Excerpt from the
2019 Water Almanac
Chapter 4: Lower Rum River Watershed

Prepared by the Anoka Conservation District

Chapter 4: Lower Rum River Watershed

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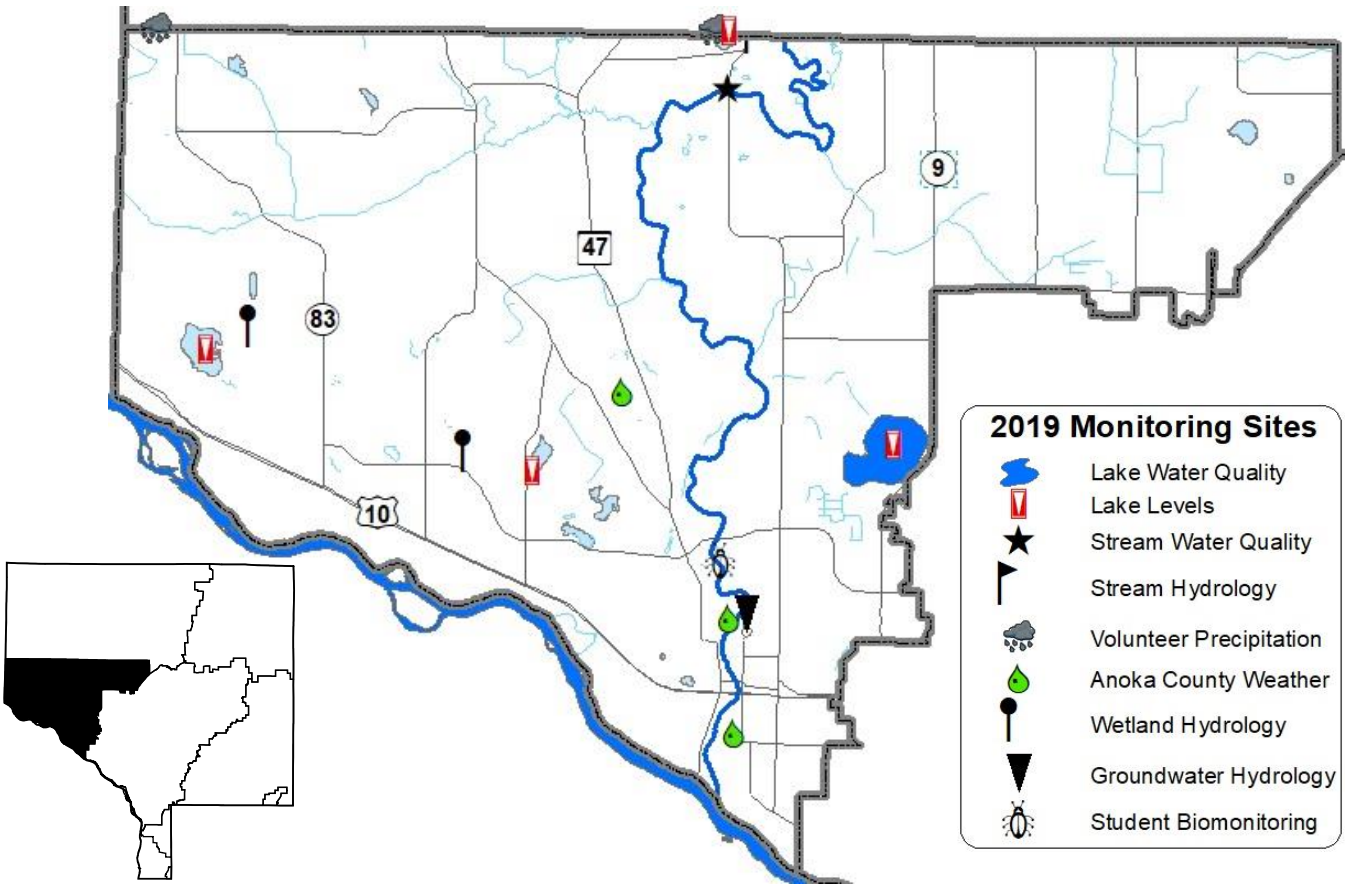


Lake Level Monitoring

Partners: LRRWMO, ACD, MN DNR, volunteers

Description: Weekly water level monitoring in lakes. The past five and twenty-five years of data 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).

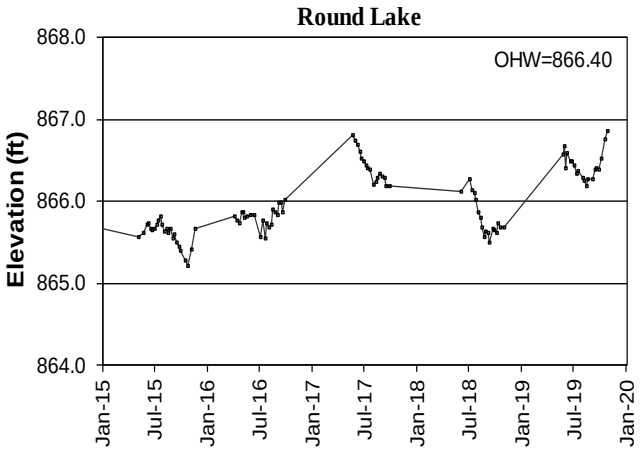
Purpose: To understand lake hydrology, including the impacts of climate or other water budget changes. These data are useful for regulatory, building/development, and lake management decisions.

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

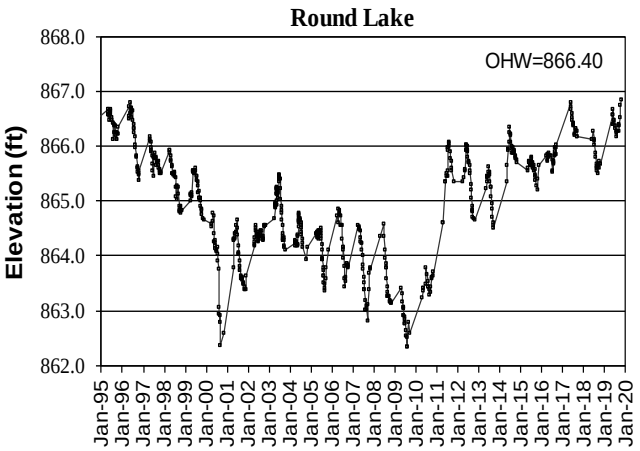
Results: Lake levels were measured by volunteers throughout the 2019 open water season. Lake gauges were installed and surveyed by the Anoka Conservation District and MN DNR. 2019 levels were higher than 2018 levels, and historical levels in general. Lake levels followed the expected pattern of higher levels in the spring with declining levels through summer. A wet summer, and very wet fall caused levels to drop less than usual into late summer, and then to increase dramatically through October. Most lakes ended the season at very high levels for the time of year. Sunfish Lake appears to be rising over the past 25 years with all of 2019 staying above the OHW. Round Lake has rebounded to its 1994 levels after dropping almost five feet through 2010.

All lake level data can be downloaded from the MN DNR website's Lakefinder feature. Ordinary High Water Level (OHW), the elevation below which a DNR permit is needed to perform work, is listed for each lake on the corresponding graphs below.

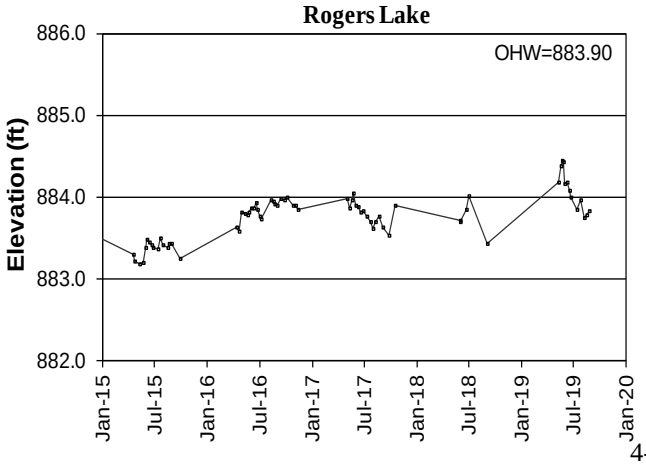
Round Lake Levels – last 5 years



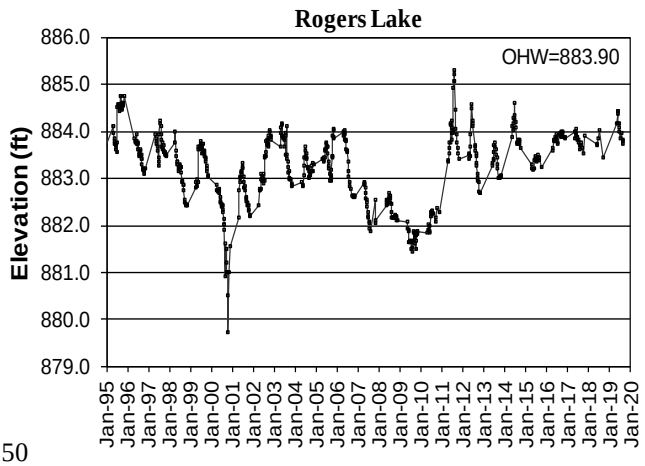
Round Lake Levels – last 25 years



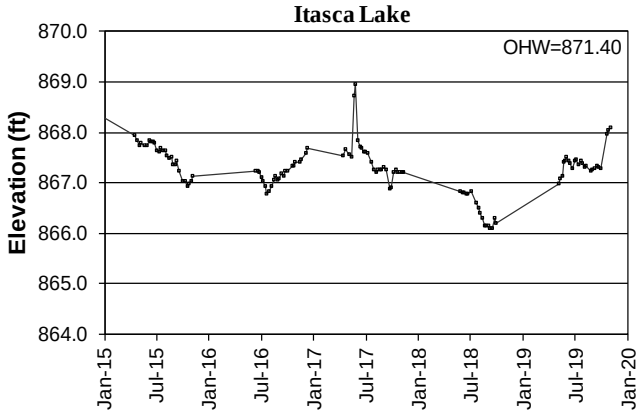
Rogers Lake Levels – last 5 years



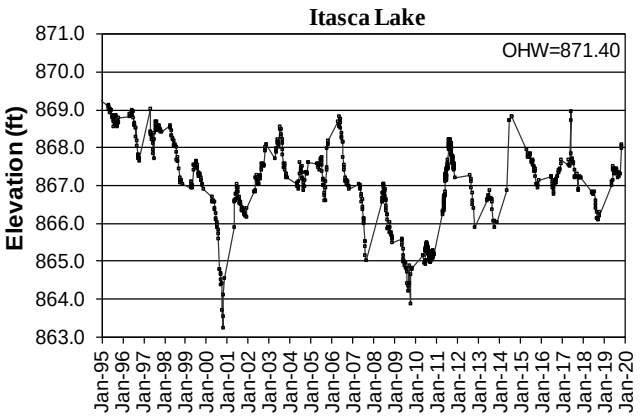
Rogers Lake Levels – last 25 years



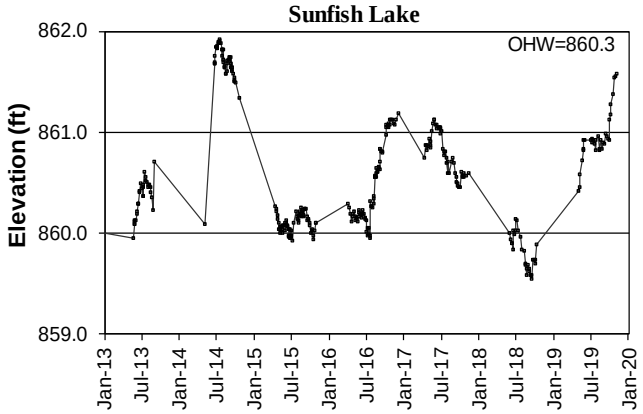
Itasca Lake Levels – last 5 years



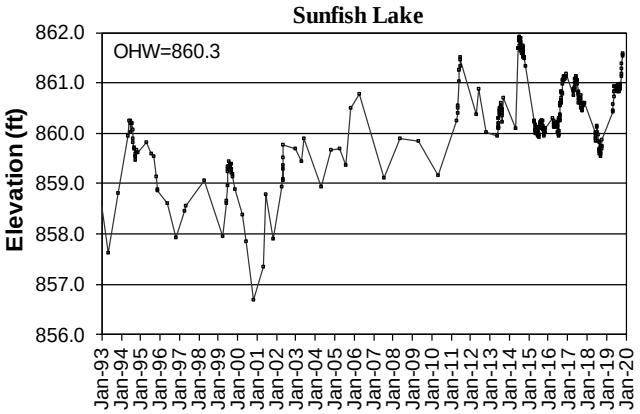
Itasca Lake Levels – last 25 years



Sunfish/Grass Lake Levels – last 5 years



Sunfish/Grass Lake Levels – last 25 years



Lake Water Quality

Partners: ACD, LRRWMO, Anoka County Ag Preserves Program

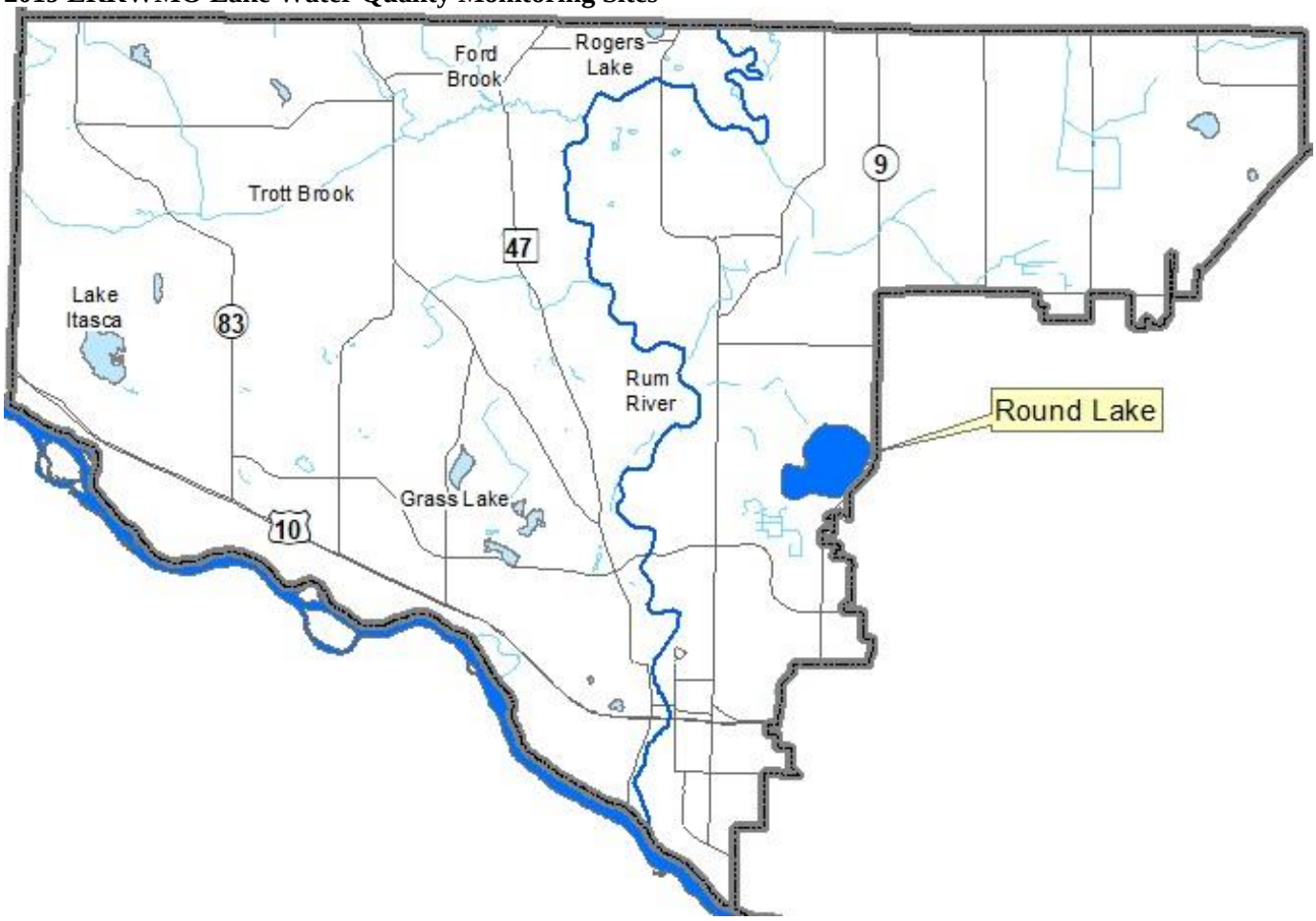
Description: May through September, every-other-week, monitoring is conducted for the following parameters: total phosphorus, chlorophyll-a, Secchi transparency, dissolved oxygen, turbidity, temperature, conductivity, pH, and salinity.

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

Locations: Round Lake

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 from the ACD. Refer to Chapter 1 for additional information on lake dynamics and interpreting the data.

2019 LRRWMO Lake Water Quality Monitoring Sites



Round Lake

City of Andover, Lake ID # 02-0089

Background

Round Lake is located in southwest Anoka County. It has a surface area of 220 acres and maximum depth of 19 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 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 from a dirt ramp on the lake's southeast side. Recreation is minimal primarily consisting of canoeing, kayaking, and wintertime fishing.

2019 Results

In 2019, Round Lake's water quality was very good compared with other lakes in this region (NCHF Ecoregion) receiving an overall A letter grade. The average of both total phosphorus (22.7 µg/L) and chlorophyll-a (5.1 µg/L) slightly increased from 2016, when the lake was last monitored. Both were still well below the state standards for shallow lakes (60 µg/L and 20µg/L respectively). Average Secchi transparency was 9.6 feet which is greater than the historical average of 8.5 feet. Phosphorus and algae concentrations were fairly consistent with a slight seasonal increase during July. Total phosphorus (29 µg/L), Cl-a (11.6 µg/L), and Secchi transparency (7.92 ft.), all had their poorest result during July. Even these "worst case" results during the middle of summer are quite good for a lake in this region and well within state standards for each parameter.

Trend Analysis

Twelve years of water quality monitoring has been conducted by the Anoka Conservation District (1998-2000, 2003, 2005, 2007, and 2009-2010, 2012, 2014, 2016-2019), which is a marginal number of years for trend analysis. In 2010, the results of the analysis indicated a significant trend of declining water quality across the years studied to that point (repeated measures MANOVA with response variables TP, Cl-a, and Secchi depth, $F_{2,5} = 9.6065$, $p = 0.0194$). When the analysis is run on all data to date, including the exceptional water quality observed since 2012, no significant water quality changes are apparent ($F_{2,9} = 0.63$, $p = 0.55$).). We examined each of the response variables separately using a one-way ANOVA to gain insight into which parameters could be influencing current water quality conditions. TP and Cl-a show non-significant downward trends, but lake level fluctuations are likely main drivers of TP and Cl-a concentrations in the lake due to dilution factors.

Discussion

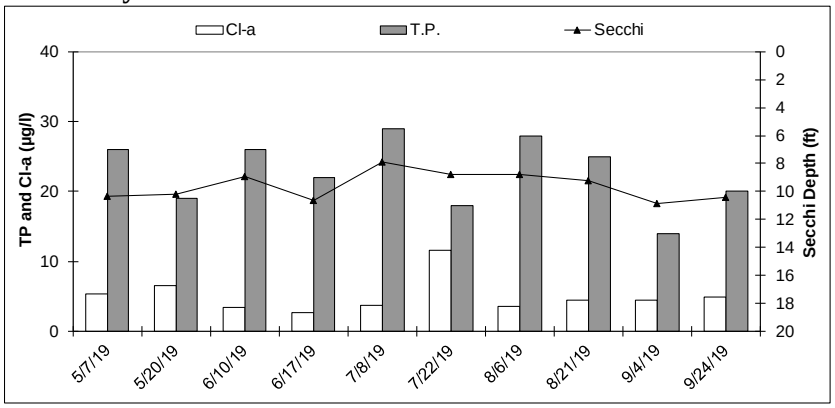
In 2019, exceptional water quality was observed in Round Lake for the fourth consecutive monitored year since 2012, earning the lake an A letter grade each year. There was growing concern about a trend toward poorer water quality, and continually falling lake levels from the mid-1990s through 2010. During this period, lake levels decreased by more than 4 feet on average. There was speculation that in-lake nutrient sources, driven by sediment mixing, were a contributor of phosphorus. During low water level conditions, there is more wind mixing due to shallow water depths, and in these years, there was also a conspicuous reduction of chara (a plant-like algae) carpeting the bottom. Since 2012, water levels have recovered substantially and water quality has dramatically improved. It does seem that low water levels in Round Lake have a correlation with poorer water quality.

The lake has few surface water inputs, so groundwater is important to lake hydrology. There have been concerns that local surficial groundwater levels, and hence the lake, are negatively impacted by a variety of causes including irrigation, residential groundwater use, and stormwater management. Groups including the MN DNR, ACD, watershed organizations, and cities have studied these potential causes. None has been found to cause lower-than-expected lake levels. Several lakes, including Round Lake and Bunker Lake, are potentially affected by groundwater overuse. Conservation of groundwater must become a regional and local priority as it will most likely become an increasing issue as development and population in the county continue to grow.

Round Lake

City of Andover, Lake ID # 02-0089

2019 Daily Results



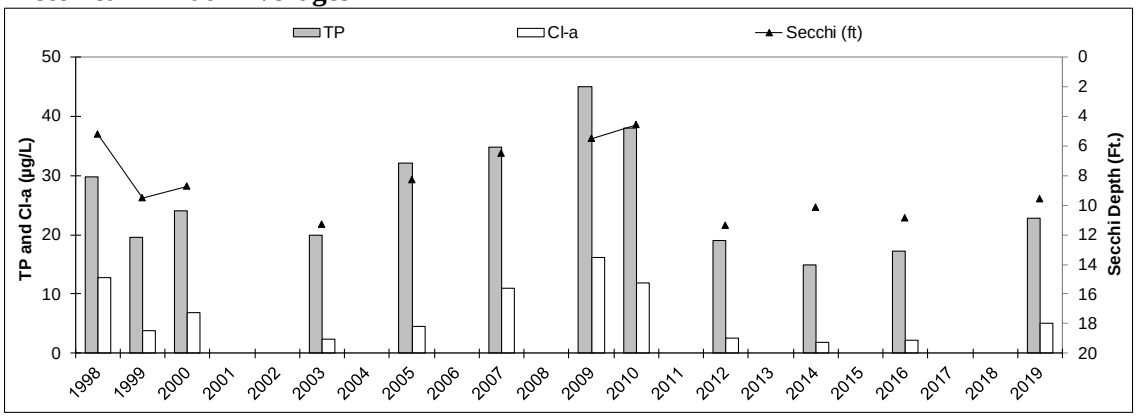
2019 Median Results

pH		8.11
Specific Conductivity	mS/cm	0.34
Turbidity	NTU	1.15
D.O.	mg/l	10.99
D.O.	%	128.2
Temp.	°F	71.84
Salinity	%	0.16
Cl-a	µg/L	5.1
T.P.	µg/l	23.5
Secchi	ft	2.96

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**
State Standards	60 ug/L	20 ug/L	>3.3 ft	

Historical Annual Averages



Round Lake

2019 Water Quality Data

	Units	R.L.*	Date: 5/7/2019 Time: 1:15	5/20/2019 1:30	6/10/2019 10:10	6/17/2019 12:30	7/8/2019 12:15	7/22/2019 12:15	8/6/2019 12:30	8/21/2019 12:00	9/4/2019 12:15	9/24/2019 12:20	Average	Min	Max
pH		0.1	8.29	8.02	8.11	8.11	8.36	8.10	8.33	7.98	7.86	7.95	8.11	7.86	8.36
Specific Conductivity	mS/cm	0.01	0.363	0.376	0.336	0.313	0.324	0.348	0.350	0.324	0.335	0.316	0.339	0.313	0.376
Turbidity	FNRU	1	N/A	0.00	1.20	1.10	3.10	1.40	0.00	1.20	0.60	0.80	1	0	3
D.O.	mg/l	0.01	12.51	9.51	8.22	9.08	11.80	10.36	12.53	10.94	11.03	12.48	10.85	8.22	12.53
D.O.	%	1	126.6	93.0	96.5	105.7	152.4	130.2	134.3	129.8	122.6	146.6	123.8	93.0	152.4
Temp.	°C	0.1	15.15	13.12	22.11	22.16	26.60	25.65	26.89	23.92	20.58	20.45	21.7	13.1	26.9
Temp.	°F	0.1	59.3	55.6	71.8	71.9	79.9	78.2	80.4	75.1	69.0	68.8	71.0	55.6	80.4
Salinity	%	0.01	0.17	0.18	0.16	0.15	0.16	0.17	0.17	0.16	0.16	0.15	0.16	0.15	0.18
Cl-a	ug/L	0.5	5.4	6.5	3.4	2.7	3.7	11.6	3.6	4.5	4.4	4.9	5.1	2.7	11.6
T.P.	mg/l	0.010	0.026	0.019	0.026	0.022	0.029	0.018	0.028	0.025	0.014	0.020	0.023	0.014	0.029
T.P.	ug/l	10	26	19	26	22	29	18	28	25	14	20	22.7	14	29
Secchi	ft	0.1	10.33	10.16	8.92	10.66	7.92	8.75	8.8	9.3	10.8	10.4	9.6	7.9	10.8
Secchi	m	0.1	3.1	3.1	2.7	3.2	2.4	2.7	2.7	2.8	3.3	3.2	2.9	2.4	3.3
Physical			1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Recreational			1	1.0	2.0	2.0	3.0	2.0	2.0	2.0	2.0	2.0	1.9	1.0	3.0

*reporting limit

Stream Water Quality - Chemical Monitoring

Partners: MPCA, ACD, LRRWMO

Description: Two sites on the Rum River were monitored in 2019. The locations of the river monitoring sites were located near the approximate upstream and downstream extents of the Lower Rum River Watershed. A site near the northern boundary of the Upper Rum River Watershed in St. Francis has been additionally monitored in previous years, but was not monitored in 2019. Monitoring near the southern extent of the Lower Rum Watershed was completed by the Metropolitan Council (Met Council) downstream of the Anoka Dam. Collectively, this data allows for an upstream to downstream water quality comparison within Anoka County, as well as within each watershed.

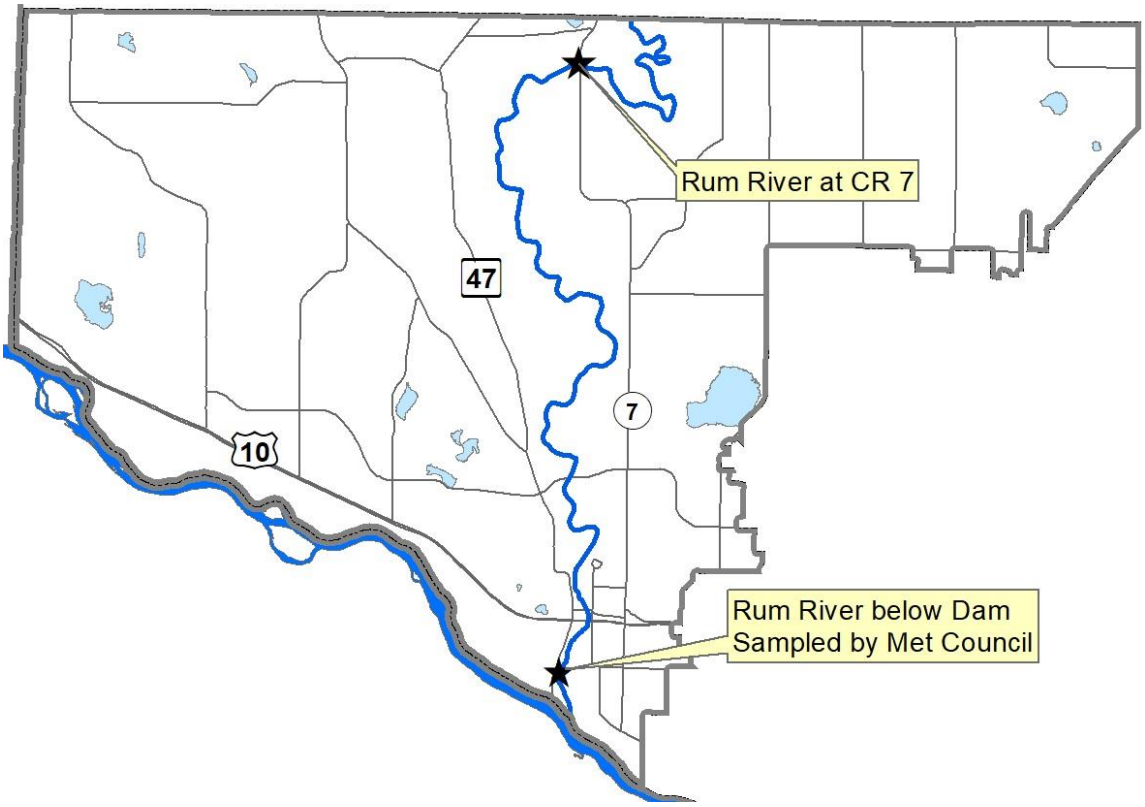
Monitoring by Anoka Conservation District occurred in May through October for each of the following parameters: total suspended solids, total phosphorus, Secchi tube transparency, dissolved oxygen, turbidity, chlorides, temperature, specific conductivity, pH, and salinity. Metropolitan Council monitoring occurred weekly March to October. The Met Council monitors all the parameters listed above, plus several more. Met Council monitoring data can be found on their Environmental Information Management Systems (EIMS) website (https://eims.metc.state.mn.us/). Data from both sources are summarized in this report.

Purpose: To detect water quality trends, diagnose and identify the source of any problems, and guide management.

Locations: **2019:** Rum River at County Road 7 (ACD), Rum River at Anoka Dam (Met Council)
Past: Rum River at County Road 24 (ACD)

Results: Results are presented on the following pages.

2019 Rum River Monitoring Sites



Stream Water Quality Monitoring

RUM RIVER

Rum River at Co. Rd. 24 (Bridge St), St. Francis	STORET Site ID = S000-066
Rum River at Co. Rd. 7 (Roanoke St), Ramsey	STORET Site ID = S004-026
Rum River at Anoka Dam, Anoka[1]	STORET Site ID = S003-183

[1]monitored by the Metropolitan Council

Years Monitored

At Co. Rd. 24 – 2004, 2009-2011, 2014-2018 (ACD)

At Co. Rd. 7 – 2004, 2009- 2011, 2014-2018, **2019** (ACD)

At Anoka Dam – 1996-2011(MC WOMP), 2015-2018, **2019** (Met Council)

Background

The Rum River is one of Anoka County's highest quality and most valuable water resources. It is designated as a state scenic and recreational river throughout Anoka County, and is heavily used for recreation. Subwatersheds that drain to the Rum in Anoka County include Seelye Brook, Ford Brook, Cedar Creek and Trott Brook. The Rum River watershed is quite large and extends to the north through most of Isanti and Mille Lacs Counties, and encompassing Lake Mille Lacs where it originates. The Rum River also has a West Branch tributary, which flows through portions of Morrison and Benton Counties.

Because its watershed is so large, the degree to which Rum River water quality improves or is degraded as it flows through Anoka County is hard to calculate, and is highly influenced by factors further upstream. The Metropolitan Council has monitored water quality at the Rum's outlet to the Mississippi River since 1996. This water quality and hydrologic data is well suited for evaluating the river's water quality just before it joins the Mississippi River and exits Anoka County. Monitoring water quality at upstream sites has occurred only in more recent years. Water quality changes might be expected from upstream to downstream because predominant land use changes dramatically from forested and undeveloped upstream of Anoka County, rural residential in the upstream areas of Anoka County, and to suburban in the downstream areas.

Methods

In 2004, 2009-2011, and 2014-2019 monitoring was conducted to determine if Rum River water quality changes through Anoka County, and if so, generally where do these changes occur. The data is reported for all sites together for a more comprehensive analysis of the river from upstream to downstream.

In 2019, the river was monitored during both storm and baseflow conditions by taken grab samples at County Road 7, located at the top of the Lower Rum River Watershed. Eight water quality samples were taken; half during baseflow conditions and half following storm events. Storms are generally defined as one-inch or more of rainfall in 24 hours, or a significant snowmelt event combined with rainfall. In some years, particularly drought years, smaller storm events were used for sampling. Downstream of the Anoka Dam, the river was monitored by the Metropolitan Council using a different schedule. Data from six Met Council sampling events that occurred within 48 hours of an ACD monitoring event were included in the graphs and analysis below. County Road 24 (furthest upstream) was not sampled in 2019 but historical data is included in the analysis.

At County Road 7, parameters tested with portable meters included pH, specific conductivity, turbidity, temperature, salinity, and dissolved oxygen. Parameters tested by water samples sent to a state-certified lab included total phosphorus, total suspended solids, and chlorides. The Metropolitan Council monitored additional parameters at the Anoka Dam.

Water level and flow data are available from the US Geological Survey, who maintains a hydrological monitoring site at Viking Boulevard.

The purpose of this report is to make an upstream to downstream comparison of Rum River water quality. It includes only parameters tested at all sites, and only similar dates that samples were collected in 2019. It does not include additional parameters tested at the Anoka Dam, or additional monitoring events at that site. For that information, see Metropolitan Council reports at https://eims.metc.state.mn.us/. All other raw data can be obtained from the Anoka Conservation District, and is available through the Minnesota Pollution Control Agency's EQuIS database (https://www.pca.state.mn.us/data/environmental-quality-information-system-equis).

Results Summary

This report includes data from 2019 and an overview of previous year's data. The following is a summary of results.

- Specific conductivity is an indicator of dissolved constituents. Specific conductivity in the Rum River is lower than other Anoka County streams. Specific conductivity generally increases mildly moving downstream. Average specific conductivity at County Road 7 in 2019 was 0.247 mS/cm.
- Chlorides averaged 9.36 mg/L at County Road 7 in 2019, which is low. As development continues in the Rum River watershed, efforts should include minimizing road deicing salt use and utilizing new water softening technology. Other streams near the Rum River do have significant high chlorides problems. The chronic State standard for chlorides is 230 mg/L which needs to be exceeded two or more times in a three-year period for a stream to be considered impaired.
- Phosphorus concentrations in the Rum River have a tendency to straddle the 100 µg/L State standard at ACD sampled sites. The site at County Road 7 averaged 86.6 µg/L and exceeded the standard on two sampling occasions in 2019, once during baseflow, and once after a storm event. Interestingly, concentrations below the Anoka Dam as measured by Met Council averaged just 56.8 µg/L. It is likely that the pool above the dam itself is providing settling treatment of water quality to the Rum River. These artificially low concentrations downstream of the dam do not minimize the reality that the Rum River is straddling the impairment threshold for phosphorus, and even small increases could cause the Rum River to be listed as impaired.
- Suspended solids and turbidity generally remained low in the Rum River in 2019 compared to State standards and to other Anoka County streams. Average turbidity was similar to previous years. ACD results garnered an eight-sample average of 8.55 NTU turbidity 8.22 mg/L TSS for 2019. Even lower turbidity and TSS concentrations measured by Met Council downstream of the Anoka Dam are likely due to settling in the pool created by the dam. Though suspended solids remain well under state impairment thresholds in the Rum, both TSS and turbidity show a moderate increase during storm events, and stormwater runoff mitigation should be a focus of management efforts, especially as other pollutants may be associated with suspended solids.
- Dissolved oxygen remained above the State standard of 5 mg/L in 2019 and previous monitored years. The lowest concentration recorded in 2019 was 6.58 mg/L at Rum River at C.R. 7. This was similar to the minimums recorded over the last several years.
- pH remained near neutral levels in the Rum River in 2019 after being elevated on some occasions in 2015 and 2017. pH should remain between 6.5 and 8.5 to support aquatic life and meet state water quality standards.

Below the data are presented and discussed for each parameter in greater detail. Management recommendations will be included at the conclusion of this report. The Rum River is an exceptionally important waterbody, and its protection and improvement should be a high priority.

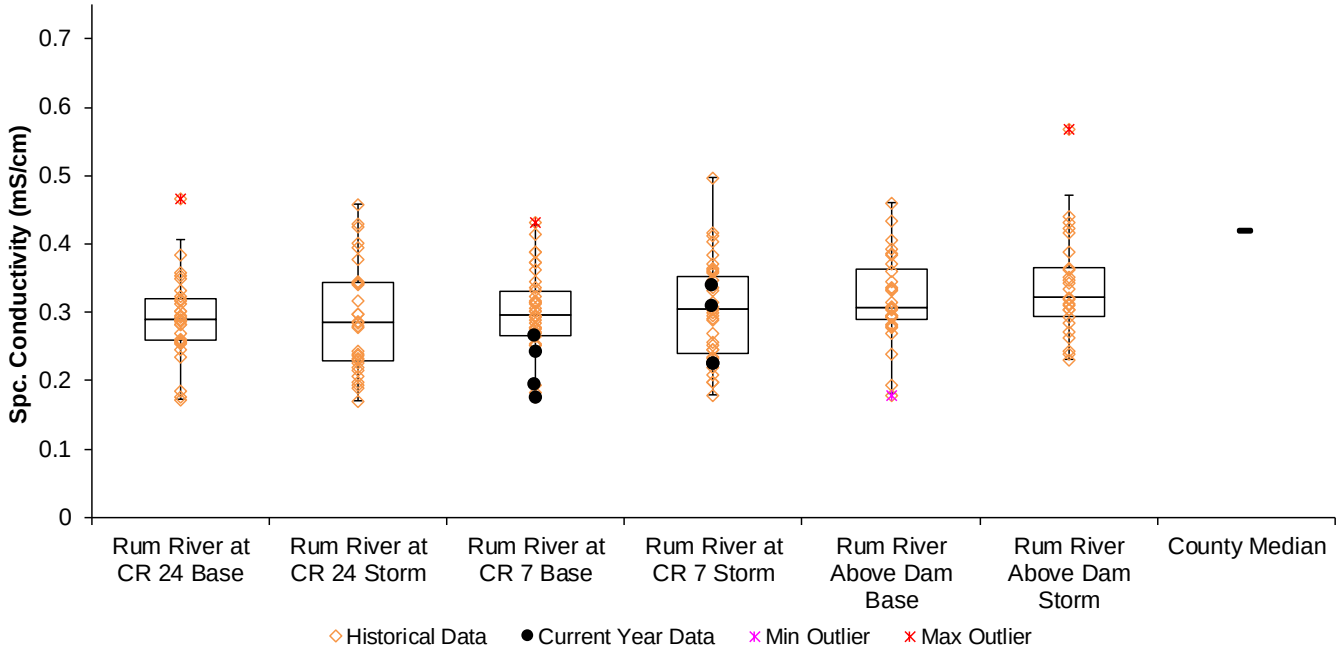
Specific Conductivity

Specific conductivity is an indicator of dissolved pollutants. Dissolved pollutant sources include road runoff and industrial chemicals, among many others. Metals, hydrocarbons, and road salts are often of concern in a suburban environment. Specific conductivity is the broadest measure of dissolved pollutants we use. It measures electrical conductivity of the water; pure water with no dissolved constituents has zero specific conductivity.

Specific conductivity is acceptably low in the Rum River, but does show a tendency to increase slightly moving downstream. Conductivity is measured in different units by Met Council below the Dam than the units used by ACD above the dam. Because of this, the results cannot be compared for this parameter for that site. Average specific conductivity in 2019 (all conditions) was 0.247 mS/cm at County Road 7.This is lower than the historical median for Anoka County streams of 0.420 mS/cm. The 2019 maximum observed specific conductivity in the Rum River was 0.347 mS/cm at County Road 7 following a storm event.

Specific conductivity has historically been consistent between storm flow conditions and baseflow conditions in the Rum River. High baseflow specific conductivity has been observed in most other nearby streams and tributaries to the Rum. This occurrence has been studied extensively, and the largest cause has often been found to be road deicing salts that have infiltrated into the shallow aquifer. Water softening salts and geologic materials also contribute, but to a lesser degree. Many of these streams contribute to the Rum River.

Specific Conductivity during Baseflow and Storm Conditions. Orange diamonds are historical data from previous years and black circles are 2019 readings. Box plots show the median (middle line), 25th and 75th percentile (ends of box), and 10th and 90th percentiles (floating outer lines).

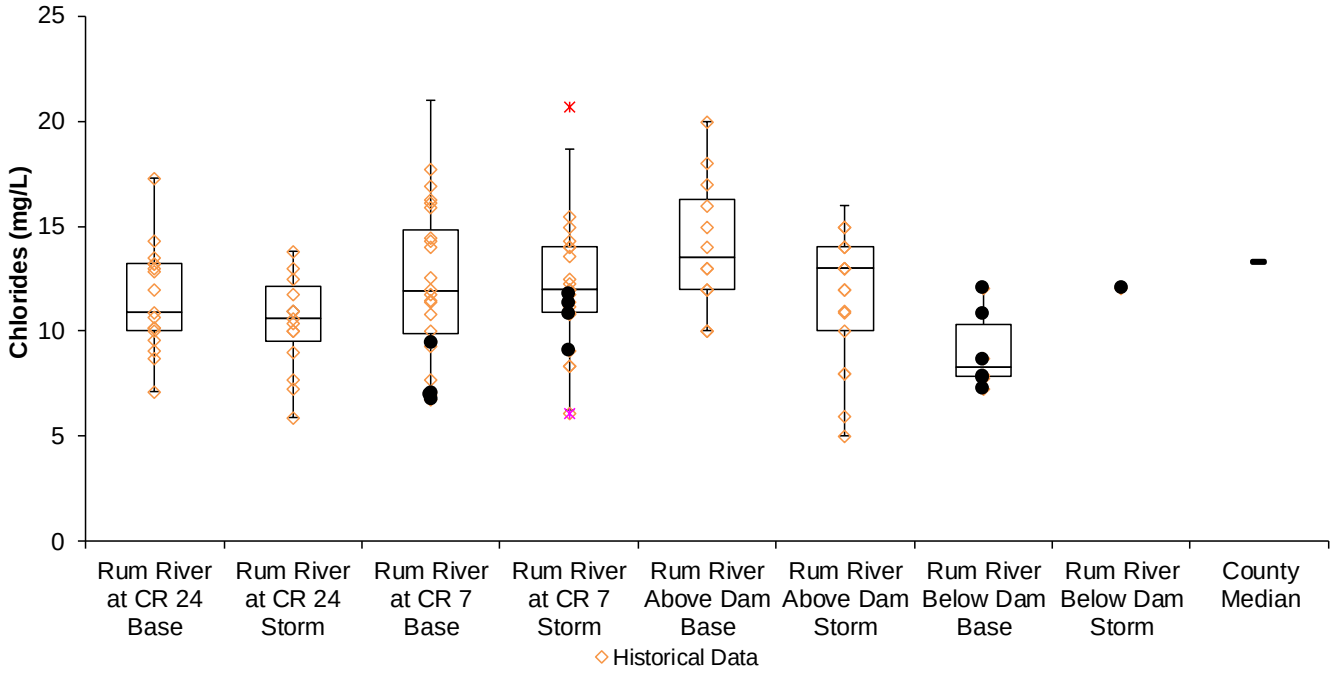


Chlorides

Chlorides are the measure of chloride salts, the most common of which are road de-icing chemicals, and those used in water softening. Chlorides can also be present in other pollutant types, such as wastewater. These pollutants are of concern because of the effect they can have on the stream's biological community. They are also of concern in this case because the Rum River is upstream from the Twin Cities drinking water intakes on the Mississippi River. Specific Conductivity data, reported above, is commonly a reflection of chlorides, with higher specific conductivity generally corresponding to higher chlorides.

In 2019, water samples for chloride analysis were taken from the Rum River at C.R. 7 and below the Anoka Dam. At these locations, average chlorides concentrations were 9.2 mg/L and 9.54 mg/L respectively. Chloride concentrations in general in 2019 were on the low end of results gathered since 2004, but were slightly elevated during storm samples. May factors can contribute to variation in chloride concentrations year to year, not least of which is annual weather patterns that affect road salting. Practices like cities providing Smart Salt training to staff, improved water treatment process, and high efficiency water softeners can help reduce the chloride load to streams. Higher density housing and paved streets, and very snowy or icy winters can increase the chloride load to a stream. The chronic state water quality standards for chloride concentration in streams is 230 mg/L. The Rum has historically been well below that standard, and remains there in 2019.

Chlorides during Baseflow and Storm Conditions. Orange diamonds are historical data from previous years and black circles are 2019 readings. Box plots show the median (middle line), 25th and 75th percentile (ends of box), and 10th and 90th percentiles (floating outer lines).



Total Phosphorus

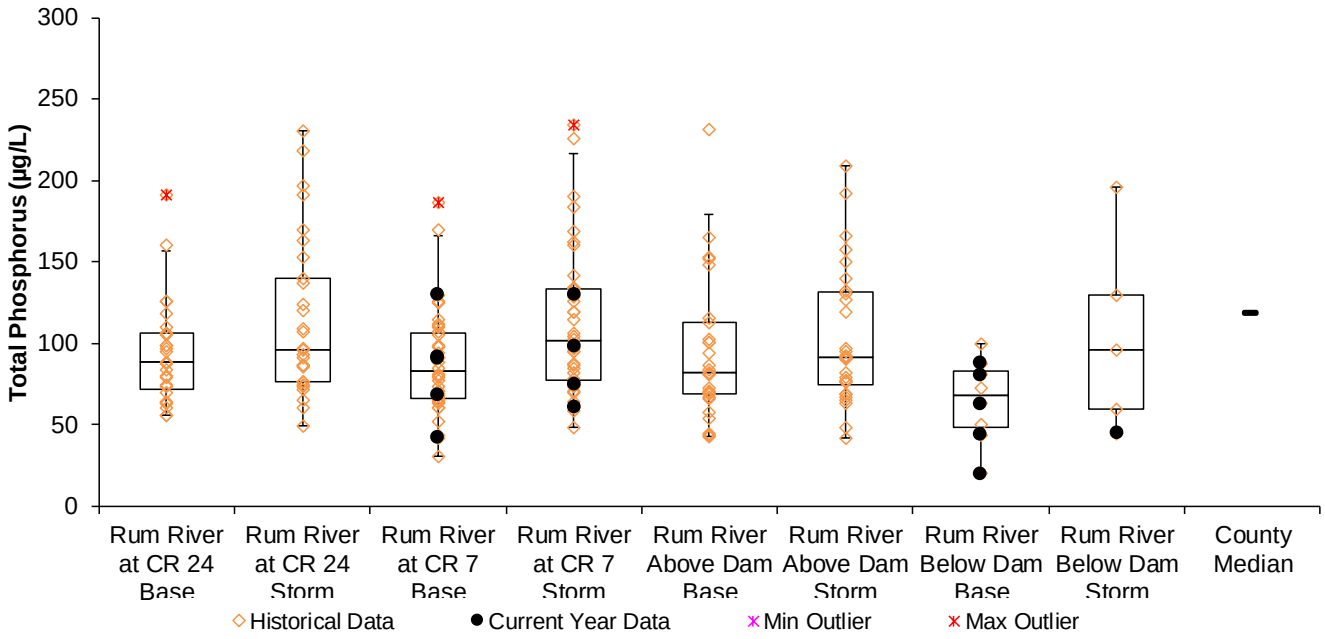
The nutrient phosphorus is one of the most common pollutants in our region, and can be associated with urban runoff, agricultural runoff, wastewater, and many other sources. It causes excessive algal growth and a number of other associated problems for aquatic life and recreation. Phosphorus concentrations in the Rum River are near the state impairment threshold.

In 2019, as in most years prior, total phosphorus averaged near the State water quality standard at 86.6 µg/L at County Road 7. Two of eight samples collected by ACD yielded total phosphorus concentrations over the state standard of 100 µg/L. One exceedance occurred after a storm event and one during baseflow conditions. Interestingly, results from Met Council monitoring below the dam showed lower concentrations at baseflow that any previous monitoring conducted upstream of the dam in the past. From the 6 representative samples used for analysis, total phosphorus averaged just 56.83 µg/L below the dam in 2019. The pool caused by the dam may be causing nutrient laden particles to settle out of the water column as the river slows down and widens upstream of the dam. The dam may be causing water quality improvements in the Rum River due to this settling action that haven't been accounted for in the past. Looking at all data collected at all sites, phosphorus concentrations tend to be higher during storm flows than base flows. Since the Rum River is close to exceeding the phosphorus state standard upstream, efforts should be made to prevent any additional phosphorus loading which may result in the

Rum River being designated as "impaired" for nutrients. Future upgrades to wastewater treatment plants throughout the Rum River watershed may offer phosphorus reductions. At the same time, development should include current stormwater treatment in order to maintain nutrient loading levels and hopefully reduce overall phosphorus levels. Larger reduction strategies will be necessary to offset the increasing loading that will likely occur with increasing development, more frequent and intense precipitation events, upstream ditch cleaning and other factors.

According to the Rum River WRAPS report, preventing additional nutrient loading to the Rum River should be a high priority throughout the watershed. Additionally, current loading sources differ throughout the watershed based on landuse differences. In the lower reaches of the Rum River in Anoka County, stabilization of streambank erosion is identified as the number one strategy for reducing loading in this portion of the watershed. ACD has partnered with Anoka County Parks and the Upper and Lower Rum River WMOs to secure $1.4 Million in grant and matching funds to implement bank stabilization practices along eroding banks in the Rum River over the next three years. These projects will reduce the direct loading of sediment and nutrients to the river from these banks into the future.

Total Phosphorus during Baseflow and Storm Conditions. Orange diamonds are historical data from previous years and black circles are 2019 readings. Box plots show the median (middle line), 25th and 75th percentile (ends of box), and 10th and 90th percentile (floating outer lines).



Turbidity and Total Suspended Solids (TSS)

Turbidity and total suspended solids (TSS) are two different measurements of solid material suspended in the water. Turbidity is measured by the refraction of a light beam passed through a water sample and is most sensitive to large particles. Total suspended solids are measured by filtering solids from a water sample and weighing the filtered material. The amount of suspended material is important because it affects transparency and aquatic life, and because many other pollutants, such as phosphorus, are attached to particles. Many stormwater treatment practices such as street sweeping, sumps, and stormwater settling ponds, target sediment and these attached pollutants. In 2019, median turbidity and total suspended solids in the Rum River were lower than the historical median for Anoka County streams.

In the Rum River, turbidity is generally low but usually increases during storms, though there is substantial variability (see figure below). There is no clear change in turbidity or suspended solids upstream to downstream at ACD monitoring sites above the Anoka Dam. The average turbidity, in 2019 (all conditions) at County Road 7 was 8.55 NTU. The historical median for Anoka County streams is 11.39 NTU. Turbidity was only elevated on one occasion, after a storm event, where it reached 24.2 NTU. Even though turbidity is no longer used by the state to determine if a stream is impaired, it should continue to be monitored as an indicator of increasing pollutant levels.

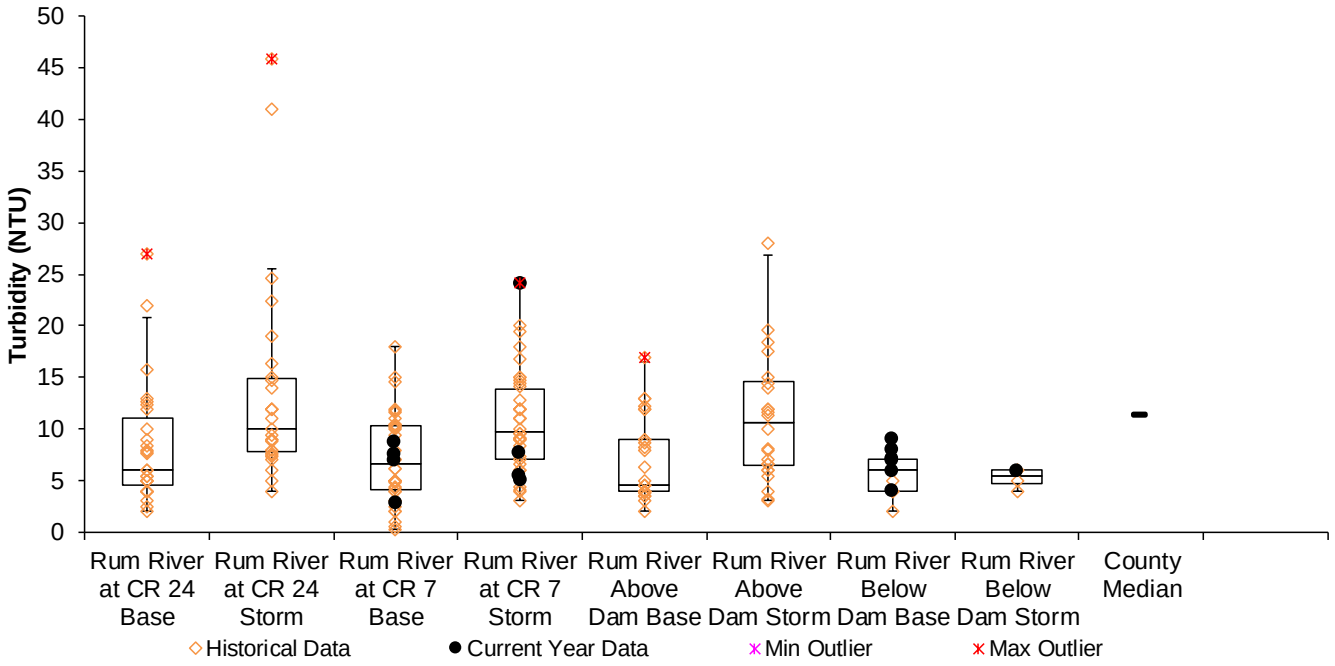
The average TSS concentration (all conditions) in 2019 at County Road 7 was 8.22 mg/L, lower than the Anoka County stream median for TSS of 14.37mg/L. It is also lower than state water quality standard. The state threshold for TSS impairment in the Rum River is 10% of samples April 1-September 30 exceeding 30 mg/L. The highest concentration recorded in 2019 was 10.6 mg/L. ACD has not collected a sample in the Rum River over 30 mg/L TSS since May of 2010.

Like total phosphorus concentrations, samples collected by Met Council below the Anoka Dam had decreased turbidity and TSS. It is likely that the same settling effect that is reducing phosphorus concentrations is also reducing the concentration of suspended particles in the water column. Additionally, like total phosphorus, storm flows increase the concentration of suspended solids within the water column vs. baseflow conditions.

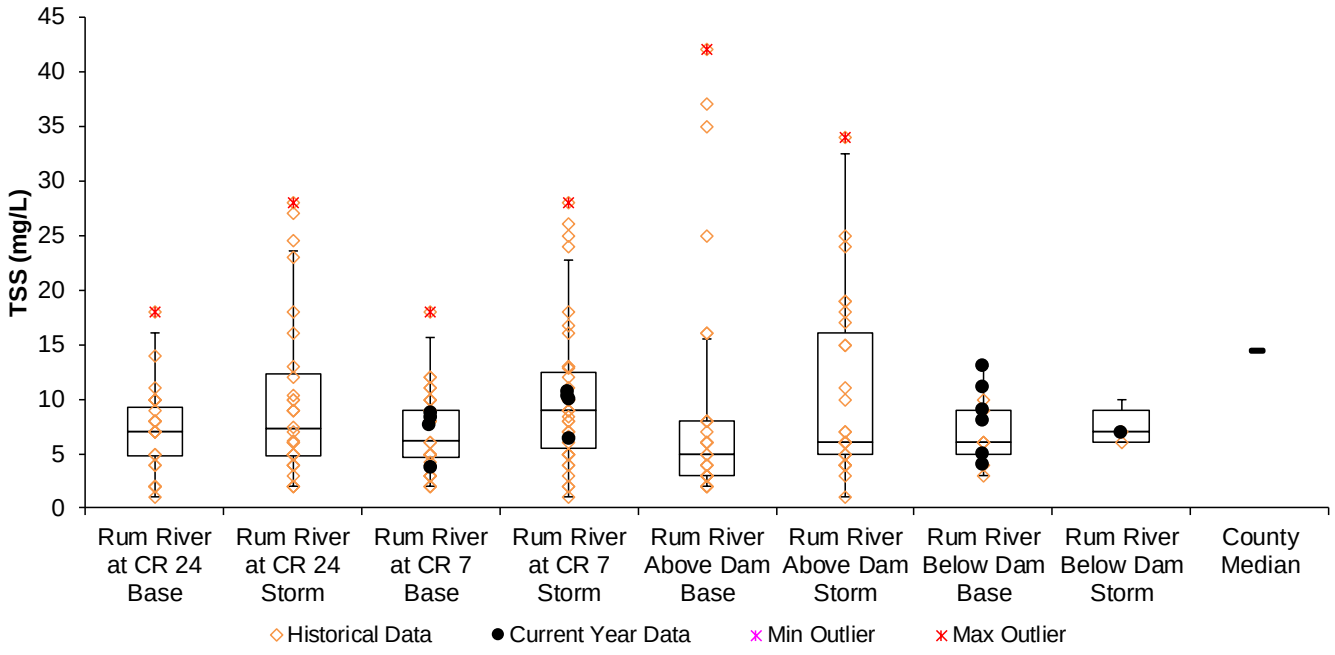
Suspended solids can come from within and outside of the river channel. Sources on land include soil erosion, road sanding, and others. Riverbank erosion and movement of the river bottom also contributes to suspended solids. A moderate amount of this “bed load” is natural and expected.

Though the Rum River remains well under the impairment threshold for TSS, rigorous stormwater treatment should occur as the Rum River watershed continues to develop. Increasing development in the watershed could seriously impact the river, especially given that stormwater carries many pollutants in addition to suspended sediments. There should also be an effort to bring stormwater treatment up-to-date in older developments throughout the watershed.

Turbidity during Baseflow and Storm Conditions. Orange diamonds are historical data from previous years and black circles are 2019 readings. Box plots show the median (middle line), 25th and 75th percentile (ends of box), and 10th and 90th percentiles (floating outer lines).



Total Suspended Solids during Baseflow and Storm Conditions. Orange diamonds are historical data from previous years and black circles are 2019 readings. Box plots show the median (middle line), 25th and 75th percentile (ends of box), and 10th and 90th percentiles (floating outer lines).



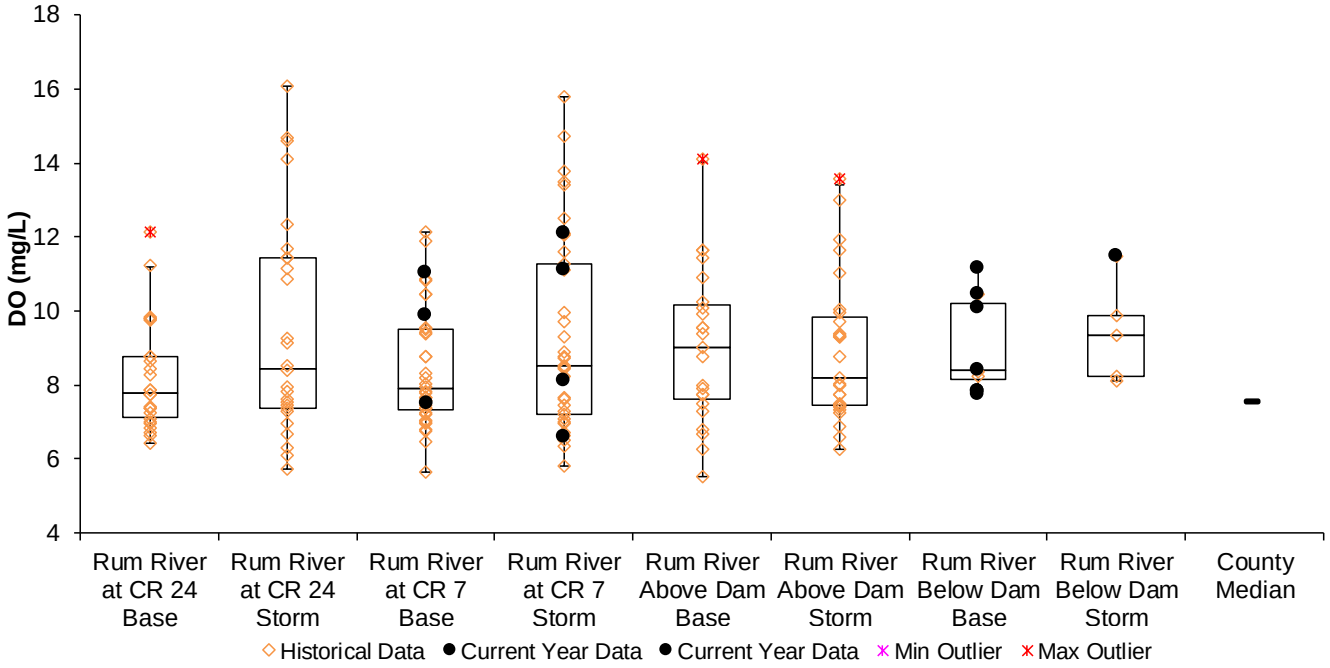
Dissolved Oxygen

Dissolved oxygen is necessary for aquatic life, including fish. Organic pollution causes oxygen to be consumed during decomposition. If oxygen levels fall below the state water quality standard of 5 mg/L, aquatic life begins to suffer. A stream is considered impaired if 10% of observations are below this level in the last 10 years. Dissolved oxygen levels are typically lowest in the early morning because of decomposition consuming oxygen at night without offsetting oxygen production by photosynthesis. In 2019, dissolved oxygen in the Rum River was always above 5 mg/L at all monitoring sites.

The lowest dissolved oxygen observed in the Rum River in 2019 was 6.58 mg/L. Only on five occasions has dissolved oxygen readings been below 6.0 mg/L in the Rum River throughout the monitoring record, with the 3 most recent readings occurring during a single storm in 2011. The low dissolved oxygen result this year was recorded during a storm in July when water temperatures were above 77° F. Warm water holds less oxygen, therefore this low reading is likely a result of low water on a hot day, rather than pollution.

Decreases in dissolved oxygen may result from an increase in the level of nutrients in the stream. Making sure that phosphorus and nitrogen inputs to the stream are maintained or decreased is important for healthy dissolved oxygen levels. The principle sources of these nutrients are fertilizer and wastewater.

Dissolved Oxygen during Baseflow and Storm Conditions. Orange diamonds are historical data from previous years and black circles are 2019 readings. Box plots show the median (middle line), 25th and 75th percentile (ends of box), and 10th and 90th percentiles (floating outer lines).

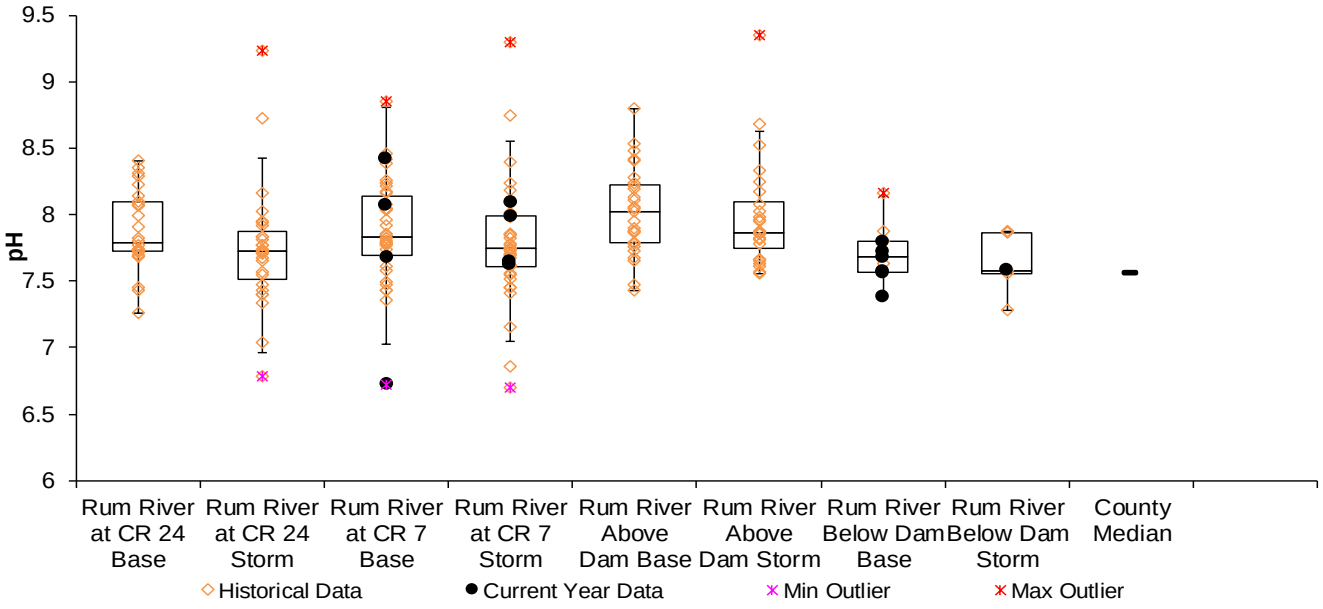


pH

pH refers to the acidity of the water. The state standard is for pH levels to remain between 6.5 and 8.5. The Rum River is generally within this range, but has exceeded 8.5 on rare occasions in the past and has become more common in recent years (2015, 2017). In these years, exceedances of 8.5 were observed at all sites. 2018-2019 saw a positive change with no sampling events exceeding 8.5.

There are a variety of potential factors leading to temporary spikes in pH in water quality. Although it is a positive development that they did not occur in the past couple years, pH should be continued to be monitored in the Rum River due to the previous spikes.

pH during Baseflow and Storm Conditions. Orange diamonds are historical data from previous years and black circles are 2019 readings. Box plots show the median (middle line), 25th and 75th percentile (ends of box), and 10thand 90th percentiles (floating outer lines).



Summary and Recommendations

In general, water quality in the Rum River is good. However, there is typically a slight increase in specific conductivity moving downstream, phosphorus levels are near State water quality standards, and pH over 8.5 has occurred in recent years, although they did not occur in 2019. Making this a local priority and increasing protection on the river will help avoid much costlier restoration efforts that may be required later on if no action is taken.

In addition to comparing water quality in the Rum River upstream to downstream, water quality should continue to be monitored/compared between Rum River tributaries and the Rum River main stem to help target where pollutant loading is occurring. Based on historical monitoring of direct tributaries in Anoka County, water quality in the Rum River is degraded by most of these smaller systems. Many of the tributaries experience frequent exceedances of State standards, especially for total phosphorus. This is important since the Rum River is already nearing exceedance of the total phosphorus standard.

Protection of the Rum River should continue to be a high priority for local officials. Large population increases are expected to continue in the Rum River watershed and future developments have the potential to degrade water quality if the river is not included in the local planning process. Specifically, new development should aim to follow more protective stormwater standards, which are designed to maintain, and preferably reduce, phosphorus discharge to the river. Road deicing locally, which has become more sophisticated in recent years, should focus on minimizing salt application while still keeping roads safe.

The Rum River's scenic and natural qualities are also what bring additional developmental pressure to these key protection areas. Local ordinances to preserve scenic nature areas along the Rum River exist but sometimes sufficient enforcement is lacking. Additionally, preservation of riparian parcels with high natural resource quality should be considered with easement or fee title acquisition.

Watershed-wide (Mille Lacs Lake to the Anoka Dam) coordination of Rum River management is increasing. A Watershed Restoration and Protection Strategies (WRAPS) was completed in 2017. It is a scientific study that identifies recommended management strategies. A "One Watershed, One Plan" (1W1P) in 2019-2020 offers multi-county planning. This plan will prioritize and coordinate action. After completion of the 1W1P a new State funding source will become available – Watershed Based Funding – to implement water quality improvement projects. Additionally, ACD has partnered with Anoka County Parks and the Rum River WMOs in Anoka County to secure large sums of grant and match funds to continue stabilizing eroding banks along the river.

Stream Water Quality – Biological Monitoring

Partners: LRRWMO, ACD, Anoka High School

Description: This program combines environmental education and stream monitoring. Under the supervision of ACD staff, high school science classes collect aquatic macroinvertebrates from a stream, identify their catch to the family level, and use the resulting numbers to gauge water and habitat quality. These methods are based upon the knowledge that 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 information about stream health.

Purpose: To assess stream health and supplement chemical water quality monitoring data.
To provide an environmental education service to the community.

Location: Rum River behind Anoka High School, south side of Bunker Lake Blvd, Anoka

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

Tips for Data Interpretation

Consider all biological indices of water quality together rather than looking at each alone, this will give a more comprehensive summary of stream conditions. Compare the 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:

Families — Number of invertebrate families. Higher values indicate better quality.

EPT — Number of families of the generally pollution-intolerant orders Ephemeroptera (mayflies), Plecoptera (stoneflies), Trichoptera (caddisflies). Higher numbers indicate better stream quality.

Family Biotic Index (FBI) — 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

Population Attributes Metrics

% EPT: This measure compares the number of organisms in the EPT orders (Ephemeroptera - mayflies: Plecoptera - stoneflies: Trichoptera - caddisflies) to the total number of organisms in the sample. A high percent of EPT is good.

% Dominant Family: This 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 or a few families dominate, and all others are rare).

RUM RIVER

Behind Anoka High School, Anoka
STORET SiteID = S003-189

Last Monitored

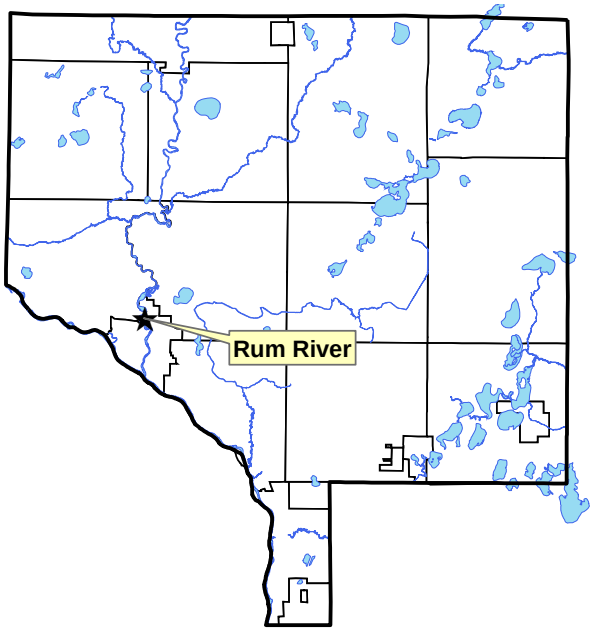
By Anoka High School in 2018

Monitored Since

2001

Student Involvement

Over 100 students in 2019, over 1,300 total since 2001



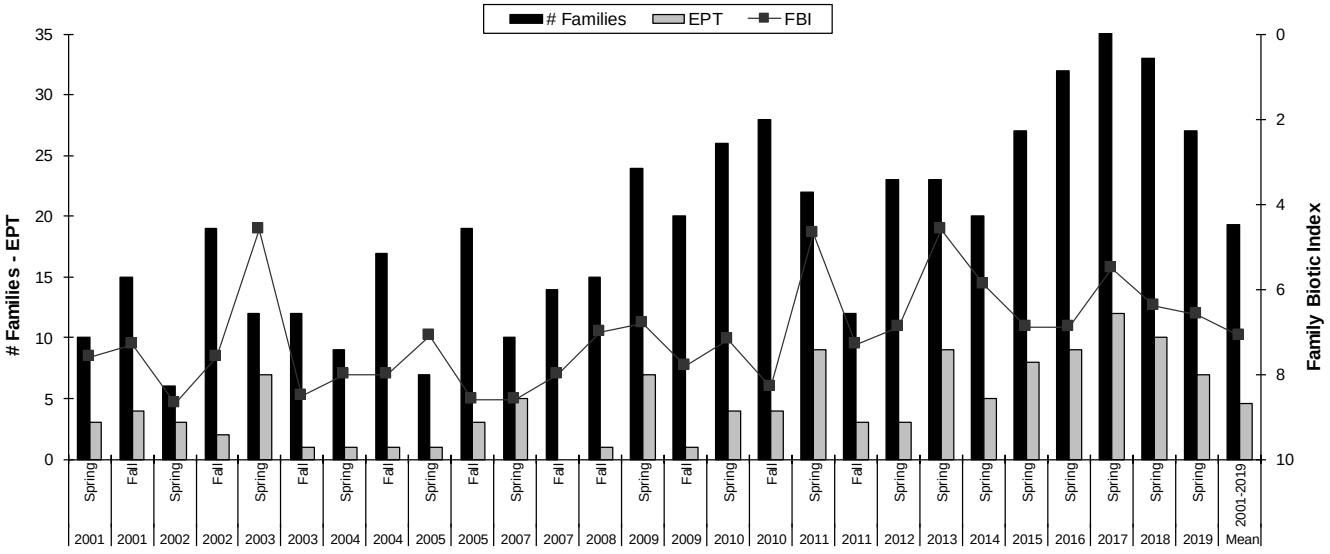
Background

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 river has both rocky riffles (northern part of county) as well as pools and runs with sandy bottoms. The River's condition is generally regarded as excellent. Most of the Rum River in Anoka County has a state "scenic and recreational" designation. The sampling site is near the Bunker Lake Boulevard bridge behind Anoka High School. Most sampling has been conducted in a backwater rather than the main channel.

Results

Anoka High school classes monitored the Rum River in spring of 2019 with Anoka Conservation District (ACD) oversight. The results for spring 2019 were better than the overall historical average but continue a now two year decline since 2017, which had the best results on record. Students collected 27 different families of invertebrates, a mark only achieved each year since 2015. Seven unique families of the most sensitive taxa (Ephemeroptera, Plecoptera, and Trichoptera; EPT), were collected in 2019. The last three years of monitoring at this site (2016, 2017, and 2018) are the best three years on record, with 2019 and 2015 being slightly lower.

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	2015	2016	2017	2018	2019	Mean
Season	Spring	Spring	Spring	Spring	Spring	2001-2019
FBI	6.90	6.90	5.50	6.40	6.60	7.1
# Families	27	32	41	33	27	19.4
EPT	8	9	12	10	7	4.6
Date	11-May	17-May	15-May	14-May	10-May	
Sampled By	AHS	AHS	AHS	AHS	AHS	
Sampling Method	MH	MH	MH	MH	MH	
Mean # Individuals/Rep.	767	3363	1439	1648	1341	
# Replicates	2	1	2	3	1	
Dominant Family	Siphlonuridae	Siphlonuridae	Pelecypoda	Siphlonuridae	Siphlonuridae	
% Dominant Family	69.3	74.9	26.6	48.1	66.8	
% Ephemeroptera	78.9	78.7	14.9	65.1	74.4	
% Trichoptera	1.4	0	0.1	0.1	0.7	
% Plecoptera	0	0.4	26	1.9	0.8	
% EPT	80.3	79.1	41	67.1	75.9	

Discussion

Both chemical and biological monitoring indicate the good quality of this river. Its habitat is ideal for a variety of stream life, and includes a variety of substrates, plenty of woody snags, riffles, and pools. Water chemistry monitoring done at various locations on the Rum River throughout Anoka County found that water quality is also good. Both habitat and water quality decline, but are still good, in the downstream reaches of the Rum River where development is more intense and the Anoka Dam creates a slow moving pool.

Historically, biomonitoring near Anoka was conducted mostly in a backwater area that, during periods of low water level, has a mucky bottom and does not receive good flow. During those conditions the area was unlikely to be occupied by families which are pollution intolerant. Recent monitoring has included sampling the main channel during an extremely low water level condition, followed by multiple years of very high water levels monitoring in both the shallow backwater pool and the main channel. The main channel and higher water levels offer opportunities for a more diverse habitat. These changes in sampling likely explain the apparent improvement in the invertebrate community in recent years.

Wetland Hydrology

Partners: LRRWMO, ACD

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

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

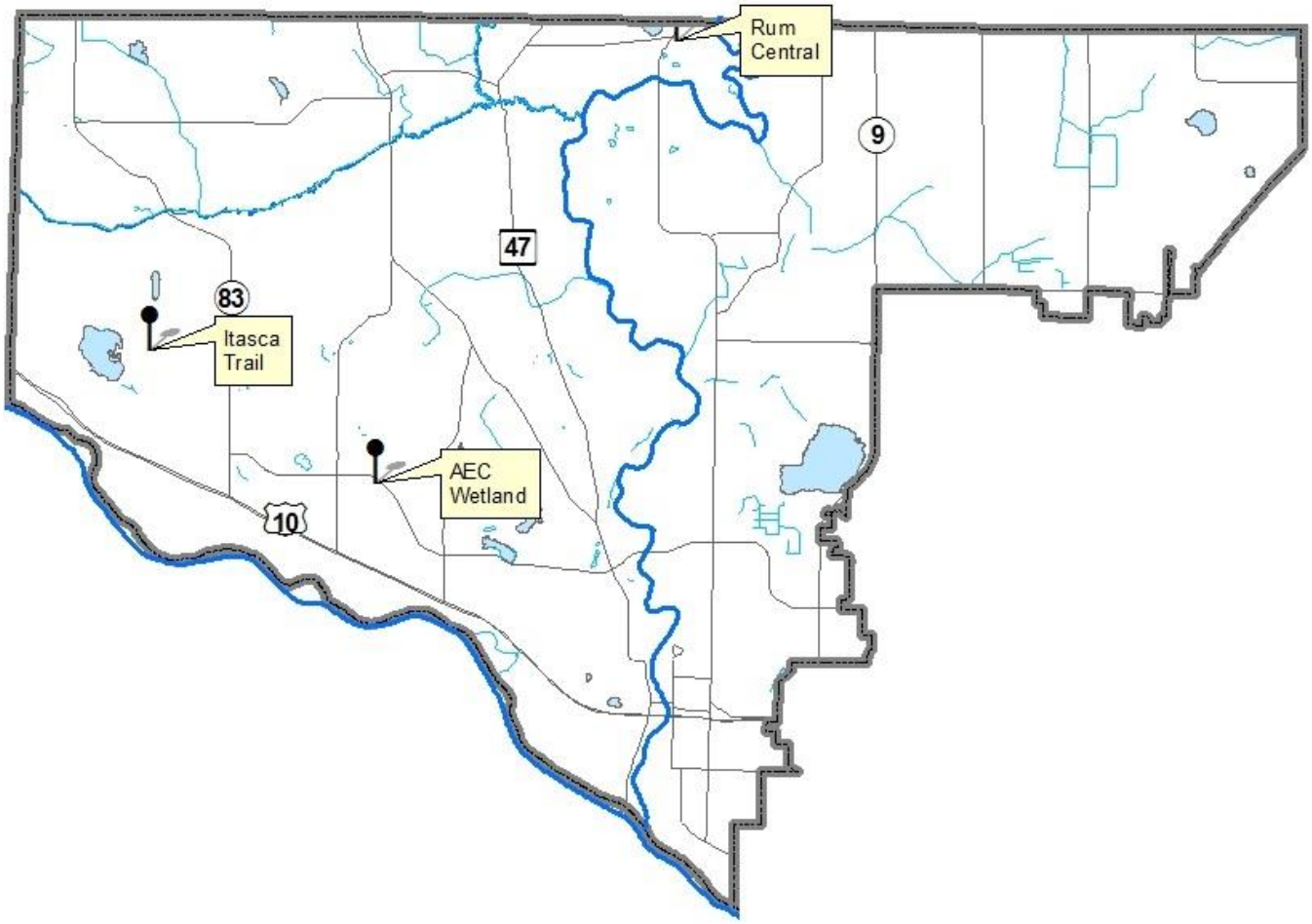
Locations: AEC Reference Wetland, Connexus Energy Property on Bunker Lake Blvd, Ramsey

Rum River Central Reference Wetland, Rum River Central Park, Ramsey

Lake Itasca Trail Reference Wetland, Lake Itasca Park, Ramsey

Results: Depicted on the following pages.

Lower Rum River Watershed Wetland Hydrology Monitoring Sites



Wetland Hydrology Monitoring

AEC REFERENCE WETLAND

Cottonwood Park, adjacent to Connexus Energy Offices (formerly Anoka Electric Coop), Ramsey

Site Information

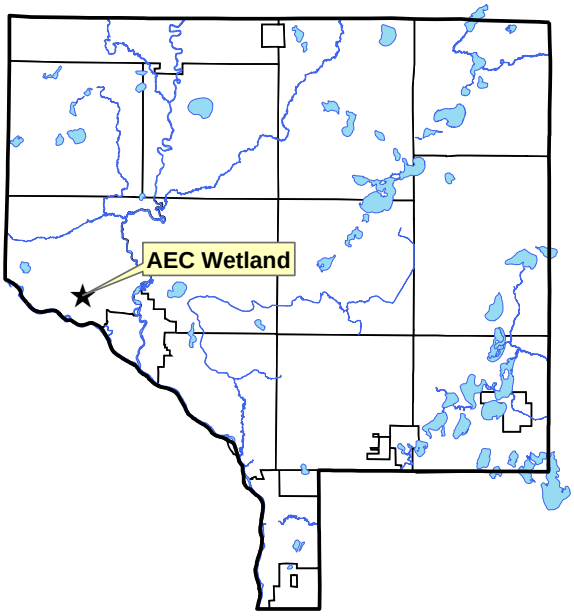
Monitored Since: 1999

Wetland Type: 3

Wetland Size: ~18 acres

Isolated Basin? No, probably receives storm water

Connected to a Ditch? No



Soils at Well Location:

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

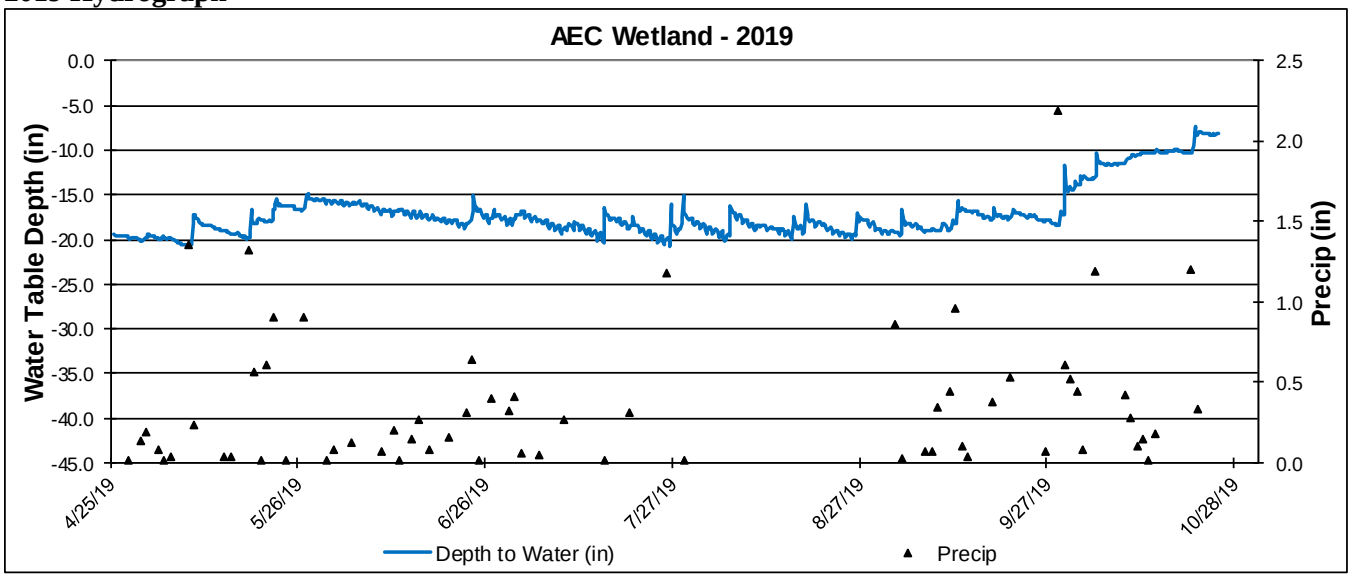
Surrounding Soils: Hubbard coarse sand

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: Well is located at the wetland boundary.

2019 Hydrograph



RUM RIVER CENTRAL REFERENCE WETLAND

Rum River Central Regional Park, Ramsey

Site Information

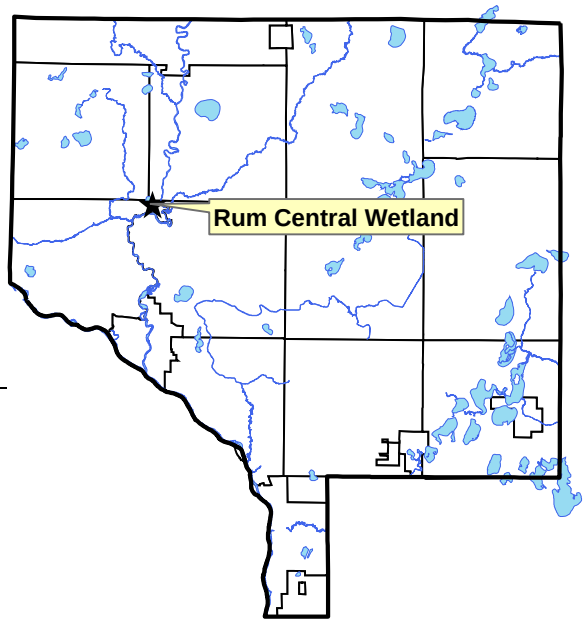
Monitored Since: 1997

Wetland Type: 6

Wetland Size: ~0.8 acres

Isolated Basin? Yes

Connected to a Ditch? No



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	-

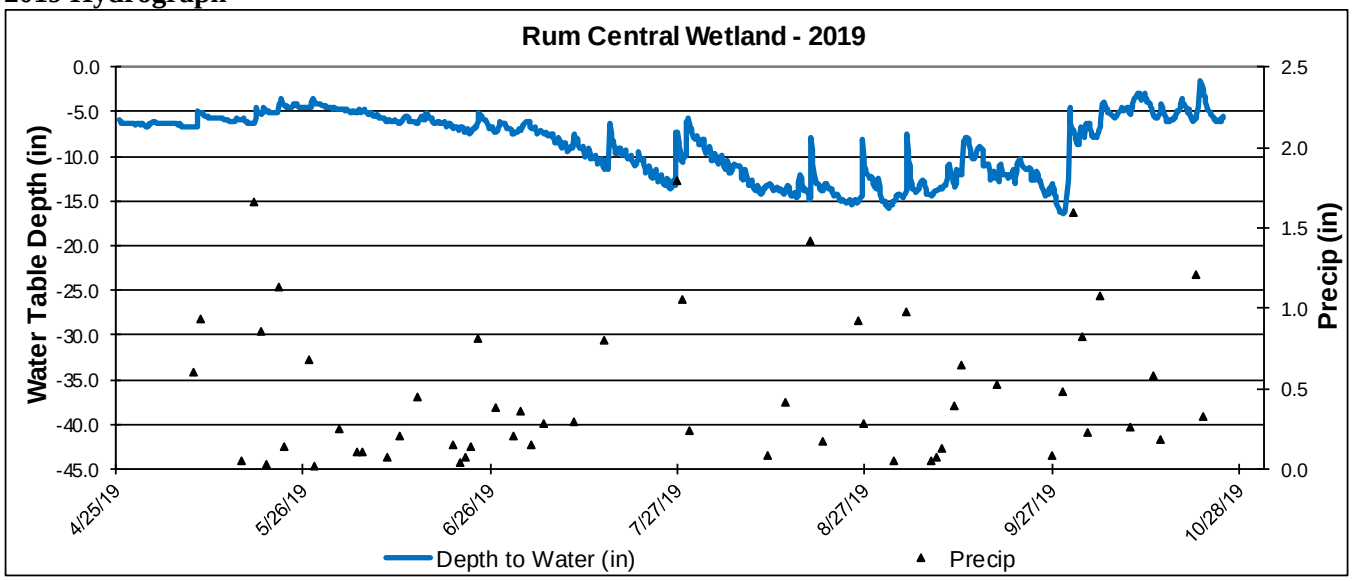
Surrounding Soils: Zimmerman fine sand

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: Well is located at the wetland boundary.

2019 Hydrograph



Wetland Hydrology Monitoring

LAKE ITASCA TRAILS REFERENCE WETLAND

Lake Itasca Trails Park, Ramsey

Site Information

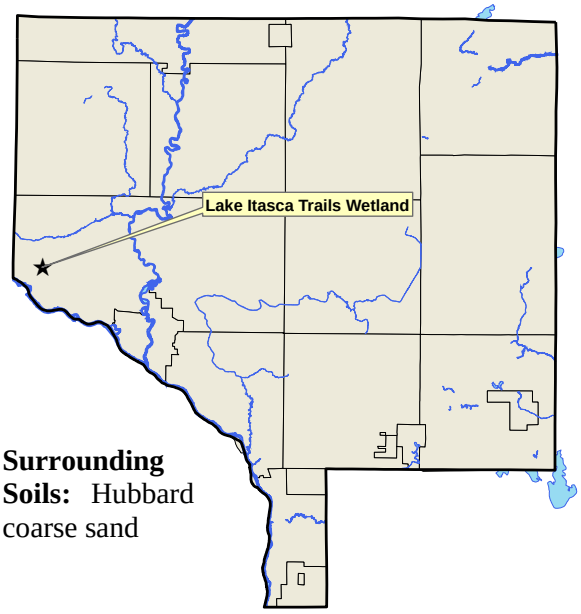
Monitored Since: 2013

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:

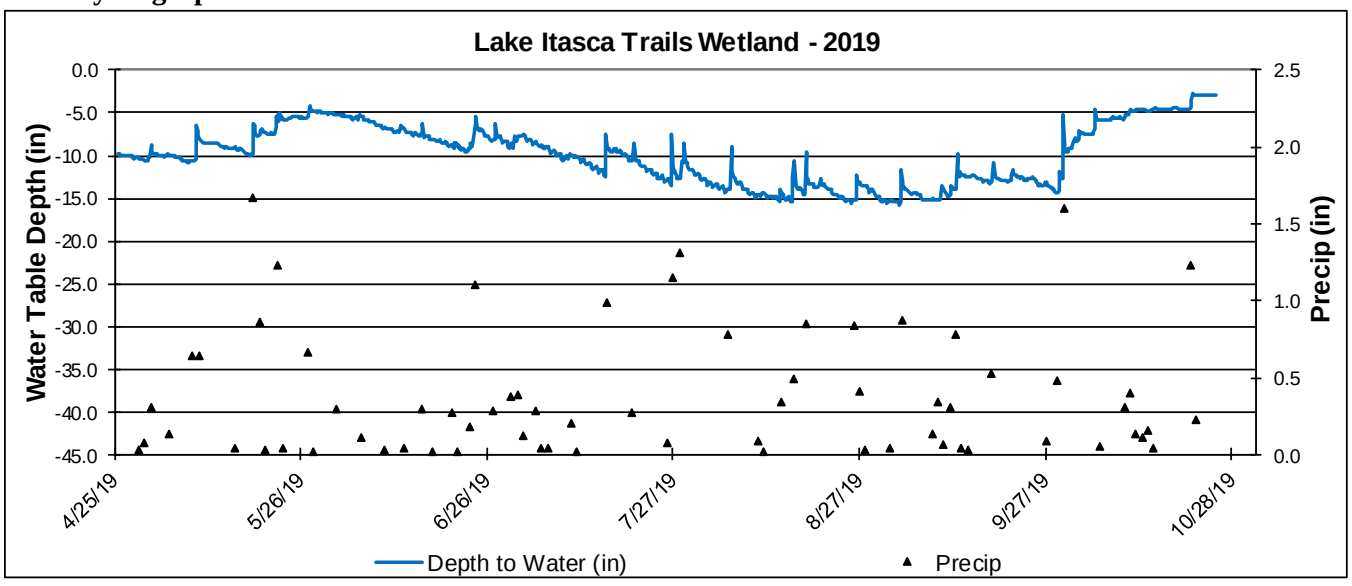
Horizon	Depth	Color	Texture	Redox
A1	0-12	10yr2/0	Mucky sand	-
A2	12-20	10ry2/1	Sand	-
B1	20-36	10yr4/1	Sand and fine gravel	-
B2	36-48	10yr6/1	Sand and fine gravel	-

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: Well is located about 10 feet east and about 6 inches downslope of the wetland boundary. DNR Public Water Wetland 2-339.

2019 Hydrograph



Water Quality Grant Fund

Partners: LRRWMO, ACD

Description: The LRRWMO provides cost share grants for projects on either public or private property that will improve water quality, such as repairing streambank erosion, restoring native shoreline vegetation, or rain gardens. This funding is administered by the Anoka Conservation District. Projects affecting the Rum River are given the priority because it is viewed as an especially valuable resource.

Purpose: To improve water quality in lakes, streams and rivers by correcting erosion problems and providing buffers or other structures that filter runoff before it reaches the water bodies.

Results: Projects reported in the year they are installed.

LRRWMO Cost Share Fund Summary

2006 LRRWMO Contribution	+	$1,000.00
2008 Expense – Herrala Rum Riverbank stabilization	-	$ 150.91
2008 Expense – Rusin Rum Riverbank stabilization	-	$ 225.46
2009 LRRWMO Contribution	+	$1,000.00
2009 Expense – Rusin Rum Riverbank bluff stabilization	-	$ 52.05
2010 LRRWMO Contribution	+	$ 0
2010 LRRWMO Expenses	-	$ 0
2011 LRRWMO Contribution	+	$ 0
2011 Expense - Blackburn Rum riverbank	-	$ 543.46
2012 LRRWMO Contribution	+	$1,000.00
2013 LRRWMO Contribution	+	$1,000.00
2013 Expense – Geldacker Mississippi Riverbank	-	$1,000.00
2014 LRRWMO Contribution	+	$2,050.00
2006-14 Expense – Smith Rum Riverbank stabilization	-	$ 2,561.77
2015 LRRWMO Contribution	+	$1,000.00
2016 LRRWMO Contribution	+	$1,000.00
2016 Expense – Brauer Rum Riverbank	-	$1,150.00
2018 LRRWMO Contribution	+	$2,000.00
2014-16 Expense – Anoka rain garden plants	-	$ 916.59
2019 LRRWMO Contribution	+	$2,000.00
Fund Balance		**$5,449.76**

Rum River Bank Stabilizations

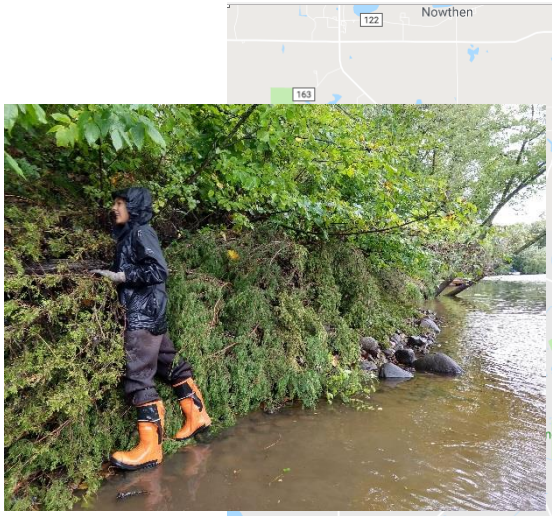
Partners: LRRWMO, URRWMO, ACD, MN DNR Conservation Partners Legacy Grant Program, Lessard-Sams Outdoor Heritage Council grant, landowners

Description: 6 riverbank stabilization projects were installed on the Rum River in Anoka and Isanti Counties in 2019. At these sites, cedar tree revetments and willow stakes were used to stabilize eroding banks. The projects were installed with labor from Conservation Corps Minnesota (CCM) work crews. Funding for the 5 revetments installed in Anoka County came from the Conservation Partners Legacy Grant Program from the Outdoor Heritage Fund, a Clean Water Fund CCM crew labor grant, the URRWMO and LRRWMO, and landowner contributions. Funding for 1 additional revetment in Isanti County came from the Lessard-Sams Outdoor Heritage Council, a Clean Water Fund CCM crew labor grant and landowner contribution.

Purpose: To stabilize areas of riverbank with mild to moderate erosion to reduce sediment loading in the Rum River, as well as to reduce the likelihood of much larger and more expensive corrective projects in the future.

Location: Rum River Central Regional Park, Rum River North County Park, 3 residential properties in Anoka County, and the River Bluff Preserve in Isanti County

Results: Stabilized 650 linear feet of riverbank on the Rum River in Anoka and Isanti Counties.



Rum River Bank Erosion Grants

Partners: ACD, Anoka County Parks, LRRWMO, URRWMO

Description: The Anoka Conservation District (ACD) prepared an inventory of Rum River bank erosion using 360° photos of the riverbanks of the Rum throughout Anoka County. The photos are available through Google Maps using the Street View feature. An inventory report identifying 80 stretches of riverbank with moderate to very severe erosion is available on ACD's website. Estimated project cost and annual sediment load reduction to the river were calculated. ACD used this inventory to apply for grant funding for stabilization projects to correct some of these eroding banks. These applications, and matching money from Anoka County and the Rum River WMOs resulted in $1.4 Million to be used over the next three years for stabilization projects.

Purpose: To identify and prioritize riverbank stabilization sites and be used by ACD and other entities to pursue grant funds to restore or stabilize eroding stretches of Rum Riverbank.

Location: Rum River conveyance throughout Anoka County

Results: Inventory of 80 stretches of moderate to very severe erosion on banks of the Rum River. $1.4 Million has been secured so far in grant and matching funds to implement stabilization projects.

Application illustration for the Lessard-Sams Outdoor Heritage Council to do Rum River stabilization projects utilizing bioengineering approaches. The LSOHC reccomended funding these projects at $952,000 over the next three years, which will be matched with $236,000 in local funds from Anoka County and the Upper and Lower Rum River WMOs.

Anoka Rain Gardens

Partners: City of Anoka, ACD

Description: A street resurfacing project in the 38th Lane neighborhood in the City of Anoka is scheduled for summer of 2020. This neighborhood has two previously installed rain gardens that are performing well, and protecting water quality in the Rum River by treating stormwater that was otherwise piped through the storm sewer system to the river. The City of Anoka hired ACD to design three more rain gardens in this neighborhood that will installed in conjunction with the street resurface project. Collectively, these rain gardens will remove about 80% of the pollutant load from 4.5 acres in this neighborhood. Design work was completed in January of 2020, and installation will happen during the summer of 2020.

Purpose: To improve water quality in the Rum and Mississippi Rivers.

Location: 38th Lane Neighborhood, Anoka

Results: Three more rain gardens were designed for installation in 2020. Two rain gardens were installed in this same neighborhood in 2017.

Map of installed and planned rain gardens

Newsletter Articles

Partners: LRRWMO, ACD

Description: The Lower Rum River Watershed Management Organization (LRRWMO) contracts the Anoka Conservation District (ACD) to create public education materials. The LRRWMO is required to distribute an annual publication under State Rules. This requirement is met through newsletters or infographics in city newsletters. This method ensures wide distribution at minimal cost.

Purpose: To improve public understanding of the LRRWMO, its functions, and accomplishments.

Location: Watershed-wide

Results: In 2019, the Anoka Conservation District (ACD) drafted three newsletter infographics and sent them to cities for inclusion in their newsletters. The three brief articles are shown below.

2019 Newsletter Articles

This Storm Drain is Part of Your River

Storm drains lead directly to your lakes, streams, and rivers—not to water treatment facilities! Many drain directly to natural waterways, while others first lead to stormwater ponds where some pollutants, but not all, are captured. **Please keep your storm drains clean** – if you wouldn't dump it in the river, don't dump it in the storm drain.

Lower Rum River Watershed Management Organization
www.LRRWMO.org

A titch less salt, please

Salt is sooo good. Tasty on food. Keeps roads safe. Softens hard water. Yet salt, measured by chlorides, is a growing problem in your local lakes and streams. Water softeners are one place where you can fine tune your salt use to keep area waterbodies healthy and save yourself money.

Softeners use salt when they regenerate, a process that washes accumulated minerals from their ion exchange resin beads. Think of this as a filter that takes out your water's hardness, but needs to be rinsed with saltwater when it gets gunked up. The frequency of regeneration can be based on either water used or time since the last regeneration. In either case, you need to tell the softener what your water's hardness is. If you don't, you may be wasting salt or failing to soften your water sufficiently.

Water hardness tests are readily available. Test kits can be purchased at hardware stores or online. Test strips are free from some companies, like Morton Salt, through their websites. If you are on city water, the city can tell you the hardness. Water softener control panels are generally pretty simple, allowing you to enter your water's hardness.

Salt used by water softeners doesn't disappear. It is discharged to your septic system or to the wastewater treatment plant, but it cannot be removed in those facilities. Salt from your water softener is eventually discharged to the ground or rivers.

The Lower Rum River Watershed Management Organization (LRRWMO) thanks you for helping protect your lakes and streams. The LRRWMO is formed by the cities of Anoka, Andover and Ramsey to manage local water resources. For more information see www.LRRWMO.org.

Your lawn doesn't need more P.

Minnesota law prohibits the use of phosphorus lawn fertilizers in most cases. The reason is simple—there's already adequate phosphorus in your soil. Extra phosphorus will runoff and make lakes and streams green with algae. If your lawn is unhealthy, a lack of phosphorus probably isn't the problem.

Suggestions for a healthy lawn:

- ✓ **Aerate.** This allows water, nutrients, and oxygen to penetrate down to where they're needed.
- ✓ **Mow taller.** In summer 2.5"-3" height promotes deeper root growth and drought resistance.
- ✓ **Water modestly.** 1" per week by rain or irrigation is sufficient. More is wasteful and contributes to nutrient runoff.
- ✓ **Get a soil test.** Find out what fertilizer or lime, if any, you really need. Mail-in tests are available through the University of MN soil testing laboratory for less than $20.
- ✓ **Mulch.** Leaving grass clippings on the lawn provides the equivalent of one fertilizer application per year.
- ✓ **Shop smart.** When purchasing fertilizers look at the three number sequence on the bag. A middle number of "0" indicates that it contains no phosphorus.

Thank you for helping the Lower Rum River Watershed Management Organization (LRRWMO) keep local waterbodies healthy. The LRRWMO is formed by the cities of Anoka, Andover and Ramsey to manage local water resources. For more information see www.LRRWMO.org.

LRRWMO Website

Description: The Lower Rum River Watershed Management Organization (LRRWMO) contracts the Anoka Conservation District (ACD) to design and maintain a website about the LRRWMO and the Lower Rum River watershed. The website has been in operation since 2003.

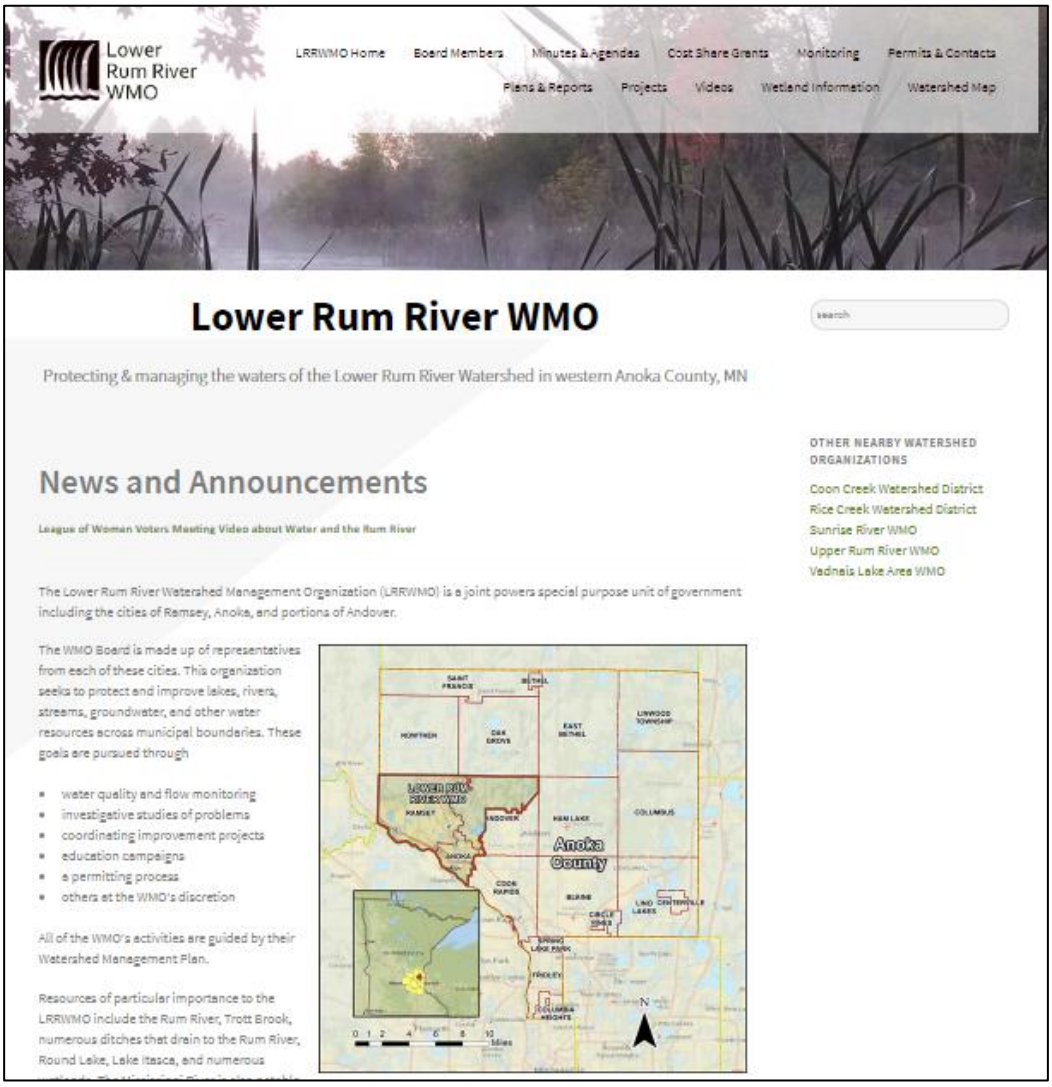
Purpose: To increase awareness of the LRRWMO and its programs. The website also provides tools and information that helps users better understand water resources issues in the area.

Location: LRRWMO.org

Results: In 2019 the LRRWMO's new website, which was launched in 2018, was maintained. The website includes:

- Directory of board members,
- Meeting minutes and agendas,
- Watershed management plan and annual reports,
- Descriptions of work that the organization is directing,
- Highlighted projects,
- Informational videos,
- Maps of the URRWMO.

LRRWMO Website Homepage



Financial Summary

The ACD accounting is organized by program and not by customer. This allows us to track all of the labor, materials and overhead expenses for a program. We do not, however, know specifically which expenses are attributed to monitoring which sites. To enable reporting of expenses for monitoring conducted in a specific watershed, we divide the total program cost by the number of sites monitored to determine an annual cost per site. We then multiply the cost per site by the number of sites monitored for a customer.

2019 Financial Table

Lower Rum River Watershed	Volunteer Precip	DNR Groundwater Wells	Wetland Levels	Lake Levels	Lake Water Quality	Stream Water Quality	Biomonitoring	Rum River Small Watersheds Grant	1WIP Rum River Planning	Planning Assistance	Admin/Reporting/Grants	City of Anoka Rain Gardens	Rum River Revetments	Rum River Stabilization - Rum Central Park	LRRWMO Retrofits	Mississippi River Park Stabilization	Website	Education/Newsletter	Outreach Collaborative	Total
Revenues																				
LRRWMO			1950	1240	1825	1975	900				850				417		865	1720		11742
State - Other		138																	12101	12239
DNR OHF													935							935
BWSR Capacity Direct														5588						5588
BWSR Local Water Planning					223															223
Metro ETA & NPEAP														1579	885					2464
Regional/Local									884			9126	8754			2485			764	22012
Anoka Co. General Services		239	79		43			160	4420	204	317	84					727		2075	8348
County Ag Preserves/Projects					367		475						1862	22712						25416
Service Fees							250						1149						66	1464
TOTAL		376	2029	1240	2459	1975	1625	160	5304	204	1167	9210	12699	29879	1302	2485	1592	1720	15006	90431
Expenses-																				
Capital Outlay/Equip		1	2	1	4	1	0		9		0	9	42	4		7	1		15	97
Personnel Salaries/Benefits		347	1739	739	1656	896	1102	146	4899	237	1157	10234	9591	3741	814	2262	1082	1294	9369	51306
Overhead		19	85	40	84	52	68	12	271	12	51	493	404	199	51	95	61	90	529	2613
Employee Training		1	6	3	4	3	4	1	16	2	3	65	32	16	2	5	4	3	37	205
Vehicle/Mileage		5	24	10	24	11	13	1	64	3	18	125	146	47	10	36	14	15	117	682
Rent		17	74	32	87	43	47	7	238	6	51	298	511	151	41	123	50	67	423	2267
Program Participants													699	26144						26843
Program Supplies			126		585	411	80		64			6	566		417		458		1324	4035
TOTAL		390	2056	824	2444	1417	1314	167	5561	259	1279	11229	11991	30303	1334	2528	1669	1468	11813	88048
NET		-14	-27	416	15	558	311	-7	-257	-55	-112	-2020	708	-424	-32	-43	-78	252	3193	2383

Recommendations

- **Identify and prioritize projects for water quality improvement in the new LRWRMO Watershed Management Plan** being developed in 2020. New non-competitive State Watershed Based Funding may be used for these projects, as well as competitive grants.
- **Continue to install projects identified in the stormwater retrofit studies for the Cities of Anoka and Ramsey.** Projects have been identified and ranked that would improve stormwater runoff before it is discharged to the Rum or Mississippi River. Metropolitan Council grant funds were used to construct three projects in 217-2018. Three more projects are being installed by the City of Anoka in 2020. Additional cost-effective projects exist, however landowner willingness and buried utilities are obstacles in many areas.
- **Engage with upstream entities creating a collaborative Rum River One Watershed, One Plan** (1W1P). As the receiving entity at the bottom of the watershed for all water flowing downstream, it is especially important to collaborate on, and prioritize, projects benefitting the river. 1W1P planning continues through 2020.
- **Implement the MPCA Rum River WRAPP (Watershed Restoration and Protection Plan).** This WRAPP was an assessment of the entire Rum River watershed. It outlines regional priorities and management strategies, and attempts to coordinate them across jurisdictions. The primary project type identified in Anoka County is the stabilization of eroding banks along the Rum River.
- **Maintain or reduce Rum River phosphorus.** 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. Depletion of shallow groundwater is a concern region-wide.
- **Continue surveillance water monitoring** at a frequency sufficient to detect changes and trends.
- **Continue chloride sampling at all sites on a rotating basis.** Chloride sampling was conducted at County Road 7 in 2018 and 2019. Because this pollutant can have such a profound impact on aquatic life and drinking water, continuing to periodically include it in the monitoring regime is prudent.
- **Continue to support and fund riverbank stabilization projects. $**1.4 Million has been secured by ACD and local matching partners for the next three years, but over 7 miles of eroding bank was identified during our 2018-2019 inventory. Another round of Watershed Based Implementation funding will be coming in 2020. These funds can support additional projects identified in that inventory.