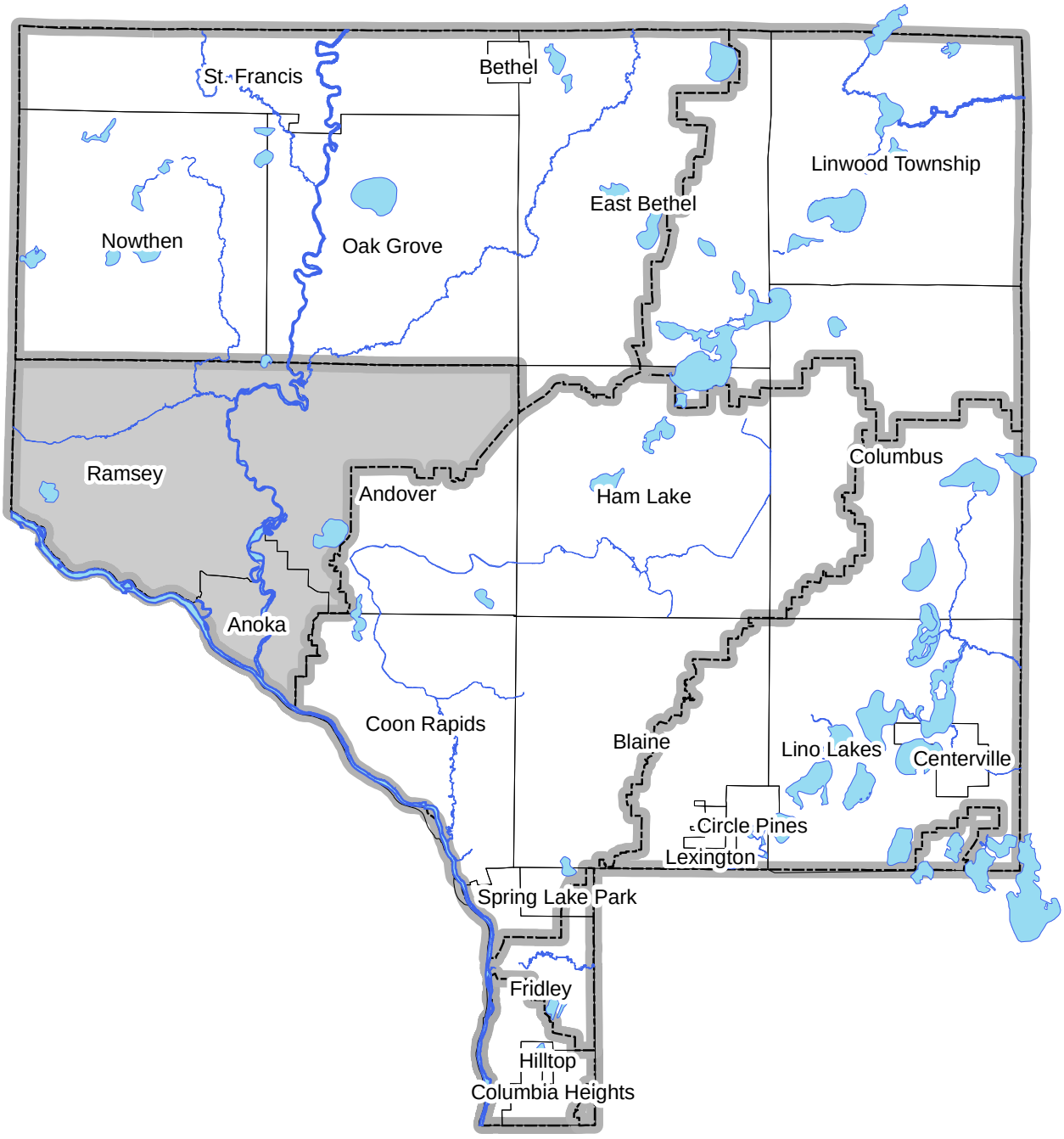
Excerpt from the
2018 Anoka Water Almanac

Chapter 4: Lower Rum River Watershed



Prepared by the Anoka Conservation District

Chapter 4: Lower Rum River Watershed

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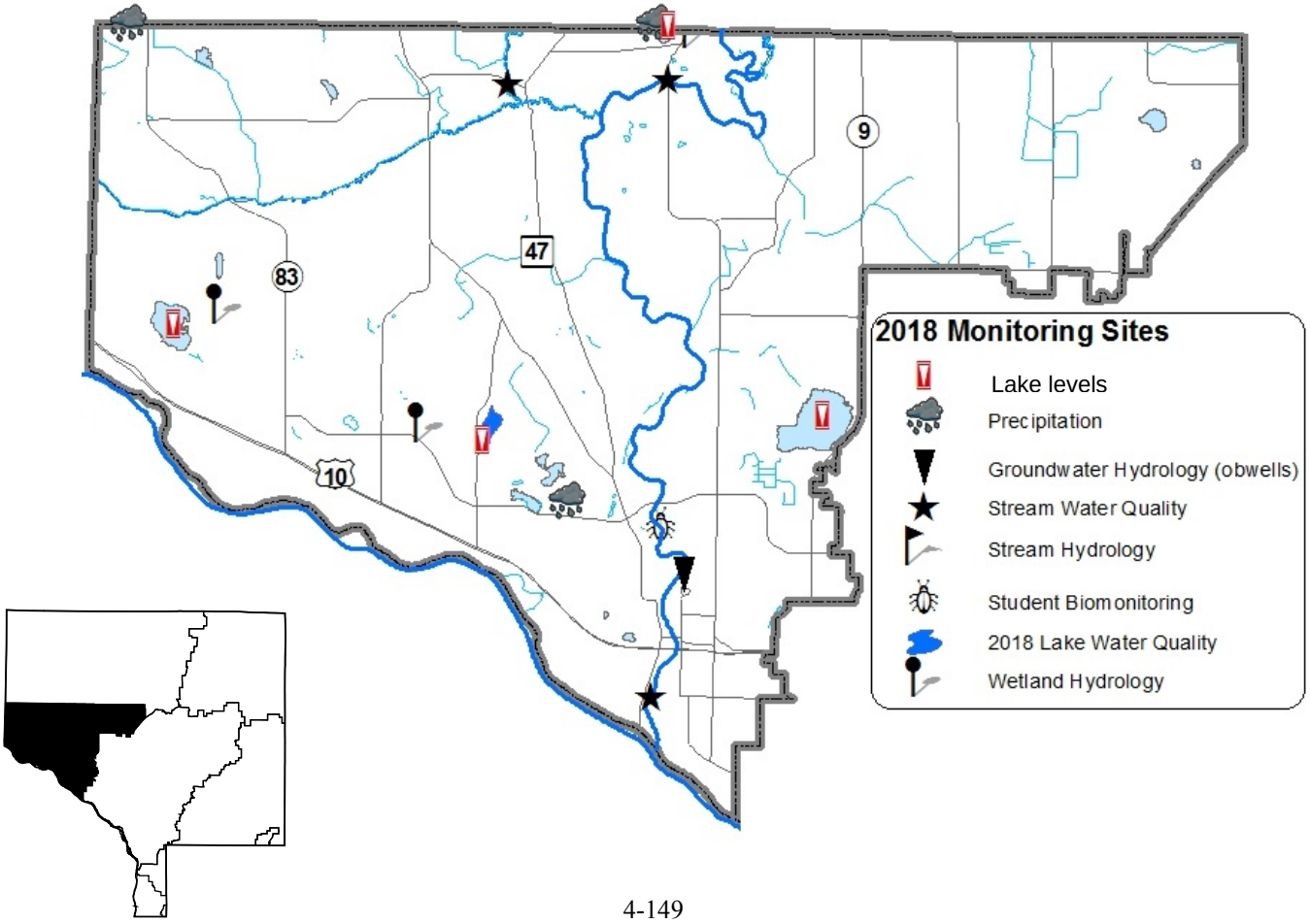


Lake Level Monitoring

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).

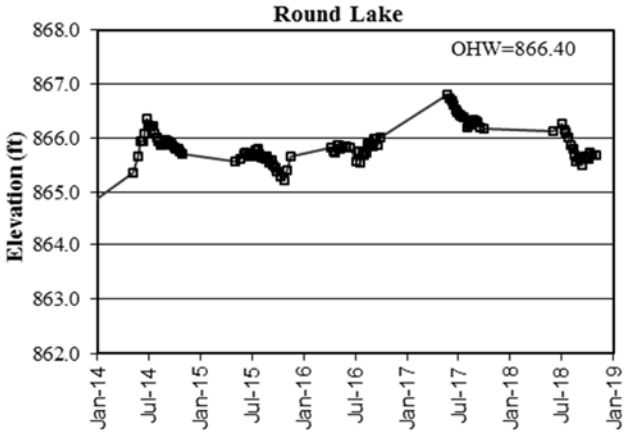
Purpose: To understand lake hydrology, including the impacts of climate or other water budget changes. These data are useful for regulatory, building/development, and lake management decisions.

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

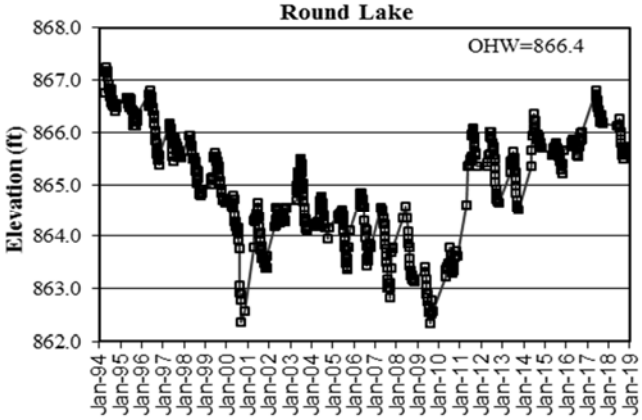
Results: Lake levels were measured by volunteers throughout the 2018 open water season. Lake gauges were installed and surveyed by the Anoka Conservation District and MN DNR. 2018 levels were generally lower than 2017 levels. All lakes followed the expected pattern of high levels in the spring with declining levels through summer. Sunfish Lake appears to be rising over the past 25 years, and Round Lake has almost 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.

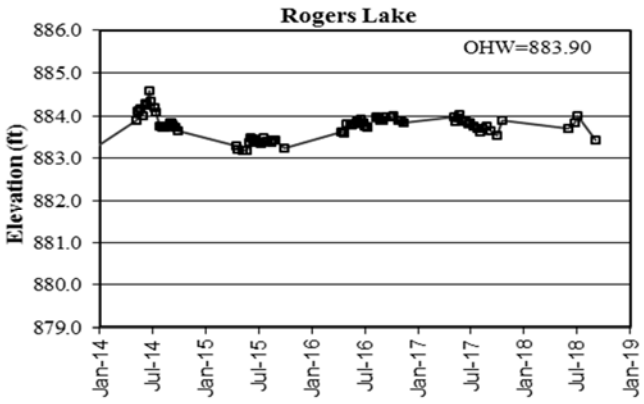
Round Lake Levels – last 5 years



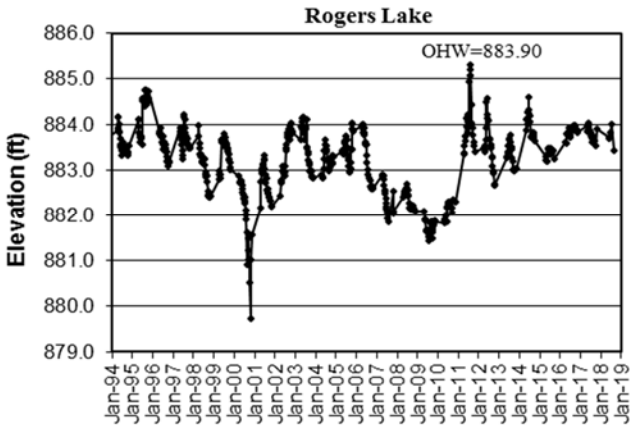
Round Lake Levels – last 25 years



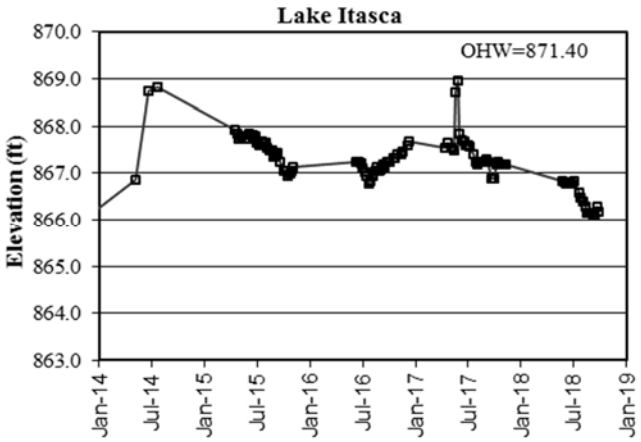
Rogers Lake Levels – last 5 years



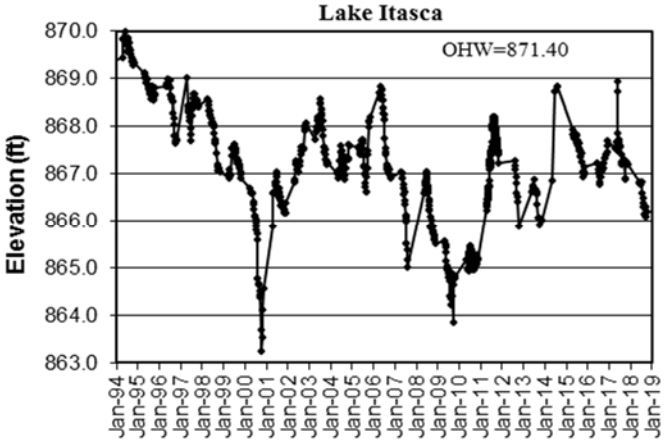
Rogers Lake Levels – last 25 years



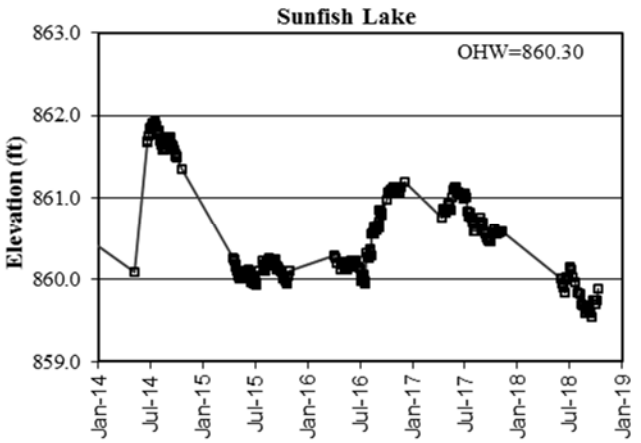
Itasca Lake Levels – last 5 years



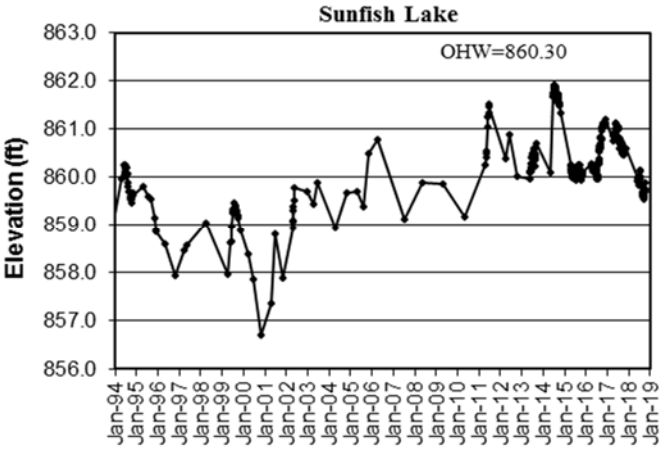
Itasca Lake Levels – last 25 years



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

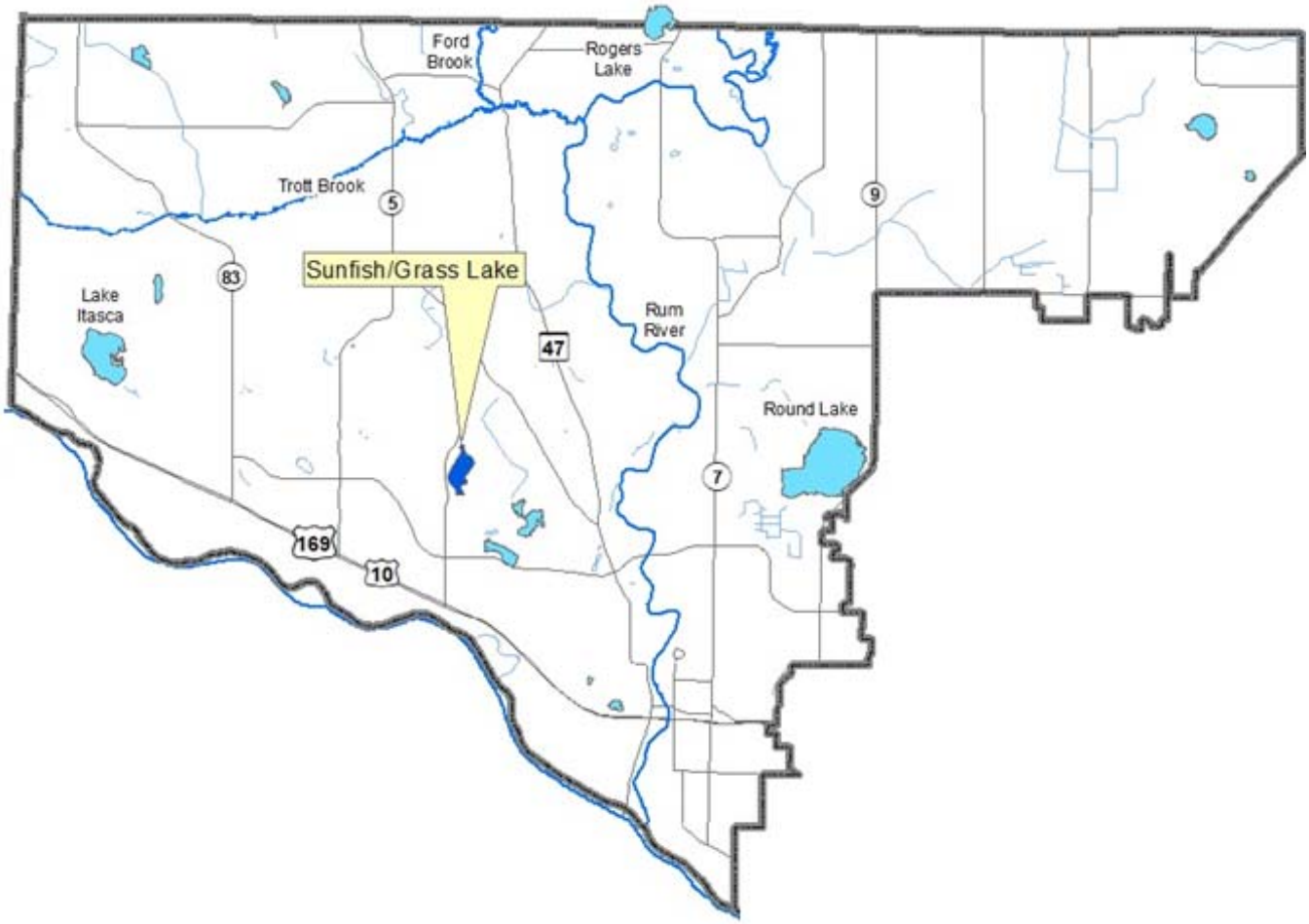
Description: May through September, every-other-week, monitoring is conducted for the following parameters: total phosphorus, chlorophyll-a, Secchi transparency, dissolved oxygen, turbidity, temperature, conductivity, pH, and salinity.

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

Locations: Sunfish/Grass 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.

LRRWMO Lake Water Quality Monitoring Sites



Sunfish/Grass Lake

City of Ramsey, Lake ID #02-0113

Background

Sunfish/Grass Lake is located in the City of Ramsey in southwestern Anoka County. It is a small lake with a surface area of 35 acres. The lake does not have a public boat landing, but can be accessed through Sunfish Lake Park on the west side of the lake. The park has a fishing pier and kayaks, which can both be used by the public. The lake is quite shallow with floating leaf, emergent, and submergent aquatic vegetation throughout. A very small portion of the shoreline is developed with most of the lake being surrounded by park or wooded land.

2018 Results

Sunfish/Grass Lake has not been extensively monitored in the past. 2018 was the third year in which the Anoka Conservation District (ACD) monitored the lake as part of the regular lake sampling efforts. The lake was previously monitored by ACD in 2016 and 2017 with four additional years of monitoring through the MPCA Citizen Lake Monitoring Program (CLMP) with varying degrees of intensity.

In 2018 Sunfish Lake's water quality was good compared with other lakes in this region (NCHF Ecoregion), receiving an overall B letter grade. Total phosphorus (TP), Chlorophyll-a (CL-a) and Secchi readings were all better than state water quality standards, but not as good as some previous years at this lake. The average total phosphorus concentration in 2018 of 33 µg/L was up from 16.6 µg/L in 2017. The average chlorophyll-a concentration of 8.09 µg/L is the highest on record. In previous years chlorophyll-a ranged from 3.1 to 7.1 µg/L. Secchi depth was obscured by vegetation on 7 of 10 sampling occasions (≥4 ft.) on the other 3 occasions it varied from 2.3 to 6.9 ft.

Trend Analysis

There is not yet enough data for a trend analysis of any parameter.

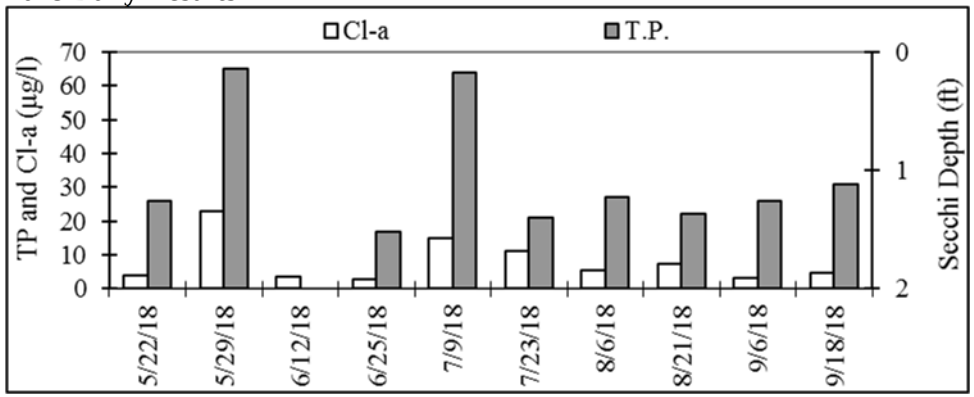
Discussion

Grass Lake looks to be in good health, returning to a B grade after receiving an overall A letter grade in 2017 and receiving B grades in each of the previous three years monitored for each parameter since 2012. This letter grade would likely be further substantiated if Secchi readings were not limited by the depth of the lake. Total phosphorus and chlorophyll-a concentrations remain well below state water quality standards for shallow lakes.

Sunfish/Grass Lake

City of Ramsey, Lake ID #02-0113

2018 Daily Results



2018 Median Results

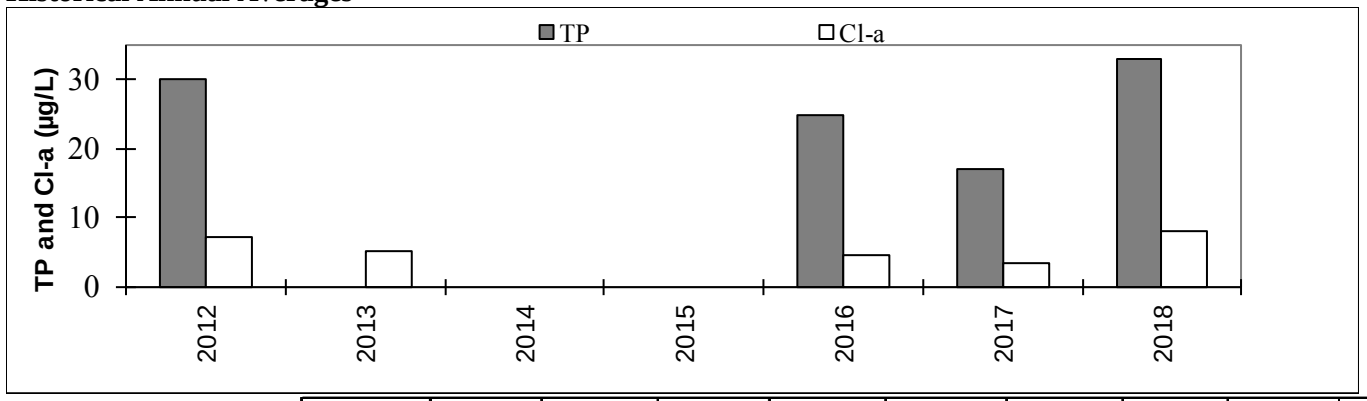
pH		7.97
Specific Conductivity	mS/cm	0.455
Turbidity	NTU	2.05
D.O.	mg/l	8.55
D.O.	%	1.02
Temp.	°F	75.9
Salinity	%	0.2
Cl-a	µg/L	5.2
T.P.	µg/l	26.0
Secchi	ft	>3

Historical Report Card

Year	TP	Cl-a	Secchi	**Overall**
2012	B	A	C	**B**
2013		A	C	**B**
2014				
2015				
2016	C	A	n/a	**B**
2017	A	A	n/a	**A**
2018	C	A	n/a	**B**
State Standards	60 µg/L	20 µg/L	>3.3 ft	

Due to Secchi transparency exceeding lake depth or being obscured by vegetation in recent years, it was not included on the graph (for recent years) or in the overall grade.

Historical Annual Averages



Date:	5/22/2018	5/29/2018	6/12/2018	6/25/2018	7/9/2018	7/23/2018	8/6/2018	8/21/2018	9/6/2018	9/18/2018
Time:	12:45	14:02	14:40	15:42	16:27	14:15	15:10	14:15	14:13	14:08

	Units	R.L.*											Average	Min	Max
pH		0.1	9.39	9.38	8.02	8.28	8.00	7.94	7.78	7.48	7.22	7.12	8.06	7.12	9.39
Specific Conductivity	mS/cm	0.01	0.317	0.308	0.990	0.411	0.463	0.515	0.432	0.450	0.460	0.474	0.482	0.308	0.990
Turbidity	NTU	1	2.1	5.5	0.0	8.0	1.2	1.2	0.3	2.0	31.0	7.0	6	0	31
D.O.	mg/l	0.01	12.05		8.35	8.58	8.67	10.11	8.52	6.48	6.15	3.1**	8.61	6.15	12.05
D.O.	%	1	139.4%		98.5%	92.0%	110.4%	128.8%	105.3%	77.3%	68.1%	36.8%**	102%	68%	139%
Temp.	°C	0.1	19.55	28.91	21.80	26.43	28.80	26.50	25.05	23.75	22.27	21.99	24.5	19.6	28.9
Temp.	°F	0.1	67.2	84.0	71.2	79.6	83.8	79.7	77.1	74.8	72.1	71.6	76.1	67.2	84.0
Salinity	%	0.01	0.16	0.15	0.49	0.20	0.22	0.25	0.21	0.22	0.22	0.23	0.24	0.15	0.49
Cl-a	ug/L	1	4.00	23.10	3.56	3.03	15.00	11.20	5.62	7.48	3.09	4.8100	8.09	3.0	23.1
T.P.	mg/l	0.005	0.026	0.065		0.017	0.064	0.021	0.027	0.022	0.026	0.031	0.033	0.017	0.065
T.P.	ug/l	5	26	65		17	64	21	27	22	26	31	33	17	65
Secchi	ft		>4	2.3	6.9	3	>4	>4.5	>4	>4	>4.33	>4		2.3	6.9
Secchi	m		>1.21	0.7	2.1	0.9	>1.21	>1.22	>1.21	>1.21	>1.3	>1.21	0.0	0.7	2.1
Physical			1	2	1	1	1	1		1	1	1	1.1	1.0	2.0
Recreational			2	2	1	2	3	2		2	2	2	2.0	1.0	3.0

*reporting limit

** excluded from calculations due to likely inaccuracy

Stream Water Quality - Chemical Monitoring

Partners: MPCA, ACD, LRRWMO

Description: The Rum River and several tributary streams were monitored in 2018. The locations of river monitoring include the approximate top and bottom of the Lower Rum River Watershed Management Organization (WMO) and at the top of the Upper Rum River WMO. Tributaries in the Upper Rum River WMO were monitored simultaneously with Rum River monitoring for greatest comparability near their outfalls into the river. Monitoring at the bottom of the Lower Rum River WMO was completed by the Metropolitan Council (Met Council) below the dam in Anoka. Collectively, these data allow for an upstream to downstream water quality comparison within Anoka County, as well as within each watershed organization. It also allows us to examine whether the tributaries degrade Rum River water quality.

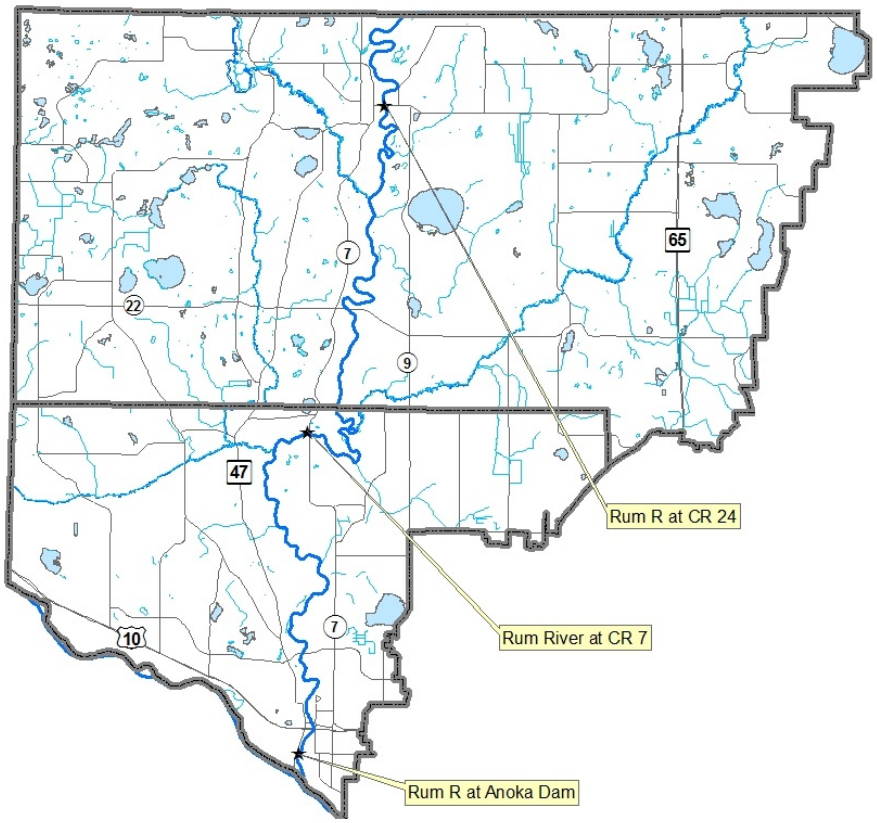
Monitoring by Anoka Conservation District occurred in May through October for each of the following parameters: total suspended solids, total phosphorus, Secchi tube transparency, dissolved oxygen, turbidity, temperature, specific conductivity, pH, and salinity. Metropolitan Council monitoring occurred weekly March to October and semi-monthly November to February. 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: Rum River at County Road 24 (ACD)
Rum River at County Road 7 (ACD) Rum River at Anoka Dam (Met Council)

Results: Results are presented on the following pages.

2018 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

At Co. Rd. 7 – 2004, 2009- 2011, 2014-2018

At Anoka Dam – 1996-2011(MC WOMP), 2015-2018

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, north of the county fairgrounds in Anoka. It is used for boating, tubing, and fishing. Much of western Anoka County drains to the Rum River. Subwatersheds that drain to the Rum include Seelye Brook, Ford Brook, and Cedar Creek (reported in the Upper Rum River WMO section of this Water Almanac) and Trott Brook.

The extent to which Rum River water quality improves or is degraded within Anoka County has been unclear. 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. Monitoring elsewhere has occurred only in more recent years. Water quality changes might be expected from upstream to downstream because land use changes dramatically from rural residential in the upstream areas of Anoka County to suburban in the downstream areas.

Methods

In 2004, 2009-2011, and 2014-2018 monitoring was conducted to determine if Rum River water quality changes in Anoka County, and if so, generally where changes occur. The data is reported for all sites together for a more comprehensive analysis of the river from upstream to downstream.

In 2018 the river was monitored during both storm and baseflow conditions by grab samples. At County Road 24 (farthest upstream) only four samples were taken due to lower funding levels. At County Road 7, eight water quality samples were taken; half during baseflow and half following storms. These two sites were monitored by the Anoka Conservation District. At the Anoka Dam the river was monitored by the Metropolitan Council using a different schedule.

Monitoring was conducted during both baseflow and storm conditions. Storms were 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 storms were sampled because of a lack of larger storms. All storms sampled were significant runoff events.

Key water quality parameters were monitored at all sites. 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 and total suspended solids, as well as chloride at Rum River at County Road 7. Additional parameters were monitored at the Anoka Dam by the Metropolitan Council.

Water levels or flow was observed during each water quality sampling. The Metropolitan Council monitoring station at the Anoka Dam includes automated equipment that continuously tracks water levels and calculates flows. Water level and flow data for other sites were obtained 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 in 2018. 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 also available through the Minnesota Pollution Control Agency's EQuIS database, which is available through their website (https://www.pca.state.mn.us/data/environmental-quality-information-system-equis).

Results Summary

This report includes data from 2018 and an overview of previous year's data. The following is a summary of results.

- Specific conductivity and chlorides are measured as representatives of dissolved constituents. Specific conductivity in the Rum River is lower than other Anoka County streams. Specific conductivity increases mildly downstream, though it is slightly lower at the furthest downstream site compared to the mid-county site. Average specific conductivity for sites tested in 2018 from upstream to downstream was 0.266, 0.282, and 0.269 mS/cm, respectively.
- Chlorides were tested at Rum River at C.R. 7 where it averaged 14 mg/L, which is low. As development continues in all parts of the Rum River watershed, efforts to prevent future problems 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.
- Phosphorus in the Rum River in recent years has been near the State water quality standard of 100 µg/L at all sampled sites. Sites exceeded the standard on three single sampling occasions in 2018, once during baseflow, and twice after a storm event. 2018 total phosphorus in the Rum River in 2018 averaged 78.8, 83.3, and 86.0 µg/L at sampled sites from upstream to downstream. This year total phosphorus increased slightly compared to the low values of 2017. The minimal increase from upstream to downstream is overall a good thing as it points to relatively small phosphorus contributions occurring in Anoka County. However, because small increases in phosphorus could cause the Rum River to exceed State standards and be declared "impaired," preventing phosphorus increases should be a focus of watershed management.
- Suspended solids and turbidity generally remained at acceptable levels in the Rum River and are lower than most other Anoka County streams. Average turbidity peaked at the mid-county site Rum River at C.R. 7 where average turbidity was 19.3 NTU. From upstream to downstream in 2018 turbidity averages were 7.2, 19.43, and 3.85 NTU, respectively. TSS levels were low in the Rum River compared to other Anoka County streams averaging 10.94, 10.1, and 5.54 mg/L from upstream to downstream. The low turbidity and TSS levels at the downstream site are likely due to settling in the pool created by the dam at Anoka. Though suspended solids remain well under state impairment thresholds in the Rum, turbidity does 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.
- pH returned to more typical levels in 2018 in the Rum River after being elevated on some occasions in 2017. pH should remain between 6.5 and 8.5 to support aquatic life and meet State water quality standards. On one occasion in May 2017, all three sampled sites exceeded pH 9. However, this year there were no examples of pH exceeding 9, in fact the highest pH recorded was 8.46, within the range required to meet state standards. This decrease in pH both on average and overall is good, but concern remains because there have been a number of spikes in pH over 8.5 in recent years. pH levels over 9 are quite alkaline for natural waterways. There are a variety of potential factors leading to temporary spikes in pH, including discharge of high nutrient and algae waters to the river from lakes or wetlands. pH should continue to be monitored in the Rum River in the future.
- Dissolved oxygen remained above the state standard of 5 mg/L in 2018 and previous monitored years, however the lowest recorded level occurred this year. The lowest concentration recorded at any of the three sites in 2018 was 5.64 mg/L at Rum River at C.R. 7 compared to 6.89 mg/L at Rum River at Anoka Dam in 2017.

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

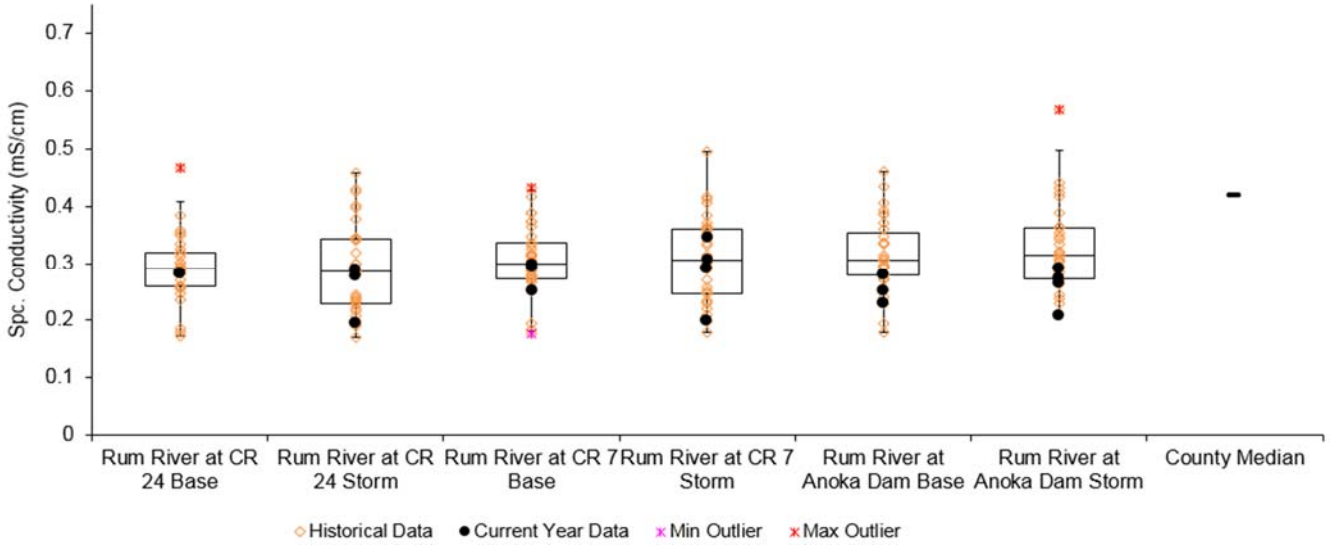
Specific conductivity and chlorides are measures of dissolved pollutants. Dissolved pollutant sources include road runoff and industrial chemicals, among many others. Metals, hydrocarbons, and road salts, as well as other pollutants are often of concern in a suburban environment. Specific Conductivity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

Specific conductivity is acceptably low in the Rum River, in the past it has shown a consistent pattern of increasing downstream (see figure below) and is usually higher during baseflow conditions. Average specific conductivity from upstream to downstream in 2018 (all conditions) did not meet these expectations with readings of 0.266 mS/cm, 0.282 and 0.269 mS/cm, respectively. All three sites are lower than the historical median for 34 Anoka County streams of 0.420 mS/cm and. The 2018 maximum observed specific conductivity in the Rum River was 0.347 mS/cm at County Road 7 during storm conditions. During storm flows there is a statistically significant trend of increasing specific conductivity from upstream to downstream when averaged over the last 5 years.

Specific conductivity is lower on average during storm events (especially at the upstream sites), suggesting that stormwater runoff contains fewer dissolved pollutants than the surficial water table that feeds the river during baseflow. High baseflow specific conductivity has been observed in most other nearby streams as well. 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.

In years past, specific conductivity has increased from upstream to downstream and that is the expected trend. During baseflow, this increase from upstream to downstream likely reflects greater road densities and deicing salt application. That this pattern is not seen this year could be due to precipitation or runoff differences, or the timing of sampling. Additionally, the below the dam specific conductivity readings were atypical in 2018 in that specific conductivity was higher during storm than baseflow events, though modestly higher at that, averaging 0.279 mS/cm during storms and 0.254 mS/cm during baseflow.

Specific Conductivity during Baseflow and Storm Conditions. Orange diamonds are historical data from previous years and black circles are 2018 readings. Box plots show the median (middle line), 25th and 75th percentile (ends of box), and 10th and 90th percentiles (floating outer lines).

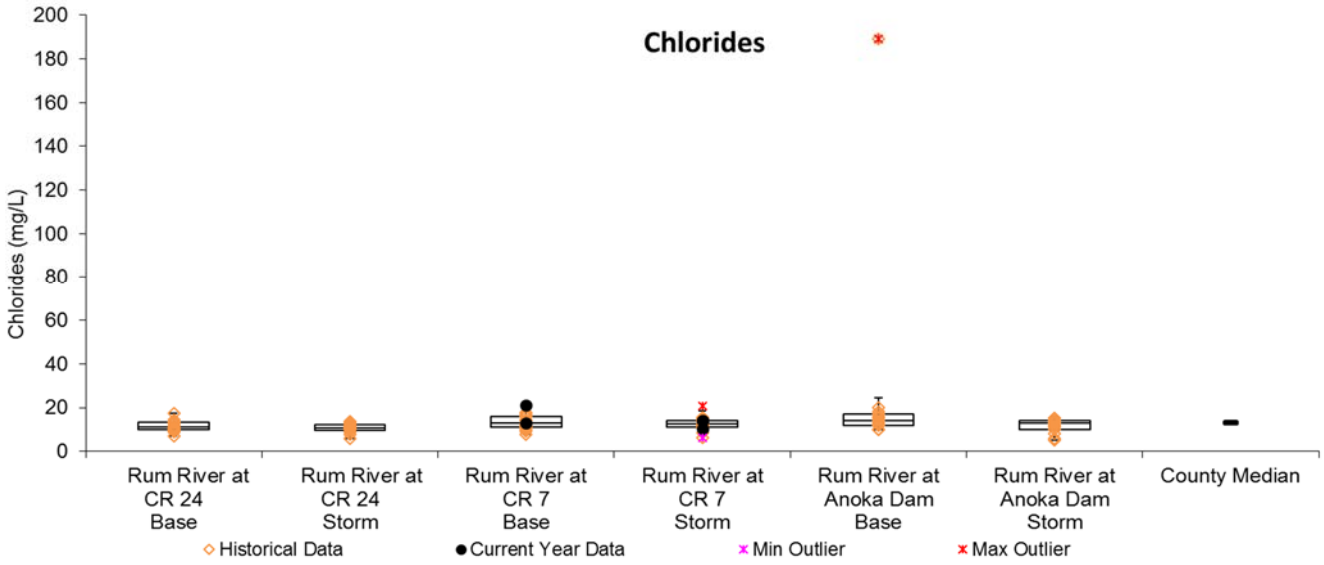


Chlorides

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 greatest concern because of the effect they can have on the stream's biological community. They can also be of concern because the Rum River is upstream from the Twin Cities drinking water intakes on the Mississippi River. Specific Conductivity data, reported above, is partially a reflection of chlorides with higher specific conductivity corresponding to higher chlorides, generally.

In 2018 water samples for chloride analysis were taken from the Rum River at CR7. At this location average chloride was 14.7 mg/L for all events and 14.2 and 15.0 mg/L for storms and base flow conditions, respectively. This reflects the typical trend seen in specific conductivity of greater dissolved pollutants during baseflow conditions and likely reflects infiltration of road salts into the shallow aquifer. This information could be of greater value if chloride sampling occurred at all sites sampled in the Rum River watershed and, additionally, if samples were taken after snowfall events and corresponding specifically to snowmelt.

Chlorides during Baseflow and Storm Conditions. Orange diamonds are historical data from previous years and black circles are 2018 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

Phosphorus is one of the most common pollutants in this 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. Rum River total phosphorus is near State impairment thresholds.

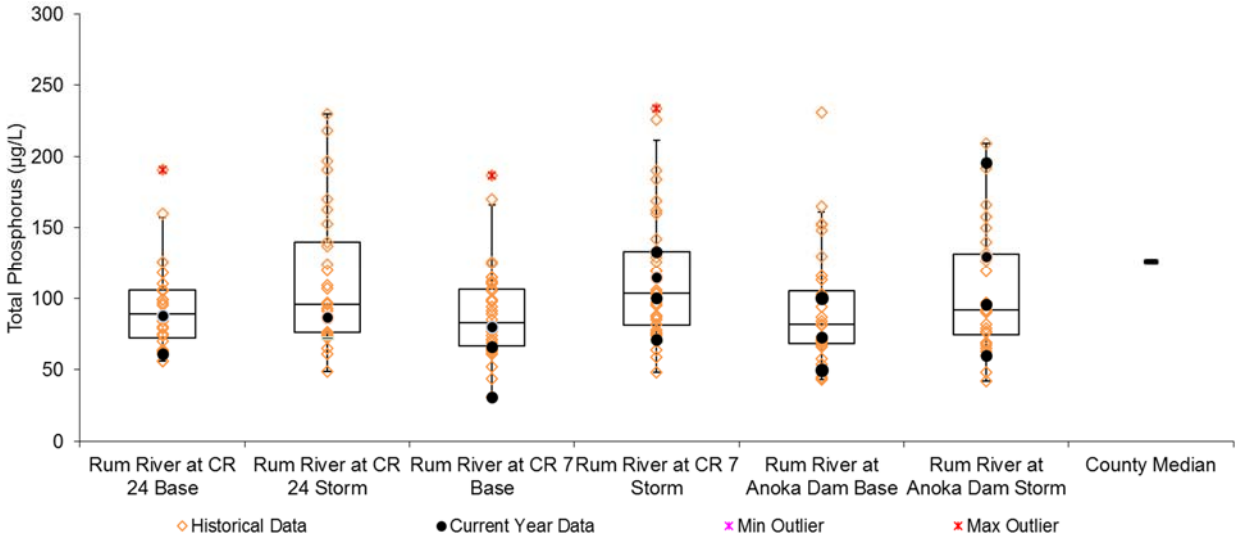
The average phosphorus concentration in 2018 increased from upstream to downstream and approached State standards for impairment. At the three monitored sites phosphorus from upstream to downstream was 78.8, 83.3 and 86.0 µg/L, respectively. The watershed becomes increasingly suburbanized in the lower reaches.

In 2018, as in many years pre-2016, total phosphorus was close to exceeding State water quality standards. Four samples among the three sites combined in 2018 yielded total phosphorus concentrations over the State standard of 100 µg/L. Of those, two occurred on July 2nd at the mid-county and downstream sites after significant rainfall.

Because the Rum River is close to exceeding State water quality standards for phosphorus, monitoring should be continued in the future, and every effort should be made to prevent phosphorus increases 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 robust stormwater treatment to not just keep nutrient loading to the river the same, but reduce it. Reductions will be necessary to offset likely increases from land use changes, more intense precipitation events, upstream ditch cleaning and other factors.

Total Phosphorus during Baseflow and Storm Conditions. Orange diamonds are historical data from previous years and black circles are 2018 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 attached pollutants. In 2018, median turbidity and total suspended solids in the Rum River were lower than the historical median for Anoka County streams.

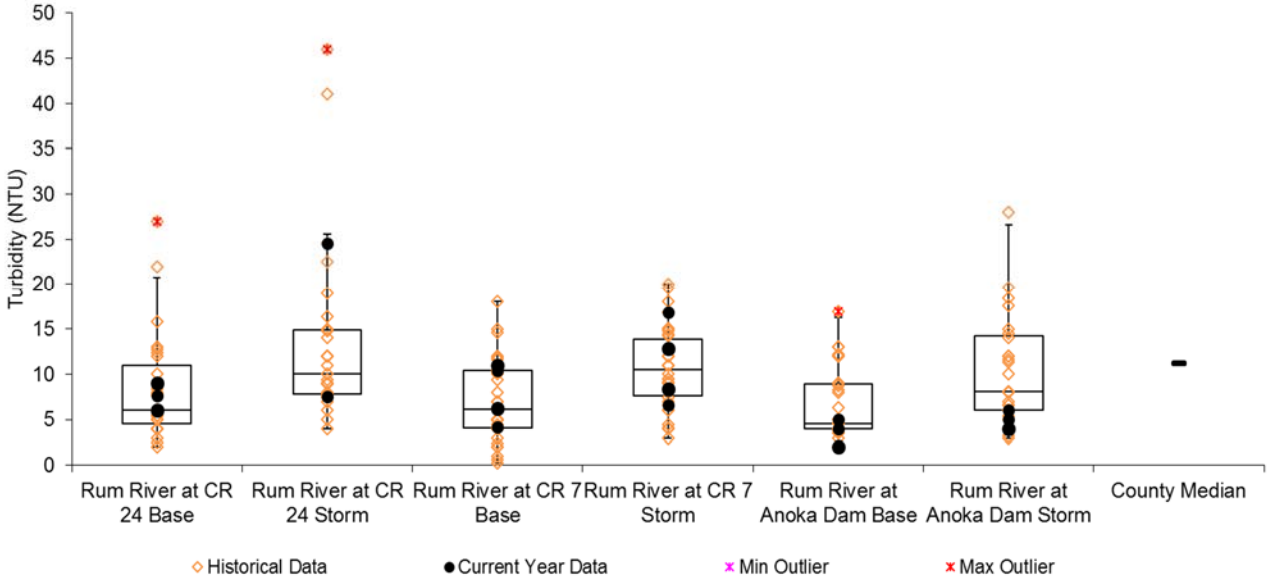
In the Rum River, turbidity is generally low but increases during storms. There is substantial variability (see figure below). There is no clear change in turbidity or suspended solids upstream to downstream. The average turbidity, in 2018 (storms and baseflow) for each site moving upstream to downstream was 7.2, 19.4, and 3.85 NTU. The historical median for Anoka County streams is 11.2 NTU. Turbidity was elevated on a few occasions, especially during and after storm events. Over the last 5 years there is a statistically significant increase in turbidity from upstream to downstream during baseflow conditions and also for all samples. This likely reflects the effect of increased erosion and contribution of sediments in the more developed southern portion of the county.

Average TSS results (all conditions) in 2018 for sites moving upstream to downstream were 10.94, 10.1, and 5.54 mg/L. These are all lower than the Anoka County stream median for TSS of 13.66 mg/L. It is also lower than State water quality standards. The State threshold for TSS impairment in the Rum River is 10% of samples April 1-September 30 exceeding 30 mg/L TSS. The highest concentration recorded in 2018 was 24 mg/L. ACD has not collected a sample in the Rum River over 30 mg/L TSS since May of 2010.

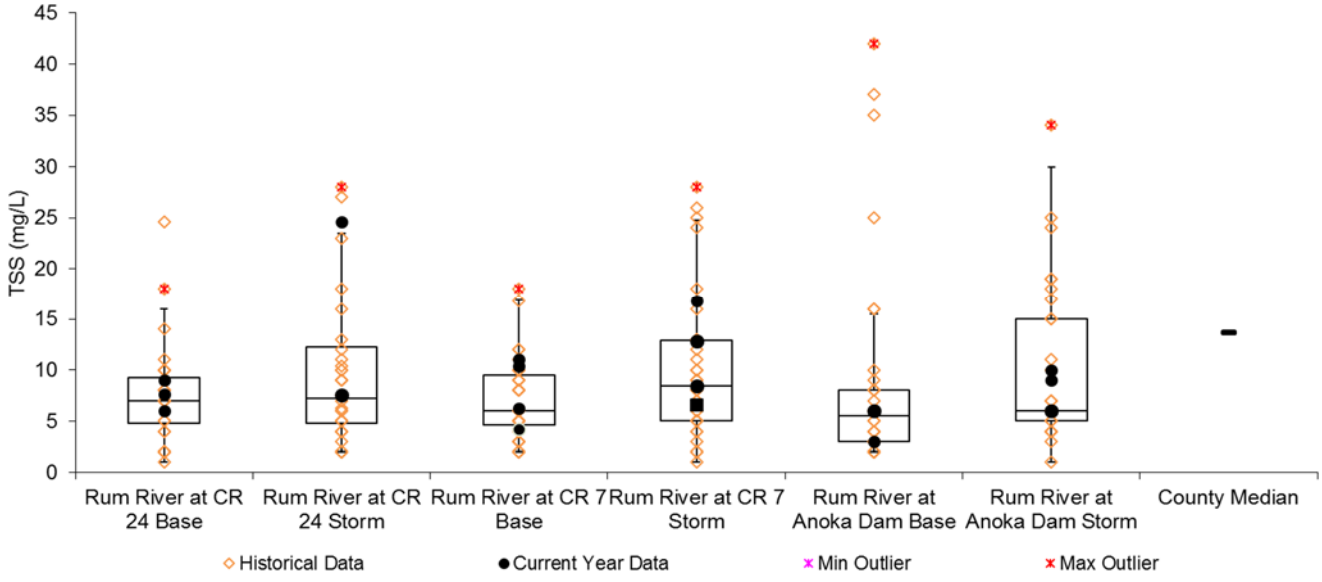
Suspended solids can come from within and outside of the river channel. Sources on land include soil erosion, road sanding, and others. Riverbank erosion and movement of the river bottom also contributes to suspended solids. A moderate amount of this "bed load" is natural and expected.

Though the Rum River remains well under the impairment threshold for TSS, rigorous stormwater treatment should occur as the Rum River watershed continues to be developed or the collective pollution caused by many small developments could seriously impact the river, especially given that stormwater carries many pollutants in addition to suspended sediments. Bringing stormwater treatment up to date in older developments is also important.

Turbidity during Baseflow and Storm Conditions. Orange diamonds are historical data from previous years and black circles are 2018 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 2018 readings. Box plots show the median (middle line), 25th and 75th percentile (ends of box), and 10th and 90th percentiles (floating outer lines).



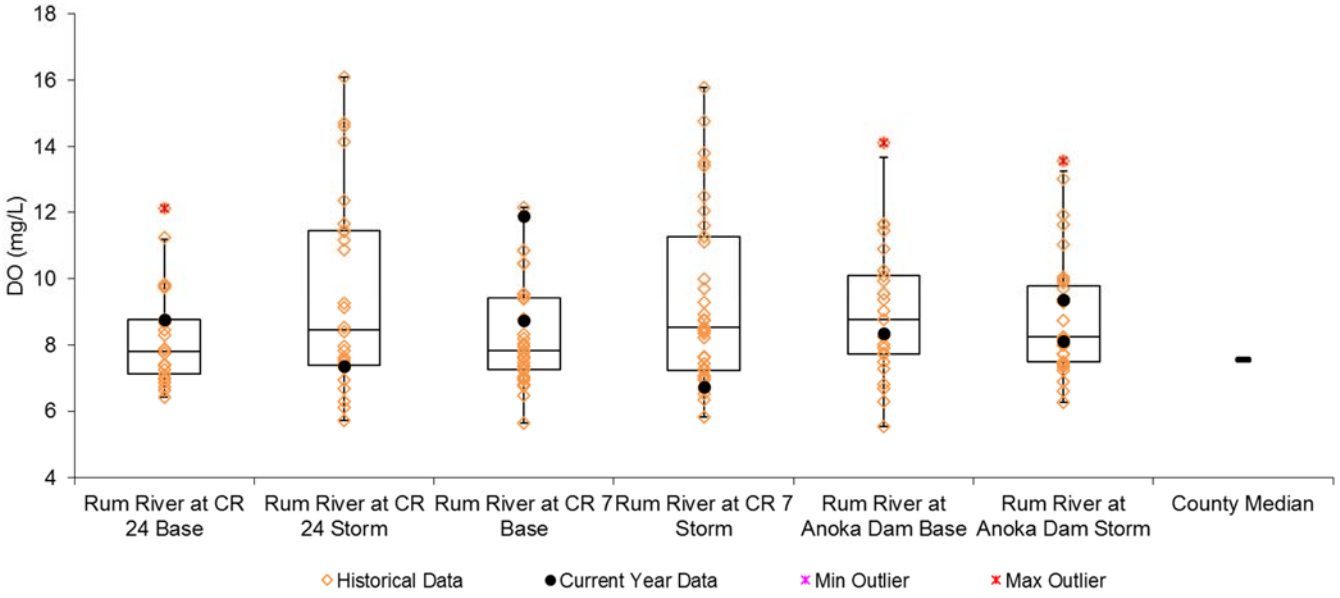
Dissolved Oxygen

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 2018, 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 2018 was 5.64 mg/L. This is only the fifth time that a dissolved oxygen reading below 6 has occurred in the Rum River throughout the monitoring record, with the 3 most recent previous readings occurring during a single storm in 2011 when dissolved oxygen dipped below six at all three sites. The low dissolved oxygen result this year was recorded at base flow during 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 lowered 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 2018 readings. Box plots show the median (middle line), 25th and 75th percentile (ends of box), and 10th and 90th percentiles (floating outer lines).

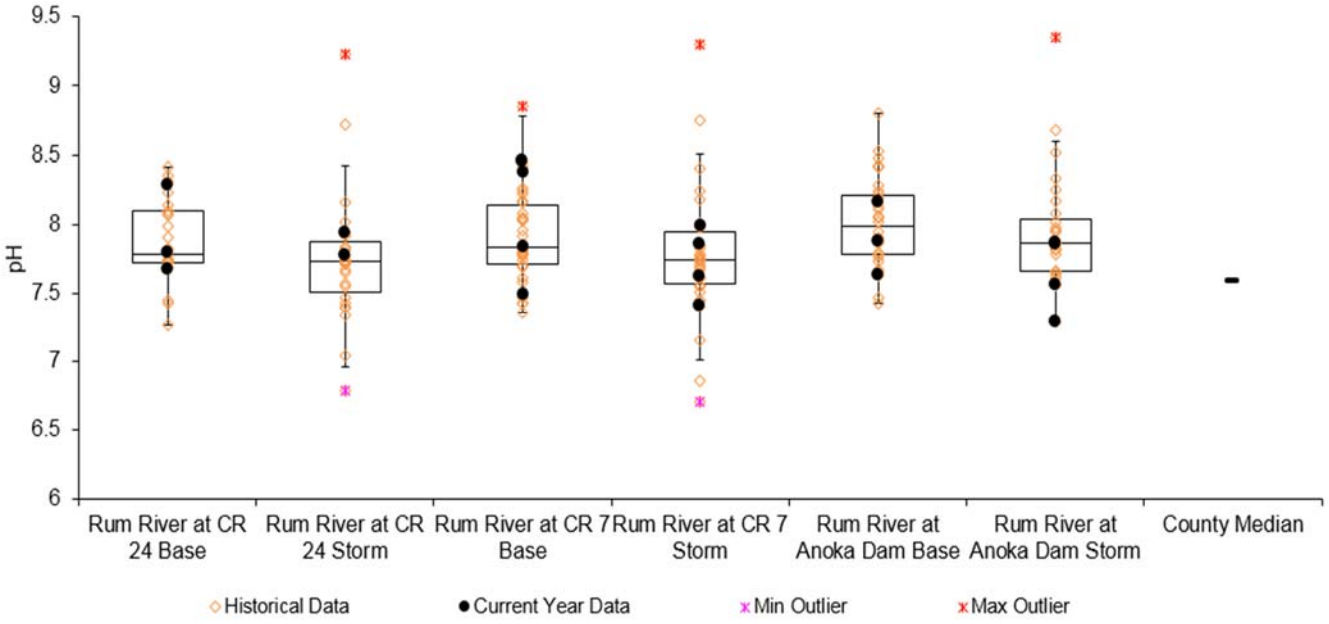


pH

pH refers to the acidity of the water. The Minnesota Pollution Control Agency's water quality standard is for pH 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. In recent years (2015, 2017) however, exceedances of 8.5 have been commonplace at all sites. In 2017, pH levels over 9 were recorded at all three sites after a storm event on 5/18/2017. Exceedances were recorded in 2015 after a spring storm in March at the lower two sampling sites as well as at the Anoka Dam during baseflow conditions in July. This year saw a positive change with no events exceeding 8.5.

There are a variety of potential factors leading to temporary spikes in pH. It is, however, disconcerting that spikes over 8.5 seem to be happening more frequently in recent years, although it is a positive development that they did not occur this year. pH should continue to be monitored in the Rum River in the future to see if the spikes get worse or become even more common.

pH during Baseflow and Storm Conditions. Orange diamonds are historical data from previous years and black circles are 2018 readings. Box plots show the median (middle line), 25th and 75th percentile (ends of box), and 10th and 90th percentiles (floating outer lines).



Summary and Recommendations

In general, the Rum River's water quality is good. However, there is typically a slight increase in specific conductivity moving downstream, phosphorus levels are near state water quality standards, and pH spikes over 8.5 have been more frequent in recent years, although they did not occur this year. The river is in need of protection now to avoid more difficult and costly restoration becoming a necessity later.

Relative changes in 3 water quality parameters in tributaries and the Rum River moving upstream to downstream. Plus/minus signs indicate difference relative to Rum River at CR 24 (top of the county).

	Specific Conductivity	Total Suspended Solids	Total Phosphorus
	Difference Relative to Rum R. at CR 24		
Rum River @ CR 24	0.266 mS/cm	10.94 mg/L	78.8 µg/L
Seelye Brook @ CR 7	+	-	+
Cedar Creek @ CR 9	+	+	+
Rum River @ CR 7	+	-	+
Ford Brook @ CR 63	+	+	+
Rum River @ Anoka Dam	=	-	+

In addition to comparing water quality in the Rum River upstream to downstream, water quality was also compared between Rum River tributaries and the Rum River main stem. For specific conductivity, total suspended solids, and total phosphorus the Rum river had better water quality than the tributaries, except when TSS results at Rum River at CR 24 and Seelye Brook at CR 9 were compared. Based on these results the tributaries sampled are likely reducing water quality in the Rum River. 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 total phosphorus standards and the tributaries are likely contributing to this problem. Moving forward it is important to continue to monitor and protect both the Rum River and its tributaries in order to prevent further decline in water quality potentially leading to water quality impairments in the Rum.

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's watershed within Anoka County. This continued development has the potential to degrade water quality unless carefully planned and managed with the river in mind. Specifically, new development should follow stormwater standards designed to at least 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 keeping roads safe.

Development pressure is likely to be especially high near the river because of its scenic and natural qualities. Local ordinances to preserve the scenic nature of the river do exist, and enforcement is key. Additionally, preservation of riparian parcels with high natural resources 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 especially active currently. 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.

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 quality, both independently as well as by supplementing chemical 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, because each gives only a partial picture of stream condition. 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).

Biomonitoring

RUM RIVER

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

Last Monitored

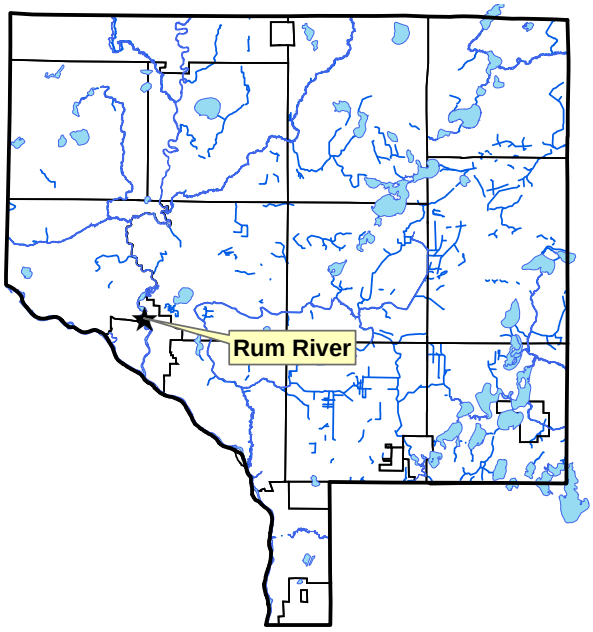
By Anoka High School in 2018

Monitored Since

2001

Student Involvement

Over 100 students in 2018, over 1,200 total since 2001



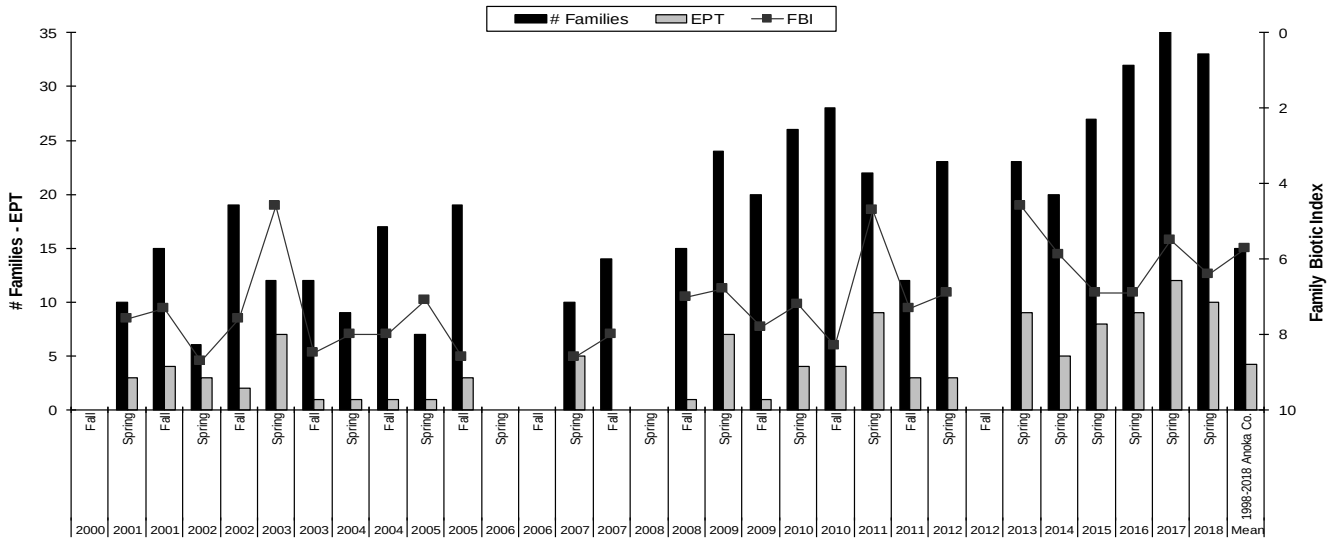
Background

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 2018 with Anoka Conservation District (ACD) oversight. The results for spring 2018 were better than previous years with the exception of last year (2017) which had the best results on record. Students collected 33 different families of invertebrates at this site, the second most since 2001. 10 unique families of the most sensitive taxa (Ephemeroptera, Plecoptera, and Trichoptera; EPT), were collected in 2018. The last three years of monitoring at this site (2016, 2017, and 2018) are the best three years on record. Additionally, results for family biotic index, number of families, and number of EPT taxa are all much better than the countywide mean over 21 years of data collection in numerous streams.

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	2014	2015	2016	2017	2018	Mean
Season	Spring	Spring	Spring	Spring	Spring	1998-2018 Anoka Co.
FBI	5.90	6.90	6.90	5.50	6.40	5.7
# Families	20	27	32	41	33	15.0
EPT	5	8	9	12	10	4.3
Date	20-May	11-May	17-May	15-May	14-May	
sampling by	AHS	AHS	AHS	AHS	AHS	
sampling method	MH	MH	MH	MH	MH	
Mean # individuals	350	767	3363	1439	1648	
# replicates	4	2	1	2	3	
Dominant Family	Siphlonuridae	Siphlonuridae	Siphlonuridae	Pelecypoda	Siphlonuridae	
% Dominant Family	33.4	69.3	74.9	26.6	48.1	
% Ephemeroptera	57.8	78.9	78.7	14.9	65.1	
% Trichoptera	0.1	1.4	0	0.1	0.1	
% Plecoptera	0.5	0	0.4	26	1.9	
% EPT	58.4	80.3	79.1	41	67.1	

Discussion

Both chemical and biological monitoring indicate the good quality of this river. 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. 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.

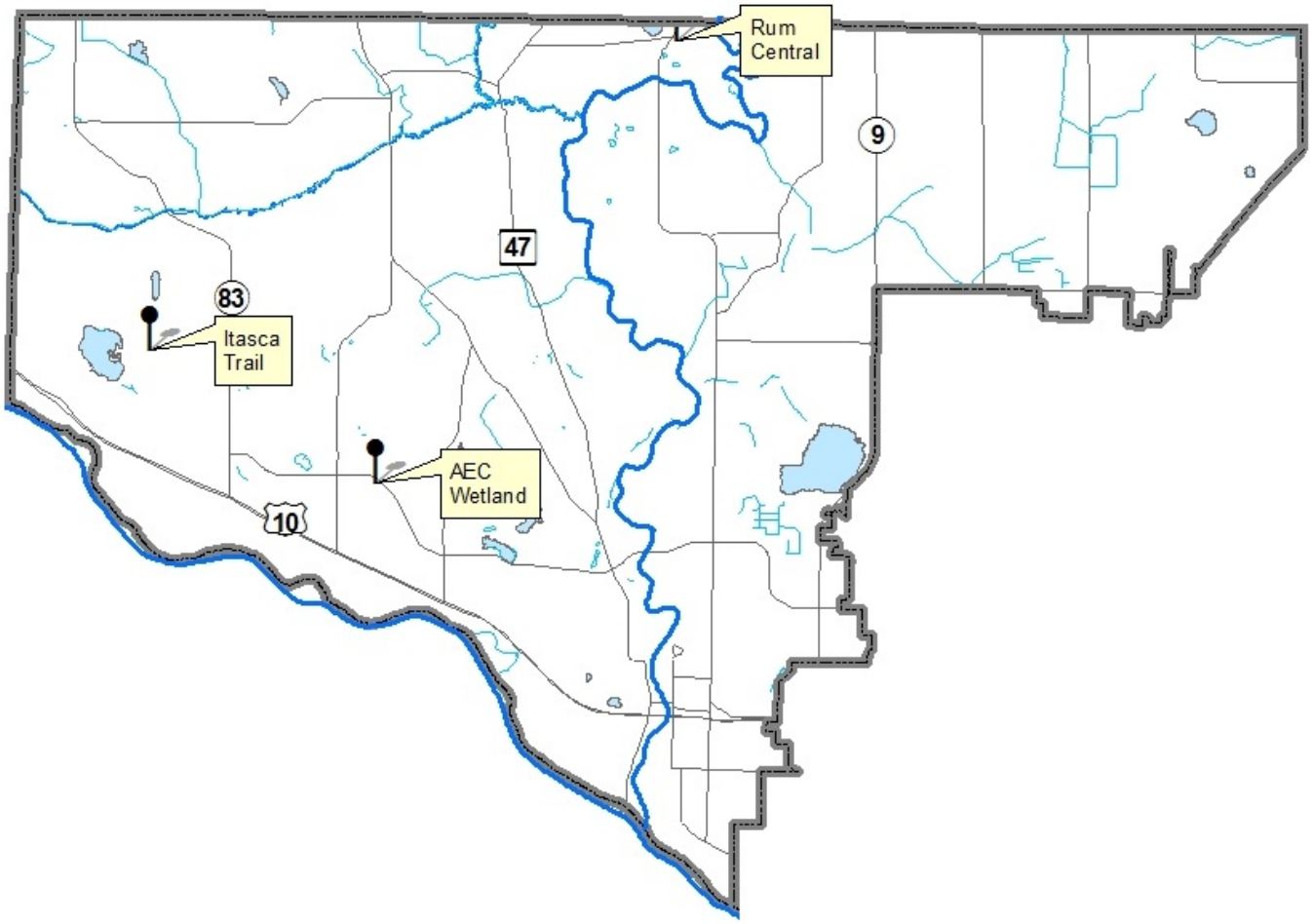
Locations: AEC Reference Wetland, Connexus Energy Property on Bunker Lake Blvd, Ramsey

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

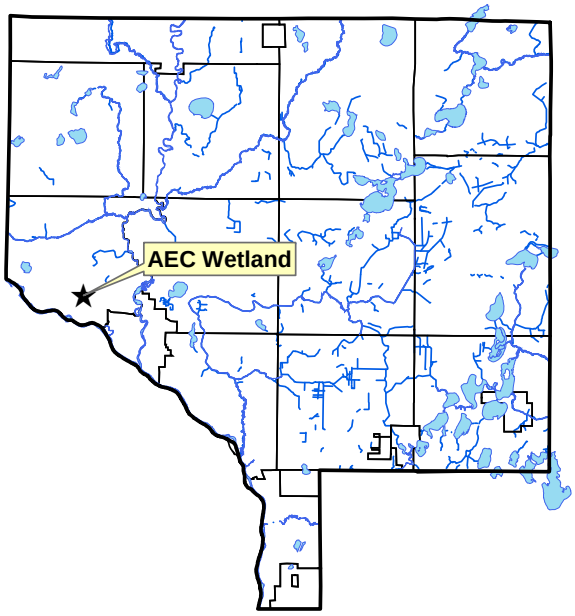
Monitored Since: 1999

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	-

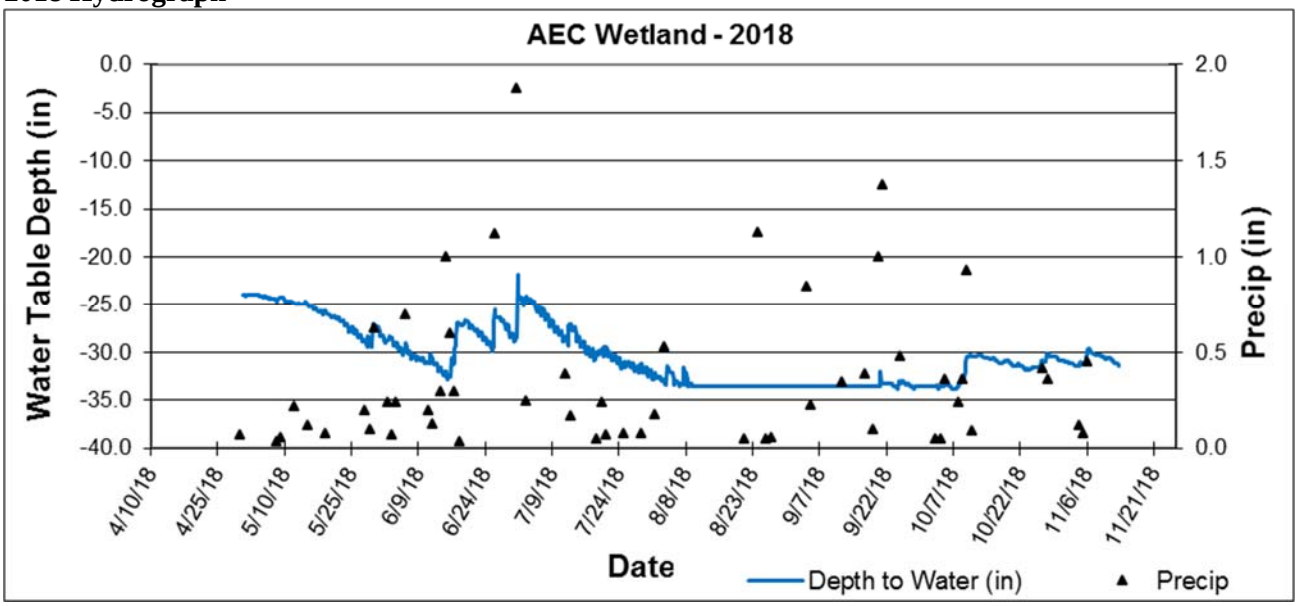
Surrounding Soils: Hubbard coarse sand

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.

2018 Hydrograph



Wetland Hydrology Monitoring

RUM RIVER CENTRAL REFERENCE WETLAND

Rum River Central Regional Park, Ramsey

Site Information

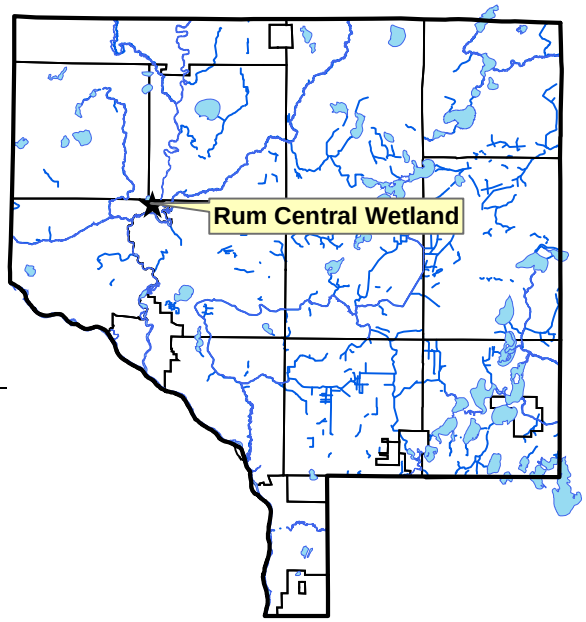
Monitored Since: 1997

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	-

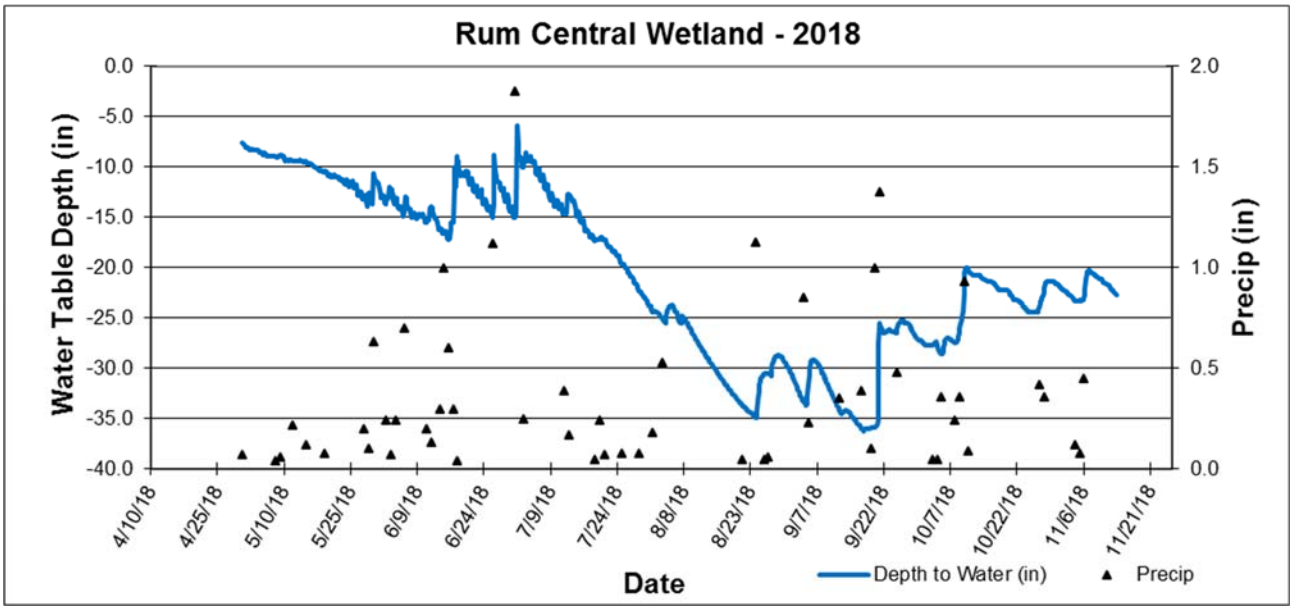
Surrounding Soils: Zimmerman fine sand

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.

2018 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:

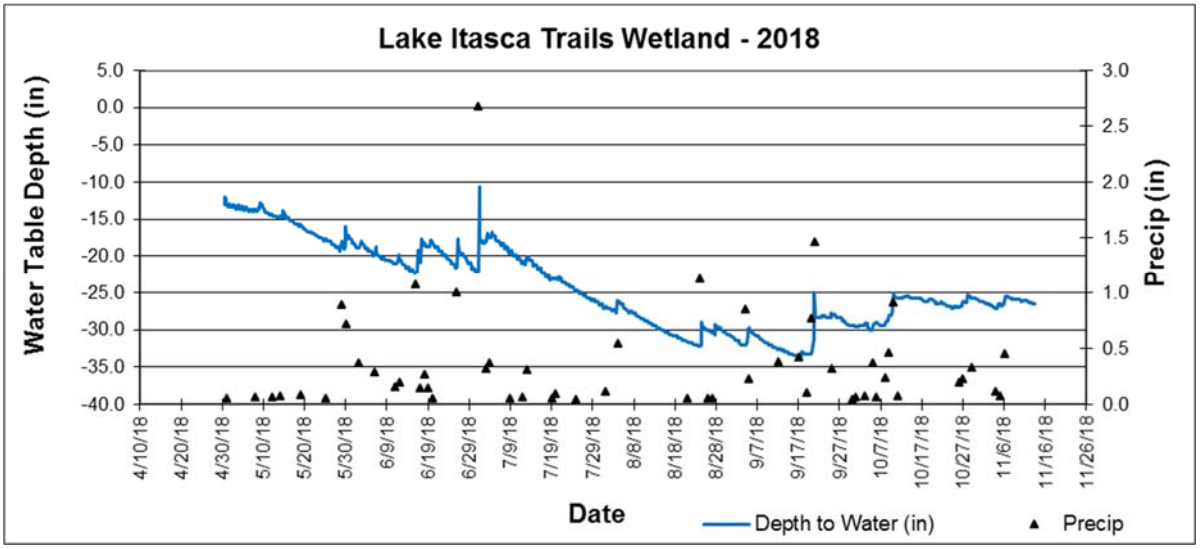
Horizon	Depth	Color	Texture	Redox
A1	0-12	10yr2/0	Mucky sand	-
A2	12-20	10ry2/1	Sand	-
B1	20-36	10yr4/1	Sand and fine gravel	-
B2	36-48	10yr6/1	Sand and fine gravel	-

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.

2018 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
2012 Expense – Smith Rum Riverbank	-	$1,596.92
2013 LRRWMO Contribution	+	$1,000.00
2013 Expense – Geldacker Mississippi Riverbank	-	$1,431.20
2014 LRRWMO Contribution	+	$2,050.00
2015 LRRWMO Contribution	+	$1,000.00
2015 Expense – Smith Rum Riverbank	-	$ 533.65
2016 LRRWMO Contribution	+	$1,000.00
2016 Expense – Brauer Rum Riverbank	-	$1,150.00
2018 LRRWMO Contribution	+	$1,000.00
2018 Expense – Rum River Revetments	-	$2,000.00
Fund Balance		**$3,366.35**

Rum River Bank Stabilizations

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

Description: 12 riverbank stabilization projects were installed on the Rum River in Anoka and Isanti Counties in 2018. 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 4 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 4 additional revetments 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, in order to reduce sediment loading in the Rum River, as well as to reduce the likelihood of a much larger and more expensive corrective project in the future.

Location: Rum River Central Regional Park, 8 residential properties in Anoka County, City of Isanti, and 2 residential properties in Isanti County.

Results: Stabilized 2,223 linear feet of riverbank on the Rum River in Anoka and Isanti Counties.

Rum River Bank Erosion Inventory

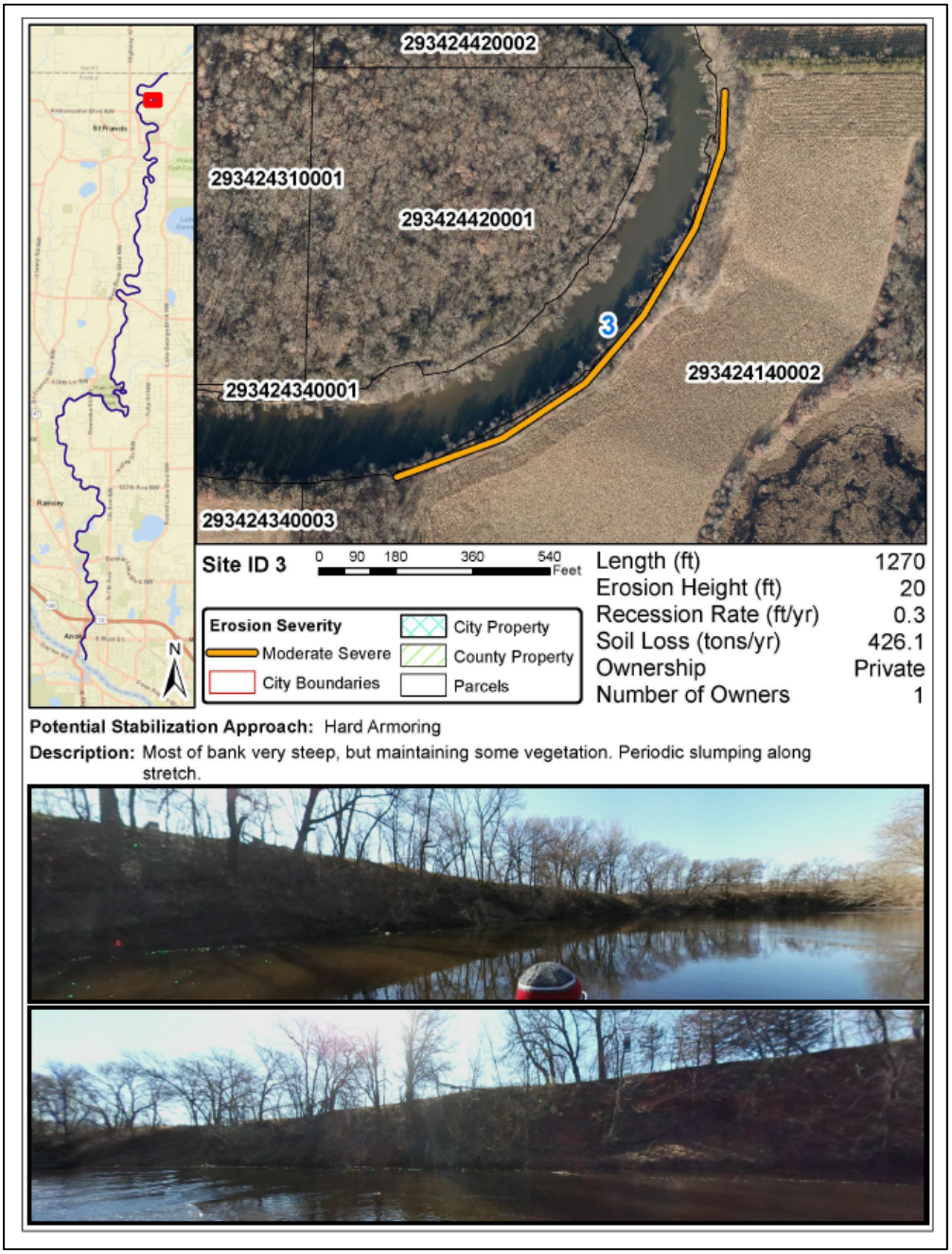
Partners: ACD

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.

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.



Anoka Rain Gardens

Partners: LRRWMO, ACD, grant from Metropolitan Council

Description: In 2015 and 2016 a stormwater retrofit analysis (SRA) was done on selected areas in the Cities of Ramsey and Anoka. Many potential projects were modeled and a cost-benefit analyses performed. Subsequently, in 2017 and 2018 cost-effective projects were installed. In 2017 two rain gardens were installed in Anoka. In 2018 one more rain garden was installed. This rain garden is the first in Anoka County to utilize Focal Point technology. Focal Point uses a special media to rapidly filter large amounts of stormwater in a small project footprint. It was used in 2018 due to a higher water table and trees limiting available space at an otherwise ideal project location. Funding was from Clean Water Funds through the Anoka Conservation District (ACD) and a Metropolitan Council Grant to the Lower Rum River WMO. ACD managed the project.

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

Location: Selected areas in the Cities of Ramsey and Anoka.

Results: Two rain gardens were installed in 2017 and one more was installed in 2018. The 2018 project is shown below.


Pre-project


Completed project without plants
(to be planted in spring 2019)

Newsletter Articles

Partners: LRRWMO, ACD

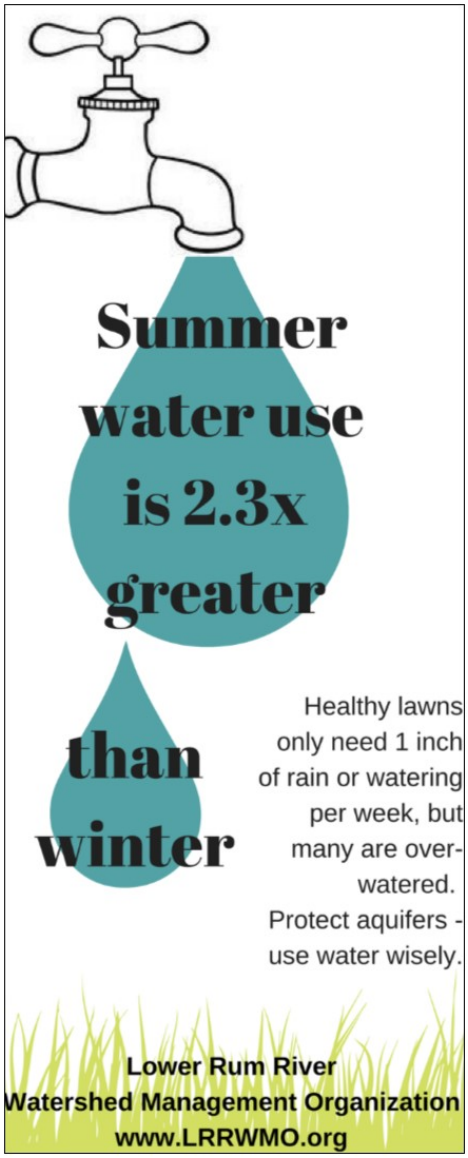
Description: The Lower Rum River Watershed Management Organization (LRRWMO) contracts the Anoka Conservation District (ACD) to create public education materials. The LRRWMO is required to distribute an annual publication under State Rules. This requirement is met through newsletters or infographics in 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 2018, the Anoka Conservation District (ACD) drafted three newsletter infographics and sent them to cities for inclusion in their newsletters. Two of the 2018 infographics focus on reducing water wasted during lawn irrigation. The third focuses on keeping curbside gutters clean as they are conveyances to rivers and lakes.

2018 Newsletter Infographics



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.

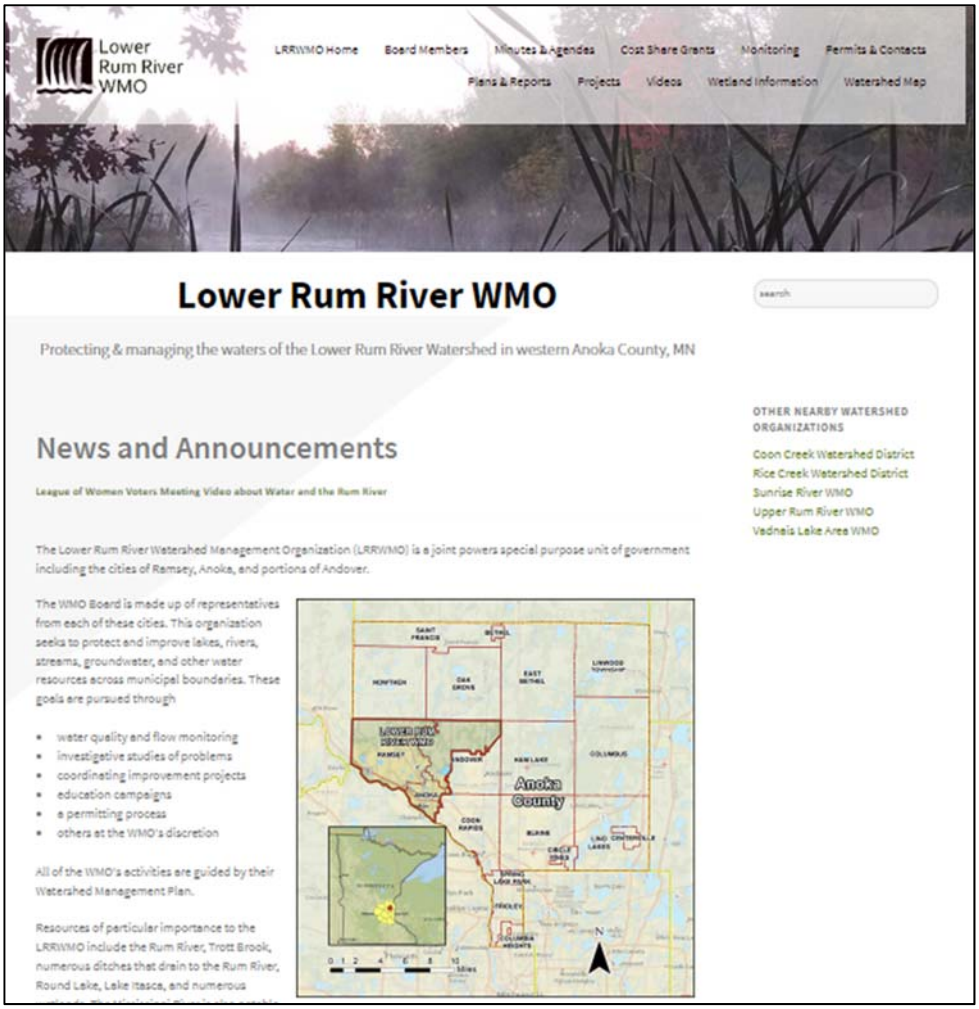
Location: LRRWMO.org

Results: In 2018 a new LRRWMO website was developed. The previous website was >10 years old and there were problems with website security. The Anoka Conservation District developed a template website and finalized it with URRWMO Board input. The new 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.

The website is regularly updated throughout the year.

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.

Lower Rum River Watershed Financial Summary

		Monitoring & Inventory									Planning & Land Protection					Technical Assistance						Resource Improvement Projects						Administrative Assistance			Outreach					
Lower Rum River Watershed	Total	Volunteer Precip	DNR Groundwater Wells	Wetland Levels	Lake Levels	Lake Water Quality	Stream Water Quality	Biomonitoring	Inventory - Rum River Erosion	Water Resources Almanac	Anoka Sandplain Partnership	1W1P Rum River	Wetland Resto Opportunities	Land Prot/Resto Strategies	Land Protection Outreach	Landowner Tech. Asst.	Project Profiles	BMP Maintenance & Inspection	WCA Enforcement	Wetland Consultation	Wetland Restoration and Banking	Anoka Nat. Pres. Restoration	Cooperative Weed Management	Rum River Revets	Rum River Stabilization Site 4	LRRWMO Retrofits	Mississippi River Park Park Stabilization	LRRWMO Admin/Reporting/Website	WCA Implementation	Watershed Based Funding Coordination	Video Development	Brochures & Displays	Web Blog	Web Story Map	LRRWMO Educ/Newsletter	Anoka County Outreach Program
Revenues																																				
LRRWMO	30345			1950	1200	1800	1365	900																		18135		3875						1120	
State - Other	11066		70																				1845						9152						
MPCA																																				
DNR OHF	6462																							6462											
DNR CPL																																				
BWSR - Service Grant	19958										1049		1064	375		955	300	651							12412				2190	311	591	58			
BWSR - Project Grant	24472																								22214										2258
Metro ETA & NPEAP	22212															84									13648	8480									
Regional/Local	29273					92																		23075			6106								
Anoka Conservationi District	12533								95	746	152	736		26	111	983		50	337	2927	250	879	9					1515	3369	6		60	14	183		87
County Ag Preserves/Projects	21200					269		633																	20297										
Service Fees	4866														362								219	4263					22						
TOTAL	182387		70	1950	1200	2162	1365	1533	95	746	1201	736	1064	401	473	2021	300	701	337	2927	250	879	2073	33801	68571	26614	6106	5390	12542	2196	311	651	73	183	1120	2344
Expenses-																																				
Personnel Salaries/Benefits	83879	122	152	1155	779	1660	350	1271	96	1026	1009	728	899	347	400	1765	269	562	298	2442	218	818	1534	21537	11967	9163	5930	3927	8249	1859	73	507	55	167	914	1631
Overhead	9750	16	20	133	89	199	41	166	8	137	141	67	135	41	59	208	35	70	39	338	31	85	171	2447	1444	1026	534	471	921	276	11	74	5	19	147	144
Vehicle/Mileage	1570	2	2	29	19	39	7	22	2	8	8	14	5	4	3	37	2	11	6	33	2	16	33	433	192	215	107	90	162	22	1	7	1	2	2	30
Project Direct - Supplies	11439	1		20	2	376	182								9			50		50			350	2414	1850	1547		840	3388	6	224	60	11			58
Project Direct - Capital	101					78	23																													
Project Direct - Installation	73131																							5809	52591	14731										
TOTAL	179870	142	174	1338	889	2353	604	1459	106	1171	1159	808	1039	392	470	2011	307	693	342	2864	250	919	2088	32640	68044	26682	6571	5329	12720	2163	310	647	73	188	1063	1863

Recommendations

- **Continue to install projects identified in the stormwater retrofitting 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. 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 on a watershed scale to ensure the greatest overall benefit to the river. 1W1P planning happens in 2019-2020.
- **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. It should be especially useful as the Lower Rum River WMO updates its 10-year watershed management plan beginning in 2019.
- **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.
- **Consider chloride sampling at all sites on a rotating basis.** Chloride sampling has not been done in recent years. Conductivity levels are rising in the entire county, and this may be due to chlorides.
- **Consider supporting a Rum riverbank stabilization grant application** that the Anoka Conservation District and Anoka County are considering pursuing from the Lessard-Sams Outdoor Heritage Council.
- **Use the photo inventory of Rum Riverbanks collected by the ACD to identify stabilization projects.** Photos are viewed using the "StreetView" function in GoogleMaps.