

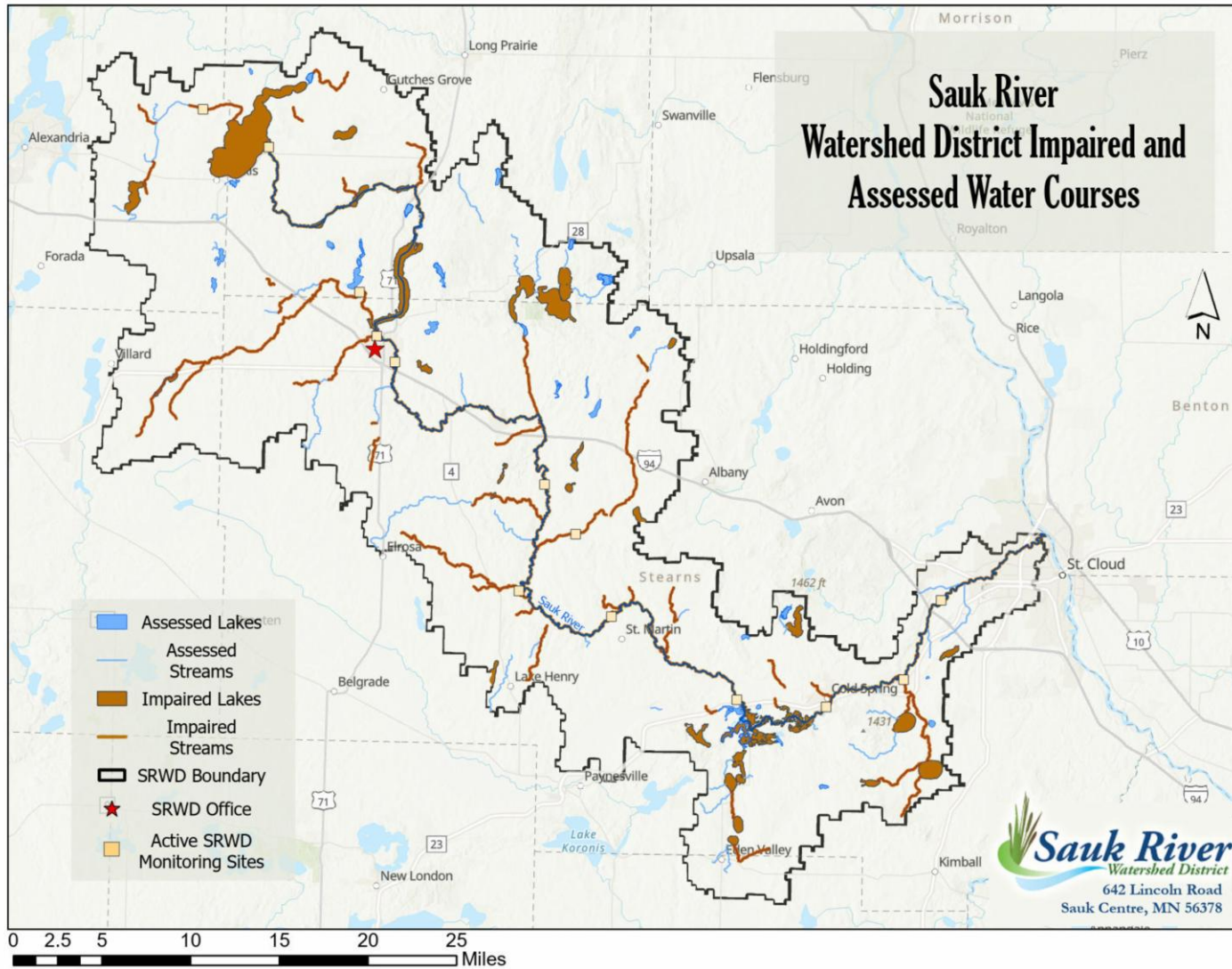
2025 MONITORING SUMMARY WORKSHOP

Abi Borgerding
Environmental Monitoring Manager
April 21st, 2026



OVERVIEW

- Watershed Background
- Precipitation Data
- Discharge
- Sauk River Mainstem
- Tributaries
- Lakes
- Additional Monitoring in 2026

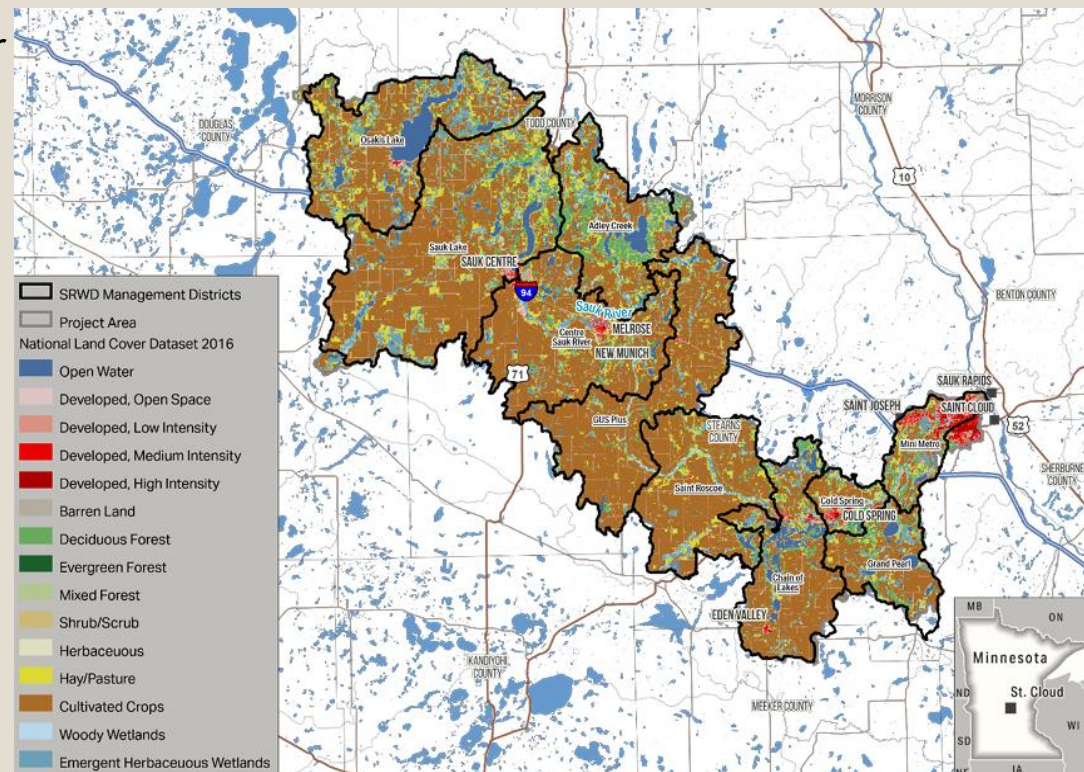


WATERSHED BACKGROUND

Monitoring Department Goals:

1. Track long-term water quality trends.
2. Evaluate project and program effectiveness.
3. Utilize the monitoring results in making sound, science-based decisions on future projects/programs.

- Sauk River is **~126 miles** long
- Watershed is 1,041 square miles or **667,000 acres**
 - **366 miles** of perennial streams, **190 miles** of public drainage systems
- Around **280 lakes** larger than 10 acres
- Divided into **10 Watershed Management Districts**
- **3 major dams** along river
- **7 monitoring sites** on mainstem,
6 stream sites (tributaries)



Location Name	EQJIS Site ID	Management District	Impairment(s)
JD2 @CR3	S006-568	Osakis Lake	TSS, Fish Bio, Invert Bio, DO, Nutrients, <i>E. coli</i>
Osakis Outlet (Headwaters to Guernsey Lk)	S002-649	Sauk Lake	Mercury in fish tissue
Hoboken Creek	S014-892	Sauk Lake	Fish Bio
Ashely 11	S004-625	Sauk Lake	Fish Bio, Invert Bio, <i>E. coli</i> , DO
Sauk River's Edge (Sauk Lk to Melrose Dam)	S000-373	Centre Sauk	Fish Bio, Invert Bio, Mercury in fish tissue
SR 30 (Sauk River; <u>Adley Cr</u> to Getchell Cr)	S000-366	Centre Sauk	Fish Bio, Invert Bio, Mercury in fish tissue, <i>E. coli</i>
Getchell Creek	S003-289	GUS Plus	Fish Bio, Invert Bio, DO, <i>E. coli</i>
Stony Creek	S000-497	GUS Plus	TSS, Fish Bio, Invert Bio, <i>E. coli</i>
Unnamed Creek (07010202-542)	S000-950	GUS Plus	<i>E. coli</i> , turbidity
SR 12 (Sauk River; Getchell Cr to State Hwy 23)	S000-702	St. Roscoe	Mercury in fish tissue, <i>E. coli</i>
Richmond (Sauk River; Getchell Cr to State Hwy 23)	S000-517	St. Roscoe	Mercury in fish tissue, <i>E. coli</i>
Cold Spring (Sauk River; <u>Knaus Lk</u> to Cold Spring Dam)	S003-286	Cold Spring	Mercury in fish tissue, Nutrients
Mill Creek	S000-444	Grand Pearl	Fish Bio, Invert Bio, <i>E. coli</i> , Fecal coliform
SR 121 (Sauk River; Mill Cr to Mississippi R)	S000-360	Mini Metro	Mercury in fish tissue, Nutrients, PCB-F

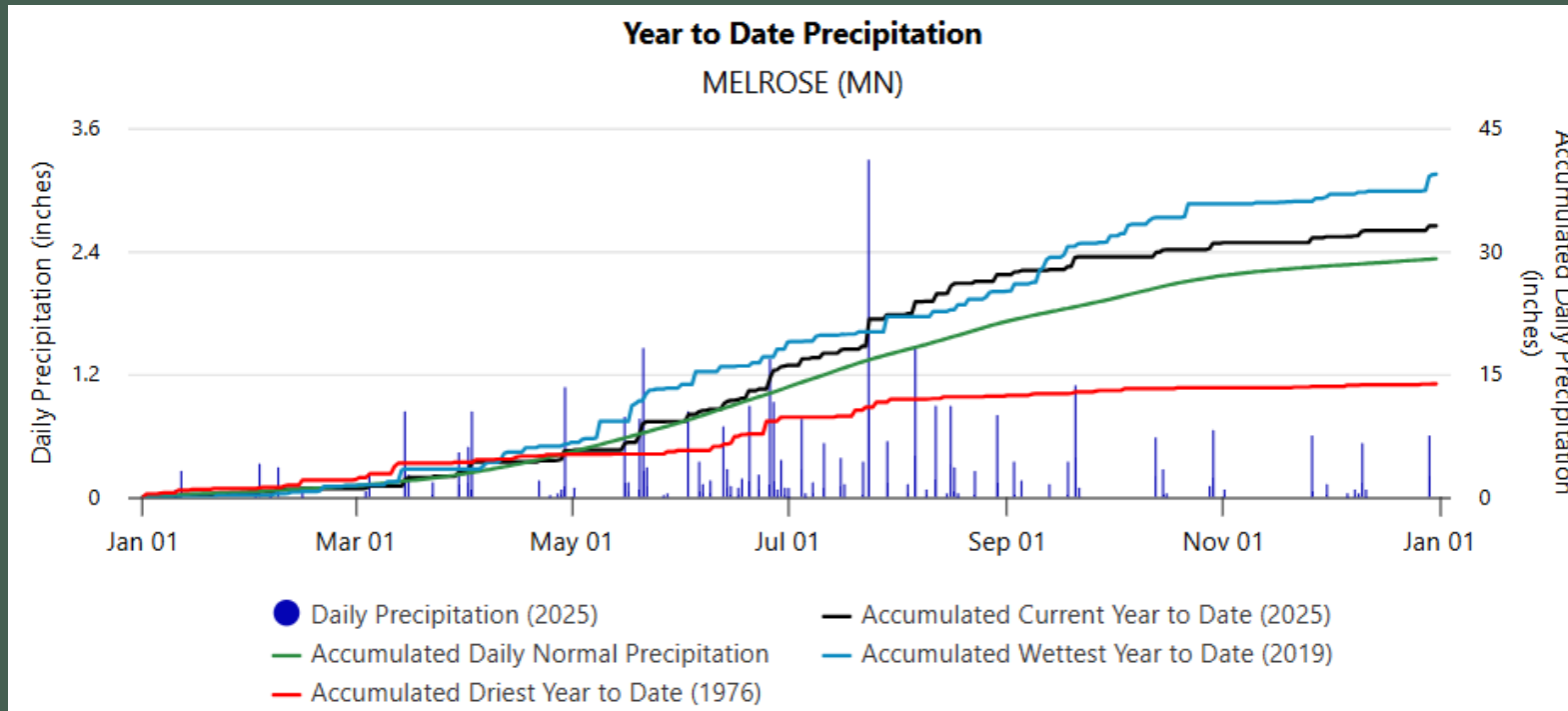
- 41 impaired lakes, 60 impaired stream segments
- Strong history of conservation in watershed
- Other watershed concerns: excessive sediment, *E. coli*, degradation of high-quality lakes
- River/Stream Sampling: total phosphorus, ortho-phosphate, total Kjeldahl nitrogen, nitrates, total suspended solids
 - Chloride and hardness 2x a year
- Lakes: Chlorophyll-A, TP, OP, TKN

WATERSHED BACKGROUND CONT.

SRWD Top Priority Concerns:

1. Altered Hydrology
2. Sediment & Nutrient Impairments

- Wet growing season
- Normal precipitation from March-Sep is **22.8 inches**
 - 2025 accumulated for March-Sep: **28.3 inches** (5.5" higher than average)
- Ended with a dry and warm fall (6°F above average)



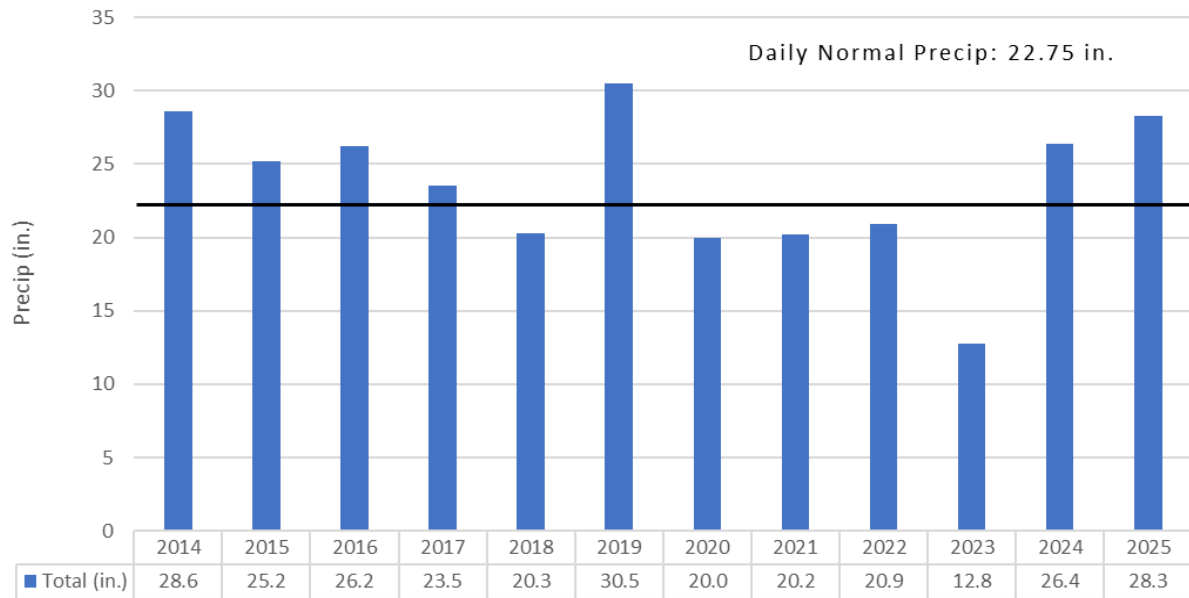
2025 Precipitation Data



Climate Data

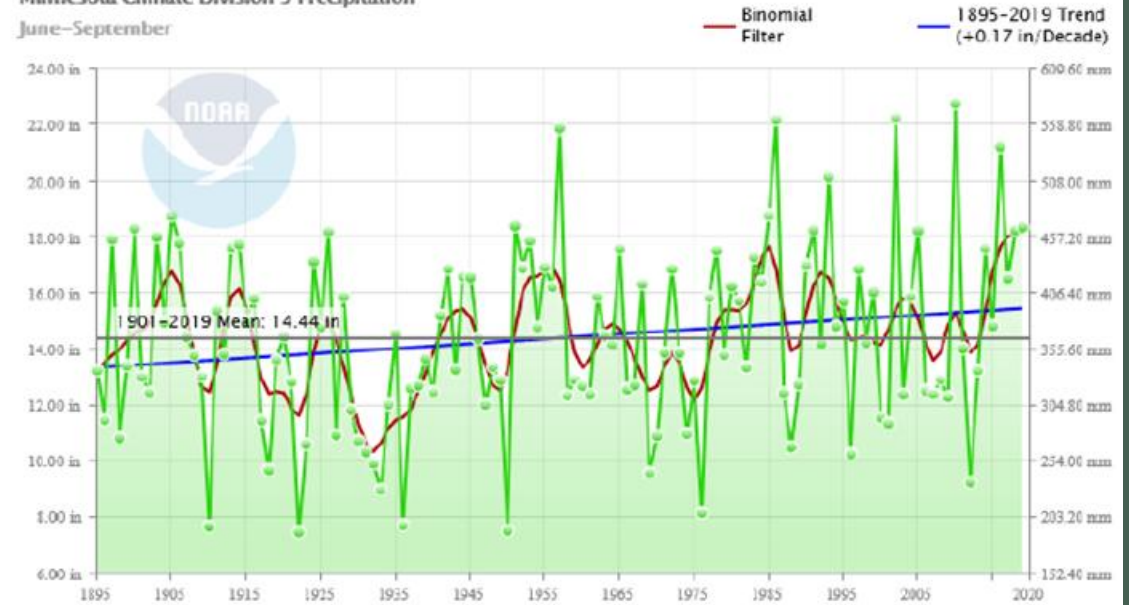
Annual Accumulated Precipitation March—September

Melrose, MN



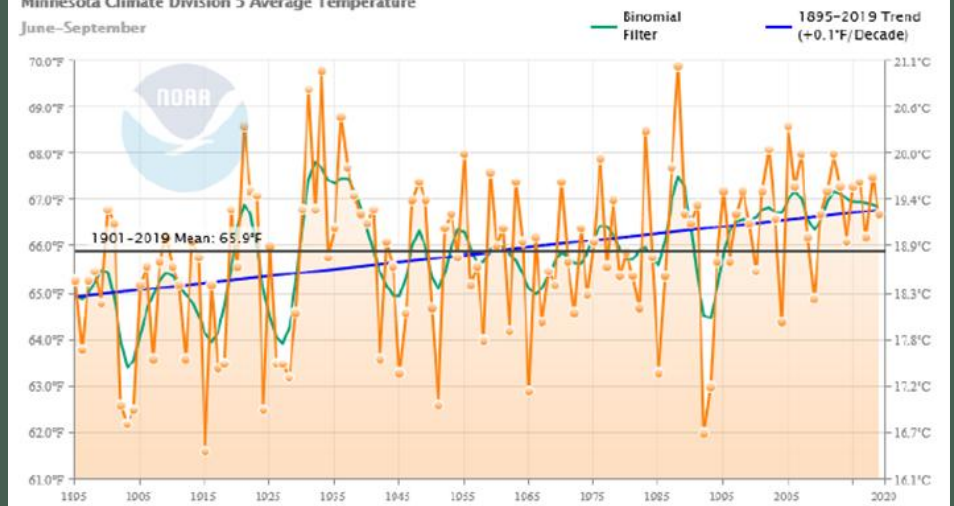
Growing season (June–Sept) precipitation for 1895–2019 from NOAA [2020a] for Minnesota Climate Division 5

Minnesota Climate Division 5 Precipitation
June–September

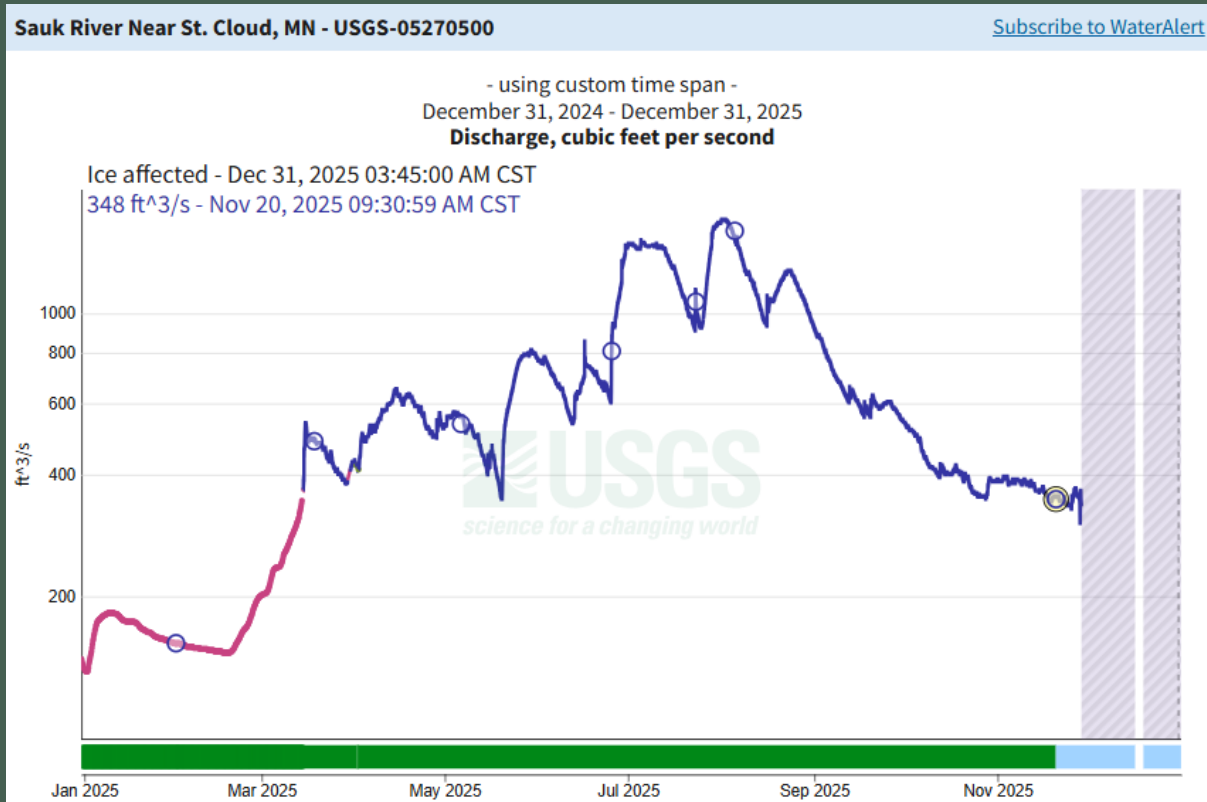


Growing season (June to September) temperatures for 1895–2019 from NOAA [2020a] for Minnesota Climate Division 5

Minnesota Climate Division 5 Average Temperature
June–September



- Highest rate was **1710 cfs** in August
- Never reached flood stage
- For Sauk River Watershed, monthly flows typically highest during early spring months



2025 FLOW/ DISCHARGE DATA



SR12 on 8.20.2025

2025 Monitoring Sites	Total Phosphorus (µg/L)	Ortho-phosphate (µg/L)	% OP:TP	Total Kjeldahl Nitrogen (mg/L)	Nitrate + Nitrite (mg/L)	Total Suspended Solids (mg/L)	Specific Conductivity (µS/cm)	Chloride (mg/L)	Hardness (CaCO3)	Transparency Tube (cm)	DO (mg/L)	Temp (°C)	Temp (°F)	Flow Count	Sample Visits
Osakis Outlet	68	25	37	1.07	0.03	10.2	408.0	20.4	201	91.9	9.98	16.2	61.2	8	16
SR Edge	78	39	50	1.04	1.73	4.3	525.8	22.2	266	93.3	9.31	17.4	63.3	8	15
SR 30	<u>109</u>	67	61	0.95	1.44	3.7	573.1	32.2	261	95.9	7.82	17.1	62.8	8	16
SR 12	<u>134</u>	89	66	1.03	2.02	6.8	603.1	32.4	272	88.0	8.16	16.2	61.2	N/A	16
Richmond	<u>145</u>	106	73	0.95	2.19	4.0	613.5	28.8	287	93.7	6.36	16.3	61.3	9	15
Cold Spring	<u>131</u>	81	62	1.09	1.26	5.2	569.5	29.8	248	80.3	9.70	17.1	62.8	8	16
SR 121	<u>136</u>	97	71	0.98	1.25	3.7	579.7	33.2	288	97.0	8.71	17.5	63.5	8	16
JD2@CR3	<u>181</u>	89	49	1.59	0.62	18.4	550.8	19.6	266	90.4	4.67	15.4	59.7	18	16
Ashley Creek	<u>153</u>	95	62	1.25	2.96	16.2	639.3	23.8	333	80.3	7.64	14.3	57.7	7	16
Hoboken Creek	<u>145</u>	106	73	1.31	11.81	5.9	823.3	32.4	470	89.4	9.99	13.3	55.9	8	16
Getchell Creek	<u>298</u>	204	68	1.93	1.61	16.8	690.3	33.9	306	77.6	8.01	15.5	59.9	9	17
Unnamed Creek	<u>105</u>	65	62	0.98	7.22	5.7	804.4	27.2	336	98.1	11.46	7.4	45.3	1	7
Mill Creek	60	26	43	0.65	0.37	5.0	468.0	22.8	252	99.4	9.74	14.9	58.8	9	16

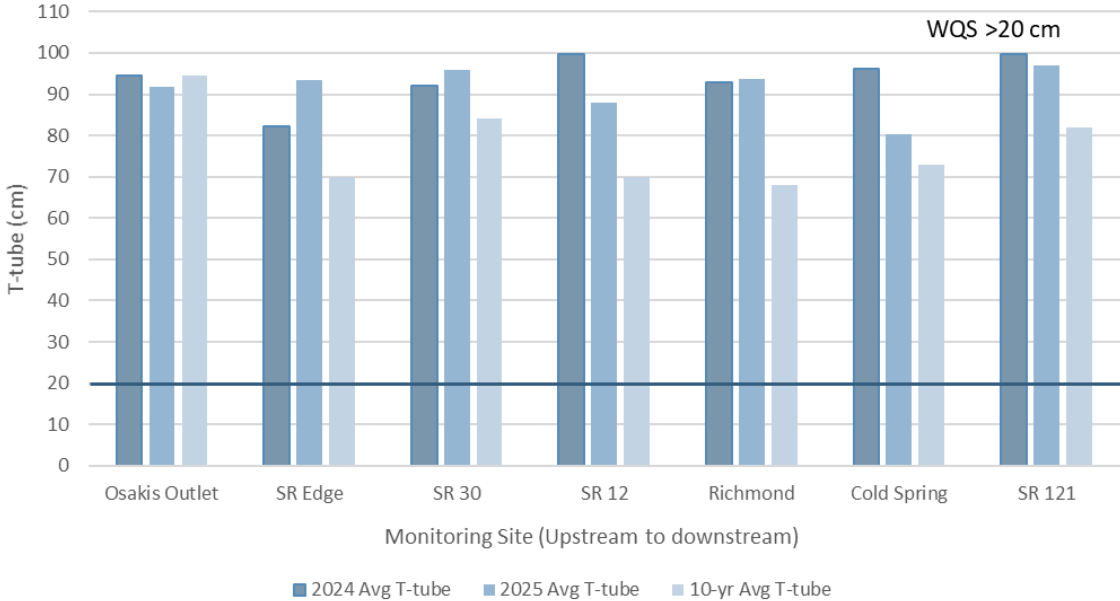
- Listed upstream to downstream
- Samples every-other week, flows done monthly

SAUK RIVER MAINSTEM & TRIBUTARIES

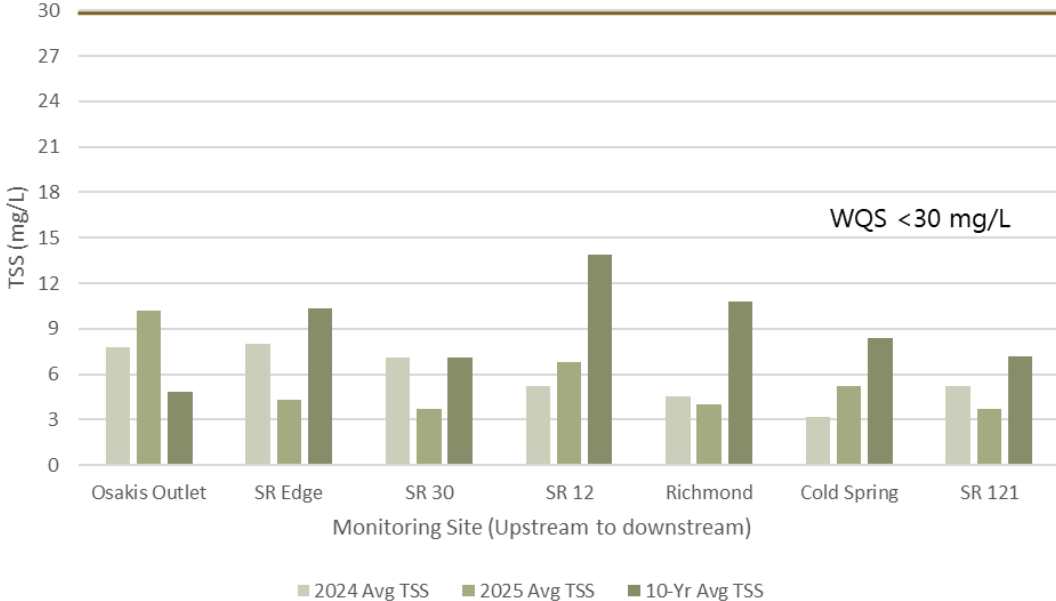


MAINSTEM AVERAGES

Average Transparency Tube Measurements

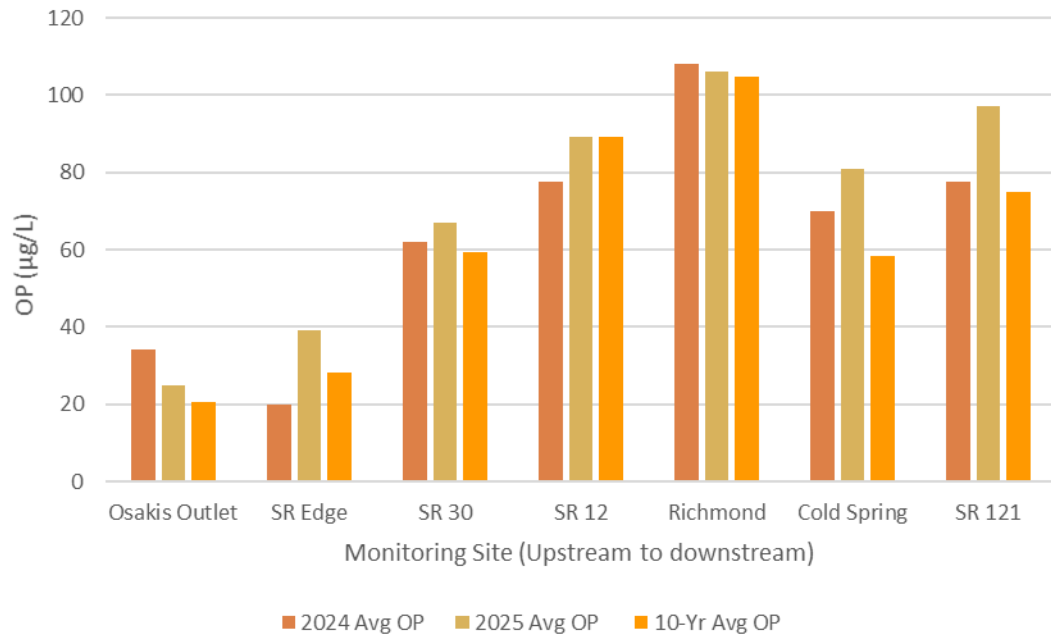


Average Total Suspended Solids (TSS) Concentrations

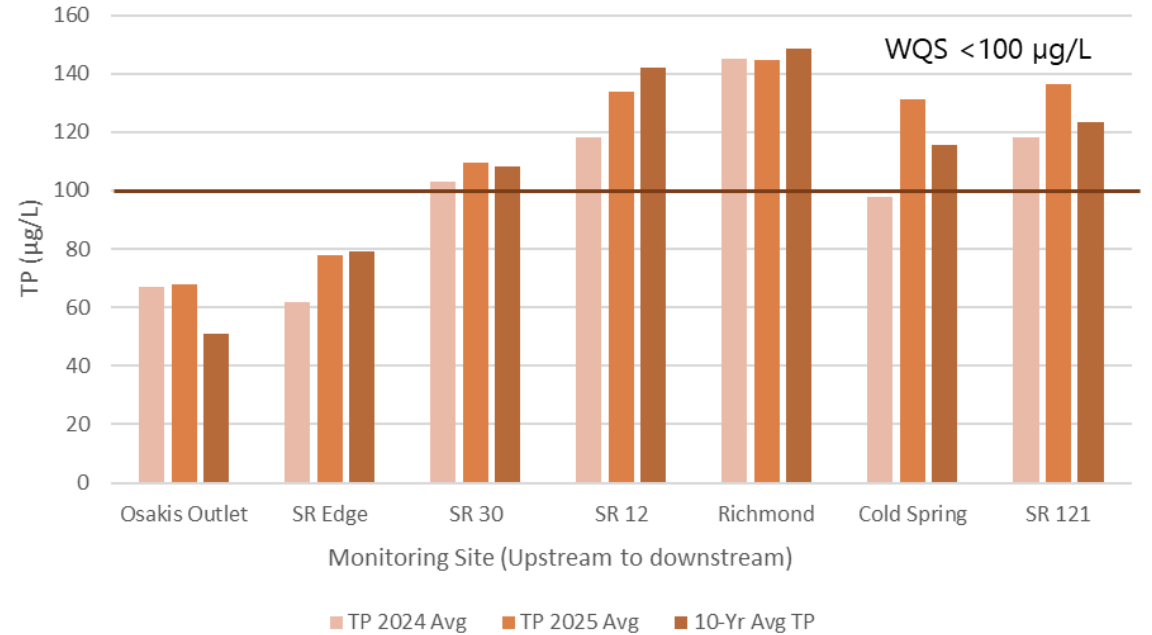


MAINSTEM AVERAGES CONT.

Average Orthophosphate (OP) Concentrations



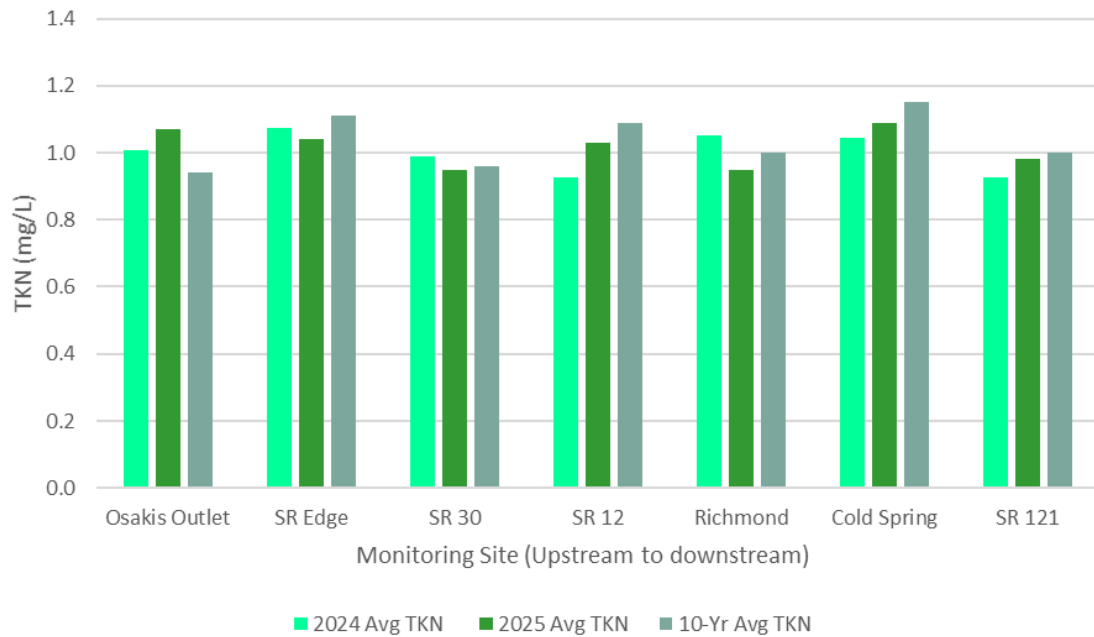
Average Total Phosphorus (TP) Concentrations



Orthophosphate: dissolved, *inorganic* form of phosphorus that is easily taken up by plants and bacteria; high levels correlated with poor water quality, algae blooms, and reduced viability of certain aquatic species (no state WQ standard)

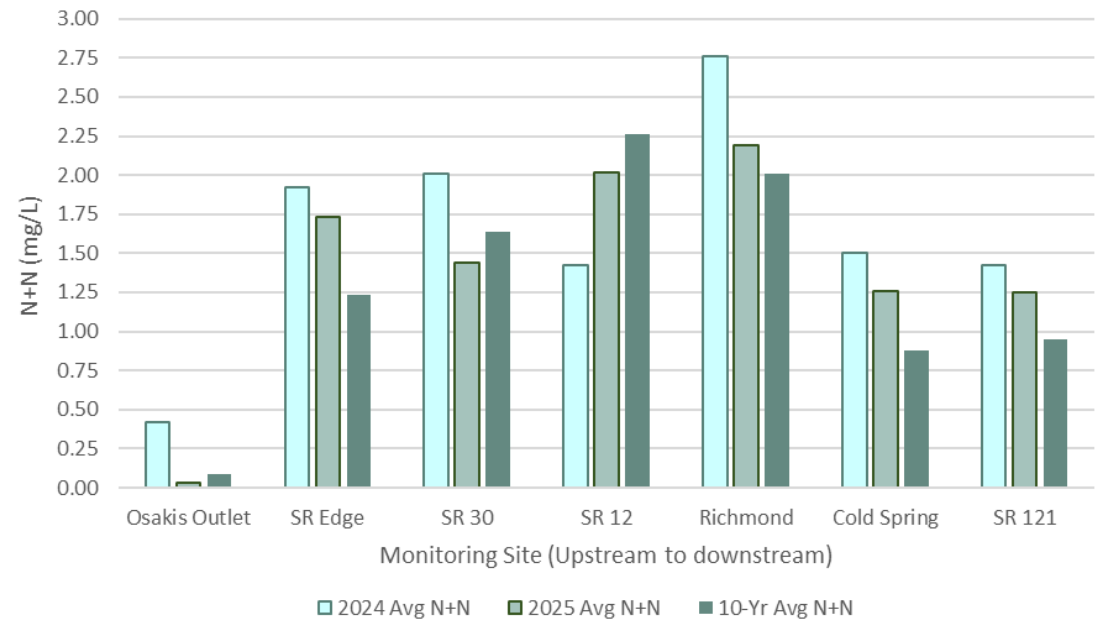
MAINSTEM AVERAGES CONT.

Total Kjeldahl Nitrogen (TKN) Concentrations

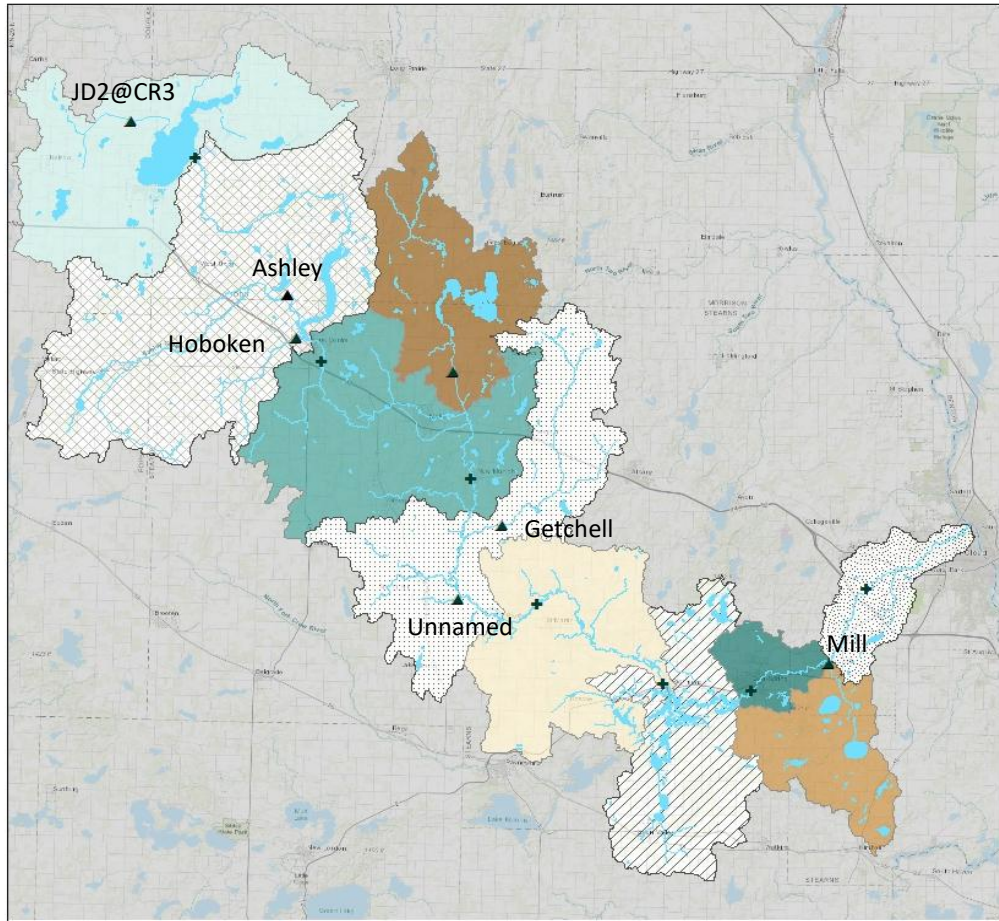


TKN: method for measuring *organic* nitrogen plus ammonia; nitrate and ammonia are the major forms of dissolved inorganic nitrogen and are the **only available forms for algal and plant uptake** (no WQ standard for surface water)

Average Nitrate & Nitrite Concentrations

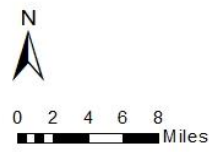


Nitrate + Nitrite: measure of *inorganic* nitrogen; common sources are runoff from fertilizers, leaking septic systems, sewage, and erosion of natural deposition (EPA drinking water standard of <10 mg/L)



Sauk River Watershed Sampling Sites

- Management District**
- Adley Creek
 - Center Sauk River
 - Chain of Lakes
 - Cold Spring
 - GUS Plus
 - Grand Pearl
 - Mini Metro
 - Osakis Lake
 - Sauk Lake
 - St Roscoe
- ▲ Tributary Sites
+ Sauk River Sites

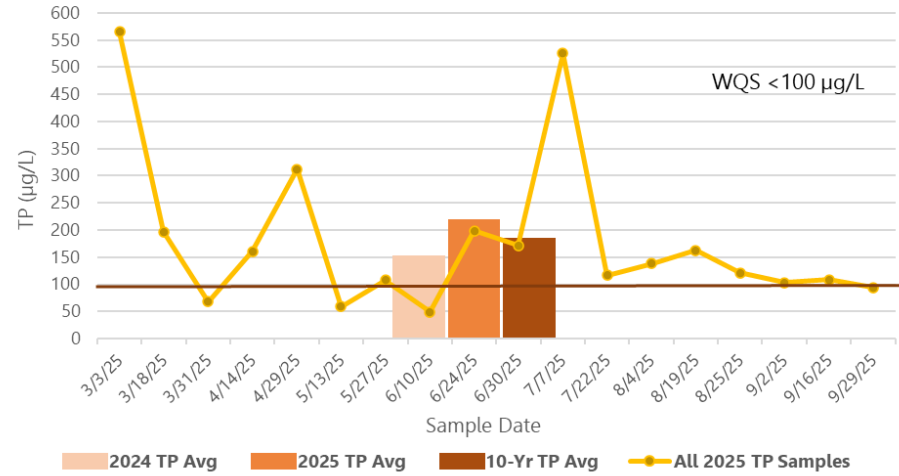


TRIBUTARY DATA

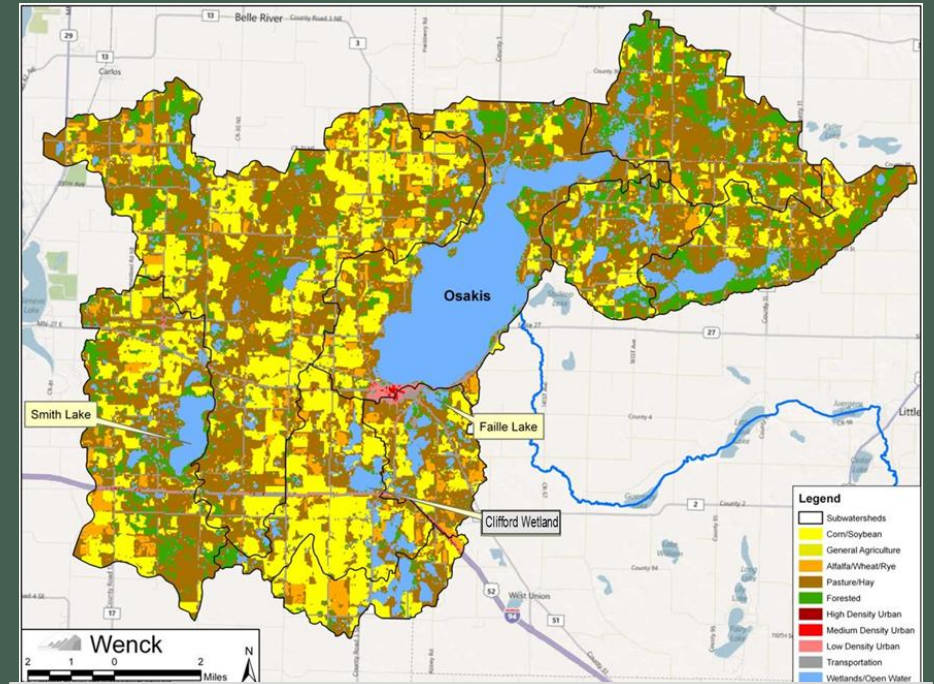
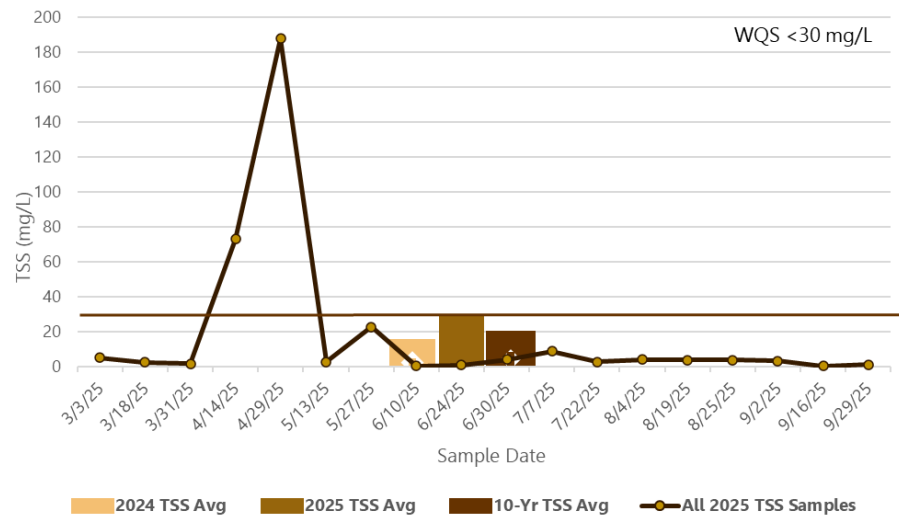
- **Update:** Unnamed Creek delisting, addition of **Stony Creek** in 2026

JD2 @CR3 (Crooked Lake Ditch)

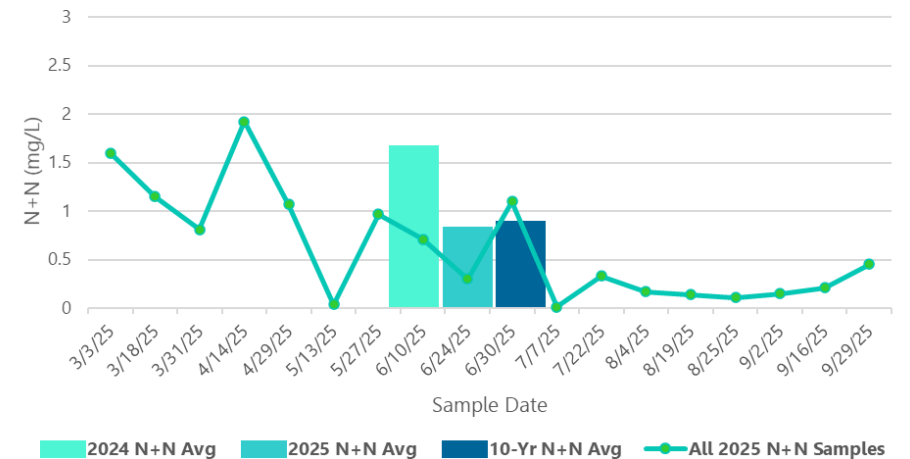
JD2 @CR3 Total Phosphorus (TP) Concentrations



JD2 @CR3 Total Suspended Solids (TSS) Concentrations

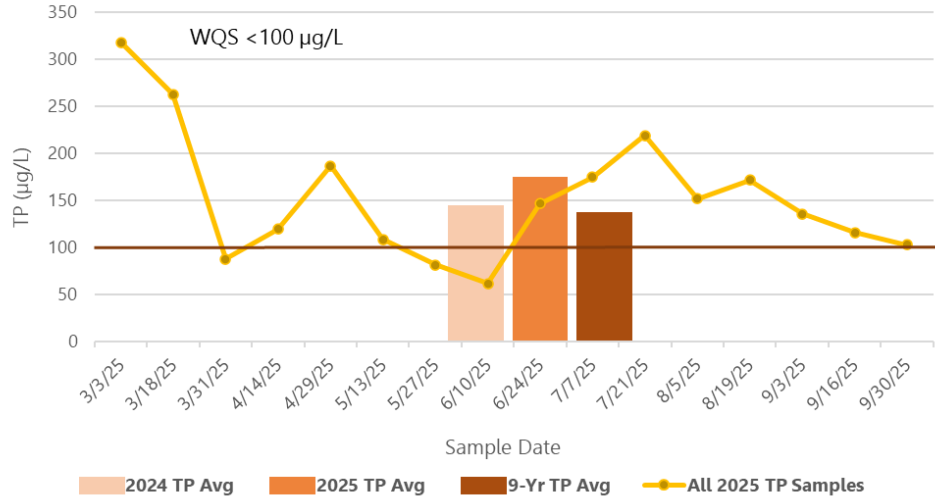


JD2 @CR3 Nitrate + Nitrite Concentrations

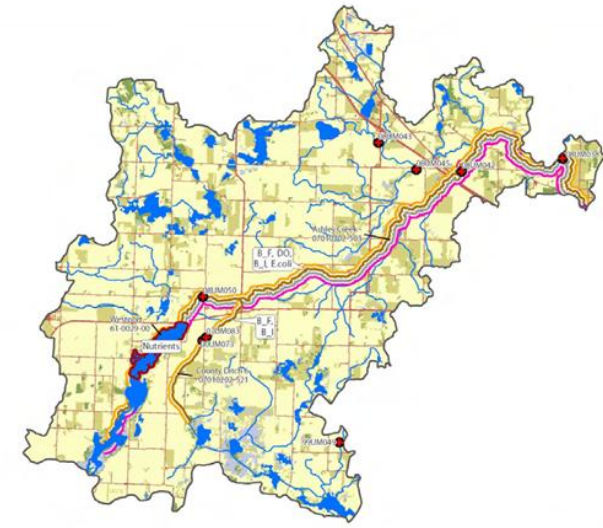
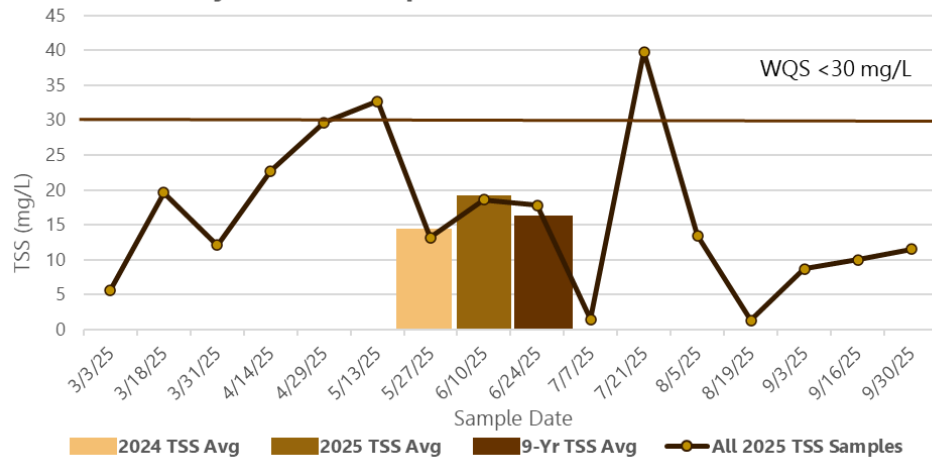


Ashley Creek

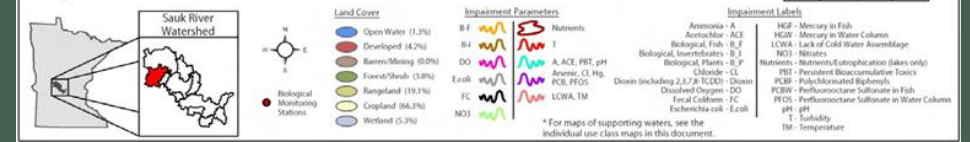
Ashley 11 Total Phosphorus (TP) Concentrations



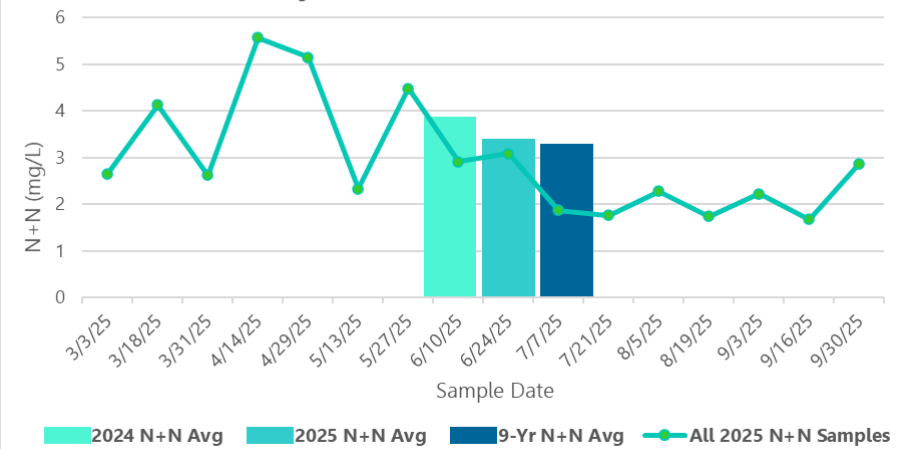
Ashley 11 Total Suspended Solids (TSS) Concentrations



Ashley Creek Watershed Unit - HUC 07010202020



Ashley 11 Nitrate + Nitrite Concentrations



Hoboken Creek

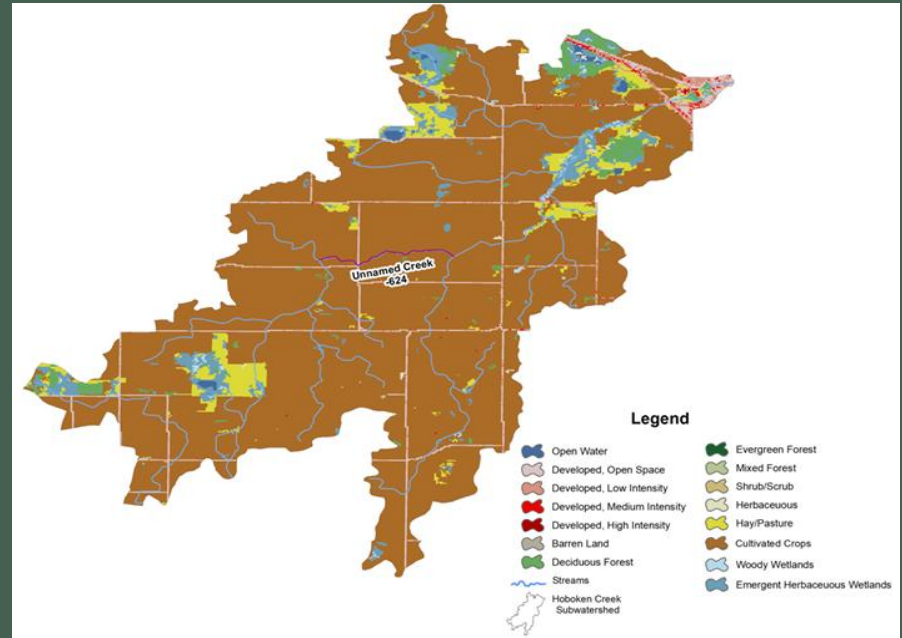
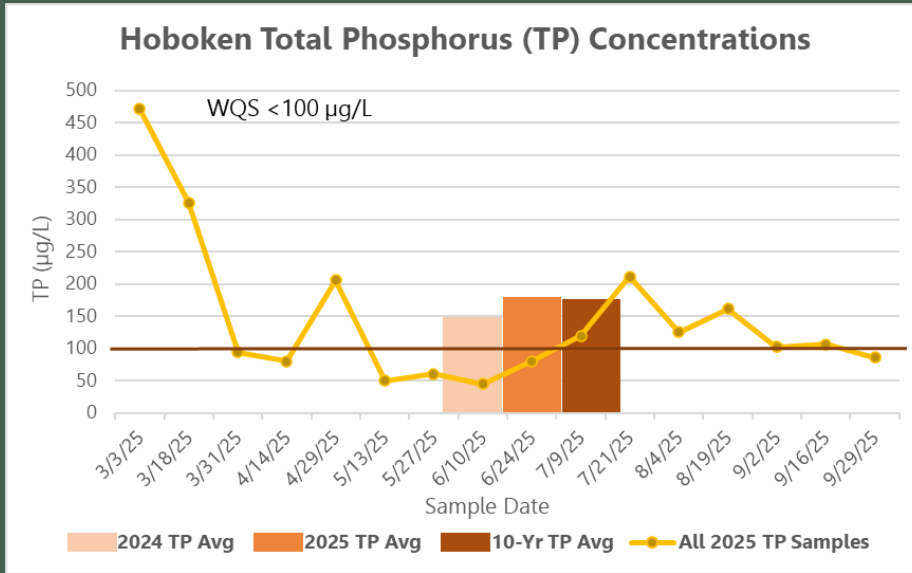
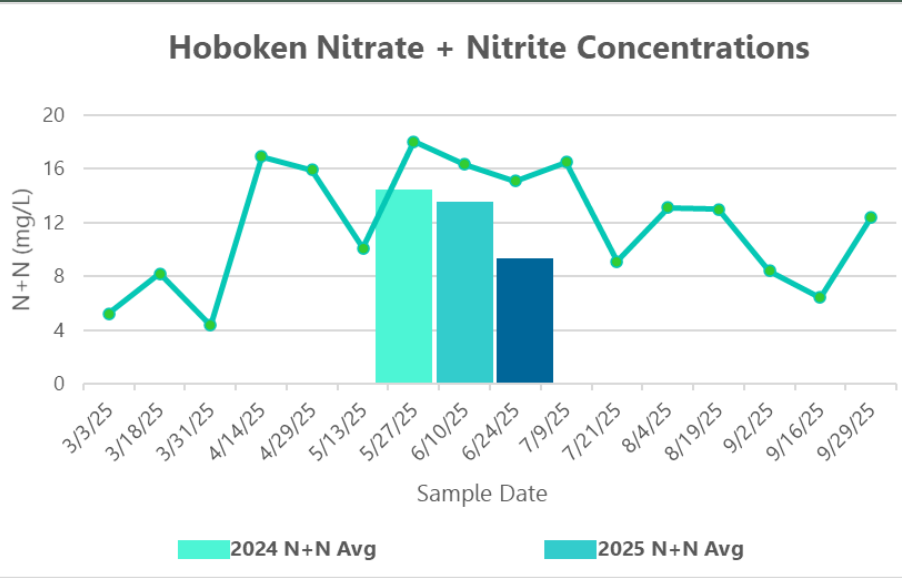
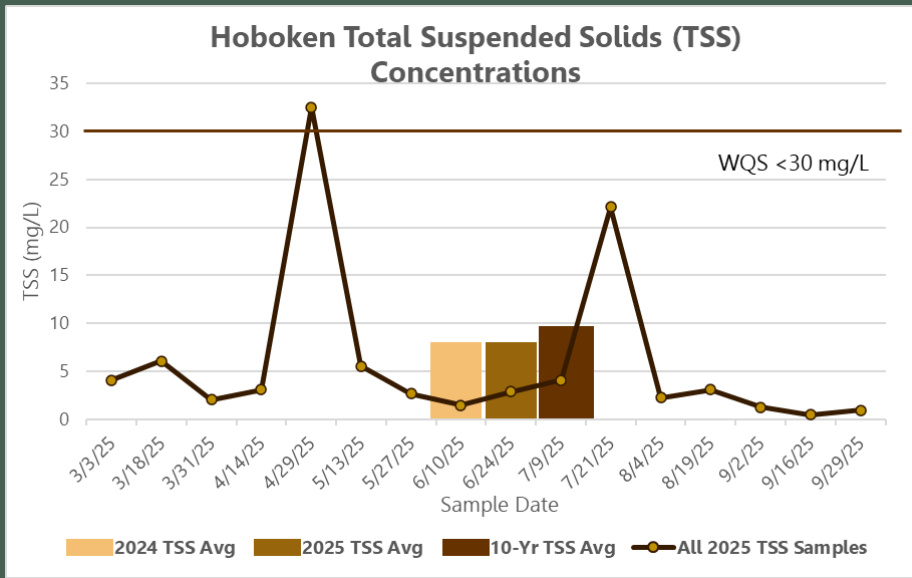
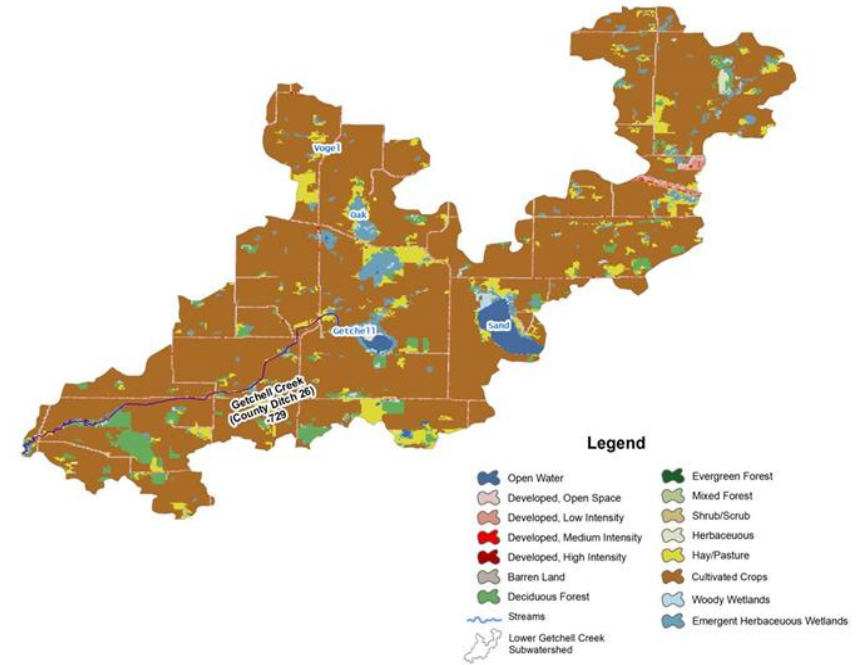
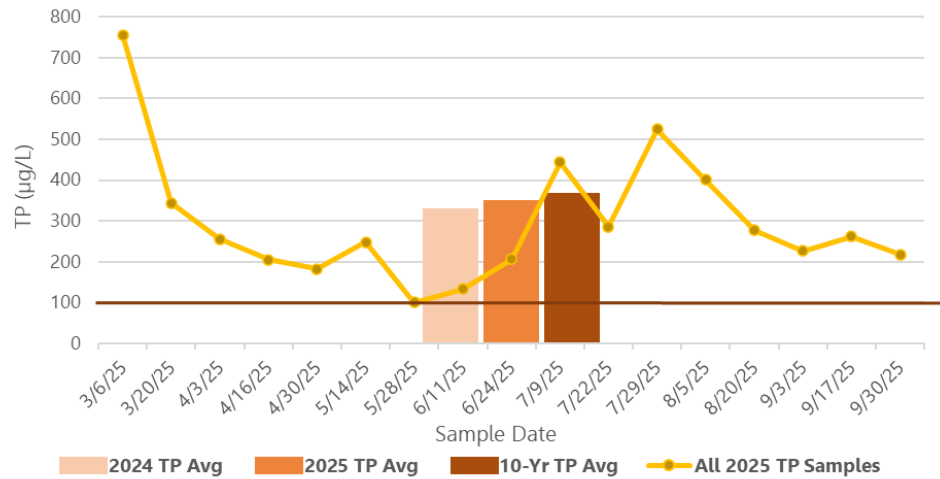


Figure 41. Land use in the Hoboken Creek Subwatershed.

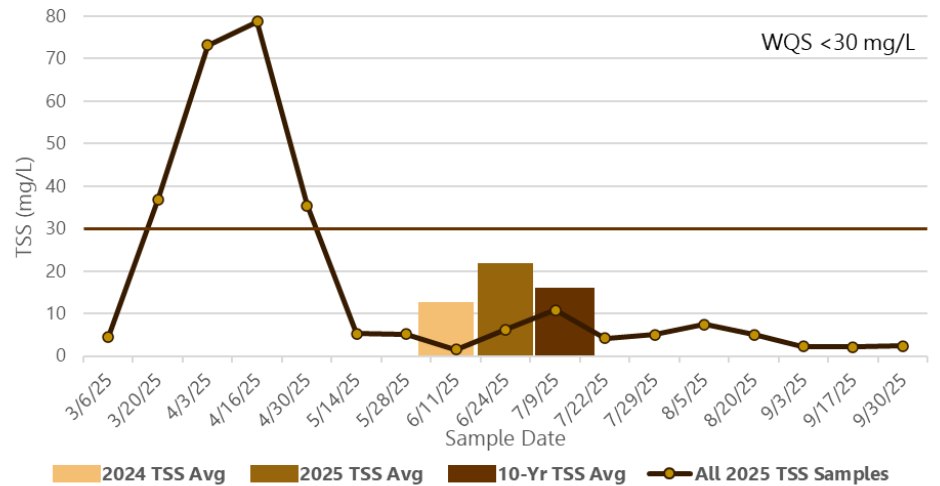


Getchell Creek (CD #26)

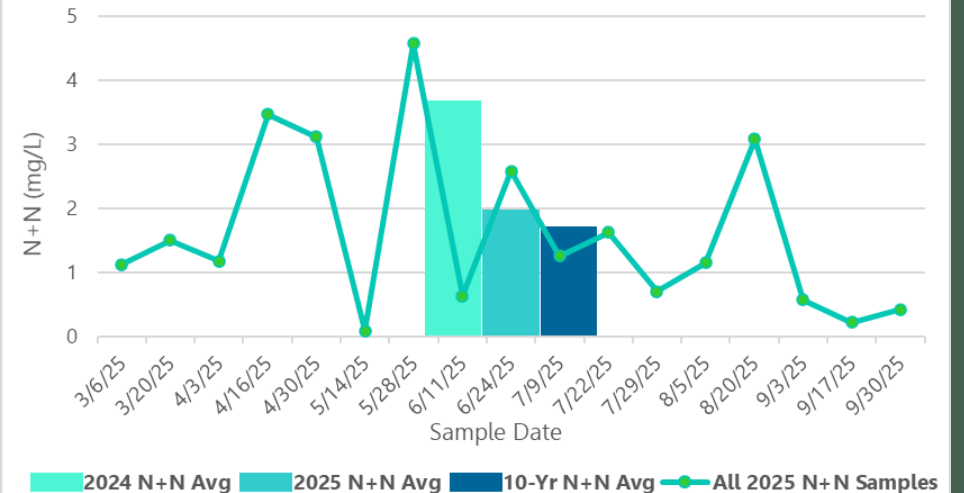
Getchell Total Phosphorus (TP) Concentrations



Getchell Total Suspended Solids (TSS) Concentrations

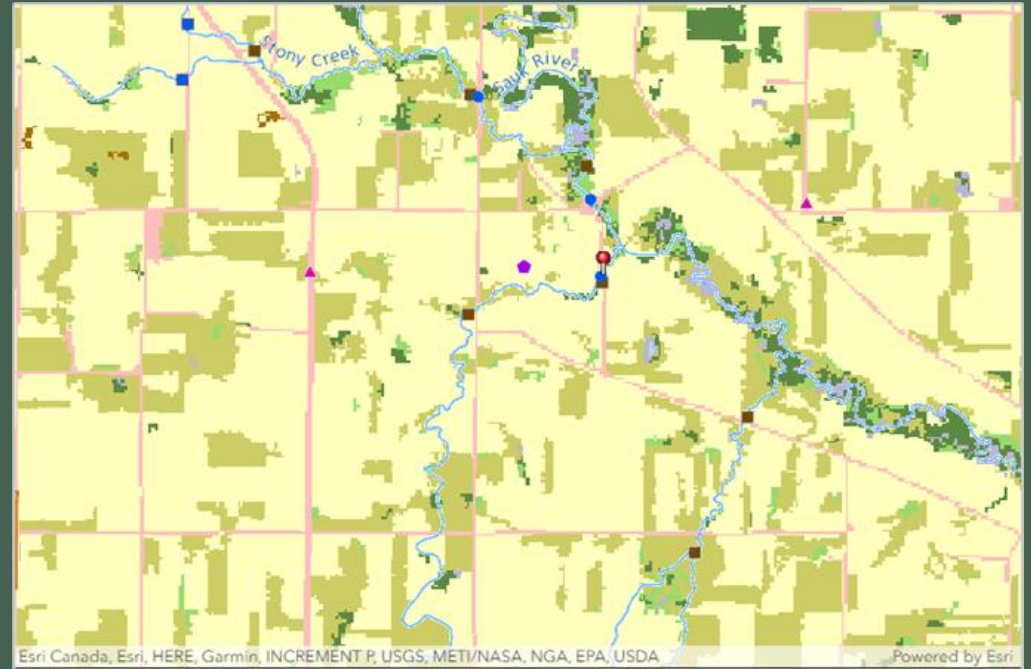
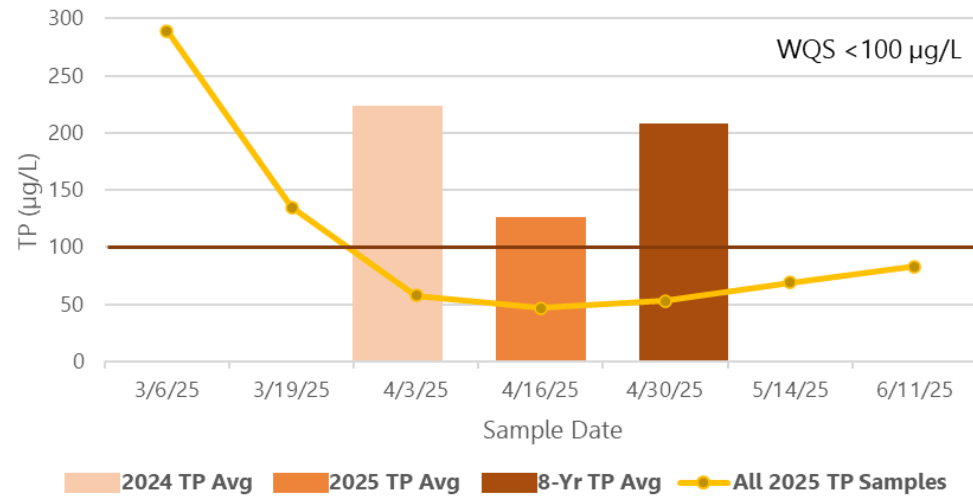


Getchell Nitrate + Nitrite Concentrations

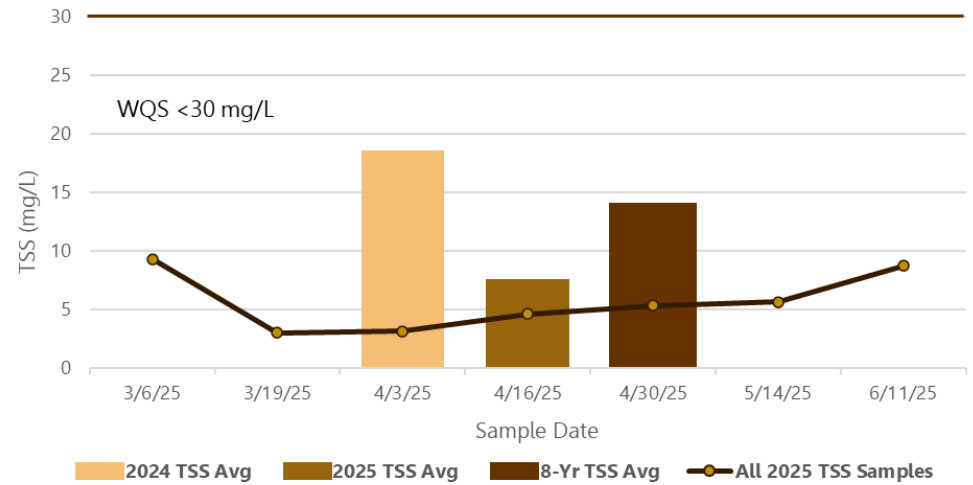


Unnamed Creek

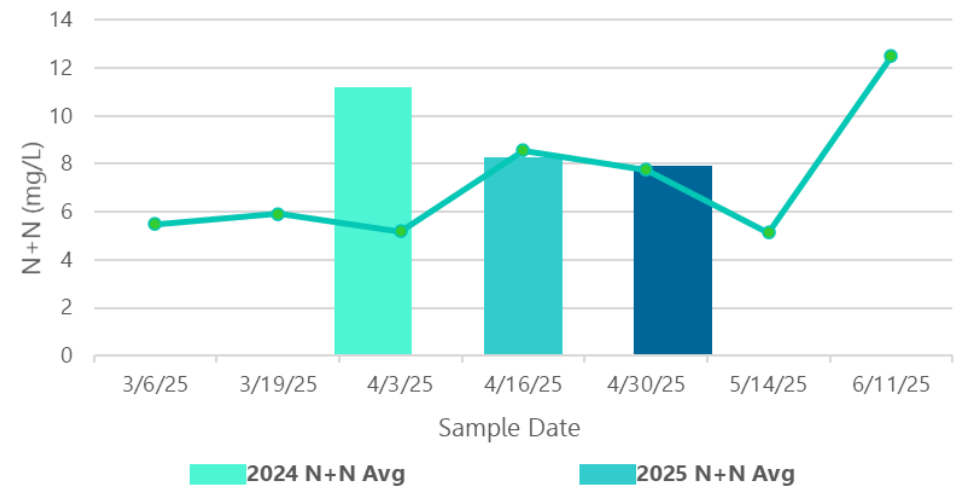
Unnamed Total Phosphorus (TP) Concentrations



Unnamed Total Suspended Solids (TSS) Concentrations

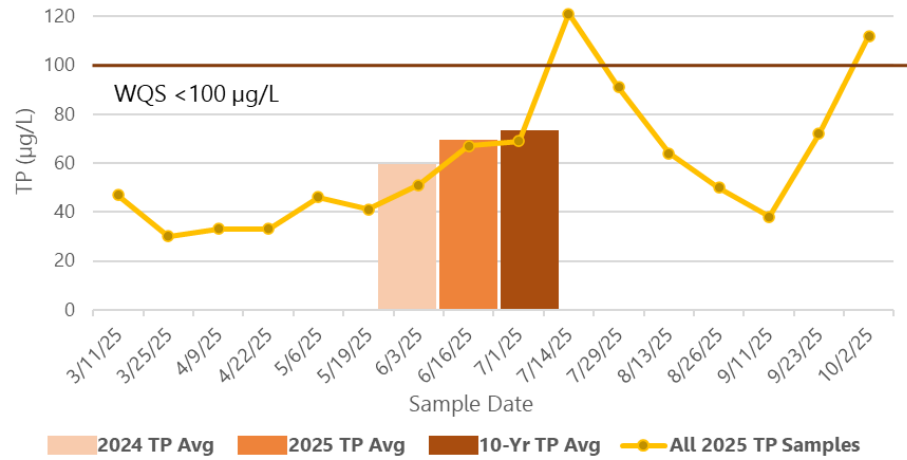


Unnamed Nitrate + Nitrite Concentrations

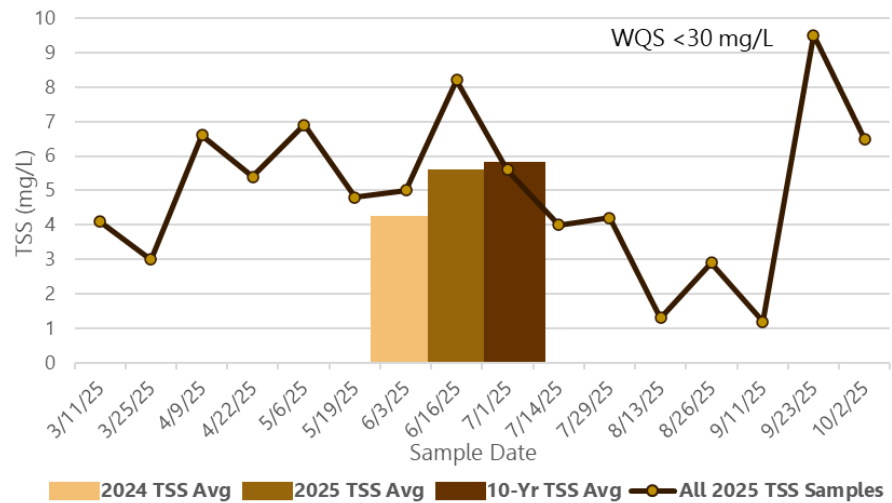


Mill Creek

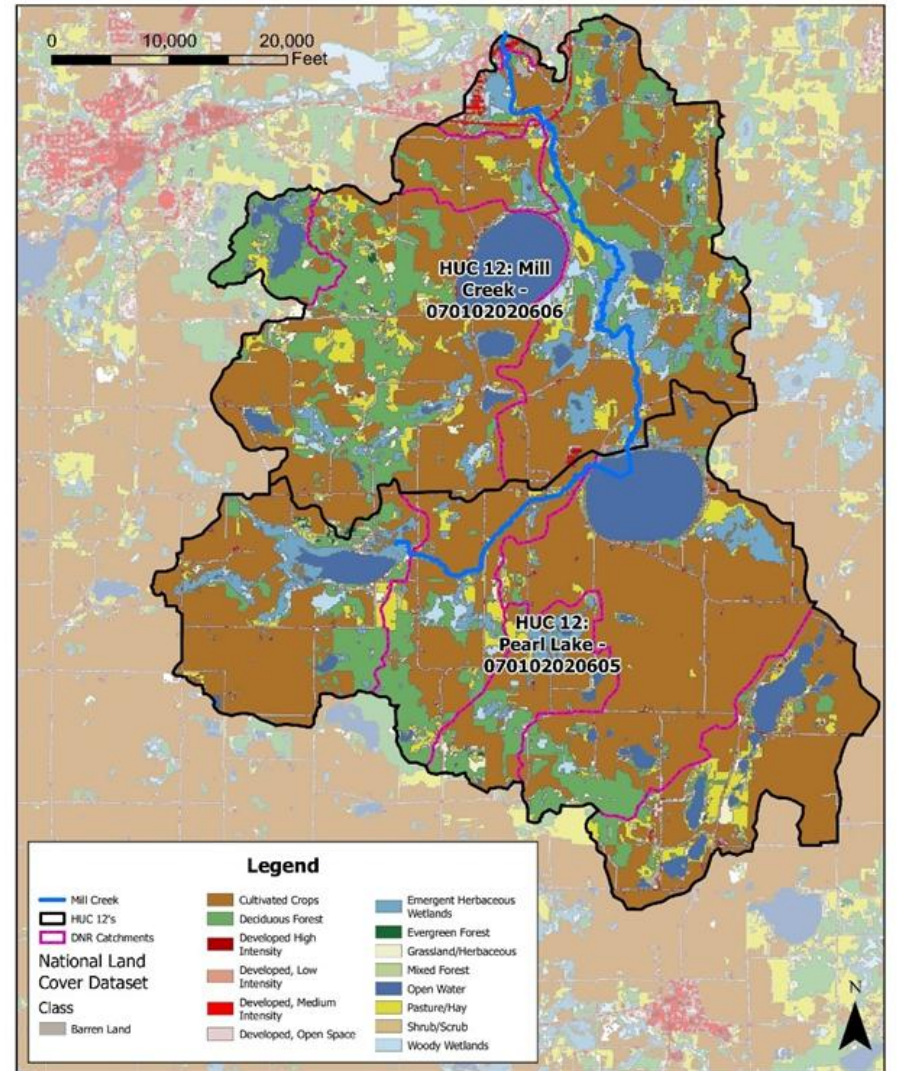
Mill Total Phosphorus (TP) Concentrations

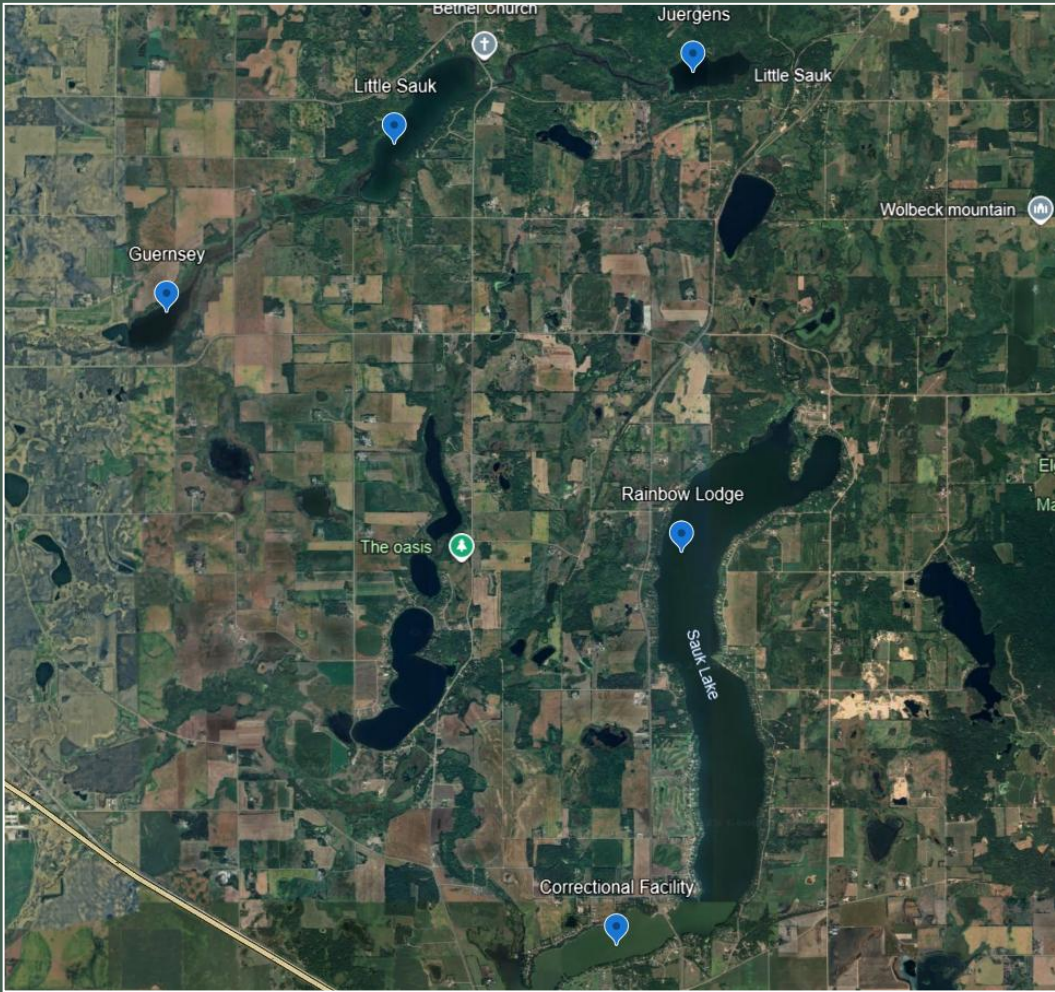


Mill Total Suspended Solids (TSS) Concentrations



Mill Creek Watershed Landuse - NLCD 2021



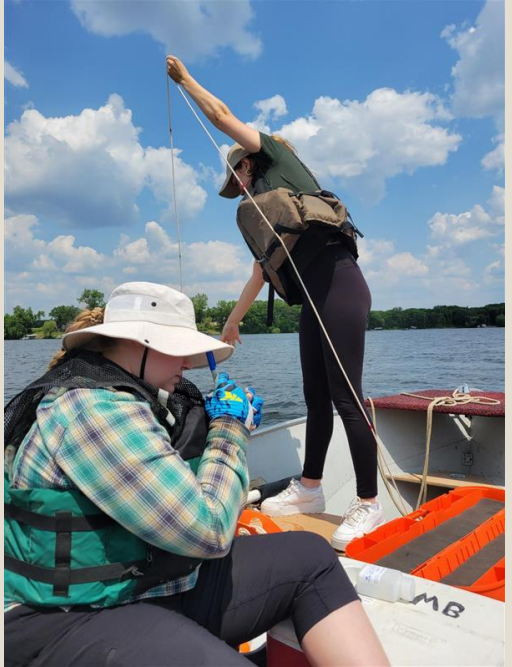


Year	Rainbow TSI	CF TSI
2004	56	63
2005	55	59
2006	58	61
2007	63	69
2015	55	59
2018	55	58
2019	57	61
2020	55	60
2025	52	53

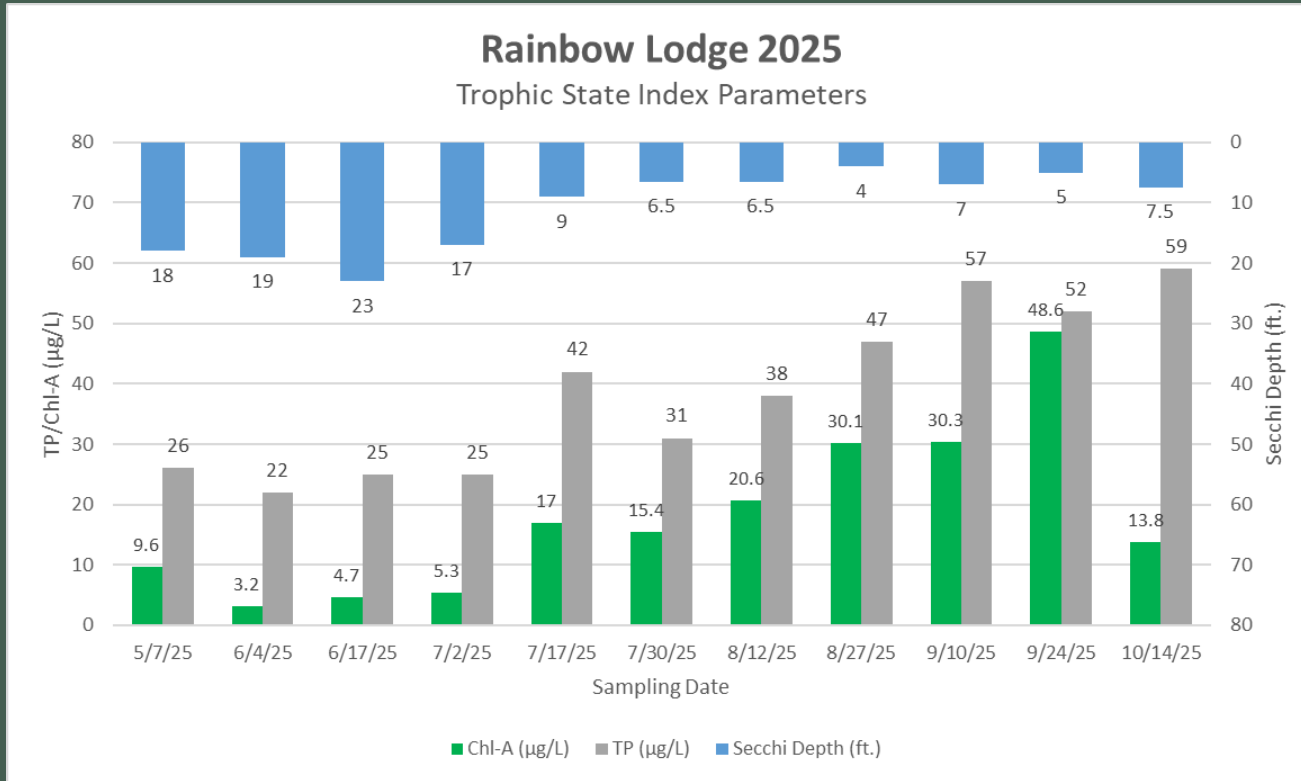
Year	Guernsey TSI	Little Sauk TSI	Juergens TSI
2008	60	58	58
2009	64	63	62
2015	63	63	—
2020	65	62	—
2025	61	57	57

- 5 lake sites, 2 locations on Big Sauk Lake (North & Southwest Bay)
- Samples collected 2x per month
 - Surface & bottom (if stratification detected)
- Parameters: **TP, OP, TKN, chlorophyll-A, Secchi disk, temp & DO profiles**

LAKE DATA



Sauk Lake – North Bay



Averages

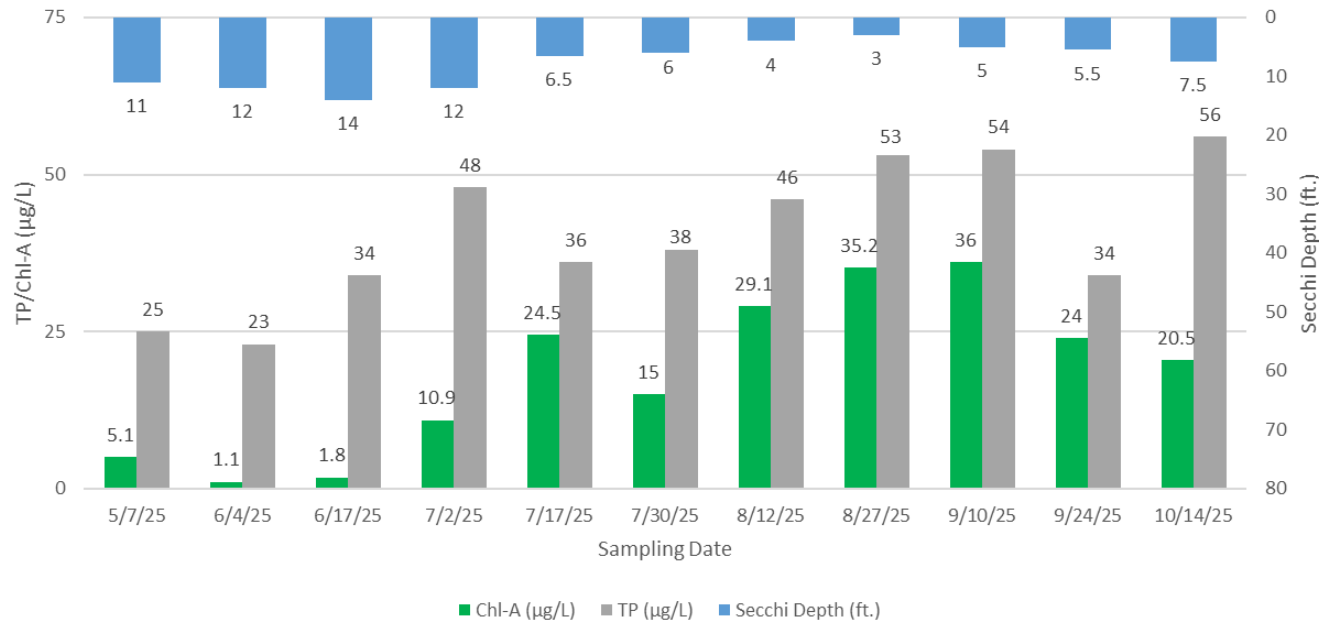
- **Chl-A:** 18.1 µg/L
- **TP:** 38.5 µg/L
- **Secchi Disk:** 11.1 ft.



Deep Lakes & Reservoirs in NCHF Ecoregion		
Substance	Units	Chronic Standard
Total Phosphorus	µg/L	40
Chlorophyll-a	µg/L	14
Secchi Disk Depth	feet	Not less than 4.6

Sauk Lake – Southwest Bay

Correctional Facility 2025
Trophic State Index Parameters



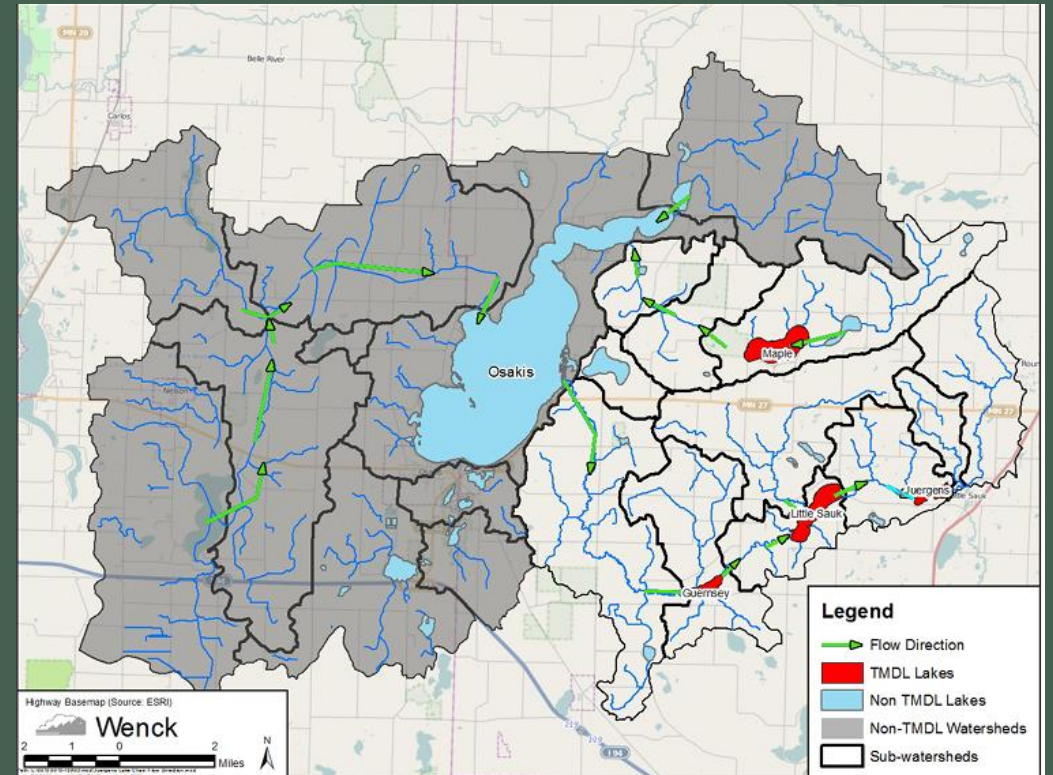
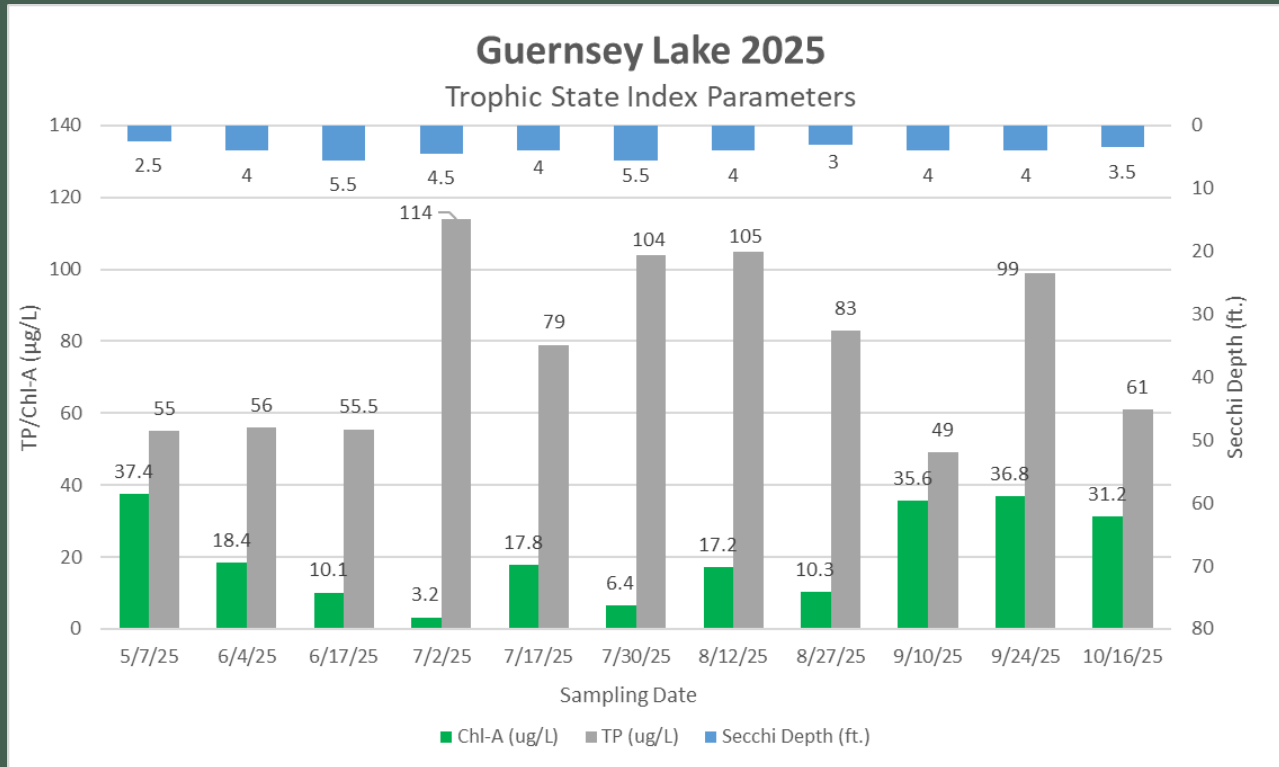
Shallow Lakes in NCHF Ecoregion (<15 ft)		
Substance	Units	Chronic Standard
Total Phosphorus	µg/L	60
Chlorophyll-a	µg/L	20
Secchi Disk Depth	feet	Not less than 3.3

Averages

- **Chl-A:** 18.5 µg/L
- **TP:** 40.6 µg/L
- **Secchi Disk:** 7.9 ft.

Guernsey Lake

Flow pattern in Juergens Chain of Lakes

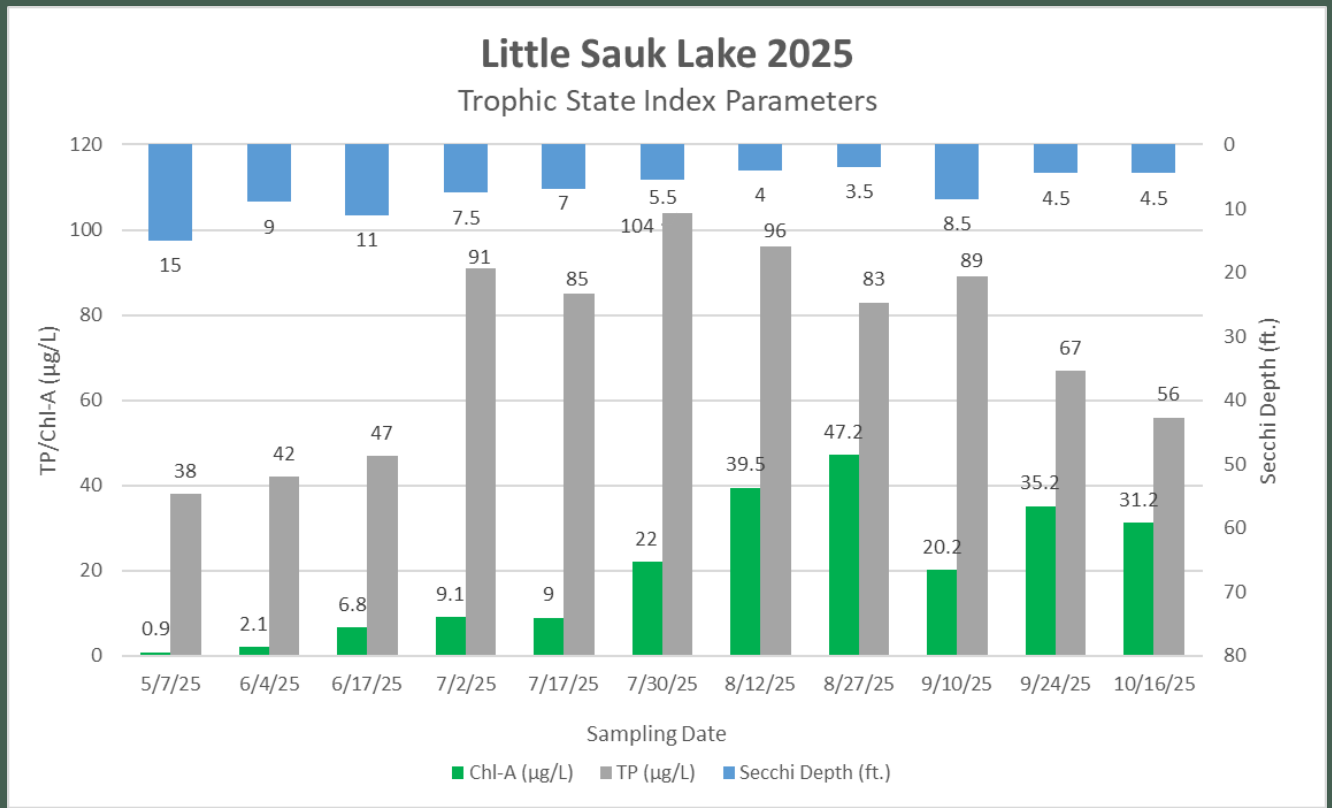


Averages

- **Chl-A:** 20.4 µg/L
- **TP:** 78.2 µg/L
- **Secchi Disk:** 4.0 ft.

Shallow Lakes in NCHF Ecoregion (<15 ft)		
Substance	Units	Chronic Standard
Total Phosphorus	µg/L	60
Chlorophyll-a	µg/L	20
Secchi Disk Depth	feet	Not less than 3.3

Little Sauk Lake



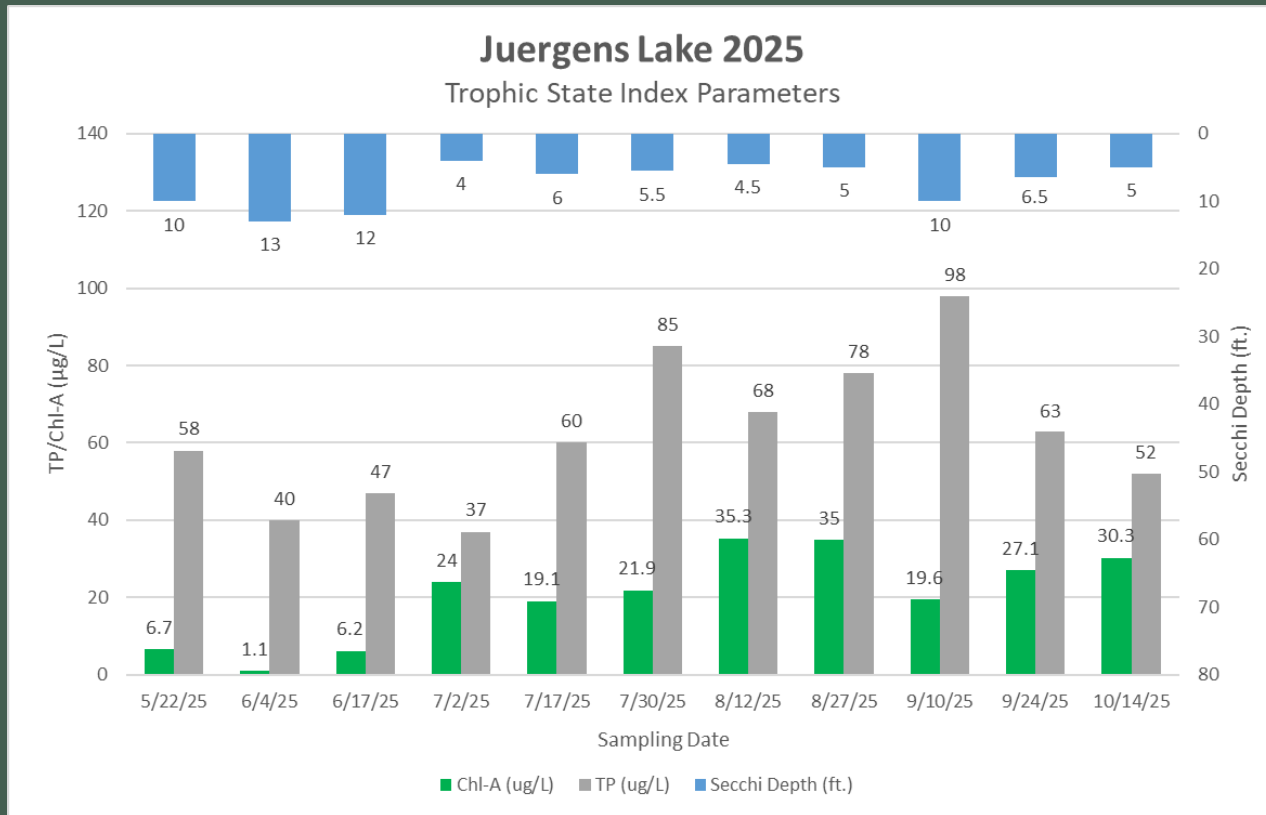
Deep Lakes & Reservoirs in NCHF Ecoregion

Substance	Units	Chronic Standard
Total Phosphorus	µg/L	40
Chlorophyll-a	µg/L	14
Secchi Disk Depth	feet	Not less than 4.6

Averages

- **Chl-A:** 20.3 µg/L
- **TP:** 72.5 µg/L
- **Secchi Disk:** 7.3 ft.

Juergens Lake



Averages

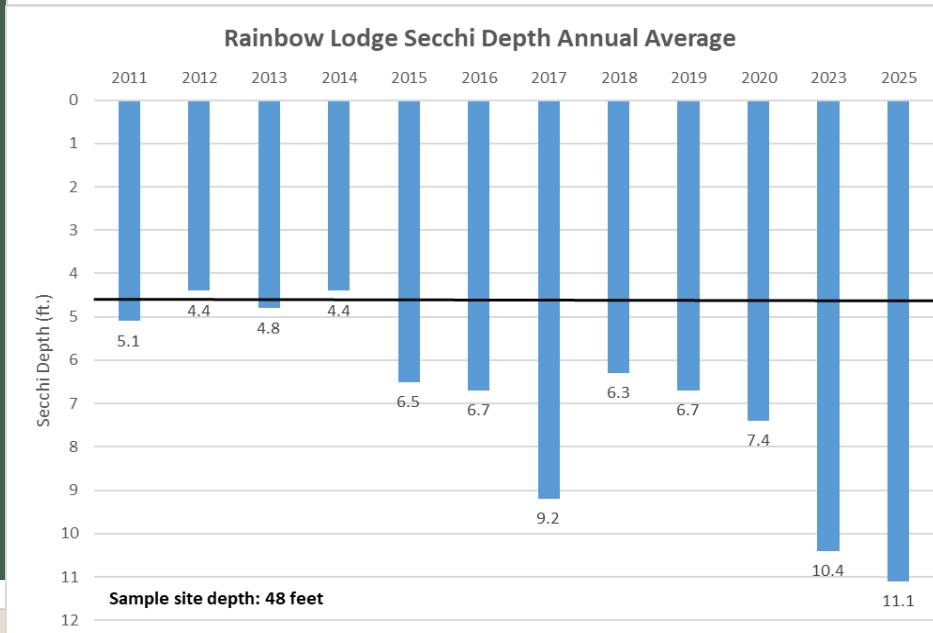
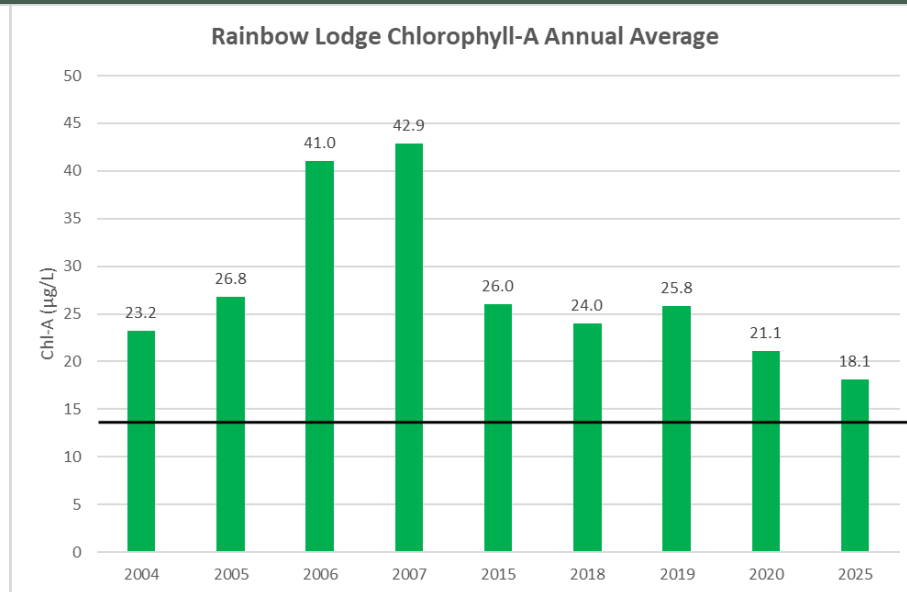
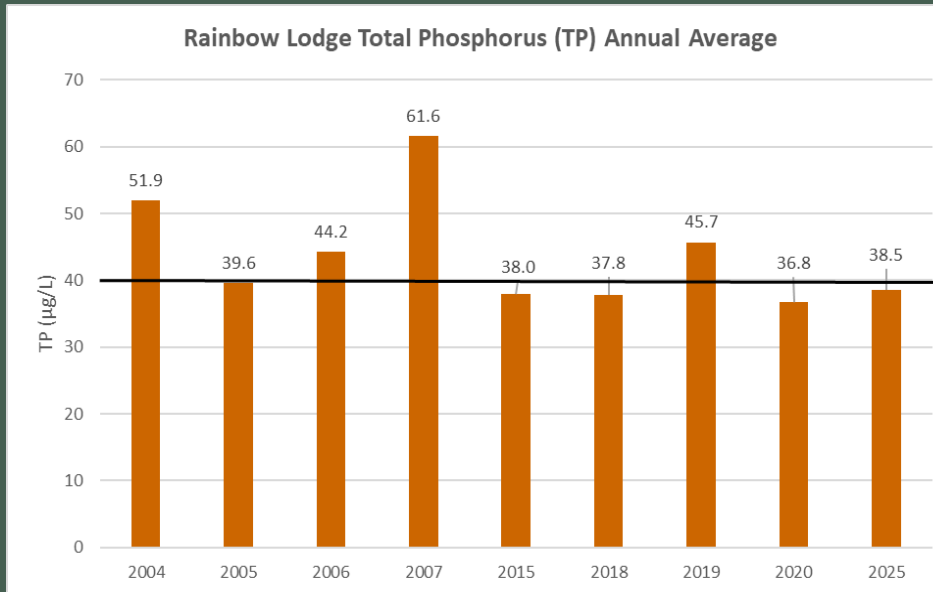
- **Chl-A:** 20.6 µg/L
- **TP:** 62.4 µg/L
- **Secchi Disk:** 7.4 ft.



Shallow Lakes in NCHF Ecoregion (<15 ft)

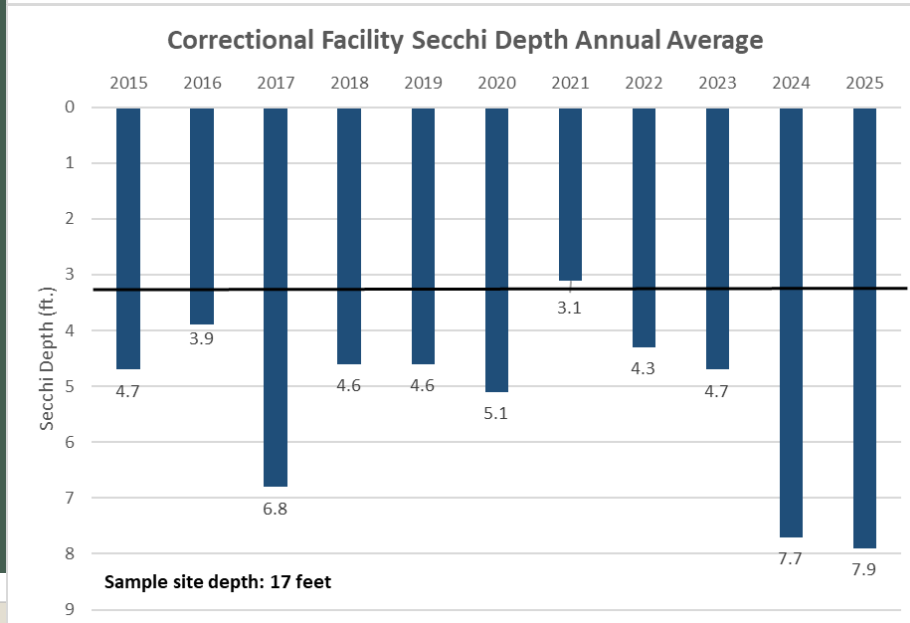
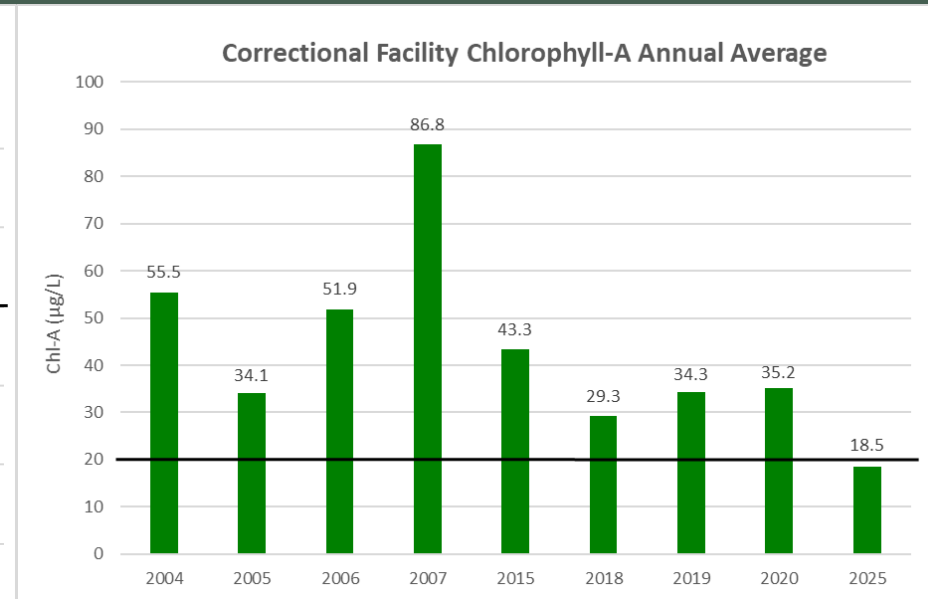
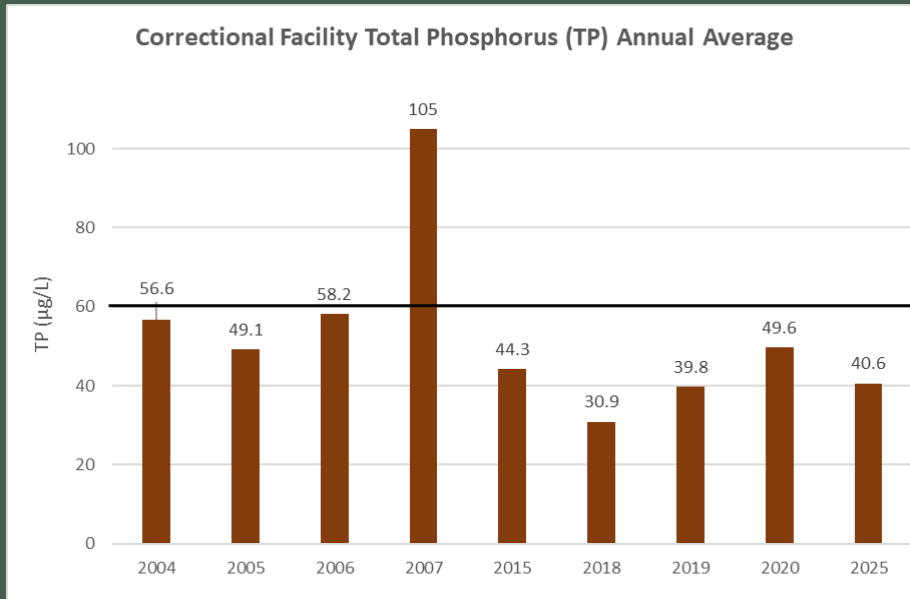
Substance	Units	Chronic Standard
Total Phosphorus	µg/L	60
Chlorophyll-a	µg/L	20
Secchi Disk Depth	feet	Not less than 3.3

NORTH BAY (Rainbow Lodge) ANNUAL AVERAGES



- Todd County SWCD shoreland projects
- Weed harvesting since 1991
- Carp removal

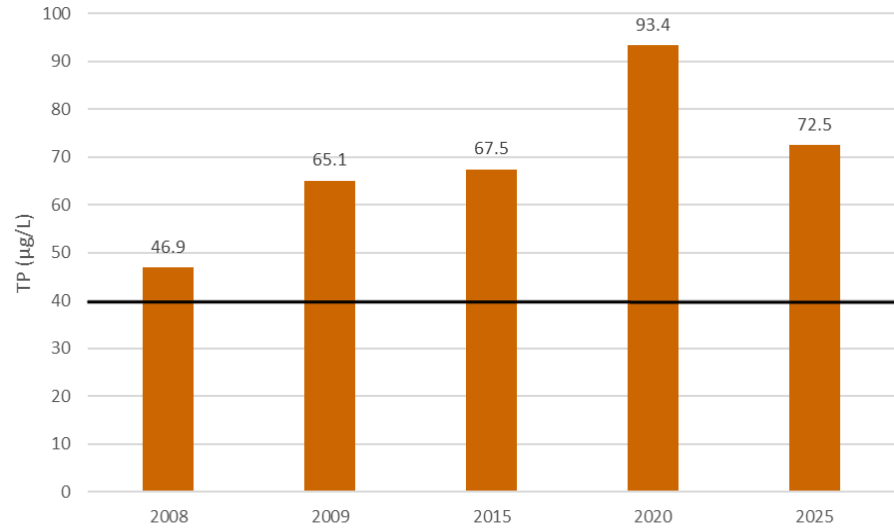
SOUTHWEST BAY (Correctional Facility) ANNUAL AVERAGES



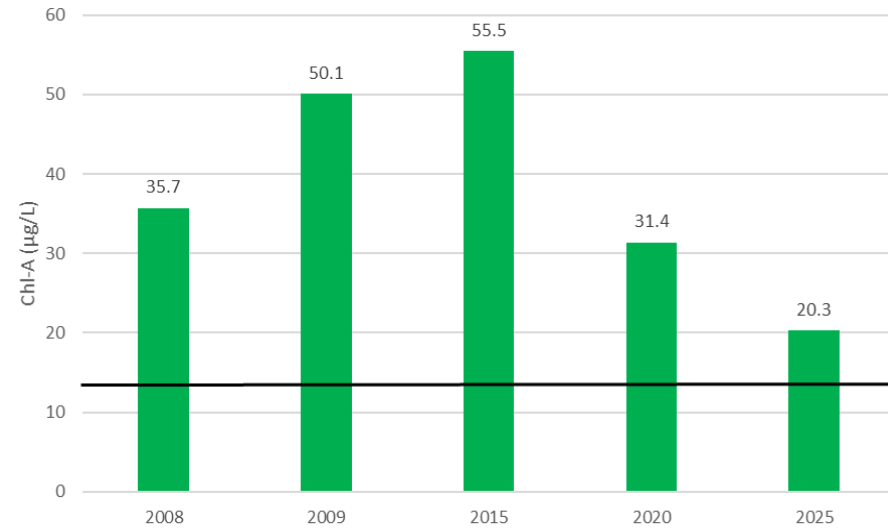
- Shallow lake, unlike North Bay
- Major TP sources: **Sauk River; Ashley & Hoboken Creeks**
- Indications of internal loading issues

LITTLE SAUK ANNUAL AVERAGES

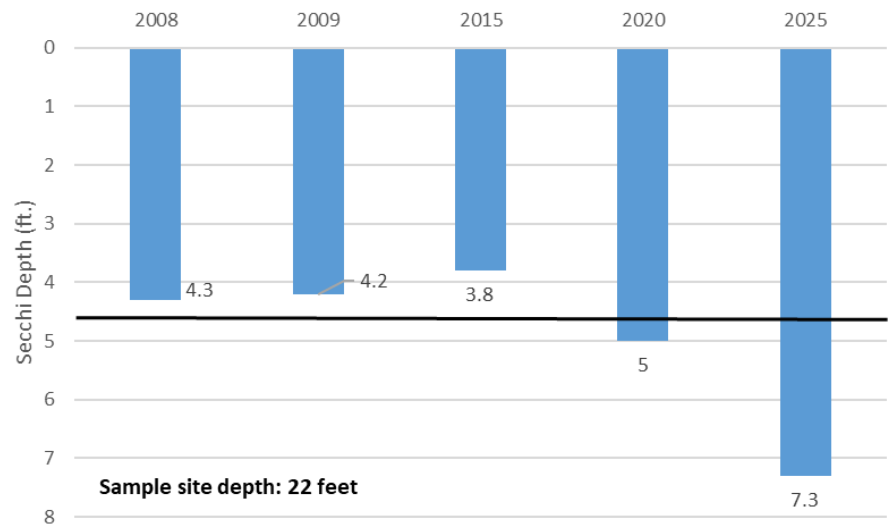
Little Sauk Total Phosphorus (TP) Annual Average



Little Sauk Chlorophyll-A Annual Average



Little Sauk Secchi Depth Annual Average



- **Deep lake**
- Receives majority of TP load from upstream lakes
- Populations of **carp** and **curly-leaf pondweed**

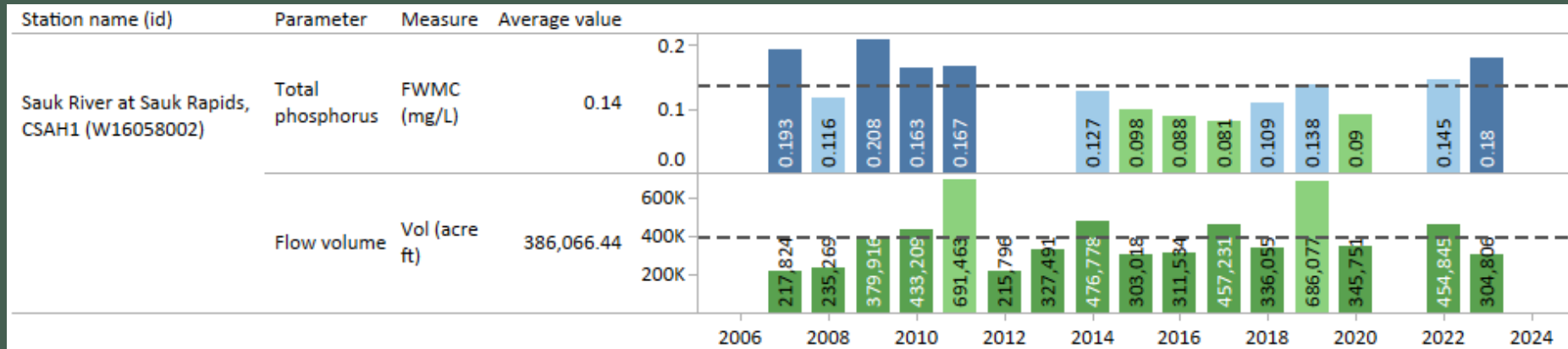
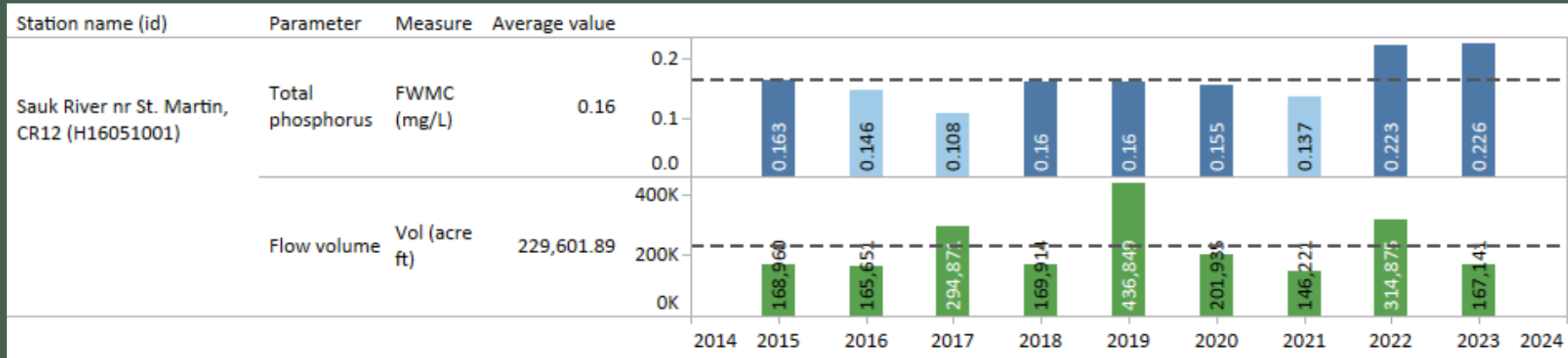
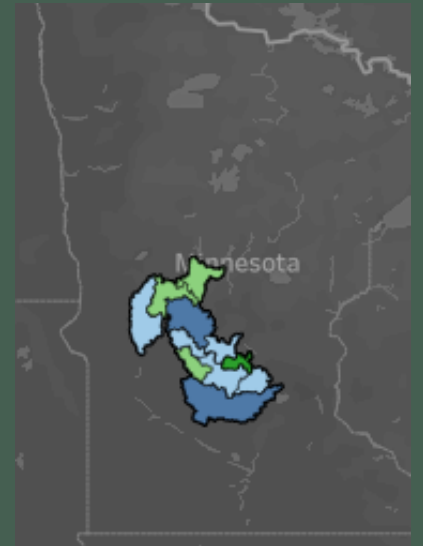
POLLUTANT LOADS (TP)

Average FWMC (mg/L)

0.049 - 0.1

0.1 - 0.15

0.15 - 0.275



2024: **0.123 mg/L***

- Long (Higgins) Lake outlet project
- Douglas CD #98 and Pope CD #6
- Additional sampling for Lake Osakis area
- Additional sampling on Sauk River upstream & downstream of Chain of Lakes (SRCLA)

ADDITIONAL MONITORING IN 2026



SR121 near St. Joseph

THANK YOU!

Abi Borgerding
Environmental
Monitoring Manager
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