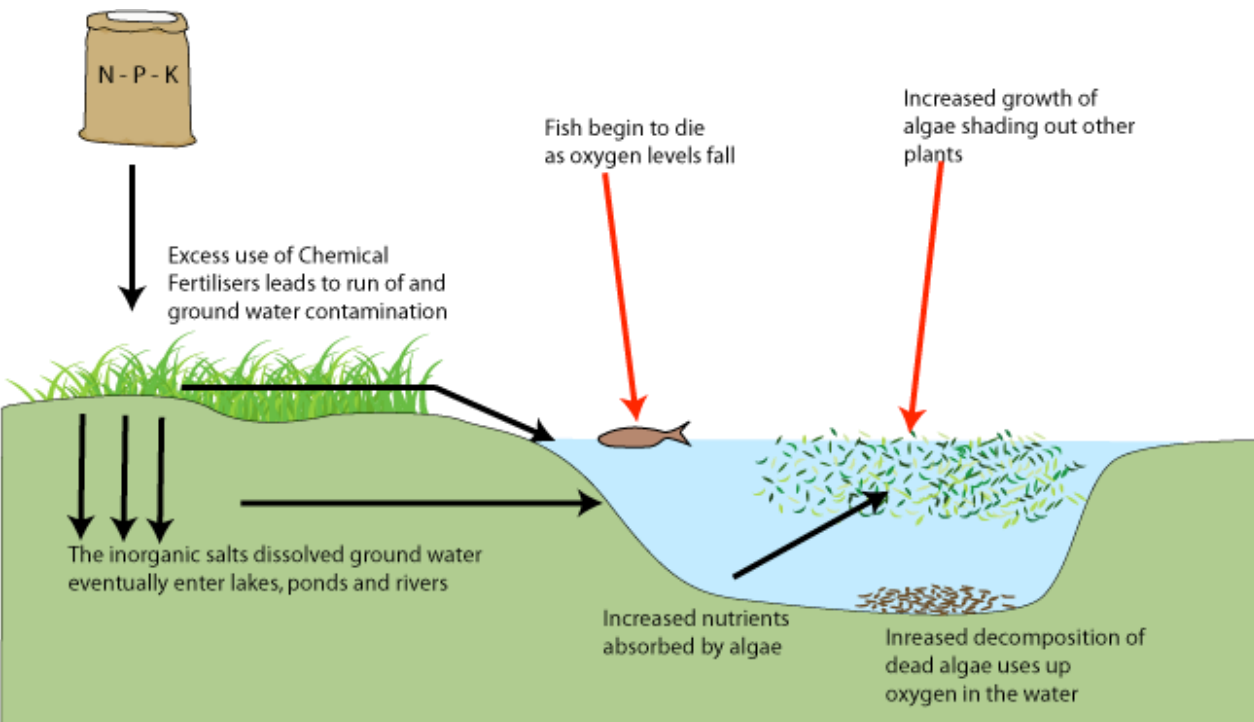
- Ruby Frisch: Alma College

What impact, if any does climate change have on river conditions?

Given climate models for this part of Michigan, what is likely to happen if no change occurs?

Phosphorus (P) and Algal Blooms - Basics

- Manure and fertilizer are full of phosphorus
- Excessive phosphorus levels can contribute to algal blooms and “Dead Zones”
- High water temp and increased precipitation can **increase** algal blooms



What I Did...

- Averaged the entire Pine River temperatures from 2004-2024 using Alma College Data and NOAA database
- Looked at Gratiot Co. / PR watershed summer and winter temperatures
- Looked at precipitation rates

What I Found

- Air temperatures in Gratiot County have risen from June to August, 2004-2024
- Air temperatures in Gratiot County have risen from January to March, 2004-2024
- Water temperature of the Pine River watershed has risen from 2004-2024
- Precipitation rates have increased
- Algae blooms have the potential to appear earlier and stay later



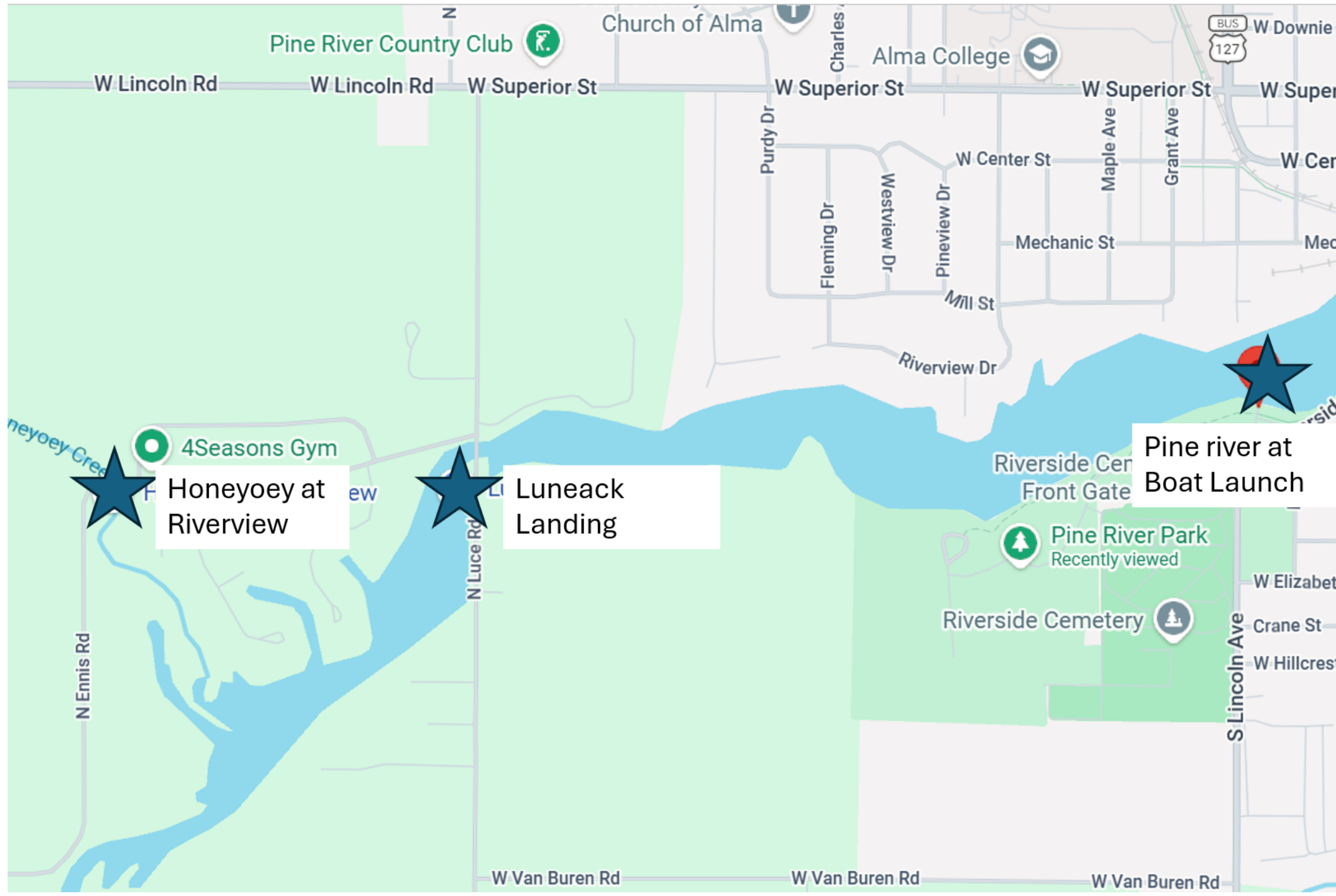
Are There Human Health Risks Due to *E. coli* in the Pine River Watershed?

- Talia Thompson (Montcalm CC)

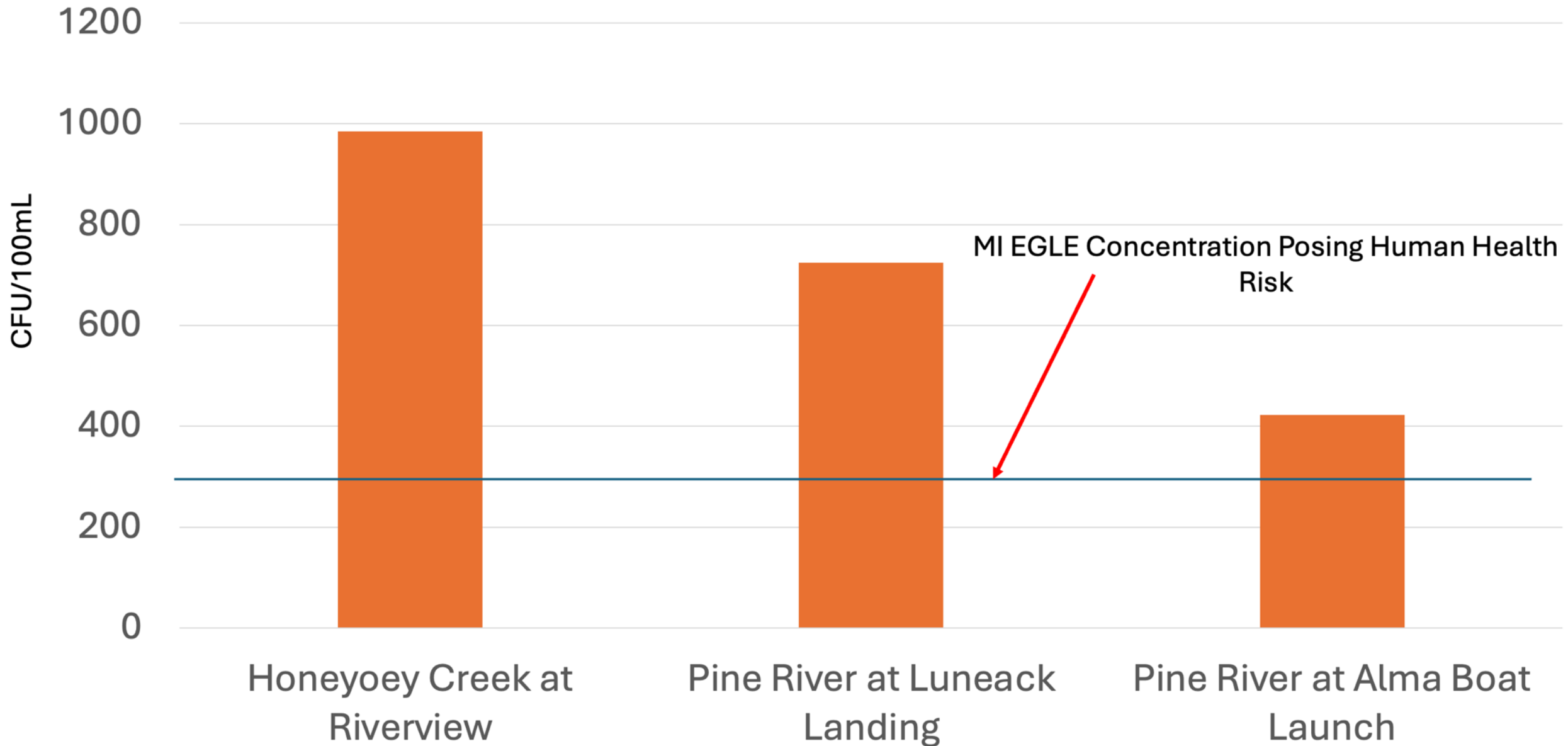
Survey of three sites in which people are most likely to interact with the river

Comparing bacterial concentrations over time with health department standards

**Sites most likely
to be access
points for people
fishing or boating
in the river**



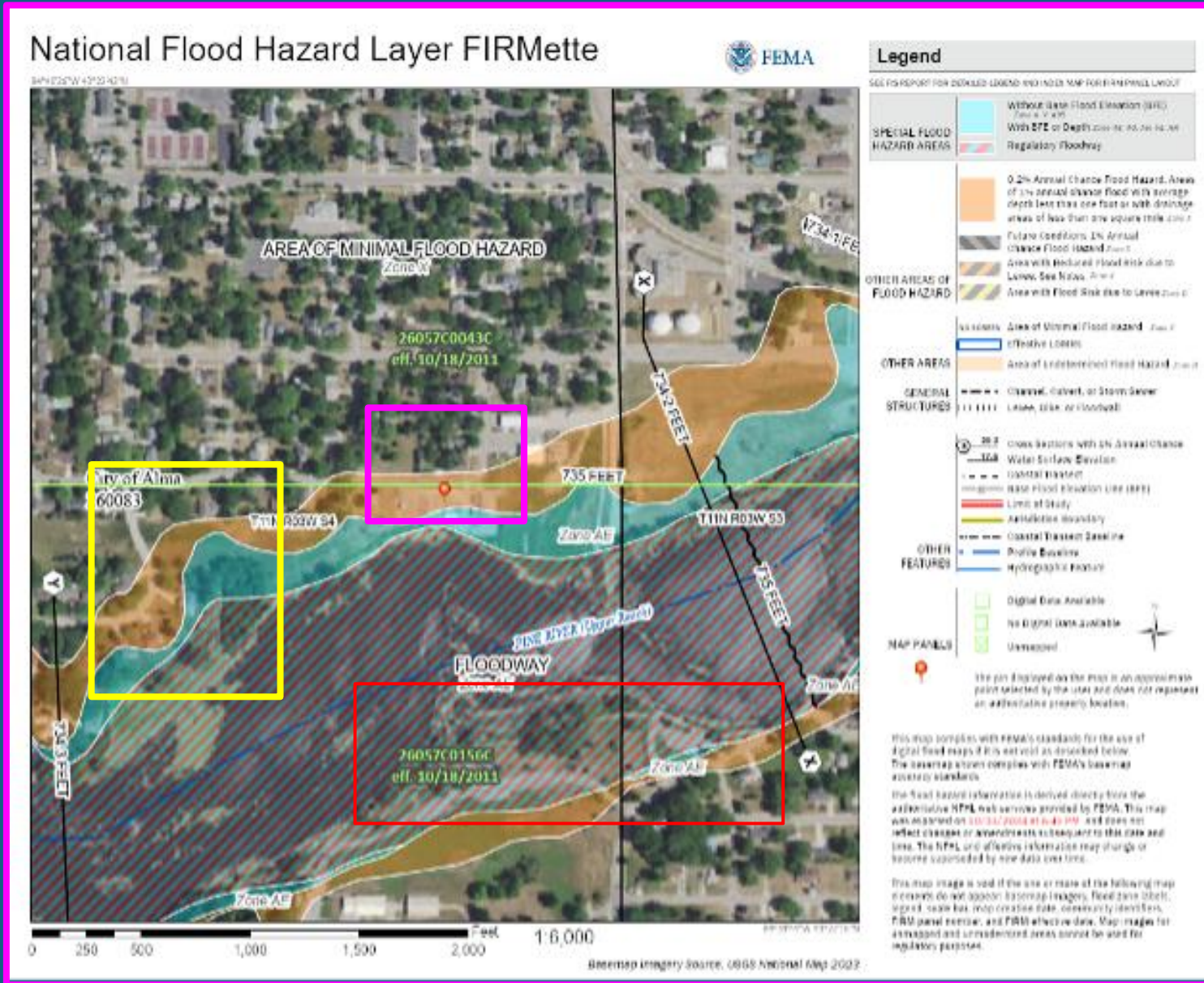
Average E. coli Concentration (2021-2026) for Sites Where Human Interaction With Surface Water is Likely



Work Done By ENV 310 Class, 2024

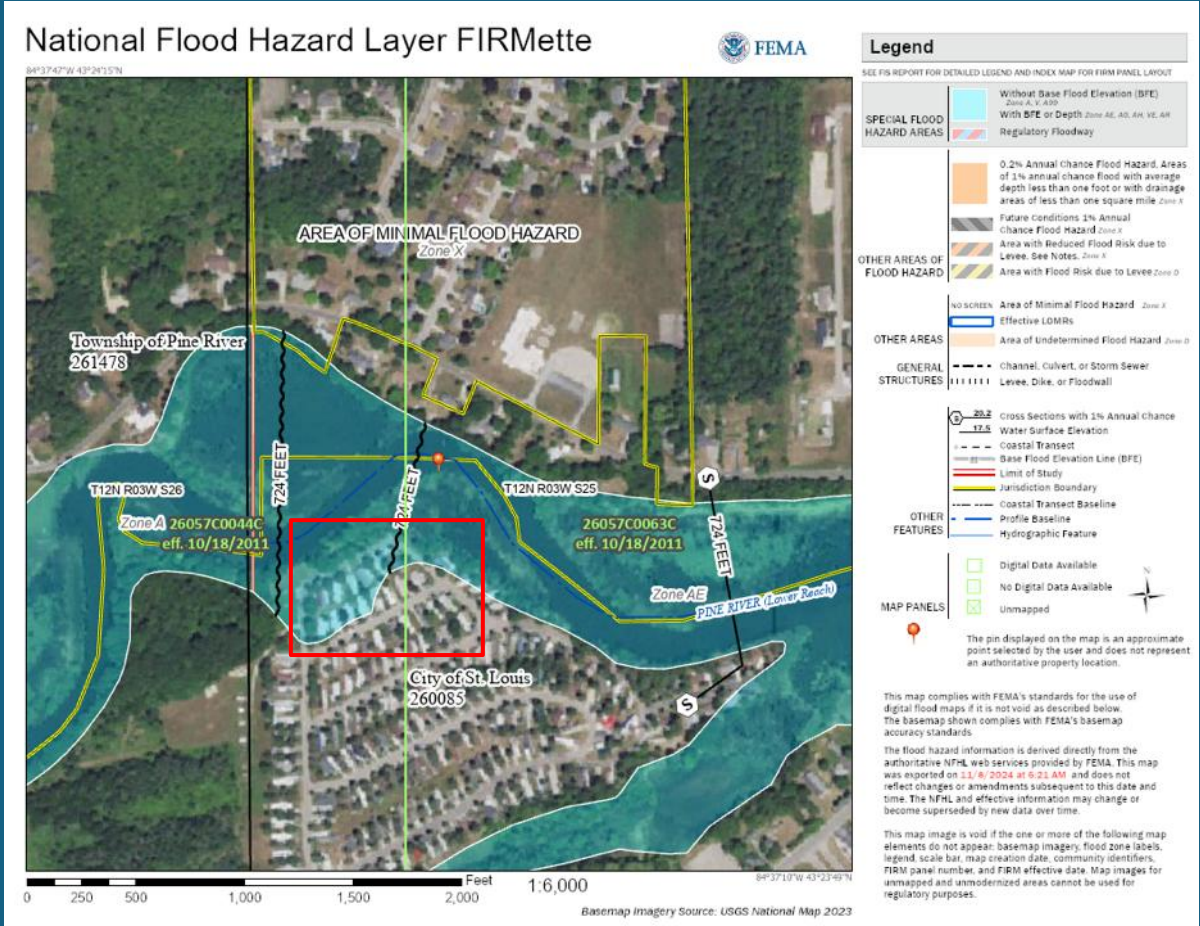
- Ref: **Jack Yodzeviciis, Karol Pucek, Marlow Dillon, Kyle Scheck, Emmerson Goodin**

FEMA Flood Map



- Many of the areas vulnerable to flooding are in areas with lower than average property values, associated with higher vulnerability
 - Yellow box**
 - Property value: \$90,000-150,000
 - Property taxes: \$4,000-5,000
 - Red box**
 - Property value: \$30,800-57,000
 - Property taxes: \$1,500-2,000
 - Purple box**
 - electrical site at 550 mill st
- ## Impacts
- Many people living in these areas are of lower socioeconomic status and unlikely to have funds to evacuate their homes.
 - When the Pine River floods into these homes and are exposed to E.Coli from the river.
 - Harmful contaminants will be extremely expensive to clean

Evergreen Housing



- Red box
- Unit value: \$2k - \$4k

Wrap-Up

- Nearly the entire Pine River Watershed from the headwaters to St. Louis dam (and downstream) is *impaired* due to agricultural inputs as well as septic system leakage
- Agricultural inputs dominate the degradation of the watershed by far, though human inputs should not be ignored
- Over the past 25 years, the watershed has deteriorated to the degree that there are few, if any sites that represent even a modestly clean environment
- Many sites people use to access the river exhibit high bacterial and nutrient loading- especially after rain events
- The future of the watershed, unless there are drastic changes made is for further degradation and longer periods of health risks (ecological and human) due to a changing climate

THANK YOU!!!!

Without the continued financial support from the Healthy Pine River Group, none of this would be possible.

We thank you very much for your continued interest and support!!!!

Remember: You not only help us understand the watershed, but you make a difference in the lives and careers of our students!!!

QUESTIONS?

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