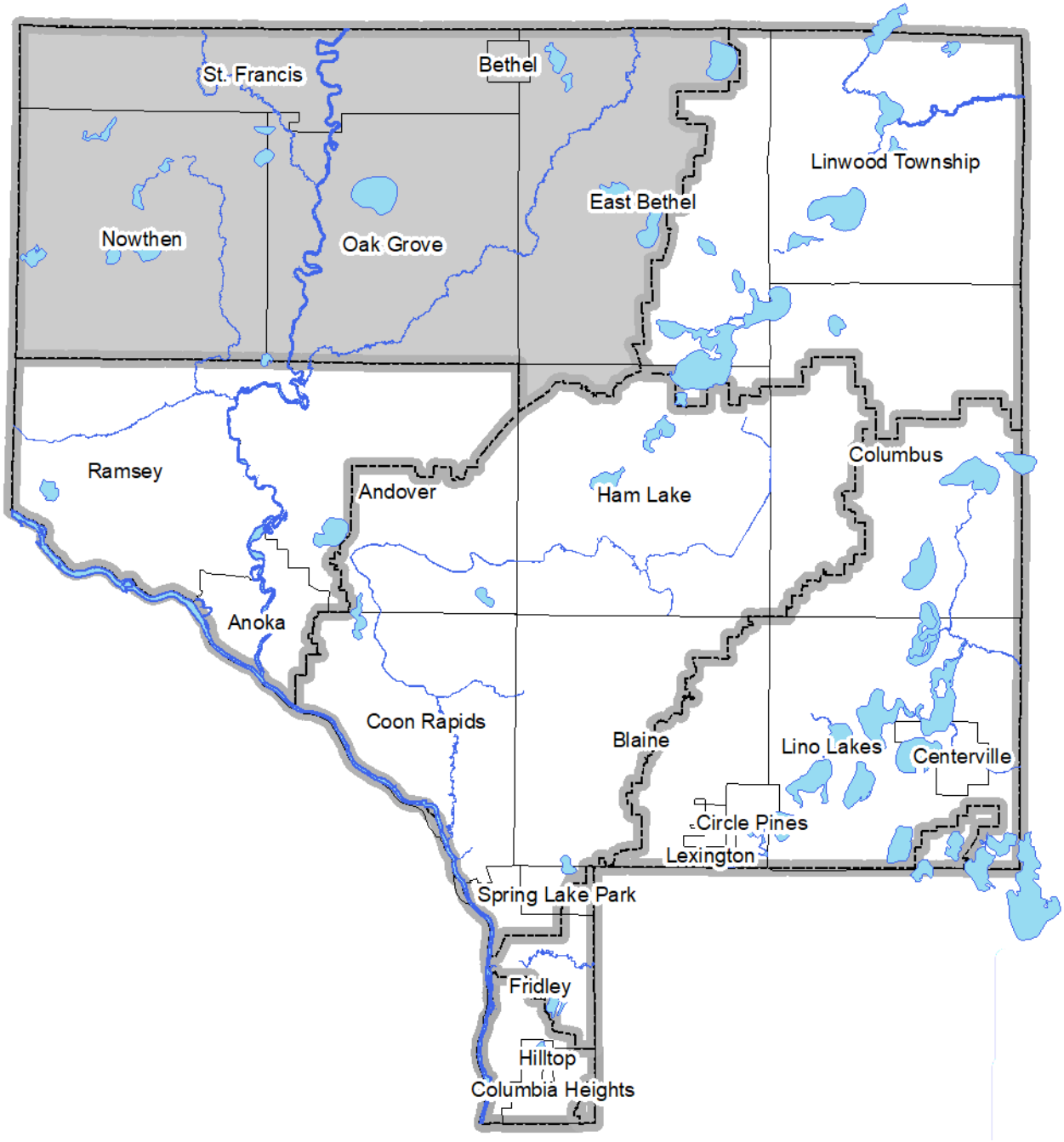
Excerpt from the 2023 Water Almanac

Chapter 3: Upper Rum River Watershed



Prepared by the Anoka Conservation District

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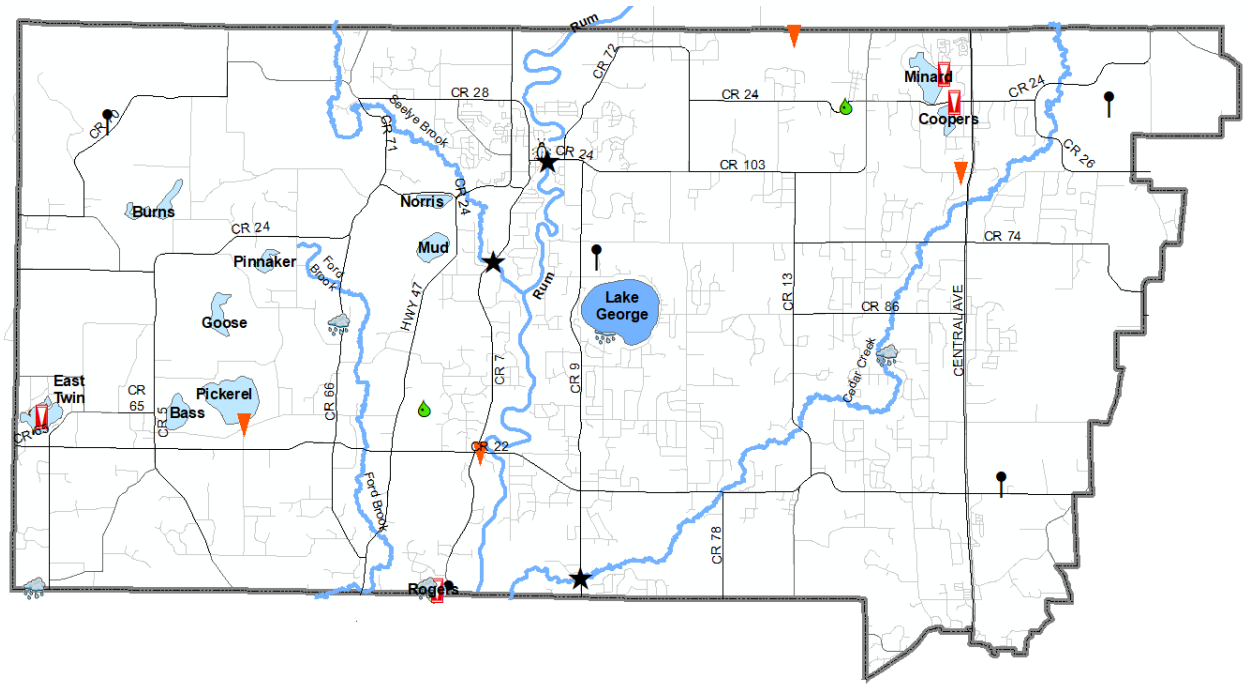
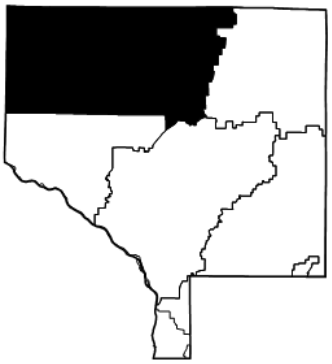
Recommendations

- **Fund and install projects identified in the URRWMO Watershed Management Plan**. This prioritized list was created by the URRWMO Technical Advisory Committee:
  1. Rum Riverbank stabilizations*
  2. Anoka County Water Resources Outreach Collaborative*
  3. Perform stormwater retrofit analyses for the Rum River and subwatershed assessments*.
  4. Lake George shoreline stabilizations*
  5. Lake George iron-enhanced sand filter feasibility study
  6. Ditch 19 connector dredging

  * Indicates projects that have been initiated using State grant funds and URRWMO matching funds.
- **Maintain or reduce Rum River phosphorus**. Phosphorus levels in the Rum River are close to exceeding state water quality standards.
- **Protect Lake George water quality**. Measures include installing projects ranked in a 2022 study and ensuring robust stormwater retention/treatment for any new development in the subwatershed.
- **Complete ongoing Ford Brook and Rum River sub-watershed studies in 2024.** The studies identify and rank water quality projects. This is funded by a 2021 Rum Metro Watershed Based Implementation Funding (WBIF) grant.
- **In the East Twin and Pickerel Lake subwatersheds, protect undeveloped lands or implement rigorous water quality protection measures during development.** These lakes have excellent water quality and small drainage areas.
- **Promote Septic System Fix-up Grants** to landowners, particularly in shoreland areas. Grants are for low-income households.
- **Promote groundwater conservation and protection.** Metropolitan Council models predict 3+ ft. drawdown of surface waters in parts of the URRWMO by 2030, and 5+ ft. by 2050. This indicates conservation actions will be required to ensure the groundwater supply stays sufficient. Infiltration practices should be prioritized
- **Promote well sealing cost share grants** to landowners.
- **Promote practices that limit road deicing salt applications** while keeping roads safe. Streams throughout the URRWMO have increasing specific conductance. Requiring municipal plow drivers to become certified through MN Pollution Control Agency deicing courses is recommended.
- **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 URRWMO is not a member, but may wish to track activities in the upper watershed or collaborate.
- **Accelerate planned Rum River monitoring in 2026-2027 to occur in 2025**. In this way it will occur at the same time and be comparable to once-every-ten years monitoring of tributaries by the MN Pollution Control Agency.

Monitoring Sites: Upper Rum River Watershed





2023 Monitoring Sites

- Groundwater Hydrology
- Volunteer Precipitation
- Anoka County Weather
- Lake Levels
- Student Biomonitoring
- Wetland Hydrology
- Stream WQ
- Lakes WQ

Lake Levels Monitoring

Partners: URRWMO, ACD, MN DNR, Volunteers

Description: Staff gauges were installed by Anoka Conservation District (ACD), surveyed by the MN DNR, and monitored by weekly by local volunteers. The past five and twenty-five years of data (if available) for each lake are illustrated below, and all historical data are available on the Minnesota DNR website using the "LakeFinder" feature (https://www.dnr.state.mn.us/lakefind/index.html). The Ordinary High Water Level (OHW) is listed for each lake on the corresponding graphs below. Anything work occurring below this elevation requires a DNR permit.

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

Location: East Twin, Coopers, Minard, and Lake George

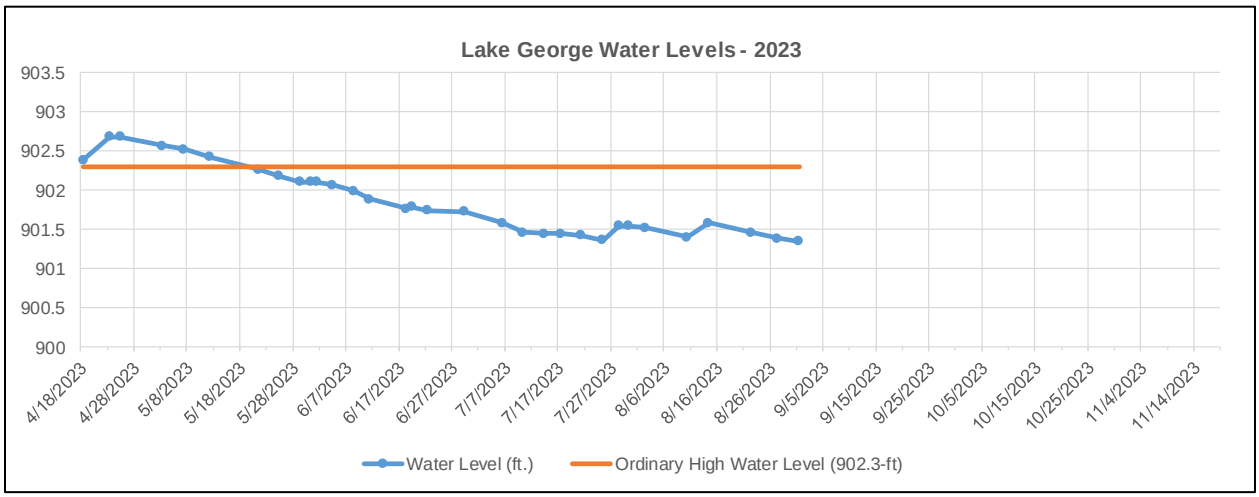
Results: **Lake George.** In spring 2023, Lake George had the fifth highest water levels in the last 23 years. Drought conditions developed the remainder of the growing levels, and water levels dropped 1.34 feet. Overall, water levels were within the range observed in the past, but water levels this high and low are observed every five years, on average.

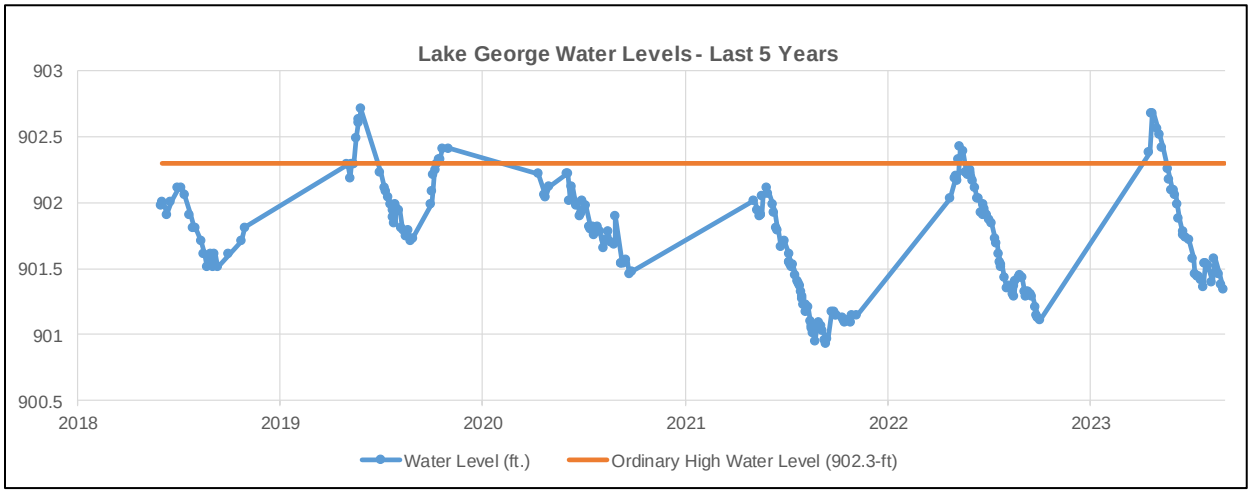
Coopers Lake. In 2023, Coopers Lake also had high spring water levels. The lake dropped 3.62 feet during drought the remainder of the growing season. ACD was unable to secure a volunteer at Coopers Lake in 2023, so ACD used a calibrated data logger that collected lake water level data at 24-hour intervals. The lowest observed reading in 2023 was 917.84 feet – this is the second lowest reading since lake level monitoring began in 2011; the lowest recorded reading was in 2022. There have been local concerns about the cause of frequent low water.

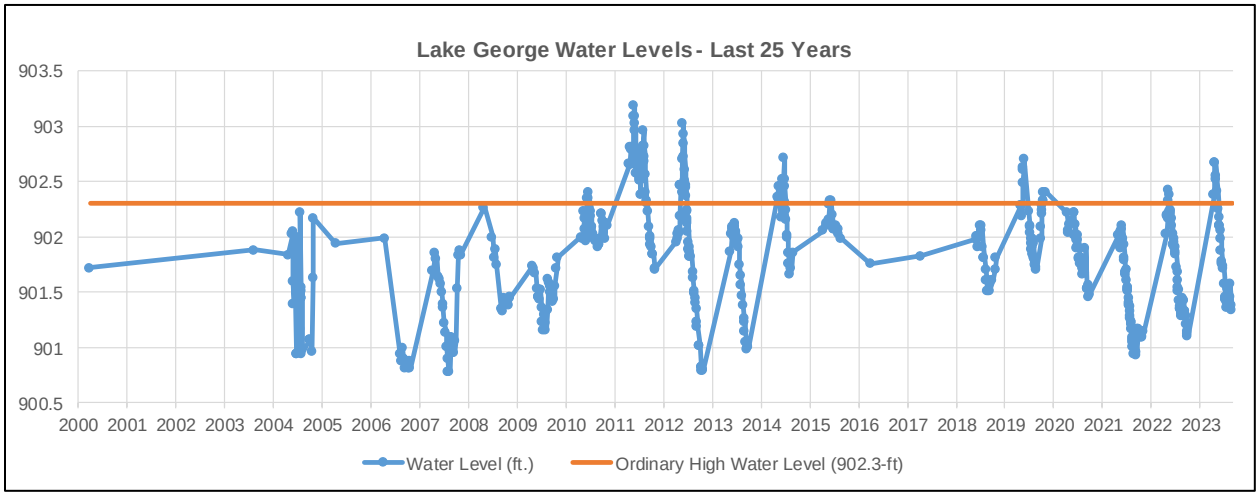
Minard Lake. In 2023, Minard Lake dropped 0.66 feet from spring highs to late summer lows. Water levels were similar to previous years with no noteworthy trend.

East Twin Lake. No data was collected at East Twin Lake in 2023.

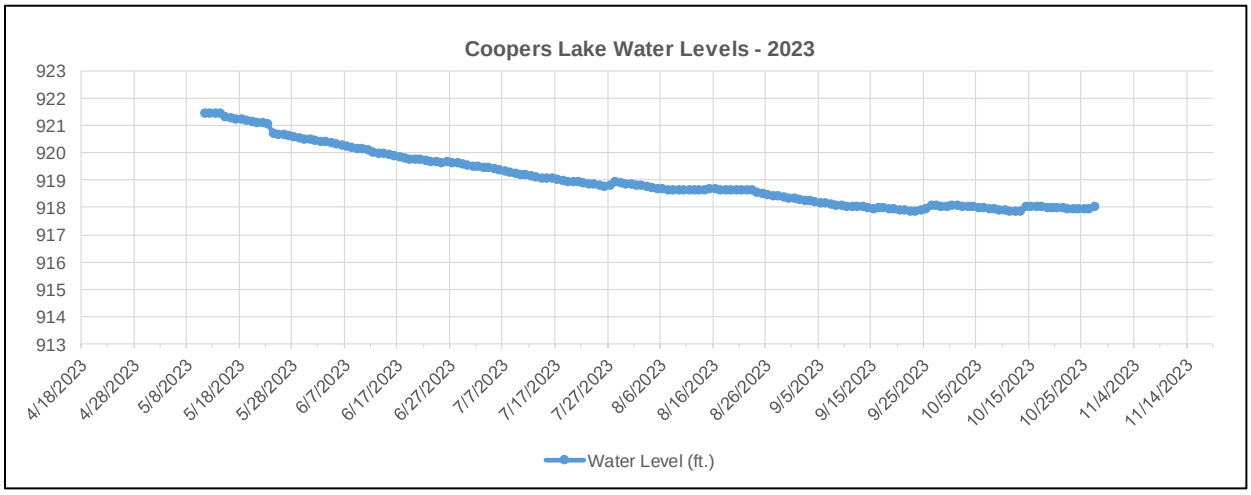
Lake George

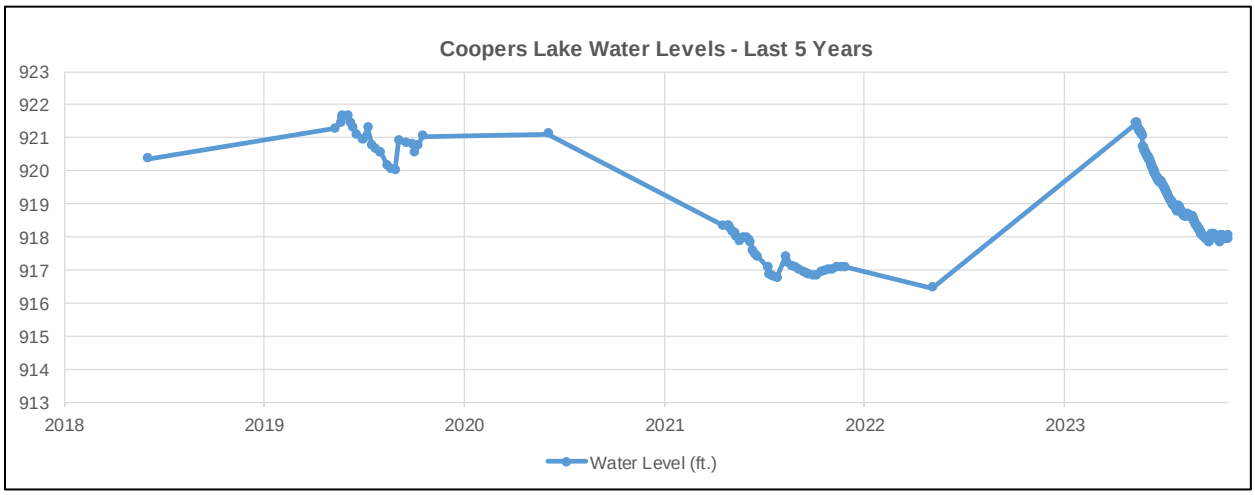

Lake George Water Levels - 2023
903.5
903
902.5
902
901.5
901
900.5
900
4/18/2023
4/28/2023
5/8/2023
5/18/2023
5/28/2023
6/7/2023
6/17/2023
6/27/2023
7/7/2023
7/17/2023
7/27/2023
8/6/2023
8/16/2023
8/26/2023
9/5/2023
9/15/2023
9/25/2023
10/5/2023
10/15/2023
10/25/2023
11/4/2023
11/14/2023
Water Level (ft.)
Ordinary High Water Level (902.3-ft)

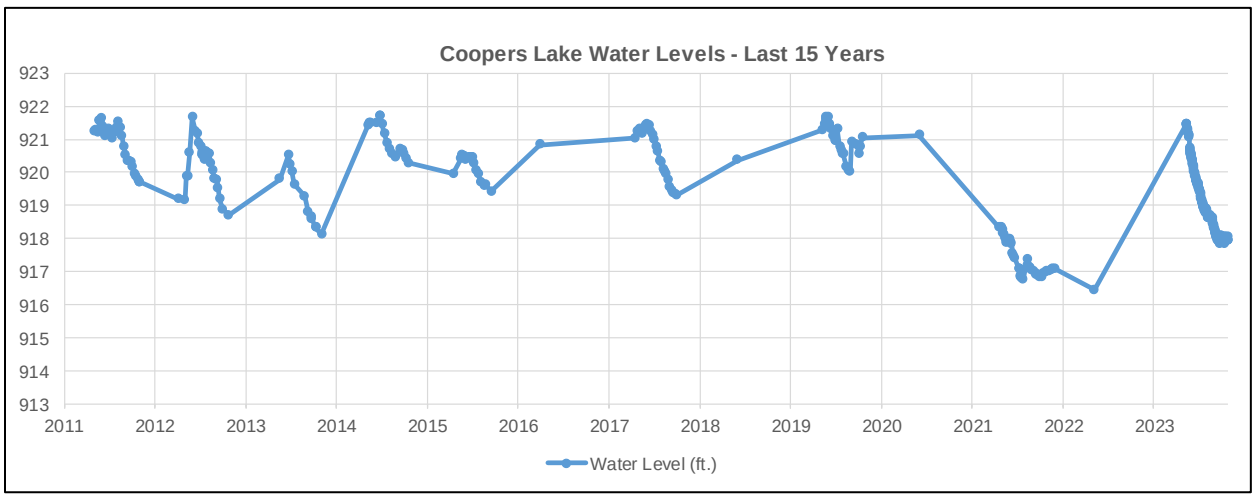

Lake George Water Levels - Last 5 Years
903
902.5
902
901.5
901
900.5
2018
2019
2020
2021
2022
2023
Water Level (ft.)
Ordinary High Water Level (902.3-ft)


Lake George Water Levels - Last 25 Years
903.5
903
902.5
902
901.5
901
900.5
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
Water Level (ft.)
Ordinary High Water Level (902.3-ft)

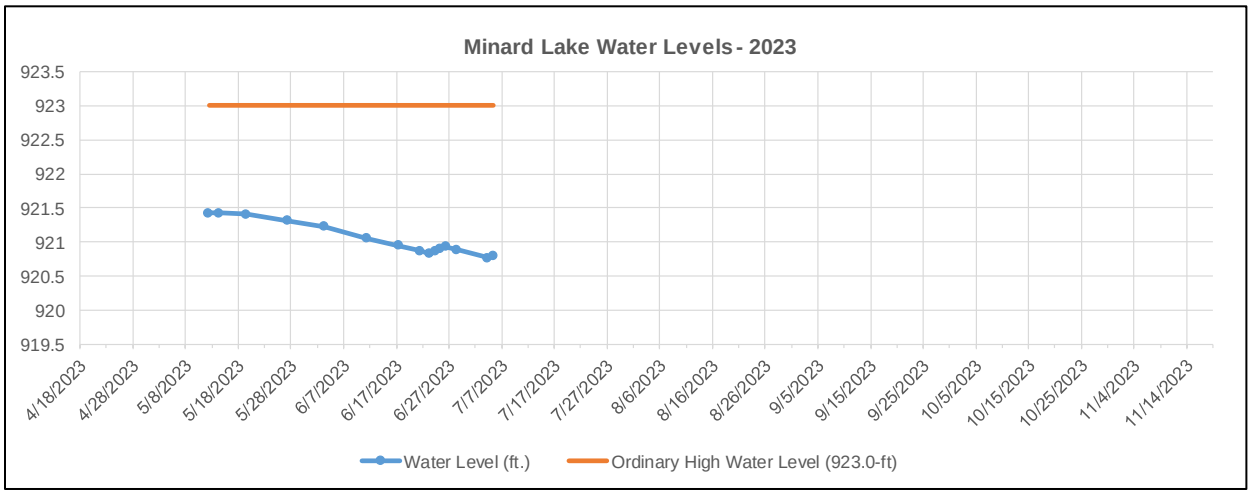
Coopers Lake

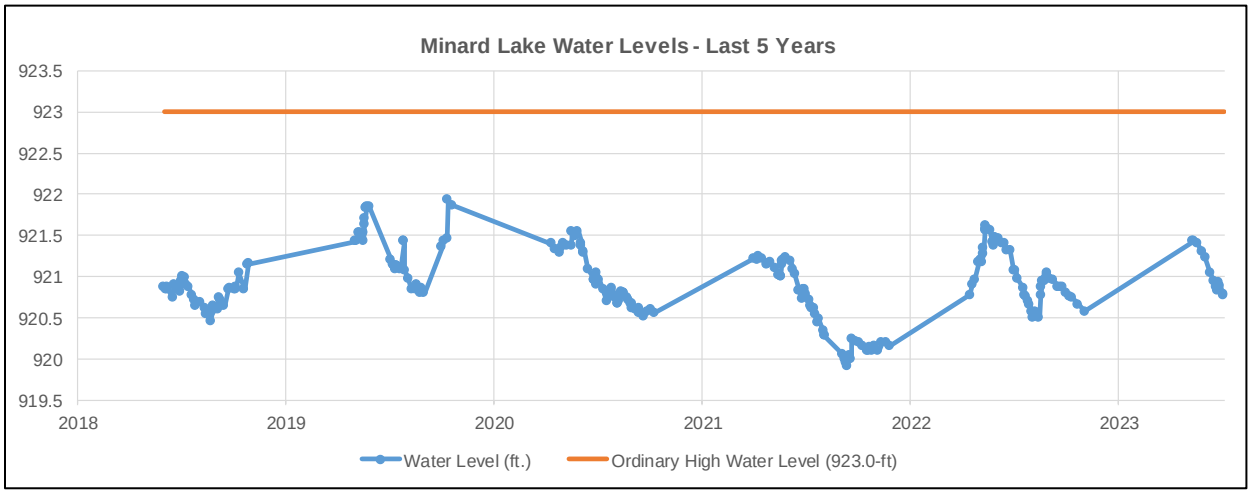


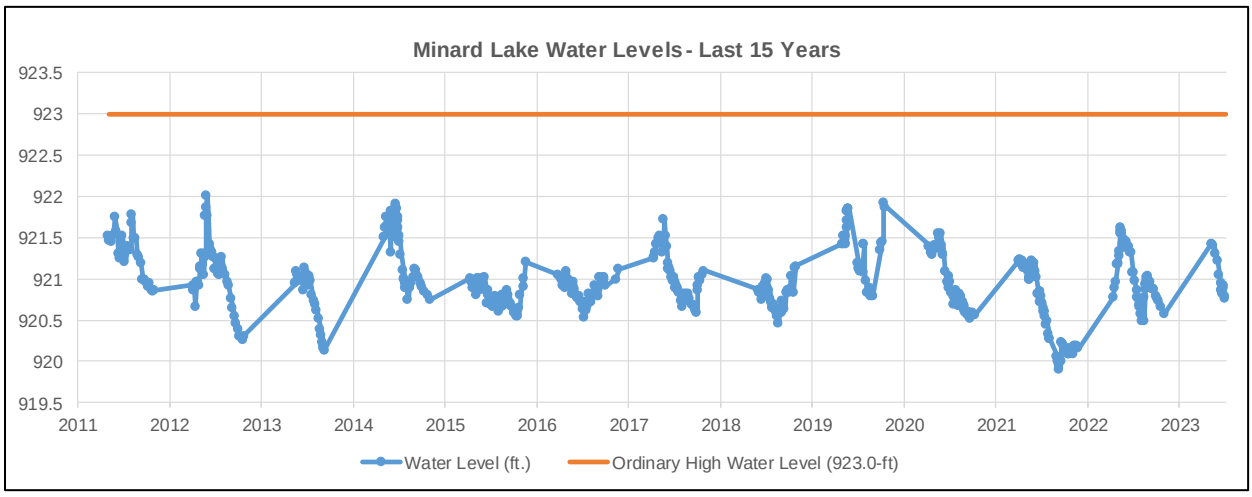




Minard Lake


Minard Lake Water Levels - 2023
923.5
923
922.5
922
921.5
921
920.5
920
919.5
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 (923.0-ft)


Minard Lake Water Levels - Last 5 Years
923.5
923
922.5
922
921.5
921
920.5
920
919.5
2018
2019
2020
2021
2022
2023
Water Level (ft.)
Ordinary High Water Level (923.0-ft)


Minard Lake Water Levels - Last 15 Years
923.5
923
922.5
922
921.5
921
920.5
920
919.5
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
Water Level (ft.)
Ordinary High Water Level (923.0-ft)

2023 Aquatic Invasive Vegetation Mapping

Partners: Lake George LID, Lake George Conservation Club, MNDNR, ACD

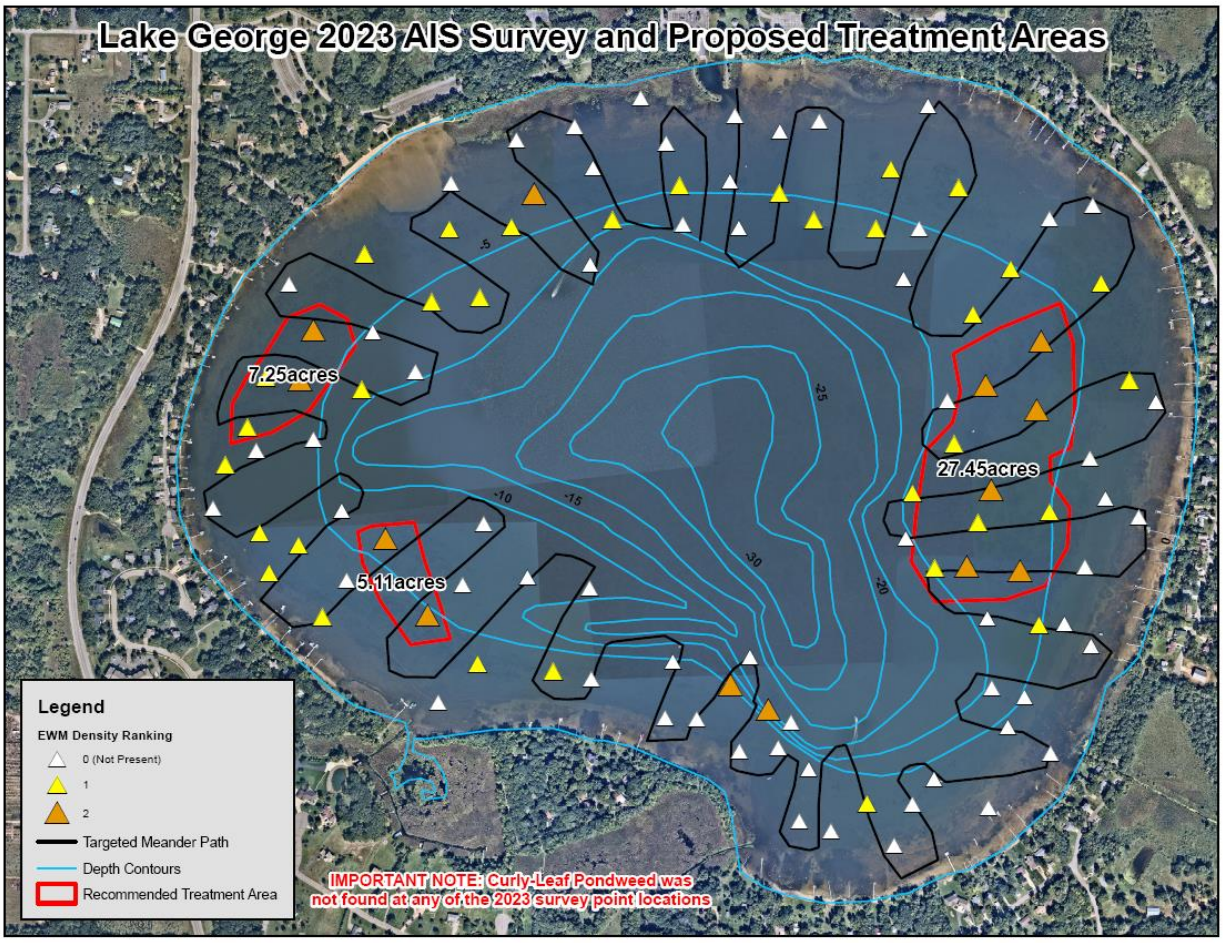
Description: ACD was contracted by the Lake George Lake Improvement District (GLID) to conduct an aquatic invasive vegetation delineation.

Purpose: To map out the presence of Curly Leaf Pondweed (CPL) and Eurasian Water Milfoil (EWM) as required for MN DNR herbicide treatment permits. The goal was to map these invasive species early in the growing season to allow for herbicide treatment as early as possible for reduced impacts on native plants and lessened possible impacts on water quality.

Locations: Lake George, City of Oak Grove

Results: The maps below were delivered to the MN DNR and Lake George Improvement District within 48 hours of the field surveys. These survey points were reviewed by the MN DNR and helped direct herbicide treatment efforts.

Lake George CPL and EWM Survey - May 17, 2023



Lake Water Quality

Partners: ACD, Lake George LID and Conservation Club, URRWMO

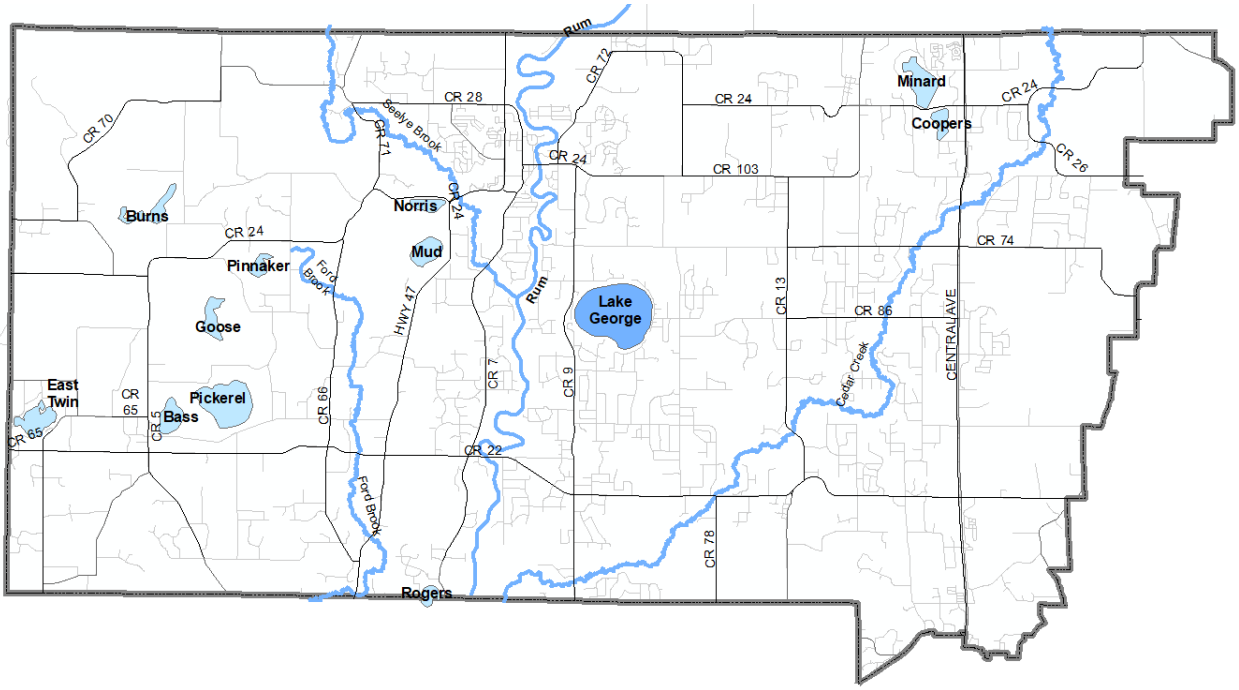
Description: Lake water quality monitoring was conducted ten times between May through September, approximately every two weeks. The monitoring parameters include total phosphorus, chlorophyll-a, Secchi transparency, dissolved oxygen, turbidity, temperature, specific conductance, pH, and salinity.

Purpose: To detect water quality trends and diagnose the cause of change.

Locations: Lake George

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

2023 Upper Rum River Watershed Lake Water Quality Monitoring Sites



Lake George

CITY OF OAK GROVE, LAKE ID # 02-0091

Background

Lake George is located in north-central Anoka County. The lake has a surface area of 535 acres with a maximum depth of 32 feet. Public access is from Lake George County Park on the lake's north side, where there is both a swimming beach and a boat launch. About 70% of the lake is surrounded by homes; the remainder is county parkland. The watershed is mostly undeveloped or vacant, with some residential areas, particularly on the lakeshore and in the southern half of the watershed. Lake George is a highly valued lake due to its recreational opportunities and ecological quality. The lake has a notably diverse plant community (most metro area lakes have 10-12 different aquatic plant species; Lake George is home to 24).

2023 Results

In 2023, Lake George had good water quality with an "A" letter grade. Total phosphorous (TP) averaged 19.30 µg/L, which was similar to levels recorded in previous years except 2022. Chlorophyll-a (Cl-a) averaged 7.36 µg/L, which was similar to levels recorded in previous years except 2022.

2023 water quality was better than 2022, particularly for total phosphorus. In 2022, four samples had phosphorus concentrations over 40 µg/L, which was unusual and resulted in the highest observed average phosphorus on record. That year (2022), sampling was by the Metropolitan Council for the first time since 2009. In 2023, phosphorus concentrations were similar to those observed in other recent years. The reason for higher measured phosphorus in 2022 is unknown.

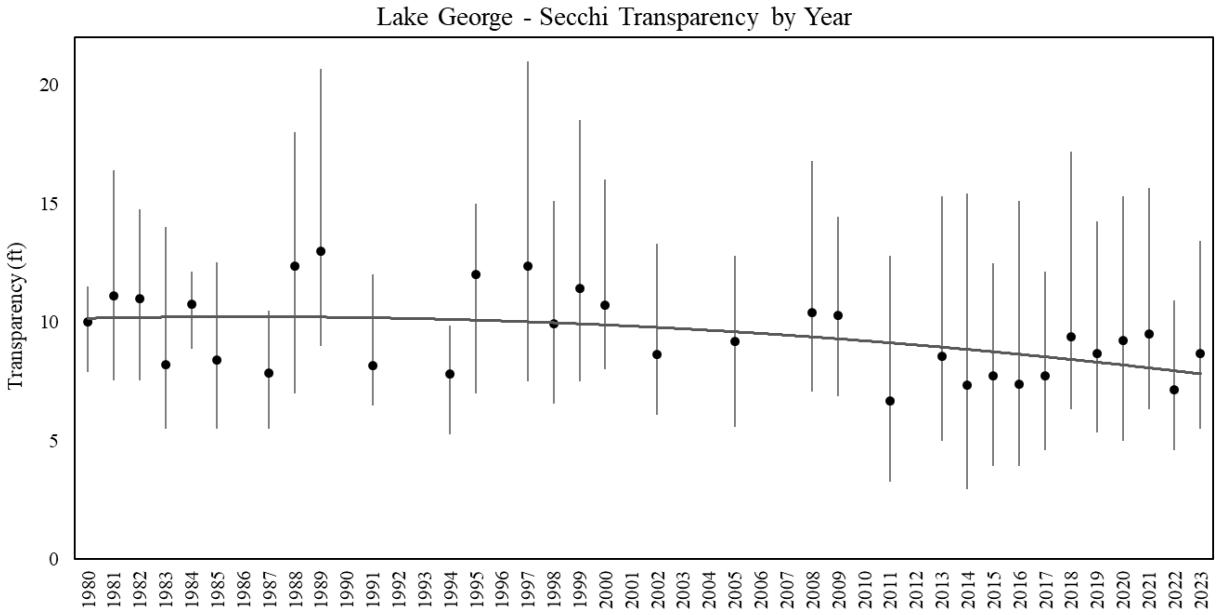
Secchi transparency, in general, was better in the beginning of the season and gradually became poorer into August and September. Average Secchi transparency was 8.66 ft. (2.6 m), which is a 1.5 ft. improvement from 2022. This value is mostly consistent with what was recorded between 2018 to 2021, however, it still indicates an overall declining trend in transparency.

Although Lake George water quality remains better than state standards and is ranked good for a metro county lake, simply adhering to these standards is not the goal for such an important water body. Decline of Lake George's Secchi transparency has been a cause for concern in recent years with a now twenty-two-year trend of decline in our statistical analyses.

Trend Analysis

The Metropolitan Council (between 1980 and 2009) and ACD (1997, 1999, 2000, 2002, 2005, 2008, 2011, and 2013-2023) have collected over thirty-two years of water quality data. A broad analysis that simultaneously considers TP, Cl-a, and Secchi transparency did find a statistically significant trend of changing water quality between from 1980 to 2023 (repeated measures MANOVA with response variables TP, Cl-a, and Secchi transparency, p=<0.01). When parameters are isolated for individual analysis, there is no significant change in Cl-a or TP. However, during this same period there is a statistically significant trend of declining Secchi transparency (p=<0.001).

Lake George Secchi Transparency Trend: Includes years with partial datasets not covering all open water months. Those years are excluded from ACD's statistical analysis and graphs later in this document.



Discussion

Lake George remains one of the clearest lakes in Anoka County, but a trend of declining Secchi transparency from the mid-1990s through around 2016 caused concern. In 2018, an intensive study of the lake and its watershed was completed. Work for the study included monitoring of tributaries, modeling, and evaluation of projects to correct declining water quality. The Lake George Improvement District, Lake George Conservation Club, Anoka Conservation District, and a state Clean Water grant funded the study.

The aforementioned study provides some insight into the causes of transparency decline. While a number of factors may play a role, an increase in the average amount of precipitation is the most significant driver identified. Water years (Oct. 1 – Sept. 30) that are wetter than the 100-year 90th percentile result in increased volumes of runoff and nutrients into the lake from surrounding tributaries, and the lake has the poorer clarity in those years, or in immediately subsequent years. These "wet" years were more frequent during the period when lake transparency declined. Six out of sixteen years from 2001 to 2017 were "wet" with water year precipitation above the historical 90th percentile, with 1999 reaching just under the 90th percentile mark. Additionally, four of these six wet years occurred during the sustained low Secchi transparency period of 2010 through 2017.

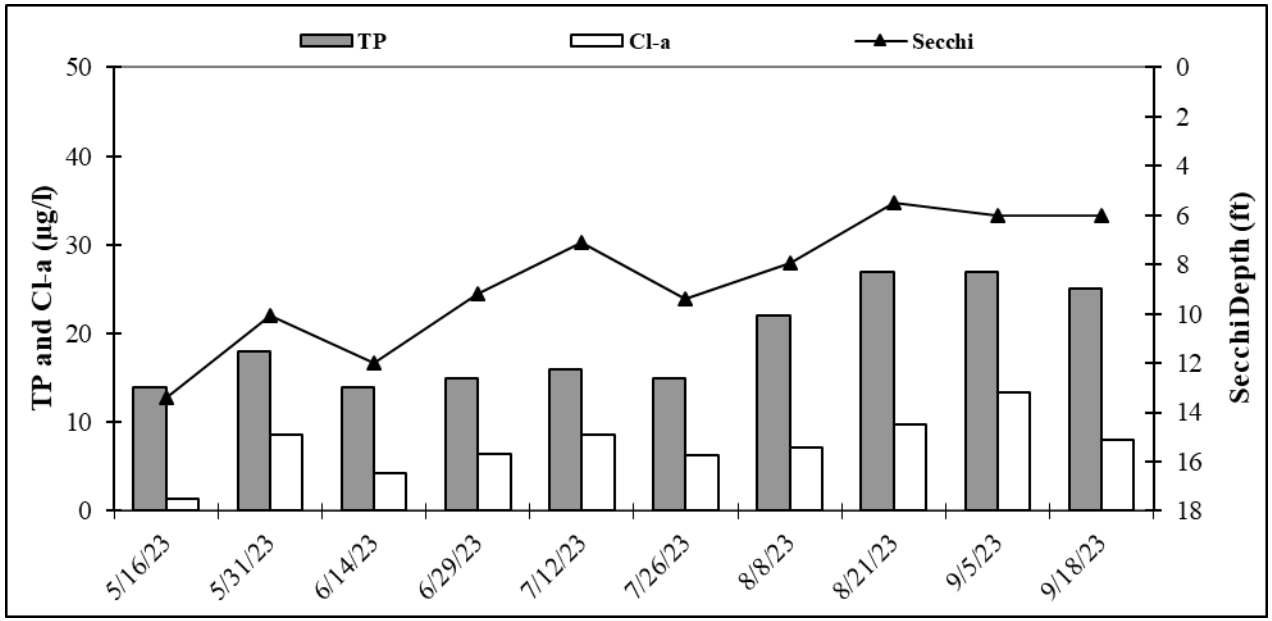
Annual variation in the relationship between Secchi transparency and precipitation indicates that precipitation is a major, but not the only, influence on water quality. The 2019 calendar year was the wettest on record, with Secchi results being only slightly poorer than in 2018, but that average was likely skewed by much higher readings earlier in the season. Annual precipitation in 2020-2023 was below average and the correlation between precipitation and Secchi clarity was again observed in 2020 and 2021 but not in 2022 which had low precipitation and poor Secchi transparency. In 2023, Secchi results returned to typical values that are expected with low precipitation. There is concern that climate change and increased runoff from development in the watershed will drive poorer water quality in Lake George into the future.

The Ditch 19 weir just east of Lake George was replaced in 2020. This structure is an important hydrological control for the lake and this project may have offered some additional clarity benefit right away. The replaced outlet structure should result in reduced nutrient delivery to the lake during wet years, and the broader benefits of restoring lake hydrology and enhancing game fish spawning opportunities.

Other actions identified in the 2018 study include agricultural best practices, an iron-enhanced sand filter in the County Park, public education, lakeshore restorations, enhanced stormwater standards for new developments in the lakeshed and others. While certain tributary subwatersheds do generate more nutrients than others, and therefore deserve special consideration for projects, it is also noted that some of these subwatersheds drain through large wetlands with some apparent pollutant removal ability. Projects nearest the lake are favored because they treat a larger upstream area and do not duplicate treatment that might already be provided by certain wetlands.

The MN DNR notes an additional concern for Lake George in the 2017 Rum River Watershed Fish-Based Lake IBI Stressor Identification Report. That report found Lake George's fish community was not impaired, but was one of special concern and deemed vulnerable. Lack of aquatic habitat and near-shore development disturbances were indicated as stressors. To help address this concern, ACD received a grant to implement lakeshore restoration projects on the lake in 2021-2022. Additional lakeshore restoration projects were completed in 2023. These types of practices promote native lakeshore habitat while also reducing phosphorus loading into the lake.

LAKE GEORGE
2023 Results



2023 Median Results

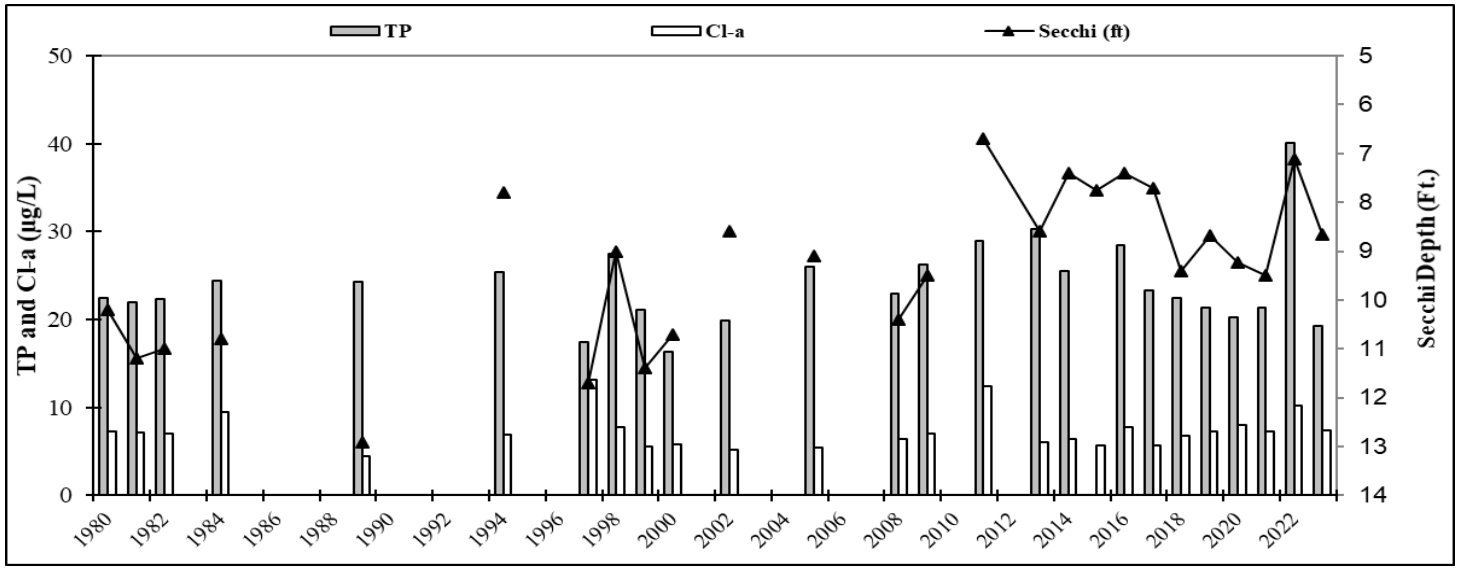
pH		8.52
Specific Conductance	mS/cm	0.24
Turbidity	NTU	0.65
D.O.	mg/l	9.06
D.O.	%	111.70
Temp.	°F	73.90
Salinity	%	0.12
Cl-a	µg/L	7.57
T.P.	µg/l	17.00
Secchi	ft	8.54

Lake George
02-0091-00-201
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

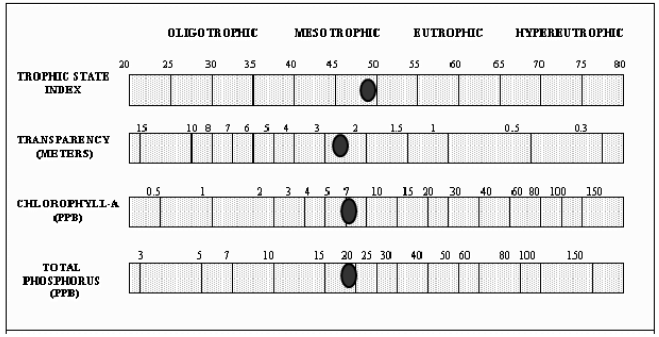


Historical Report Card

Year	TP	Cl-a	Secchi	Overall
1980	A	A	A	**A**
1981	A	A	A	**A**
1982	A	A	A	**A**
1984	B	A	A	**A**
1989	B	A	A	**A**
1994	B	A	B	**B**
1997	A	B	A	**A**
1998	B	A	B	**B**
1999	A	A	A	**A**
2000	A	A	B	**A**
2002	A	A	B	**A**
2005	B	A	B	**B**
2008	B+	A	A	**A**
State Standards	40 ug/L	14 ug/L	>4.6 ft	

Year	TP	Cl-a	Secchi	Overall
2008	B+	A	A	**A**
2009	B	A	B	**B**
2011	B	B	C	**B**
2013	B	A	B	**B**
2014	B	A	B	**B**
2015	A	A	B	**A**
2016	B	A	B	**B**
2017	B	A	B	**B**
2018	A	A	B	**A**
2019	A	A	B	**A**
2020	A	A	B	**A**
2021	A	A	B	**A**
2022	C	B+	B-	**B**
2023	A	A	B	**A**
State Standards	40 ug/L	14 ug/L	>4.6 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

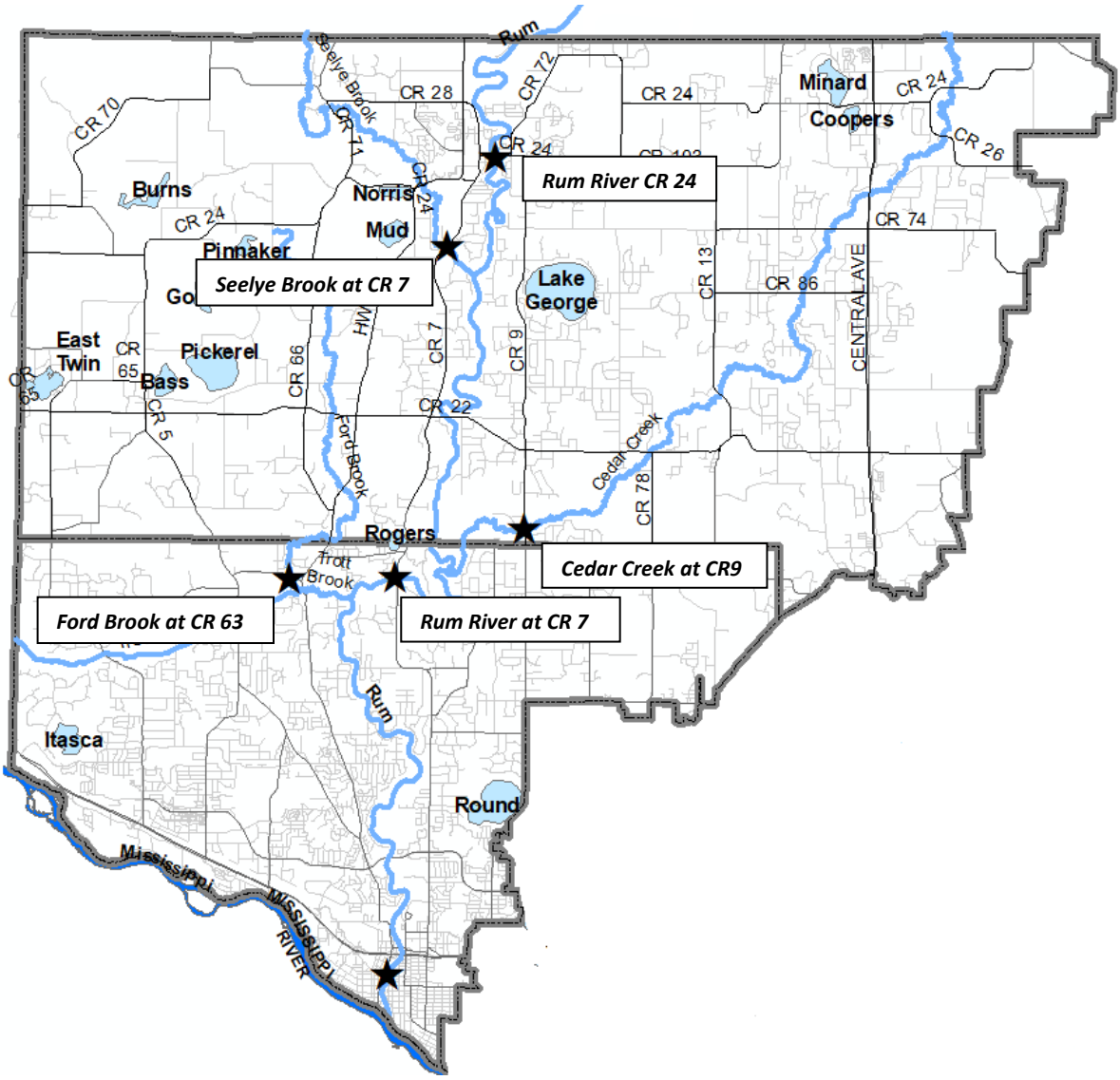
Stream Water Quality Monitoring

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.

2023 Rum River & Tributaries 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

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, within the City of St. Francis where the Isanti County border is 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 southcentral Isanti County, flowing southwest before entering the Rum River. Cedar Creek flows through northcentral 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 the local watershed plans as 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 it enters 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 site 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. These two samples were recorded above the state standard, but they are atypical values and 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 on average have been 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.

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 triggers additional 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 it increases slightly upstream to downstream. Average specific conductivity from upstream to downstream in 2023 (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 higher road density and development.

In 2023, specific conductivity in the Rum River was higher during baseflow conditions than during stormflows. This is a consistent trend 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 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 mostly higher during stormflow conditions, but average values of baseflow and stormflow conditions were similar. Average specific conductivity in 2023 (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 main stem of 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

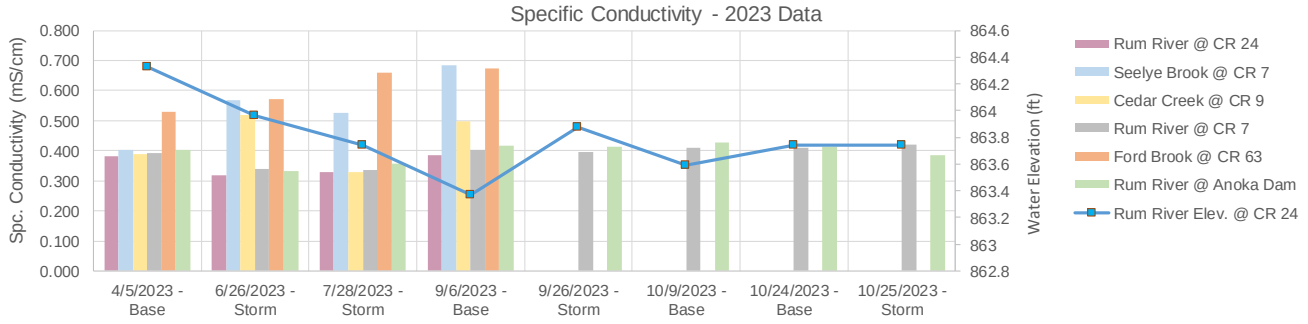
	AVG	MED	TOTAL
Rum River @ CR 24	11.5	10.9	17
Rum River @ CR 7	13.2	12.3	28
Rum River @ Anoka Dam	17.4	15.5	16

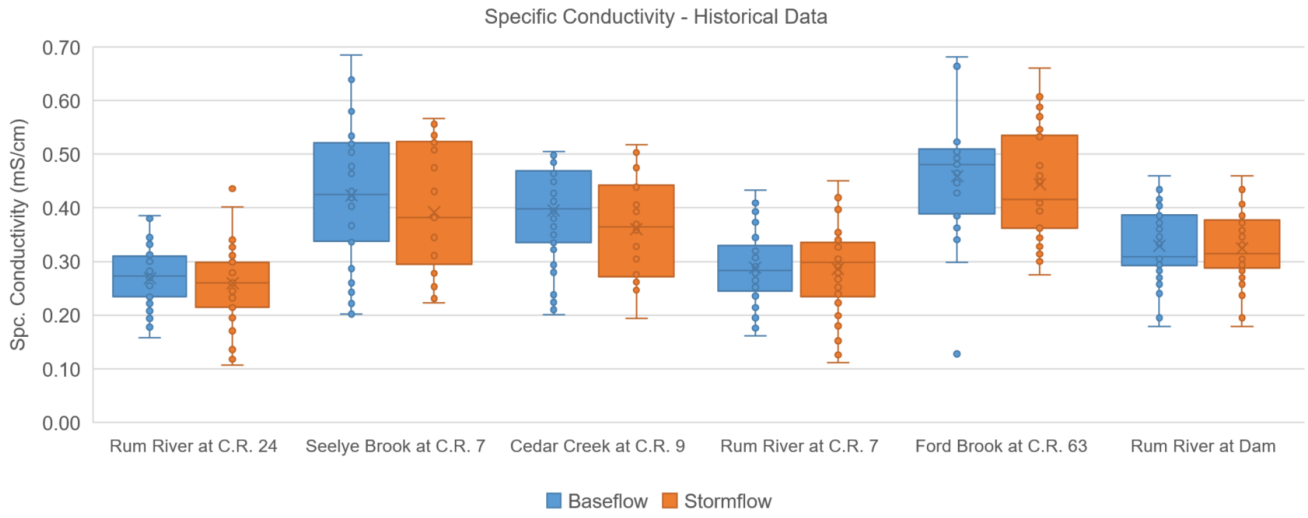
Chloride - Historical Stormflow Data

	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

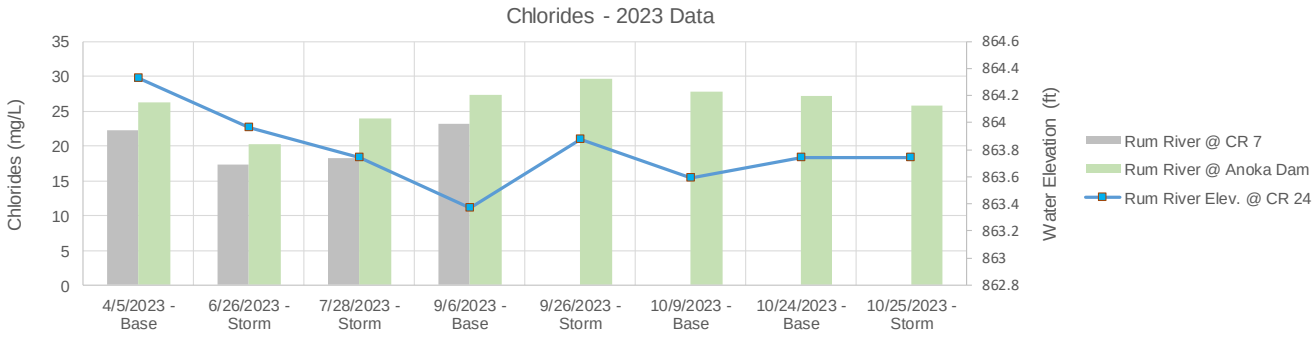
For water resource management, it is important to note that the sources of dissolved pollutants are generally the same for both stormwater and baseflow it is only the timing of delivery to the waterway that is different. Preventing the release of dissolved pollutants into the environment and treating 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.

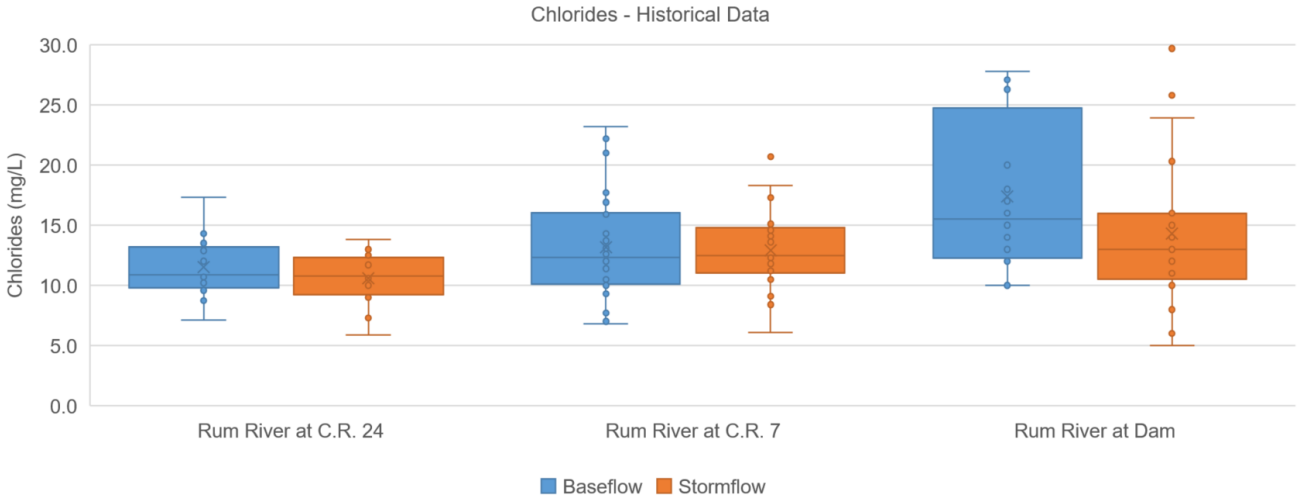
Specific Conductivity during Baseflow and Storm Conditions. Box plots show the median (middle line), 25th and 75th percentile (ends of box), and 10th and 90th percentiles (floating outer lines). Historical boxplot data also includes this year's data.





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

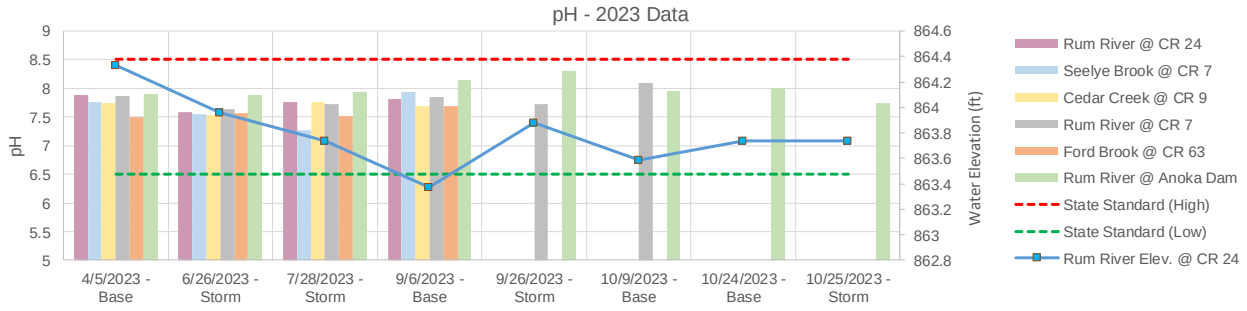
pH - 2023 Stormflow Data

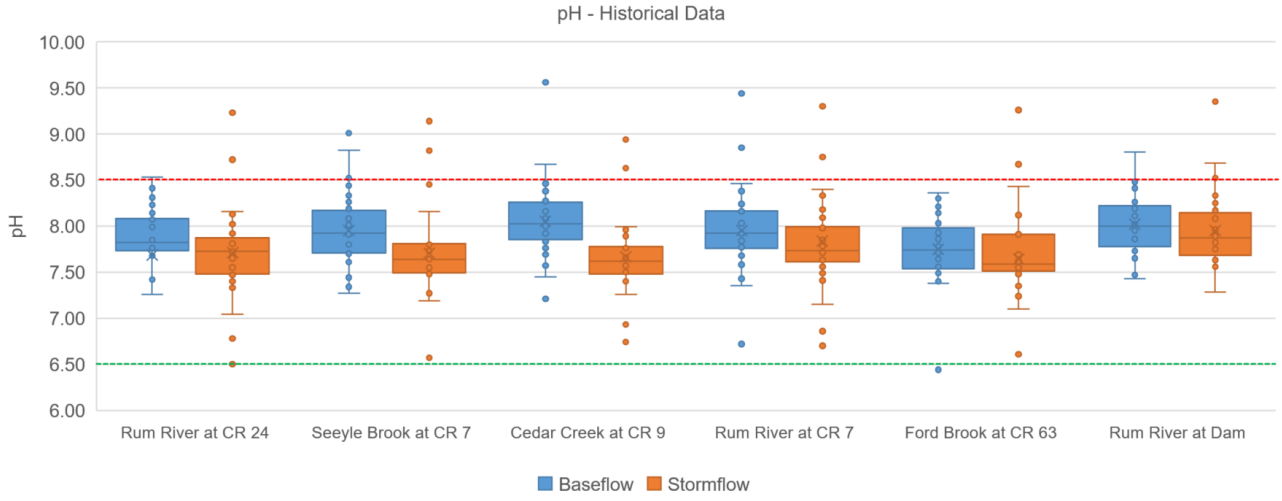
	AVG	MED	TOTAL #	< 6.5	> 8.5
Rum River @ CR 24	7.68	7.68	2	0	0
Seelye Brook @ CR 7	7.41	7.41	2	0	0
Cedar Creek @ CR 9	7.65	7.65	2	0	0
Rum River @ CR 7	7.69	7.72	3	0	0
Ford Brook @ CR 63	7.54	7.54	2	0	0
Rum River @ Anoka Dam	7.97	7.91	4	0	0

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 different 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 different 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 different 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 years at the above sites. 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	

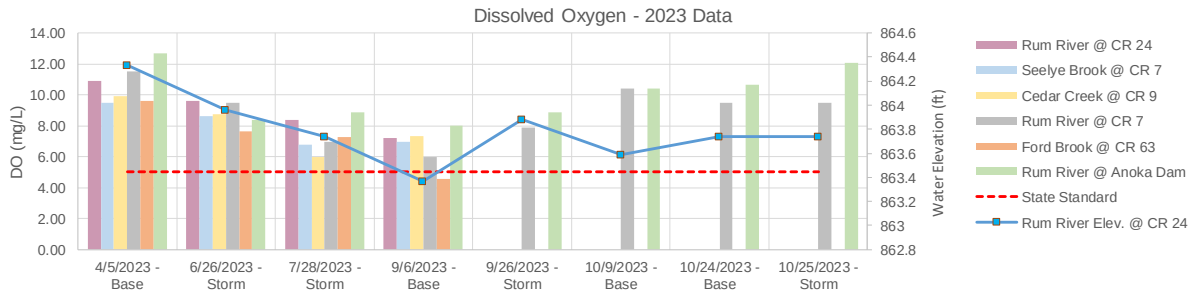
DO - Historical Baseflow Data

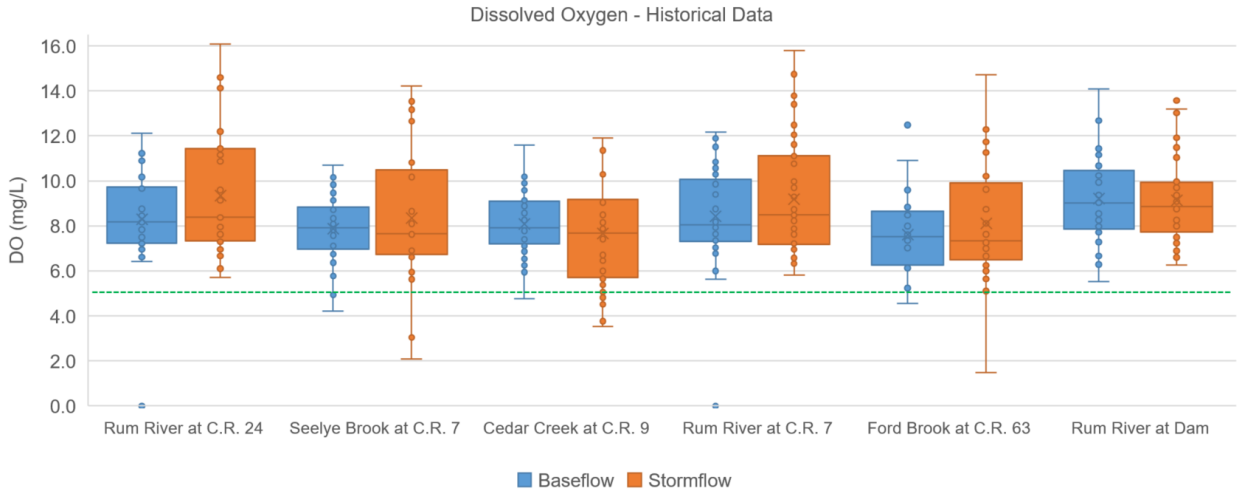
	AVG	MED	TOTAL #	< 5 mg/L
Rum River @ CR 24	8.52	8.21	38	0
Seelye Brook @ CR 7	7.88	7.91	36	2
Cedar Creek @ CR 9	8.09	7.92	40	1
Rum River @ CR 7	8.62	8.11	44	0
Ford Brook @ CR 63	7.61	7.51	26	1
Rum River @ Anoka Dam	9.21	9.03	39	0

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

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 (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.

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

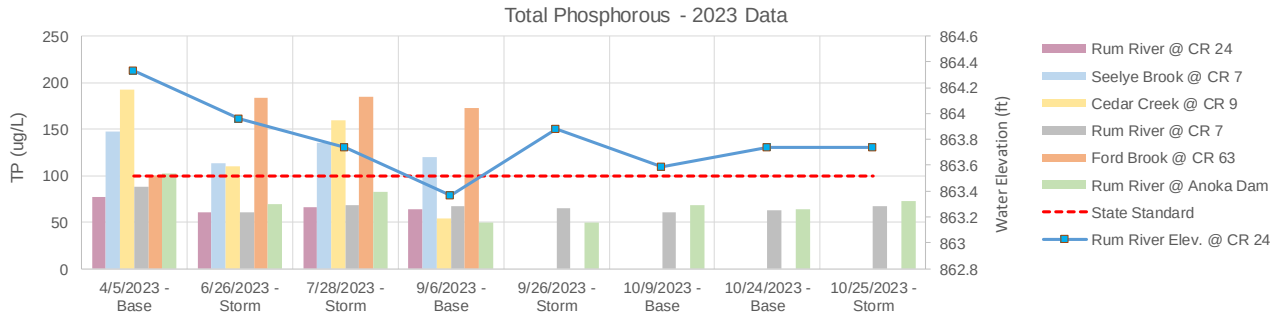
TP - Historical Baseflow Data

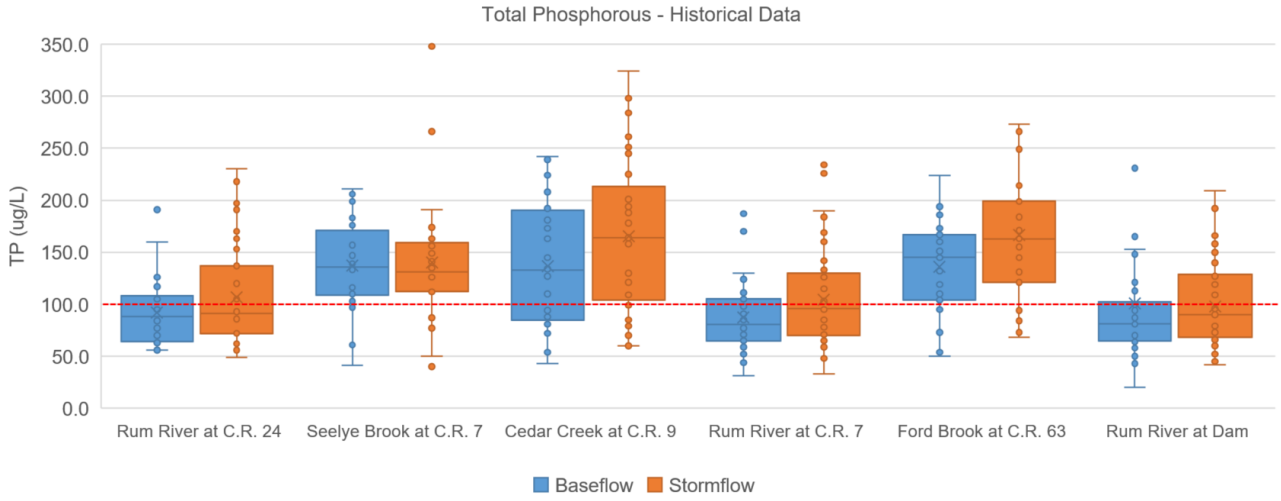
	AVG	MED	TOTAL	> 100 µg/L
Rum River @ CR 24	92.2	88.0	33	11
Seelye Brook @ CR 7	137.4	135.5	28	24
Cedar Creek @ CR 9	136.6	133.0	32	19
Rum River @ CR 7	87.2	80.5	46	12
Ford Brook @ CR 63	136.3	145.0	29	24
Rum River @ Anoka Dam	101.0	81.0	45	14

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 Rum 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 different 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 in Seelye Brook.

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 different 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

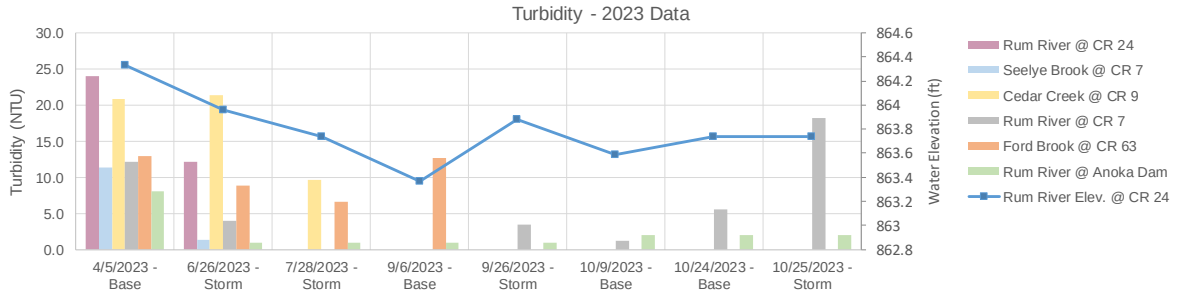
	AVG	MED	TOTAL #	> 30 mg/L
Rum River @ CR 24	7.4	7.0	33	0
Seelye Brook @ CR 7	7.7	5.5	28	1
Cedar Creek @ CR 9	14.3	13.0	32	2
Rum River @ CR 7	6.9	6.0	46	0
Ford Brook @ CR 63	11.3	9.0	29	2
Rum River @ Anoka Dam	8.4	5.5	46	3

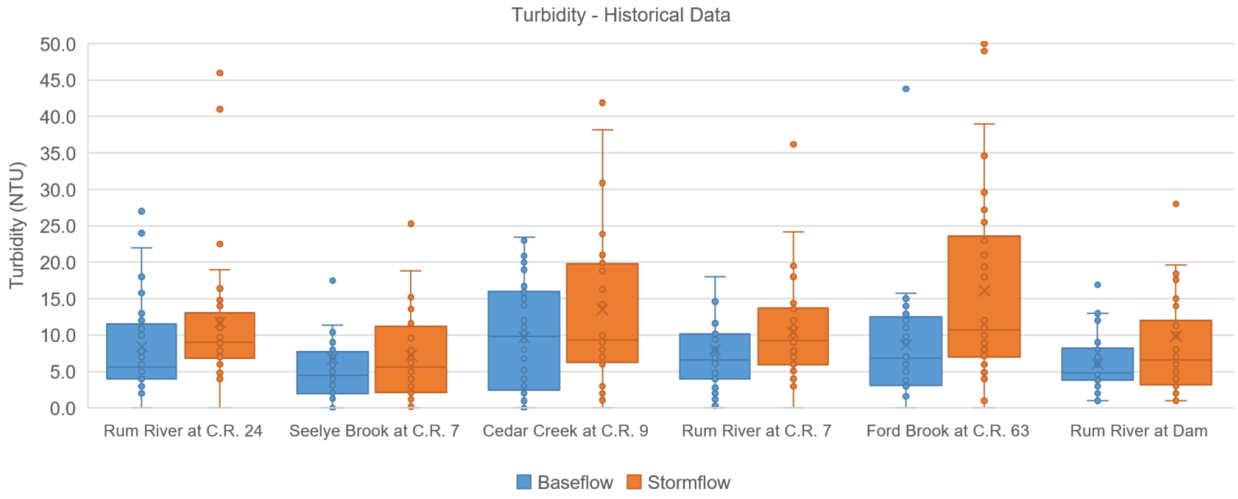
TSS - Historical Stormflow Data

	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

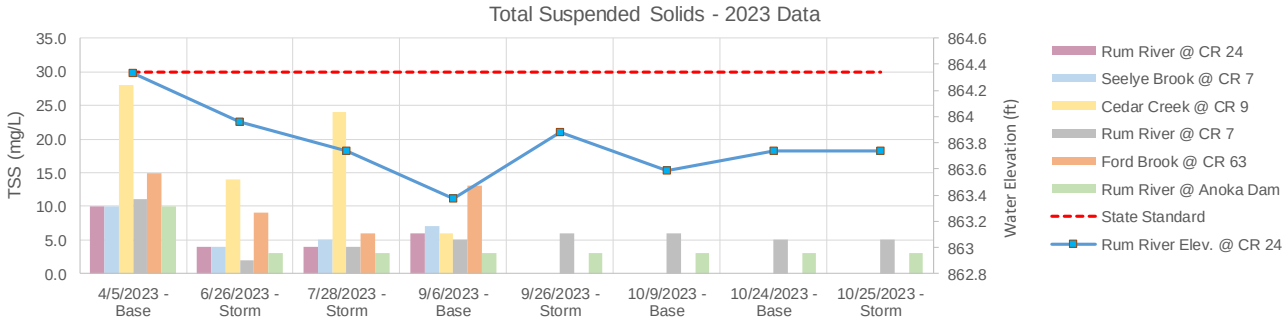
While the Rum River and these tributaries remain well under the impairment threshold for TSS, rigorous stormwater treatment in new developments should be a priority in the coming years. There are also opportunities to better treat current runoff from developed and agricultural landscapes. ACD and partners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

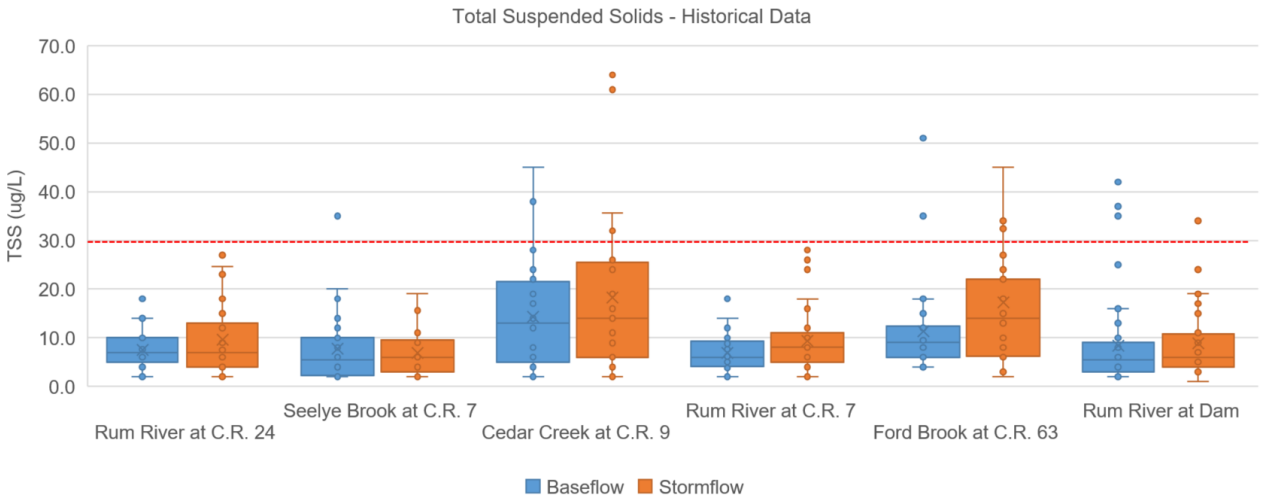
Turbidity during Baseflow and Storm Conditions. Box plots show the median (middle line), 25th and 75th percentile (ends of box), and 10th and 90th percentiles (floating outer lines). Historical boxplot data also includes this year's data.





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: St. Francis American Legion Post #622, St. Francis High School, ACD, URRWMO

Description: This long-standing 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 at Rum River North County Park, St. Francis

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

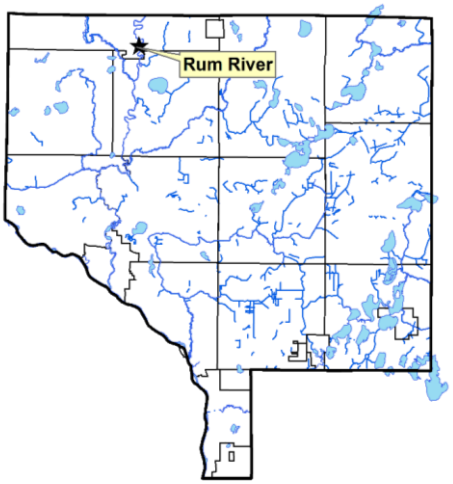
<u>Population Attributes Metrics</u> **% EPT** compares the number of organisms in the EPT orders (Ephemeroptera, Plecoptera, Trichoptera) to the total number of organisms in the sample. A high percent of EPT is good.

% 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

St. Francis High School, St. Francis

Monitored Since
2000



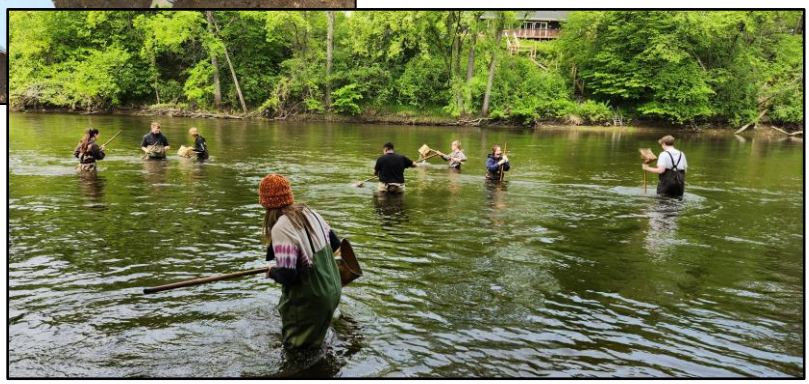
Student Involvement
Approx. 150 students in 2023, approximately 1,800 since 2000. The site is monitored by St. Francis High School, with facilitation by the Anoka Conservation District.

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. Other than the Mississippi, the Rum River is the largest river in the county. In Anoka County, the river has both rocky riffles as well as pools and runs with sandy bottoms. The river's condition is generally regarded as excellent. Large portions of the Rum River in Anoka County have a State "scenic and recreational river" designation.

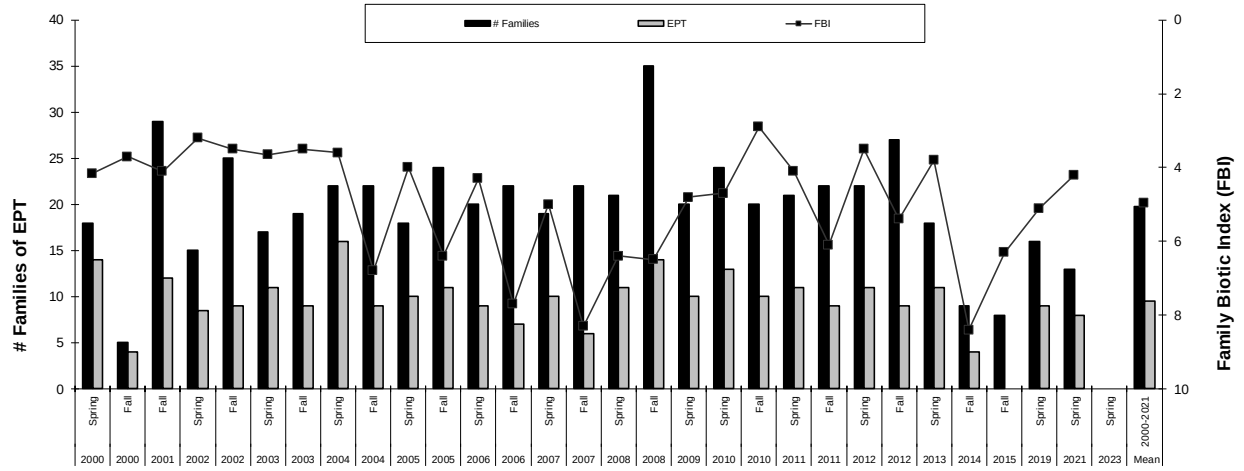
The sampling site is in Rum River North County Park, in St. Francis. This site is typical of the Rum in Northern Anoka County, having a rocky bottom with numerous pool and riffle areas.

Results
All students who participated in 2023 sampling were part of sophomore biology courses. All specimens were identified to the best of the students' abilities for a rapid assessment in the field and then returned to the river. As a result, no preserved samples are available for ACD identification and inclusion in the Water Almanac.



Summarized Biomonitoring Results for Rum River North County Park, St. Francis

(samplings by St. Francis High School and Crossroads Schools in 2002-2003 are averaged)



Biomonitoring Data for Rum River at Rum River North County Park, St. Francis

Data presented are from the most recent five years. Complete data from 2021 is not available, as the number of individuals of each species collected were not recorded. The categories that rely on this information are left blank for 2021. Additionally, 2023 has been excluded as no preserved samples are available for ACD identification.

Year	2013	2014	2015	2019	2021	Mean
Season	Spring	Fall	Fall	Spring	Spring	2000-2021
FBI	3.8	8.4	6.3	5.1	4.2	5.0
# Families	18	9	8	16	13	19.8
EPT	11	4	0	9	8	9.5
Date	20-May	24-Oct	22-Jul	19-May	26-May	
Sampled By	SFHS	SFHS	4-H	SFHS	SFHS	
Sampling Method	MH	MH	MH	MH	MH	
Mean # Individuals/Rep.	247.5	219	23	139		
# Replicates	2	1	1	1		
Dominant Family	Baetiscida	Corixidae	Cambaridae	Siphlonuridae		
% Dominant Family	34.7	86.3	34.8	32.4		
% Ephemeroptera	54.1	3.7	0	46		
% Trichoptera	6.3	0.5	0.0	0		
% Plecoptera	30.3	2.3	0	18		

Discussion

Historically, both chemical and biological monitoring indicate the good water quality of this river. Poorer results in 2014 and 2015 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. Taxa that are extremely sensitive to pollution are still being found. Water chemistry monitoring done at various locations on the Rum River throughout Anoka County indicates that water quality is also good. Continued biological monitoring is recommended both as an education program and for long-term ecological condition monitoring.

Wetland Hydrology

Partners: URRWMO, ACD

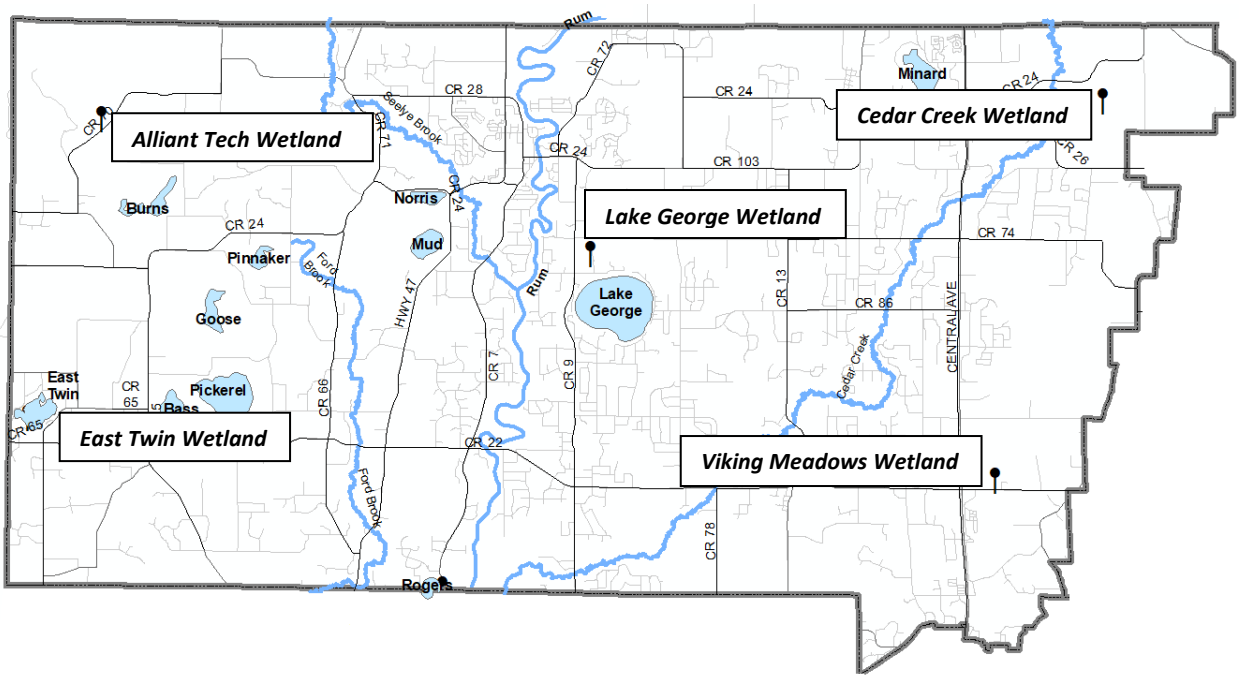
Description: Continuous groundwater level monitoring at a wetland boundary. Countywide, ACD maintains a network of 23 wetland hydrology monitoring stations.

Locations: Alliant Tech Wetland, East Twin Wetland, Lake George Wetland, Cedar Creek Wetland, Viking Meadows Wetland.

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

Results: See the following pages.

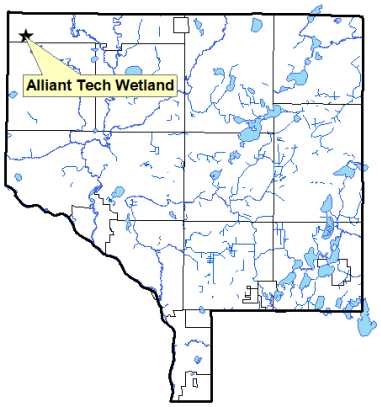
2023 URRWMO Wetland Hydrology Monitoring Site



ALLIANT TECH REFERENCE WETLAND

Alliant Tech Systems Property, St. Francis

Site Information



Monitored Since: 2001

Wetland Type: 5

Wetland Size: ~12 acres

Isolated Basin: Yes

Connected to a Ditch: No

Surrounding Soils: Emmert

Soils at Well Location:

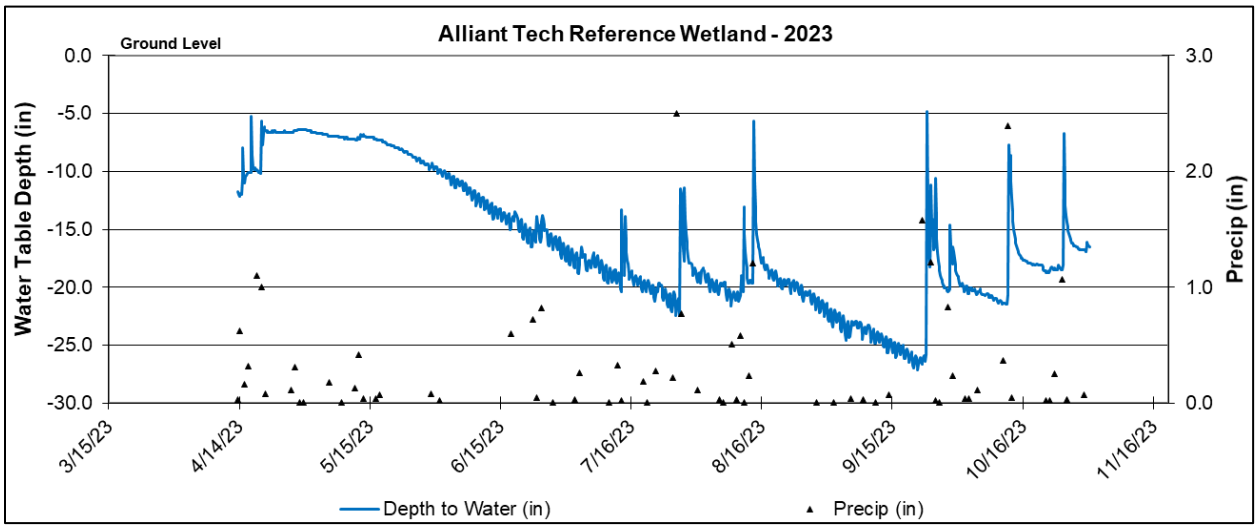
Horizon	Depth	Color	Texture	Redox
A	0-8	N2/0	Murky loam	-
Bg	8-35	5y5/1	Sandy Loam	-

Vegetation at Well Location:

Scientific	Common	% Coverage
Carex Spp	Sedge undiff.	90
Lycopus americanus	American Bungleweed	20
Phalaris arundinacea	Reed Canary Grass	5

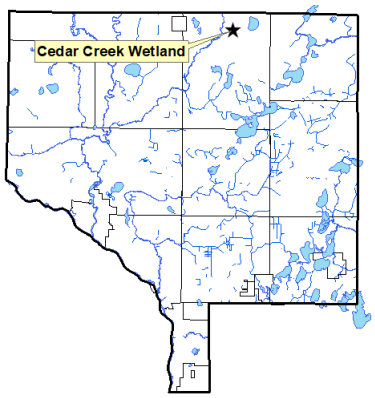
Other Notes: This wetland lies next to the highway in a low area surrounded by hilly terrain. The boring is located near the wetland edge. The basin holds water throughout the year.

2023 Hydrograph (Well Depth 40 inches)



CEDAR CREEK REFERENCE WETLAND

Cedar Creek Ecosystem Science Reserve, East Bethel

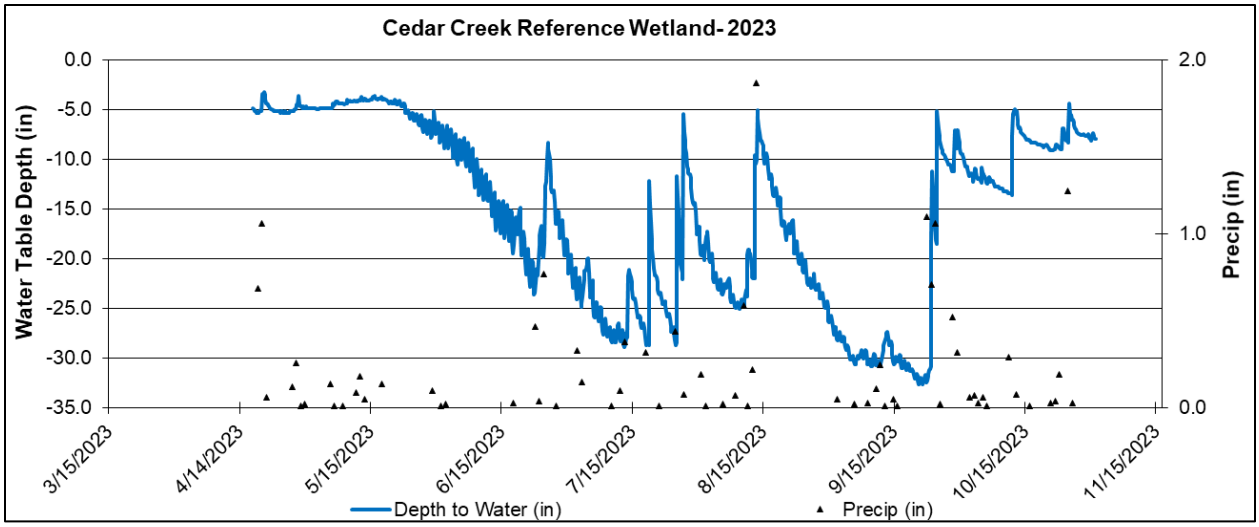


Site Information

Monitored Since:	1996
Wetland Type:	6
Wetland Size:	>150 acres
Isolated Basin:	No
Connected to a ditch:	No
Surrounding Soils:	Zimmerman
Soils at Well Location:	Not yet available
Vegetation at Well Location:	Not yet available

Other Notes: This wetland is located within a science research reserve, operated by the University of Minnesota. Much of this area, including the area surrounding the monitoring site, is in a natural state. This wetland probably has some hydrologic connection to the floodplain of Cedar Creek.

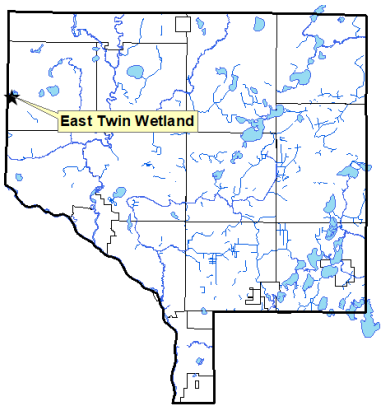
2023 Hydrograph (Well Depth 40 inches)



EAST TWIN REFERENCE WETLAND

Twin Lake City Park, Nowthen

Site Information



Monitored Since: 2001

Wetland Type: 5

Wetland Size: ~5.9 acres

Isolated Basin: Yes

Connected to a Ditch: No

Surrounding Soils: Lake Beach, Growton and Heyder fine sandy loam

Soils at Well Location:

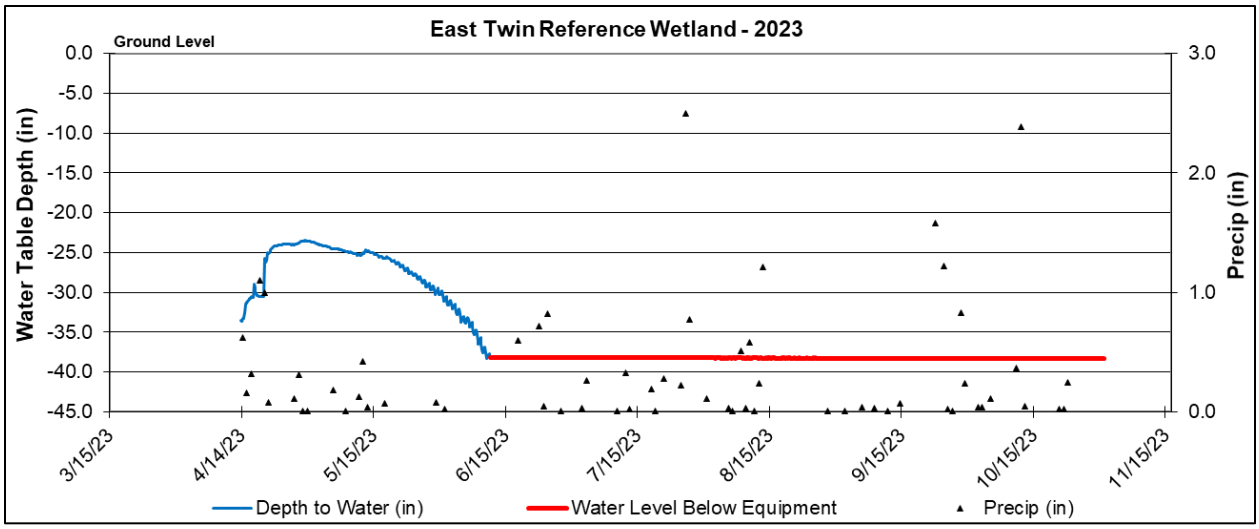
Horizon	Depth	Color	Texture	Redox
A	0-8	10yr 2/1	Mucky Loam	-
Oa	Aug-40	N2/0	Organic	-

Vegetation at Well Location:

Scientific	Common	% Coverage
Phalaris arundinacea	Reed Canary Grass	100
Cornus amomum	Silky Dogwood	30
Fraxinus pennsylvanica	Green Ash	30

Other Notes: This wetland is located in Twin Lake Community Park near East Twin Lake and lake levels influence the hydrology of the wetland.

2023 Hydrograph (Well Depth 38 inches)



LAKE GEORGE REFERENCE WETLAND

Lake George County Park, Oak Grove

Site Information

Monitored Since: 1997

Wetland Type: 3/4

Wetland Size: ~9 acres

Isolated Basin: Yes

Connected to a Ditch: No

Surrounding Soils: Lino loamy fine sand and Zimmerman fine sand

Soils at Well Location:

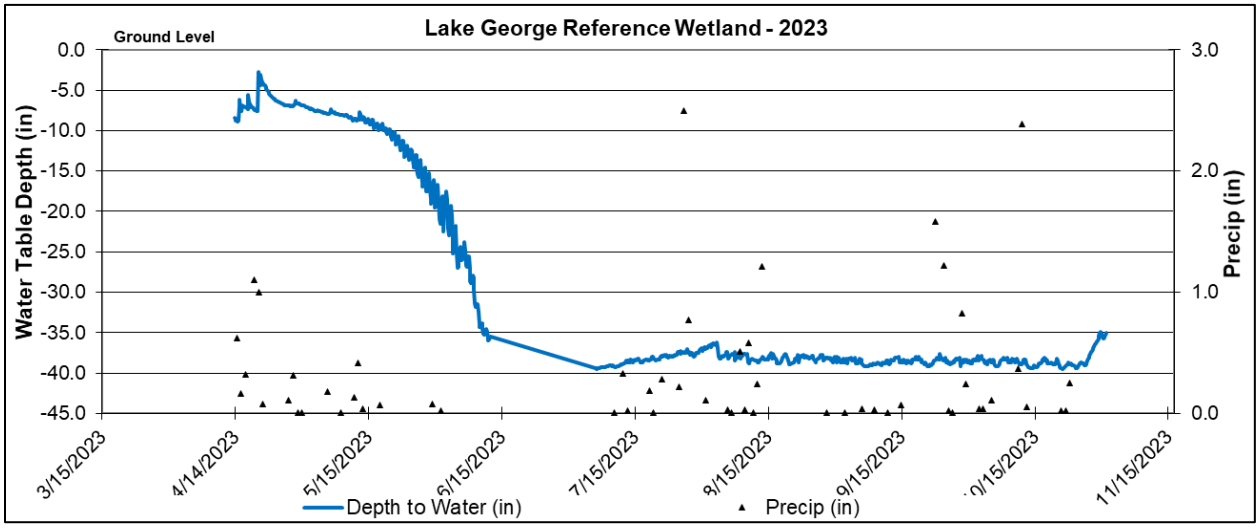
Horizon	Depth	Color	Texture	Redox
A	0-8	10yr2/1	Sandy Loam	-
Bg	8-24	2.5y5/2	Sandy Loam	20% 10yr5/6
2Bg	24-35	10gy 6/1	Silty Clay Loam	10% 10yr 5/6

Vegetation at Well Location:

Scientific	Common	% Coverage
Cornus stolonifera	Red-osier Dogwood	90
Populus tremuloides	Quaking Aspen	40
Quercus rubra	Red Oak	30
Onoclea sensibilis	Sensitive Fern	20
Phalaris arundinacea	Reed Canary Grass	10

Other Notes: This wetland is located in Lake George County Park near Lake George. Data unavailable between 6/12/2023 and 7/7/2023.

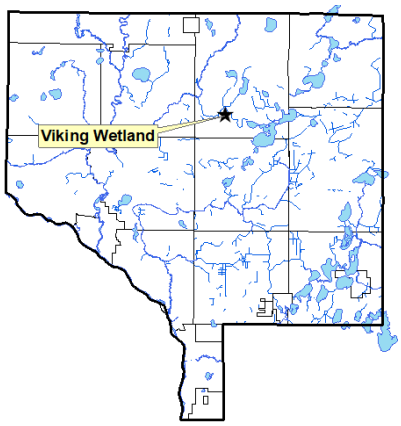
2023 Hydrograph (Well Depth 40 inches)



VIKING MEADOWS REFERENCE WETLAND

Viking Meadows Gold Course, East Bethel

Site Information



Monitored Since: 1999

Wetland Type: 2

Wetland Size: ~0.7 acres

Isolated Basin: No

Connected to a Ditch: Yes

Surrounding Soils: Zimmerman fine sand

Soils at Well Location:

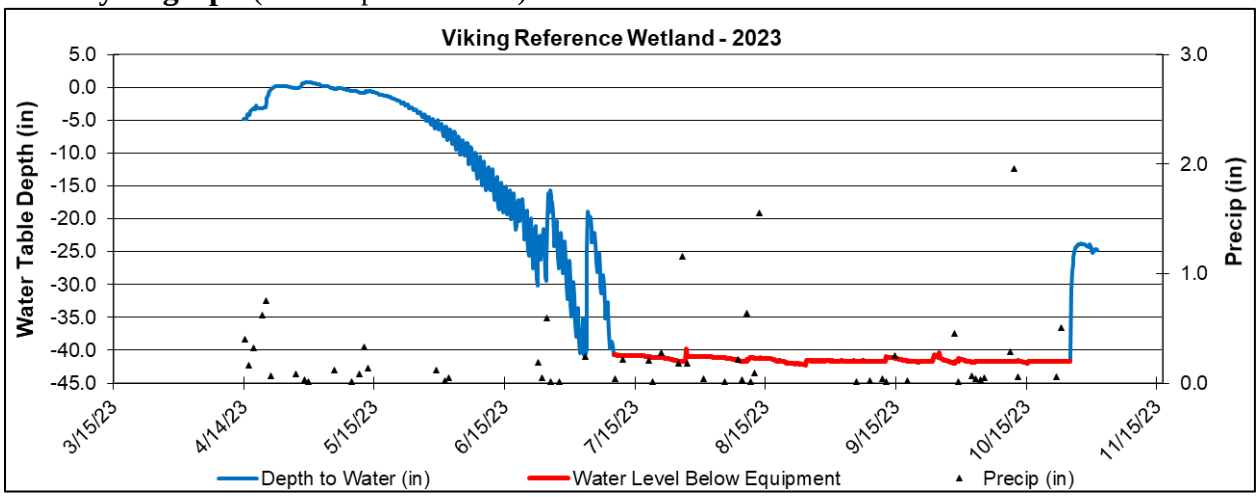
Horizon	Depth	Color	Texture	Redox
A	0-12	10yr2/1	Sandy Loam	-
Ab	12-16	N2/0	Sandy Loam	-
Bg1	16-25	10yr4/1	Sandy Loam	-
Bg2	25-40	10yr4/2	Sandy Loam	5% 10yr5/6

Vegetation at Well Locations:

Scientific	Common	% Coverage
Phalaris arundinacea	Reed Canary Grass	100
Acer rubrum (T)	Red Maple	75
Acer negundo (T)	Boxelder	20

Other Notes: This wetland is located at the entrance to Viking Meadows Golf Course, and is located near the wetland edge. The boring was dry in the fall season due to abnormally dry conditions throughout Anoka County.

2023 Hydrograph (Well Depth 44 inches)



Water Quality Improvement Projects

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

Lake George Shoreline Stabilizations (2)

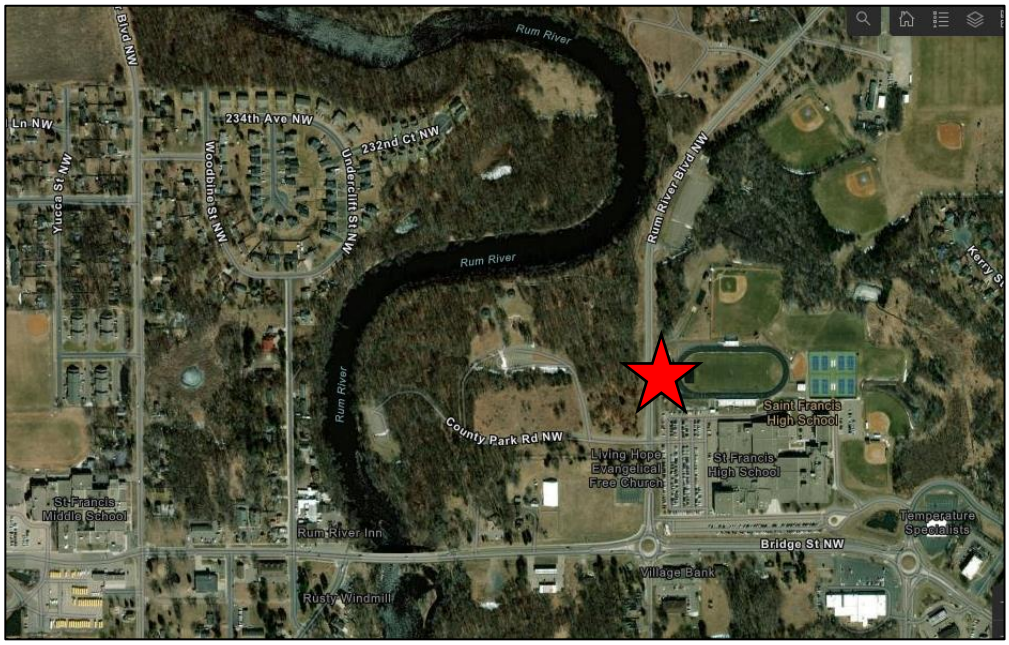
Shoreline stabilizations and native plant buffers were completed at two adjacent properties on Lake George. The shorelines, at 41 and 55 linear feet, were bare eroding sand and turf grass prior to the projects. The project included rock rip rap and native plant buffers of 370 and 287 square feet. Funding was from a Watershed Based Implementation Funding (WBIF) grant and landowners.

Photos: Site conditions before (left) and after (right).

Rum River Blvd Swale Stabilization

A roadside swale stabilization was completed on the west side of the St. Francis High School campus. The project stabilized a 460 ft. eroding swale. The project was a priority because the swale terminates in a stream that drains to the Rum River less than 500 ft. downstream. The swale receives a large amount of runoff from the high school and adjacent lands. The 9.97 ac drainage is more than half impervious surface. Funding was from a Watershed Based Implementation Funding (WBIF) grant and the Upper Rum River Watershed Management Organization. Partners included the City of St. Francis, St. Francis High School, and Anoka Co Highway Department.

Photos: Site conditions before (left) and after (right).



Dellwood Community Park Rum Riverbank Stabilization

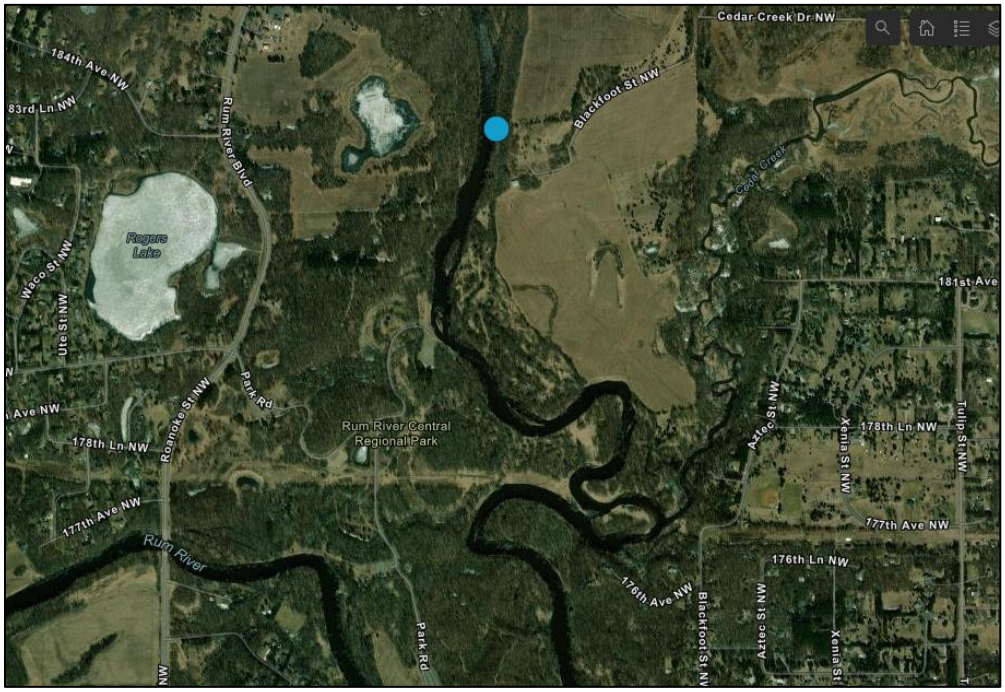
Moderate to severe bank erosion along 630 feet of Rum Riverbank in Dellwood River Park (St. Francis) was causing significant tree and soil loss and was threatening a public walking trail. Several practices were used to stabilize the riverbank including three rock bend way weirs that deflect flow away from the bank, rock rip rap, root wads, and cedar tree revetments. Funding was from the Lessard-Sams Outdoor Heritage Fund City of St. Francis, and Anoka County.

Photos: Site conditions before (left) and after (right).

Cedar Creek Conservation Area Rum Riverbank Stabilization

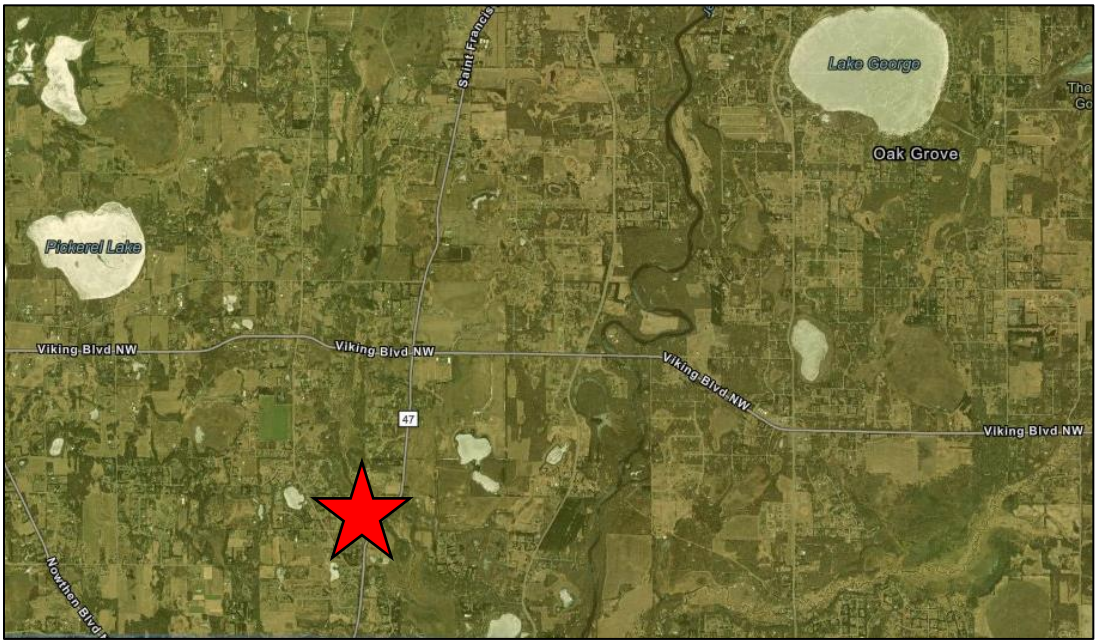
Anoka Conservation District (ACD) in partnership with the Conservation Corps of Minnesota & Iowa (CCMI) and Anoka County Parks installed a cedar tree revetment within the Cedar Creek Conservation Area in Oak Grove. Installation of this revetment has been ongoing from 2021-2023 and totals 2,305 linear feet. The cut cedar trees, anchored to the bank, provide soft armor to prevent erosion. Shrubs are planted by live staking for long term stabilization. Funding was from a MN DNR Conservation Partners Legacy grant, grant of crew time from the Conservation Corps of MN and IA, and donated materials

Photos: Site conditions before (left) and after (right).



Septic System Fix Up

One non-compliant septic system was replaced in 2023 using grant funds for low income households. The SSTS Fix-Up Program is administered by ACD, which prioritizes projects near priority lakes and streams. Funding was from a Watershed Based Implementation Funding (WBIF) grant and the landowner. The 2023 project was adjacent to Ford Brook.



Subwatershed Studies

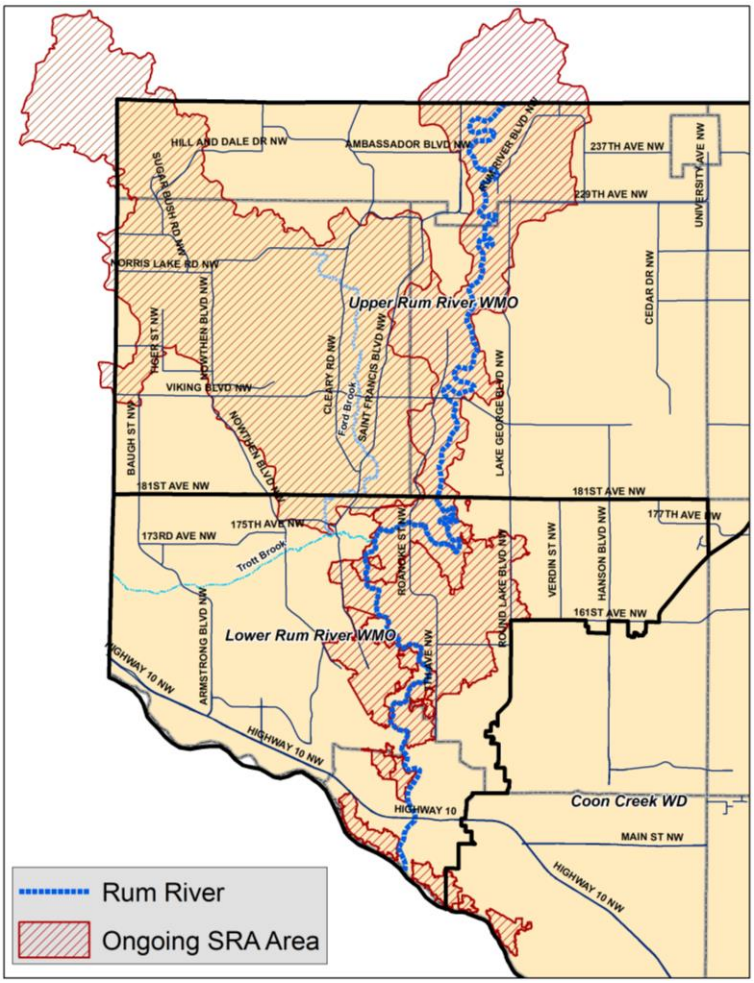
Partners: LRRWMO, URRWMO, ACD

Description: Subwatershed studies identify projects to improve water quality and rank them by cost effectiveness. The process includes identifying a priority waterbody, 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 Ford Brook, 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.



URRWMO Annual Report to BWSR and State Auditor

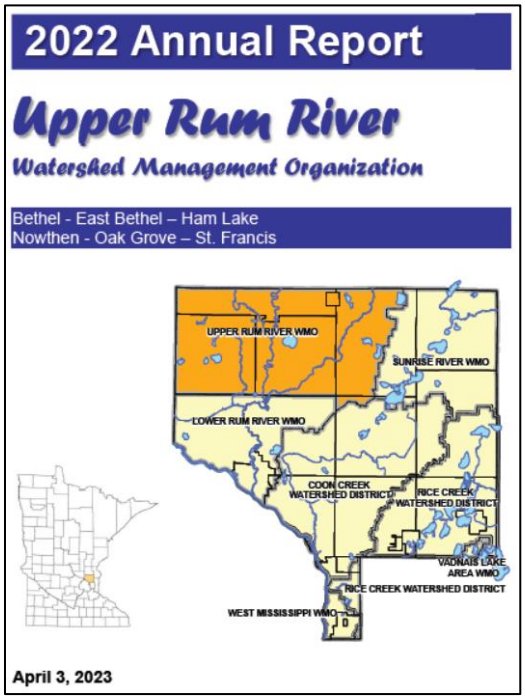
Partners: URRWMO, ACD

Description: The URRWMO is required by law to submit an annual report to the Minnesota Board of Water and Soil Resources (BWSR). This report consists of an updated list of all URRWMO Board members, work activities related to the URRWMO Watershed Management Plan, current 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). The URRWMO must also submit an annual financial report to the State Auditor. This includes submitting a financial report and filling out a multi-worksheet form.

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

Location: Watershed-wide

Results: ACD prepared the URRWMO annual report to BWSR and reporting to the State Auditor. They are available on the URRWMO website.



Administrative Services

Partners: URRWMO, ACD

Description: ACD serves as the URRWMO Watershed Coordinator, providing a variety of administrative services. Tasks are limited to those defined in the contractual agreement.

Purpose: To facilitate the day-to-day operations of the URRWMO.

Results: Administrative assistance provided to the URRWMO by ACD included:

- Prepared meeting packets for and facilitated URRWMO meetings.
- Developed annual budgets.
- Prepared URRWMO activity summary report for board members and cities.
- Requested & received biomonitoring funding for the American Legion.
- Represented URRWMO interested during Watershed Based Implementation Funding meetings.
- Worked to city bring ordinances into compliance with URRWMO standards.
- Presented amendments to the URRWMO joint powers agreement.
- Fielded questions from developers, the county highway department, and others regarding URRWMO stormwater and wetland standards.
- Facilitated the URRWMO technical advisory committee.
- Fielded requests from the City of Anoka for Anoka dam project support.
- Insurance renewal.
- Board tour of projects.
- Fielded community concerns about URRWMO funding mechanisms.
- Created a reorganized ledger and treasurer's report form.

Website

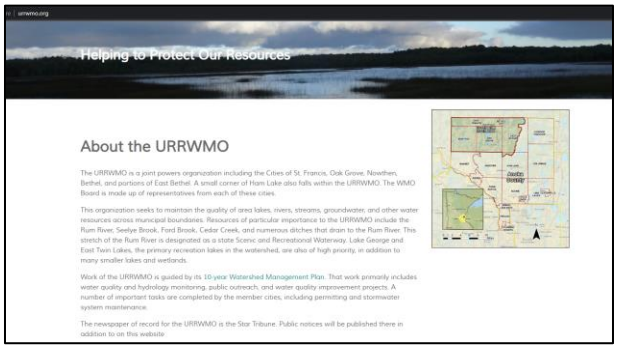
Partners: URRWMO, ACD

Description: The URRWMO contracts ACD to maintain the URRWMO website.

Purpose: To increase awareness of the URRWMO and its programs. The website also provides resources that helps users better understand water resource issues in the watershed.

Locations: www.URRWMO.org

Results: In 2023, ACD maintained the existing URRWMO website, paid the domain registration and hosting fees, and posted meeting minutes and agendas.



Newsletters

Partners: ACD, URRWMO

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 URRWMO and its programs.

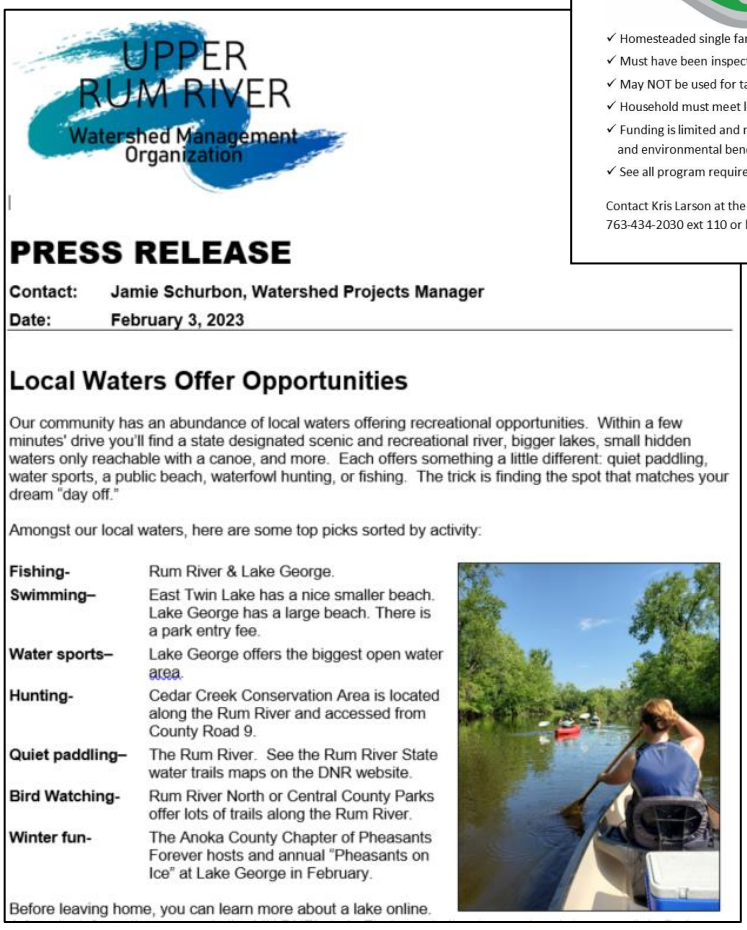
Location: Watershed-wide

Results: ACD prepared two articles/infographics for the URRWMO in 2023. The topics included septic system fix-up grants and local water recreation opportunities. Articles were printed in partnering city newsletter

Septic system repair & replacement grants

- ✓ Homesteaded single family homes or duplexes in Anoka Co.
- ✓ Must have been inspected and issued a certificate of non-compliance.
- ✓ May NOT be used for tank pumping or other maintenance.
- ✓ Household must meet low income thresholds. Grant covers up to 90% depending on income.
- ✓ Funding is limited and may vary by location. Shoreland areas or projects providing the greatest health and environmental benefits may be preferentially funded.
- ✓ See all program requirements at www.AnokaSWCD.org under "financial assistance."

Contact Kris Larson at the Anoka Conservation District.
763-434-2030 ext 110 or kris.larson@anokaswcd.org



UPPER RUM RIVER Watershed Management Organization

PRESS RELEASE

Contact: Jamie Schurbon, Watershed Projects Manager
Date: February 3, 2023

Local Waters Offer Opportunities

Our community has an abundance of local waters offering recreational opportunities. Within a few minutes' drive you'll find a state designated scenic and recreational river, bigger lakes, small hidden waters only reachable with a canoe, and more. Each offers something a little different: quiet paddling, water sports, a public beach, waterfowl hunting, or fishing. The trick is finding the spot that matches your dream "day off."

Amongst our local waters, here are some top picks sorted by activity:

Fishing-	Rum River & Lake George.
Swimming–	East Twin Lake has a nice smaller beach. Lake George has a large beach. There is a park entry fee.
Water sports–	Lake George offers the biggest open water area.
Hunting-	Cedar Creek Conservation Area is located along the Rum River and accessed from County Road 9.
Quiet paddling–	The Rum River. See the Rum River State water trails maps on the DNR website.
Bird Watching-	Rum River North or Central County Parks offer lots of trails along the Rum River.
Winter fun-	The Anoka County Chapter of Pheasants Forever hosts and annual "Pheasants on Ice" at Lake George in February.

Before leaving home, you can learn more about a lake online.

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 URRWMO. The URRWMO 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 URRWMO area benefits from outreach by the Rum River Watershed Partnership.

2023 accomplishments included:

Projects promotion

- Neighborhood-wide rain garden promotion in the 225th Lane area of St. Francis. Approximately 12 direct conversations were done with landowners.
- Wetland restoration outreach to specific properties in the Ford Brook subwatershed and along the Rum River.

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

- Lake George groups meeting – ACD staff presented about water quality improvement efforts at a joint meeting of the Lake George Conservation Club and Lake Improvement District.

Other

- Videos – The "Our Waters" video series which the URRWMO 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.