

Summary of Data from Summer, 2023 Testing on Pine River, Upper Saginaw River Drainage Basin

Central, Lower Peninsula, Michigan

Alma College Program of Environmental Studies

Alma College Great Lakes Watershed Institute

M. Borrello, Director and Chair

Introduction

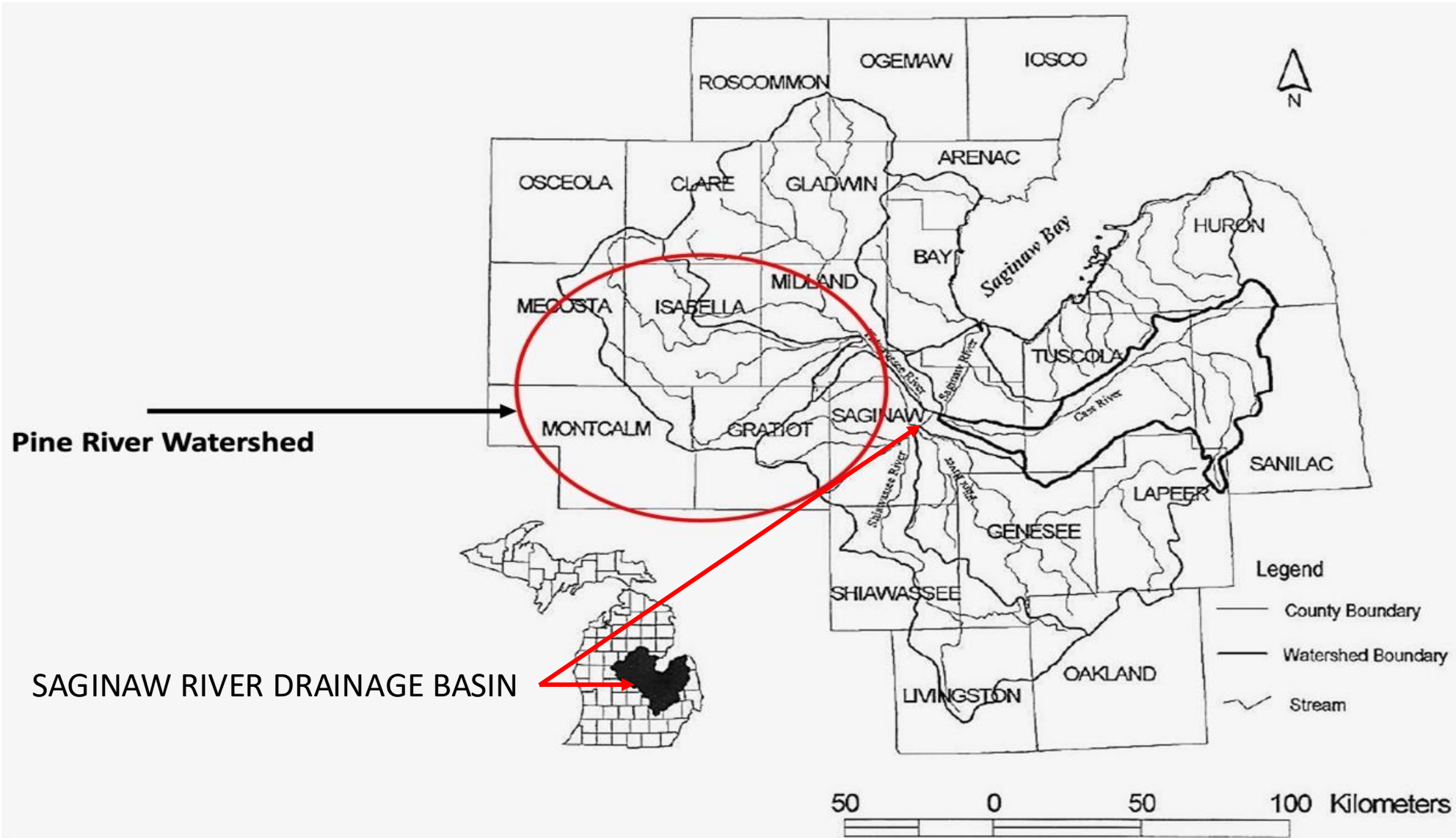
- Sampling sites were selected based on previous sample results
- Funding was supported by Alma College, and the Healthy Pine River Group
- Focus was given to downstream sites as St. Louis residents have complained about recent algal blooms
- Equipment used was calibrated and new water sources were installed for deionized water

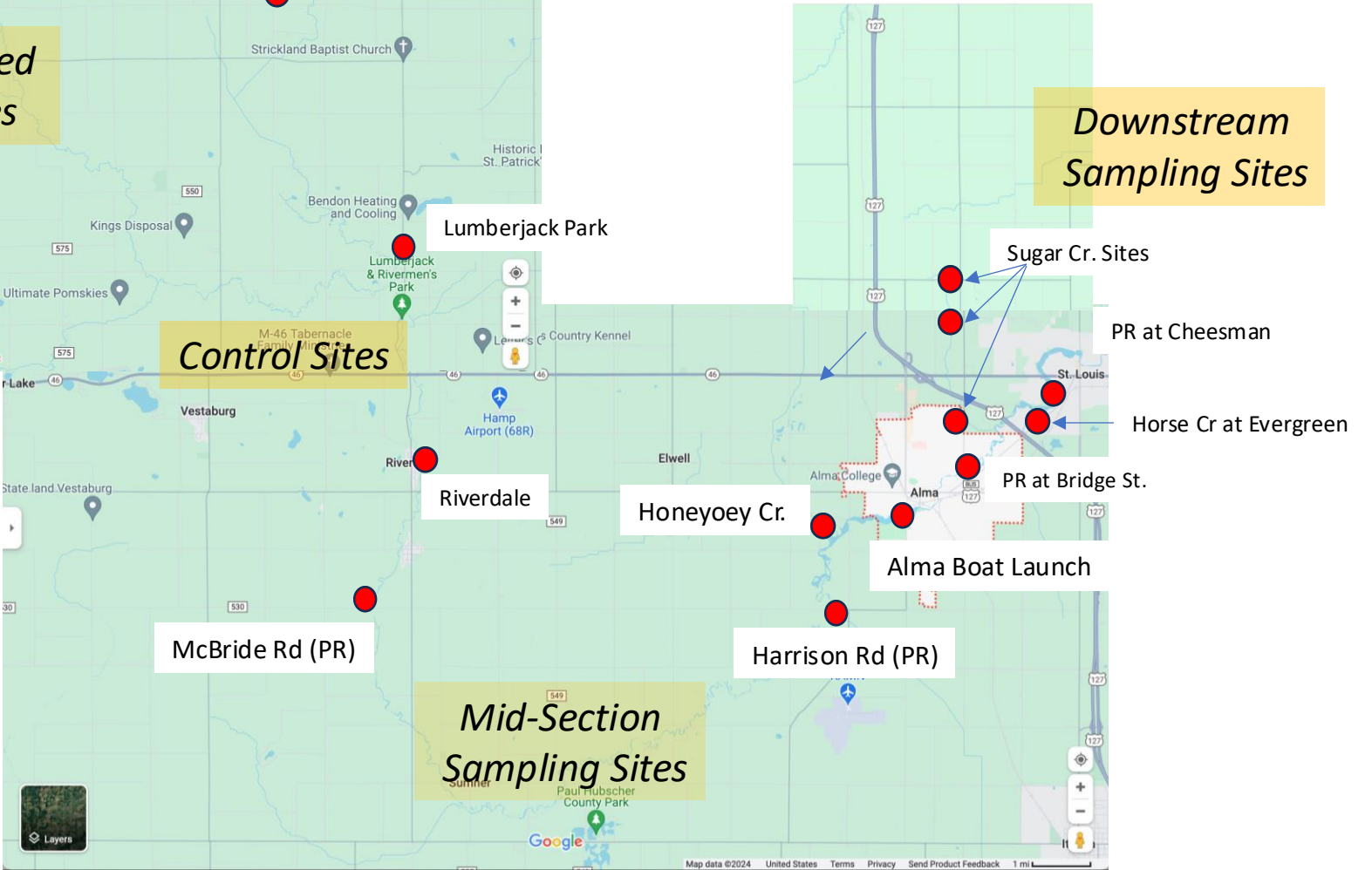
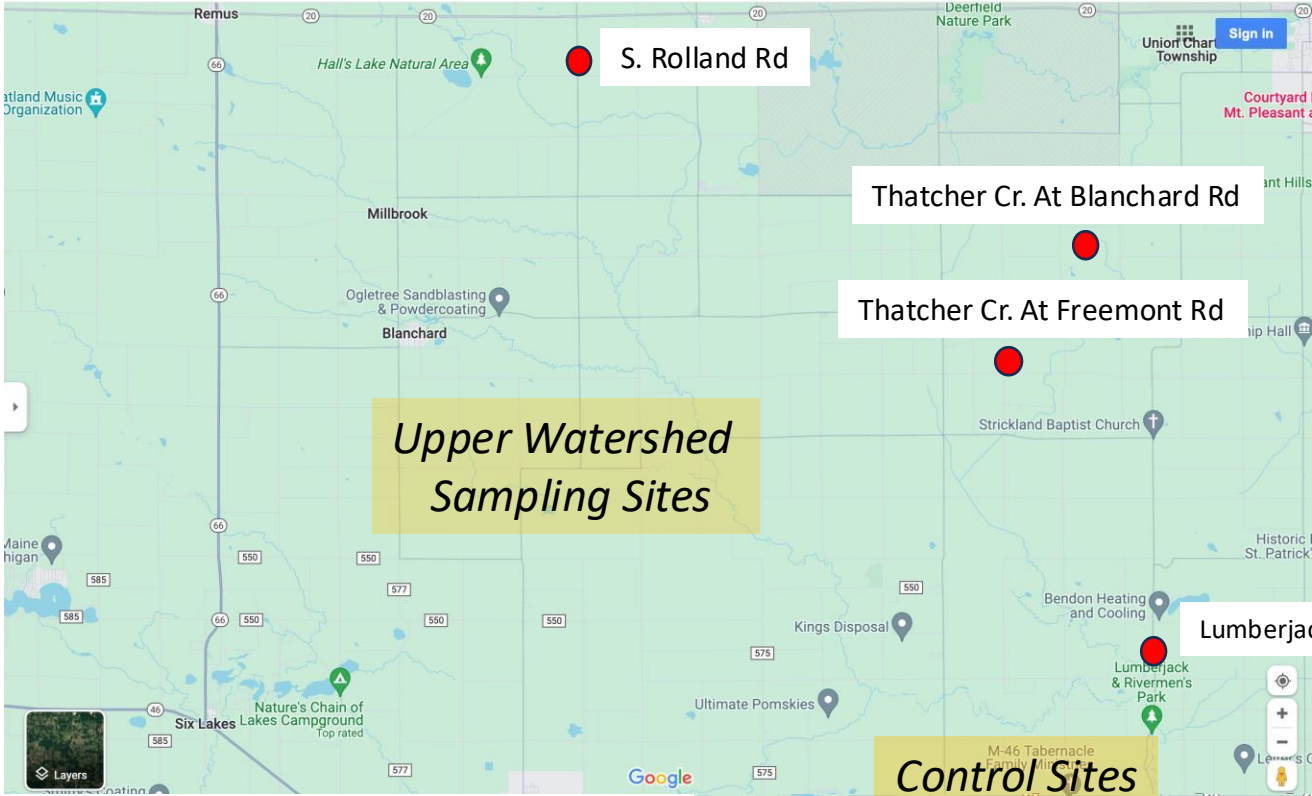
Methodology

- Followed State of Michigan and U.S. EPA field and lab protocols
 - See Mitchell and Stapp, 1997
- Error bars were less than what would appear on graphs
- Statistical Analyses were conducted (ANOVA and t-tests for significance)

For more information, contact M. Borrello at borrello@alma.edu

Field Area: Sampling Area



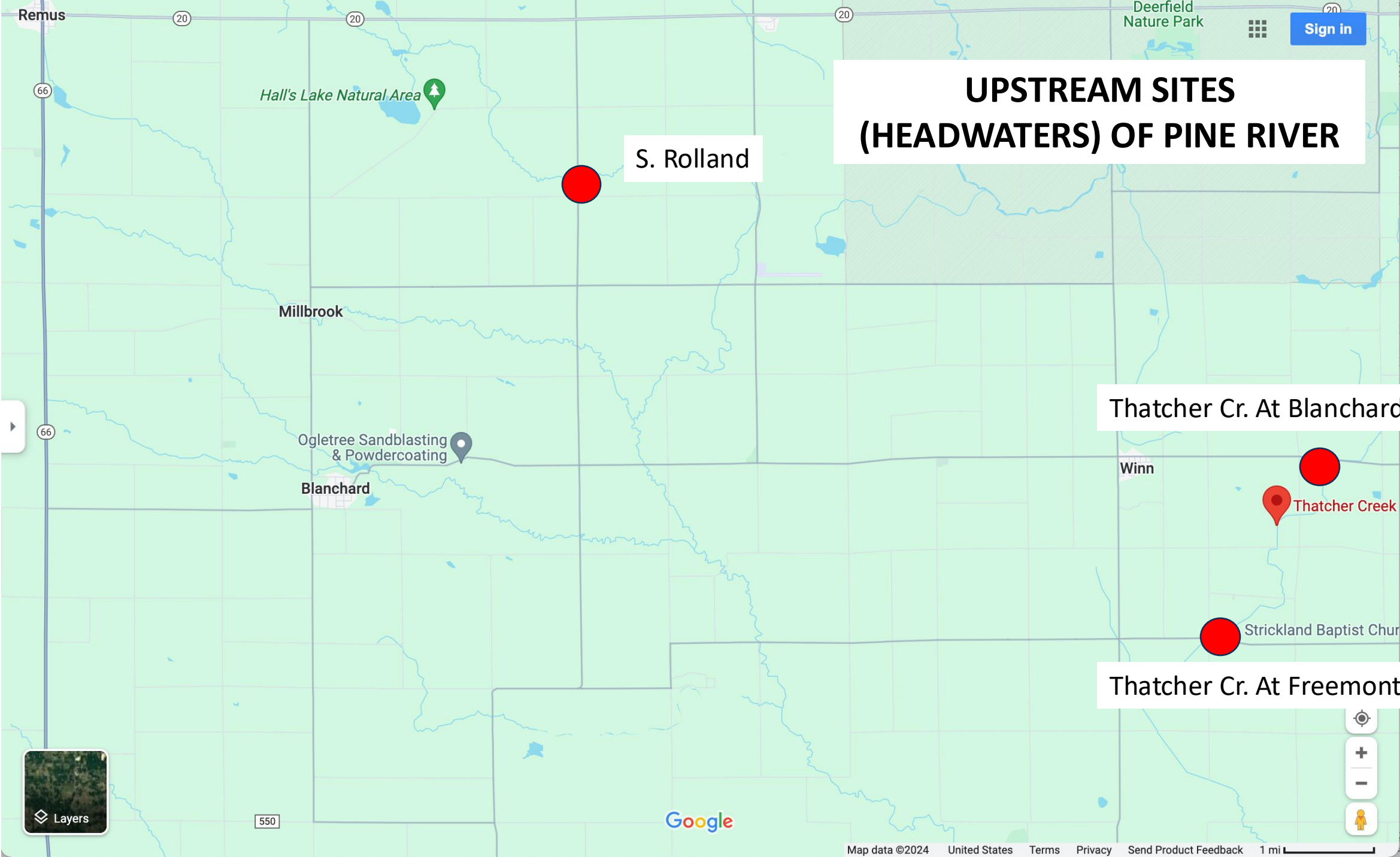


UPSTREAM SITES (HEADWATERS) OF PINE RIVER

S. Rolland

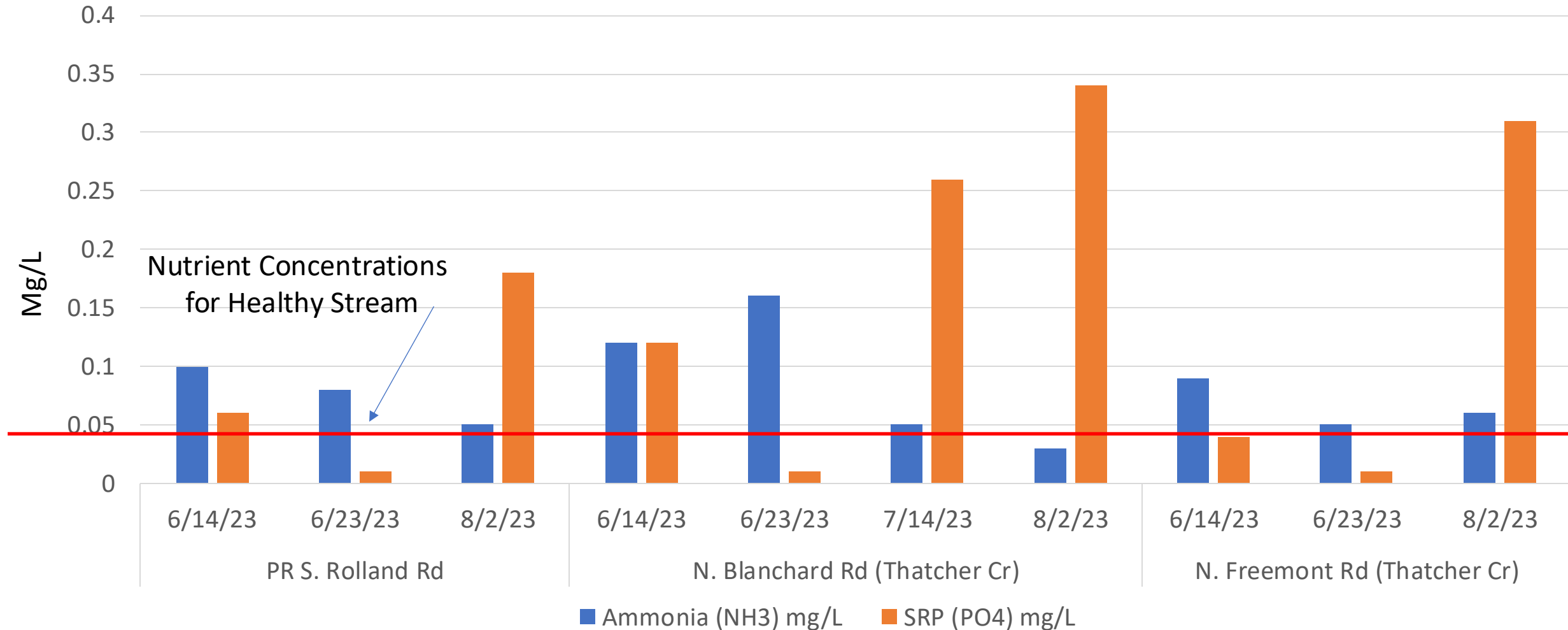
Thatcher Cr. At Blanchard

Thatcher Cr. At Freemont

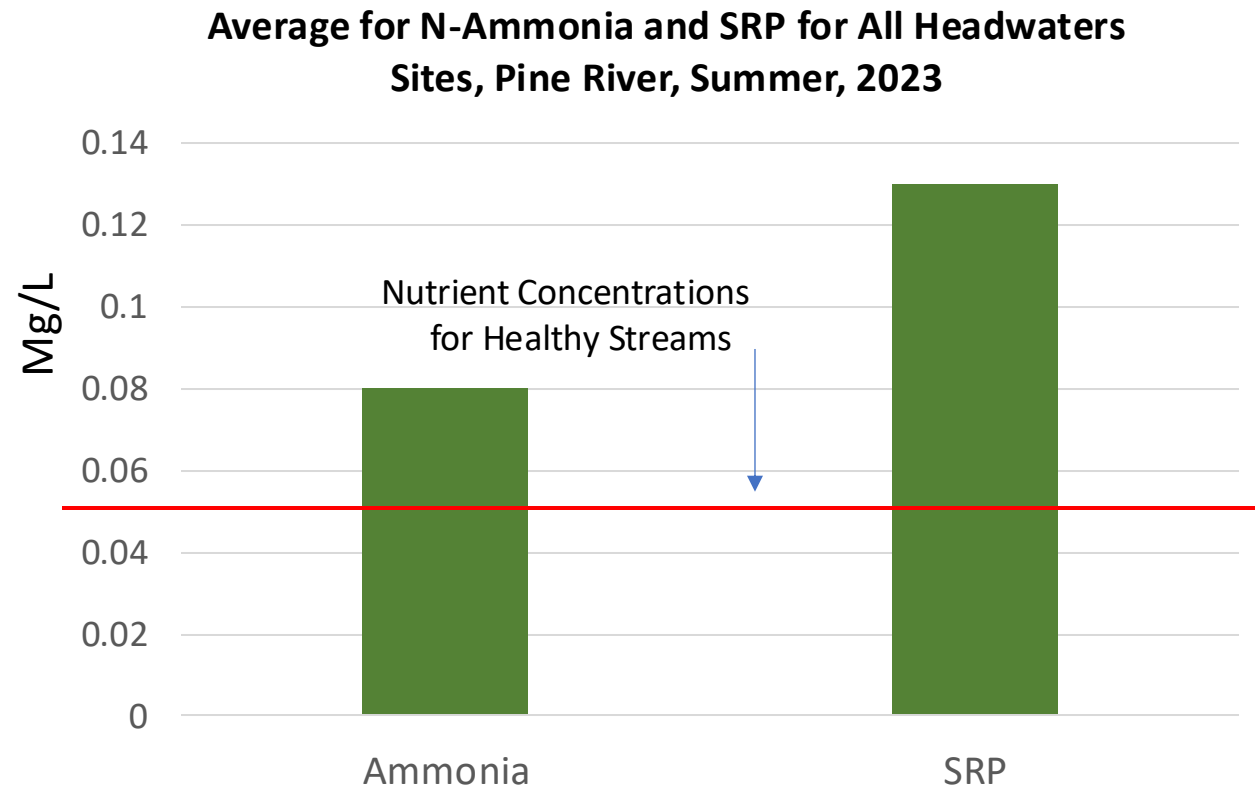
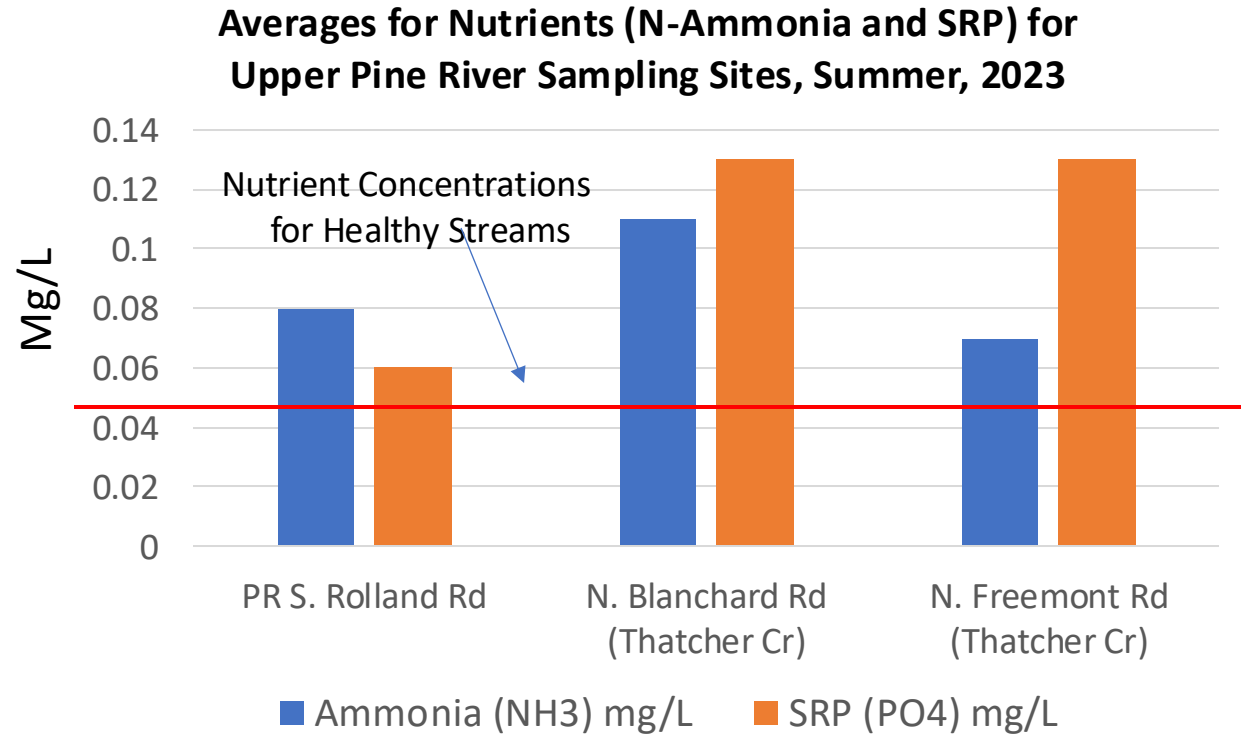


Nutrient Results: Upper Pine River Watershed w/ Sampling Sites

Results: Nutrient Analyses for Upper Pine River Watershed, Summer, 2023

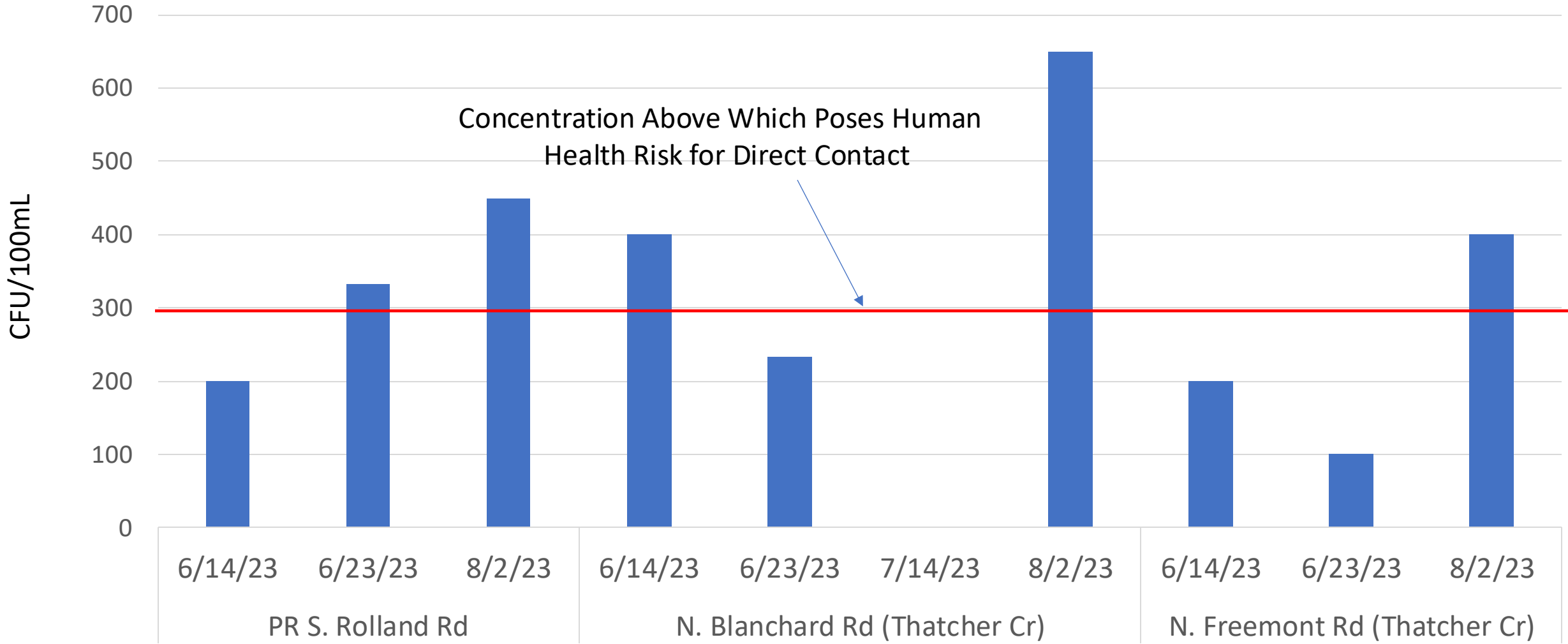


Results: Nutrient Averages for Upper Pine River Watershed

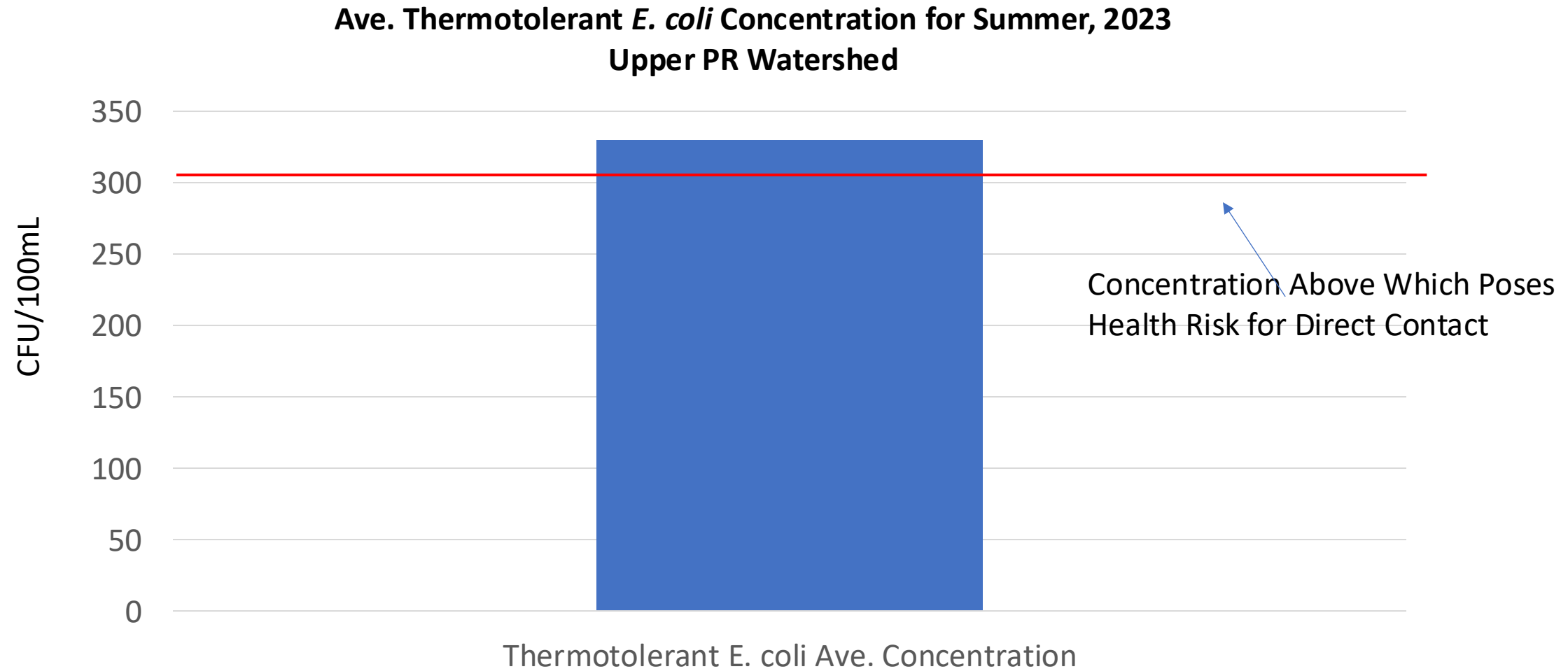


Results: Thermotolerant *E. coli* Upper Pine River Watershed w/Sampling Sites

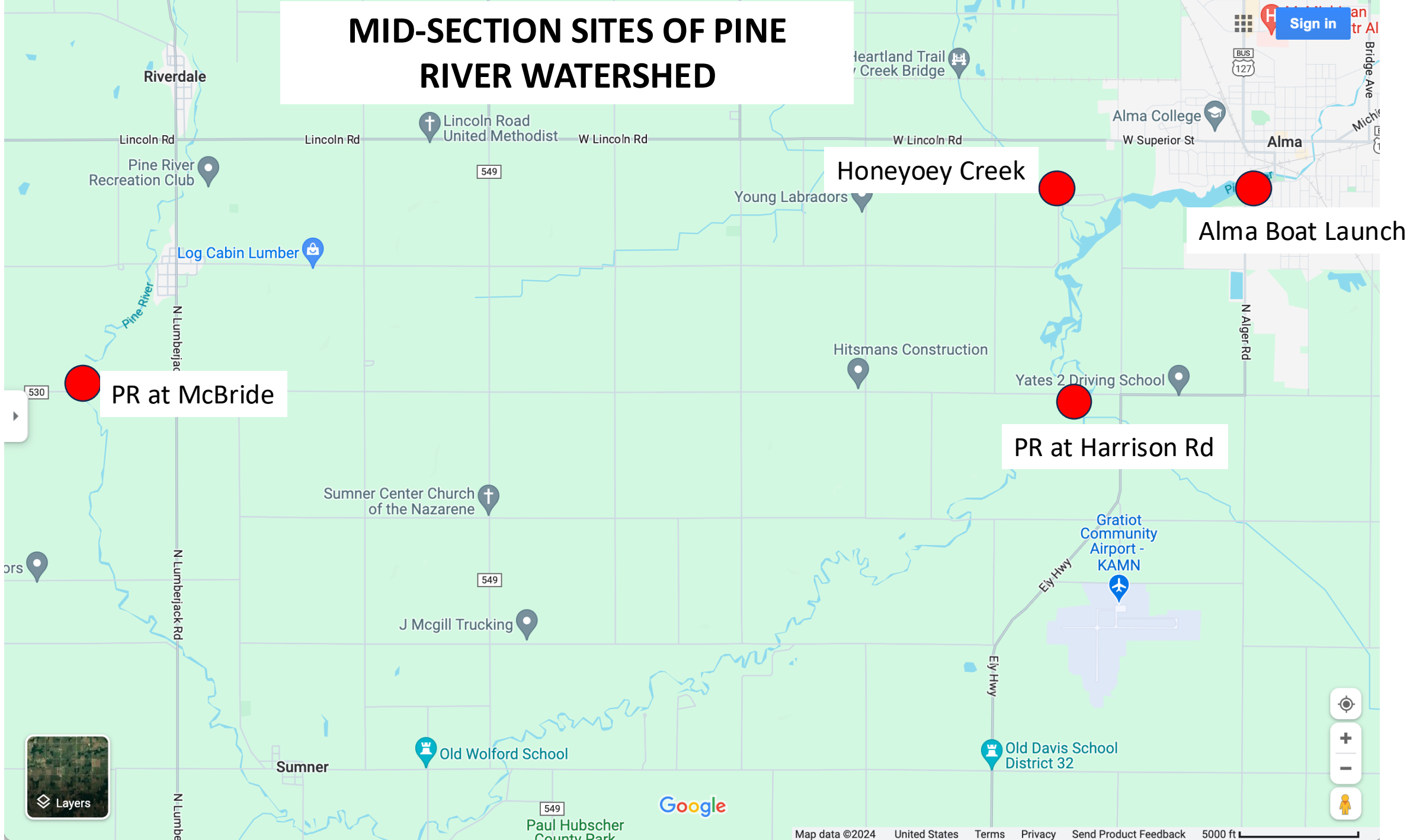
Thermotolerant *E. coli* Concentrations in Upper Pine River Watershed, Summer, 2023



Thermotolerant *E. coli* Concentration Averages for Summer, 2023 – Upper PR Watershed

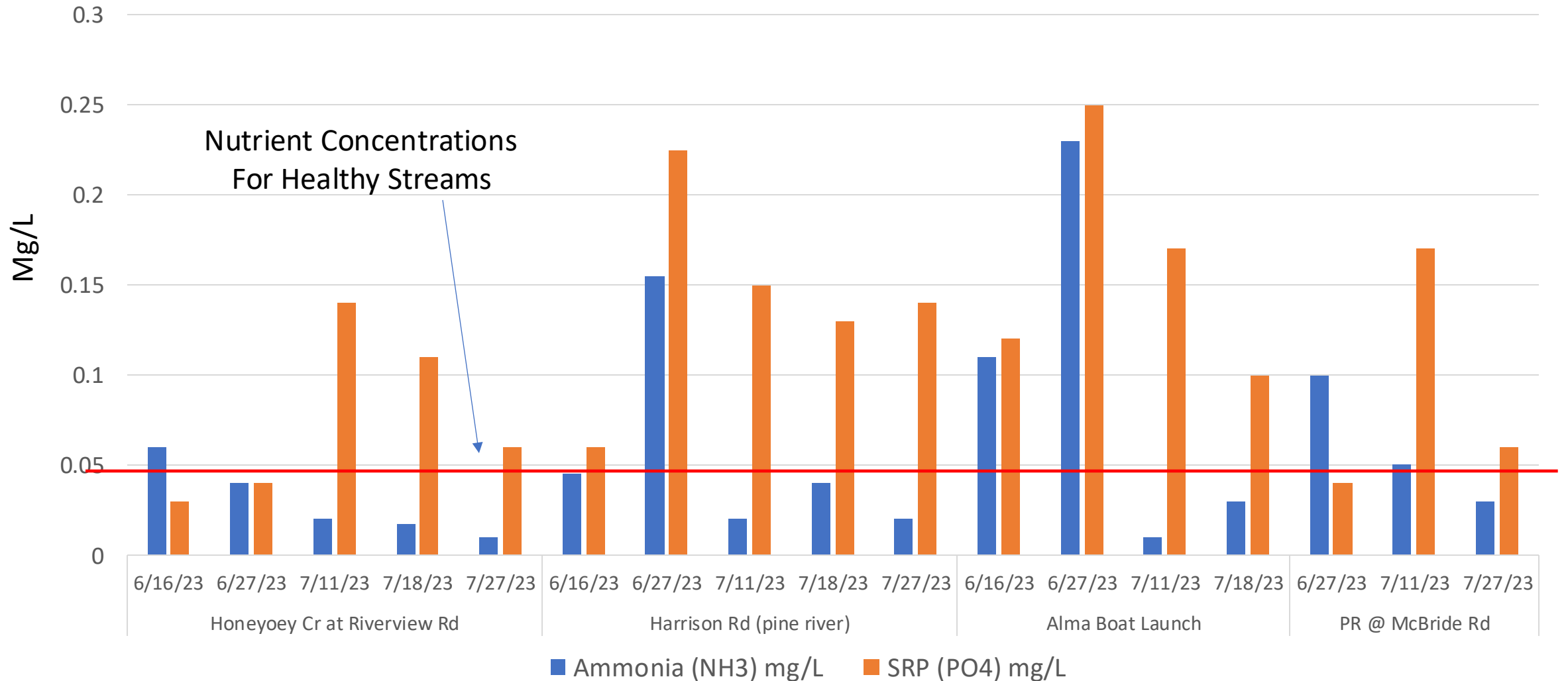


MID-SECTION SITES OF PINE RIVER WATERSHED



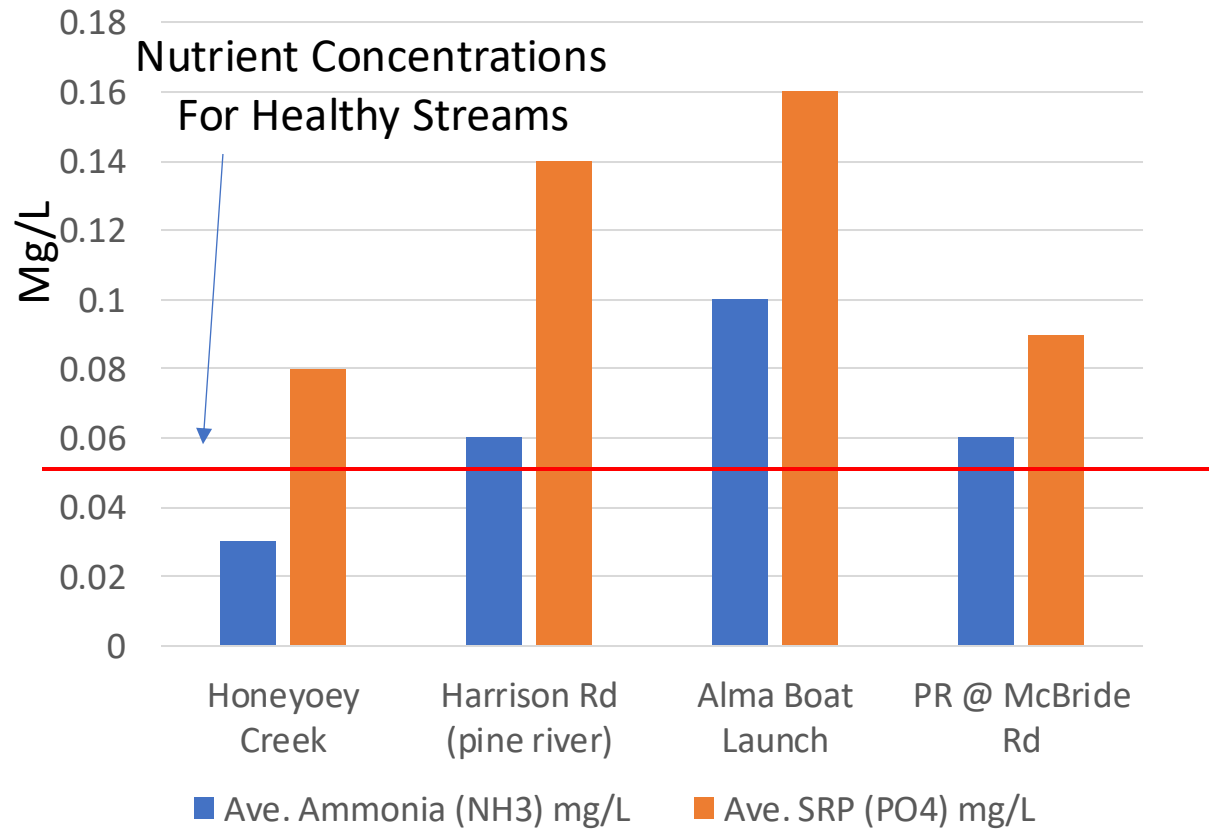
Results for Nutrients: Mid-Section of Pine River Watershed with Sampling Sites

Nutrient Results for Sampling Site in Mid-Section of Pine River Watershed, Summer, 2023

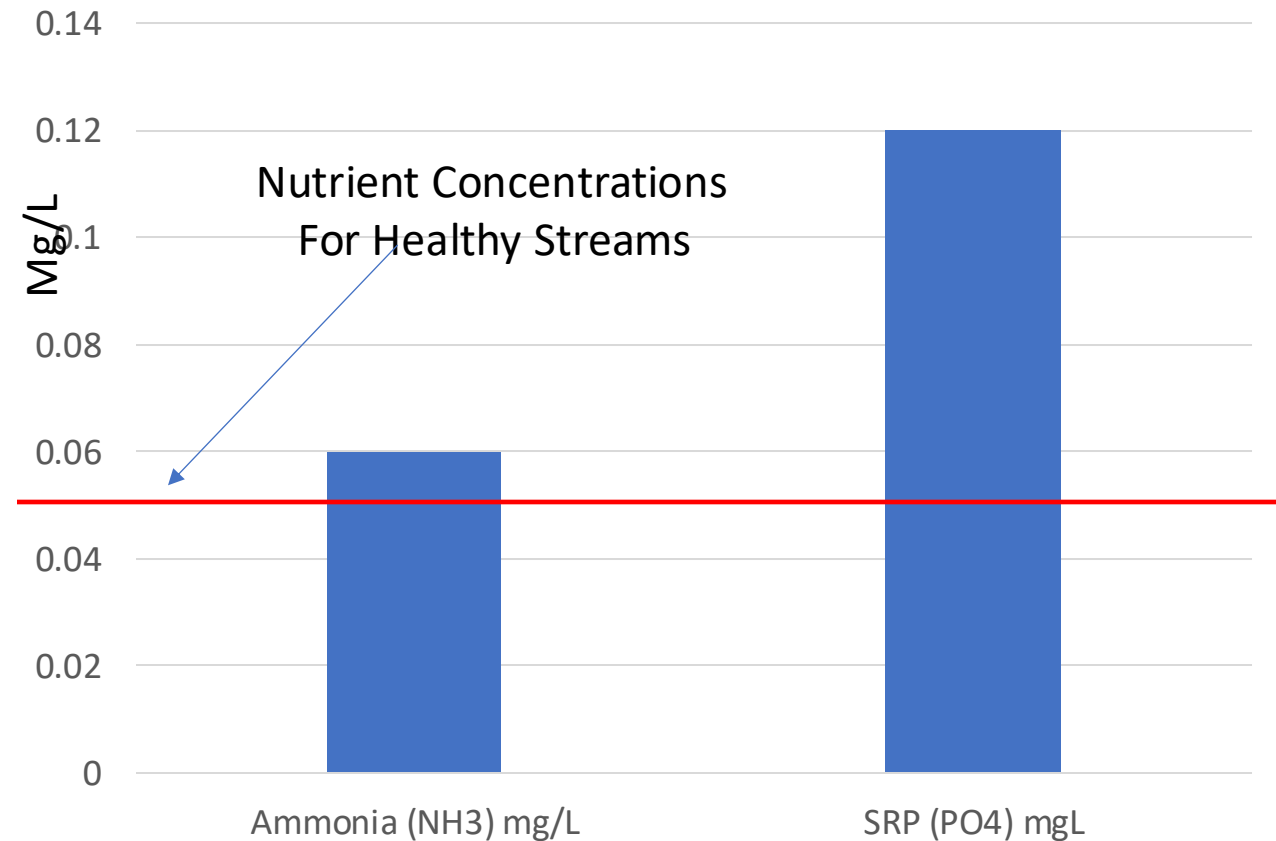


Results: Nutrient Averages for Mid-Section Pine River Watershed

Nutrient Averages for Mid-Section Portion of Pine River Watershed, Summer, 2023

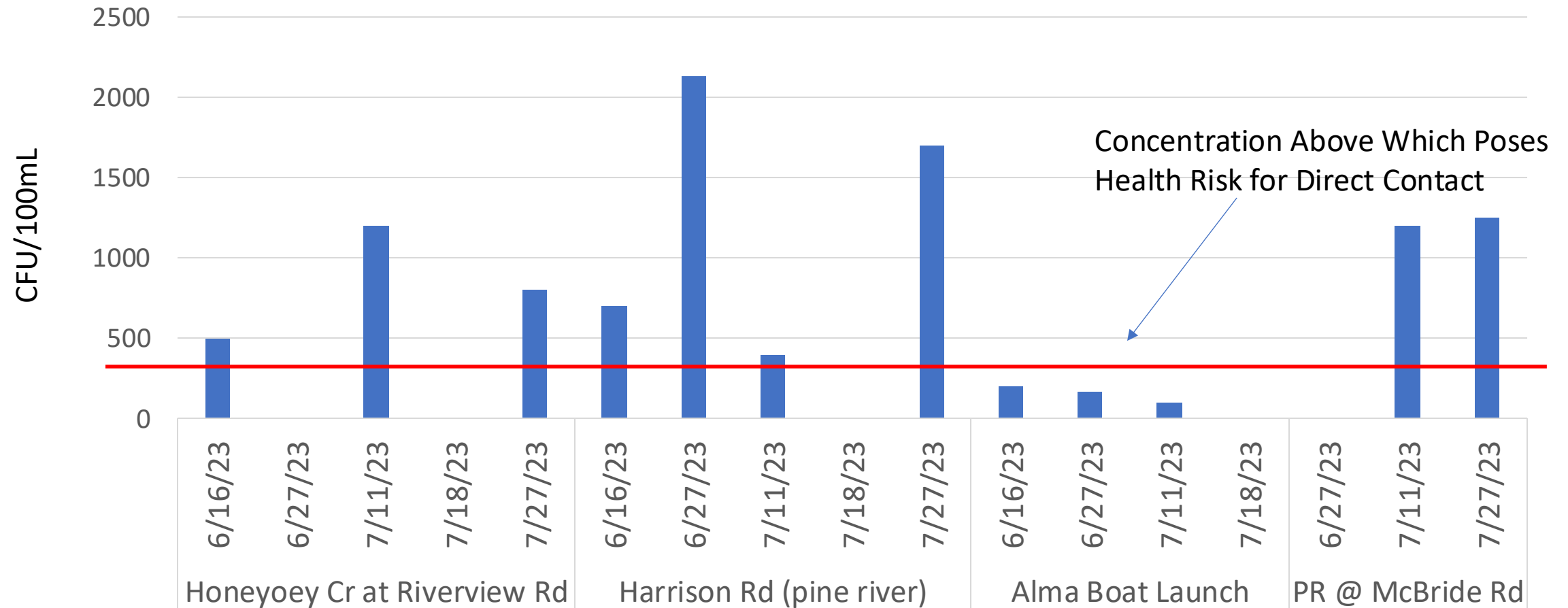


Average for N-Ammonia and SRP for All Mid-Section Sites, Pine River Watershed, Summer, 2023



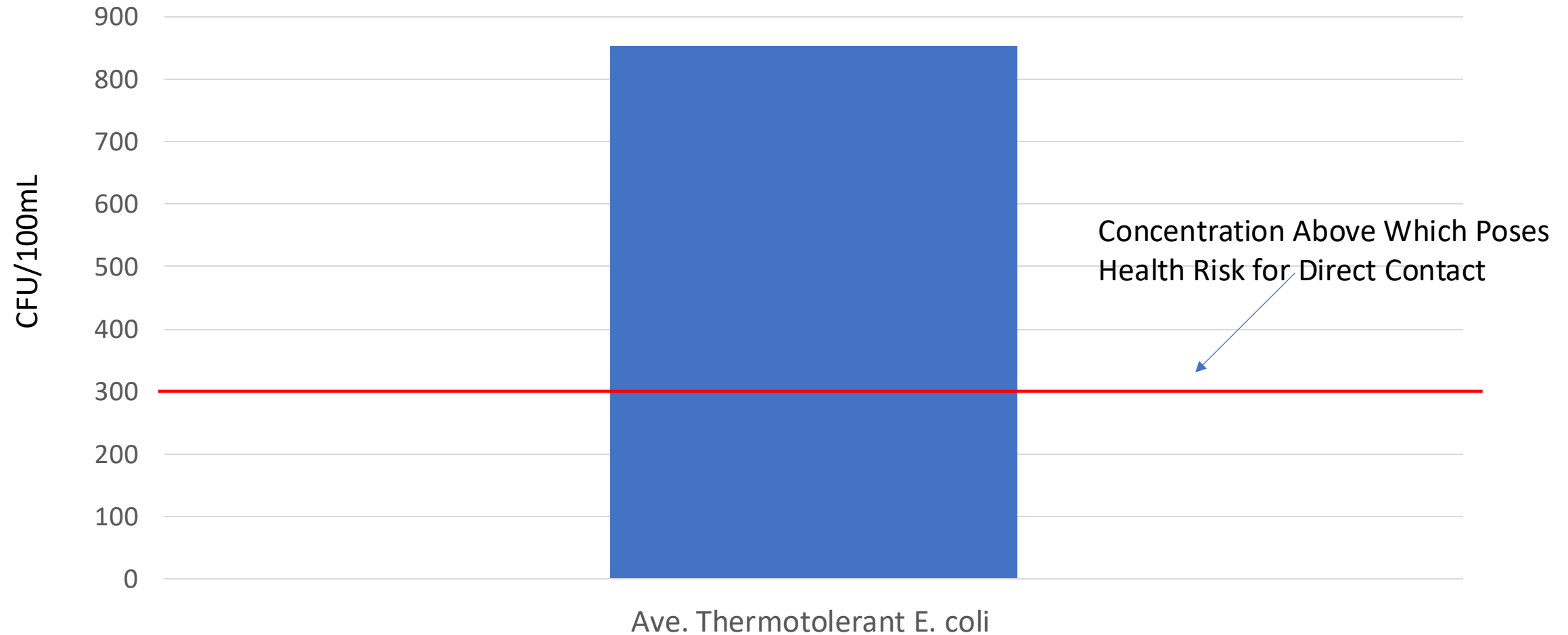
Results: Thermotolerant *E. coli* Concentrations – Mid-Section w/Sampling Sites, PR Watershed, Summer, 2023

Thermotolerant *E. coli* Concentrations Mid-Section Sites Pine River Watershed, Summer, 2023



Thermotolerant *E. coli* Concentration Averages for Summer, 2023 – Mid-Section PR Watershed

Ave. Thermotolerant *E. coli* Concentrations Mid-Section Sampling Sites, Pine River, Summer, 2023



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Bethany Township H

Sugar Cr. at Jefferson

Sugar Cr. at Madison

SAMPLING LOCATIONS

Downstream Sites

Flow Direction

Petticoat Junction

Francesco's Bistro

The Blue Shamrock Pub

St. Louis

Hutson

Walmart Supercenter

Meijer

Sugar Cr. Dwnstream
at Cheesman

PR Cheesman Rd Overpass

Horse Creek at Evergreen

Pine River at Bridge St.

Alma College

Alma

Fire Island

Happy Trails Pet Hotel

E Lincoln Rd

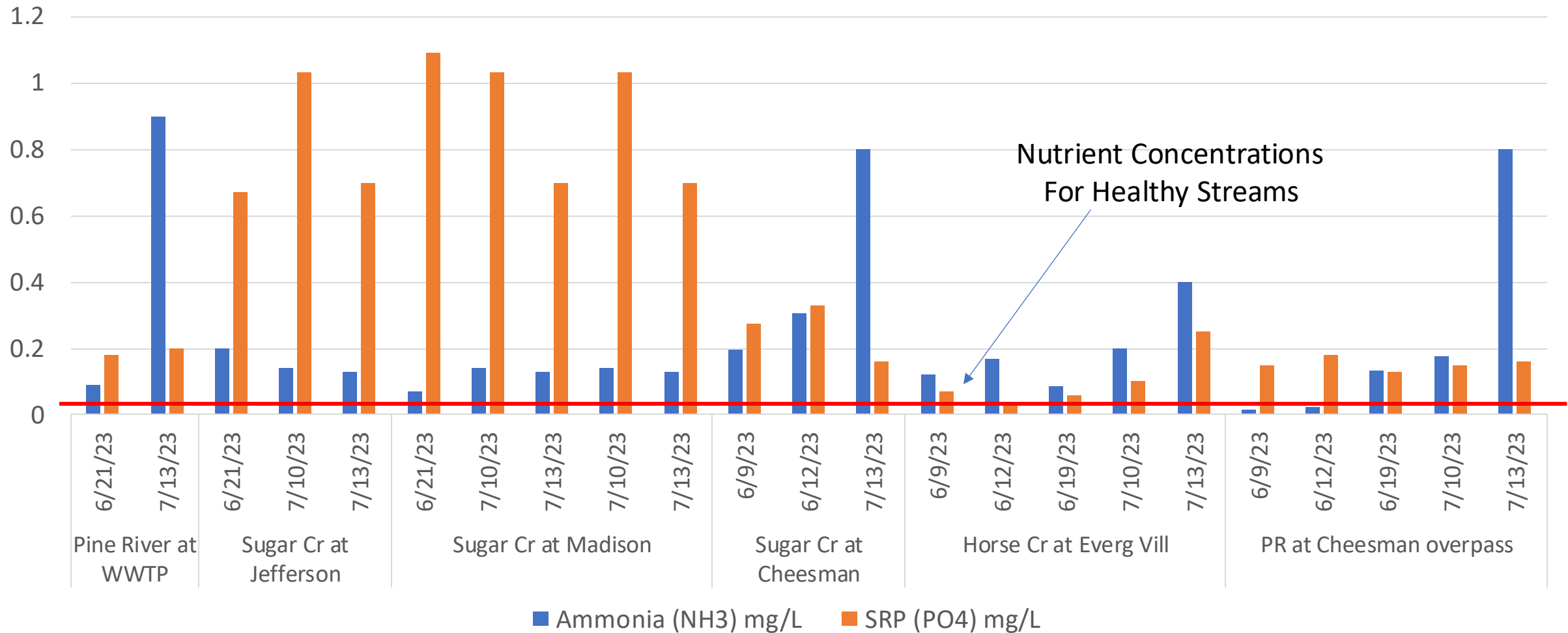
E Lincoln Rd

E Lincoln



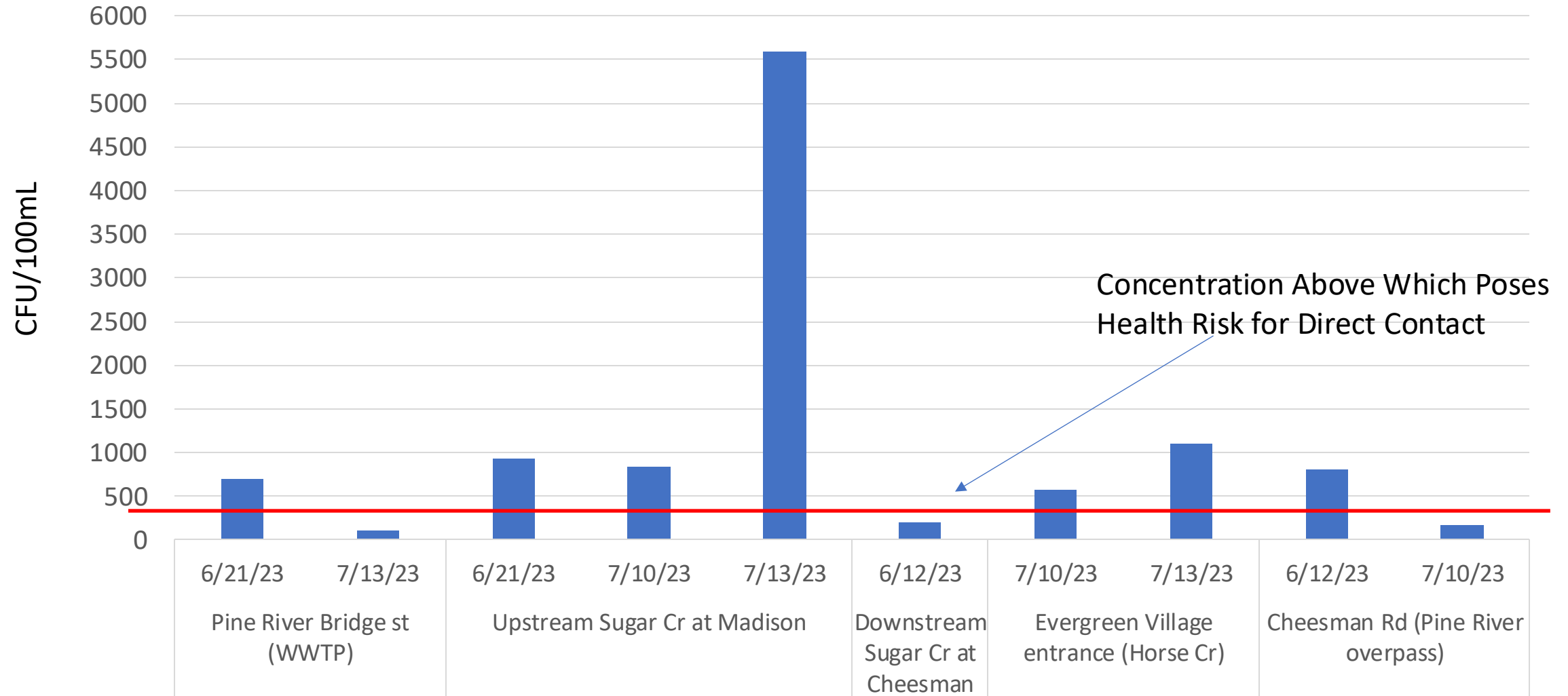
Results: Nutrient Concentrations Downstream Sites Pine River Above St. Louis Dam, Summer, 2023

Nutrient Concentrations at Downstream Sites Above St. Louis Dam, Pine River, Summer, 2023

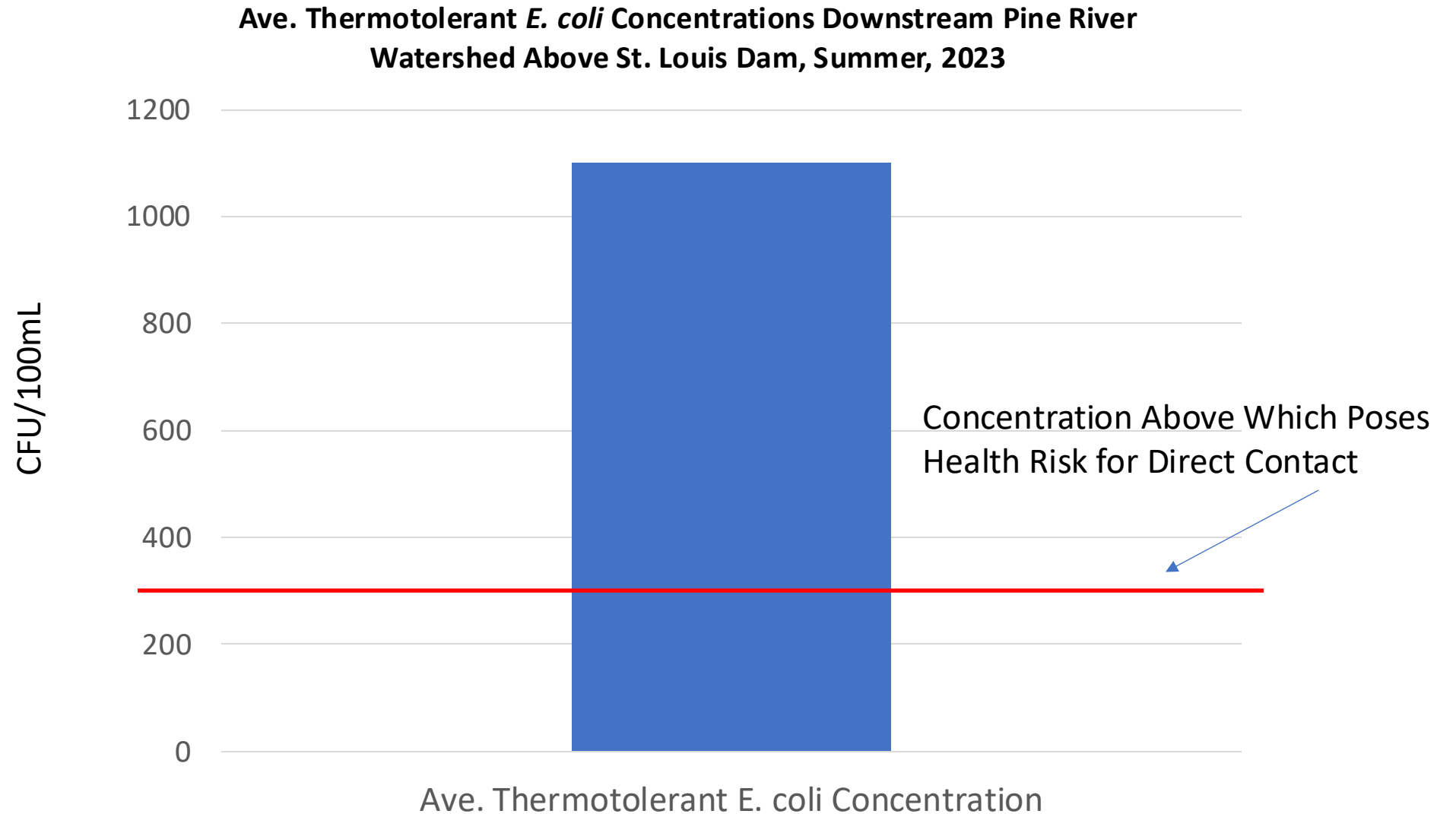


Results: Thermotolerant *E. coli* Concentrations for Downstream Pine River Watershed w/Sampling Sites

Thermotolerant *E. coli* Concentrations, Downstream Pine River Watershed Above St. Louis Dam, Summer, 2023



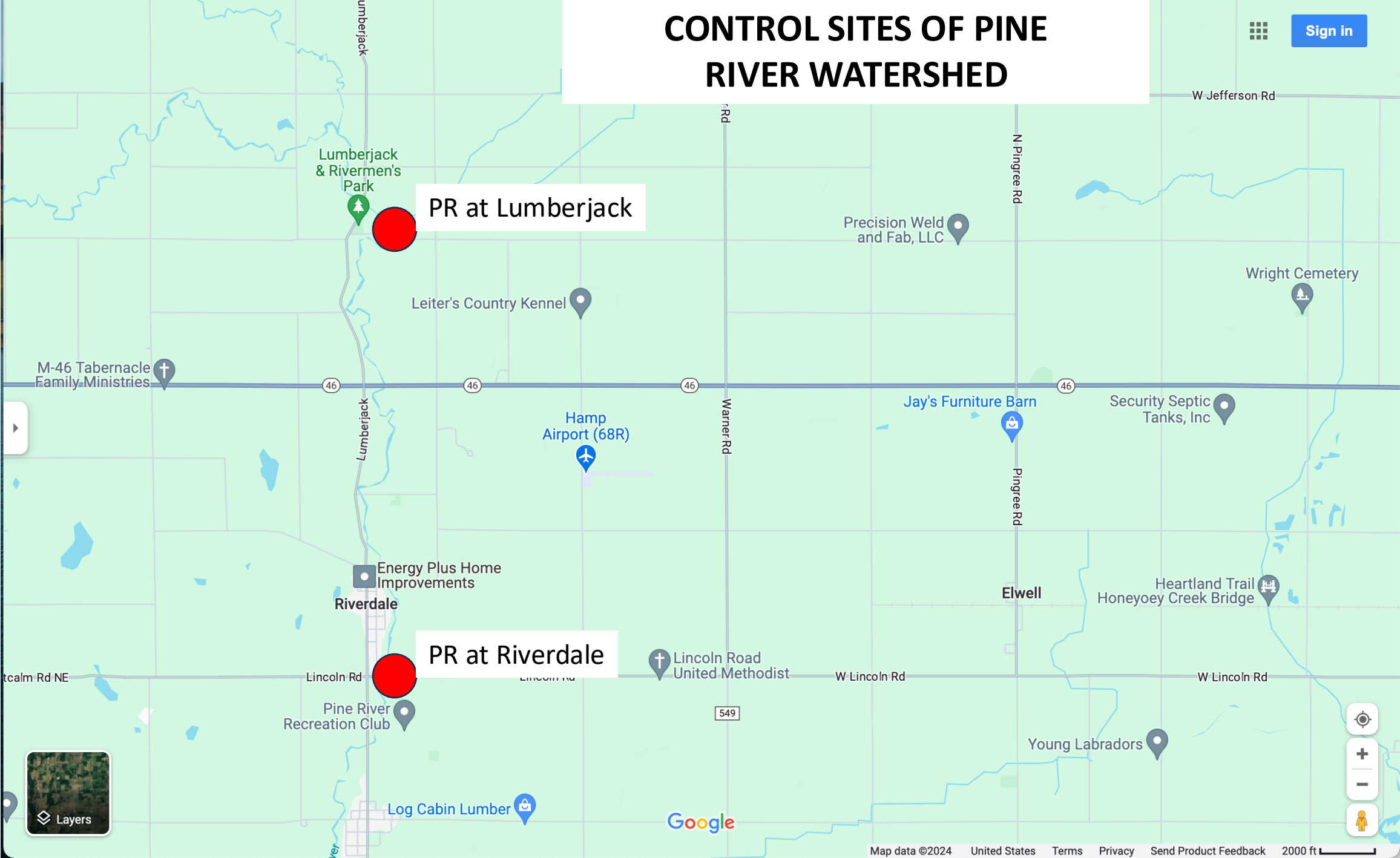
Results: Ave. Thermotolerant *E. coli* Concentrations for Downstream Pine River Watershed Above St. Louis Dam, Summer, 2023



CONTROL SITES OF PINE RIVER WATERSHED



Sign in

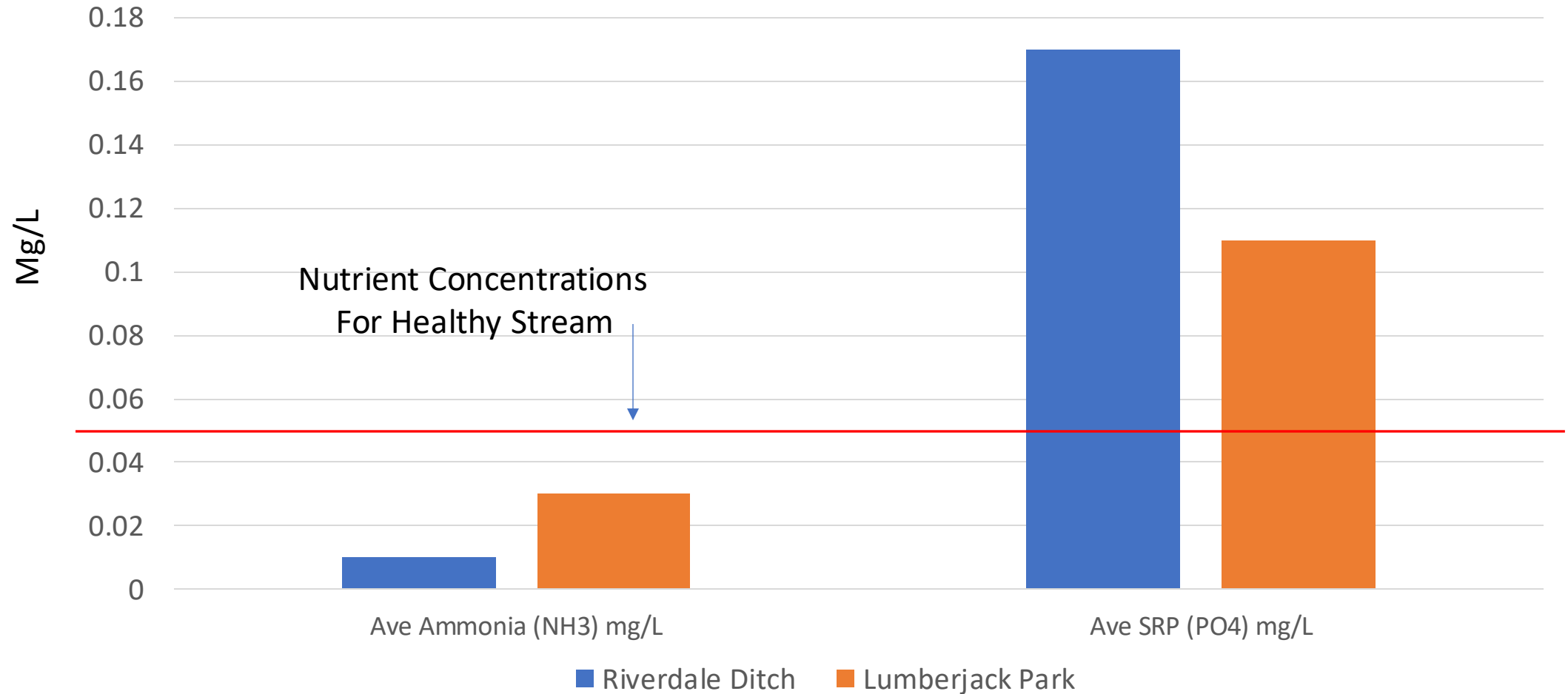


PR at Lumberjack

PR at Riverdale

Results: Nutrient Concentrations Control Sites, Pine River Watershed, Summer, 2023

Average Nutrient Concentrations for "Control" Sites, Pine River Watershed, Summer, 2023



Results: Thermotolerant *E. coli* Concentrations for Control Sites, Pine River Watershed, Summer, 2023

