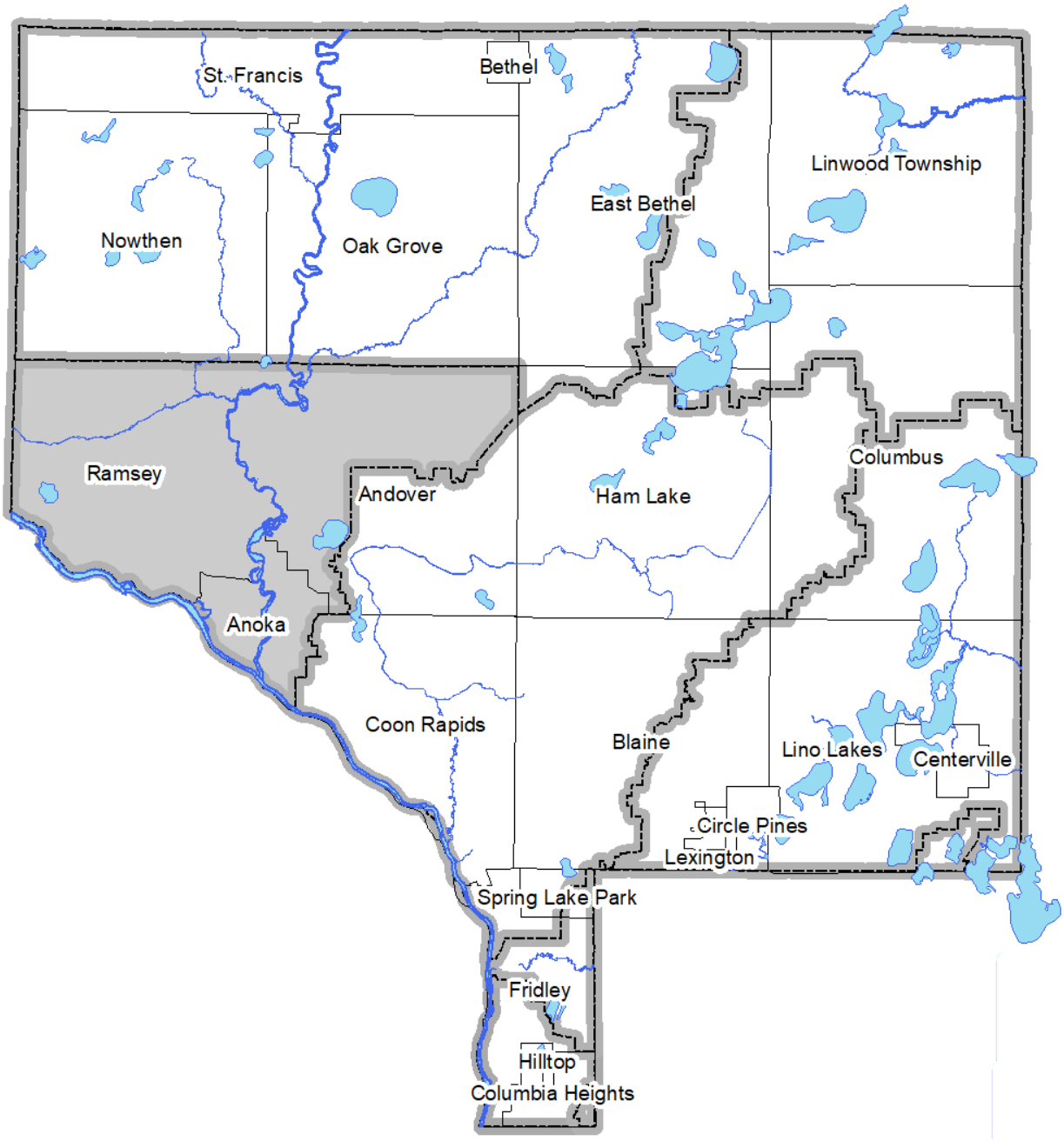
Excerpt from the 2023 Water Almanac

Chapter 4: Lower Rum River Watershed



Prepared by the Anoka Conservation District

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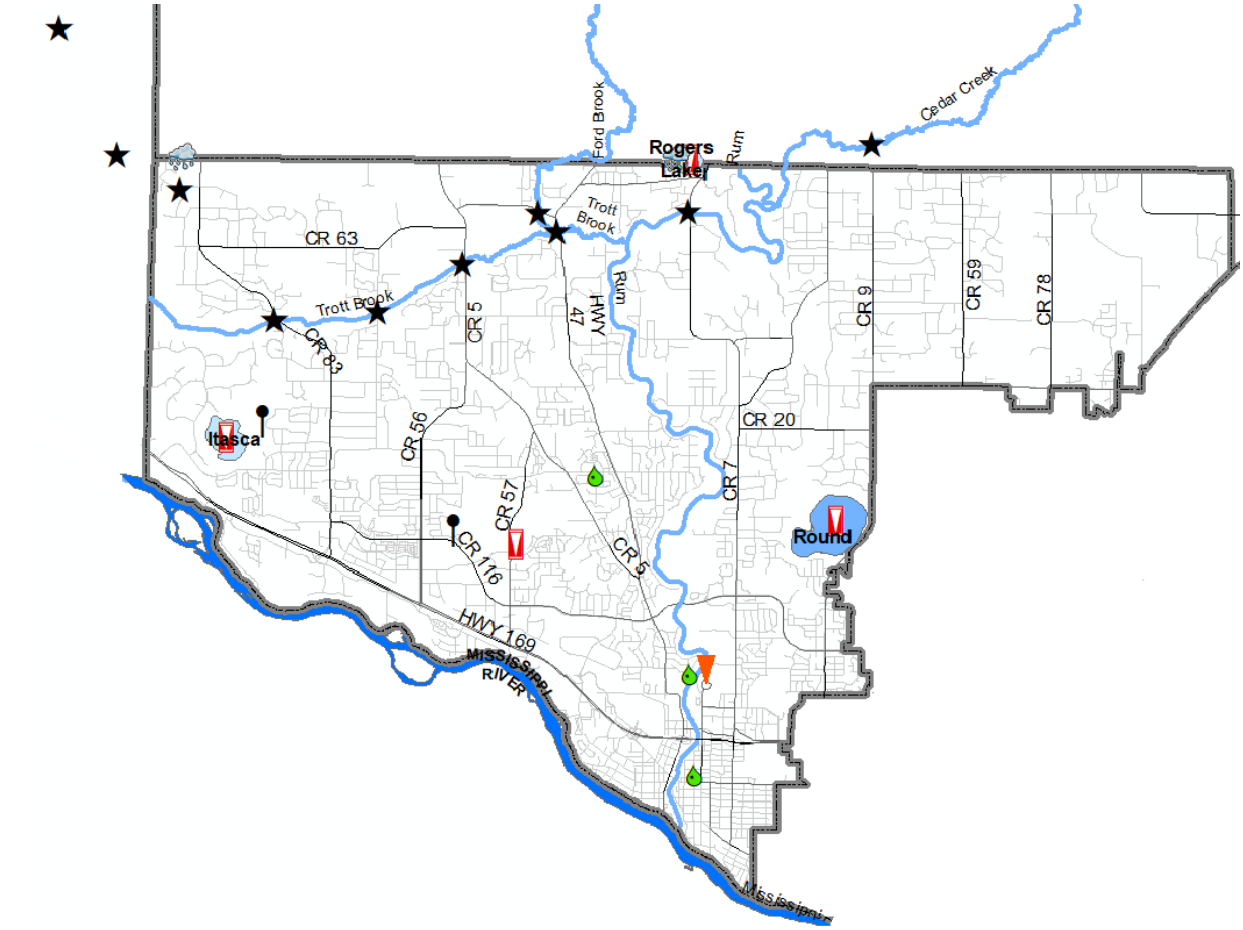
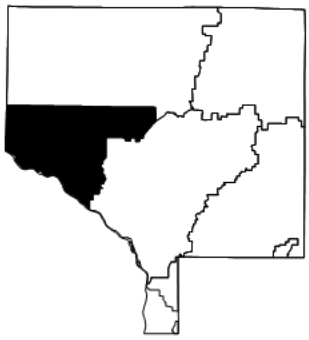
Recommendations

- **Complete the ongoing subwatershed studies in 2024.** The studies identify and rank water quality projects in areas draining to the Rum River and Mississippi River. This was funded by a 2021 Rum Metro Watershed Based Implementation Funding (WBIF) grant.
- **Continue to install projects identified in the stormwater retrofit studies.** Projects have been identified and ranked.
- **Install additional stormwater treatment, when appropriate, during street projects.**
- **Continue to collaborate with ACD on riverbank stabilizations.** ACD has secured large grants. Local matching funding is needed and the projects are a priority in the LRRWMO Plan.
- **Complete the Trott Brook study of low oxygen 2024.** The study will follow upstream to downstream monitoring in 2023. The study already has a grant funding source. In the meantime, ensure developments draining to the stream have robust stormwater treatment.
- **Manage phosphorus levels in the Rum River.** Phosphorus levels are close to state water quality standards. It may be appropriate to review development and stormwater discharge ordinances to ensure phosphorus does not increase in coming years.
- **Implement groundwater conservation measures** throughout the watershed and promote them metro-wide. Promote sealing of unused wells and regular well water testing. Depletion of shallow groundwater is a concern region-wide.
- **Promote Septic System Fix-up Grants to landowners,** particularly in shoreland areas. Grants are for low-income households.
- **Continue to prioritize water quality monitoring** at a frequency sufficient to detect baseline conditions and to be able to be proactive detecting any changes and trends.
- **Continue chloride sampling at all sites on a rotating basis.** Chloride can have such a profound impact on aquatic life and drinking water, continuing to periodically include it in the monitoring regime is prudent.
- **Track activities of the Rum River Watershed Partnership.** That group developed a comprehensive plan for the watershed through the One Watershed, One Plan (1W1P) process and receives >$1M in state funds biennially to implement it. The LRRWMO is not a member, but may wish to track activities in the upper watershed or collaborate. Project types identified in the LRRWMO area include stormwater retrofits, riverbank stabilization, public outreach, and others.

2023 Water Monitoring Sites Map

Lower Rum River Watershed





2023 Monitoring Sites

- Stream WQ
- Anoka County Weather
- Volunteer Precipitation
- Wetland Hydrology
- Groundwater Hydrology
- Lake WQ

Lake Level Monitoring

Partners: LRRWMO, ACD, MNDNR, Volunteers

Description: Weekly water level monitoring was conducted using staff gages installed in each lake. The past five and twenty-five years of data for each lake are illustrated below, and all historical data are available on the Minnesota DNR website using the "LakeFinder" feature (www.dnr.mn.us.state\lakefind\index.html). The Ordinary High Water Level (OHW) is listed for each lake on the corresponding graphs below and any work that is to occur below this elevation a DNR permit is required.

Purpose: To understand lake hydrology, including the impact of climate or other water budget changes. These data sets are useful for regulatory, building/development, and lake management decisions.

Locations: Round, Rogers, Itasca, and Sunfish/Grass.

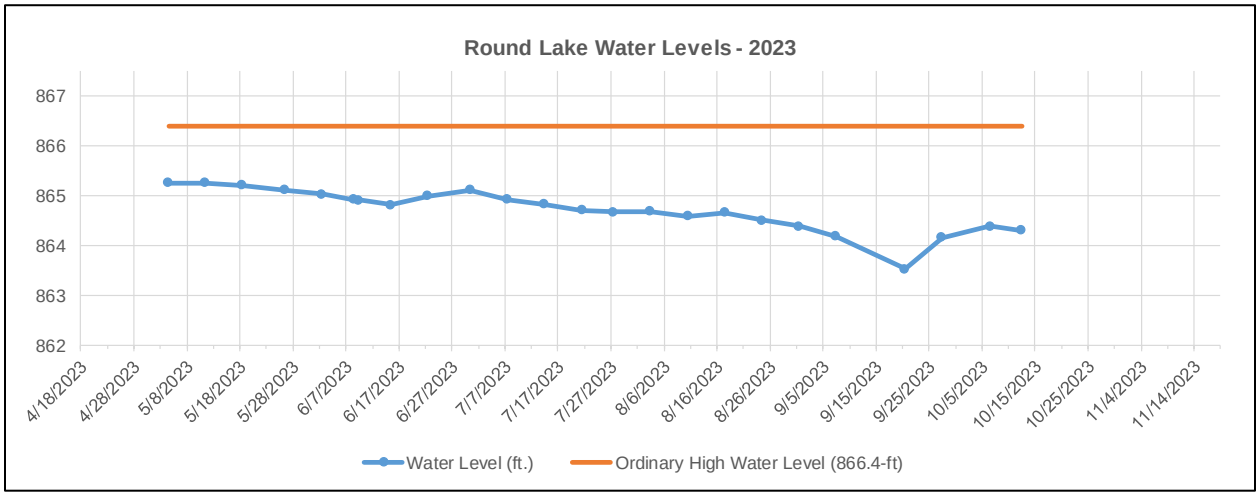
Results: **Round.** In 2023, Round Lake water levels were within the historically observed range, however that range is wide and has been the subject of past disputes and studies. During 2000 to 2010, water levels were lower. During 2010 to 2020, water levels were higher. Since 2020 water levels appear to be dropping to lower levels once again. Both 2022 and 2023 have had summertime droughts. Spring 2023 had flooding in many areas due to heavy snowpack, but not at Round Lake because it has no significant stream flows in or out. Lower levels result in increased vegetation and difficulty launching any watercraft from the dirt public access.

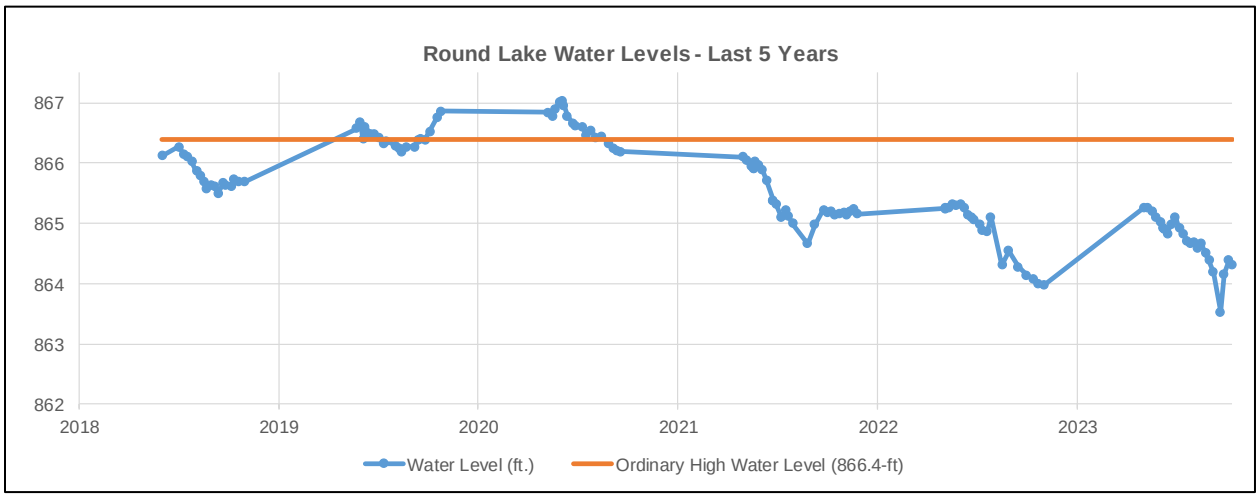
Rogers. In 2023, Rogers Lake levels were slightly lower than most years and ranged 1.27 feet, which is not atypical for this lake. This year was the lowest recorded reading since 2010. Levels were similar, but slightly lower, than those recorded in 2022.

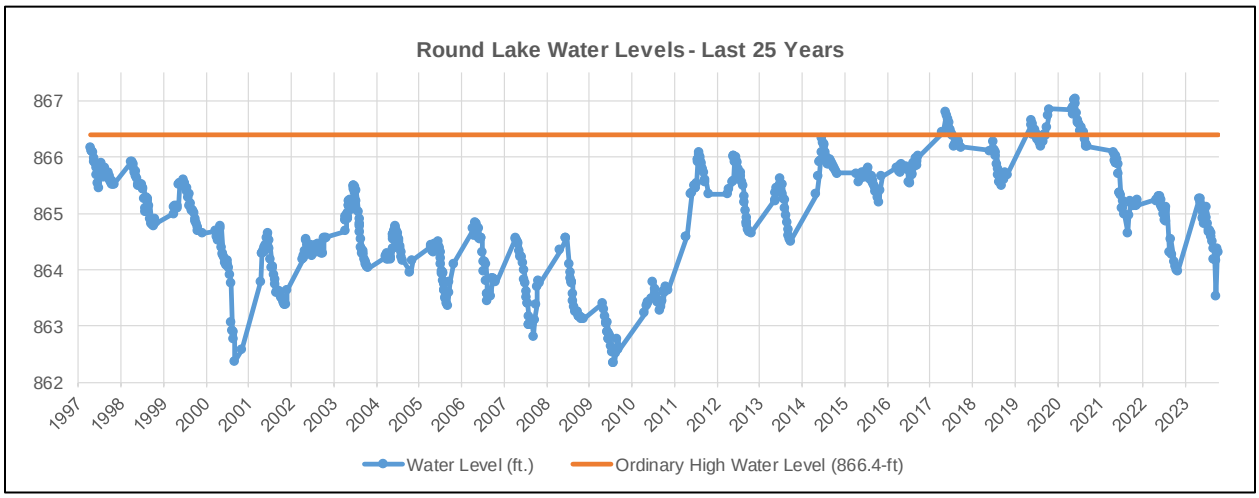
Itasca. Itasca Lake is small and shallow but the observed historic range of lake levels is around 6 feet. It is presently in the lower end of the historically observed range, and more than three feet lower than 2023. Residents have expressed concern about water levels, including the possible impacts of groundwater depletion or climate changes. They have also expressed concern about cattail growth. Low water levels increased cattail growth and made it difficult for the volunteer to take readings throughout the season.

Sunfish / Grass. The volunteer secured to monitor this lake did not take any readings in 2023. No data was collected in 2023.

Round Lake


Round Lake Water Levels - 2023
867
866
865
864
863
862
4/18/2023
4/28/2023
5/8/2023
5/18/2023
5/28/2023
6/7/2023
6/17/2023
6/27/2023
7/7/2023
7/17/2023
7/27/2023
8/6/2023
8/16/2023
8/26/2023
9/5/2023
9/15/2023
9/25/2023
10/5/2023
10/15/2023
10/25/2023
11/4/2023
11/14/2023
Water Level (ft.)
Ordinary High Water Level (866.4-ft)


Round Lake Water Levels - Last 5 Years
867
866
865
864
863
862
2018
2019
2020
2021
2022
2023
Water Level (ft.)
Ordinary High Water Level (866.4-ft)


Round Lake Water Levels - Last 25 Years
867
866
865
864
863
862
1997
1998
1999
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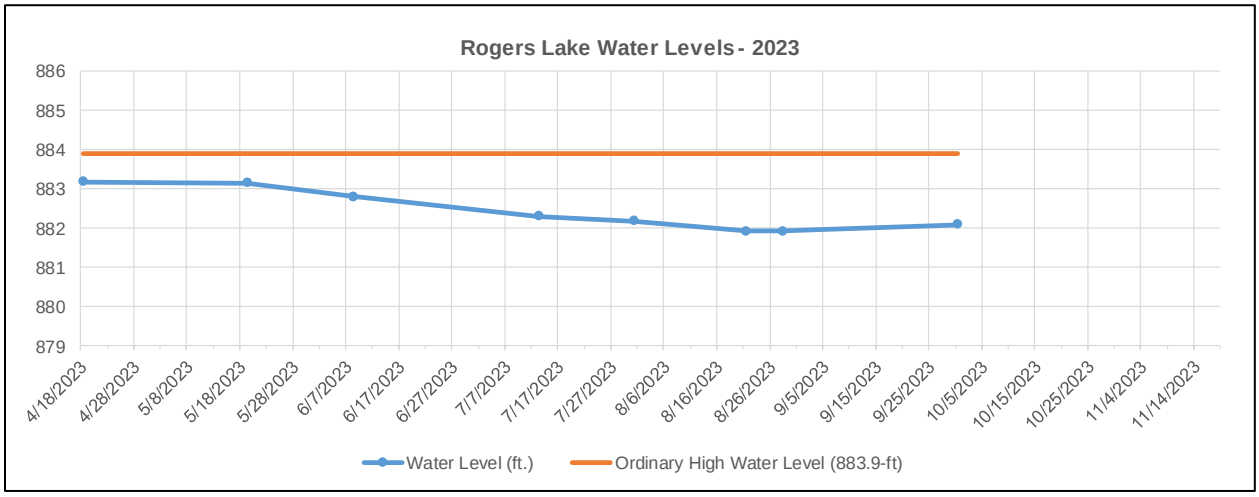
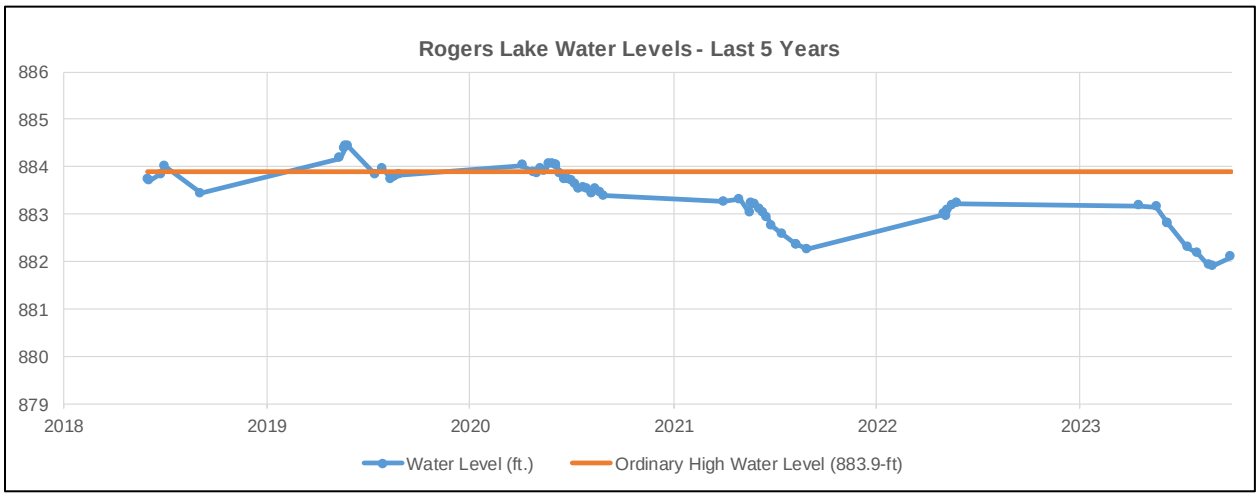
2022
2023
Water Level (ft.)
Ordinary High Water Level (866.4-ft)

Rogers Lake


Rogers Lake Water Levels - 2023
886
885
884
883
882
881
880
879
4/18/2023
4/28/2023
5/8/2023
5/18/2023
5/28/2023
6/7/2023
6/17/2023
6/27/2023
7/7/2023
7/17/2023
7/27/2023
8/6/2023
8/16/2023
8/26/2023
9/5/2023
9/15/2023
9/25/2023
10/5/2023
10/15/2023
10/25/2023
11/4/2023
11/14/2023
Water Level (ft.)
Ordinary High Water Level (883.9-ft)


Rogers Lake Water Levels - Last 5 Years
886
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880
879
2018
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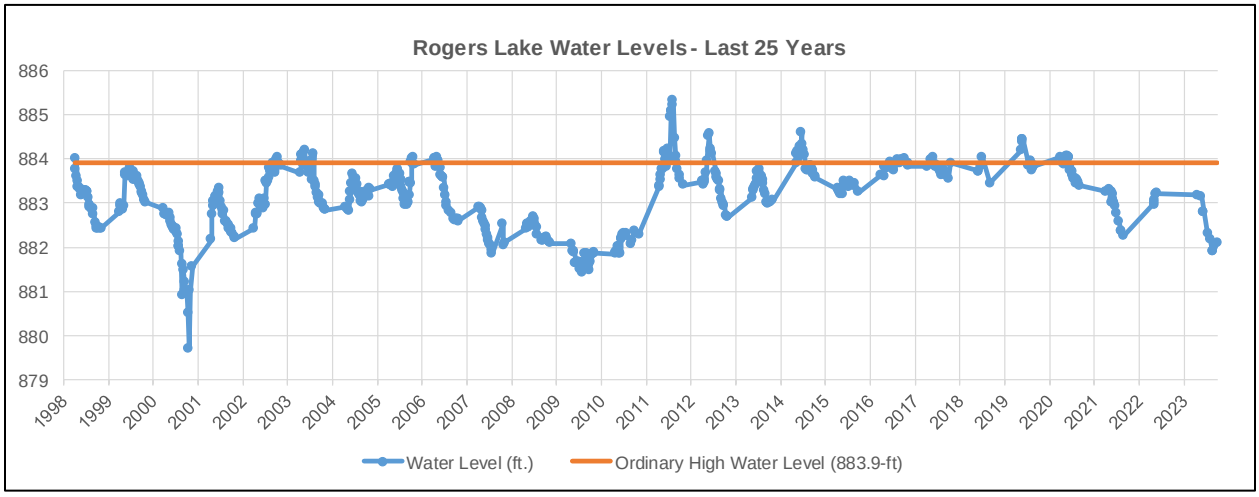
2020
2021
2022
2023
Water Level (ft.)
Ordinary High Water Level (883.9-ft)


Rogers Lake Water Levels - Last 25 Years
886
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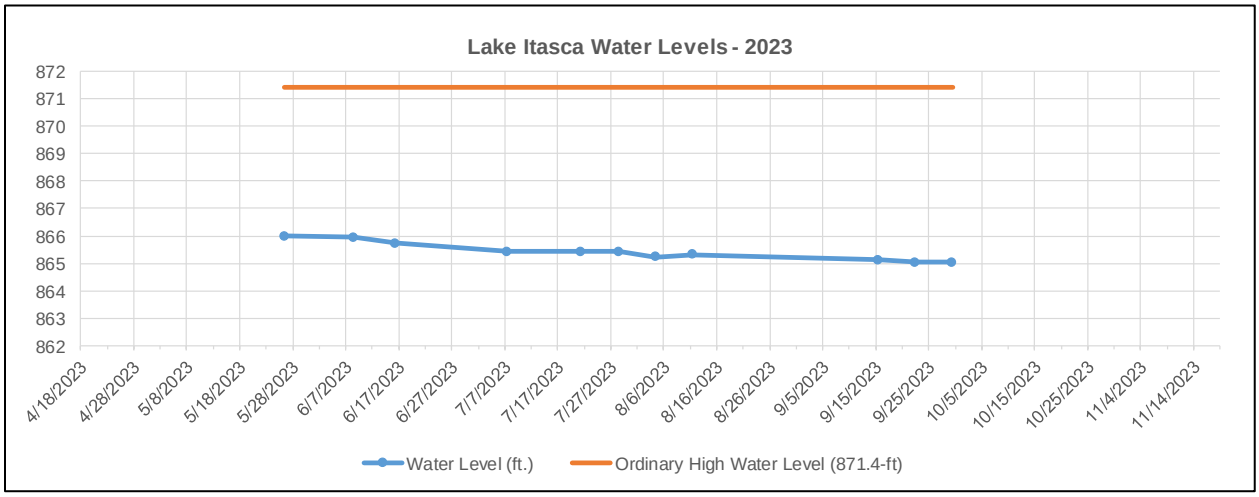
2021
2022
2023
Water Level (ft.)
Ordinary High Water Level (883.9-ft)

Lake Itasca


Lake Itasca Water Levels - 2023
872
871
870
869
868
867
866
865
864
863
862
4/18/2023
4/28/2023
5/8/2023
5/18/2023
5/28/2023
6/7/2023
6/17/2023
6/27/2023
7/7/2023
7/17/2023
7/27/2023
8/6/2023
8/16/2023
8/26/2023
9/5/2023
9/15/2023
9/25/2023
10/5/2023
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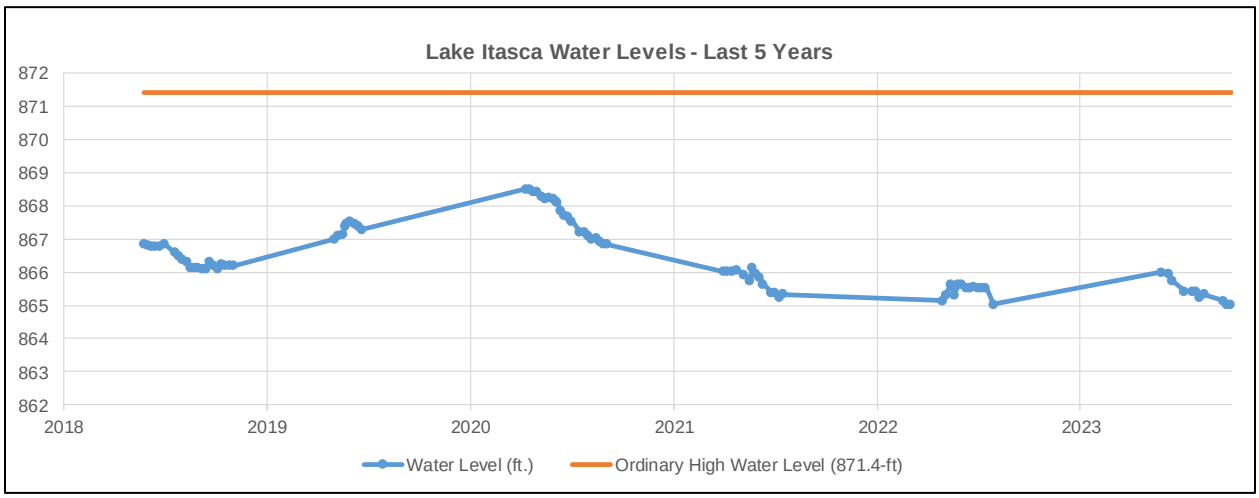
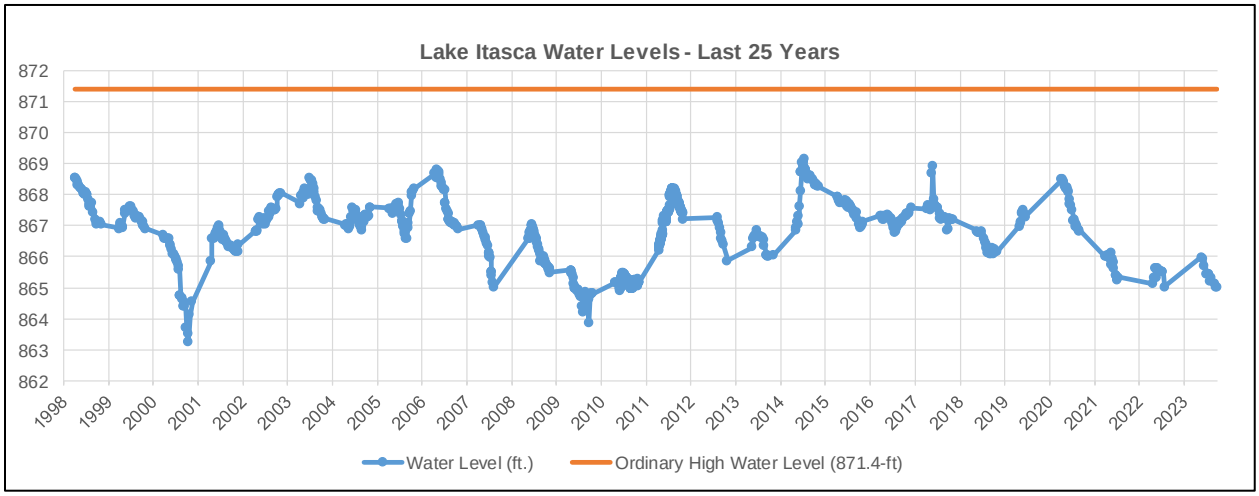
11/4/2023
11/14/2023
Water Level (ft.)
Ordinary High Water Level (871.4-ft)


Lake Itasca Water Levels - Last 5 Years
872
871
870
869
868
867
866
865
864
863
862
2018
2019
2020
2021
2022
2023
Water Level (ft.)
Ordinary High Water Level (871.4-ft)


Lake Itasca Water Levels - Last 25 Years
872
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2021
2022
2023
Water Level (ft.)
Ordinary High Water Level (871.4-ft)

Lake Water Quality

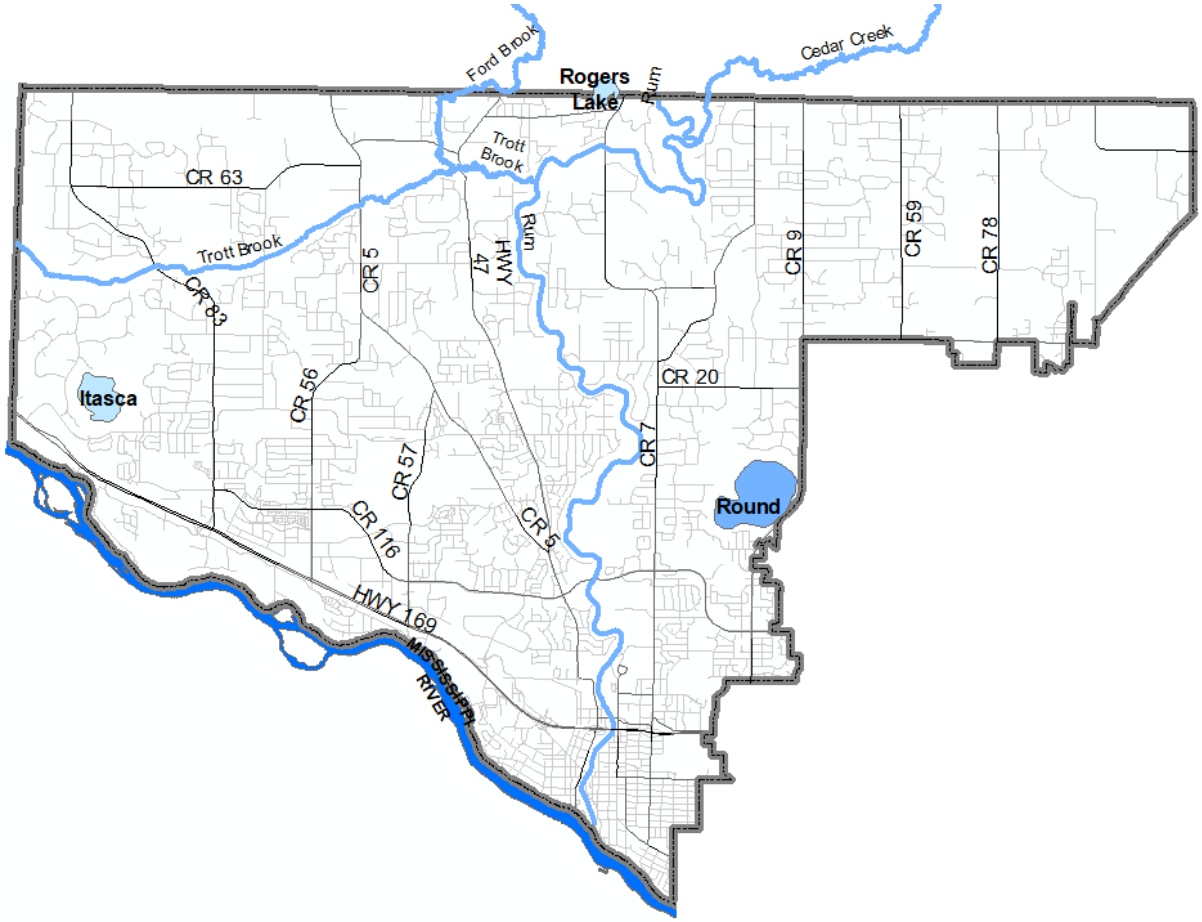
Partners: ACD and LRRWMO

Description: Lake water quality monitoring was conducted ten-times between May – October, approximately every two weeks.

Location: Round Lake

Results: Detailed data for each lake are provided on the following pages, including a summary of historical conditions and trend analysis. Previous years' data are available from the Minnesota Pollution Control Agency's (MPCA) electronic data access (EDA) website. Refer to Chapter 1 for additional information on lake dynamics and interpreting the data.

2023 LRRWMO Lake Water Quality Monitoring Site (darker shaded lakes monitored in 2023)



Round Lake

CITY OF ANDOVER, LAKE ID # 02-0089

Background

Round Lake is located in southwest Anoka County. It has a surface area of 260 acres and maximum depth of 15 feet, though the majority of the lake is less than 4 feet deep. The lake is surrounded by cattails and has submerged vegetation interspersed throughout the lake basin. This lake has a small watershed and is not subject to many of the negative impacts that occur on more developed lakes. Public access is available on the lake's southeast side but the access is an unmaintained dirt ramp and is not heavily used. Recreation is minimal, primarily consisting of canoeing, kayaking, and wintertime fishing.

2023 Results

In 2023, Round Lake's water quality was exceptional compared with other lakes in the region (NCHF Ecoregion), receiving an overall A letter grade. This was an improvement from the C+ letter grade the lake received in 2022, and similar to other A-grades received in previous monitoring years (2012, 2014, 2016, 2019). The average concentrations for total phosphorous (19.3 µg/L) and chlorophyll-a (7.4 µg/L) were both well below the state standards for shallow lakes (60 µg/L and 20µg/L, respectively) and some of the lowest on record. Average Secchi transparency in 2023 was 8.4 feet, which was better than the historical average for Round Lake (8.3 feet) and 1.8 feet greater than the average transparency recorded in 2022. Overall, water quality in Round Lake in 2023 was excellent and was similar to previous years before 2022.

Trend Analysis

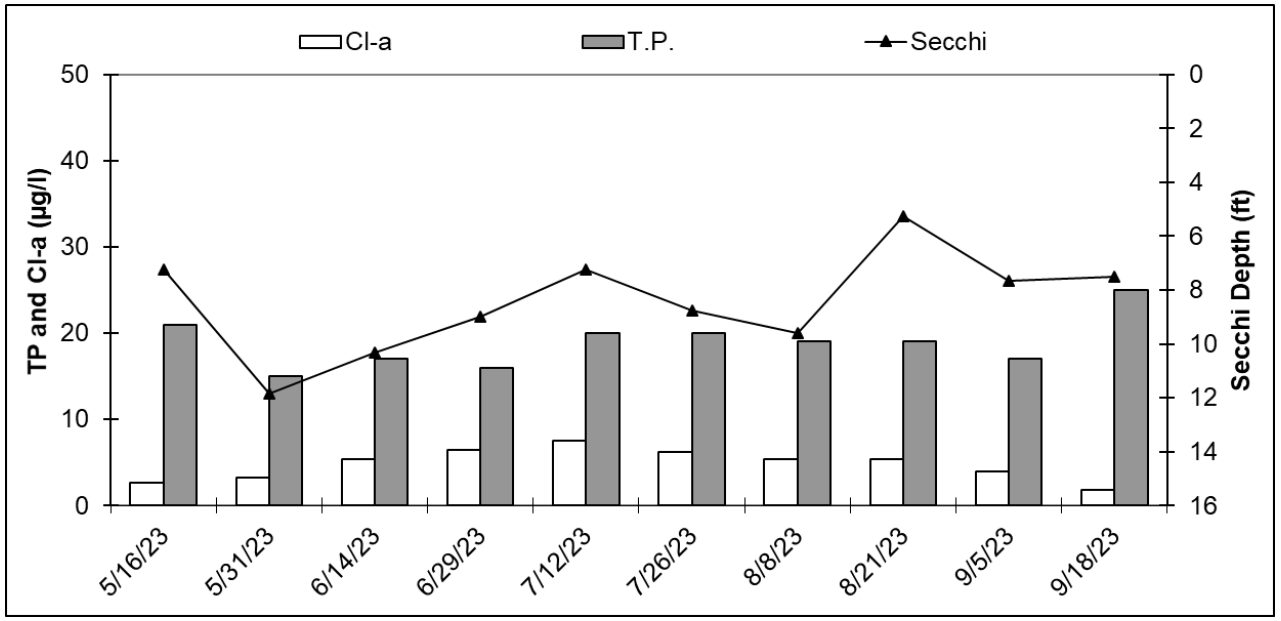
Fourteen years of water quality monitoring has been conducted by ACD (1998-'00, '03, '05, '07, and '09-'10, '12, '14, '16, '19, '22, '23). When analyzing water quality between 1998 and 2023 no statistical significant trend was detected (MANOVA model including response variables total phosphorous (TP), chlorophyll-a (Cl-a), and Secchi depth $F_{3,12} = 0.21$, $p = 0.88$). We also examined each of the response variables separately using a one-way ANOVA model and no significant trends were observed.

Discussion

Poor water quality in Round Lake appears to be correlated with low water levels. From 2007 to 2010, water levels on Round Lake were 2-3 feet lower than typically observed in other years. During that same time period there was a statistically significant trend of declining water quality, which earned C letter grades. When higher water levels returned in Round Lake from 2012 through 2021, water quality improved back to A letter grades. 2022 and 2023 have had declining, but still moderate lake levels, and lake water quality has remained A or B letter grades. Based on this data, one might speculate that additional drops in the lake level may soon approach the tipping point at which water quality is negatively impacted. Internal nutrient sources and wind-driven sediment mixing are likely contributors of elevated phosphorus levels during low water. Staff have also anecdotally noted a visible reduction of chara (a plant-like algae) during prolonged low water. Chara normally carpets the basin bottom and can minimize wind mixing of sediment. There have been concerns that surficial groundwater levels are being negatively impacted by a variety of causes including irrigation, residential groundwater use, and stormwater management. Conservation of groundwater is a regional and local priority.

ROUND LAKE

2023 Results



2023 Median Results

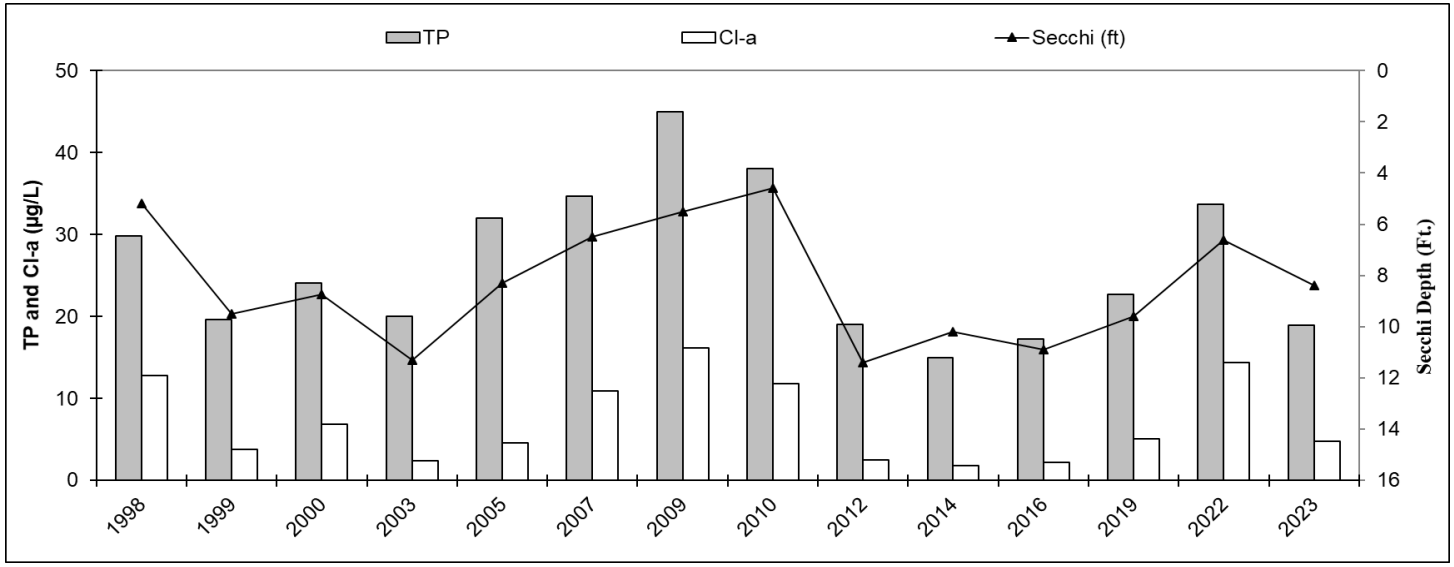
pH		8.65
Specific Conductance	mS/cm	0.35
Turbidity	NTU	0.05
D.O.	mg/l	9.52
D.O.	%	116.40
Temp.	°F	76.29
Salinity	%	0.17
Cl-a	µg/L	5.34
T.P.	µg/l	19.00
Secchi	ft	8.21

Round Lake
02-0089-00-201
2023 Water Quality Data

			Date:	5/16/2023	5/31/2023	6/14/2023	6/29/2023	7/12/2023	7/26/2023	8/8/2023	8/21/2023	9/5/2023	9/18/2023			
			Time:	11:00	10:40	12:04	11:30	11:30	11:00	11:25	12:30	11:25	10:50			
	Units	R.L.*		Results	Results	Results	Results	Results	Results	Results	Results	Results	Results	Average	Min	Max
pH		0.1		8.34	8.65	8.32	8.25	8.60	8.68	8.71	8.44	8.61	8.41	8.50	8.25	8.71
Specific Conductivity	mS/cm	0.01		0.233	0.241	0.242	0.239	0.244	0.237	0.234	0.232	0.227	0.234	0.236	0.227	0.244
Turbidity	NTU	1		1.60	0.40	0.30	0.30	1.70	0.000	2.00	0.40	0.90	1.80	0.94	0	2
D.O.	mg/l	0.01		10.29	10.28	8.47	9.23	8.59	9.61	8.77	9.23	8.88	8.73	9.21	8.47	10.29
D.O.	%	100.0%		111.7	123.3	106.9	113.6	104.4	124.5	111.9	109.7	111.7	98.6	111.6	98.6	124.5
Temp.	°C	0.1		18.18	22.57	22.90	25.15	23.41	26.81	26.13	23.14	25.04	19.69	23.3	18.2	26.8
Temp.	°F	0.1		64.7	72.6	73.2	77.3	74.1	80.3	79.0	73.7	77.1	67.4	73.9	64.7	80.3
Salinity	%	0.01		0.11	0.12	0.12	0.12	0.12	0.12	0.11	0.11	0.11	0.11	0.12	0.11	0.12
Cl-a	µg/L	1		1.34	8.54	4.27	6.41	8.54	6.23	7.12	9.79	13.35	8.01	7.36	1.3	13.4
T.P.	mg/l	0.005		0.014	0.018	0.014	0.015	0.016	0.015	0.022	0.027	0.027	0.025	0.019	0.014	0.027
T.P.	µg/l	5		14	18	14	15	16	15	22	27	27	25	19.30	14	27
Secchi	ft			13.4	10.1	12.0	9.2	7.1	9.4	7.9	5.5	6.0	6.0	8.66	5.5	13.4
Secchi	m			4.09	3.07	3.66	2.79	2.16	2.87	2.41	1.68	1.83	1.83	2.6	1.7	4.1
Physical				1	1	1	1	1	1	1	1	1	2	1.1	1.0	2.0
Recreational				1	1	1	1	1	1	2	1	1	2	1.2	1.0	2.0

*Reporting Limit

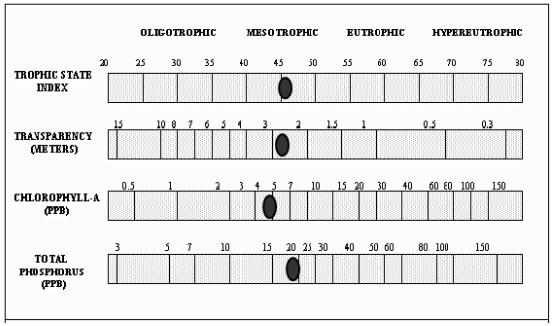
Historical Annual Averages



Historical Report Card

Year	TP	Cl-a	Secchi	Overall
1998	B	B	C	**B**
1999	A	A	B	**A**
2000	B	A	B	**B**
2003	A	A	A	**A**
2005	B	A	B	**B**
2007	C	B+	C	**C**
2009	C	B	C	**C**
2010	C	B	C	**C**
2012	A	A	A-	**A**
2014	A	A	A	**A**
2016	A	A	A	**A**
2019	A	A	B	**A**
2022	C	B	C	**B**
2023	A	A	B	**A**
State Standards	60 ug/L	20 ug/L	>3.3 ft	

Carlson's Trophic State Index



Grade	Percentile	TP (µg/L)	Cl-a (µg/L)	Secchi Disk (m)
A	< 10	<23	<10	>3.0
B	10 - 30	23 – 32	10 - 20	2.2 - 3.0
C	30 – 70	32 – 68	20 – 48	1.2 – 2.2
D	70 – 90	68 – 152	48 – 77	0.7 – 1.2
F	> 90	> 152	> 77	< 0.7

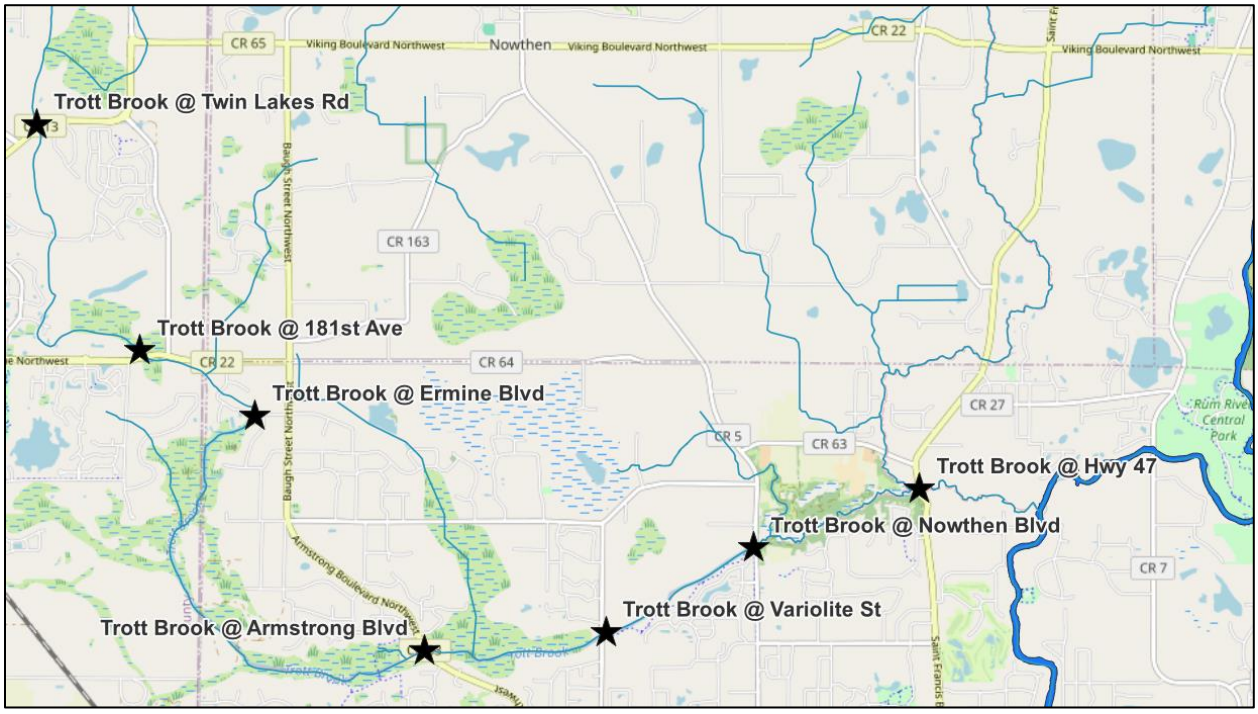
Trott Brook Dissolved Oxygen Study

Partners: ACD, LRRWMO, and MPCA

Description: Water quality monitoring focused on dissolved oxygen was conducted from upstream to downstream in order to identify sources of or reasons for low oxygen in downstream reaches of Trott Brook. This stream is listed as impaired for low oxygen based on monitoring only at the Nowthen Blvd crossing. Water quality monitoring was conducted eight-times between May – October, four times following storm events and four times during baseflow conditions. The monitoring parameters includes total phosphorus, dissolved oxygen, turbidity, temperature, specific conductance, pH, and salinity. Additionally, the MN Pollution Control Agency (MPCA) deployed sondes at four sites for seven days which took hourly measurements of dissolved oxygen, allowing analysis of diurnal fluctuations.

Locations: From upstream to downstream - Trott Brook at Twin Lakes Rd, Trott Brook at 181st Ave, Trott Brook at Ermine Blvd (near Eaton St.), Trott Brook at Armstrong Blvd, Trott Brook at Variolite St, Trott Brook at Nowthen Blvd, Trott Brook at Highway 47

2023 Trott Brook Monitoring Sites



Trott Brook Stream Water Quality

Trott Brook at Hwy 47, St. Francis	STORET Site ID = S017-043
Trott Brook at Nowthen Blvd, St. Francis	STORET Site ID = S003-176
Trott Brook at Variolite St, Oak Grove	STORET Site ID = S004-306
Trott Brook at Armstrong Blvd, Ramsey	STORET Site ID = S008-652
Trott Brook at Ermine Blvd, St. Francis	STORET Site ID = S003-202
Trott Brook at 181st Blvd, St. Francis	STORET Site ID = S017-041
Trott Brook at Twin Lake Rd, Oak Grove	STORET Site ID = S017-042

Background

In 2023, monitoring was completed at seven sites along the Trott Brook system in western Anoka County and eastern Sherburne County. The objective was to help determine how water quality changes from upstream to downstream, and where these changes are occurring. Emphasis was on determining the causes of low dissolved oxygen levels in the Trott Brook system. Trott Brook is on the State's list of impaired water for low oxygen based on monitoring only at the Nowthen Blvd site. The data is reported for all sites, side-by-side, for a more comprehensive analysis of water quality in the Trott Brook, upstream to downstream.

Results Summary

This report includes data from 2023 and an overview of historical data. The following is a summary of results.

- Dissolved constituents were measured by specific conductivity. Specific conductivity in Trott Brook is lower than other Anoka County streams and within the healthy range. Periodic monitoring every 2-5 yrs. is recommended.
- pH was within a healthy range (6.5-8.5) at all monitoring sites in 2023.
- Dissolved oxygen occasionally fell below the state standard of 5 mg/L; five occasions during baseflow and two occasions post-storm. Low dissolved oxygen levels have historically been observed in Trott Brook, however, it isn't limited to a specific area. Low DO is likely the result of increased nutrients in the system, which organic matter from peaty wetlands combines with slow-moving water from a flat, meandering stream.
- Phosphorus levels in Trott Brook in have occasionally exceeded the state standard of 100 µg/L at all sampled sites, but has been lower on average. In 2023, average phosphorous at all sites ranged from 60.0 µg/L to 116.8 µg/L during baseflow conditions, and 93.3 µg/L to 126.8 µg/L post-storm. Reducing phosphorus levels in Trott Brook is a regional priority.
- Turbidity remained at acceptable levels in Trott Brook. Robust stormwater treatment within new developments and continued surveillance monitoring is recommended.
- Overall – The priority for Trott Brook is increasing dissolved oxygen and reducing phosphorus. Increasing dissolved oxygen in the Trott Brook may be difficult due to the nature of the stream. Reducing phosphorous is more tangible goal, as a 5% reduction is a top goal identified in local and regional water plans. Achieving it will require work throughout the watershed, including upstream of Anoka County.

Below the data is presented and discussed for each parameter in greater detail. Management recommendations for each parameter is included in individual sections.

Specific Conductivity

Dissolved pollutant sources include urban road runoff, salt, and agricultural or industrial chemicals, among many others. Conductivity is a broad measure of dissolved pollutants. High conductivity often triggers additional work to determine the cause. Specific conductivity was acceptably low in Trott Brook in 2023. The average and median specific conductivity at each site is listed in the tables below. Specific conductivity at the Trott Brook sites were similar, and typically increased slightly upstream to downstream. This likely reflects higher road densities and greater deicing efforts with salt application as well as other pollutant sources associated with increased development.

In 2023, specific conductivity in Trott Brook was observed higher on average during baseflow conditions than during stormflow conditions. This is consistent with trends observed in previous years, and it provides some insight into the pollutant sources. If dissolved pollutants were only elevated after storms, stormwater runoff would be suspected as the primary driver. However, because dissolved pollutants are highest during baseflow conditions, the suspected primary contributor is groundwater, which normally feeds the stream during baseflow. The largest source of pollution is believed to be road salts that have infiltrated into the shallow aquifer. Water softening salts and geologic materials can also be pollution contributors.

Specific Conductivity - 2023 Baseflow Data

	AVG	MED	TOTAL #
Trott Brook @ Twin Lakes Rd	0.561	0.578	4
Trott Brook @ 181st Ave	0.477	0.477	4
Trott Brook @ Ermine Blvd.	0.482	0.477	4
Trott Brook @ Armstrong Blvd	0.556	0.570	4
Trott Brook @ Variolite St	0.563	0.572	4
Trott Brook @ Nowthen Blvd	0.568	0.574	4
Trott Brook @ Hwy 47	0.552	0.587	4

Specific Conductivity - 2023 Stormflow Data

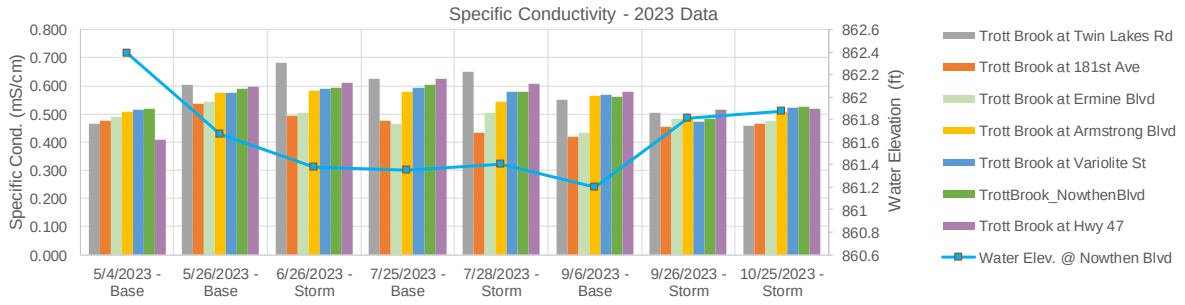
	AVG	MED	TOTAL #
Trott Brook @ Twin Lakes Rd	0.574	0.577	4
Trott Brook @ 181st Ave	0.462	0.460	4
Trott Brook @ Ermine Blvd.	0.492	0.494	4
Trott Brook @ Armstrong Blvd	0.530	0.527	4
Trott Brook @ Variolite St	0.542	0.552	4
Trott Brook @ Nowthen Blvd	0.545	0.553	4
Trott Brook @ Hwy 47	0.563	0.563	4

Specific Conductivity - Historical Baseflow Data

	AVG	MED	TOTAL #
Trott Brook @ Nowthen Blvd	0.489	0.494	19

Specific Conductivity - Historical Stormflow Data

	AVG	MED	TOTAL #
Trott Brook @ Nowthen Blvd	0.421	0.416	18



For water resource management, it is important to note that the sources of dissolved pollutants are generally the same for both stormwater and baseflow it is only the timing of delivery to the waterway that is different. Preventing the release of dissolved pollutants into the environment and treating them before infiltration occurs should be a high priority. Training and equipment that minimize road salting while still maintaining safe roads safe is being increasingly emphasized by watershed managers. The MPCA now provides a training program where organizations and employees to obtain a smart-salting certification, which then has to be renewed every few years.

pH

pH refers to the acidity of the water. The state standard for pH is between 6.5 - 8.5 and pH is generally lower during storm events than during baseflow conditions because the pH of rain is typically lower (more acidic). While acid rain is a longstanding problem, its effect on this aquatic system is minimal.

In 2023, average pH in Trott Brook ranged from 7.61 - 7.80 during baseflow conditions, and 8.04 - 8.57 post-storm. Based on current and historical data, pH in Trott Brook is within the healthy range.

pH - 2023 Baseflow Data

	AVG	MED	TOTAL #	< 6.5	> 8.5
Trott Brook @ Twin Lakes Rd	7.61	7.61	4	0	0
Trott Brook @ 181st Ave	7.70	7.68	4	0	0
Trott Brook @ Ermine Blvd.	7.73	7.76	4	0	0
Trott Brook @ Armstrong Blvd	7.80	7.79	4	0	0
Trott Brook @ Variolite St	7.64	7.67	4	0	0
Trott Brook @ Nowthen Blvd	7.66	7.64	4	0	0
Trott Brook @ Hwy 47	7.77	7.79	4	0	0

pH - Historical Baseflow Data

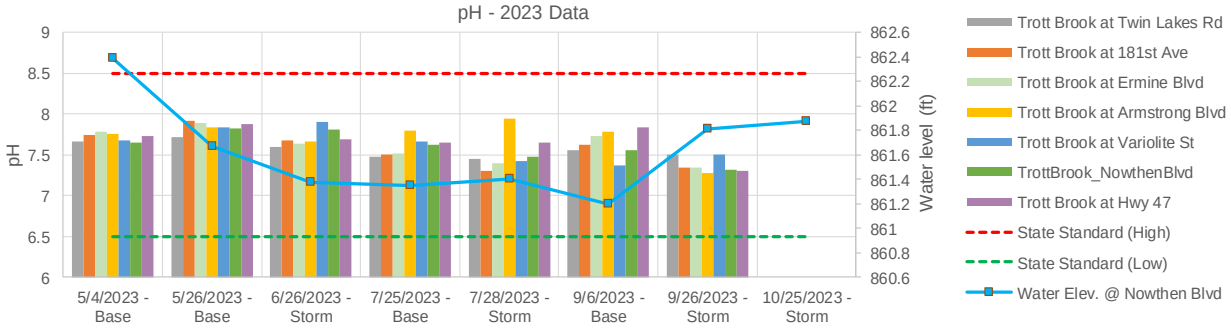
	AVG	MED	TOTAL #	< 6.5	> 8.5
Trott Brook @ Nowthen Blvd	7.76	7.72	19	0	0

pH - 2023 Stormflow Data

	AVG	MED	TOTAL #	< 6.5	> 8.5
Trott Brook @ Twin Lakes Rd	8.04	7.55	4	0	1
Trott Brook @ 181st Ave	8.24	7.51	4	0	1
Trott Brook @ Ermine Blvd.	8.25	7.52	4	0	1
Trott Brook @ Armstrong Blvd	8.51	7.80	4	0	1
Trott Brook @ Variolite St	8.57	7.70	4	0	1
Trott Brook @ Nowthen Blvd	8.53	7.65	4	0	1
Trott Brook @ Hwy 47	8.56	7.67	4	0	1

pH - Historical Stormflow Data

	AVG	MED	TOTAL #	< 6.5	> 8.5
Trott Brook @ Nowthen Blvd	7.49	7.48	17	1	0



Dissolved Oxygen

The primary purpose of the 2023 Trott Brook study was to diagnose the nature and locations of the low oxygen impairment of the Trott Brook system. ACD has periodically monitored Trott Brook over the years, but never in-depth, at multiple locations in one year. Trott Brook meanders through differing ecological sections – from peaty wetlands to developing neighborhoods – and historical data at one location wasn't enough to assess the extent of declining dissolved oxygen in Trott Brook. 2023 monitoring aimed to determine causes of impairment and identify projects to improve it.

Dissolved oxygen is necessary for aquatic life, including fish. Organic pollution causes oxygen to be consumed during decomposition. If oxygen levels in water fall below 5 mg/L, aquatic life begins to suffer. A stream is considered impaired if 10% of observations are below 5 mg/L in the last 10 years. Dissolved oxygen levels are typically lowest in the early morning because of decomposition consuming oxygen at night without the offsetting of oxygen production by photosynthesis.

For 2023 monitoring, all grab samples were taken in the early morning (starting prior to 8:00AM) to measure oxygen concentrations at their lowest levels of the day. Additionally, samples were taken as close as possible to simultaneously. Finally, sondes were deployed for one week at 4 of the sites that took measurements hourly.

In 2023, grab measurements of dissolved oxygen (DO) occasionally fell below 5 mg/L; five occasions during baseflow and two occasions post-storm. The average and median data collected at each site is shown below. The average DO for all Trott Brook sites was 6.7 mg/L during baseflow and the same post-storm. The median of all Trott Brook sites was 7.3 mg/L during baseflow and 6.8 mg/L post-storm. DO measurements below the state standard were most common at Twin Lakes Road and Variolite Street.

DO - 2023 Baseflow Data

	AVG	MED	TOTAL #	< 5 mg/L
Trott Brook @ Twin Lakes Rd	5.5	5.6	4	2
Trott Brook @ 181st Ave	6.2	6.4	4	1
Trott Brook @ Ermine Blvd.	7.3	7.4	4	0
Trott Brook @ Armstrong Blvd	7.9	8.3	4	0
Trott Brook @ Variolite St	6.0	6.5	4	1
Trott Brook @ Nowthen Blvd	7.2	7.4	4	0
Trott Brook @ Hwy 47	6.8	7.2	4	1

DO - 2023 Stormflow Data

	AVG	MED	TOTAL #	< 5 mg/L
Trott Brook @ Twin Lakes Rd	5.6	5.7	4	1
Trott Brook @ 181st Ave	6.2	5.8	4	0
Trott Brook @ Ermine Blvd.	7.1	6.8	4	0
Trott Brook @ Armstrong Blvd	7.8	8.2	4	0
Trott Brook @ Variolite St	6.3	6.8	4	1
Trott Brook @ Nowthen Blvd	6.7	7.1	4	0
Trott Brook @ Hwy 47	7.1	6.7	4	0

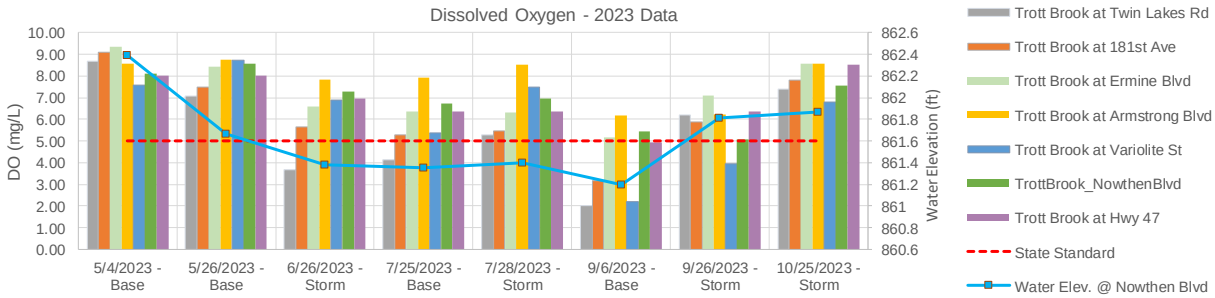
DO - Historical Baseflow Data

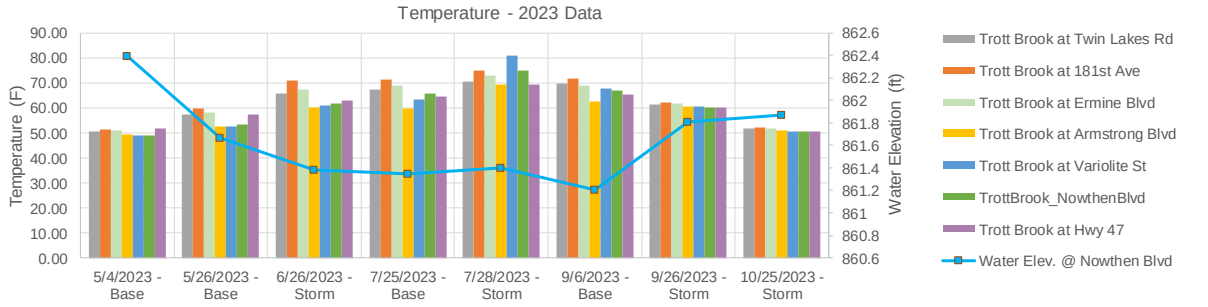
	AVG	MED	TOTAL #	< 5 mg/L
Trott Brook @ Nowthen Blvd	7.1	6.9	16	0

DO - Historical Stormflow Data

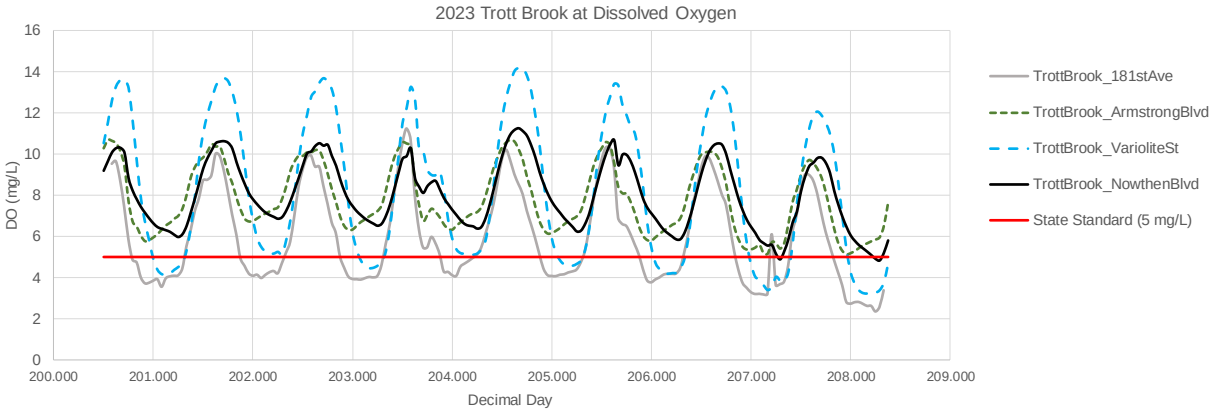
	AVG	MED	TOTAL #	< 5 mg/L
Trott Brook @ Nowthen Blvd	6.3	7.0	16	4

On most dates it appears that oxygen increases from upstream to downstream, at least for the first four sites. The sites were sampled in this order. It would be expected that those sampled first (earliest in the morning) would have lower oxygen, and increased oxygen production from photosynthesis as the morning progressed could be responsible for the apparent trend. There is a noticeable trend between decreasing dissolved oxygen levels and increasing water temperature. This is expected as dissolved oxygen levels are known to have an inverse relationship with temperature; warm water can hold less oxygen. Temperatures remained fairly consistent between sites on a given sample day, suggesting major springs or other inflows are either uncommon or uniformly common in all areas.

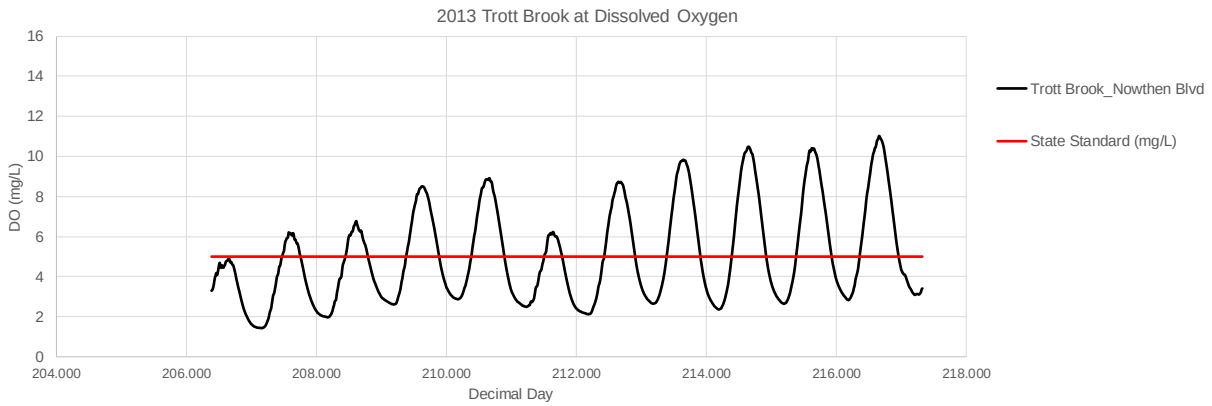




During 2023, deployable sondes were placed in four Trott Brook locations to take dissolved oxygen measurements hourly. The deployable sondes found occasionally low oxygen at each site, but conditions varied (see graph below). Oxygen levels do fall below the state standard of 5 mg/L on a daily basis at some sites, but not at others. There is no upstream to downstream trend, and the sites with the lowest observed oxygen were not adjacent. This suggests multiple, diffuse impacts across the watershed that are causing low oxygen.



A sonde was also placed in the stream in 2013, and the results were different (graph below). That sonde was placed at Nowthen Blvd by the MPCA. Lower oxygen was observed and a greater range. That data was considered when listing the stream as impaired.



The low dissolved oxygen levels are likely the result of decomposition in adjacent wetlands. Trott Brook flows through large wetland throughout its length, and in many sections the stream is straightened through these wetlands. The water has a lot of contact with decaying organic matter which can strip the water of oxygen. As a result, identifying projects for the purpose of addressing the low oxygen impairment is difficult, and the scope of any such projects would need to be large. Some ideas to consider and further evaluate include:

- Increasing Riparian Shading. There is an inverse relationship between temperature and dissolved oxygen levels. Increasing riparian shading should reduce instream temperatures and will likely increase dissolved oxygen levels throughout Trott Brook. It may also increase riparian and in-stream habitat.

- Stream Aeration Projects. In-stream structures such as riffles and pools throughout Trott Brook could increase stream aeration. A challenge for this project type is flat topography.

- Best Management Practices for New Development. There are several areas of new development along Trott Brook. Ensuring robust stormwater retention / treatment for any new development will help prevent Trott Brook from potential worsening conditions and may inherently address low dissolved oxygen levels.

Total Phosphorus

Total phosphorus (TP) is a nutrient that is most limiting for algae growth and other production. High phosphorus can result in a large range of oxygen levels (high daytime oxygen, high decomposition). In 2023, average TP concentrations at the Trott Brook sites occasionally exceed the state standard (100 µg/L), but was usually lower. Phosphorous levels during stormflow is higher than baseflow, which is expected. For example, the average TP across all years monitored in Trott Brook at Nowthen Blvd is 95.7 µg/L during baseflow conditions and 135.0 µg/L post-storm. Of the 36 samples taken across all years at Nowthen Blvd, there have been 16 occurrences of the state standard being exceeded, the majority during post-storm conditions.

In 2023, average TP at all sites ranged from 60.0 µg/L to 116.8 µg/L during baseflow conditions, and 93.3 µg/L to 126.8 µg/L post-storm. This data does not suggest that high phosphorus in the water is problematic, or a driver of the low oxygen impairment.

TP - 2023 Baseflow Data

	AVG	MED	TOTAL #	> 100 ug/L
Trott Brook @ Twin Lakes Rd	103.3	78.0	4	1
Trott Brook @ 181st Ave	60.0	63.0	4	0
Trott Brook @ Ermine Blvd.	87.3	90.5	4	1
Trott Brook @ Armstrong Blvd	70.8	74.5	4	0
Trott Brook @ Variolite St	116.8	80.5	4	1
Trott Brook @ Nowthen Blvd	68.3	77.0	4	0
Trott Brook @ Hwy 47	87.0	97.5	4	2

TP - 2023 Stormflow Data

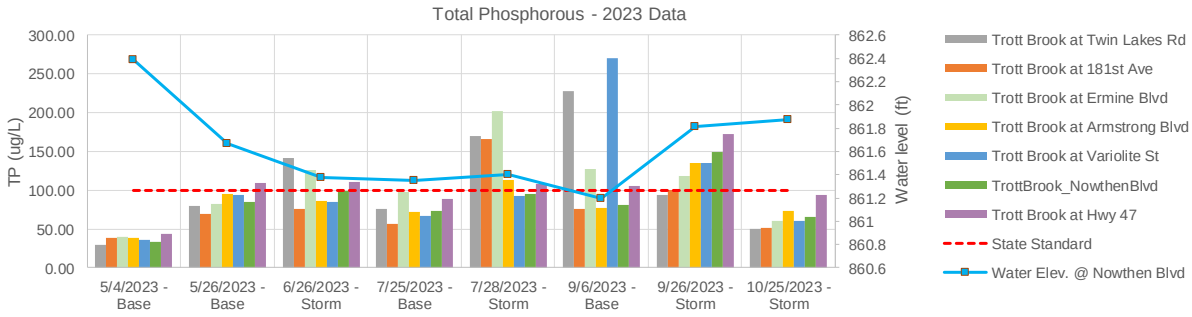
	AVG	MED	TOTAL #	> 100 ug/L
Trott Brook @ Twin Lakes Rd	113.8	117.5	4	2
Trott Brook @ 181st Ave	98.5	88.0	4	1
Trott Brook @ Ermine Blvd.	126.8	122.5	4	3
Trott Brook @ Armstrong Blvd	101.8	99.5	4	2
Trott Brook @ Variolite St	93.3	89.0	4	1
Trott Brook @ Nowthen Blvd	102.0	97.0	4	1
Trott Brook @ Hwy 47	121.5	109.5	4	3

TP - Historical Baseflow Data

	AVG	MED	TOTAL #	> 100 ug/L
Trott Brook @ Nowthen Blvd	95.7	80.5	18	5

TP - Historical Stormflow Data

	AVG	MED	TOTAL #	> 100 ug/L
Trott Brook @ Nowthen Blvd	135.0	115.0	18	11



Turbidity

Turbidity is a measurement of solid material suspended in the water. Suspended material in water affects water transparency, aquatic life, and because many other pollutants are attached to sediment particles. Suspended solids in the waterway can come from both internal and external sources. External sources can include a variety of particles in stormwater runoff. Internally, bank erosion and movement of the bottom substrate contribute to suspended sediments. Average 2023 turbidity measurements for each Trott Brook site are shown below. In all conditions, turbidity was low. Generally, turbidity was higher during baseflow than during stormflow conditions, which is atypical. It may be that in-stream sources are largest and diluted by storm inflows. There is no clear trend of changing turbidity from upstream to downstream. Turbidity decreased as water levels decreased; Anoka County was in a state of drought for a large portion of 2023. With little additional surface overflow runoff, Trott Brook remained relatively clear during this time period.

While high turbidity in Trott Brook is not a concern at this time, rigorous stormwater treatment in new developments should be a priority in the coming years. There are also opportunities to better treat current runoff from developed and agricultural landscapes.

Turbidity - 2023 Baseflow Data

	AVG	MED	TOTAL #
Trott Brook @ Twin Lakes Rd	3.5	3.5	4
Trott Brook @ 181st Ave	4.8	4.9	4
Trott Brook @ Ermine Blvd.	2.6	2.5	4
Trott Brook @ Armstrong Blvd	4.5	2.2	4
Trott Brook @ Variolite St	4.0	1.4	4
Trott Brook @ Nowthen Blvd	3.0	1.7	4
Trott Brook @ Hwy 47	6.0	5.4	4

Turbidity - Historical Baseflow Data

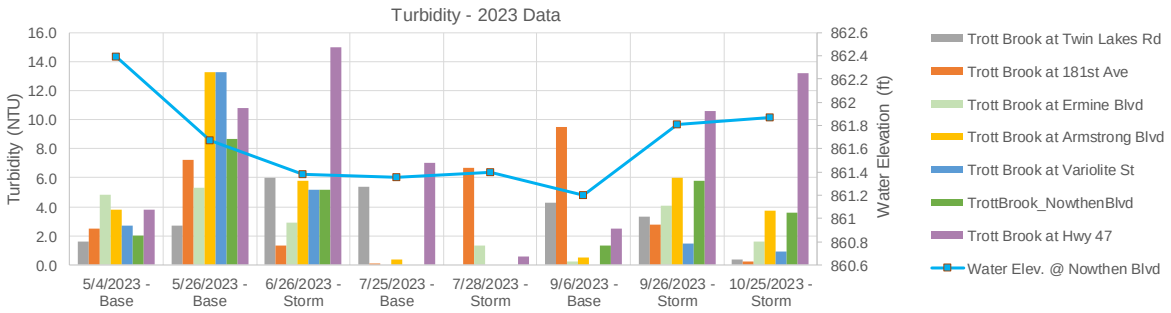
	AVG	MED	TOTAL #
Trott Brook @ Nowthen Blvd	2.3	1.7	18

Turbidity - 2023 Stormflow Data

	AVG	MED	TOTAL #
Trott Brook @ Twin Lakes Rd	2.4	1.9	4
Trott Brook @ 181st Ave	2.8	2.1	4
Trott Brook @ Ermine Blvd.	2.5	2.3	4
Trott Brook @ Armstrong Blvd	3.9	4.8	4
Trott Brook @ Variolite St	1.9	1.2	4
Trott Brook @ Nowthen Blvd	3.7	4.4	4
Trott Brook @ Hwy 47	9.9	11.9	4

Turbidity - Historical Stormflow Data

	AVG	MED	TOTAL #
Trott Brook @ Nowthen Blvd	7.7	5.5	18



Stream Water Quality Monitoring

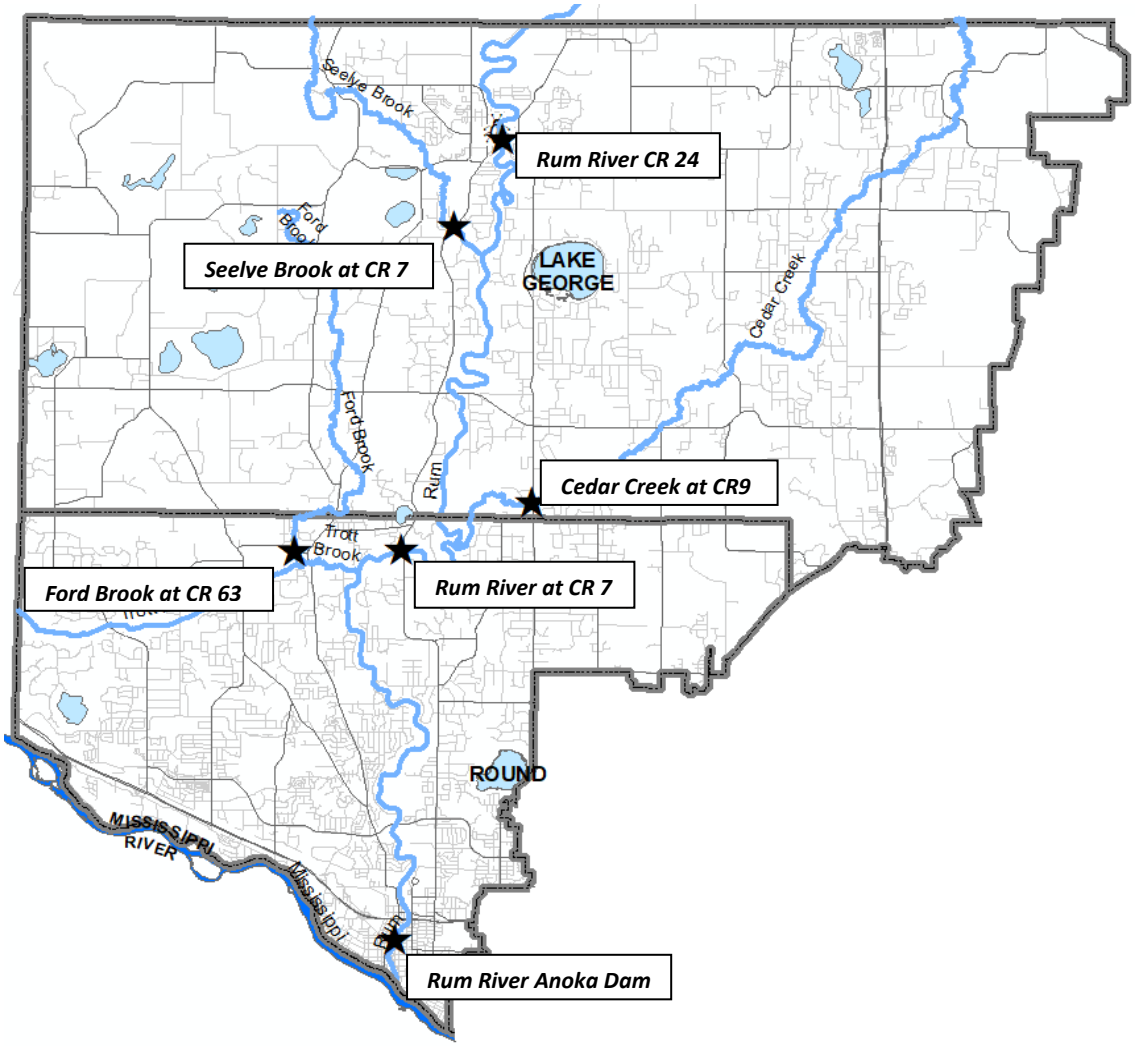
Partners: ACD, LRRWMO, and URRWMO

Locations: Rum River at C.R. 24, Seeyle Brook at C.R. 7, Cedar Creek at C.R. 9, Rum River at C.R. 7, and Ford Brook at C.R. 63.

Description: Water quality monitoring was conducted four times between May – September, two times following storm events and two times during baseflow conditions. The monitoring parameters includes total phosphorus, total suspended solids, dissolved oxygen, turbidity, temperature, specific conductance, transparency, pH, and salinity.

Results: In this chapter, summary results are presented for the Rum River and certain larger tributaries. Users may wish to additionally review data from the Metropolitan Council for the Rum River at the Anoka Dam.

2023 Rum River Monitoring Sites



Rum River & Tributaries Water Quality

Rum River at Co. Rd. 24 (Bridge St), St. Francis	STORET Site ID = S000-066
Seelye Brook at Co. Rd. 7, St. Francis	STORET Site ID = S003-204
Cedar Creek at Hwy 9, Oak Grove	STORET Site ID = S003-203
Rum River at Co. Rd. 7 (Roanoke St), Ramsey	STORET Site ID = S004-026
Ford Brook at Co. Rd 63, Ramsey	STORET Site ID = S003-200
Rum River at Anoka Dam, Anoka	STORET Site ID = S003-183

Background

The Rum River is one of Anoka County's most valued water resources. The river is designated as a state "scenic and recreational" river until it reaches southern Anoka County and is used extensively for all types of recreation. A large portion of western Anoka County drains to the Rum River including the subwatersheds of Seelye Brook, Trott Brook, Ford Brook, and Cedar Creek.

The Rum River and tributaries have been monitored simultaneously in multiple years (2004, 2009-2011, 2014-2019, 2022, & 2023). The objective of this data is to help determine how water quality changes in the Rum River system as it moves through Anoka County and where these changes might be occurring. The data is reported for all sites, side-by-side, for a more comprehensive analysis of water quality in the Rum River, upstream to downstream. Land use surrounding the river changes dramatically from rural residential in the upstream portions of Anoka County to suburban and urbanized in the downstream areas. Sites included:

Rum River at C.R. 24 is located in northern Anoka County, the City of St. Francis with the Isanti County border just upstream. This location is the best available site to monitor the upstream extent of the Upper Rum River Watershed Management Organization and Anoka County.

Cedar Creek at C.R. 9 is a tributary originating in south central Isanti County, flowing southwest before entering the Rum River. Cedar Creek flows through north central Anoka County, progressing through lands with high-quality natural communities, including the Cedar Creek Ecosystem Science Reserve. Habitat in the lower stretches of the stream are of moderate quality with little development, but the stream is listed as an impaired water for excessive *E. coli* bacteria. Cedar Creek is one of the larger streams in Anoka County, reaching 25-feet wide and regularly having depths greater than 2-feet during baseflow conditions. The stream bottom is primarily silt. The watershed is moderately developed with scattered single-family homes but the area continues to develop rapidly.

Seelye Brook at Hwy 7 is a tributary originating in southwestern Isanti County, flowing south through northwestern Anoka County before entering the Rum River. This stream is low gradient, like most other local streams. Seelye Brook has a silty or sandy bottom and lacks riffle-pool sequences. It is a moderate to large stream for Anoka County, with a typical baseflow width of 20-25 feet.

Rum River at Hwy 7 is an approximate mid-way point for the Rum River in Anoka County. It is at the approximately dividing line of the Upper and Lower Watershed Management Organizations.

Ford Brook at C.R. 63 is a tributary originating from a chain of lakes in northwestern Anoka County – Goose, Pinaker, and Eckstrom. The stream flows south until merging with Trott Brook just before entering the Rum River. The stream was identified in local watershed plans as a priority waterbody due to elevated nutrient loads that ultimately deliver to the Rum River.

Rum River at Anoka Dam represents the downstream extent of the Rum River in Anoka County before joining the Mississippi River. While the Rum River technically extends farther downstream, monitoring occurs at this location to avoid backwater influences of the Mississippi River. This site is monitored by the Metropolitan Council (Met Council), and annual monitoring has occurred back to 1996.

Results Summary

This report includes data from 2023 and an overview of historical data. All sites were monitored by ACD staff, except for the Rum River at the Anoka Dam which was monitored by the Metropolitan Council following a different schedule and sampling protocol. Metropolitan Council data is still included in this report for comparison purposes.

The following is a summary of results:

- Dissolved constituents were measured by specific conductivity and chlorides. Specific conductivity in the Rum River is lower than other Anoka County streams and within the healthy range. Chlorides are a regional concern and proactive measures to ensure it does not become elevated in the Rum River watershed is recommended. Periodic monitoring every 2-5 years is recommended.
- pH was within a healthy range (6.5-8.5) at all monitoring sites in in 2023 except for two occasions, which are suspected to be the result of a faulty pH sensor.
- Dissolved oxygen remained above the state standard of 5 mg/L except for one occasion at Ford Brook at C.R. 63.
- Phosphorus levels in the Rum River in recent years have regularly exceeded the state standard of 100 µg/L at all sampled sites, but averaged slightly lower than this threshold. In 2023, total phosphorus in the Rum River averaged 67 µg/L (C.R. 24) and 70.75 µg/L (C.R. 7) at sampled sites from upstream to downstream. Reducing phosphorus levels in the Rum River is a regional priority.
- Suspended solids and turbidity remained at acceptable levels in the Rum River, Cedar Creek, Seelye Brook, and Ford Brook. Robust stormwater treatment within new developments and continued surveillance monitoring is recommended.
- Overall – The priority for the Rum River is reducing phosphorus. A 5% reduction is a top goal identified in local and regional plans. Achieving it will require work throughout the watershed, including upstream of Anoka County.

The intention of this report is to provide a comparison of water quality in the Rum River as it moves upstream to downstream. This report only includes parameters that were tested in 2023 and does not include any additional parameters tested by the Met Council or any of their additional sampling. For more detailed information, see Met Council reports at https://eims.metc.state.mn.us/. All raw data can be obtained from ACD's online database (https://maps.barr.com/Anoka/Home/Chart/), and is also available through the MPCA's EQuIS database, (https://www.pca.state.mn.us/data/environmental-qualityinformation-system-equis).

The data is presented and discussed for each parameter in greater detail below. Management recommendations for each parameter is included in individual sections.

Specific Conductivity and Chlorides

Dissolved pollutant sources include urban road runoff, salt, and agricultural or industrial chemicals, among many others. Conductivity is a broad measure of dissolved pollutants. High conductivity often requires additional monitoring work to determine the cause. Chlorides measures certain salts, such as those used for road deicing or in water softeners, that are frequent causes of high conductivity. The State deems a stream or river "impaired" when chloride measurements regularly exceed 230 mg/L.

Specific conductivity was acceptably low in the Rum River in 2023. Specific conductivity at the Rum River sites was similar, and in nearly all years monitored it increases slightly from upstream to downstream. Average specific conductivity from upstream to downstream in 2023 (in all conditions) was 0.353 mS/cm (C.R. 24), 0.388 mS/cm (C.R. 7), and 0.394 mS/cm (Anoka Dam), respectively. This consistent trend of increasing conductivity from upstream to downstream likely reflects higher road densities and greater deicing efforts with salt application, as well as other pollutant sources associated with increased development.

In 2023, specific conductivity in the Rum River was higher during baseflow conditions than during stormflows. This is a trend observed in previous years, and it provides some insight into the pollutant sources. If dissolved pollutants were only elevated after storms, stormwater runoff would be suspected as the primary driver. However, because dissolved pollutants are highest during baseflow conditions, the suspected primary source is pollution of the shallow groundwater, which normally feeds the river during baseflow. The largest source of pollution is believed to be road salts that have infiltrated into the shallow aquifer. Water softening salts and geologic materials can also be pollution contributors.

Specific conductivity in the tributary streams – Seeyle Brook, Ford Brook, and Cedar Creek – was usually higher during stormflow conditions, but average values of baseflow and stormflow conditions were similar. Average specific conductivity in 2023 (in all conditions) was 0.545 mS/cm (Seeyle Brook at C.R. 7), 0.609 mS/cm (Ford Brook at C.R. 63), and 0.433 mS/cm (Cedar Creek at C.R. 9). These values are higher than the average conductivity reported in the Rum River.

Specific Conductivity - 2023 Baseflow Data

	AVG	MED	TOTAL #
Rum River @ CR 24	0.383	0.383	2
Seelye Brook @ CR 7	0.544	0.544	2
Cedar Creek @ CR 9	0.443	0.443	2
Rum River @ CR 7	0.403	0.406	4
Ford Brook @ CR 63	0.602	0.602	2
Rum River @ Anoka Dam	0.415	0.415	4

Specific Conductivity - 2023 Stormflow Data

	AVG	MED	TOTAL #
Rum River @ CR 24	0.323	0.323	2
Seelye Brook @ CR 7	0.546	0.546	2
Cedar Creek @ CR 9	0.423	0.423	2
Rum River @ CR 7	0.373	0.369	4
Ford Brook @ CR 63	0.616	0.616	2
Rum River @ Anoka Dam	0.372	0.372	4

Specific Conductivity - Historical Baseflow Data

	AVG	MED	TOTAL #
Rum River @ CR 24	0.269	0.273	40
Seelye Brook @ CR 7	0.424	0.425	36
Cedar Creek @ CR 9	0.395	0.399	40
Rum River @ CR 7	0.289	0.283	46
Ford Brook @ CR 63	0.460	0.481	29
Rum River @ Anoka Dam	0.329	0.309	35

Specific Conductivity - Historical Stormflow Data

	AVG	MED	TOTAL #
Rum River @ CR 24	0.259	0.260	35
Seelye Brook @ CR 7	0.392	0.382	25
Cedar Creek @ CR 9	0.361	0.365	29
Rum River @ CR 7	0.286	0.298	48
Ford Brook @ CR 63	0.444	0.416	31
Rum River @ Anoka Dam	0.324	0.315	37

In 2023, chlorides were monitored in the Rum River at C.R. 7 (on 4 of 8 sampling occasions) and in the Rum River at the Anoka Dam. Chloride results ranged from 17.3 mg/L to 29.7 mg/L, far below the state's chronic standard for aquatic life (230 mg/L). Sampling did not occur during snowmelt, when chloride is likely to be at its highest.

Chloride - 2023 Baseflow Data

	AVG	MED	TOTAL
Rum River @ CR 7	22.7	22.7	2
Rum River @ Anoka Dam	27.1	27.2	4

Chloride - 2023 Stormflow Data

	AVG	MED	TOTAL
Rum River @ CR 7	17.8	17.8	2
Rum River @ Anoka Dam	24.9	24.9	4

Chloride - Historical Baseflow Data

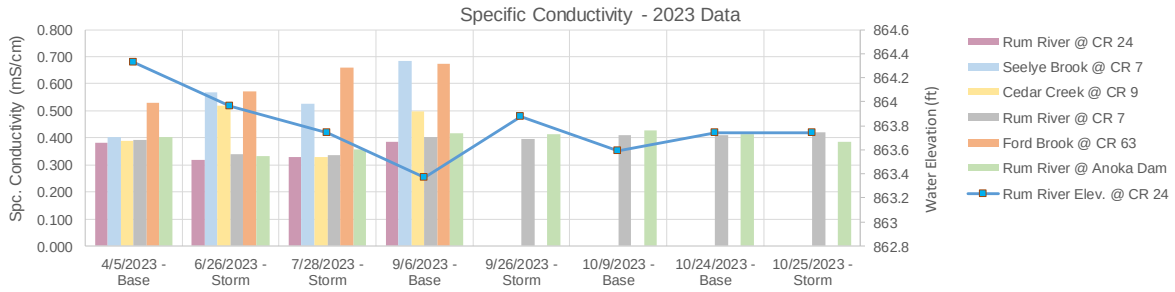
	AVG	MED	TOTAL
Rum River @ CR 24	11.5	10.9	17
Rum River @ CR 7	13.2	12.3	28
Rum River @ Anoka Dam	17.4	15.5	16

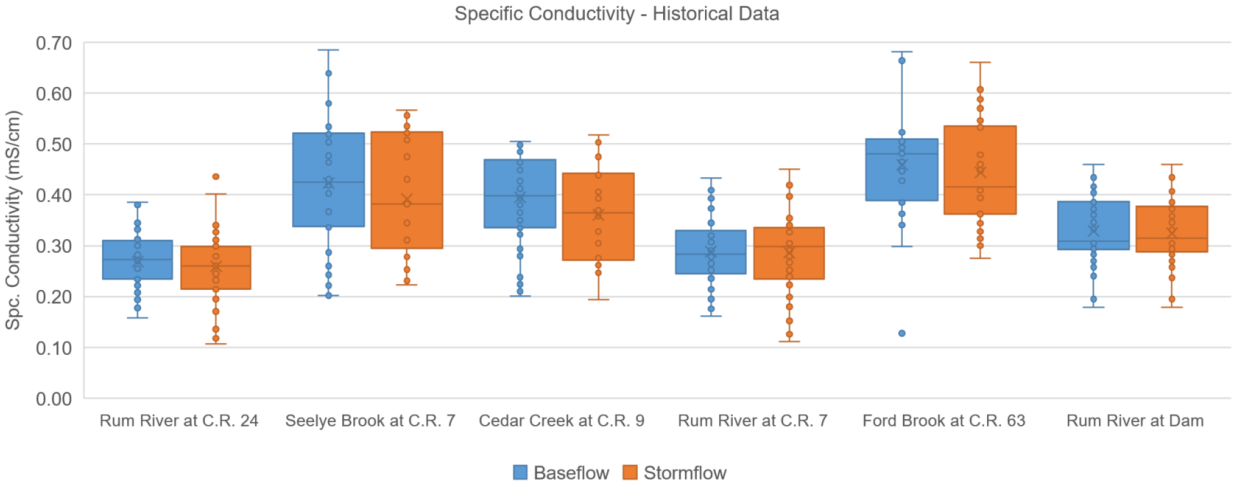
Chloride - Historical Stormflow Data

	AVG	MED	TOTAL
Rum River @ CR 24	10.6	10.8	16
Rum River @ CR 7	12.9	12.5	29
Rum River @ Anoka Dam	14.3	13.0	21

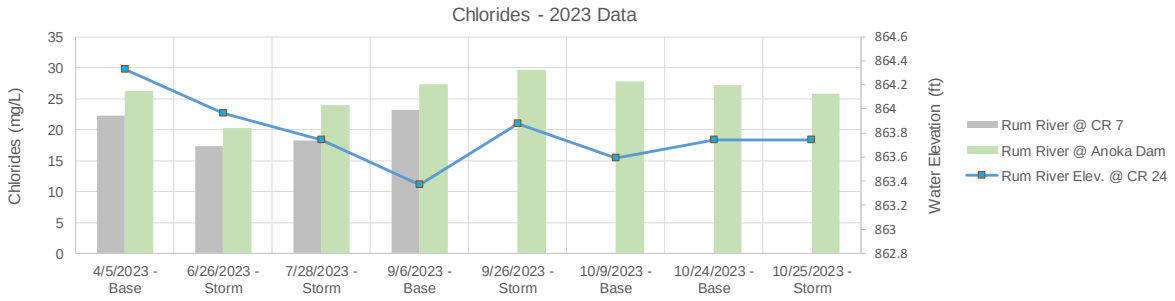
For water resource management, it is important to note that the sources of dissolved pollutants are generally the same for both stormwater and baseflow it is only the timing of delivery to the waterway that is different. Preventing the release of dissolved pollutants into the environment and treating them before infiltration occurs should be a high priority. Training and equipment that minimize road salting while still maintaining safe roads safe is being increasingly emphasized by watershed managers. The MPCA now provides a training program where organizations and employees to obtain a smart-salting certification, which then has to be renewed every few years.

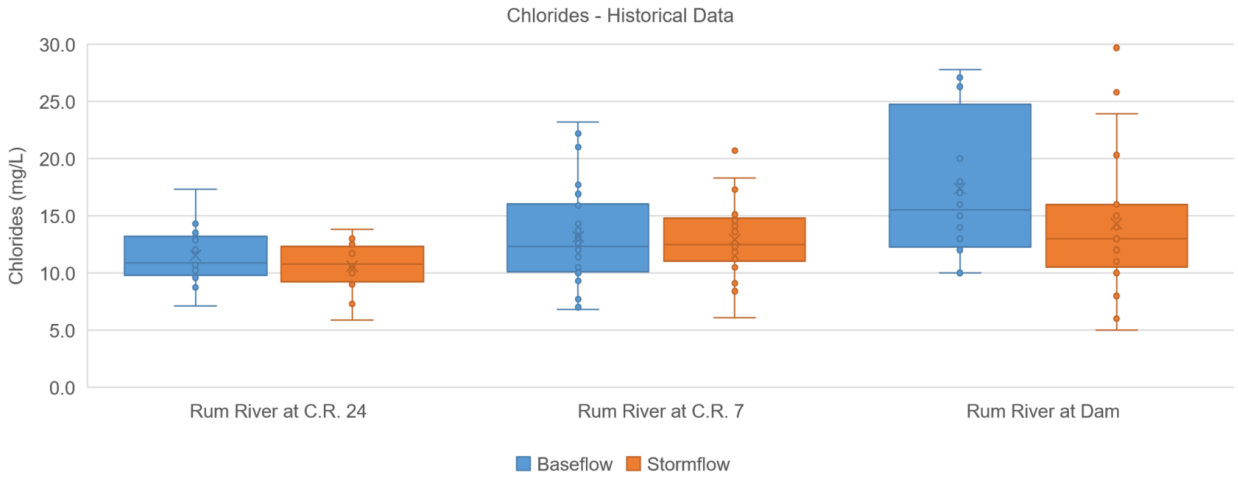
Specific Conductivity during Baseflow and Storm Conditions. Box plots show the median (middle line), 25th and 75th percentile (ends of box), and 10th and 90th percentiles (floating outer lines). Historical boxplot data also includes this year's data.





Chlorides during Baseflow and Storm Conditions. Box plots show the median (middle line), 25th and 75th percentile (ends of box), and 10th and 90th percentiles (floating outer lines). Historical boxplot data also includes this year's data.





pH

pH refers to the acidity of the water. The state standard range for pH is between 6.5 - 8.5, and pH is generally lower during storm events than during baseflow conditions because the pH of rain is typically lower (more acidic). While acid rain is a longstanding problem, its effect on this aquatic system is minimal. The rare occasions when pH is below or exceeds the state standard should not be concerning. No sampling occasions were below or exceeded the state standard range during 2023 at any of the monitoring sites.

Rum River. In 2023, the average pH in the Rum River was 7.93 during baseflow conditions and 7.78 post-storm. Historically, the Rum River exceeded the state standard on eleven occasions, and has been below the state standard on only two occasions.

Cedar Creek. In 2023, the average pH in Cedar Creek was 7.72 during baseflow conditions and 7.65 post-storm. Historically, Cedar Creek has exceeded the state standard on five occasions.

Seelye Brook. In 2023, the average pH in Seelye Brook was 7.85 during baseflow conditions and 7.41 post-storm. Historically, Seelye Brook has exceeded the state standard on five occasions.

Ford Brook. In 2023, the average pH in Ford Brook was 7.59 during baseflow conditions and 7.54 post-storm. Historically, Ford Brook has exceeded the state standard on three sampling occasions, and has been below the state standard on only two occasions.

pH - 2023 Baseflow Data

	AVG	MED	TOTAL #	< 6.5	> 8.5
Rum River @ CR 24	7.85	7.85	2	0	0
Seelye Brook @ CR 7	7.85	7.85	2	0	0
Cedar Creek @ CR 9	7.72	7.72	2	0	0
Rum River @ CR 7	7.93	7.86	3	0	0
Ford Brook @ CR 63	7.59	7.59	2	0	0
Rum River @ Anoka Dam	8.00	7.98	4	0	0

pH - Historical Baseflow Data

	AVG	MED	TOTAL #	< 6.5	> 8.5
Rum River @ CR 24	7.89	7.82	38	0	1
Seelye Brook @ CR 7	7.95	7.92	36	0	3
Cedar Creek @ CR 9	8.05	8.03	40	0	3
Rum River @ CR 7	7.92	7.89	44	0	1
Ford Brook @ CR 63	7.75	7.74	29	1	0
Rum River @ Anoka Dam	8.02	8.00	35	0	2

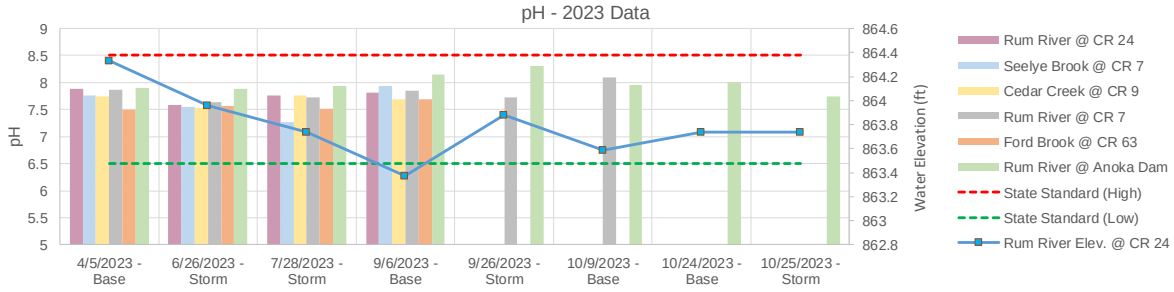
pH - 2023 Stormflow Data

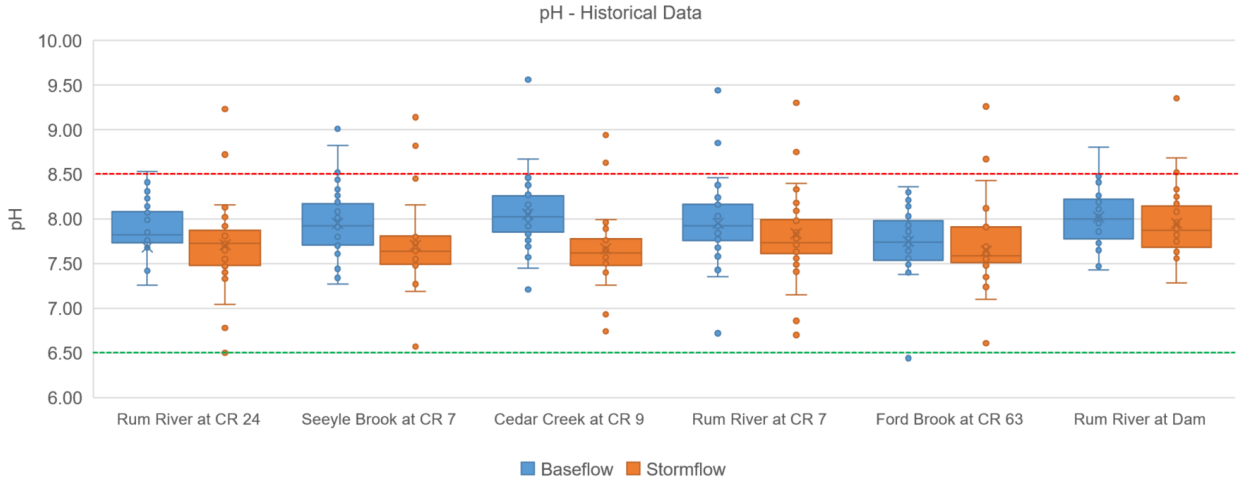
	AVG	MED	TOTAL #	< 6.5	> 8.5
Rum River @ CR 24	7.68	7.68	2	0	0
Seelye Brook @ CR 7	7.41	7.41	2	0	0
Cedar Creek @ CR 9	7.65	7.65	2	0	0
Rum River @ CR 7	7.69	7.72	3	0	0
Ford Brook @ CR 63	7.54	7.54	2	0	0
Rum River @ Anoka Dam	7.97	7.91	4	0	0

pH - Historical Stormflow Data

	AVG	MED	TOTAL #	< 6.5	> 8.5
Rum River @ CR 24	7.71	7.73	34	0	2
Seelye Brook @ CR 7	7.71	7.64	25	0	2
Cedar Creek @ CR 9	7.67	7.62	29	0	2
Rum River @ CR 7	7.76	7.73	46	0	2
Ford Brook @ CR 63	7.64	7.59	31	1	3
Rum River @ Anoka Dam	7.95	7.87	36	0	3

pH during Baseflow and Storm Conditions. Box plots show the median (middle line), 25th and 75th percentile (ends of box), and 10th and 90th percentiles (floating outer lines). Historical boxplot data also includes this year's data.





Dissolved Oxygen

Dissolved oxygen is necessary for aquatic life to survive and thrive. Organic pollution causes oxygen to be consumed during decomposition. If oxygen levels in water fall below 5 mg/L, aquatic life begins to suffer. A stream is considered impaired if 10% of observations are below 5 mg/L in the last 10-years. Dissolved oxygen levels are typically lowest in the early morning because of decomposition consuming oxygen at night without the offsetting of oxygen production by photosynthesis.

Rum River. In 2023, all measurements of dissolved oxygen in the Rum River were above 5 mg/L. Dissolved oxygen has never been observed below this state standard at any of the Rum River sites. Only on a handful of occasions has dissolved oxygen been recorded below 6.0 mg/L and many of these results were recorded during the same storm event. In 2023, the lowest observation was 6.0 mg/L during baseflow conditions.

Cedar Creek. In 2023, all measurements of dissolved oxygen in Cedar Creek were above 5 mg/L. The lowest observation this year was 6.0 mg/L post-storm. Historically, dissolved oxygen has been observed below the state standard in Cedar Creek on five occasions, the majority of which were observed post-storm.

Seelye Brook. In 2023, all measurements of dissolved oxygen in Seelye Brook were above 5 mg/L. The lowest observation this year was 6.78 mg/L post-storm. Historically, dissolved oxygen has been observed below the state standard in Seelye Brook on four occasions, equally distributed between baseflow conditions and post-storm conditions.

Ford Brook. In 2023, one measurement of dissolved oxygen in Ford Brook fell below the state of 5 mg/L. This measurement was recorded at 4.56 mg/L during baseflow conditions. Historically, dissolved oxygen has been observed below the state standard in Seelye Brook on two occasions (including 2023), equally distributed between baseflow conditions and post-storm conditions.

Only a few observations of dissolved oxygen below 5 mg/L have been observed in all monitored years. As such, there is no management concern at this time. A common driver of lower oxygen is higher nutrients, so nutrient reduction efforts will have a secondary benefit of preventing low oxygen.

DO - 2023 Baseflow Data

	AVG	MED	TOTAL #	< 5 mg/L
Rum River @ CR 24	9.06	9.06	2	0
Seelye Brook @ CR 7	8.22	8.22	2	0
Cedar Creek @ CR 9	8.63	8.63	2	0
Rum River @ CR 7	9.35	9.95	4	0
Ford Brook @ CR 63	7.08	7.08	2	1
Rum River @ Anoka Dam	10.44	10.55	4	0

DO - 2023 Stormflow Data

	AVG	MED	TOTAL #	< 5 mg/L	< 5 mg/L
Rum River @ CR 24	8.99	8.99	2	0	
Seelye Brook @ CR 7	7.72	7.72	2	0	
Cedar Creek @ CR 9	7.37	7.37	2	0	
Rum River @ CR 7	8.46	8.68	4	0	
Ford Brook @ CR 63	7.45	7.45	2	0	
Rum River @ Anoka Dam	9.55	8.87	4	0	

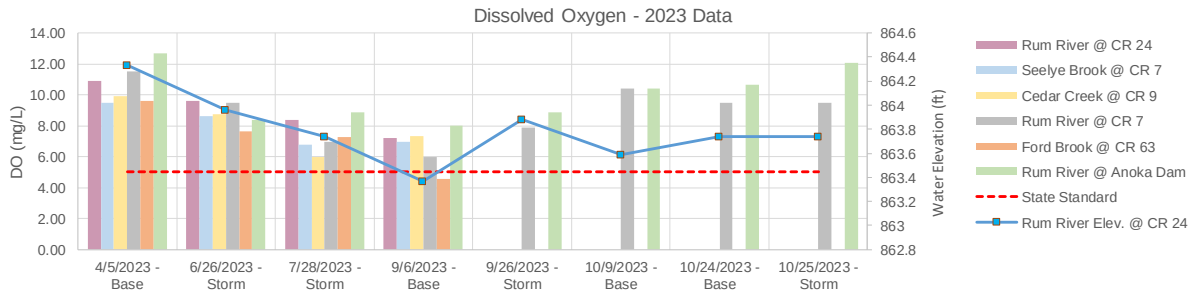
DO - Historical Baseflow Data

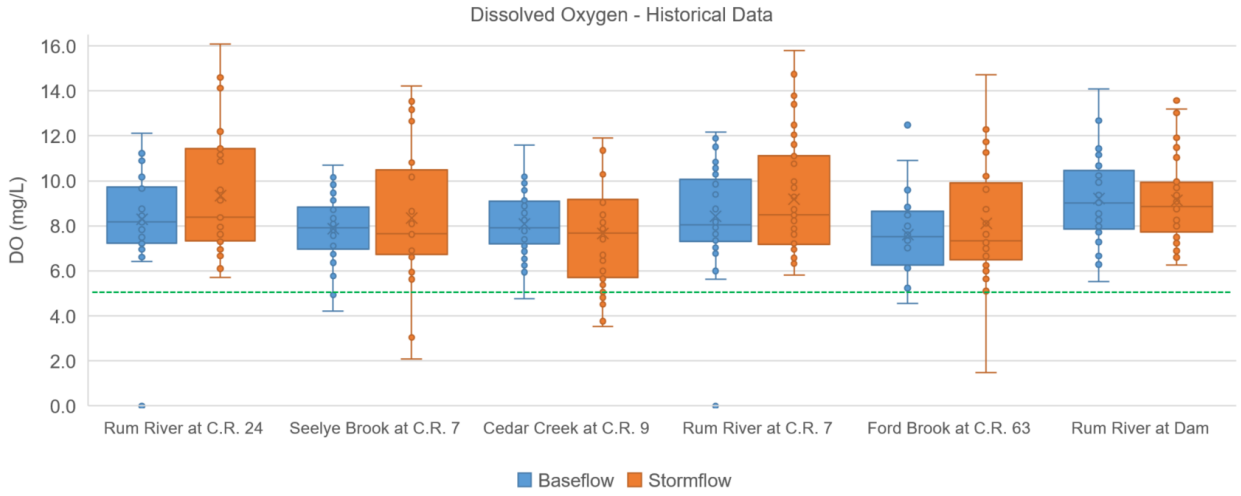
	AVG	MED	TOTAL #	< 5 mg/L
Rum River @ CR 24	8.52	8.21	38	0
Seelye Brook @ CR 7	7.88	7.91	36	2
Cedar Creek @ CR 9	8.09	7.92	40	1
Rum River @ CR 7	8.62	8.11	44	0
Ford Brook @ CR 63	7.61	7.51	26	1
Rum River @ Anoka Dam	9.21	9.03	39	0

DO - Historical Stormflow Data

	AVG	MED	TOTAL #	< 5 mg/L
Rum River @ CR 24	9.34	8.38	33	0
Seelye Brook @ CR 7	8.36	7.66	25	2
Cedar Creek @ CR 9	7.66	7.68	28	4
Rum River @ CR 7	9.19	8.50	46	0
Ford Brook @ CR 63	8.10	7.33	29	1
Rum River @ Anoka Dam	9.13	8.87	40	0

Dissolved Oxygen during Baseflow and Storm Conditions. Box plots show the median (middle line), 25th and 75th percentile (ends of box), and 10th and 90th percentiles (floating outer lines). Historical boxplot data also includes this year's data.





Total Phosphorus

The nutrient phosphorus (TP) is one of the most common pollutants to local waterways, and can be associated with stormwater runoff, wastewater, fertilizers, soil loss, and many other sources. Since it is an essential nutrient in the natural ecosystem, even a slight increase of phosphorus levels in a waterway can result in harmful algae blooms, accelerated plant growth, low dissolved oxygen levels and other negative effects to fish, macroinvertebrates, and other aquatic animals.

The State deems a stream or river "impaired" in the central region of Minnesota when TP measurements exceed 100 µg/L and a second condition is met. The second condition is chlorophyll-a >18 µg/L, diel dissolved oxygen flux of 3.5 mg/L or periphyton chlorophyll-a >150 mg/m^2.

Rum River. In 2023, average phosphorous concentrations at the Rum River sites for all conditions, upstream to downstream, were 67.0 µg/L (C.R. 24), 67.4 µg/L (C.R. 7), and 69.9 (Anoka Dam), respectively. On average, phosphorous was higher during baseflow than during stormflow, which is atypical. For example, the average TP across all years at the Rum River C.R. 7 site is 87.2 µg/L during baseflow and 104.5 µg/L post-storm. Historically, 58 of the 162 measurements taken at these Rum River sites have been greater than 100 µg/L.

Cedar Creek. In 2023, TP levels in Cedar Creek averaged 129.0 µg/L during all conditions. It averaged 123.0 µg/L during baseflow and 135.0 µg/L post-storm. Historically, 41 of the 61 measurements taken at the Cedar Creek site have been greater than 100 µg/L. Individual results over 200 µg/L have been a near-annual occurrence since 2015, but were not observed in 2022 and 2023.

Seelye Brook. In 2023, TP levels in Seelye Brook averaged 128.8 µg/L during all conditions. It averaged 133.5 µg/L during baseflow and 124.0 µg/L post-storm. Historically, 44 of the 53 measurements taken at the Seelye Brook site have been greater than 100 µg/L.

Ford Brook. In 2023, TP levels in Ford Brook averaged 160.5 µg/L during all conditions. It averaged 136.50 µg/L during baseflow and 184.50 µg/L post-storm. Historically, 49 of the 60 measurements taken at the Ford Brook site have been greater than 100 µg/L.

Phosphorus reduction is a management priority in the Rum River watershed. Local and regional water plans have set a 5% reduction goal to ensure the river does not become classified as "impaired."

TP - 2023 Baseflow Data

	AVG	MED	TOTAL	> 100 µg/L
Rum River @ CR 24	70.5	70.5	2	0
Seelye Brook @ CR 7	133.5	133.5	2	2
Cedar Creek @ CR 9	123.0	123.0	2	1
Rum River @ CR 7	69.8	65.0	4	0
Ford Brook @ CR 63	136.5	136.5	2	1
Rum River @ Anoka Dam	71.0	66.0	4	1

TP - 2023 Stormflow Data

	AVG	MED	TOTAL	> 100 µg/L
Rum River @ CR 24	63.5	63.5	2	0
Seelye Brook @ CR 7	124.0	124.0	2	2
Cedar Creek @ CR 9	135.0	135.0	2	2
Rum River @ CR 7	65.0	66.0	4	0
Ford Brook @ CR 63	184.5	184.5	2	2
Rum River @ Anoka Dam	68.8	71.0	4	0

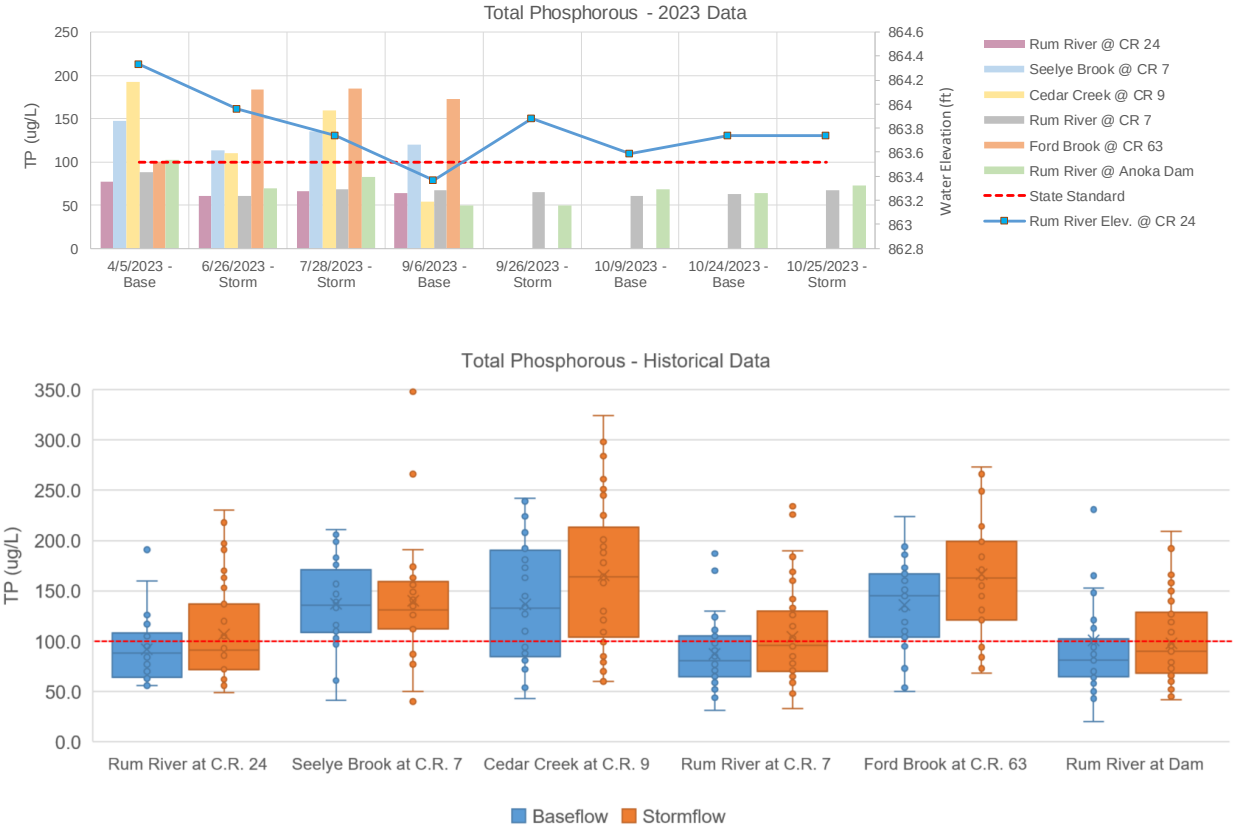
TP - Historical Baseflow Data

	AVG	MED	TOTAL	> 100 µg/L
Rum River @ CR 24	92.2	88.0	33	11
Seelye Brook @ CR 7	137.4	135.5	28	24
Cedar Creek @ CR 9	136.6	133.0	32	19
Rum River @ CR 7	87.2	80.5	46	12
Ford Brook @ CR 63	136.3	145.0	29	24
Rum River @ Anoka Dam	101.0	81.0	45	14

TP - Historical Stormflow Data

	AVG	MED	TOTAL	> 100 µg/L
Rum River @ CR 24	106.8	91.0	35	14
Seelye Brook @ CR 7	140.4	131.0	25	20
Cedar Creek @ CR 9	165.7	164.0	29	22
Rum River @ CR 7	104.5	96.0	48	21
Ford Brook @ CR 63	166.8	163.0	31	25
Rum River @ Anoka Dam	98.0	90.0	41	13

Total Phosphorus during Baseflow and Storm Conditions. Box plots show the median (middle line), 25th and 75th percentile (ends of box), and 10th and 90th percentiles (floating outer lines). Historical boxplot data also includes this year's data.



Turbidity and Total Suspended Solids

Turbidity and total suspended solids (TSS) are two measurements of solid material suspended in the water. Turbidity is measured by refraction of a light beam passed through a water sample and is sensitive to larger particles. TSS is measured by filtering solids from a water sample and weighing the filtered material. The amount of suspended material present in water is important because it affects water transparency, aquatic life, and because many other pollutants are attached to sediment particles. Suspended solids in the waterway can come from both internal and external sources. External sources can include a variety of particles in stormwater runoff. Internally, bank erosion and movement of the bottom substrate contribute to suspended sediments. A moderate amount of this type of internal loading is natural. The State deems a stream or river "impaired" in the central region of Minnesota when 10% of TSS measurements exceed 30 mg/L. There is no turbidity standard.

Rum River. In 2023, average turbidity at the Rum River sites for all conditions, upstream to downstream, was 9.1 NTU (C.R. 24), 5.6 NTU (C.R. 7), and 2.3 NTU (Anoka Dam), respectively. The average TSS at the Rum River sites for all conditions, upstream to downstream, was 6.0 mg/L (C.R. 24), 5.5 mg/L (C.R. 7), and 3.9 mg/L (Anoka Dam), respectively. Turbidity is generally low in the river but increases are observed after storm events. There is no clear trend of changing turbidity or suspended solids from upstream to downstream.

Cedar Creek. In 2023, average turbidity in Cedar Creek was 10.5 NTU during baseflow conditions and 15.5 post-storm. Average TSS in Cedar Creek was 17.0 mg/L during baseflow conditions and 19.0 mg/L post-storm. The historical median TSS in Cedar Creek has been 13.0 mg/L during baseflow conditions and 14.0 mg/L post-storm. While TSS in Cedar Creek is above the historical median for Anoka County streams, it remains well below the state standard (30 mg/L). Historically, TSS has been observed above the state standard in Cedar Creek on seven occasions, the majority of which were post-storm. Reasons for low suspended material likely include the relative lack of manmade stormwater outfalls and the fact that the creek slowly meanders through broad floodplain wetlands.

Seelye Brook. In 2023, average turbidity in Seelye Brook was 5.7 NTU during baseflow conditions and 0.7 NTU post-storm. Average TSS in Seelye Brook was 8.5 mg/L during baseflow conditions and 4.5 mg/L post-storm. The historical median TSS in Seelye Brook has been 5.5 mg/L during baseflow conditions and 6.0 mg/L post-storm. These are healthy levels that are well below the state standard. Only on one occasion was TSS recorded above the state standard.

Ford Brook. In 2023, average turbidity in Ford Brook was 12.8 NTU during baseflow conditions and 7.8 NTU post-storm. Average TSS in Ford Brook was 14.0 mg/L during baseflow conditions and 7.5 mg/L post-storm. The historical median TSS in Ford Brook has been 6.0 mg/L during baseflow conditions and 14.0 mg/L post-storm. Historically, TSS has been observed above the state standard in Ford Brook on seven occasions, the majority of which were post-storm.

Turbidty - 2023 Baseflow Data

	AVG	MED	TOTAL
Rum River @ CR 24	12.0	12.0	2
Seelye Brook @ CR 7	5.7	5.7	2
Cedar Creek @ CR 9	10.5	10.5	2
Rum River @ CR 7	4.7	3.4	4
Ford Brook @ CR 63	12.8	12.8	2
Rum River @ Anoka Dam	3.3	2.0	4

Turbidity - 2023 Stormflow Data

	AVG	MED	TOTAL
Rum River @ CR 24	6.1	6.1	2
Seelye Brook @ CR 7	0.7	0.7	2
Cedar Creek @ CR 9	15.5	15.5	2
Rum River @ CR 7	6.4	3.7	3
Ford Brook @ CR 63	7.8	7.8	2
Rum River @ Anoka Dam	1.3	1.0	4

Turbidity - Historical Baseflow Data

	AVG	MED	TOTAL
Rum River @ CR 24	8.4	5.6	37
Seelye Brook @ CR 7	6.8	4.5	36
Cedar Creek @ CR 9	9.7	9.8	40
Rum River @ CR 7	8.0	6.6	44
Ford Brook @ CR 63	8.6	6.8	28
Rum River @ Anoka Dam	6.1	4.8	44

Turbidity - Historical Stormflow Data

	AVG	MED	TOTAL
Rum River @ CR 24	11.7	9.0	33
Seelye Brook @ CR 7	7.2	5.6	24
Cedar Creek @ CR 9	13.5	9.4	28
Rum River @ CR 7	10.4	9.3	46
Ford Brook @ CR 63	16.1	10.7	30
Rum River @ Anoka Dam	9.9	6.6	35

TSS - 2023 Baseflow Data

	AVG	MED	TOTAL #	> 30 mg/L
Rum River @ CR 24	8.0	8.0	2	0
Seelye Brook @ CR 7	8.5	8.5	2	0
Cedar Creek @ CR 9	17.0	17.0	2	0
Rum River @ CR 7	6.8	5.5	4	0
Ford Brook @ CR 63	14.0	14.0	2	0
Rum River @ Anoka Dam	4.8	3.0	4	0

TSS - 2023 Stormflow Data

	AVG	MED	TOTAL #	> 30 mg/L
Rum River @ CR 24	4.0	4.0	2	0
Seelye Brook @ CR 7	4.5	4.5	2	0
Cedar Creek @ CR 9	19.0	19.0	2	0
Rum River @ CR 7	4.3	4.5	4	0
Ford Brook @ CR 63	7.5	7.5	2	0
Rum River @ Anoka Dam	3.0	3.0	4	0

TSS - Historial Baseflow Data

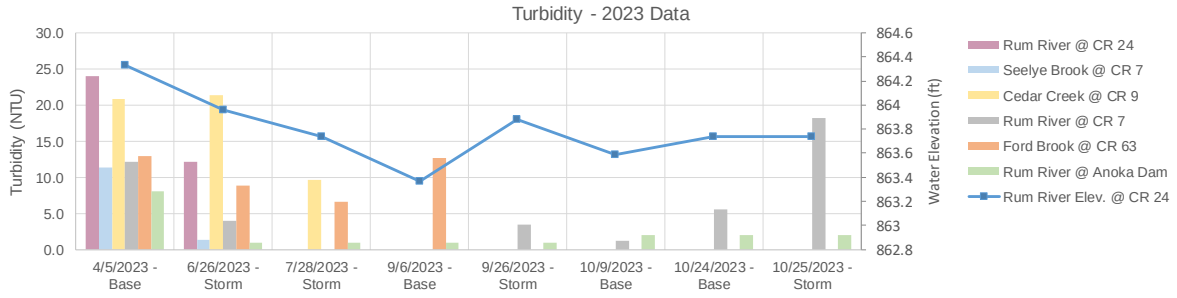
	AVG	MED	TOTAL #	> 30 mg/L
Rum River @ CR 24	7.4	7.0	33	0
Seelye Brook @ CR 7	7.7	5.5	28	1
Cedar Creek @ CR 9	14.3	13.0	32	2
Rum River @ CR 7	6.9	6.0	46	0
Ford Brook @ CR 63	11.3	9.0	29	2
Rum River @ Anoka Dam	8.4	5.5	46	3

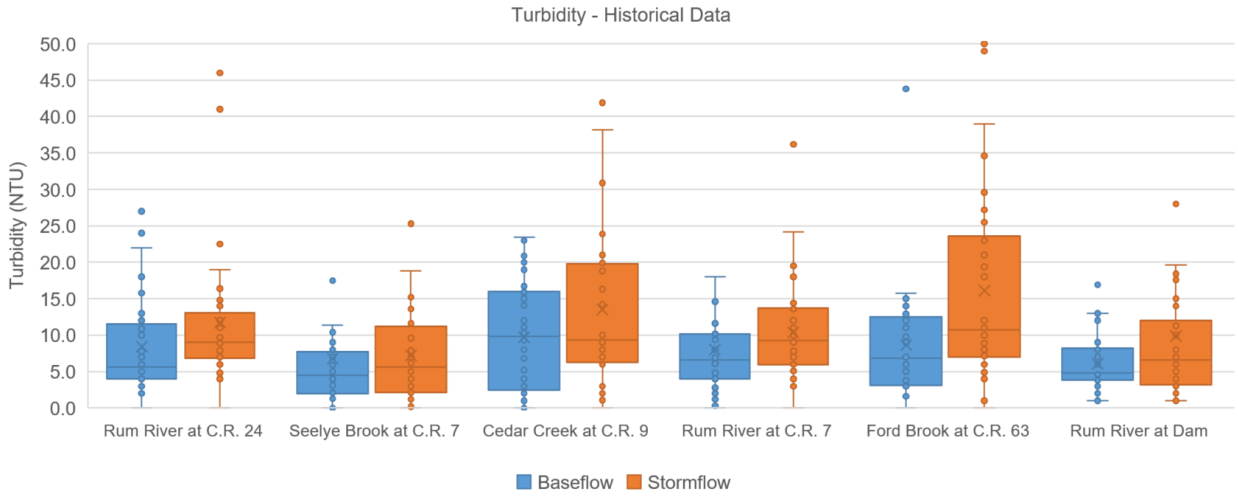
TSS - Historical Stormflow Data

	AVG	MED	TOTAL #	> 30 mg/L
Rum River @ CR 24	9.5	7.0	35	0
Seelye Brook @ CR 7	6.9	6.0	25	0
Cedar Creek @ CR 9	18.3	14.0	29	5
Rum River @ CR 7	9.4	8.0	48	0
Ford Brook @ CR 63	17.3	14.0	31	5
Rum River @ Anoka Dam	8.8	6.0	40	1

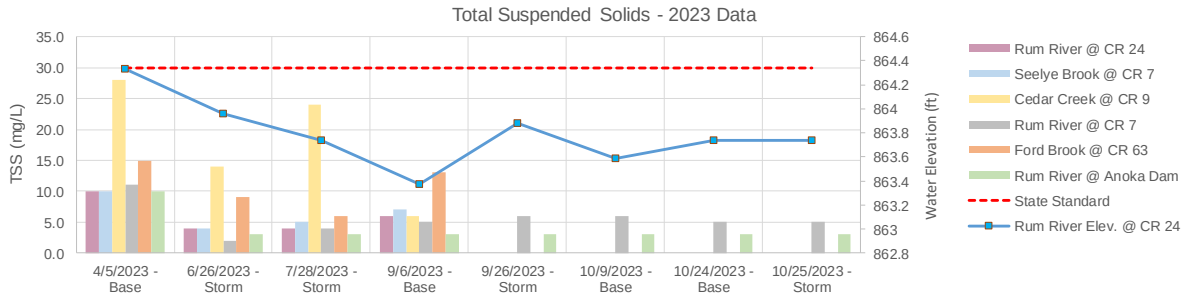
While the Rum River and these tributaries remain well under the impairment threshold for TSS, rigorous stormwater treatment in new developments should be a priority in the coming years. There are also opportunities to better treat current runoff from developed and agricultural landscapes. ACD and partners currently have a well-funded riverbank stabilizations program because it offers multiple benefits to water quality, habitat, and land protection.

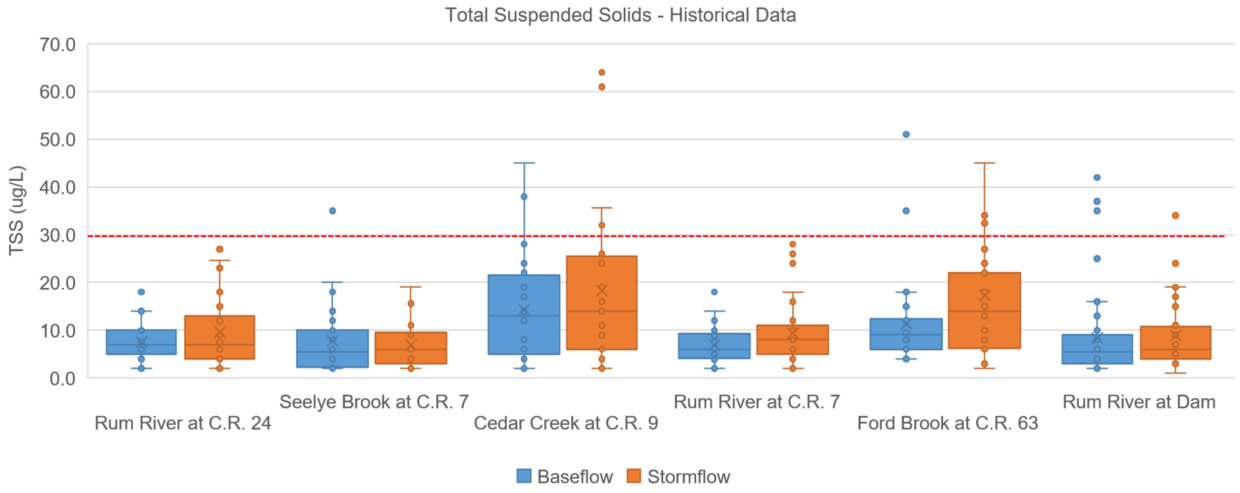
Turbidity during Baseflow and Storm Conditions. Box plots show the median (middle line), 25th and 75th percentile (ends of box), and 10th and 90th percentiles (floating outer lines). Historical boxplot data also includes this year's data.





Total Suspended Solids during Baseflow and Storm Conditions. Box plots show the median (middle line), 25th and 75th percentile (ends of box), and 10th and 90th percentiles (floating outer lines). Historical boxplot data also includes this year's data.





Stream Water Quality – Biological Monitoring

Partners: LRRWMO, ACD, Anoka High School

Description: This long-standing Anoka Conservation District program combines environmental education and stream water quality monitoring. Under the supervision of ACD staff, high school science classes collect aquatic macroinvertebrates from stream sites, identify their catch to the family level, and then use the biotic index to score water and habitat quality. Different families of macroinvertebrates have different water and habitat quality requirements. The families collectively known as EPT (Ephemeroptera, or mayflies, Plecoptera, or stoneflies, and Trichoptera, or caddisflies) are generally pollution intolerant. Other families can thrive in low-quality water. Therefore, a census of stream macroinvertebrates yields important information on overall stream health.

Purpose: To assess stream quality through biological monitoring while providing an environmental education service to the community.

Location: Rum River behind Anoka High School

Results: Results for each site are detailed on the following pages.

Data Interpretation

Consider all biological indices of water quality together rather than look at each alone, since each gives only a partial picture of stream condition. Compare the final numbers to county-wide averages. This gives some sense of what might be expected for streams in a similar landscape, but does not necessarily reflect what might be expected of a minimally impacted stream. Some key numbers to look for include:

<u># Families</u> — Number of Invertebrate families. Higher values indicate better quality.

<u>EPT</u> — Number of families of the generally pollution-intolerant orders. Ephemeroptera, Plecopter, Trichoptera. Higher numbers indicate better stream quality.

<u>Family Biotic Index (FBI)</u> — An Index that utilizes known pollution tolerances for each family. Lower numbers indicate better stream quality.

FBI	Stream Quality Evaluation
0.00-3.75	Excellent
3.76-4.25	Very Good
4.26-5.00	Good
5.01-5.75	Fair
5.76-6.50	Fairly Poor
6.51-7.25	Poor
7.26-10.00	Very Poor

<u>Population Attributes Metrics</u>

% EPT compares the number of organisms in the EPT orders (Ephemeroptera, Plecoptera, Trichoptera) to the total number of organisms in the sample. A high percent of EPT is good.

% Dominant Family measures the percentage of individuals in the sample that are in the sample's most abundant family. A high percentage is usually bad because it indicates low evenness (one of a few families dominate, and all others are rare)

Rum River

Anoka High School, Anoka

Monitored Since
2001

Student Involvement
Approximately 100 students in 2023, over 1,600 total since 2001. This site is monitored by Anoka High School, with facilitation from the Anoka Conservation District.

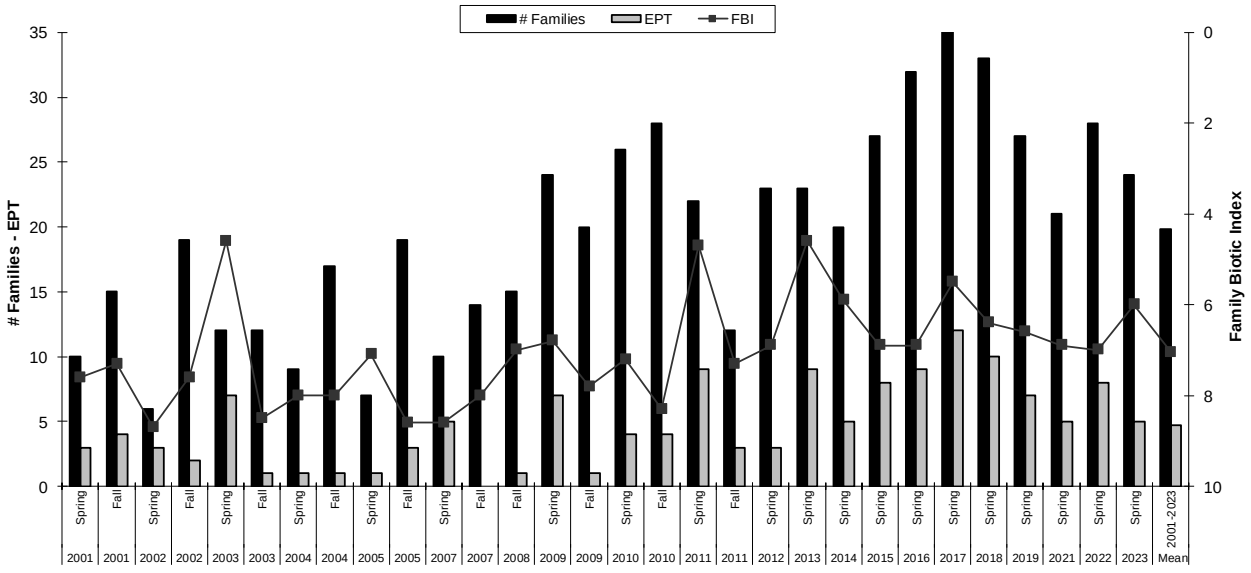
Background

The Rum River originates from Lake Mille Lacs, and flows south through western Anoka County where it joins the Mississippi River in the City of Anoka. In Anoka County the Rum River is riffled (northern part of the county) as well as portions of the river containing pools with a sandy river bottom. The Rum River's overall condition is regarded as excellent and most of the Rum River in Anoka County is designated as a state "scenic and recreational" waterway. The sampling site is located behind the Anoka High School and most sampling has been conducted in a backwater section rather than the main channel.

Results
Findings have suggested declining river health since 2017. However, looking across all years there has been wide variation that might be due to sampling effort, river levels, and other factors.

Results in 2023 were slightly poorer than 2022. In 2023, students collected 24 different families of invertebrates, while 28 families were collected in 2022. Five families of the most sensitive taxa (Ephemeroptera, Plecoptera, and Trichoptera, EPT) were collected in 2023.

Historical Biomonitoring Results for Rum River behind Anoka High School



Biomonitoring Data for the Rum River behind Anoka High School – Most Recent Five Years

Year	2018	2019	2021	2022	2023	Mean
Season	Spring	Spring	Spring	Spring	Spring	2001-2023
FBI	6.40	6.60	6.90	7.00	6.00	7.0
# Families	33	27	21	28	24	19.9
EPT	10	7	5	8	5	4.7
Date	14-May	10-May	11-May	10-May	10-May	
sampling by	AHS	AHS	AHS	AHS	AHS	
sampling method	MH	MH	MH	MH	MH	
# individuals	1648	1341	687	860	1090	
# replicates	3	1	1	1	1	
Dominant Family	Siphlonuridae	Siphlonuridae	Siphlonuridae	Corixidae	Baetiscidae	
% Dominant Family	48.1	66.8	59.1	35.6	38.3	
% Ephemeroptera	65.1	74.4	64.2	18.8	44.1	
% Trichoptera	0.1	0.7	0	0	0	
% Plecoptera	1.9	0.8	0.4	0.7	0.5	
% EPT	67.1	75.9	64.6	19.5	44.6	

Discussion

Historically, both chemical and biological monitoring indicate above average water quality in the Rum River. Poorer results in 2021-2023 may reflect varying site and sampling conditions rather than a shift in the biological community. Habitat is ideal for a variety of stream life, and includes a variety of substrates, plenty of woody, snags, riffles, and pools.

Historically, biomonitoring near Anoka High School was conducted mostly in a backwater area with a mucky bottom, particularly during high or moderate water levels. That area tends to not be occupied by pollution intolerant families and has less diversity. When water levels are low, students are also able to sample in the main channel with its rockier bottom, more sensitive families, and greater diversity. Water levels in the Rum River have been moderate the last several times this site was sampled, requiring backwater sampling; this may be contributing to the decline in sensitive families captured.

Wetland Hydrology

Partners: LLRWMO, ACD

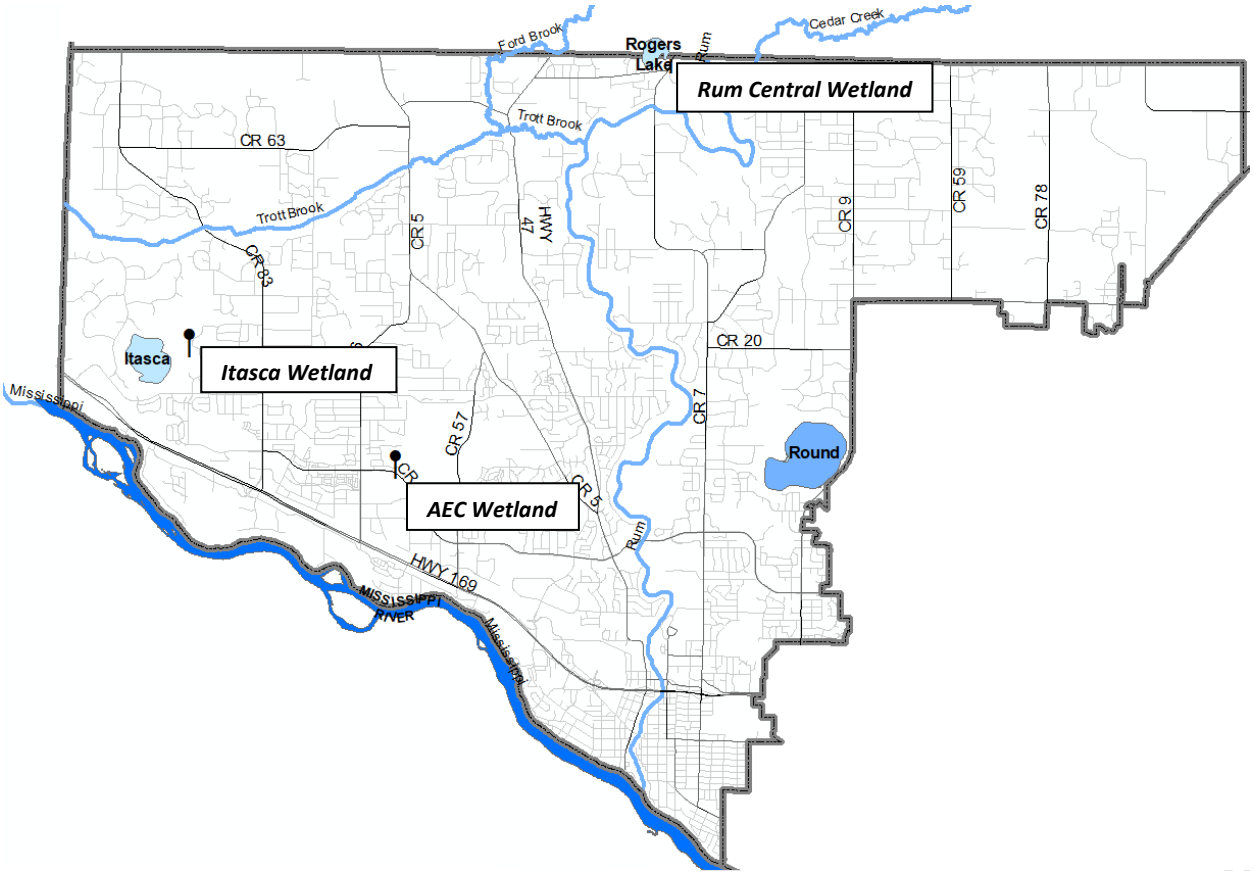
Description: Continuous groundwater level monitoring within wetlands, ACD maintains a network of 23 wetland hydrology monitoring stations.

Locations: AEC Wetland, Rum Central Wetland, Itasca Wetland.

Purpose: To provide understanding of wetland hydrology, including the impacts of climate and changes in land use. These data aid in local wetland delineations by documenting hydrologic trends including the timing, frequency, and duration of saturation.

Results: See the following pages

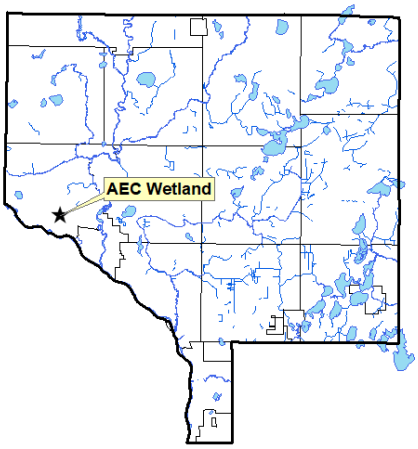
2023 LRRWMO Wetland Hydrology Monitoring Sites



AEC REFERENCE WETLAND

Cottonwood Park, City of Ramsey

Site Information



Monitored Since: 1999

Wetland Type: 3

Wetland Size: ~18 acres

Isolated Basin: No, probably receives storm water

Connected to a Ditch: No

Surrounding Soils: Hubbard coarse sand

Soils at Well Location:

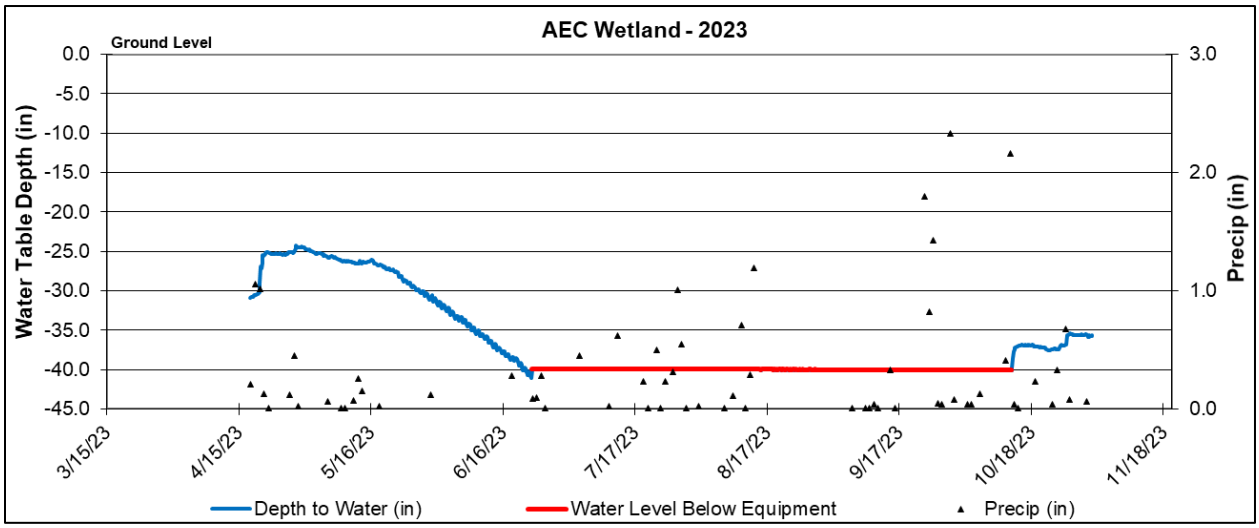
Horizon	Depth	Color	Texture	Redox
A	0-15	10yr2/1	Sandy Loam	-
Bw	15-40	10yr3/2	Gravelly Sandy loam	-

Vegetation at Well Location:

Scientific	Common	% Coverage
Populus tremuloides	Quaking Aspen	30
Salix bebbiana	Bebb Willow	30
Carex Spp	Sedge undiff.	30
Solidago canadensis	Canada Goldenrod	20

Other Notes: This boring is located near the wetland boundary. In 2023, Anoka County experienced drought conditions. As a result, this boring was dry the majority of the year.

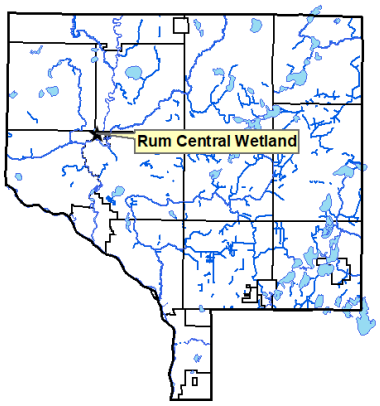
2023 Hydrograph (Well Depth 40 inches)



RUM CENTRAL REFERENCE WETLAND

Rum River Central Regional Park, Ramsey

Site Information



Monitored Since: 1997

Wetland Type: 6

Wetland Size: ~0.8 acres

Isolated Basin: Yes

Connected to a Ditch: No

Surrounding Soils: Zimmerman fine sand

Soils at Well Location:

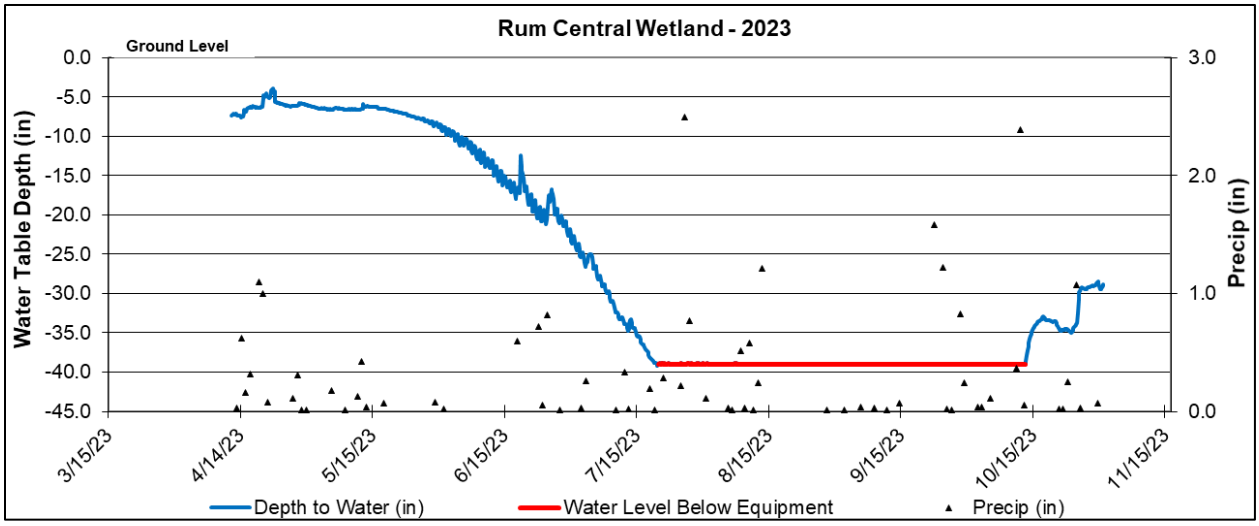
Horizon	Depth	Color	Texture	Redox
A	0-12	10yr2/1	Sandy Loam	-
Bg1	12-26	10ry5/6	Sandy Loam	-
Bg2	26-40	10yr5/2	Loamy Sand	-

Vegetation at Well Location:

Scientific	Common	% Coverage
Phalaris arundinacea	Reed Canary Grass	40
Corylus americanum	American Hazelnut	40
Onoclea sensibilis	Sensitive Fern	30
Rubus strigosus	Raspberry	30
Quercus rubra	Red Oak	20

Other Notes: This boring is located near the wetland boundary. Anoka County was in a state of drought through most of 2023. As a result, the boring was dry during the fall season.

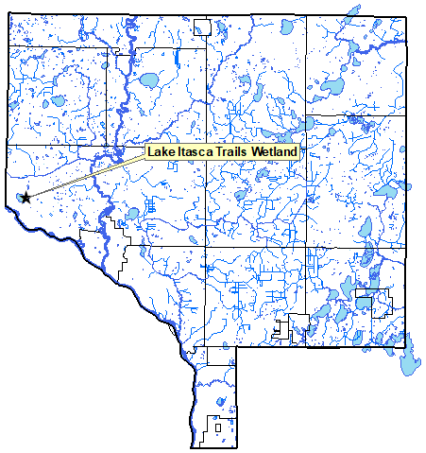
2023 Hydrograph (Well Depth 39 inches)



LAKE ITASCA TRAILS REFERENCE WETLAND

Lake Itasca Trails Park, City of Ramsey

Site Information



Monitored Since: 2013

Wetland Type: 2/6

Wetland Size: ~10 acres

Isolated Basin: Yes

Connected to a Ditch: No

Surrounding Soils: Hubbard coarse sand

Soils at Well Location:

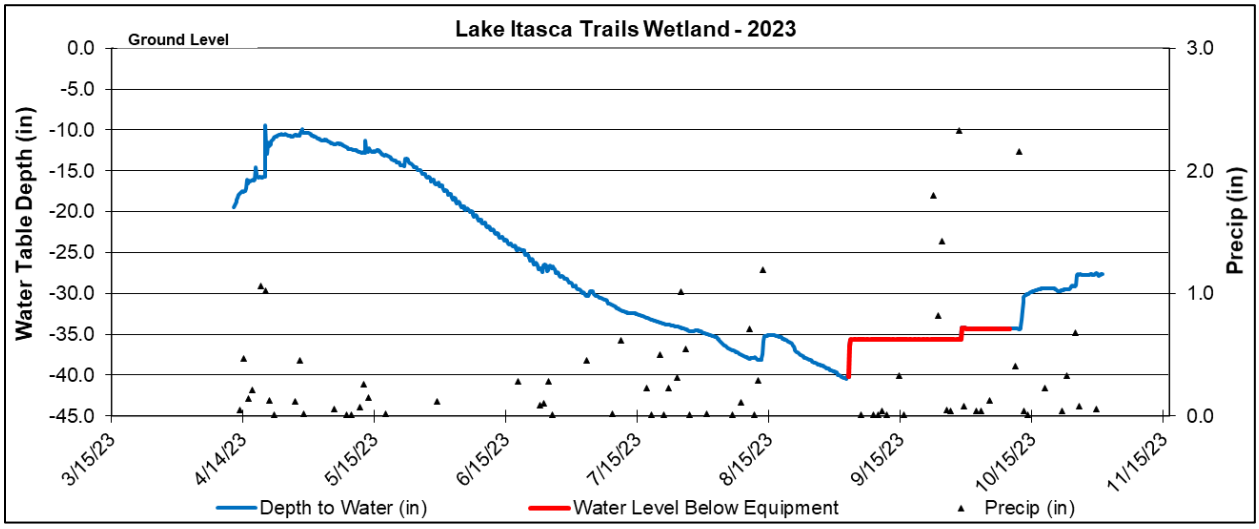
Horizon	Depth	Color	Texture	Redox
A1	0-12	10yr2/0	Mucky sand	-
A2	12-20	10ry2/1	Sand	-
B1	20-36	10yr4/1	Sand and fine gravel	-
B2	36-48	10yr6/1	Sand and fine gravel	-

Vegetation at Well Location:

Scientific	Common	% Coverage
Carex stricta	Hummock Sedge	80
Phalaris arundinacea	Reed Canary Grass	20
Salix sp.	Willow	20
Rubus sp.	Bristle-berry	5

Other Notes: The boring is located near the wetland boundary. Anoka County was in a state of drought through most of 2023. As a result, the boring was dry during late fall.

2023 Hydrograph (Well Depth 40 inches)



Subwatershed Studies

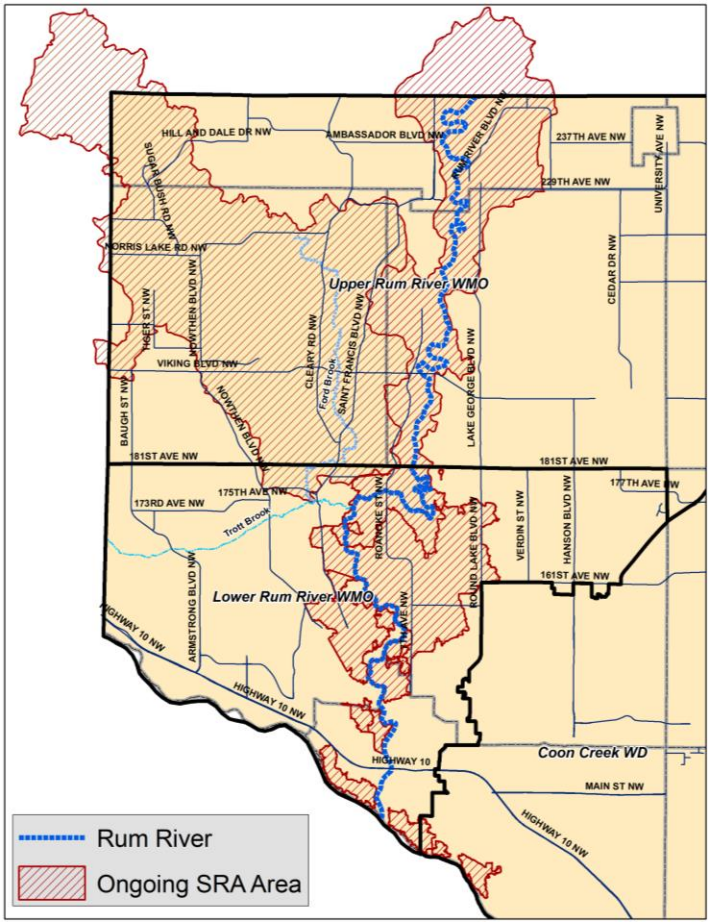
Partners: LRRWMO, URRWMO, ACD

Description: Subwatershed studies identify projects to improve water quality and rank them by cost effectiveness. The process includes identifying a priority waterbody, the watershed delineation, identifying projects, cost estimates, and modeling benefits.

Purpose: To allow prioritization of the most cost effective water quality projects.

Results: In 2023 the Anoka Conservation District is working on subwatershed studies for the Ford Brook watershed, and direct drainage areas to the Rum and Mississippi Rivers. The areas are discontinuous because some areas were previously studied, do not directly discharge to the waterbody of interest, or have little or no stormwater infrastructure. Among the studied areas, some areas have more analysis due to the number of possible projects identified and direct discharge into the priority waterbody.

Each of these studies is underway and will be completed in 2024. Funding is from a Rum Metro Watershed Based Implementation Funding grant and match from the Upper and Lower Rum River WMOs.



Water Quality Grant Fund

Partners: LRRWMO, ACD

Description: The LRRWMO provides cost share grants for projects on both public and private lands that will improve water quality, such as repairing streambank erosion, restoring native lakeshore vegetation, or installing rain gardens. ACD administers this funding. Projects affecting the Rum River are given priority because it is viewed as an exceptionally valuable resource.

Purpose: To improve water quality in lakes, streams, and rivers by correcting erosion problems and treating stormwater runoff before it reaches the water bodies.

Results: Projects reported in the year they are installed.

LRRWMO Cost Share Fund Summary

2020 LRRWMO Contribution	$1,449.76
2022 LRRWMO Contribution	$2,000.00
2022 Expense – 6 Rum & Mississippi Riverbank stabilizations	$6,000.00
2023 LRRWMO Contribution	$5,000.00
Current Balance	$8,449.76

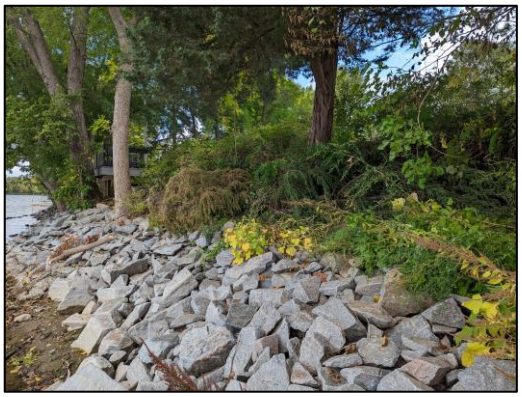
Water Quality Improvement Projects

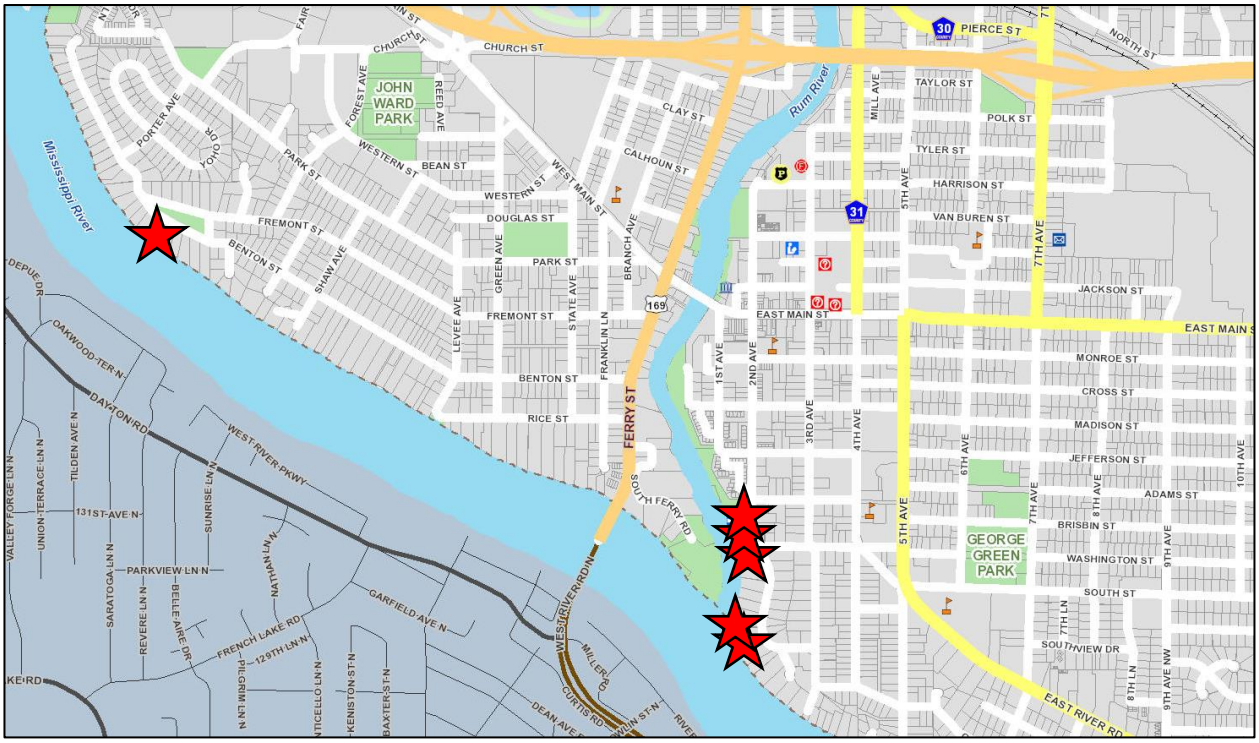
The following water quality projects were installed in 2023 in the Lower Rum River WMO.

Critical Area Plantings – 3 Rum River Sites, 3 Mississippi River Sites

In 2023 ACD did follow-up planting at six riverbank sites where the toe-of-slope had been stabilized in 2022. At each site, rock was used on the lower bank in 2022. 2023 work was upper bank stabilization with vegetation, totaling 7,747 square feet and 760 linear feet of riverbank. Funding was from the Rum Metro Watershed Based Implementation Fund grant (WBIF), state cost share grant from ACD, district capacity grant funds from ACD, and landowners.

Photos: Two sites during vegetation establishment.

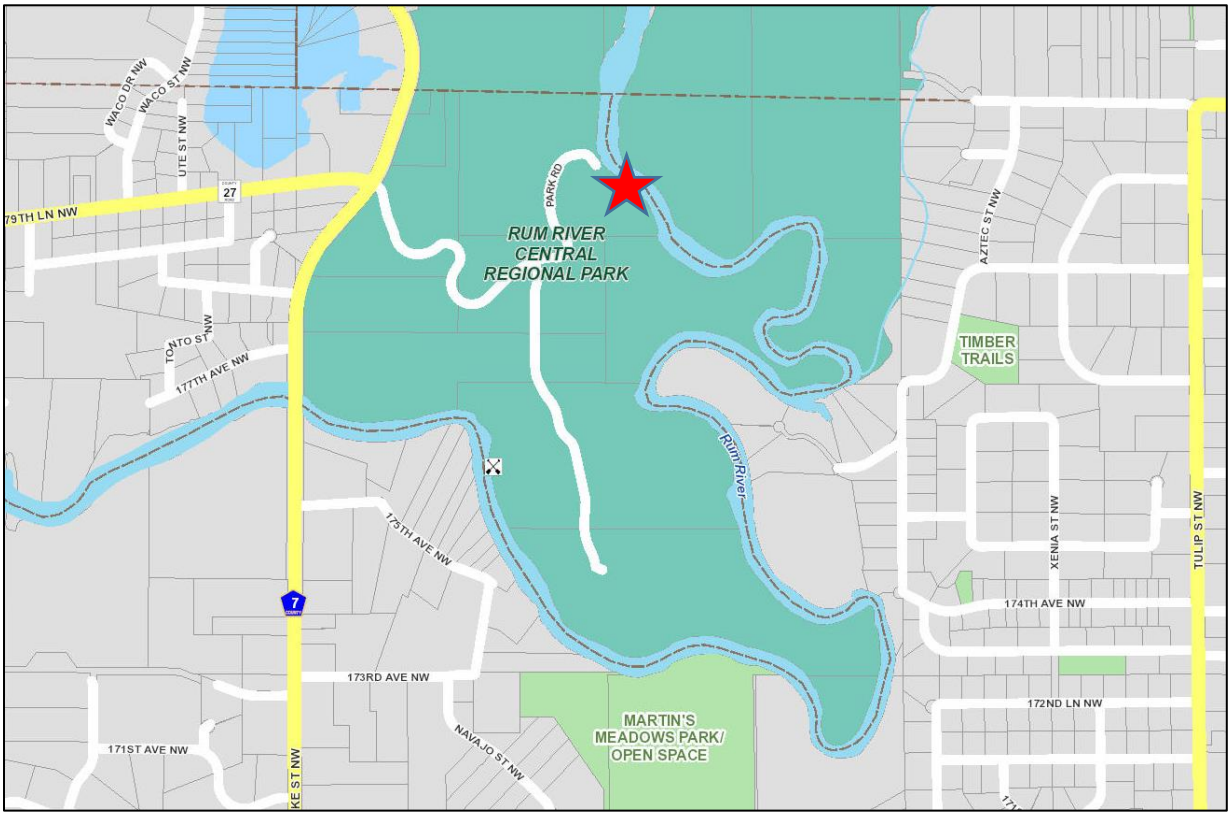




Rum Central Park Boat Launch Area Riverbank Stabilization

A riverbank stabilization project was completed in 2022, and subsequently damaged by spring 2023 floods before vegetation establishment. That flood was the highest in 51 years. The Anoka Conservation District and Anoka County Highway Department repaired the damage. The project length was 90 ft. Funding sources were Anoka County and the Outdoor Heritage Fund.

Photo: Flooding damage spring 2023 (left). July 2023 after repair (right).



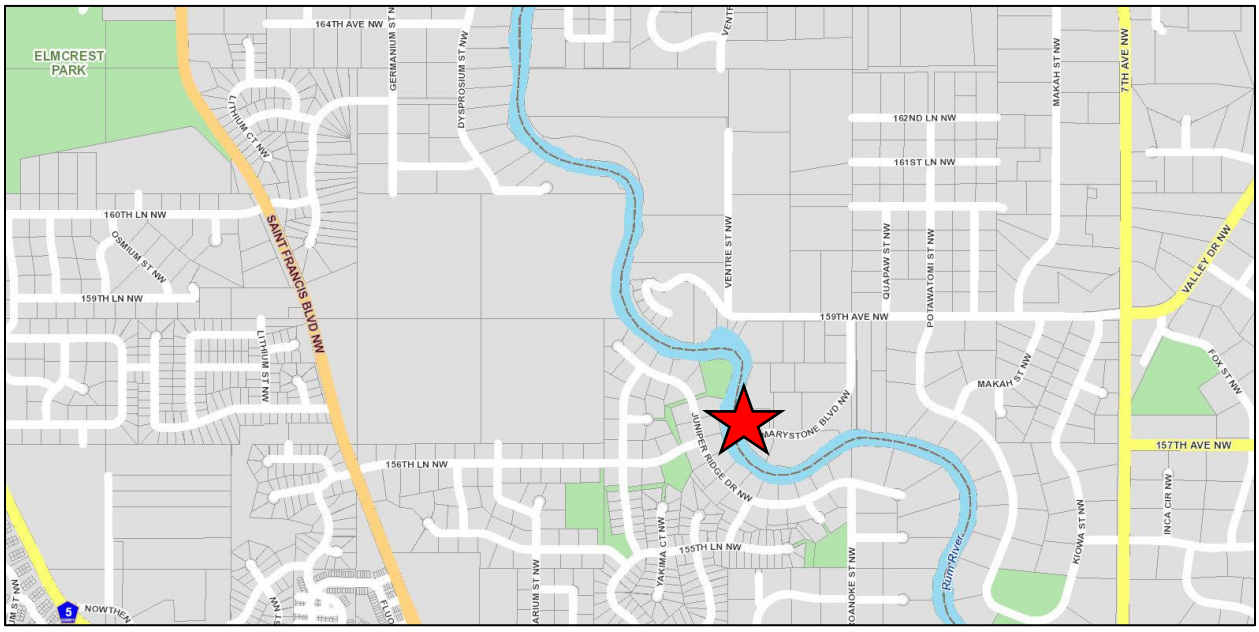
Neilson Rum Riverbank Stabilization

A 100 linear ft. riverbank was stabilized. Techniques included:

- Protecting the toe of bank with a cedar tree revetment,
- Contouring the slope with brush bundles to hold soil from migrating downslope,
- Revegetation by hydro-seeding, and 1,000 plant plugs and shrubs.

Project benefits included stabilizing 3,200 sq ft, suspended solids reduction of 19.56 tons/yr, and phosphorus reduction of 16.62 lbs/yr.

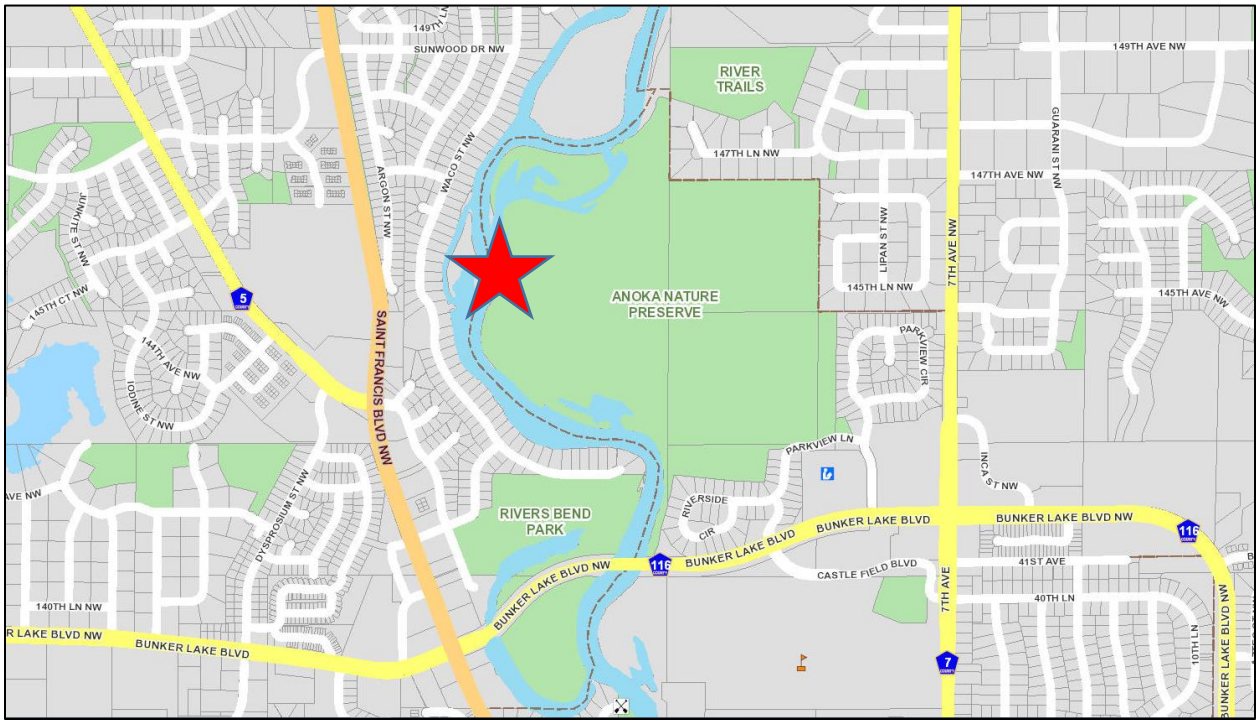
Project design and construction oversight were by the Anoka Conservation District. Construction was by Prairie Restorations, Inc. The project was funded with a combination of Rum Metro Watershed Based Implementation Funds from the MN Board of Water and Soil Resources, other state funds, and the landowner.



Anoka Nature Preserve Riverbank Stabilization

570 feet of cedar tree revetments were installed to stabilize moderately eroding banks of the Rum River. Installation was completed by MN Conservation Corps crews, with assistance and organizing from the Anoka Conservation District. Bare root shrubs were planted throughout. Funding was from a MN DNR Conservation Partners Legacy grant, Conservation Crews of Minnesota and Iowa, the Anoka Conservation District, and donated supplies.

Photos: Riverbank pre-project (left). Installed cedar tree revetment (right).



Annual Report to BWSR

Partners: LRRWMO, ACD

Description: The Lower Rum River Watershed Management Organization (LRRWMO) is required by law to submit an annual report to the Minnesota Board of Water and Soil Resources (BWSR). This report consists of an up-to-date listing of LRRWMO Board members, activities related to implementing the LRRWMO Watershed Management Plan, the status of municipal water plans, financial summaries, and other work results. The report is due annually, 120 days after the end of the URRWMO's fiscal year (April 30th).

Purpose: To document progress toward implementing the LRRWMO Watershed Management Plan and to provide transparency of operations.

Location: Watershed-wide

Results: ACD prepared the LRRWMO annual report

Website Maintenance

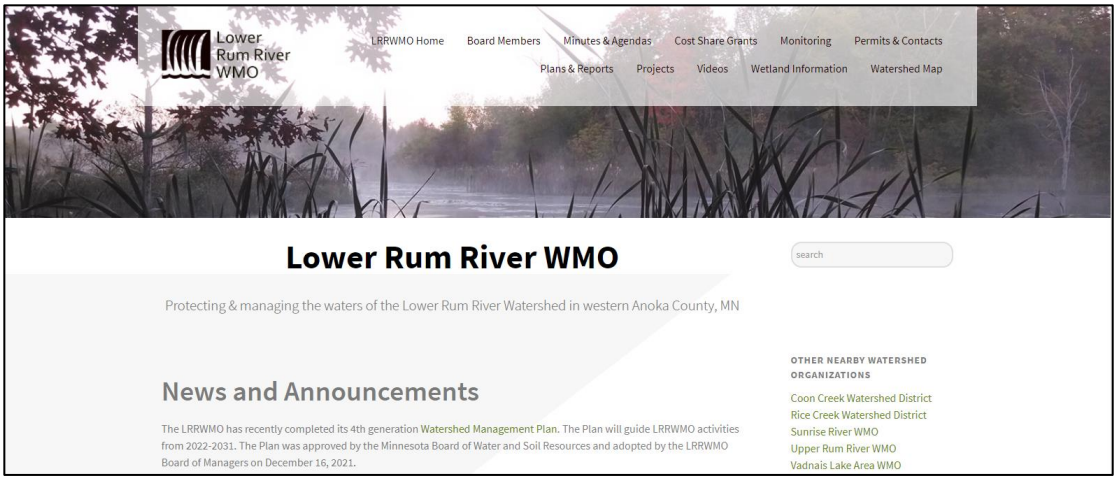
Partners: LRRWMO, ACD

Description: The LRRWMO contracted ACD to maintain their official website.

Purpose: To increase awareness of the LRRWMO. The website also provides tools and information regarding LRRWMO programs.

Location: http://www.lrrwmo.org/

Results: ACD maintained the existing LRRWMO website, paid the domain registration and hosting fees, and posted meeting minutes and agendas.



Newsletters

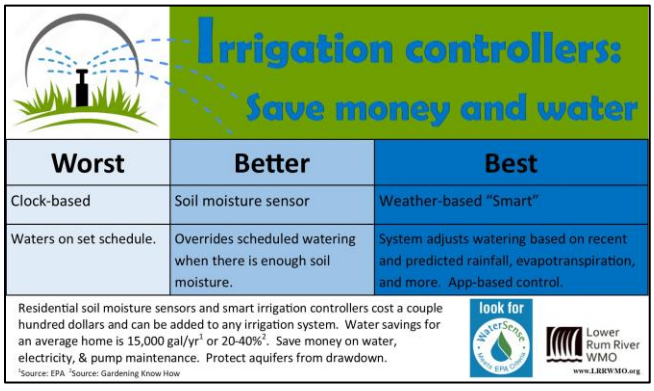
Partners: ACD, LRRWMO

Description: ACD develops LRRWMO outreach pieces, required by the state, such as newsletter articles or infographics. Topics have included stormwater management, wetland regulation and protection, water quality best management practices, septic fix-up funding opportunities, groundwater, watershed planning, and others.

Purpose: To increase public awareness of the LRRWMO and its programs.

Location: Watershed-wide

Results: ACD prepared three articles/infographics for the LRRWMO in 2023. The topics included smart irrigation, the Adopt-a-Drain Program, and septic system fix-up grants. Articles were printed in partnering city newsletters.



Outreach and Education

Partners: ACD, Anoka County, WMO's, watershed districts, cities and townships

Description: ACD conducted public outreach and education including newsletter articles, workshops, community events, and others. Each effort is intended to reduce work needed by cities and avoid duplication. There are multiple funding sources including cities, watershed organizations, ACD, and Watershed Based Implementation Funding from the State.

Purpose: To inform community residents, businesses, staff, and decision-makers about issues affecting local waterbodies and groundwater resources. To achieve behavioral changes that improve water quality and recruit people to install water quality projects.

Location: Watershed-wide

Results: Outreach efforts are collaborative. Some tasks are exclusively performed by ACD for the LRRWMO. The LRRWMO also provides funding to support the Anoka County Water Resources Outreach Program which uses funds pooled from various sources to perform regional outreach used in multiple watersheds. Finally, the LRRWMO area benefits from outreach by the Rum River Watershed Partnership.

2023 accomplishments included:

Workshops promotion

- Smart Salting – Distributed information to community public works departments about this training and certification program from the MPCA.
- Cover Crops & Soil Health – Promoted a workshop to agricultural producers. Funded by the Rum River Watershed Partnership.

Community events

- Andover City Council presentation – ACD staff presented about watershed planning and new state grants for water quality.
- River Clean Up – Promotion of a citizen-led Mississippi River cleanup event.
- Tree Planting at Wetland Restoration – ACD staff, along with The Nature Conservancy, led a volunteer tree planting effort at the Andover Pine Hills North wetland restoration project.

Other

- Adopt a Drain – ACD promoted this program through the watershed. Presently there are 134 adopted drains in the LRRWMO.
- Videos – The "Our Waters" video series which the LRRWMO contributed to produce received national press. The "Our Groundwater Connection" video was used by Ohio TV news to help explain groundwater contamination from the East Palestine train derailment.
- Local Officials Education about Land Use Planning – A new video entitled "When Development Comes to Town" was promoted to elected officials and planning/zoning committees. The video was funded by the Lower St. Croix Partnership.