

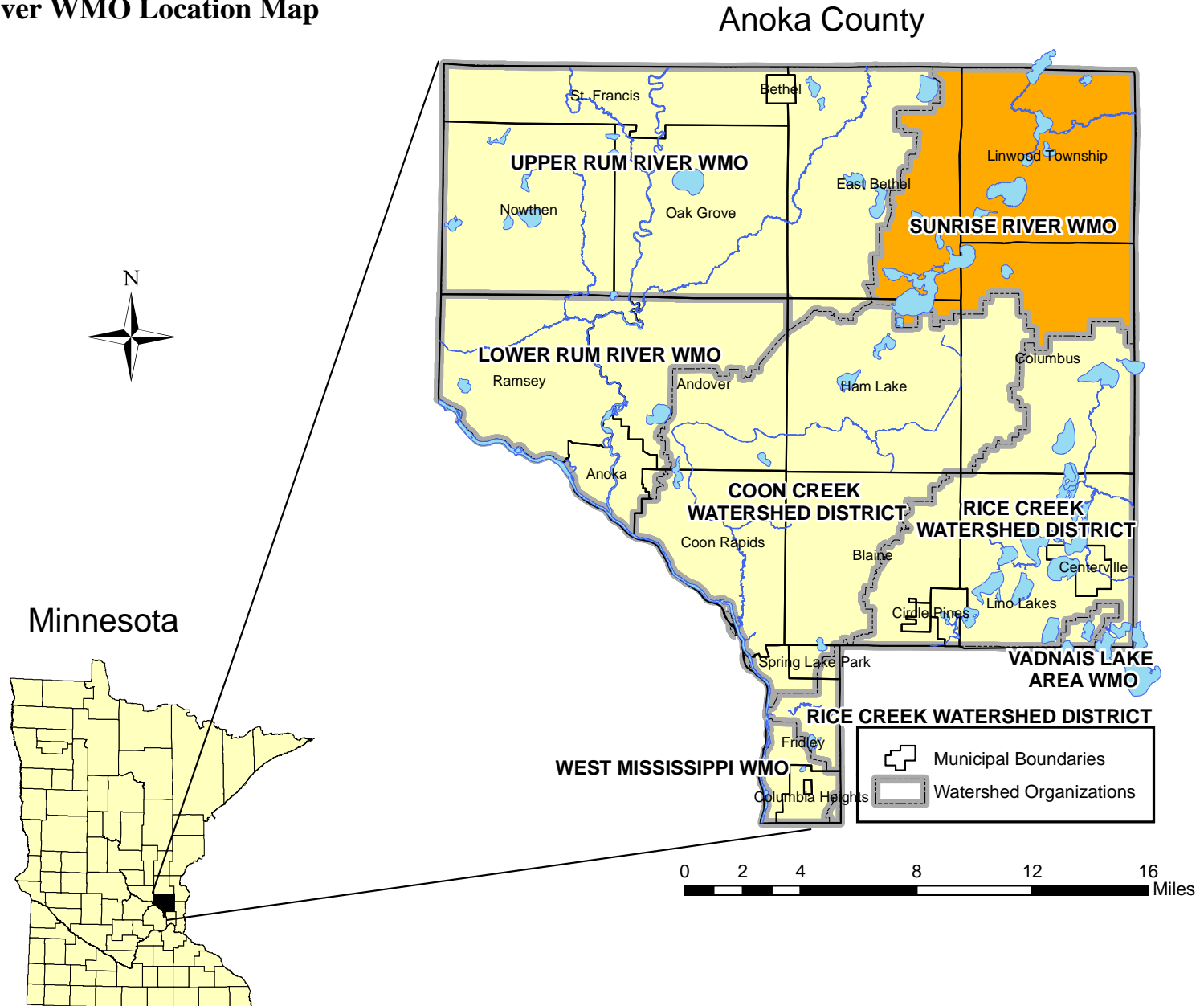
# 2016 Annual Report



**East Bethel – Ham Lake – Linwood - Columbus**

**April 17, 2017**

# Sunrise River WMO Location Map



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## I. Introduction to this Report

This report is intended for local and state oversight agencies, as well as interested citizens. At the local level, it is intended to provide member communities, their elected officials, and staff with an activity update. At the state level, this report meets the annual watershed management organization reporting requirements of Minnesota Rules 8410.0150. The report is intended to fulfill 2016 reporting requirements.

## II. About the Sunrise River WMO

The Sunrise River Watershed Management Organization (SRWMO) is a special purpose unit of government that operates as a joint powers organization under Minnesota Statutes, Section 471.59. It is comprised of Linwood Township and portions of the Cities of Columbus, Ham Lake, and East Bethel. Board members are appointed by the member communities. Financing is from member communities. The SRWMO's direction is laid out in its watershed management plan and the member municipalities' local water plans.

The SRWMO area is rich in water and natural resources. Approximately 50% of the area is water and wetlands, including 19 lakes. Five are major recreational lakes (Coon, Fawn, Linwood, Martin, and Typo). 19% of the SRWMO area is high quality natural communities that have undergone little human disturbance since pre-settlement times. Many of these areas have been designated by the State as sites of biodiversity significance or regionally significant ecological areas. 27 plant and animal species that are state endangered, threatened, special concern, or rare are known to occur in the SRWMO. These water and natural resources are at the heart of the character of these north Twin Cities metro communities.

Despite the overwhelming good quality of the natural resources, there are some areas of concern. Martin, Typo, and Linwood Lakes have been designated as "impaired" by the Minnesota Pollution Control Agency for excess nutrients. Several segments of the Sunrise River in Linwood Township are impaired for pH, turbidity, and the fish community. Coon





and Linwood Lakes are infested with two aquatic invasive species: curly leaf pondweed and Eurasian Water Milfoil. There are questions about the effects that improperly maintained septic systems may be having on water quality. Many of these problems flow across community boundaries and cannot be effectively addressed by any one community alone. This is the reason for this joint powers watershed management organization.

The Sunrise River WMO Board of Managers considers its responsibilities to be overseeing the management of water resources in the watershed. The WMO serves the community by:

- Providing a forum to consider inter-community water problems.
- Setting minimum standards for member community ordinances that consider local water resources issues.
- Educating the public about water resources.
- Facilitating water quality improvement projects, which are often cooperative endeavors with others.
- Collecting data and conducting resource monitoring on a watershed basis.
- Providing a linkage between natural resources and land use planning decisions.
- Coordinating water management activities within the WMO among governmental agencies, communities and residents.
- Maintaining a general awareness of existing water problems and the WMO's responsibilities for water management.
- Ensuring expenditures result in corresponding benefits to the public.
- Avoiding duplication among government agencies and communities.

The SRWMO operates under the following philosophies:

- Water-related problems are community problems and not individual problems.
- Water resource management is a vital matter that cannot be effectively addressed by individual communities because watersheds cover multiple communities.
- Water resources should be managed on a watershed basis. The WMO is uniquely positioned to address water resource issues across community boundaries.
- Aquatic and terrestrial areas are integrally linked and cannot be effectively managed separately.

### **SRWMO Watershed Management**

The SRWMO is guided by its 10-year watershed management plan. The new plan can be found on the SRWMO website ([www.SRWMO.org](http://www.SRWMO.org)).

### III. Activity Report

#### a. Current Board Members

##### CITY OF COLUMBUS

Bill Krebs  
16319 Kettle River Blvd  
Columbus, MN 55025  
651.592.9848  
krebsfl@hotmail.com

Vacant

##### CITY OF HAM LAKE

Kevin Armstrong  
14333 Bataan St NE  
Ham Lake, MN 55304  
763.757.5121  
kmarmst@mac.com

Scott Heaton  
2247 147<sup>th</sup> Lane NE  
Ham Lake, MN 55304  
763.434.5440  
scottmatthewheaton@gmail.com

##### CITY OF EAST BETHEL

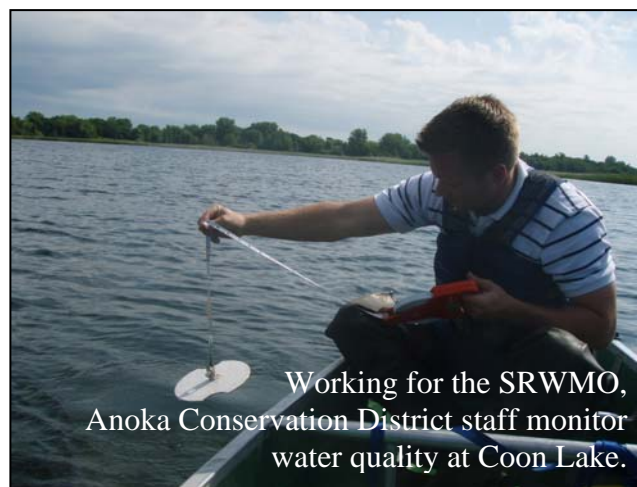
Tom Ronning  
2241 221<sup>st</sup> Ave NE  
East Bethel, MN 55011  
763.413.7851  
tom.ronning@ci.east-bethel.mn.us

Leon Mager (Vice Chair)  
19511 East Tri Oak Circle NE  
Wyoming, MN 55092-8420  
763.434.9652  
lam3@isd.net

##### LINWOOD TOWNSHIP

Paul Enestvedt  
6220 213<sup>th</sup> Lane NE  
Stacy, MN 55092  
651.408.0046  
Paul.enestvedt71@gmail.com

Dan Babineau (Chair)  
22275 Martin Lake Road NE  
Stacy, MN 55079  
763.390.9985  
danb@microconsulting.com



Working for the SRWMO,  
Anoka Conservation District staff monitor  
water quality at Coon Lake.

**b. Day to Day Contact**

The day to day contact person for the SRWMO who can answer questions about the organization is:

Jamie Schurbon, Water Resource Specialist  
Anoka Conservation District  
1318 McKay Drive NE, suite 300  
Ham Lake, MN 55304  
763-434-2030 ext. 12

**c. Employees and Consultants**

The SRWMO does not employ staff, but does utilize consulting services and enters into cooperative agreements with other government agencies. A description of contracted services is listed below:

**SRWMO consultants and partners during the reporting period:**

<b>Consultant/Partner</b>	<b>Contact</b>	<b>Work Description</b>
Anoka Conservation District	Jamie Schurbon Water Resource Specialist 1318 McKay Drive NW, #300 Ham Lake, MN 55304 763-434-2030 ext. 12 jamie.schurbon@anokaswcd.org	<ol style="list-style-type: none"><li>1. <b>Water Monitoring</b> – Water quality and hydrology monitoring in lakes, streams, and wetlands.</li><li>2. <b>Water Quality Improvement Projects</b> – Implementation of water quality improvement efforts, including administering the SRWMO water quality grant program.</li><li>3. <b>Education</b> – Promotion of SRWMO programs.</li><li>4. <b>Website</b> - Maintain SRWMO website.</li><li>5. <b>Reporting</b> - Assistance preparing this annual report and State Auditor reporting.</li><li>6. <b>Administration</b> – Serve as a limited, on-call administrator to address miscellaneous day-to-day operational issues. Assists with local water plan reviews.</li></ol>

Consultant/Partner	Contact	Work Description
Gail Gessner	Gail Gessner 4621 203rd Lane NW Oak Grove, MN 55303 (763) 753-2368 recordwmo@gmail.com	<b>Recording secretary</b> for meetings, plus miscellaneous administrative assistance.

#### d. Highlighted Recent Projects

##### Martin and Typo Lake Carp Barriers (completed 2016)

A series of four barriers has been installed to control carp in Martin and Typo Lakes in order to improve water quality and habitat. This project is funded by \$435,753 in MN DNR Conservation Partners Legacy grants, the Sunrise River WMO, Martin Lakers Association and Anoka Conservation District. The same funding partners are teaming to follow this project with a carp removal program in 2017-2019.



##### Completed carp barriers

Martin Lake Outlet



South Inlet of Martin Lake



North Inlet of Martin Lake



Typo Lake Outlet





### **Martin and Typo Lakes Carp Removal (2017-2019)**

This project is a follow-up to the carp barriers project described above. Carp Solutions, Inc, a spin-off company from the University of Minnesota Aquatic Invasive Species Research Lab will be conducting carp surveys, radio tracking and harvests. This project is funded by a MN DNR Conservation Partners Legacy grant (\$99,000), the Sunrise River WMO (\$5,000), Martin Lakers Association (\$4,900) and Anoka Conservation District (\$5,000). The project will both aim to reduce carp populations below the critical threshold for ecological damage of 100 lbs/ac and craft a plan for maintaining this condition long-term.



### **Coon Lake Stormwater Retrofits (completed 2016)**

Three rain gardens, one stormwater stabilization and three lakeshore restorations will be installed in neighborhoods draining to Coon Lake in 2015 and 2016. These were among the most highly cost effective projects identified in the 2013 Coon Lake Subwatershed Assessment. These projects are funded by a \$42,987 2014 BWSR Clean Water Fund Grant, the SRWMO, Coon Lake Improvement District, Coon Lake Improvement Association and Coon Lake Beach Community Center.



#### **Completed Coon Lake Stormwater Retrofits**

Lincoln Drive Stabilization



Mager Lakeshore



Community Center Rain Garden



19303 E Front Blvd Rain Garden



Karger Lakeshore Restoration



Sheffield Lakeshore Restoration



### **Ditch 20 Feasibility Study (2016-2018)**

This study is identifying and planning water quality practices in and around Ditch 20. The ditch has poor water quality, and drains to Typo Lake. Study includes hydrologic modeling, cooperative planning with willing landowners, evaluating a variety of projects' costs and benefits, and partial project designs.

### **Ditch 20 Area**



### **e. Public Outreach**


The SRWMO does regular public outreach and education projects, but the WMO's website serves as the primary, continuous public outreach tool. Website contents include general information about the organization, meeting agendas and minutes, water monitoring results and profiles of WMO projects. The SRWMO ensures



visibility of its website by asking member cities and townships to post the SRWMO website address in their newsletters. Links to the SRWMO website are also provided through each member community's website and the Anoka Conservation District website. The SRWMO website address is <http://www.srwmo.org>

### Sunrise River WMO website homepage

## Sunrise River Watershed Management Organization



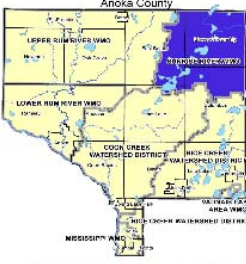
### Main Menu

- > Home
- > Board Members
- > Agenda & Minutes
- > Videos
- > Watershed Plan & Reports
- > Projects & News Articles
- > Monitoring
- > Cost Share Grants
- > Permitting

### About SRWMO

The SRWMO is a joint powers special purpose unit of government composed of member cities collaborating to manage water resources. This arrangement is based upon the recognition that water-related issues and management rarely stop at municipal boundaries. The SRWMO's boundaries are defined by the West Branch of the Sunrise River's watershed to the West and South Branch of the Sunrise's watershed to the south. To the north and east the boundaries are defined by the Anoka County boundary. It does not extend into other counties because watershed organizations are only required by law within twin cities metropolitan counties.

**SRWMO Location Map**



The SRWMO is involved in many aspects of water management including planning and regulation, water quality, flooding, shoreland management, recreation, wildlife, and erosion control. The WMO has a state-approved watershed management plan which outlines their policies and plan of work. Cities' and townships' local water management plans must be consistent with the WMO's plan. The SRWMO Board does not have employees. Instead, it works through cooperative efforts of the member cities and townships, or contracts with the Anoka Conservation District or other consultants.

**SRWMO Phone:** 763-367-7840 or call the Board member who represents your city

**WMO Mailing Address:** East Bethel City Hall, 2241 - 221st Avenue, Cedar, MN 55011

**Meeting Schedule:** 1st Thursday of the month, on the dates indicated below. Meetings are at the East Bethel City Hall in the Booster West Conference Room at 6:30pm. Additional Meetings may be added and listed below.

### Other Watershed Organizations

- > Coon Creek Watershed District
- > Lower Rum River WMO
- > Rice Creek Watershed District
- > Sunrise River WMO
- > Upper Rum River WMO
- > Vadnais Lake Area WMO

Additional public outreach is accomplished through at least annual newsletter articles. The articles are distributed to member communities for distribution in their newsletters. Periodic larger articles are distributed as press releases to the local newspaper, the Forest Lake Times.

In 2015 the SRWMO's newsletter article highlighted the Coon Lake stormwater retrofit projects. It was printed in city newsletters. The text from that article is below.



## 2016 Newsletter Article

### Grants Available to Homeowners for Shoreline Restoration

Grants and technical help are being offered by the Sunrise River Watershed Management Organization (SRWMO) to homeowners for projects that benefit water quality. Grants are targeted toward stabilizing eroding shorelines and filtering runoff before it reaches the lake. Other projects that benefit water quality are also considered. The eligible area includes Coon, Linwood, Martin and Typo Lakes, as well as smaller waterbodies in the vicinity.

Most projects include "soft engineering" to stabilize erosive losses and planting of native grasses and wildflowers that filter runoff and provide habitat. Portions of the shoreline are typically left unplanted for a dock, beach and other water access. Each design is unique but all projects provide beauty and a lasting benefit to the lake's water quality and fish.

No-cost consultations are offered, as well as assistance with a design and cost estimate. The grants pay 50-70% of materials costs. Homeowners are responsible for labor costs.

Interested landowners should contact Jamie Schurbon at the Anoka Conservation District at 763-434-2030 ext. 12 or [jamie.schurbon@anokaswcd.org](mailto:jamie.schurbon@anokaswcd.org).

Additional information about lakeshore landscaping, including hints for do-it-yourselfers and recommended plant lists, is at [www.SRWMO.org](http://www.SRWMO.org).

The SRWMO is a collaboration of Linwood Township and the Cities of East Bethel, Ham Lake and Columbus to manage water resources. It covers all of Linwood and portions of each city in the Sunrise River watershed.

*Photo: Restored shoreline at Coon Lake.*

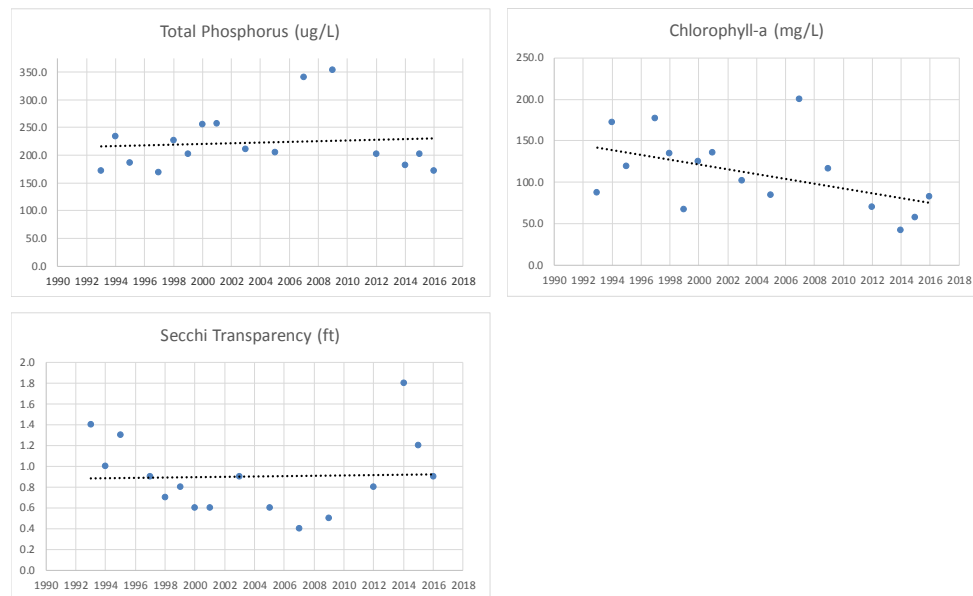


## f. Water Quality Trends

The SRWMO has a long term water quality monitoring program that includes most larger stream and recreational lakes in the watershed. From 2000-2009 the SRWMO had a robust water monitoring program to establish a baseline of data; little water monitoring had been done previously. From 2010 to the present the amount of monitoring has moderated to a level sufficient to detect trends. Many waterbodies are monitored every 2-3 years.

An important part of evaluating implementation of the watershed management plan is looking at water quality trends. Generally, the only waterbody with a statistically significant trend in the watershed is Typo Lake, which has increasing phosphorus. It is noteworthy, however, that this trend is driven strongly by poorer water quality in 2007 and 2009; more recent years have had better water quality.

## Typo Lake Water Quality Data Showing Trendlines



In addition to statistical trend tests, it is often useful to examine graphs of water quality data to look for apparent trends that are not yet statistically significant and may or may not be real. These observations, combined with other knowledge about the waterbody (new invasive species, land use changes, etc) can guide management. For this purpose **Appendix B** presents water monitoring results where no trend is apparent.

Additional water quality data is available online. Annual watershed monitoring reports are available on the SRWMO website ([www.SRWMO.org](http://www.SRWMO.org)). All water quality data collected by the SRWMO is on the MN Pollution Control Agency's EQuIS database, which is accessible through their website.

### g. Evaluation of Watershed Management Plan Implementation

The SRWMO Watershed Management Plan contains a schedule of tasks that the WMO should accomplish in order to realize its goals (see table on following page). One of the most objective ways to evaluate Plan implementation is comparing planned and accomplished work. The tables on the following pages compare work planned and work actually accomplished. There is one table for 2010-2014 and another table for 2015-2019, thereby covering the entire 10 years of the current plan's life.

In 2016 minor deviations from the Watershed Management Plan occurred. These included:

Change	Excluded the one planned stream hydrology monitoring site.
Reason	The same site was already being monitored as part of "effectiveness monitoring of water quality improvement projects" and would have been duplicative.

Change	Excluded lakeshore landscape marketing line item.
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Reason	The SRWMO's annual newsletter was about lakeshore landscaping, so an additional line item for this task would have been duplicative.
Change	No contribution to water quality cost share grant fund.
Reason	Fund has carry-over funding from previous years sufficient to fund several projects.
Change	Decreased "other water quality projects" from \$10,000 to \$5,000. In 2016 the funds will be used for the Ditch 20 Feasibility Study.
Reason	The WMO board recognizes that this project is in Isanti County outside of the WMO's jurisdictional area, yet within the watershed. The board hopes to encourage Isanti County to contribute to this project.

**2010-2014 work planned in the SRWMO Watershed Plan and actually accomplished.** Numbers are sites monitored or projects completed.

Task	2010		2011		2012		2013		2014	
	Planned	Done	Planned	Done	Planned	Done	Planned	Done	Planned	Done
<b>Monitoring and Studies</b>										
Lake Levels	5	5	5	5	5	5	5	5	5	5
Lake Water Quality	3	3	Find volunteers	Secured volunteers for 5 recreational lakes	6	6	0	0	2	2
Stream Water Quality	0	0	0	0	2	2	1	0	2	0
Stream Hydrology	2	2	2	2	2	2	2	0	2	0
Reference Wetland	3	3	3	3	3	3	3	3	3	3
<b>Studies and Investigations</b>										
Typo/Martin Lake TMDL Study	none	MPCA finalizing study	none	none	none	TMDL approved by MPCA				
Fawn Lk curly leaf pondweed assmt			Yes	Prelim review in 2010, work unnecessary						
Linwood Lake TMDL									\$20,000	Watershed WRAP/TMDL completed
<b>Water Quality Improvement Projects</b>										
Water Quality Cost Share Grant Fund	\$1,840	\$1,840 contributions, \$0 awarded	\$2,000	\$2,000 contributions, \$0 awarded	\$2,000	\$2,000, \$29.43 awarded, \$4,300 diverted to carp barriers	\$2,000	\$0	\$2,000	\$2,000
Martin - Typo Lakes Water Quality Projects		Rough fish barrier design.		Grant secured for carp barriers.	\$20,000	\$20,000 to carp barriers	\$15,000	\$15,000 to carp barriers		1 constructed, 3 underway
Martin Lake Area Stormwater Retrofit	\$5,000	\$5,000 Martin Lake area stormwater retrofits.	\$10,000	3 rain gardens installed. \$7,000 + grants						
Coon Lake Area Stormwater Retrofit						Work started, with no costs until 2013	Subwatershed retrofit study	Subwatershed retrofit study	\$20,000	\$25,000, projects started
St. Croix Basin Team	Yes	Joined								
Other Water Quality Improvement Projects		E Front Blvd retrofit planned.		E Front retrofit installed by city	\$10,000	\$10,000 to Martin/Typo Lakes carp barriers				
Continued on next page...										

Task	2010		2011		2012		2013		2014	
	Planned	Done	Planned	Done	Planned	Done	Planned	Done	Planned	Done
<b>Education and Public Outreach</b>										
SRWMO Website	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Public Officials Tour										
Lakeshore Landscaping Ed			Yes	Web video. Mailing to 66 Fawn Lake homes. Joined Blue Thumb	Yes	Lake assoc presentation,demo project, SRWMO display banner, web promo	Yes	Created display, handouts and staffed it at 2 community events	Yes	News release about local residents' practices
Aquatic Plant Ed			New sign at Martin Lk access	New sign at Martin Lk access					Yes	Staffed event displays
Other Ed			Annual newsletter article	Annual newsletter article	Annual newsletter article	Annual newsletter article	Annual newsletter article	Annual newsletter article	Annual newsletter article	Annual newsletter article
<b>Other</b>										
Estimate SRWMO P export			Yes	Yes						
Co. Geologic Atlas						Part a done				
<b>Non-Operating Administrative Expenses</b>										
On call admin asst			No	Yes	No	Yes	Yes	Yes	Yes	Yes
Annual Report to BWSR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Annual Report to State Auditor	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Review municipal local water plans	Yes	Reviewed 2 of 4	Yes	All completed						
Develop member community annual report template	Yes	Yes								
Grant Search/App	No	No	Yes	Matched DNR and BWSR Grants. DNR grant for carp barriers successful.	Yes	Matched for BWSR grants for Coon and Martin Lake stormwater retrofits. Denied.	Yes	Matched BWSR CWF grant for Coon Lake area stormwater retrofits		Matched BWSR CWF grant for Ditch 20 feasibility study
Seek bids for services			Yes	Yes			Yes	Yes		

**2015-2019 work planned in the SRWMO Watershed Plan and actually accomplished.** Numbers are sites monitored or projects completed.

Task	2015		2016		2017		2018		2019	
	Planned	Done	Planned	Done	Planned	Underway	Planned	Done	Planned	Done
<b>Monitoring and Studies</b>										
Lake Levels	5	5	5	5	5	5				
Lake Water Quality	4	4	2	2	0	0				
Stream Water Quality	2	2	1	1	1	1				
Stream Hydrology	2	2	1	0	2	2				
ReferenceWetland	3	3	3	3	3	3				
Water quality project effectiveness monitoring	1	2 lake water quality sites, 2 hydrology sites associated with carp barriers	1	2 lake water quality sites, 2 hydrology sites associated with carp barriers	1	2 lake water quality sites, 2 hydrology sites associated with carp barriers				
<b>Studies and Investigations</b>										
Fawn Lk curly leaf pondweed assmt	Yes	Yes								
Ditch 20 feasibility study for water quality projects		Feasibility study		Feasibility study		Feasibility study				
<b>Water Quality Improvement Projects</b>										
Water Quality Cost Share Grant Fund	\$2,000	\$0, fund has sufficient balance	\$2,000	\$0, fund has sufficient balance	\$2,000	\$1,000, fund has strong balance				
Martin - Typo Lakes Water Quality Projects		3 carp barriers being constructed		3 carp barriers completed						
Coon Lake Area Stormwater Retrofit	\$20,000	\$15,000, 4 projects constructed		2 lakeshore restorations, 1 rain garden						
Other Water Quality Projects	\$10,000	\$6,750 used toward Coon Lk retrofits or Ditch 20 study	\$10,000	\$5,000 Ditch 20 feasibility study	\$10,000	\$850 Linwood Lk Imp Assoc for veg mgmt plan. \$5,000 Martin & Typo Lks carp harvests				
<b>Education and Public Outreach</b>										
SRWMO Website	Yes	Yes	Yes	Yes	Yes	Yes				
Lakeshore Landscaping Ed	Yes	Booklet distribution to 670 homes	Yes	Combined with annual newsletter	Yes	No				
Continued on next page...										

Task	2015		2016		2017		2018		2019	
	Planned	Done	Planned	Done	Planned	Underway	Planned	Done	Planned	Done
Aquatic Plant Ed										
Other Ed	Annual newsletter article	Annual newsletter article, Display at Linwood Family Fun Day	Annual newsletter article	Annual newsletter article, Display at Linwood Family Fun Day	Annual newsletter article	Annual newsletter article				
<b>Other</b>										
Co. Geologic Atlas				Part b completed						
<b>Non-Operating Administrative Expenses</b>										
On call admin asst	Yes	Yes	Yes	Yes	Yes	Yes				
Annual Report to BWSR	Yes	Yes	Yes	Yes	Yes	Yes				
Annual Report to State Auditor	No	Yes	No	Yes	No	Yes				
Grant Search/App	Yes	Searched, but none applied for	Yes	Searched, but none applied for	Yes	Applied for an awarded DNR CPL grant for Martin and Typo Lake carp removal				
Seek bids for services	Yes	Yes			Yes	Yes				



**h. 2017 Work Plan** (insurance, secretarial and similar operating expenses are not included)

<b>Task</b>	<b>Purpose</b>	<b>Description</b>	<b>Locations or Action</b>	<b>Cost</b>
<b>Prepare 2015 Annual Report to BWSR and municipalities</b> (this report)	To provide transparency and accountability of organization operations.  To improve communication with member communities.	Produce an annual report of SRWMO activities and finances that satisfies Minnesota Rules 8410.0150 and is an effective tool for reporting WMO accomplishments to member city councils. The goal is to allow the city councils to better understand the SRWMO's work.	Secured Anoka Conservation District (ACD) staff to assist with this task.	\$800
<b>Prepare Annual Report to State Auditor</b>	To provide transparency and accountability of organization operations.	Online reporting of WMO finances though the State Auditor's SAFES website.	Watershed-wide	\$300
<b>Administrator (on-call, limited)</b>	To provide a day-to-day WMO contact for the public and partners. To complete day-to-day miscellaneous operational tasks.	Day-to-day WMO administration.	ACD has been hired to provide this service up to 20.5 hours.	\$2,100
<b>Grant search and applications</b>	Obtain outside funding for water quality improvement projects.	Search for grant opportunities and apply for those that are applicable to SRWMO projects.	ACD has been hired to provide this service. Projects for which to pursue grants were selected.	\$200
<b>Lake Level Monitoring</b>	To understand lake hydrology, including the impact of climate or other water budget changes. These data are useful for regulatory, building/development, and lake management decisions.	Weekly water level monitoring in lakes by volunteers. All are available on the Minnesota DNR website using the "LakeFinder" feature ( <a href="http://www.dnr.mn.us.state/lakefind/index.html">www.dnr.mn.us.state/lakefind/index.html</a> ).	Coon, Linwood, Martin, Fawn, and Typo Lakes	\$1,250
<b>Lake Water Quality Monitoring</b>	To detect water quality trends and diagnose the cause of changes.	May through September twice-monthly monitoring of the following parameters: total phosphorus, chlorophyll-a, secchi transparency, dissolved oxygen, turbidity, temperature, conductivity, pH, and salinity.		\$0
<b>Monitoring of Water Quality Improvement Project Effectiveness</b>	Determine the effectiveness of practices installed to improve water quality.	Monitoring Martin and Typo Lakes immediately after installation of carp barriers.	Martin Lake Typo Lake	\$3,500
		Monitoring water levels with electronic dataloggers on each site of the carp barriers to verify hydrologic function.	Typo Cr at Typo Lake outlet Typo Cr at Typo Cr Dr	\$1,350

<b>Task</b>	<b>Purpose</b>	<b>Description</b>	<b>Locations or Action</b>	<b>Cost</b>
<b>Stream Water Quality Monitoring</b>	To detect water quality trends and diagnose the cause of changes.	4 baseflow samples, 4 during storms. Parameters: stage, total phosphorus, TSS, Secchi tube, dissolved oxygen, turbidity, temperature, conductivity, pH, and salinity.	1. Typo Cr at Typo Cr Dr	\$1,400
<b>Reference Wetland Monitoring</b>	To provide understanding of wetland hydrology, including the impact 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.	Continuous groundwater level monitoring at a wetland boundary, to a depth of 40 inches. This is part of a network of 18 wetland hydrology monitoring stations county-wide.	1. Carlos Avery Reference Wetland 2. Carlos 181st Reference Wetland, 3. Tamarack Reference Wetland	\$1,725
<b>Cost Share Grants for Water Quality Improvement</b>	To improve water quality in lakes, rivers, and streams.	These grants offer up to 70% cost sharing of the materials needed for a water quality improvement project. The landowner is responsible for the remainder of materials, all labor, and any aesthetic components of the project. Typical projects include erosion correction, lakeshore restoration, and rain gardens. The Anoka Conservation District provides grant administration and technical assistance to landowners. SRWMO funds are used only in the SRWMO area.	Half of the planned expenditure in 2016 due to strong carryover fund balance.	\$1,000
<b>Martin and Typo Lakes Carp Removal</b>	To improve Martin and Typo Lakes Lake water quality, fishery and ecological health.	Carp management planning and removal including population surveys, radio tracking, and carp removal.	Martin and Typo Lakes	\$5,000 plus other partners
<b>Ditch 20 (Data Cr) Wetland Restoration Feasibility Study</b>	To improve water quality in the creek, Martin Lake, Typo Lake and Sunrise River.	Feasibility study to determine hydrological modification projects to the ditched wetland system that will result in water quality improvement, and which are technically feasible. A State Clean Water Fund grant has been secured to provide most funding.	Various, west of Typo Lake.	Financial contribution in previous years
<b>SRWMO Website</b>	To increase awareness of the SRWMO and its programs. The website also provides tools and information that helps users better understand water resources issues in the area.	Annually maintain and update the SRWMO website with current information about the organization, meeting minutes and agendas, and watershed plan update information.	<a href="http://www.Srwmo.org">http://www.Srwmo.org</a>	\$505
<b>Annual Ed publication - Lakeshore Land-scaping Marketing</b>	Promote water quality projects such as lakeshore restorations, rain gardens, and others.  Inform the public about the SRWMO. Meet state requirements for an annual publication.	An article will be written that is informative about the SRWMO programs and issues. It is distributed to member communities for inclusion in their newsletters.	Throughout watershed	\$500

**The following deviations from watershed plan are anticipated in 2016:**

Change	Reduced contribution to water quality cost share grant fund.
Reason	Fund has carry-over funding from previous years sufficient to fund several projects.
Change	Decreased “other water quality projects” from \$10,000 to \$5,000. In 2016 the funds will be used for the Martin and Typo Lakes Carp Removal Project.
Reason	\$5,000 was needed for the carp removal project and \$850 was requested for Linwood Lake Improvement Association lake management planning, but other potential projects are not ready.
Change	Removed lakeshore landscaping education.
Reason	This longstanding program has not been successful. The SRWMO elected to use this funding on other efforts.

**i. Status of Local Ordinances, Water Plan Adoption and Implementation**

All SRWMO member communities are required to have a Local Water Plan that is consistent with the SRWMO Watershed Management Plan. The WMOs have approval authority over these Local Water Plans. Whenever a WMO plan is updated the member municipalities have two years to update their Local Water Plans, ordinances, and other control measures to be consistent with the WMO Plan.

All local water plans have been approved. The following is the status of each city or township’s local water plan:

**Linwood Township** – Linwood Township has adopted the SRWMO Watershed Management Plan by reference.

**Ham Lake** – Approved in February 2013 by the SRWMO.

**East Bethel** – Approved in May 2011 by the SRWMO.

**Columbus** – Approved February 2011 by the SRWMO.

To track member cities’ progress on local plan implementation, the SRWMO requires a brief annual report from each city and provides a template for this report. In addition to serving as a reporting tool, the template serves as a “to do” list for our cities. These reports are available upon request, and are summarized in the table below.

**Status of city local water plans and some recent accomplishments toward plan implementation.**

<b>Linwood Township</b>	
<b>Submitted 2016 annual report to SRWMO?</b>	No
<b>Status of ordinances and</b>	

<b>control measures</b>	
<b>Some Recent Implementation Accomplishments</b>	Taking ownership and maintenance role for Martin and Typo Lake carp barriers at the conclusion of construction.
<b>City of East Bethel</b>	
<b>Submitted 2016 annual report to SRWMO?</b>	Yes
<b>Status of ordinances and control measures</b>	The City has the full suite of ordinances required by the SRWMO.
<b>Some Recent Implementation Accomplishments</b>	<ul style="list-style-type: none"> <li>• Education materials distributed to 11,000 residents on the topics of water quality monitoring, groundwater protection, controlling invasive species, hazardous waste disposal, yard waste management, pet waste disposal and the activities of the SRWMO.</li> <li>• Completed mapping of stormwater system in 2014.</li> <li>• Annual street sweeping.</li> <li>• Inspected over half of stormwater treatment basins in 2014. Remainder to be done before June 2015.</li> </ul>
<b>City of Ham Lake</b>	
<b>Submitted 2016 annual report to SRWMO?</b>	Yes
<b>Status of ordinances and control measures</b>	The City has the full suite of ordinances required by the SRWMO.
<b>Some Recent Implementation Accomplishments</b>	<ul style="list-style-type: none"> <li>• Ongoing work to complete BMP's in the City's Storm Water Pollution Prevention Plan.</li> <li>• Educational efforts through the City's newsletter, which reaches the entire population of 5,548 households and businesses. Educational article topics in 2016 included groundwater protection, water conservation, hazardous waste disposal, yard waste management, ag BMPs, pet waste disposal, and activities of the SRWMO.</li> </ul>
<b>City of Columbus</b>	
<b>Submitted 2016 annual report to SRWMO?</b>	Yes
<b>Status of ordinances and control measures</b>	The City has the full suite of ordinances required by the SRWMO.

<b>Some Recent Implementation Accomplishments</b>	<ul style="list-style-type: none"> <li>• Educational efforts through the City’s newsletter, which reaches the entire population of 1,426 households and businesses. Educational article topics in 2016 included wetland buffers, water quality monitoring, groundwater protection, controlling invasive species, hazardous waste disposal and activities of the SRWMO.</li> <li>• Partially completed mapping of stormwater systems. Completion was required by the WMO by 2014.</li> <li>• Street sweeping.</li> <li>• Inspections of storm water treatment basins.</li> </ul>
---------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

## **j. Solicitations for Services**

State rules require watershed management organizations to solicit bids for professional services at least once every two years. Most recently the SRWMO solicited bids in 2015 for work to occur in 2014. Work included hydrology monitoring, water quality monitoring, overseeing water quality improvement projects, website, preparing annual reports, grant searches, administrative assistance, and public education.

We solicited proposals by contacting engineering firms which already serve WMO member cities, plus the Anoka Conservation District. We left our request for proposals open for several months. We received only one response, from the Anoka Conservation District, and selected them for the work.

In 2017 the SRWMO plans to solicit bids for services in 2018.

## **k. Permits, Variances, and Enforcement Actions**

The SRWMO does not issue permits, variances, or take enforcement actions. These responsibilities are held by the member municipalities, as outlined in each municipality’s local water plan, ordinances, and policies.

## IV. Financial and Audit Report

### a. 2016 Financial Report

See Appendix A – 2016 Financial Report.

### b. Financial Audit

An annual financial report is complete. That report is Appendix A.

The SRWMO completed an audit of 2014 finances in 2015. No audit of 2016 is required per MN Statutes, section 6.756.

### c. 2017 Budget

At its May 5, 2016 meeting the SRWMO Board approved a 2017 budget of \$32,705. Budget details are below.

		Linwood	East Bethel	Columbus	Ham Lake
	Cost	46.40%	32.93%	16.72%	3.95%
<b>NON-OPERATING EXPENSES (split by percentages)</b>					
Grant Search and Applications	\$1,000.00	\$464.00	\$329.30	\$167.20	\$39.50
Lake Level Monitoring	\$1,300.00	\$603.20	\$428.09	\$217.36	\$51.35
Lake Water Quality Monitoring	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Lake Water Quality Monitoring - Improvement Project Effectiveness	\$3,500.00	\$1,624.00	\$1,152.55	\$585.20	\$138.25
Stream Water Quality Monitoring	\$1,400.00	\$649.60	\$461.02	\$234.08	\$55.30
Stream Hydrology Monitoring	\$1,350.00	\$626.40	\$444.56	\$225.72	\$53.33
Reference Wetland Hydrology Monitoring	\$1,725.00	\$800.40	\$568.04	\$288.42	\$68.14
Upcoming Water Quality Projects	\$10,000.00	\$4,640.00	\$3,293.00	\$1,672.00	\$395.00
SRWMO Cost Share Grant Fund	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Website – Annual Operations	\$505.00	\$234.32	\$166.30	\$84.44	\$19.95
Lakeshore Landscaping Marketing	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
SRWMO Annual Education Publication/Newsletter Article	\$500.00	\$232.00	\$164.65	\$83.60	\$19.75
Legal	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Financial Audit	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Advertise Bids for Pro Services	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Watershed Plan Update to begin in 2018	\$5,175.00	\$2,401.20	\$1,704.13	\$865.26	\$204.41
SUBTOTAL	\$26,455.00	\$12,275.12	\$8,711.63	\$4,423.28	\$1,044.97
		Linwood	East Bethel	Columbus	Ham Lake
	Cost	25.00%	25.00%	25.00%	25.00%
<b>OPERATING EXPENSES (split equally four ways)</b>					
Administrator (on-call, limited)	\$2,100.00	\$525.00	\$525.00	\$525.00	\$525.00
Annual Report to BWSR and Member Communities	\$800.00	\$200.00	\$200.00	\$200.00	\$200.00
Annual Financial Report to State Auditor	\$300.00	\$75.00	\$75.00	\$75.00	\$75.00
Secretarial or Other Administrative	\$750.00	\$187.50	\$187.50	\$187.50	\$187.50
Liability Insurance	\$2,000.00	\$500.00	\$500.00	\$500.00	\$500.00
Administrative Assistance – City of East Bethel	\$300.00	\$75.00	\$75.00	\$75.00	\$75.00
SUBTOTAL	\$6,250.00	\$1,562.50	\$1,562.50	\$1,562.50	\$1,562.50
<b>GRAND TOTAL</b>	<b>\$32,705.00</b>	<b>\$13,837.62</b>	<b>\$10,274.13</b>	<b>\$5,985.78</b>	<b>\$2,607.47</b>

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# Appendix A:

## 2016 Financial Report

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# **SUNRISE RIVER WATERSHED MANAGEMENT ORGANIZATION**

## **FINANCIAL REPORT FOR YEAR ENDED DECEMBER 31, 2016**

**To the Chairperson, Dan Babineau, of Sunrise River Water Management  
Organization**

The enclosed statement has been prepared after review of the organization's financial records for 2015. I have not audited the organization's records and do not express an opinion. The enclosed information fairly reflects the Sunrise River WMO's financial position for the stated year, based on records provided to me by the organization.

April 4, 2017

Prepared by:  
Jamie Schurbon  
Anoka Conservation District  
1318 McKay Drive NE, suite 300  
Ham Lake, MN 55304  
763-434-2030

**SUNRISE RIVER WATERSHED MANAGEMENT ORGANIZATION****2241 - 221st Avenue****Cedar, MN 55011****STATEMENT OF REVENUES AND EXPENSES**

For: year beginning January 1, 2016 and ending December 31, 2016

<b>Expenditures</b>	<b>Amount</b>
<b>Operating</b>	
Insurance – MN Counties Intergovernmental Trust	\$1,781.00
Secretarial services - Gail Gessner	\$875.00
On-call admin assistance - Anoka Conservation District	\$1,875.00
Annual report to BWSR – ACD	\$800.00
Annual financial report to State Auditor (ACD)	\$300.00
Administrative - City of East Bethel	\$0.00
Peterson Co LTD - Audit	\$1,600.00
Other	\$0.00
<b>SUBTOTAL</b>	<b>\$7,231.00</b>
<b>Non-Operating</b>	
Water Monitoring - Anoka Conservation District (ACD)	\$10,975.00
Studies and Investigations - ACD	\$0.00
Grant search and applications- ACD	\$1,000.00
Education and public outreach - ACD	\$1,005.00
Water quality improvement projects - ACD	\$5,000.00
Cost share grant fund for water quality projects	\$0.00
Other	\$0.00
Other	\$0.00
<b>SUBTOTAL</b>	<b>\$17,980.00</b>
<b>GRAND TOTAL</b>	<b>\$25,211.00</b>
<b>Revenues</b>	<b>Amount</b>
Linwood Twp	\$13,832.28
City of Columbus	\$5,987.85
City of Ham Lake	\$3,916.48
City of East Bethel	\$5,136.07
Insurance dividend	318.00
Other	0.00
Other	0.00
<b>GRAND TOTAL</b>	<b>\$29,190.68</b>
<b>Retained Cash Reserves</b>	<b>\$3,979.68</b>
<b>Total Cash Reserves</b>	<b>\$24,469.47</b>

## SUNRISE RIVER WATERSHED MANAGEMENT ORGANIZATION

### BALANCE SHEET

For the year beginning January 1, 2016 and ending December 31, 2016

<b>Assets</b>	
Cash	\$24,469.47
Accounts Receivable	\$0.00
Water quality project grant fund held at the Anoka Conservation District	\$6,619.43
Other	\$0.00
Other	\$0.00
Total Assets	\$31,088.90
<b>Liabilities</b>	
Accounts Payable	\$0.00
Other	\$0.00
Other	\$0.00
Other	\$0.00
Total Liabilities	\$0.00

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# Appendix B:

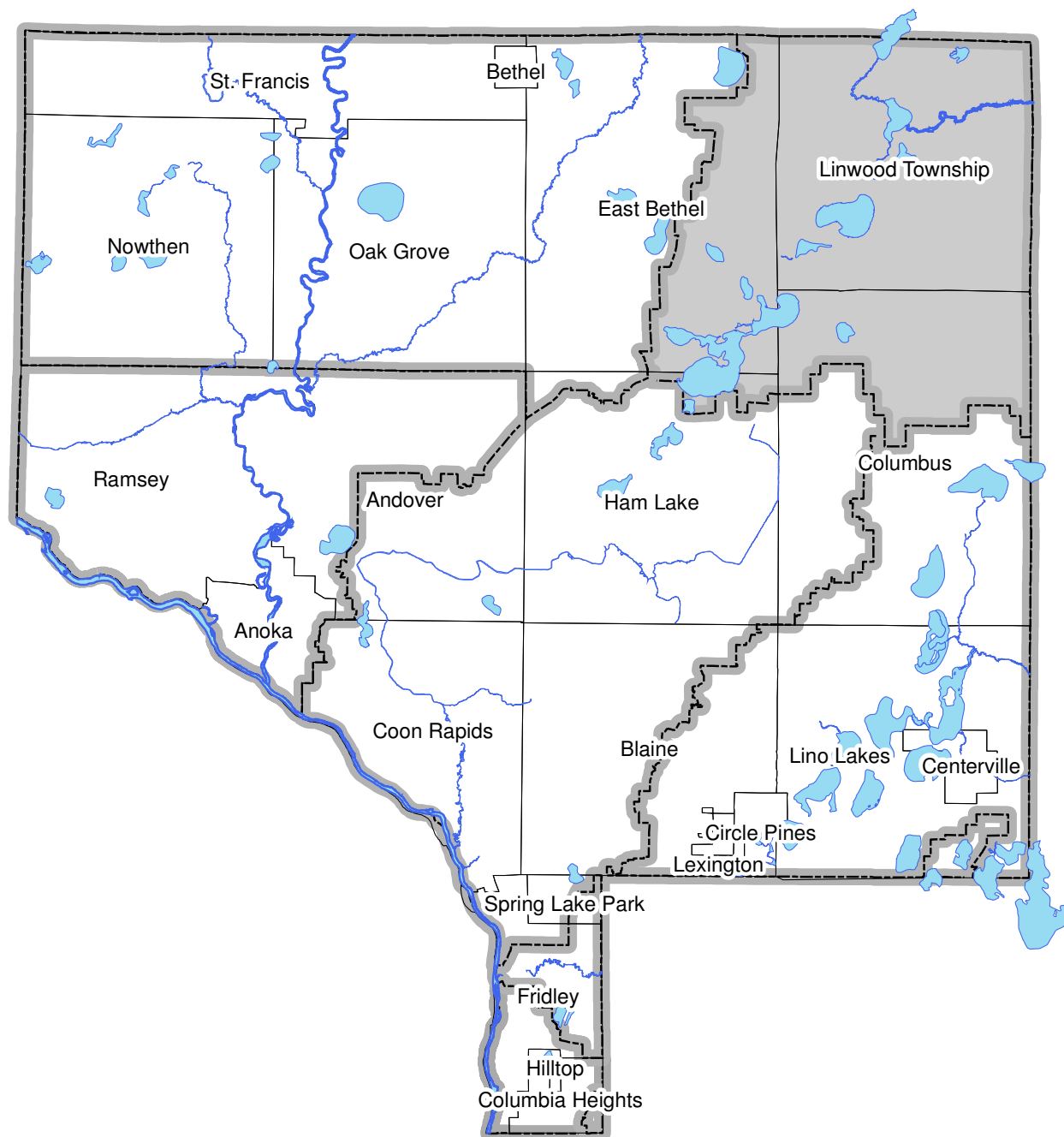
## 2016 Water Monitoring and Management Work Results



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# Excerpt from the 2016 Anoka Water Almanac

## *Chapter 2: Sunrise River Watershed*



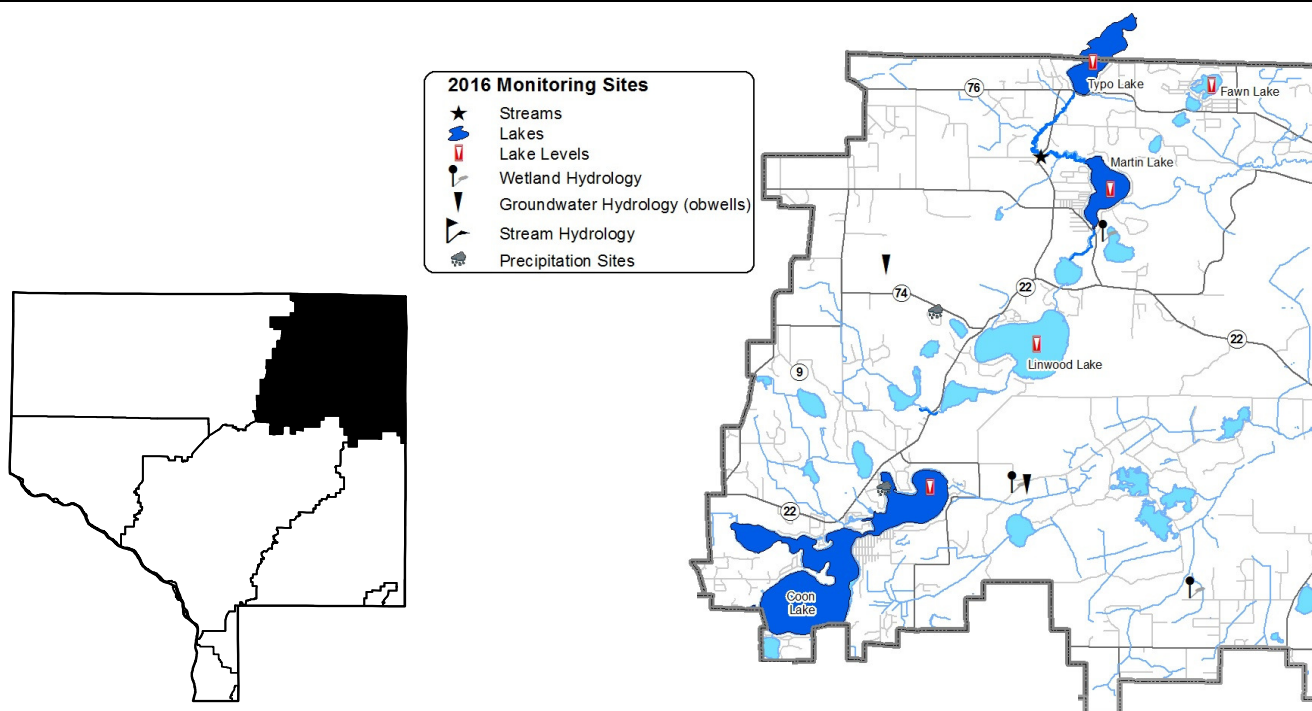
Prepared by the Anoka Conservation District



## Chapter 2: Sunrise River Watershed

Task	Partners	Page
Lake Levels	SRWMO, ACD, MN DNR, volunteers	2-32
Lake Water Quality	SRWMO, ACD, ACAP	2-34
Stream Water Quality	SRWMO, ACD, ACAP	2-44
Stream Water Hydrology	SRWMO, ACD, ACAP	2-52
Wetland Hydrology	SRWMO, ACD, ACAP	2-53
Water Quality Grant Fund	SRWMO, ACD	2-57
Coon Lake Area Stormwater Retrofit Assessment	SRWMO, ACD	2-58
Carp Barriers Installation	SRWMO, ACD, Martin Lakers Assoc, DNR, Linwood Twp, et al	2-60
Annual Education Publication	SRWMO, ACD	2-61
SRWMO Website	SRWMO, ACD	2-62
Grant Search and Applications	SRWMO, ACD	2-63
SRWMO 2015 Annual Report	SRWMO, ACD	2-64
On-call Administrative Services	SRWMO, ACD	2-65
Financial Summary		2-66
Recommendations		2-67
Groundwater Hydrology (obwells)	ACD, MNDNR	See Chapter 1
Precipitation	ACD, volunteers	See Chapter 1

ACD = Anoka Conservation District, SRWMO = Sunrise River Watershed Management Organization,  
MNDNR = Minnesota Dept. of Natural Resources, ACAP = Anoka County Ag Preserves



## Lake Levels

**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](http://www.dnr.mn.us.state/lakefind/index.html)).

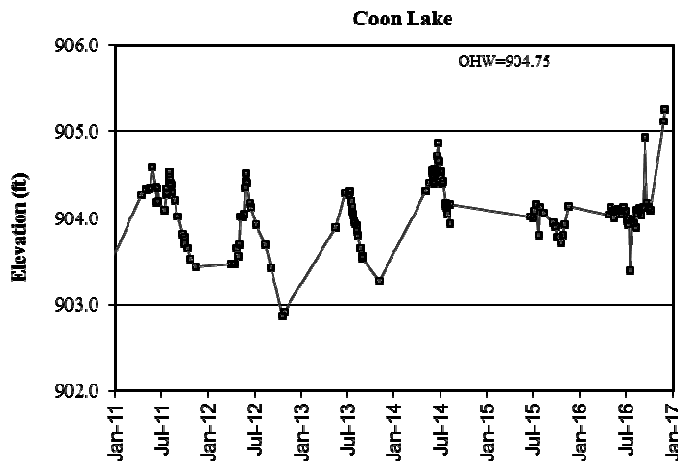
**Purpose:** To understand lake hydrology, including the impact of climate or other water budget changes. These data are useful for regulatory, building/development, and lake management decisions.

**Locations:** Coon, Fawn, Linwood, Martin, and Typo Lakes

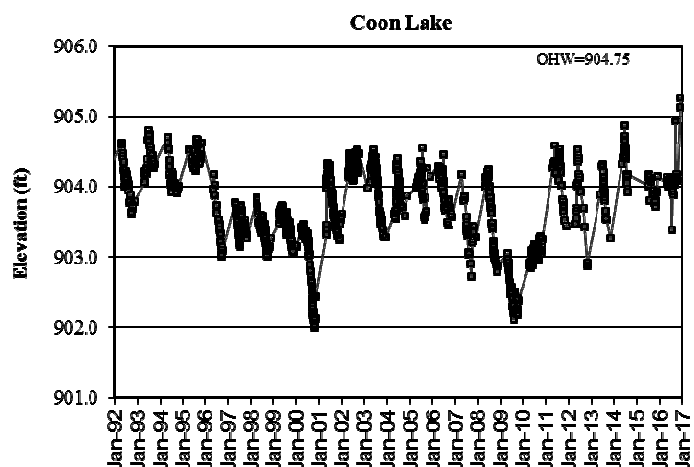
**Results:** Lake levels were measured by volunteers throughout the 2016 open water season. Lake gauges were installed and surveyed by the Anoka Conservation District and MN DNR. Lakes followed the expected pattern of increasing water levels in spring and early summer and then fell later in the summer due to less rainfall. High rainfall amounts late into fall caused a spike in lake levels at the end of the year. Coon and Fawn Lakes had their highest water levels in more than 25 years. Average lake levels were similar or slightly higher than 2015.

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.

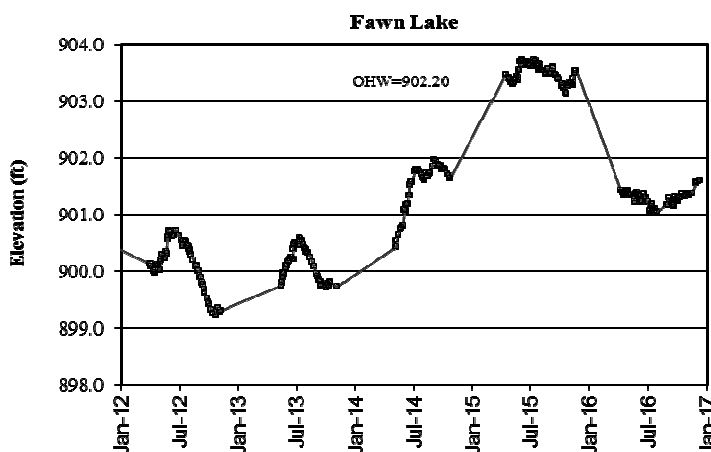
Coon Lake Levels – last 5 years



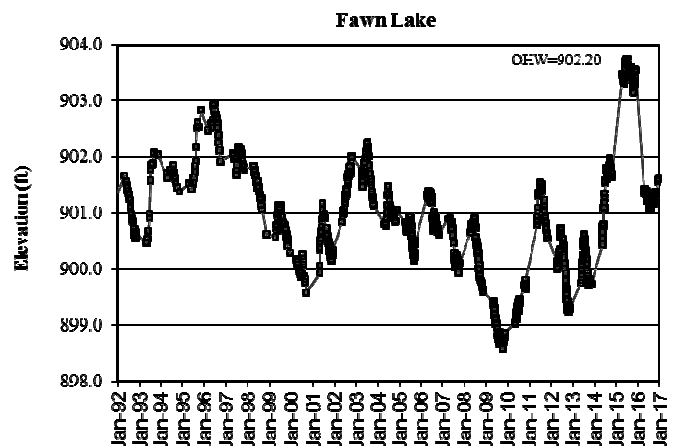
Coon Lake Levels – last 25 years



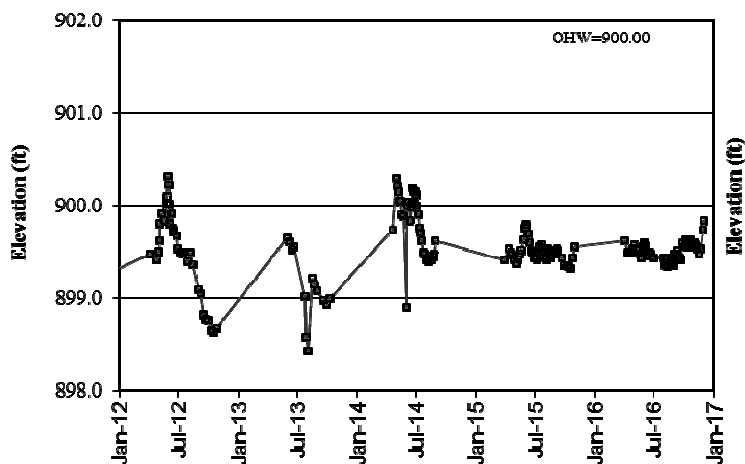
Fawn Lake Levels – last 5 years



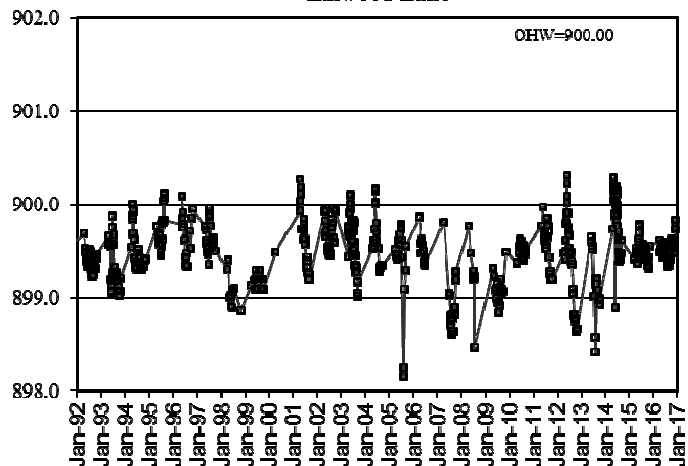
Fawn Lake Levels – last 25 years



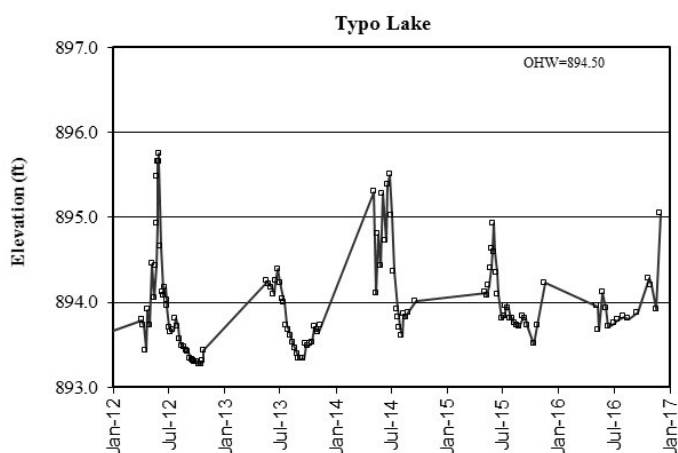
**Linwood Lake Levels – last 5 years**  
Linwood Lake



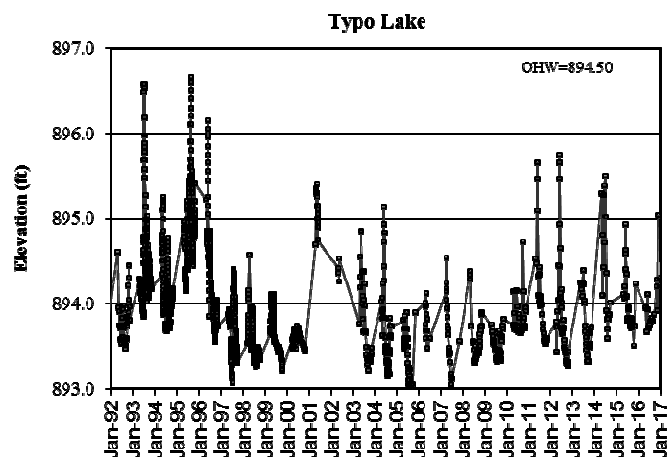
**Linwood Lake Levels – last 25 years**  
Linwood Lake



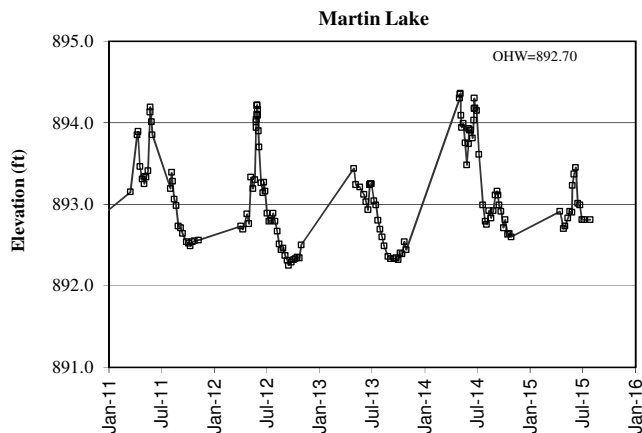
**Typo Lake Levels – last 5 years**  
Typo Lake



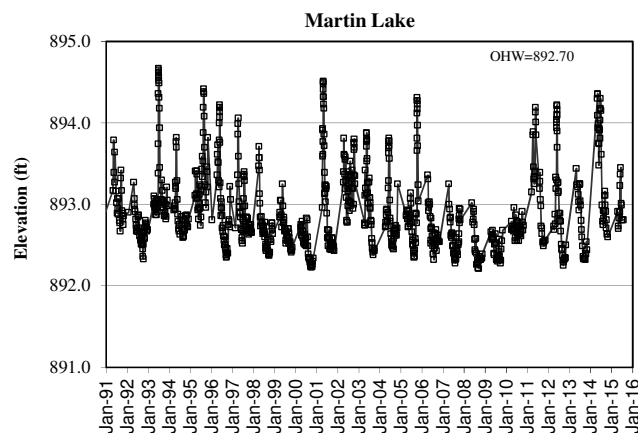
**Typo Lake Levels – last 25 years**  
Typo Lake



**\*Martin Lake Levels – last 5 years**  
Martin Lake



**\*Martin Lake Levels – last 25 years**  
Martin Lake



**\*No lake level data was received for Martin Lake in 2016**

## Lake Water Quality

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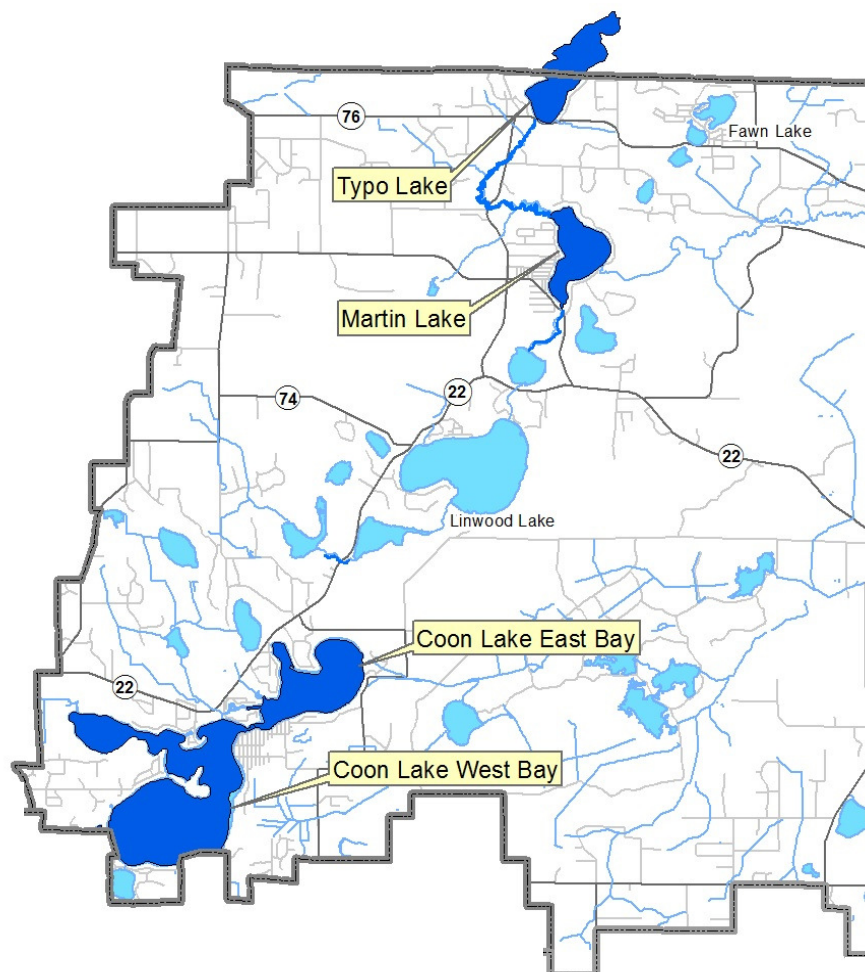
**Description:** May through September, every-other-week, monitoring is conducted for the following parameters: total phosphorus, chlorophyll-a, Secchi transparency, dissolved oxygen, turbidity, temperature, conductivity, pH, and salinity.

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

**Locations:** Coon Lake East Bay  
Coon Lake West Bay  
Typo Lake  
Martin 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.

### Sunrise Watershed Lake Water Quality Monitoring Sites



## Coon Lake- East and West Bays

City of East Bethel, City of Ham Lake & City of Columbus, Lake ID # 02-0042

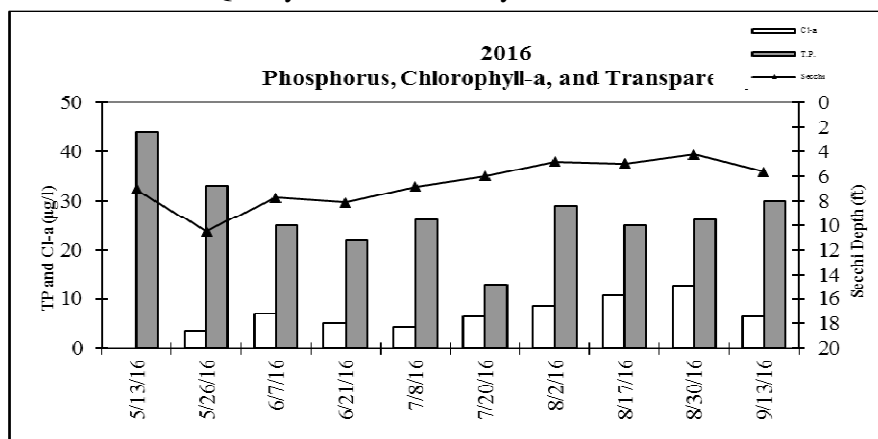
### Background

Coon Lake is located in east central Anoka County and is the county's largest lake. Coon Lake has a surface area of 1,498 acres and a maximum depth of 27 feet (9 m). Public access is available at three locations with boat ramps, including one park with a swimming beach. The lake is used extensively by recreational boaters and fishers. Most of the lake is surrounded by private residences. The watershed of 6,616 acres is rural residential. This report includes information for the East Bay (aka northeast or north bay) and West Bay (aka southwest or south bay) of Coon Lake in 2016. The 2010-16 data is from the Anoka Conservation District (ACD) monitoring at the MN Pollution Control Agency (MPCA) monitoring site #203 for the East Bay and #206 for the West Bay. Over the years, other sites have been monitored and are included in this report's trend analysis when appropriate. When making comparisons between the two bays, please consider that both bays were monitored simultaneously only biennially from 2010 to 2016. Data from other years do not lend themselves well to direct comparisons because monitoring regimes were likely different.

### 2016 Results- East Bay

In 2016 the East Bay of Coon Lake was monitored every 2 weeks. Water quality was slightly better than average for this region of the state (NCHF Ecoregion), receiving a B grade, down from the A grade achieved in 2014. Average values of important water quality parameters included 27.3 µg/L for total phosphorus, 7.2 µg/L of chlorophyll-a, and an average Secchi transparency of 6.6 feet. Both chlorophyll-a and phosphorous levels were higher than levels measured in 2014, but were still much lower than levels measured before 2010. Both parameters, however, broke a trend of reduction in each of the previous 5 years sampled. Secchi transparency results were poorer than the averages of each of the previous three years sampled at 6.6 feet, but still averaged 6 inches better than historical results. The subjective observations of the lake's physical characteristics and recreational suitability by the ACD staff indicated that lake conditions remained excellent for swimming and boating.

2016 Water Quality Results- East Bay

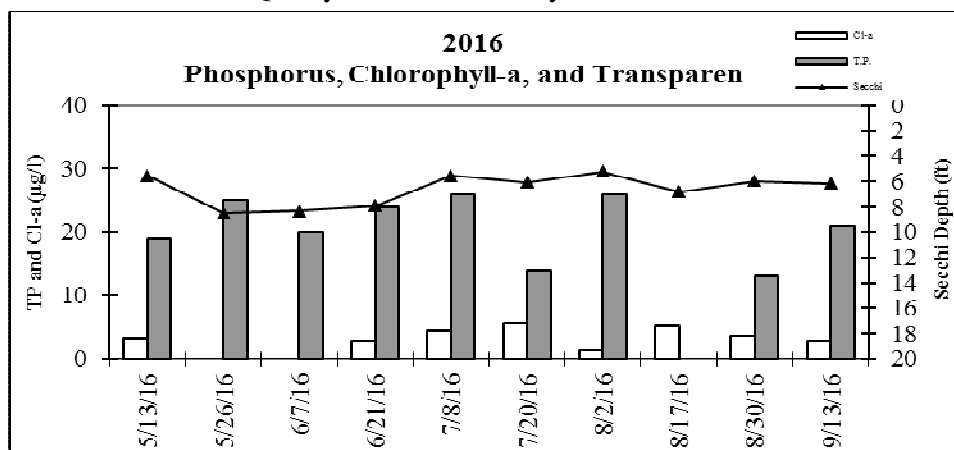


### 2016 Results- West Bay

In 2016 the West Bay had better than average water quality for this region of the state (NCHF Ecoregion), receiving an A- letter grade. Average values of water quality parameters included 21.0 µg/L for total phosphorus, 3.6 µg/L of chlorophyll-a, and Secchi transparency of 6.6 feet. Average total phosphorus levels were the lowest of all monitored years, and only 2014 chlorophyll-a levels were lower than those measured in 2016. Secchi transparency had its second best average of the last twelve years; only beat out by the 2014 average of 6.9 feet.



## 2016 Water Quality Results- West Bay



### Comparison of the Bays

The East and West Bays of Coon Lake often have noticeably different water quality. In 2010, on every date sampled, water quality was better in the West Bay than in the East. In both 2012 and 2014, water quality in the two bays was more similar. In 2016, the West Bay regained its position of higher water quality. The West Bay had lower total phosphorus readings on each sample date but two, with an average 6.1 µg/L lower than that of the East Bay. Chlorophyll-a readings were consistently lower in the West bay after the first sample date of 5/13/2016, with levels averaging exactly half those of the East Bay. Secchi transparency was consistently deeper in the East Bay during the first half of the season, but consistently lower in the second half, with overall averages being virtually identical (6.60 feet in the East Bay and 6.62 feet in the West Bay).

### Trend Analysis

To analyze Coon Lake trends we obtained historical monitoring data from the MPCA. Over the years water quality has been monitored at 17 different sites on the lake. For the trend analysis, we pooled data from five East Bay sites (#102, 203, 208, 209, and 401) and four West Bay sites (#101, 105, 206, and 207). These sites were chosen because they were all in the bay of interest, close to each other, and distant from the shoreline. The trend analysis is based on average annual water quality data for each year with data. We used data only from years with data from every month from May to September, allowing for one month of missing data. Only data from May to September were used. For years 1998 and after, only data from the ACD was used for greater comparability.

#### East Bay Trend Analysis

In the East Bay twenty two years of water quality data have been collected since 1978. During the most recent fourteen years that were monitored (since 1996), the data collected included total phosphorus, chlorophyll-a, and Secchi transparency. For most of the other eight years (pre-1997) only Secchi transparency data is available. This provides an adequate dataset for a trend analysis, however given that most of the data is from the last couple of decades, the analysis is not strong at detecting changes that occurred prior to 1990. When we examined those years with total phosphorus, chlorophyll-a, and Secchi transparency, excluding the years with only Secchi transparency data, an improving water quality trend did exist. The analysis was a repeated measures MANOVA with response variables TP, Chl-a, and Secchi depth ( $F_{2,15}=5.43$ ,  $p=0.02$ ). This is our preferred approach because it examines all three parameters simultaneously. We also examined variables TP, Chl-a, and Secchi depth across all years of existing data using a one-way ANOVA. Including all years, a significant trend of improving TP ( $F_{1,16}=7.84$ ,  $p=0.01$ ), Chl-a ( $F_{1,16}=9.69$ ,  $p<0.01$ ), and transparency ( $F_{1,21}=20.10$ ,  $p<0.001$ ) is found. In summary, it appears that water quality improvements have been occurring. It is noteworthy that this improvement seems to have primarily occurred since 2010 (see graph below). The reason for change is

unknown, but we speculate that infestation by Eurasian watermilfoil (EWM), treatment of EWM and curly leaf pondweed beginning in 2009 and constructed water quality improvement projects may be contributing.

#### West Bay Trend Analysis

Twelve years of data are available for the West Bay with only four of those years including phosphorus and chlorophyll-a data, so a powerful trend analysis is not possible. The dataset for Secchi transparency is longer, but data from 2010 and 2012 must be excluded because a full suite of Secchi measurements is not available due to clarity exceeding the lake depth occasionally. Therefore, a statistical analysis would not be highly meaningful. Instead, we will use a non-analytical look at the data. In 2016, the average Secchi transparency was 6.62 feet. For eight monitored years from 1998-2009, seven of those years had average Secchi transparency of <6 feet. It is notable that in the two most recent years sampled (2014 and 2016), the average Secchi transparency was greater than in all but one of previous years (2002). This suggests that Secchi transparency may be mildly improving, and is at least not declining.

#### **Discussion**

While Coon Lake is not listed as “impaired” by the MN Pollution Control Agency, the East Bay has been close to, or exceeded, the state water quality standard of 40 µg/L of total phosphorus in the past. Total phosphorus averaged 42 µg/L in 2006, 37 µg/L in 2008, and 39 µg/L in 2010. However, 2011 was the beginning of a four-year consecutive decline in phosphorous levels, a trend unfortunately not continued in 2016. Phosphorous levels dropped to 27 µg/L in 2011, to 26 µg/L in 2012, to 23.2 µg/L (second lowest on record) in 2013, and in 2014 hit an all-time low of 18.8 µg/L, only to rebound to 27.3 µg/L in 2016. While this result appears to break a trend in the right direction, it is still much lower than levels measured between 2001 and 2010. One year of data cannot signify either the start or the end of such a trend.

Given the highly developed nature of the lakeshore, the practices of lakeshore homeowners are a reasonable place to begin water quality improvement efforts. Residents should increase the use of shoreline practices that improve water quality and lake health, such as native vegetation buffers and rain gardens. Clearing of native vegetation to create a “cleaner” lakefront should be avoided because this vegetation is important to lake health and water quality. Septic system maintenance and replacement where necessary, should be a priority on an individual home basis and on a community level. This might be most beneficial in the Hiawatha Beach, Interlachen, and Coon Lake Beach neighborhoods, where the greatest frequency of septic system failures is suspected.

A final challenge for Coon Lake are the aquatic invasive species Eurasian water milfoil (EWM) and Curly Leaf Pondweed (CLP). EWM was discovered in the lake in 2003 and spread rapidly. In 2008 a Coon Lake Improvement District (CLID) was formed, with EWM management as a core of its function. EWM is actively monitored and treated with herbicide in accordance with DNR rules and a lake vegetation management plan. CLP has been present in Coon Lake longer than EWM and CLID began treatment of it in 2009. In 2010 the East Bay was accepted into a five-year pilot program for treatment of CLP. There is not yet enough data to say definitively, but it is possible that the early season treatment could be a contributing factor in the recent decline in phosphorous levels. CLP takes up phosphorous from the soil through its root system and dies off early summer causing a spike in phosphorous. Early treatment may be shortening the time the CLP has to uptake phosphorous from the soil as well as reducing overall regrowth due to treatments occurring prior to CLP sprouting turions (a shoot vital to reproduction).

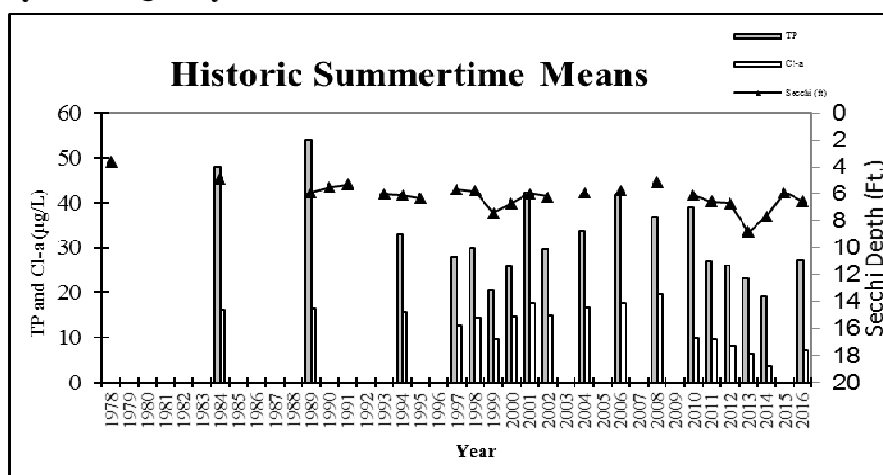
## 2016 Coon Lake East Bay Water Quality Data

Coon Lake East Bay  
2016 Water Quality Data

			5/13/2016 14:45	5/26/2016 12:45	6/7/2016 15:30	6/21/2016 13:40	7/8/2016 13:10	7/20/2016 13:15	8/2/2016 11:00	8/17/2016 12:45	8/30/2016 13:10	9/13/2016 12:30	Average	Min	Max
	Units	R.L.*	Results	Results	Results	Results	Results	Results	Results	Results	Results	Results			
pH			8.23	9.15	8.61	8.42	8.17	8.73	8.60	9.09	8.46	8.11	8.56	8.11	9.15
Conductivity	mS/cm	0.01	0.242	0.260	0.267	0.235	0.246	0.253	0.238	0.250	0.234	0.220	0.245	0.220	0.267
Turbidity	NTU	1	12.60	3.50	3.40	2.60	11.90		6.10	4.60	10.20	13.20	8	3	13
D.O.	mg/L	0.01	9.53	10.64	11.47	8.87	8.51	9.61	9.45	9.56	8.69	8.30	9.46	8.30	11.47
D.O.	%	1	96%	124%	116%	109%	109%	121%	120%	123%	107%	95%	112%	95%	124%
Temp.	°C	0.1	14.5	21.4	20.6	24.5	25.3	26.9	26.6	26.5	24.4	21.7	23.2	14.5	26.9
Temp.	°F	0.1	58.1	70.5	69.1	76.0	77.6	80.4	79.8	79.7	76.0	71.1	73.8	58.1	80.4
Salinity	‰	0.01	0.11	0.13	0.13	0.11	0.12	0.12	0.11	0.12	0.11	0.11	0.12	0.11	0.13
Cl-a	ug/L	0.5	<1	3.6	7.1	5.0	4.3	6.4	8.5	10.7	12.8	6.4	7.20	3.6	12.8
T.P.	mg/L	0.010	0.044	0.033	0.025	0.022	0.026	0.013	0.029	0.025	0.026	0.030	0.027	0.013	0.044
T.P.	ug/L	10	44	33	25	22	26	13	29	25	26	30	27.3	13	44
Secchi	ft	0.1	7.1	10.5	7.8	8.1	6.8	6.0	4.8	5.0	4.3	5.7	6.60	4.3	10.5
Secchi	m	0.1	2.2	3.2	2.4	2.5	2.1	1.8	1.5	1.5	1.3	1.7	2.01	1.3	3.2
Physical			2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.0	1.0	1.8	1.0	2.0
Recreational			2	2.0	2.0	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.7	1.0	2.0

\*reporting limit

## Coon Lake East Bay Water Quality Results



Coon Lake East Bay Historic Summertime Mean Values

Agency	1978	1984	1989	1990	1991	1993	1994	1995	1997	1998	1999	2000	2001	2002	2004	2006	2008	2010	2011	2012	2013	2014	2016
TP	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown	ACD	ACD	ACD	ACD	ACD	ACD	ACD	ACD	ACD	ACD	ACD	ACD	ACD	ACD
Cl-a	48.0	54.0	54.0	33.0	15.8	12.6	14.4	9.4	14.6	17.6	14.3	16.6	17.6	19.3	9.8	9.6	8.2	6.5	3.6	7.2			
Secchi (m)	1.11	1.50	1.80	1.68	1.62	1.83	1.86	1.93	1.72	1.76	2.26	2.04	1.82	1.90	1.81	1.80	1.55	1.90	2.00	2.10	2.68	2.35	2.0
Secchi (ft)	3.6	4.9	5.9	5.5	5.3	6.0	6.1	6.3	5.6	5.8	7.4	6.7	6.0	6.2	5.9	5.8	5.1	6.1	6.6	6.7	8.8	7.7	6.6

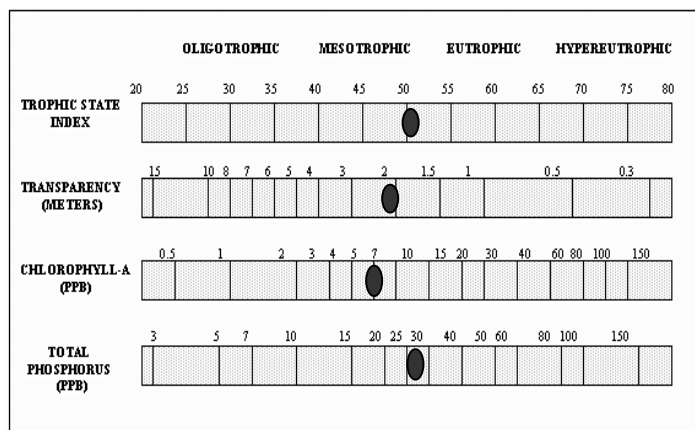
Carlsons trophic state indices

TSIP		60	62				55		52	53	48	51	58	53	55	58	56	57	52	51	49	47	52
TSIC		58	58				58		55	57	53	57	59	57	58	59	60	53	53	51	49	43	50
TSIS	58	54	52	53	53	51	51	51	52	52	48	50	51	51	51	52	54	51	50	49	46	48	50
TSI		57	57				54		53	54	50	53	56	54	55	56	57	54	51	51	48	46	51

Coon Lake Water Quality Report Card

Year	1978	1984	1989	1990	1991	1993	1994	1995	1997	1998	1999	2000	2001	2002	2004	2006	2008	2010	2011	2012	2013	2014	2016
TP		C	C				C		B	B	A	B	C	B	C	C	C	C	B	B	B+	A	B
Cl-a		B	B				B		B	B	A	B	B	B	B	B	B	A	A	A	A	A	A
Secchi	D	C	C	C	C	C	C	C	C	C	B	C	C	C	C	C	C	C	C	C+	B	B	C
Overall	D	C	C	C	C	C	C	C	B	B	A	B	C	B	C	C	C	B+	B	B	B+	A	B

## Carlson's Trophic State Index



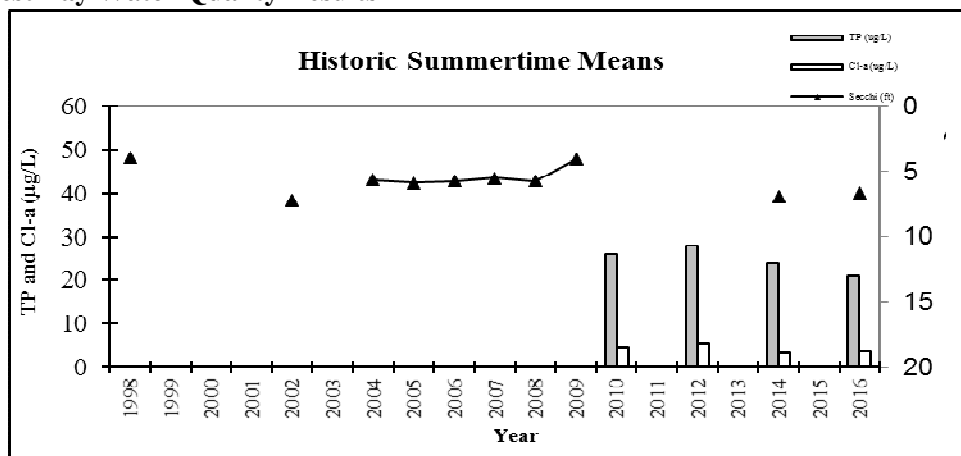
## 2016 Coon Lake West Bay Water Quality Data

Coon Lake West Bay  
2016 Water Quality Data

	Units	R.L.*	Date:	5/13/2016	5/26/2016	6/7/2016	6/21/2016	7/8/2016	7/20/2016	8/2/2016	8/17/2016	8/30/2016	9/13/2016	Average	Min	Max
			Time:	15:10	14:30	16:10	14:20	13:45	13:40	10:30	13:25	14:00	13:00			
				Results	Results	Results	Results	Results	Results	Results	Results	Results	Results			
pH		0.1		8.42	8.91	8.61	8.06	8.65	8.81	9.08	8.95	8.61	8.28	8.64	8.06	9.08
Conductivity	mS/cm	0.01		0.217	0.227	0.225	0.200	0.180	0.206	0.166	0.190	0.175	0.166	0.195	0.166	0.227
Turbidity	FNRU	1		13.00	1.60	2.30	8.36	7.10		7.20	1.10	5.50	10.00	6	1	13
D.O.	mg/l	0.01		10.51	10.58	10.14	8.36	8.65	9.62	10.72	8.32	8.42	8.71	9.40	8.32	10.72
D.O.	%	1		102%	124%	110%	104%	113%	120%	135%	105%	103%	97%	1	1	1
Temp.	°C	0.1		13.8	21.9	20.2	25.0	24.6	27.0	26.4	25.8	24.0	20.7	22.9	13.8	27.0
Temp.	°F	0.1		56.8	71.3	68.3	77.0	76.3	80.7	79.4	78.4	75.2	69.2	73.3	56.8	80.7
Salinity	‰	0.01		0.10	0.11	0.11	0.10	0.09	0.10	0.08	0.09	0.09	0.08	0.10	0.08	0.11
Cl-a	ug/L	0.5		3.2	<1	<1	2.8	4.3	5.7	1.4	5.3	3.6	2.8	3.6	1.4	5.7
T.P.	mg/l	0.010		0.019	0.025	0.020	0.024	0.026	0.014	0.026	<0.02	0.013	0.021	0.021	0.013	0.026
T.P.	ug/l	10		19	25	20	24	26	14	26	<20	13	21	20.9	13	26
Secchi	ft			5.6	8.5	8.3	7.9	5.6	6.1	5.3	6.8	6.0	6.2	6.62	5.3	8.5
Secchi	m			1.7	2.6	2.5	2.4	1.7	1.9	1.6	2.1	1.8	1.9	2.02	1.6	2.6
<b>Field Observations</b>																
Physical				2	2	2	2	2	2	2	2	1	1	1.8	1.0	2.0
Recreational				2	2	2	2	2	2	2	1	1	1	1.7	1.0	2.0

\*reporting limit

## Coon Lake West Bay Water Quality Results



### Coon Lake West Bay Historical Summertime Mean Values

Agency	ACD	ACD	ACD	ACD	ACD	ACD	ACD	ACD	ACD	ACD	ACD	ACD
Year	1998	2002	2004	2005	2006	2007	2008	2009	2010	2012	2014	2016
TP									26.0	28.0	24.0	21.0
Cl-a									4.4	5.4	3.3	3.6
Secchi (m)	1.21	2.19	1.71	1.79	1.74	1.68	1.74	1.24			2.1	2.0
Secchi (ft)	3.97	7.18	5.61	5.87	5.71	5.51	5.71	4.07			6.9	6.6

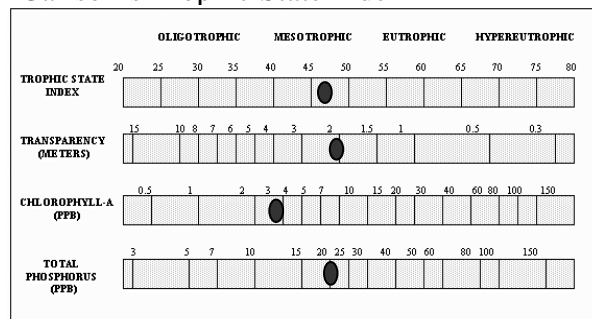
### Carlson's Trophic State Index

TSIP									51	52	50	48
TSIC									45	47	42	43
TSIS	57	49	52	52	52	53	52	57			49	50
TSI									48	50	47	47

### Coon Lake West Bay Water Quality Report Card

Year	1998	1999	2001	2003	2004	2006	2007	2009	2010	2012	2014	2016
TP (ug/L)									B	B	B	A
Cl-a (ug/L)									A	A	A	A
Secchi (m)	C	C	C	C	C	C	C	C			C	C
<b>Overall</b>									A-	A-	B	A-

## Carlson's Trophic State Index



## Typo Lake

Linwood Township, Lake ID # 30-0009

### Background

Typo Lake is located in portions of northeast Anoka County and southeast Isanti County. It has a surface area of 290 acres and maximum depth of 6 feet (1.82 m), though most of the lake is about 3 feet deep. The lake has a mucky, loose, and unconsolidated bottom in some areas, while other areas have a sandy bottom. The public access is located at the south end of the lake along Fawn Lake Drive. The lake is used very little for fishing or recreational boating because of the shallow depth and extremely poor water quality. The lake's shoreline is mostly undeveloped, with only 21 homes within 300 feet of the lakeshore. The lake's watershed of 11,520 acres is 3% residential, 33% agricultural, 28% wetlands, with the remainder being forested or grassland. Typo Lake is on the Minnesota Pollution Control Agency's (MPCA) list of impaired waters for excess nutrients.

### 2016 Results

In 2016 Typo Lake had extremely poor water quality compared to other lakes in this region (NCHF Ecoregion), receiving an overall F letter grade. This overall grade is consistent to all previous years monitored except for the D- achieved in 2014. Average total phosphorus, however, was the lowest measured in Typo Lake since 1997 at 172.0 µg/L. This is approximately half of the average total phosphorus measured in 2007 (340 µg/L) and 2009 (353 µg/L). Chlorophyll-a levels in 2016 (83.4 µg/L) rebounded from their second lowest average in 2015 (57.5 µg/L). However, this total is still well below the historical average of 111.3 µg/L. In both 2007 and 2009 a Secchi disk could be seen only 5-6 inches below the surface, on average. There was a slight improvement in 2012 to 9-10 inches and a larger improvement in 2014 to 21-22 inches. In 2016, average Secchi transparency declined back to under a foot (about 11 inches) after its first consecutive years averaging over one foot in 2014 and 2015.

### Trend Analysis

Sixteen years of water quality monitoring have been conducted by the Minnesota Pollution Control Agency (1993, '94, and '95) and the Anoka Conservation District (1997-2001, '03, '05, '07, '09, '12, '14, '15, '16). Water quality has significantly declined from 1993 to 2016 (repeated measures MANOVA with response variables TP, Cl-a, and Secchi depth;  $F_{2,13}=4.22$ ,  $p=0.04$ ). When we tested these response variables individually with one-way ANOVAs TP, Cl-a, and Secchi depth show no significant change across this time period. A superficial look at graphs of these parameters suggests that total phosphorus is generally increasing. The trend toward higher phosphorus continues even though 2016 had the lowest average in Typo since 1997. Cl-a appears to be declining and Secchi depth appears to be increasing.

### Discussion

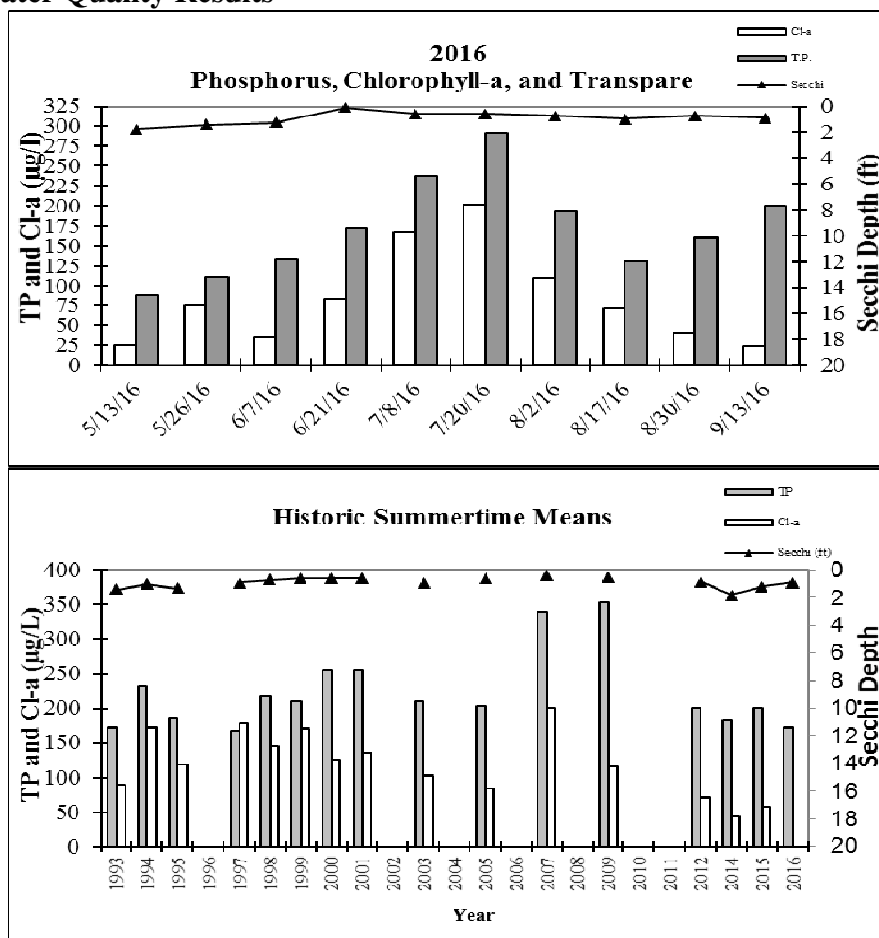
Typo Lake, along with Martin Lake downstream, were the subject of a TMDL study by the Anoka Conservation District, which was approved by the State and EPA in 2012. This study documented the source of nutrients to the lake, the degree to which each is impacting the lake, and put forward lake rehabilitation strategies. Some factors impacting water quality on Typo Lake include the presence of rough fish, high phosphorus inputs from a ditched wetland west of the lake, and lake sediments. Several rain gardens have been installed, carp barriers were completed in 2016 with carp removals planned for 2017-19 and a feasibility study of ditched wetland projects upstream of Typo Lake is underway.

### 2016 Typo Lake Water Quality Data

Typo Lake		Date		5/13/2016	5/26/2016	6/7/2016	6/21/2016	7/8/2016	7/20/2016	8/2/2016	8/17/2016	8/30/2016	9/13/2016			
2016 Water Quality Data		Time		13:15	12:00	14:20	12:25	12:00	11:50	12:55	11:45	12:20	11:30			
	Units	R.L.*	Results	Results	Results	Results	Results	Results	Results	Results	Results	Results	Results	Average	Min	Max
pH		0.1	9.25	8.59	9.27	9.17	9.06	9.69	9.62	9.48	9.23	8.74	9.21	8.59	9.69	
Conductivity	mS/cm	0.01	0.317	0.283	0.309	0.252	0.221	0.216	0.220	0.242	0.232	0.228	0.252	0.216	0.317	
Turbidity	FNRL	1	42.20	60.70	71.40	87.80	218.00		120.00	105.00	104.00	106.00	102	42	218	
D.O.	mg/l	0.01	12.11	8.64	12.57	11.07		10.36	13.05	7.57	10.27	9.34	10.55	7.57	13.05	
D.O.	%	1	109%	100%	144%	148%	117%	140%	169%	92%	126%	102%	125%	92%	169%	
Temp.	°C	0.1	13.3	21.4	21.1	24.7	24.9	27.8	27.1	23.6	24.3	19.7	22.79	13.30	27.79	
Temp.	°F	0.1	55.9	70.5	70.0	76.5	76.8	82.0	80.8	74.6	75.7	67.4	73.0	55.9	82.0	
Salinity	‰	0.01	0.15	0.14	0.15	0.12	0.11	0.11	0.11	0.12	0.11	0.11	0.1	0.1	0.2	
Cl-a	µg/l	0.5	25.6	75.8	35.6	83.3	167.0	201.0	110.0	71.2	39.9	24.2	83.4	24.2	201.0	
T.P.	mg/l	0.010	0.088	0.111	0.134	0.172	0.238	0.292	0.194	0.131	0.160	0.200	0.172	0.088	0.292	
T.P.	µg/l	10	88	111	134	172	238	292	194	131	160	200	172	88	292	
Secchi	ft	0.1	1.8	1.4	1.3	0.1	0.6	0.6	0.8	1.0	0.8	0.9	0.9	0.1	1.8	
Secchi	m	0.1	0.5	0.4	0.4	0.0	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.0	0.5	
Field Observations																
Physical			3.0	5.0	4.0	5.0	5.00	5.00	5.0	4.0	3.0	3.0	4.2	3.0	5.0	
Recreational			3.0	5.0	4.0	5.0	5.00	5.00	5.0	4.0	3.0	3.0	4.2	3.0	5.0	

\*reporting limit

## Typo Lake Water Quality Results



Typo Lake Historic Summertime Mean Values

Agency	CLMP	CLMP	MPCA	MPCA	MPCA	ACD	ACD	ACD	ACD	ACD	ACD	ACD	ACD	ACD	ACD	ACD	ACD	ACD
Year	1974	1975	1993	1994	1995	1997	1998	1999	2000	2001	2003	2005	2007	2009	2012	2014	2015	2016
TP			172.0	233.0	185.6	168.0	225.7	202.1	254.9	256.0	209.8	204	340.5	353.0	201.0	182.0	201.4	172.0
Cl-a			88.1	172.8	119.6	177.8	134.7	67.5	125.3	136.0	102.5	84.7	200.9	116.2	70.7	42.8	57.5	83.4
Secchi (m)	0.23	0.27	0.43	0.29	0.38	0.27	0.21	0.25	0.18	0.19	0.3	0.2	0.1	0.1	0.2	0.6	0.4	0.3
Secchi (ft)	0.2	0.3	1.4	1.0	1.3	0.9	0.7	0.8	0.6	0.6	0.9	0.6	0.4	0.5	0.8	1.8	1.2	0.9

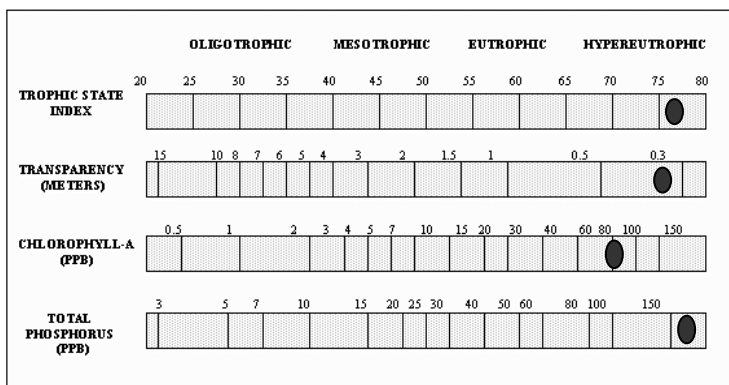
Carlson's Trophic State Indices

Agency	CLMP	CLMP	MPCA	MPCA	MPCA	ACD	ACD	ACD	ACD	ACD	ACD	ACD	ACD	ACD	ACD	ACD	ACD	ACD
Year	1974	1975	1993	1994	1995	1997	1998	1999	2000	2001	2003	2005	2007	2009	2012	2014	2015	2016
TSIP			78	83	79	78	82	81	83	82	81	81	88	89	81	79	81	78
TSIC			75	81	78	82	79	72	74	77	76	74	83	77	72	68	70	74
TSIS	81	79	72	78	74	79	82	80	86	85	77	83	93	83	67	73	73	77
TSI			75	81	77	79	81	78	81	81	78	79	88	86	79	71	75	77

Typo Lake Water Quality Report Card

Year	1974	1975	1993	1994	1995	1997	1998	1999	2000	2001	2003	2005	2007	2009	2012	2014	2015	2016
TP			F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
Cl-a			F	F	F	F	F	D	F	F	F	F	F	F	D	C	D	F
Secchi	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
Overall			F	F	F	F	F	F	F	F	F	F	F	F	F	D-	F	F

## Carlson's Trophic State Index



## Martin Lake

### Linwood Township, Lake ID # 02-0034

#### Background

Martin Lake is located in northeast Anoka County. It has a surface area of 223 acres and maximum depth of 20 ft. The public access is located on the southern end of the lake. The lake is used moderately by recreational boaters and fishers, and would likely be used more if water quality improved. Martin Lake is almost entirely surrounded by private residences. The 5402 acre watershed is 18% developed; the remainder is vacant, agricultural or wetlands. The non-native, invasive plant curly-leaf pondweed occurs in Martin Lake, but not at nuisance levels. Martin is on the Minnesota Pollution Control Agency's (MPCA) list of impaired waters for excess nutrients.

#### 2016 Results

In 2016 Martin Lake had poor water quality compared other lakes in the North Central Hardwood Forest Ecoregion (NCHF), receiving a C letter grade. This eutrophic lake has chronically high total phosphorus and chlorophyll-a. In 2016 total phosphorus averaged 69.1 µg/L, well below the lake's historical average of 92.1 µg/L and only slightly above the impairment threshold of 60 µg/L. In fact, this is the lowest average total phosphorus on record for Martin Lake, just edging out an average of 69.2 µg/L in 1999. Chlorophyll-a was higher than the previous three years, however, at 17.8 µg/L. Average Secchi transparency was only 3.1 feet in 2016, right on par with its historical average. The ACD staff's subjective perceptions of the lake were that "high" algae made the lake less than desirable for swimming from July through September.

#### Trend Analysis

Fifteen years of water quality data have been collected by the Minnesota Pollution Control Agency (1983), Metropolitan Council (1998, 2008), and the ACD (1997, 1999-2001, 2003, 2005, 2007, 2009, 2012-2016). Citizens monitored Secchi transparency 17 other years. Anecdotal notes from DNR fisheries data indicate poor water quality dating back to at least 1954. Although still pretty poor, water quality in Martin Lake has actually shown an improvement from 1983 to 2016 that is statistically significant (repeated measures MANOVA with response variables TP, Cl-a, and Secchi depth;  $F_{2,12}=7.06$ ,  $p<0.01$ ). Further examination of the data (one-way ANOVAs on the individual response variables) shows that while TP and Secchi depth appear to be trending in the wrong direction, though not statistically significant, Cl-a has now shown a statistical decrease with  $F_{1,13}=7.42$ ,  $p<0.02$ .

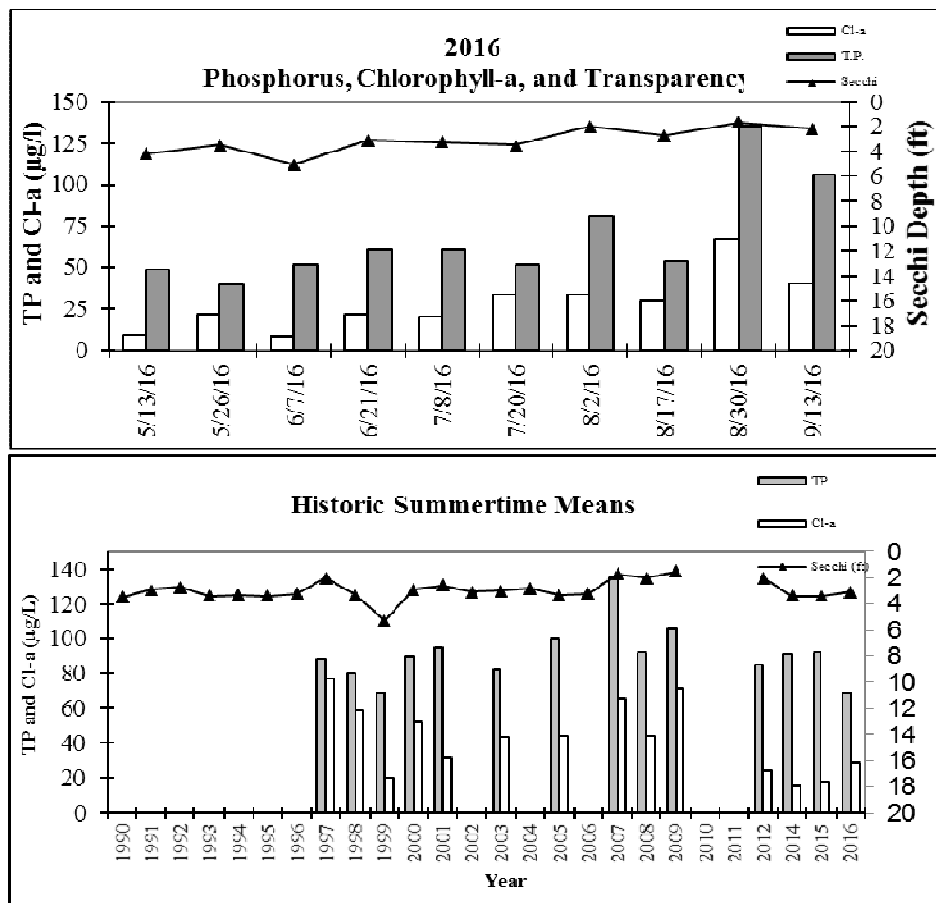
#### Discussion

Martin Lake, along with Typo Lake upstream, were the subject of a TMDL study by the Anoka Conservation District that was approved by the State and EPA in 2012. This study documented the source of nutrients to the lake, the degree to which each is impacting the lake, and put forward lake rehabilitation strategies. Water from Typo Lake and internal loading (carp, septic systems, sediments, etc) are two of the largest negative impacts on Martin Lake water quality. Several rain gardens have been installed, carp barriers were completed in 2016 with carp removals planned for 2017-19 and a feasibility study of ditched wetland projects upstream of Typo Lake is underway. While the lowest average total phosphorus on record measured in one season does not necessarily represent a trend of improving water quality in Martin Lake, it is certainly not a bad sign. Hopefully these results can be replicated and improved on in the future.

#### 2016 Martin Lake Water Quality Data

Martin Lake 2016 Water Quality Data		Date:	5/13/2016	5/26/2016	6/7/2016	6/21/2016	7/8/2016	7/20/2016	8/2/2016	8/17/2016	8/30/2016	9/13/2016			
		Time:	13:50	12:45	14:50	13:00	12:30	12:30	12:00	12:05	12:45	12:00			
	Units	R.L.*	Results	Results	Results	Results	Results	Results	Results	Results	Results	Results	Average	Min	Max
pH		0.1	8.64	9.15	7.76	8.46	8.37	9.22	8.87	9.03	8.63	8.46	8.66	7.76	9.22
Conductivity	mS/cm	0.01	0.326	0.332	0.362	0.320	0.342	0.325	0.310	0.339	0.315	0.292	0.326	0.292	0.362
Turbidity	FNRL	1	21.50	14.30	9.10	16.40	36.90		28.30	21.80	53.80	49.70	27.98	9.10	53.80
D.O.	mg/l	0.01	8.88	13.05	6.80	9.83	8.25	13.64	11.06	10.72	11.34	9.13	10.27	6.80	13.64
D.O.	%	1	90%	151%	76%	120%	105%	172%	141%	136%	139%	104%	123%	76%	172%
Temp.	°C	0.1	14.8	21.4	20.1	24.4	25.1	26.2	26.3	25.9	24.1	21.3	22.9	14.8	26.3
Temp.	°F	0.1	58.6	70.5	68.2	76.0	77.1	79.1	79.3	78.6	75.3	70.4	73.3	58.6	79.3
Salinity	‰	0.01	0.15	0.16	0.18	0.15	0.16	0.16	0.15	0.16	0.15	0.14	0.16	0.14	0.18
Cl-a	µg/L	0.5	9.3	22.1	8.5	22.1	20.6	33.5	33.5	29.9	67.3	40.6	28.7	8.5	67.3
T.P.	mg/l	0.010	0.049	0.040	0.052	0.061	0.061	0.052	0.081	0.054	0.135	0.106	0.069	0.040	0.135
T.P.	µg/l	10	49	40	52	61	61	52	81	54	135	106	69.1	40	135
Secchi	ft		4.2	3.5	5.1	3.1	3.3	3.5	2.0	2.8	1.7	2.2	3.1	1.7	5.1
Secchi	m		1.3	1.1	1.5	0.9	1.0	1.1	0.6	0.8	0.5	0.7	1.0	0.5	1.5
Field Observations/Appearance															
Physical			3.0	4.0	3.0	4.0	4.0	4.0	3.0	4.0	2.0	2.0	3.3	2.0	4.0
Recreational			3.0	4.0	3.0	4.0	4.0	4.0	3.0	3.0	1.0	2.0	3.1	1.0	4.0
*reporting limit															

## Martin Lake Water Quality Results



Martin Lake Summertime Annual Mean

Agency	CLMP	ACD	MC	ACD	ACD	ACD	CLMP	ACD	CLMP	ACD	ACD	ACD	CAMP	CAMP	ACD	ACD	ACD	ACD
Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2012	2014	2015	2016
TP			88.0	80.0	61.7	89.4	95.4		81.9		100.0		135.0	92.0	106.0	85.0	91.0	92.6
Cl-a			77.0	58.8	18.0	52.5	31.4		43.3		44.3		65.8	44.1	71.4	24.1	15.5	17.4
Secchi (m)	1.0	0.6	1.0	1.8	0.9	0.8	0.9	0.9	0.9	1.0	1.0	0.5	0.6	0.4	0.6	1.0	1.0	1.0
Secchi (ft)	3.2	2.0	3.3	5.3	2.9	2.6	3.1	3.0	2.8	3.3	3.2	1.7	2.0	1.5	2.0	3.4	3.4	3.1

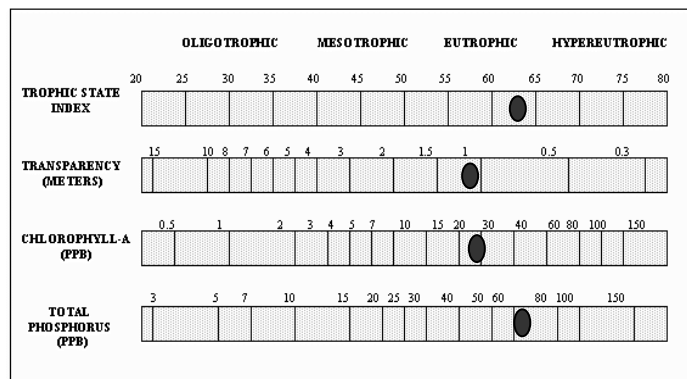
Carlson's Trophic State Indices

	TSIP	TSIC	TSIS	TSI
1996	69	73	60	70
1997	67	71	60	66
1998	64	68	52	58
1999	68	67	63	66
2000	69	63	65	66
2001	68	68	62	66
2002	68	68	62	66
2003	71	68	60	66
2004	75	72	70	72
2005	69	68	67	68
2006	71	73	73	72
2007	68	62	60	66
2008	69	58	60	62
2009	69	59	60	63
2012	68	58	60	63
2014	69	59	60	63
2015	69	59	60	63
2016	65	64	60	63

Martin Lake Water Quality Report Card

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2012	2014	2015	2016
TP	D	D	D	C	D	D		D		D		D	D	D	D	D	D	C
Cl-a	D	D	D	B	C	C		C		C		D	C	D	D	B	B	C
Secchi	D	F	D	C	D	D	D	D	D	D	D	F	F	F	F	D	D	D
Overall	D	D	D	C	D	D		D		D		D	D	D	D	C	C	C

## Carlson's Trophic State Index





## Stream Water Quality

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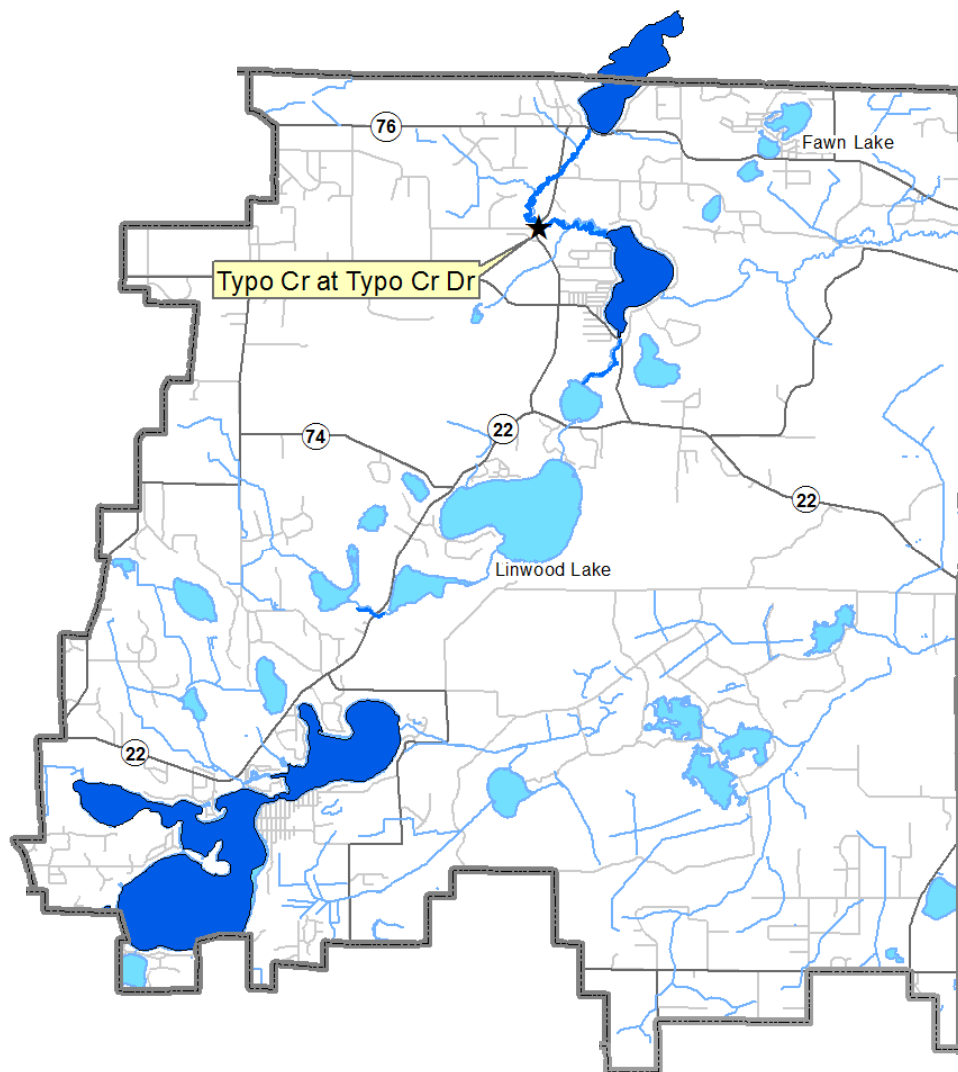
**Description:** Stream water quality is monitored with grab samples on eight occasions throughout the open water season, including four times immediately following a storm (1" of rain within a 24hr period) and four times during baseflow conditions. The selected site was chosen to monitor the impacts of the carp barriers installed in the watershed over time. Parameters monitored include water level, pH, conductivity, turbidity, transparency, dissolved oxygen, total phosphorus and total suspended solids. This data can be paired with stream hydrology monitoring to do pollutant-loading calculations.

**Purpose:** To detect water quality trends and problems, and diagnose the source of problems.

**Location:** Typo Creek at Typo Creek Drive near 233<sup>rd</sup> Ave. NE

**Results:** Results are presented on the following pages.

### Sunrise Watershed Stream Water Quality Monitoring Sites



## Stream Water Quality Monitoring

### TYPO CREEK AT TYPO CREEK DR.

Near Typo Creek Dr. and 233<sup>rd</sup> Ave. NE, Linwood Township

STORET SiteID = S003-188

#### Years Monitored

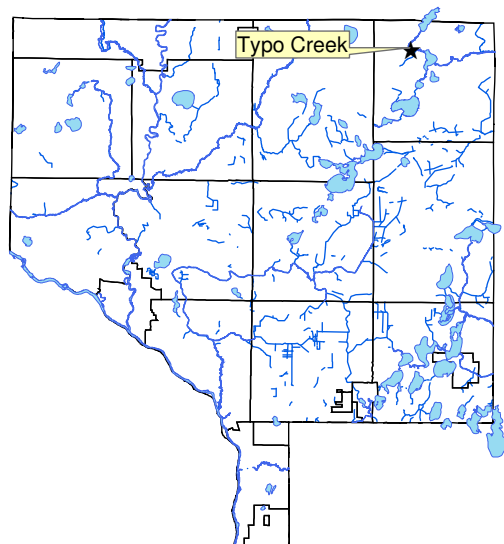
1998, 2000, 2001, 2003, 2016

#### Background

The northern inlet to Martin Lake, also called Typo Creek, flows from the outlet of Typo Lake about 1.9 miles south to Martin Lake. It is the primary inlet to Martin Lake. This stream was monitored in 2001 and 2003 as part of a TMDL impaired waters study for the two lakes it links. The watershed is primarily undeveloped. This stream carries a relatively large volume of water, with flows ranging from 4-6 cfs during baseflow and 10-17 cfs during stormflow.

#### Methods

The creek was monitored by grab samples. Eight water quality sampling events were conducted in 2016; four during baseflow and four following storms. Storms were generally defined as one-inch or more of rainfall in 24 hours or a significant snowmelt event combined with rainfall. Parameters tested with portable meters included pH, conductivity, turbidity, temperature, dissolved oxygen, and salinity. Parameters tested by water samples sent to a state-certified lab included total phosphorus, and total suspended solids.



#### Summary

Summarized water quality monitoring findings and management implications include:

- Dissolved pollutants, as measured by conductivity and chlorides, are at low and healthy levels.

*Management discussion:* Road deicing salts are a concern region-wide. They are measurable in area streams year-round, including Typo Creek. While they may be acceptably low here currently, excessive use should be avoided.

- Phosphorus loading and eutrophication remains the biggest concern for Typo Creek.

*Management discussion:* Management in response to the TMDL report, including projects like the installation of carp barriers, will reduce phosphorus levels in the creek as well as the upstream and downstream lakes, but additional work and time may be needed to reach goals.

- Suspended solids and turbidity remain a large problem in Typo Creek. This problem is directly related to the issues causing excessive nutrient loading.

*Management discussion:* Efforts involved with the reduction of nutrient loading and management of carp populations will have a direct effect on the suspended solids and turbidity issues in Typo Creek.

- pH was within the range considered normal and healthy for streams in this area during 2016, but this has not been the case in most years and the creek is listed by the State as impaired for high pH. High algal production in Typo Lake upstream causes the high pH. Management to address eutrophication will address the pH problem.

- Dissolved oxygen (DO) was quite low in 2016 compared to the years this site was monitored shortly after the turn of the millennium. This issue is likely also tied to the nutrient loading of this system.

*Management discussion:* Low dissolved oxygen is likely having a profound impact on aquatic life. This issue is primarily driven by the nutrient loading at the root of this system's problems and will likely see improvements which coincide with the nutrient reduction strategies identified and underway.

## **Results and Discussion**

Nutrient loading is the root cause of intense eutrophication and turbidity in Typo Creek. This, along with populations of invasive carp species, is having a profound negative impact on the flora and fauna of this system. A TMDL study has been completed for this stream, and corrective projects are being implemented. It is likely that the severity of the issues facing this creek, and the rest of its watershed, will require a large amount of time, involvement and project development to reach goals.

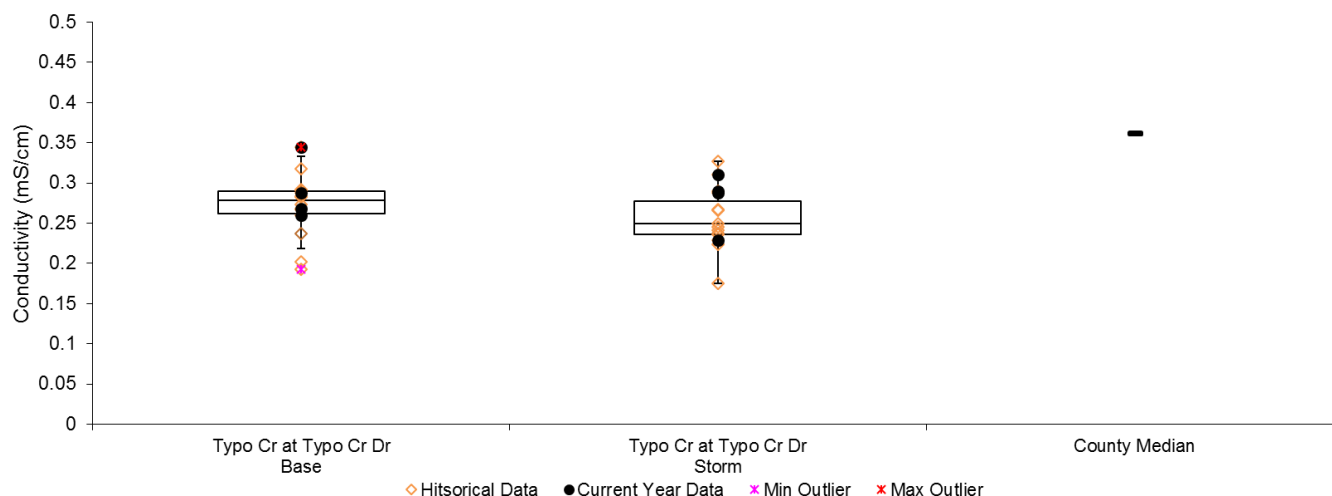
### Conductivity and chlorides

Conductivity and chlorides are measures of dissolved pollutants. Dissolved pollutant sources include urban road runoff, industrial chemicals, among many others. Metals, hydrocarbons, road salts, and others are often of concern in a suburban environment. Conductivity is the broadest measure of dissolved pollutants we used. It measures electrical conductivity of the water; pure water with no dissolved constituents has zero conductivity. Chlorides are the measure of chloride salts, the most common of which are road de-icing chemicals. 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.

Conductivity was acceptably low in Typo Creek, averaging 0.285 mS/cm over the sampling season. This is notably lower than the median for 34 Anoka County streams of 0.362 mS/cm. Conductivity was slightly lower during storms, suggesting that stormwater runoff contains fewer dissolved pollutants than the surficial water table that feeds the river during baseflow. High baseflow conductivity has been observed in many other area streams with the largest cause believed to be road salts that have infiltrated into the shallow aquifer.

Chlorides were not tested in 2016, and were last sampled at this site in 2003. Chloride results in 2003 ranged between 8 mg/L and 12 mg/L, far below the Minnesota Pollution Control Agency's (MPCA) chronic standard for aquatic life of 230 mg/L. The primary reason for low chloride levels in this river is low road densities in the watershed, and therefore less use of road deicing salts.

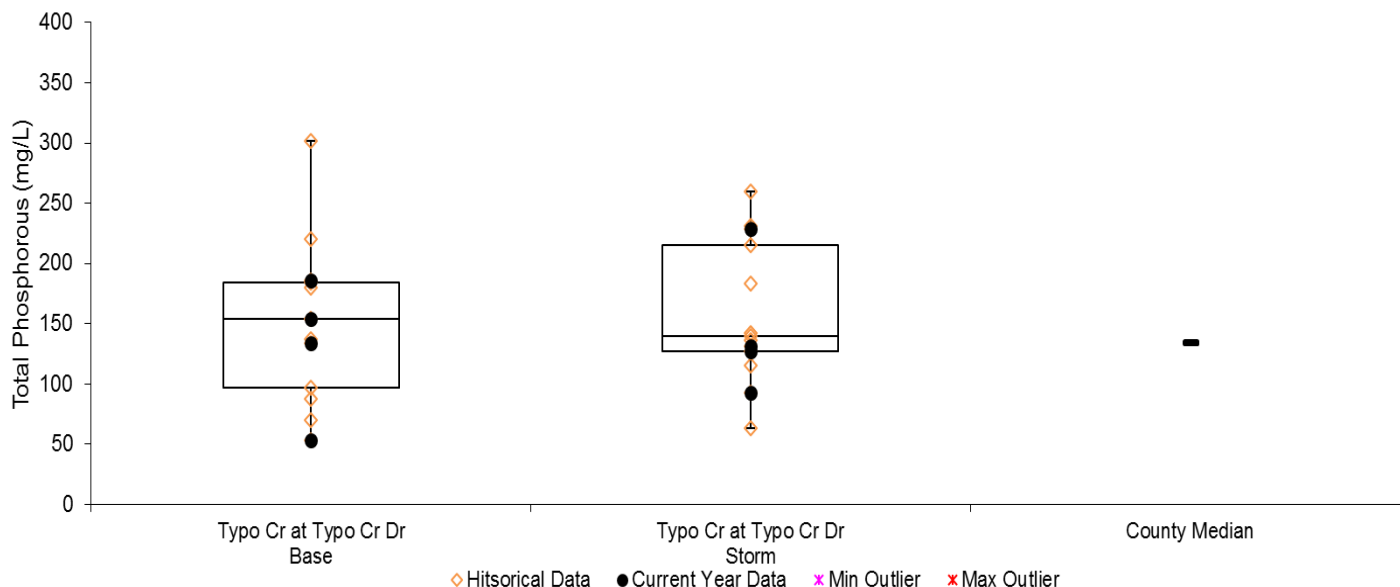
**Conductivity during baseflow and storm conditions.** Orange diamonds are historical data from previous years and black circles are 2016 readings. Box plots show the median (middle line), 25<sup>th</sup> and 75<sup>th</sup> percentile (ends of box), and 10<sup>th</sup> and 90<sup>th</sup> percentiles (floating outer lines).



### Total Phosphorus

Total phosphorus (TP), a nutrient, is one of the most common pollutants in our region, and can be associated with urban runoff, agricultural runoff, wastewater, and many other sources. The average total phosphorus concentration of Typo Creek in 2016 was 138 ug/L, well in exceedance of the state standard (100 ug/L). These high phosphorus levels are common for the area. In the case of Typo Creek, phosphorus levels are also reflective of conditions of Typo Lake upstream. A TMDL was approved for Typo Creek in 2012 for pH and turbidity before the current stream eutrophication standards applied. Nutrients are the primary cause of high turbidity and pH. Nutrient reduction projects are ongoing.

**Total phosphorus during baseflow and storm conditions.** Orange diamonds are historical data from previous years and black circles are 2016 readings. Box plots show the median (middle line), 25<sup>th</sup> and 75<sup>th</sup> percentile (ends of box), and 10<sup>th</sup> and 90<sup>th</sup> percentiles (floating outer lines).



### ***Turbidity and Total Suspended Solids (TSS)***

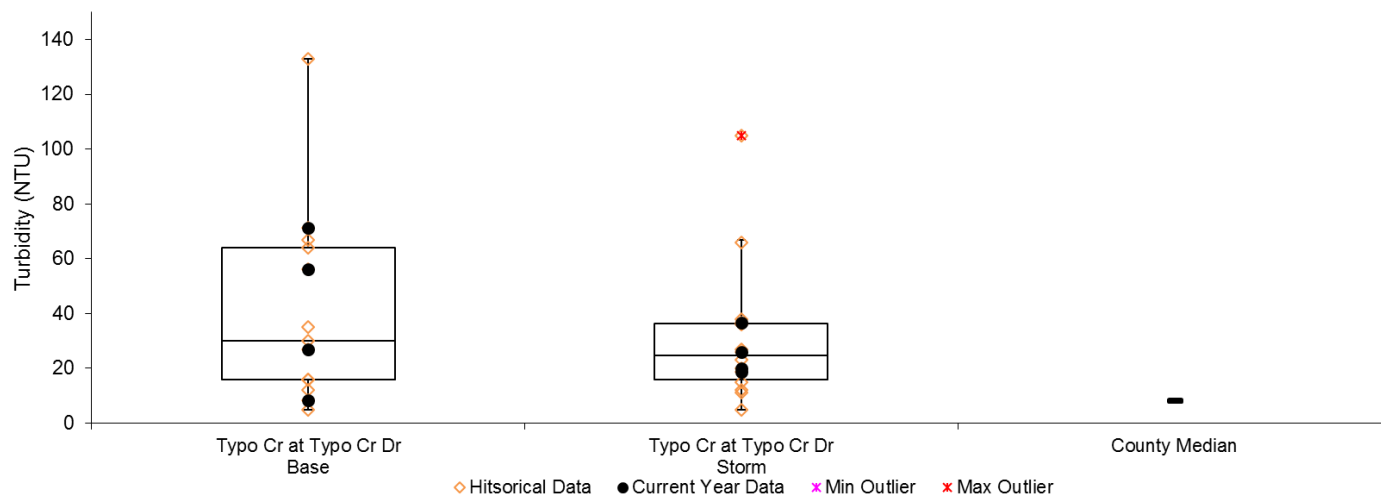
Turbidity and total suspended solids (TSS) are two different measurements of solid material suspended in the water. Turbidity is measured by refraction of a light beam passed through a water sample. It is most sensitive to large particles. Total suspended solids is measured by filtering solids from a 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 are attached to particles. Many stormwater treatment practices such as street sweeping, sumps, and stormwater settling ponds target sediment and attached pollutants.

It is important to note the suspended solids can come from sources both internal and external of the river. Sources on land include soil erosion, road sanding, and many others. Internally, riverbank erosion and movement of the river bottom also contributes to suspended solids. Algal production and sediment disturbance I upstream lakes also contribut.

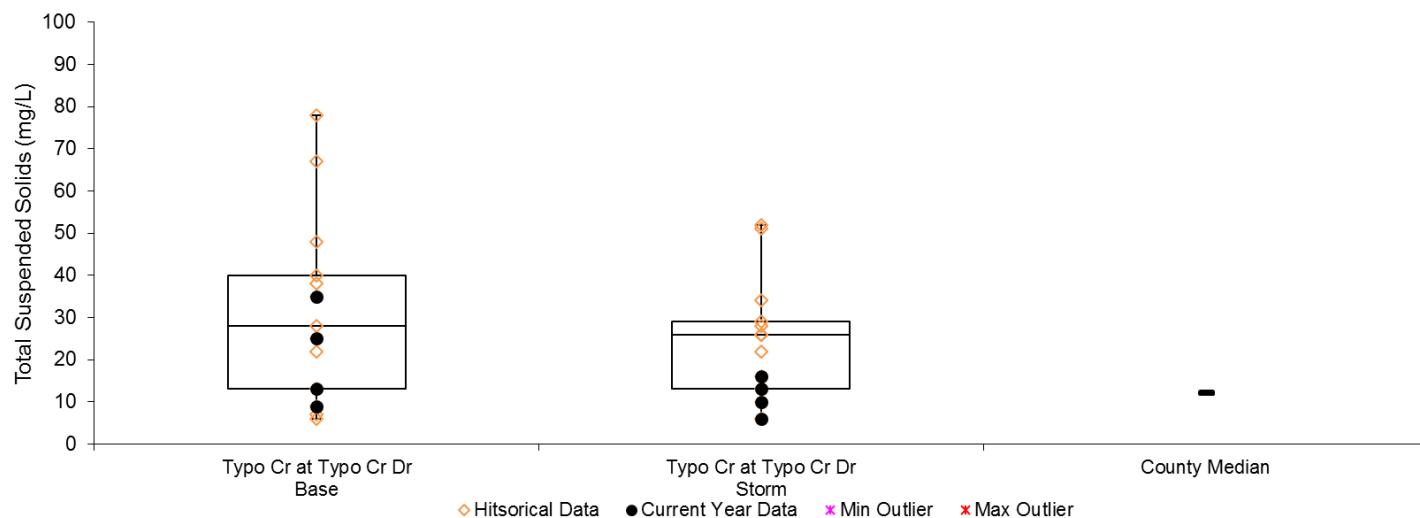
Typo Creek has been on the MPCA Impaired Waters List for turbidity since 2006. The threshold is 25 NTU turbidity. If a river exceeds this value on three occasions and at least 10% of all sampling events it is declared impaired for turbidity. Based on all years of ACD sampling, Typo Creek has exceeded 25 NTU turbidity on 15 of 27 sampling occasions, or 56% of the time. In 2016 five of eight samples had turbidity in excess of 25 NTU, with 71.2 NTU being the highest level recorded for the year.

The high turbidity levels in Typo Creek are likely due to many factors within the watershed. Rough fish are present in the creek, as well as each of the lakes it connects. Typo Lake upstream is hypertrophic, and MN DNR fisheries anecdotal notes suggest large algae blooms dating back to the 1960s. Additionally, Typo Creek and Typo Lake each have a very loose, unconsolidated, silty bottom that easily mixes with the water column and readily remains suspended.

**Turbidity during baseflow and storm conditions** Orange diamonds are historical data from previous years and black circles are 2016 readings. Box plots show the median (middle line), 25<sup>th</sup> and 75<sup>th</sup> percentile (ends of box), and 10<sup>th</sup> and 90<sup>th</sup> percentiles (floating outer lines).



**Total suspended solids during baseflow and storm conditions** Orange diamonds are historical data from previous years and black circles are 2016 readings. Box plots show the median (middle line), 25<sup>th</sup> and 75<sup>th</sup> percentile (ends of box), and 10<sup>th</sup> and 90<sup>th</sup> percentiles (floating outer lines).

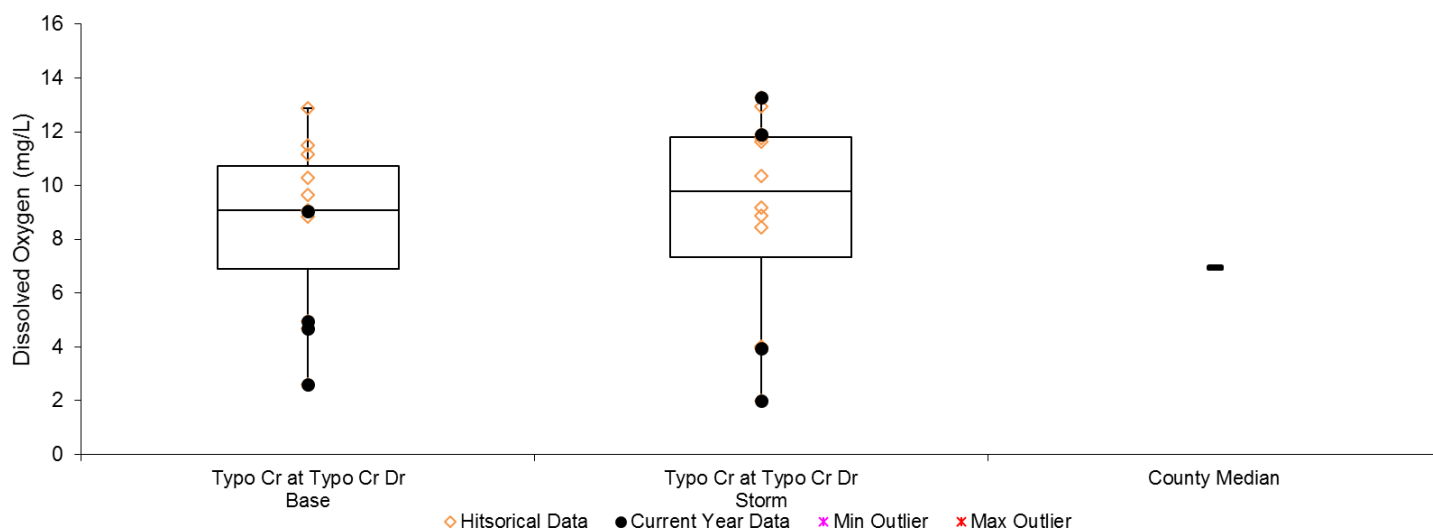


## Dissolved Oxygen

Dissolved oxygen is necessary for aquatic life, including fish. Organic pollution causes oxygen to be consumed when it decomposes. If oxygen levels fall below 5 mg/L aquatic life begins to suffer, therefore, the state water quality standard is a daily minimum of 5 mg/L. 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 three past years of sampling, Typo Creek only had a DO level below 5 mg/L on one occasion. In 2016, five of eight samples yielded sub-5 mg/L results. These results are especially disconcerting considering low DO was measured during both storm and baseflow conditions during a year that was generally wet but without flooding. These low DO concentrations are likely directly attributable to decomposition, eutrophication and lack of clarity within the stream. These conditions cause high levels of oxygen consumption without allowing sunlight to penetrate the water column and trigger photosynthesis.

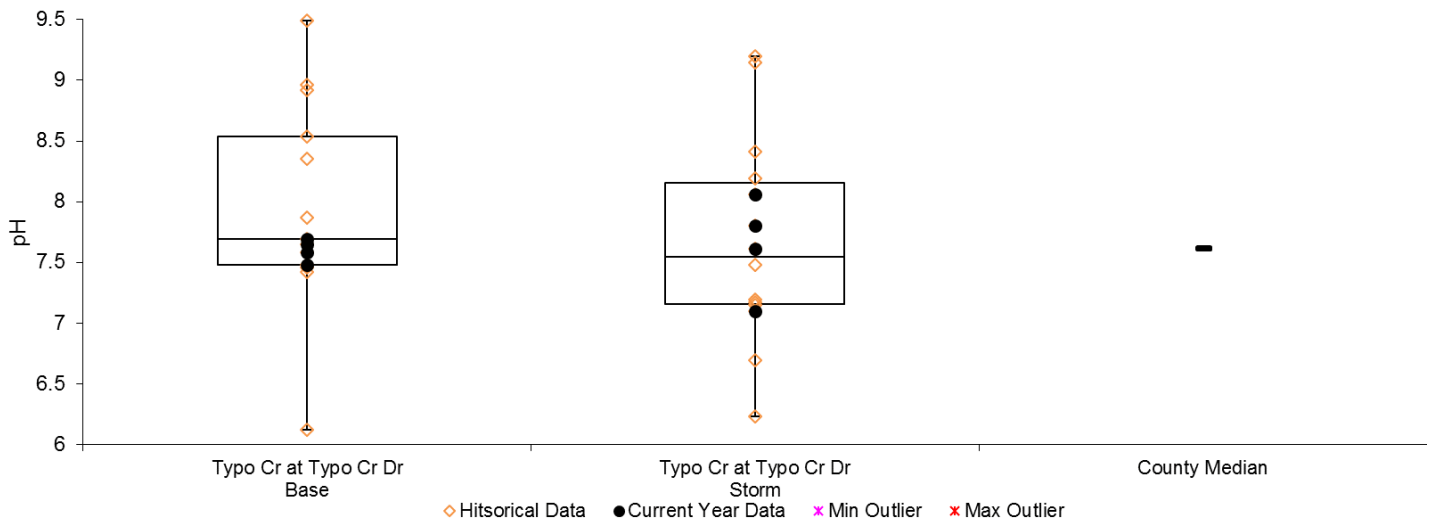
**Dissolved oxygen results during baseflow and storm conditions** Orange diamonds are historical data from previous years and black circles are 2016 readings. Box plots show the median (middle line), 25<sup>th</sup> and 75<sup>th</sup> percentile (ends of box), and 10<sup>th</sup> and 90<sup>th</sup> percentiles (floating outer lines).



## pH

pH refers to the acidity of the water, and has a large effect on a stream's ability to support aquatic life. The Minnesota Pollution Control Agency's water quality standard is for pH to be between 6.5 and 8.5. Typo Creek has been listed as impaired for pH since 2006 due to great swings both above and below the state standard range in past sampling years. In 2016, however, pH was much more stable, ranging from 7.10 to 8.06.

**pH results during baseflow and storm conditions** Orange diamonds are historical data from previous years and black circles are 2016 readings. Box plots show the median (middle line), 25<sup>th</sup> and 75<sup>th</sup> percentile (ends of box), and 10<sup>th</sup> and 90<sup>th</sup> percentiles (floating outer lines).



## Recommendations

A Total Maximum Daily Load (TMDL) plan was approved in 2012 for Typo Creek for pH and turbidity. By far the biggest issue with Typo Creek is the nutrient loading and eutrophication of the watershed. Projects including the Martin and Typo Lake carp barriers and carp removal (barriers in 2016, removals in 2017-19), projects in ditched wetlands upstream of Typo Lake (feasibility study underway) and stormwater retrofits (rain gardens installed) aim to address these issues. Conditions in Typo Creek are not likely to improve until the water quality of Typo Lake upstream improves.



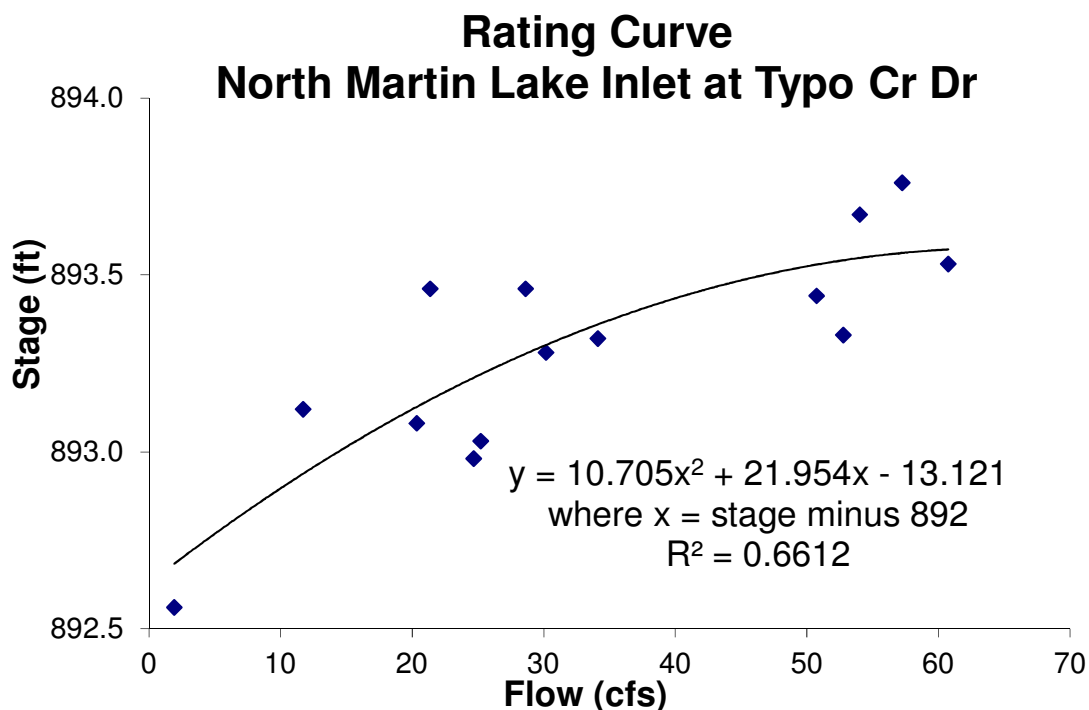
## Stream Rating Curves

**Description:** Rating curves are the mathematical relationship between water level and flow volume. They are developed by manually measuring flow at a variety of water levels. These water level and flow measurements are plotted against each other and the equation of the line best fitting these points is calculated. That equation allows flow to be calculated from continuous water level monitoring in streams.

**Purpose:** To allow flow to be calculated from water level, which is much easier to monitor.

**Locations:** North Inlet of Martin Lake (Typo Cr) at Typo Creek Drive

**Results:** Rating curves were developed for the site listed above in previous years. In 2012 ACD staff discovered an error in the equations and corrected them. They also corrected all past hydrology records that used the equations. Below are the corrected rating curves.

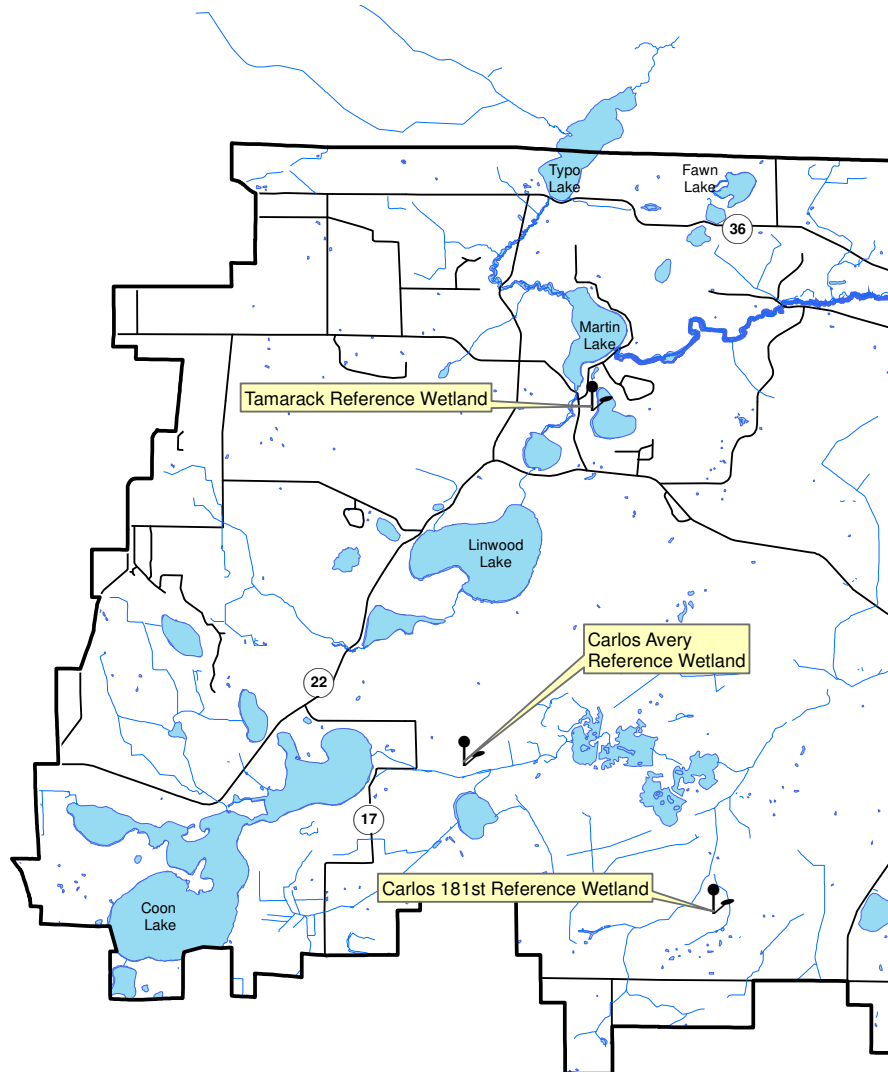


## Wetland Hydrology

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- 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:** Carlos Avery Reference Wetland, Carlos Avery Wildlife Management Area, City of Columbus  
Carlos 181<sup>st</sup> Reference Wetland, Carlos Avery Wildlife Management Area, City of Columbus  
Tamarack Reference Wetland, Linwood Township
- Results:** See the following pages.

### Sunrise Watershed Wetland Hydrology Monitoring Sites



## Wetland Hydrology Monitoring

### CARLOS AVERY REFERENCE WETLAND

Carlos Avery Wildlife Management Area, City of Columbus

#### Site Information

**Monitored Since:** 1997  
**Wetland Type:** 3  
**Wetland Size:** >300 acres  
**Isolated Basin?** No  
**Connected to a Ditch?** Yes

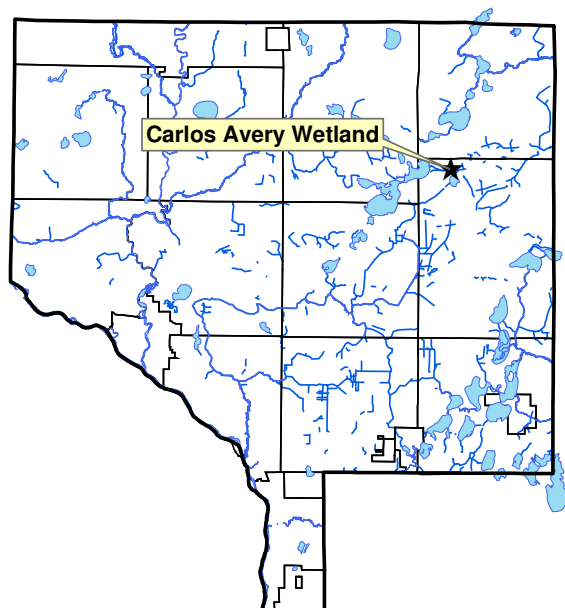
#### Soils at Well Location:

Horizon	Depth	Color	Texture	Redox
Oa	0-4	N2/0	Organic	-
Bg	4-25	10yr 5/2	Sandy Loam	25% 10yr 5/6 with organic streaking

**Surrounding Soils:** Lino loamy fine sand

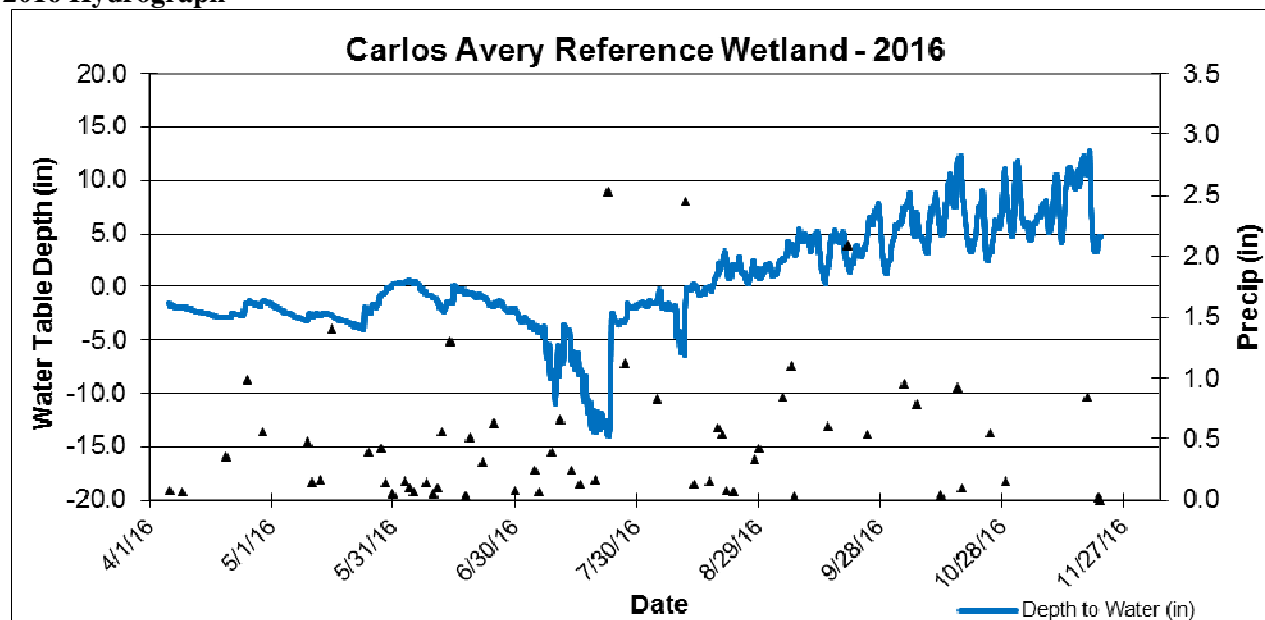
#### Vegetation at Well Location:

Scientific	Common	% Coverage
Phalaris arundinacea	Reed Canary Grass	80
Carex Spp	Sedge undiff.	40
Quercus macrocarpa	Bur Oak	40
Sagittaria latifolia	Broad-leaf Arrowhead	20
Cornus stolonifera	Red-osier Dogwood	20



**Other Notes:** This is a broad, expansive wetland within a state-owned wildlife management area. Cattails dominate within the wetland.

#### 2016 Hydrograph



## Wetland Hydrology Monitoring

### CARLOS 181ST REFERENCE WETLAND

Carlos Avery Wildlife Management Area, City of Columbus

#### Site Information

**Monitored Since:** 2006  
**Wetland Type:** 2-3  
**Wetland Size:** 3.9 acres (approx)  
**Isolated Basin?** Yes  
**Connected to a Ditch?** Roadside swale only

#### Soils at Well Location:

Horizon	Depth	Color	Texture	Redox
Oa	0-3	N2/0	Sapric	-
A	3-10	N2/0	Mucky Fine Sandy Loam	-
Bg1	10-14	10yr 3/1	Fine Sandy Loam	-
Bg2	14-27	5Y 4/3	Fine Sandy Loam	-
Bg3	27-40	5y 4/2	Fine Sandy Loam	-

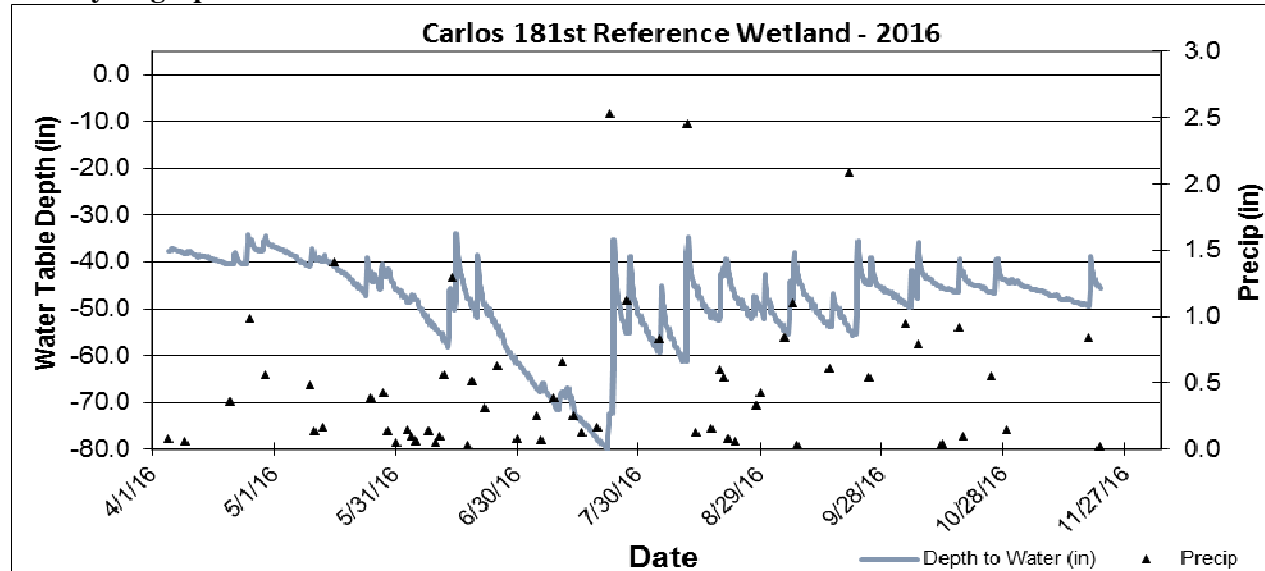
**Surrounding Soils:** Soderville fine sand

#### Vegetation at Well Location:

Scientific	Common	% Coverage
Phalaris arundinacea	Reed Canary Grass	100
Rhamnus frangula (S)	Glossy Buckthorn	40
Ulmus american (S)	American Elm	15
Populus tremuloides (T)	Quaking Aspen	10
Acer saccharum (T)	Silver Maple	10

**Other Notes:** The site is owned and managed by MN DNR. Access is from 181<sup>st</sup> Avenue.

#### 2016 Hydrograph



## Wetland Hydrology Monitoring

### TAMARACK REFERENCE WETLAND

Martin-Island-Linwood Regional Park, Linwood Township

#### Site Information

**Monitored Since:** 1999  
**Wetland Type:** 6  
**Wetland Size:** 1.9 acres (approx)  
**Isolated Basin?** Yes  
**Connected to a Ditch?** No

#### Soils at Well Location:

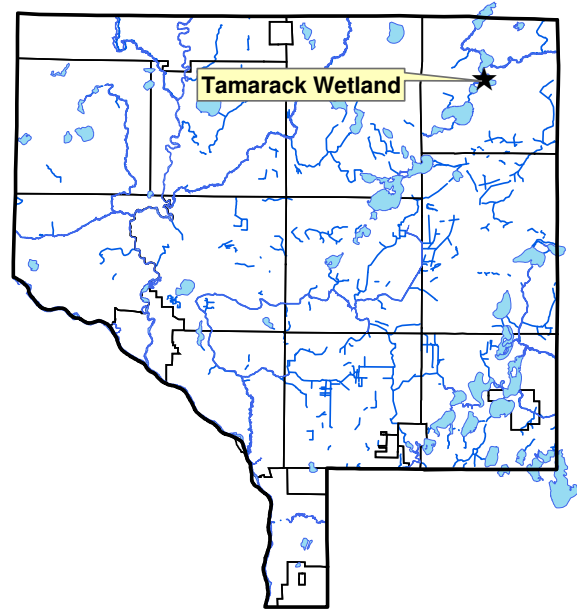
Horizon	Depth	Color	Texture	Redox
A	0-6	N2/0	Mucky Sandy Loam	-
A2	6-21	10yr 2/1	Sandy Loam	-
AB	21-29	10yr3/2	Sandy Loam	-
Bg	29-40	2.5y5/3	Medium Sand	-

**Surrounding Soils:** Sartell fine sand

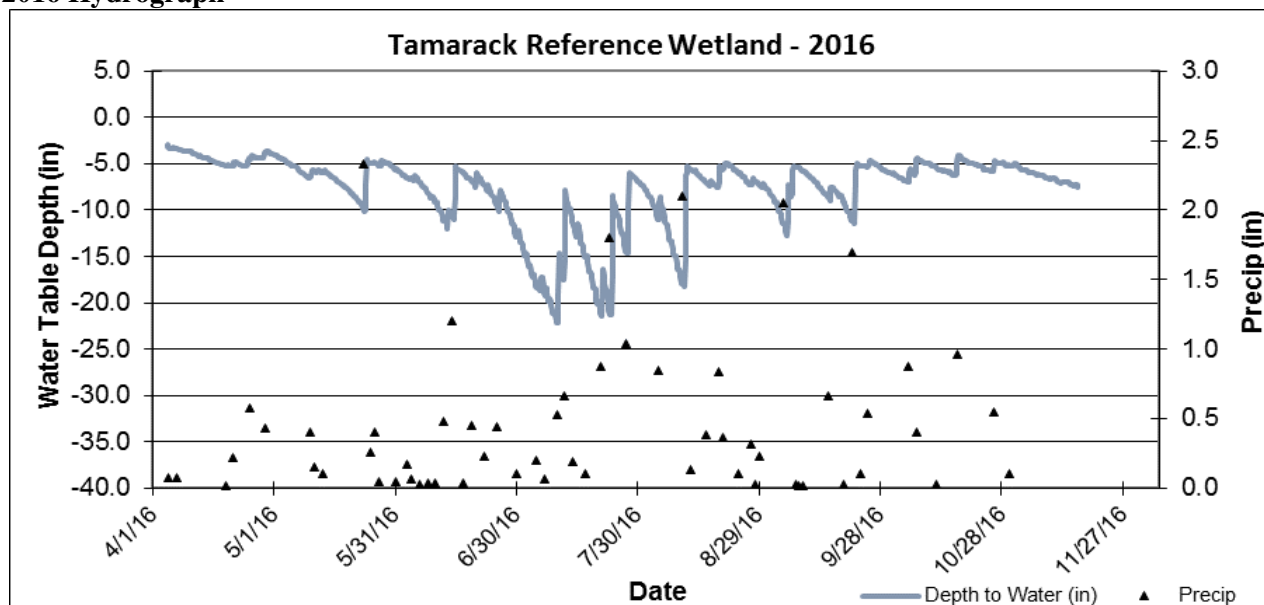
#### Vegetation at Well Location:

Scientific	Common	% Coverage
Rhamnus frangula	Common Buckthorn	70
Betula alleghaniensis	Yellow Birch	40
Impatiens capensis	Jewelweed	40
Phalaris arundinacea	Reed Canary Grass	40

**Other Notes:** The site is owned and managed by Anoka County Parks.



#### 2016 Hydrograph



## Water Quality Grant Fund

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- Description:** The Sunrise River Watershed Management Organization (SRWMO) offers cost share grants to encourage projects that will benefit lake and stream water quality. These projects include lakeshore restorations, rain gardens, erosion correction, and others. These grants, administered by the ACD, offer 50-70% cost sharing of the materials needed for a project. The landowner is responsible for the remaining materials expenses, all labor, and any aesthetic components of the project. The ACD assists interested landowners with design, materials acquisition, installation, and maintenance.
- Purpose:** To improve water quality in area lakes, streams, and rivers.
- Locations:** Throughout the watershed.
- Results:** Projects reported in the year they are installed. Installation for one rain garden began in 2016.

### SRWMO Cost Share Fund Summary

2005 SRWMO Contribution	+	\$1,000.00
2006 SRWMO Contribution	+	\$1,000.00
2006 Expense - Coon Lake, Rogers Property Project	-	\$ 570.57
2007 – no expenses or contributions		\$ 0.00
2008 SRWMO Contribution	+	\$2,000.00
2008 Expense - Martin Lake, Moos Property Project	-	\$1,091.26
2009 SRWMO Contribution	+	\$2,000.00
2010 SRWMO Contribution	+	\$1,840.00
2011 SRWMO Contribution	+	\$2,000.00
2012 SRWMO Contribution	+	\$2,000.00
2012 Expense – Linwood Lake, Gustafson Property Project	-	\$ 29.43
2012 Expense – Transfer to Martin-Typo Lakes Carp Barriers	-	\$4,300.00
2013 – no expenses or contributions		\$ 0.00
2014 SRWMO Contribution	+	\$2,000.00
2015 SRWMO Contribution		\$ 0.00
2016 SRWMO Contribution		\$ 0.00
2016 Expense – Voss Rain Garden	-	\$1,229.31
2017 Expense – Anticipated Voss Finish Up	-	\$2,658.69*
<b>Fund Balance</b>		<b>\$3,960.74</b>

\*Actual amount anticipated amount to be spent = \$451.00



## Coon Lake Area Stormwater Retrofits

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**Description:** Two more water quality improvement projects were completed in 2016, both lakeshore restorations. These projects, along with the four projects completed in 2015, were identified in a 2014 stormwater retrofit analysis study. The projects were funded by a State Clean Water Legacy Grant and local partners. An additional rain garden project was started in 2016 and is to be finished in early 2017.

**Purpose:** To improve Coon Lake water quality.

**Results:** Installed two lakeshore restorations and started work on installing a rain garden.

Four water quality improvement projects were installed in 2015 including two rain gardens, a new stabilized conveyance of stormwater flowing down Lincoln Drive and a lakeshore restoration.



Coon Lake Beach Community Center rain garden



19511 East Tri Oak Circle NE lakeshore restoration



19303 East Front Blvd rain garden



Lincoln Avenue stormwater stabilization.



Two water quality improvement projects were completed in 2016, both lakeshore restorations, with a third project, a rain garden, planned to be finished in early 2017.



3340 183rd Ave. NE lakeshore restoration



18453 Lakeview Pt. Drive Lakeshore Restoration



19303 E Front Blvd. NE rain garden to be finished in 2017



## Carp Barriers Installation

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**Description:** This project aims to improve water quality in Martin and Typo Lakes by controlling carp with strategically placed barriers and increased commercial harvests. Both lakes fail to meet state water quality standards due to excessive phosphorus, which fuels algae blooms. As a result, the lakes are often strongly green or brown and the game fishery is depressed. Carp are a major cause of poor water quality in these lakes, diminishing their value for swimming, boating, and fishing.

Barriers are an effective strategy for carp control because Typo and Martin Lake each provide something important for carp, and moving between the lakes is important to their success. Martin Lake is deeper, and good for overwintering. Typo Lake and Typo Creek are shallow and good for spawning. Stopping migrations between the lakes with barriers will reduce overwintering survival and spawning success. Additionally, barriers will allow successful commercial carp harvests.

**Purpose:** To improve water quality.

**Results:** In 2014, the SRWMO installed one carp barrier at the south inlet of Martin Lake. In the early spring of 2016, the installation of three additional barriers was completed at the following locations: Typo Lake outlet, Martin Lake north inlet, and Martin Lake outlet.

Martin Lake south inlet (completed 2014)



Typo Lake outlet (completed early 2016)



Martin Lake outlet (completed early 2016)



Martin Lake north inlet (completed early 2016)



## Annual Education Publication

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- Description:** An annual newsletter article about the SRWMO is required by MN Rules 8410.010 subpart 4, and planned in the SRWMO Watershed Management Plan.
- Purpose:** To improve citizen awareness of the SRWMO, its programs, and accomplishments.
- Results:** In 2016 the SRWMO contracted with the ACD to write the annual newsletter and provide it to member communities for distribution in their newsletters. Topics for the annual newsletter were discussed by the SRWMO Board. Shoreline restoration grant opportunities was the chosen topic.

### SRWMO 2016 Newsletter Article:

#### Grants Available to Homeowners for Shoreline Restoration

Grants and technical help are being offered by the Sunrise River Watershed Management Organization (SRWMO) to homeowners for projects that benefit water quality. Grants are targeted toward stabilizing eroding shorelines and filtering runoff before it reaches the lake. Other projects that benefit water quality are also considered. The eligible area includes Coon, Linwood, Martin and Typo Lakes, as well as smaller waterbodies in the vicinity.

Most projects include “soft engineering” to stabilize erosive losses and planting of native grasses and wildflowers that filter runoff and provide habitat. Portions of the shoreline are typically left unplanted for a dock, beach and other water access. Each design is unique but all projects provide beauty and a lasting benefit to the lake’s water quality and fish.

No-cost consultations are offered, as well as assistance with a design and cost estimate. The grants pay 50-70% of materials costs. Homeowners are responsible for labor costs.

Interested landowners should contact Jamie Schurbon at the Anoka Conservation District at 763-434-2030 ext. 12 or [jamie.schurbon@anokaswcd.org](mailto:jamie.schurbon@anokaswcd.org).

Additional information about lakeshore landscaping, including hints for do-it-yourselfers and recommended plant lists, is at [www.SRWMO.org](http://www.SRWMO.org).

The SRWMO is a collaboration of Linwood Township and the Cities of East Bethel, Ham Lake and Columbus to manage water resources. It covers all of Linwood and portions of each city in the Sunrise River watershed.

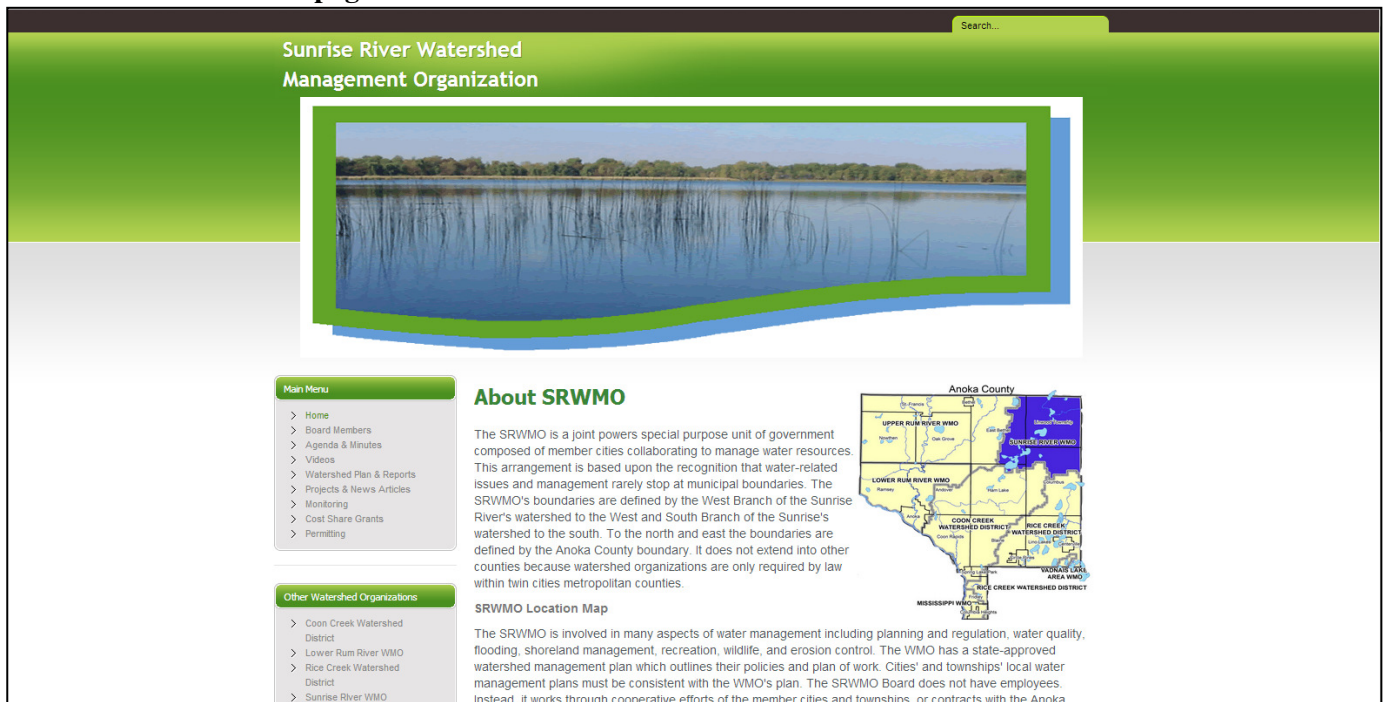
*Photo: Restored shoreline at Coon Lake.*



## SRWMO Website

- Description:** The Sunrise River Watershed Management Organization (SRWMO) contracts the Anoka Conservation District (ACD) to maintain a website about the SRWMO and the Sunrise River watershed.
- Purpose:** To increase awareness of the SRWMO and its programs. The website also provides tools and information that helps users better understand water resources issues in the area. The website serves as the SRWMO's alternative to a state-mandated newsletter.
- Location:** [www.SRWMO.org](http://www.SRWMO.org)
- Results:** In 2013, the ACD re-launched the SRWMO website.
- Regular website updates occurred throughout 2016. The SRWMO website contains information about both the SRWMO and about natural resources in the area.
- Information about the SRWMO includes:
- a directory of board members,
  - meeting minutes and agendas,
  - the watershed management plan and information about plan updates,
  - descriptions of work that the organization is directing,
  - highlighted projects.

### SRWMO Website Homepage



## Grant Searches and Applications

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- Description:** The Anoka Conservation District (ACD) partners with the SRWMO with the preparation of grant applications. Several projects in the SRWMO Watershed Management Plan need outside funding in order to be accomplished.
- Purpose:** To provide funding for high priority local projects that benefit water resources.
- Results:** Several grant opportunities were explored in 2016, however no grant applications were prepared. Recent successful grant applications have included the Ditch 20 Feasibility Study (\$72,402) and Martin and Typo Lake Carp Barriers (\$435,754). Installation of the Martin and Typo Lake Carp Barriers was completed in 2016, and the grant is in the final stages of being wrapped up.



# SRWMO Annual Report to BWSR and State Auditor

**Description:** The Sunrise River Watershed Management Organization (SRWMO) is required by law to submit an annual report to the Minnesota Board of Water and Soil Resources (BWSR), the state agency with oversight authorities. This report consists of an up-to-date listing of SRWMO Board members, activities related to implementing the SRWMO Watershed Management Plan, the status of municipal water plans, financial summaries, and other work results. The SRWMO bolsters the content of this report beyond the statutory requirements so that it also serves as a comprehensive annual report to SRWMO member communities. The report is due annually 120 days after the end of the SRWMO's fiscal year (April 30<sup>th</sup>).

The SRWMO must also submit an annual financial report to the State Auditor. They accept unaudited financial reports for financial districts with annual revenues less than \$185,000.

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

**Locations:** Watershed-wide

**Results:** Anoka Conservation District (ACD) assisted the SRWMO with preparation of an annual Sunrise River WMO Annual Report. The ACD drafted the report and a cover letter. After SRWMO Board review the final draft was forwarded to BWSR. A sufficient number of copies of the report were sent to each member community to ensure that each city council person and town board member would receive a copy. The report is available to the public on the SRWMO website.

Cover

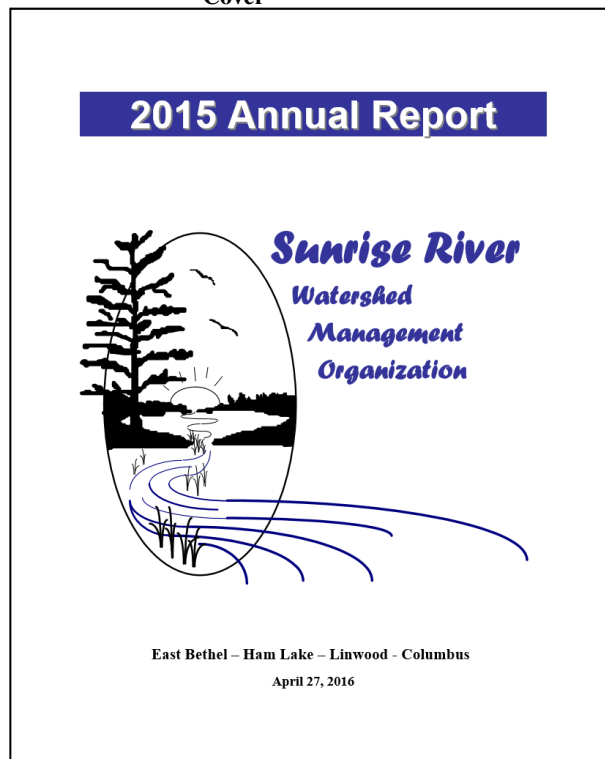


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## On-call Administrative Services

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**Description:** The Anoka Conservation District Water Resource Specialist provides limited, on-call administrative assistance to the SRWMO. Tasks are limited to those defined in a contractual agreement.

**Purpose:** To ensure day-to-day operations of the SRWMO are attended to between regular meetings.

**Results:** In 2016 a total of 39.5 hours of administrative assistance occurred as of December 31.

The following tasks were accomplished:

- Provided BWSR with information needed for the PRAP performance assessment of the WMO. Met with BWSR and the SRWMO to discuss draft findings. Prepared a letter to BWSR outlining corrections needed to the draft report.
- Responded to inquiries from the Linwood Lake Association regarding the SRWMO, budgeting, and meetings.
- Fielded questions from the Wolens family about whether they are in the SRWMO or CCWD. Ultimately, the discussion is leading to a boundary amendment, as their property is currently in the wrong watershed organization.
- Prepared a resolution supporting a WMO boundary change. Discussed this item with Mike Bury of the lake association for feedback.
- Prepared a SRWMO display for Linwood Family Fun Day.
- Prepared 2017 budget, met with the SRWMO to edit, and forwarded the budget to the cities for ratification.
- Began preparation of the 2018 budget.
- Prepared a resolution regarding One Watershed One Plan and presented the concept to the SRWMO board.
- Completed a lobbying expenses report required by the State.
- Contacted all the member cities about whether to pursue changes to the joint powers agreement proposed by Ham Lake, received their feedback and reported to the SRWMO Board.
- Filled a City of East Bethel request for a map of the WMO.
- Delivered annual reports to the member cities.
- Forwarded an offer from FEMA and DNR for floodplain mapping services to member cities.
- Occasional inquiries from contractors and developers about any SRWMO permitting requirements.
- Answered Board member questions outside of meetings.
- Assist with meeting packet preparation.

## 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.

### Sunrise River Watershed Financial Summary

Sunrise River Watershed	WMO Asst (no charge)	Volunteer Precip	Reference Wetlands	Ob Well	Lake Level	Lake WQ	Stream Level	Stream WQ	SRWMO Admin/Grant Search	WMO Annual Rpts to State	SRWMO Outreach/Promo	WMO Website Maint	Martin/Typo Carp Barriers	Buckthorn Clean Sweep	Coon Lake Retrofits	Boot Lake Buckthorn	Ditch 20 Feasibility	Total
<b>Revenues</b>																		
SRWMO	0	0	1725	0	1250	6600	1250	1400	2875	1100	500	505	8000	0	19675	0	2500	47379
State	0	0	0	240	0	0	0	0	0	0	0	0	50607	3847	7093	8669	9034	79490
Anoka Co. General Services	390	0	32	235	751	242	12	0	510	0	0	50	185	6057	1389	8789	110	18751
Anoka Conservation District	0	0	69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
County Ag Preserves/Projects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	743	0	0	743
Service Fees	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2500	2500
Regional/Local	0	0	48	0	0	557	0	0	0	0	0	0	0	0	2000	0	(0)	2605
BWSR Cons Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BWSR Capacity Funds	0	0	1834	0	0	0	0	0	0	0	0	0	12704	0	6211	0	0	20749
BWSR Cost Share TA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Metro ETA & AWQCP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6977	0	0	6977
Local Water Planning	0	367	911	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1278
<b>TOTAL</b>	<b>390</b>	<b>367</b>	<b>4619</b>	<b>475</b>	<b>2001</b>	<b>7399</b>	<b>1262</b>	<b>1400</b>	<b>3385</b>	<b>1100</b>	<b>500</b>	<b>555</b>	<b>71496</b>	<b>9904</b>	<b>44088</b>	<b>17458</b>	<b>14144</b>	<b>180542</b>
<b>Expenses-</b>																		
Capital Outlay/Equip	5	5	24	6	23	59	11	7	39	6	5	5	230	113	111	170	165	984
Personnel Salaries/Benefits	339	356	1771	413	1741	4370	810	501	2945	474	409	352	17186	8449	8254	12694	12288	73351
Overhead	25	26	130	30	128	321	60	37	217	35	30	26	1264	621	607	934	904	5395
Employee Training	2	2	10	2	10	25	5	3	17	3	2	2	97	48	46	71	69	413
Vehicle/Mileage	7	8	37	9	37	92	17	11	62	10	9	7	363	179	174	268	260	1551
Rent	12	13	63	15	62	156	29	18	105	17	15	13	614	302	295	454	439	2621
Program Participants	0	0	0	0	0	0	0	0	0	0	0	0	51430	0	31366	0	0	82795
Program Supplies	0	-42	2411	0	0	1777	2	265	0	0	0	191	311	192	3235	2866	20	11229
<b>TOTAL</b>	<b>390</b>	<b>367</b>	<b>4447</b>	<b>475</b>	<b>2001</b>	<b>6801</b>	<b>933</b>	<b>840</b>	<b>3385</b>	<b>545</b>	<b>470</b>	<b>596</b>	<b>71496</b>	<b>9904</b>	<b>44088</b>	<b>17458</b>	<b>14144</b>	<b>178338</b>

## Recommendations

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- **Pursue carp harvests now that Martin and Typo Lakes carp barriers are complete.** The SRWMO, ACD and Martin Lakers applied for a carp removal grant in January 2017.
- **Collaborate with the Linwood Lake Association.** The association has recently become more active, and has requested partnerships to manage aquatic invasive species and improve water quality.
- **Support the Ditch 20 (Data Creek) water quality improvement projects feasibility study.** The grant-funded project is led by the Anoka Conservation District. The study will be completed by 2018. Thereafter, construction of favored projects is anticipated.
- **Continue installation of stormwater retrofits around Coon and Martin Lakes** where completed studies have identified and ranked projects.
- **Continue efforts to secure grants.** A number of water quality improvement projects are being identified with more to come in 2017. Outside funding will be necessary for installation of most of these. These projects should be highly competitive for those grants.
- **Bolster lakeshore landscaping education efforts.** The SRWMO Watershed Management Plan sets a goal of three lakeshore restorations per year. Few are occurring. Fresh approaches should be welcomed.
- **Increase the use of web videos as an effective education and reporting tool.**
- **Continue the SRWMO cost share grant program** to encourage water quality projects. Consider refining the program to increase participation.
- **Encourage communities to report water quality projects to the SRWMO.** An overarching goal in the SRWMO Plan is to reduce phosphorus by 20% (986 lbs). State oversight agencies will evaluate efforts toward this goal. Both WMO and municipal project benefits should be counted.



